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Comparison of clinical and radiographic changes in peri-implant tissues in two implant connection designs

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Melissa Botero Arias
Graduates of the Faculty of Dentistry, Universidad Antonio Nariño, Armenia, Quindío, Colombia.

Melissa Castaño Botero
Graduates of the Faculty of Dentistry, Universidad Antonio Nariño, Armenia, Quindío, Colombia.

María Fernanda Quiroga Ríos
Dentist, Specialist in Health Administration, Master's Degree in Education: Human Development, Assistant Professor, Faculty of Dentistry, Universidad Antonio Nariño, Armenia, Quindío, Colombia.

Jorge Eliecer Patiño
Dentist, Specialist in Oral Surgery and Implantology, Master in Dental Sciences. Assistant Professor, Faculty of Dentistry, Universidad Antonio Nariño, Armenia, Quindío, Colombia.

ABSTRACT
A dental implant is known as a piece composed of a biocompatible material that is inserted into the bone to replace the root of a tooth. There are different types of designs for internal connections between the implant and the abutment. Among the most commonly used are the conical connection (CC) and the internal hex connection (HI), the choice of one of them can determine the prognosis of the procedure. That said, a cross-sectional case report study was carried out where 10 implants inserted in 3 patients were observed, and clinical parameters such as probing depth, presence of bleeding, redness and gingival exudate were analyzed. In addition, radiographs measured the distance between the bone crest and the implant platform, on the mesial and distal surfaces, to assess bone loss. In this sense, it was observed that the conical connection presents better stability of the clinical and radiographic parameters.

Keywords: Implant connections, Peri-implant disease, Dental implants, Peri-implant tissue.

1 INTRODUCTION

The clinical use of dental implants has managed to stand out for decades, its evolution process shows success in terms of osseintegration. (1) A variety of materials and designs are offered on the market that aim to improve both physical and mechanical characteristics. These variations directly impact the biological behavior of the implants.

Among the most commonly used connections today are the internal hexagonal and the conical(2) [0], and in turn the choice of connection determines the different interfaces that are part of the implant system, such as implant-bone, implant-fixation screw, implant-abutment and finally abutment-fixation screw.

It is clear that the implant-abutment interface determines peri-implant bone loss to a large extent. The space virtually exists between the components and allows the filtration of fluids that promote the growth of microorganisms and the invasion of the peri-implant biological width. Hence, the prevention of this bacterial microfiltration becomes a challenge in the implant industry. Therefore,

it was relevant to carry out this research to observe and compare the characteristics concerning the clinical parameters in CC and HI connections.

2 MATERIALS AND METHODS

In this case report study, 10 ODONTIT IMPLANT SYSTEMS implants were observed (Made of type 5 titanium, with a rough surface due to double acid etching and "sand blasted") of which 5 of them had a conical connection (CC) and the other 5 with internal hexagonal connection (HI), were installed during the period between 2017 and 2018 in the dental clinic of the Antonio Nariño University (Armenia campus, Quindío, Colombia). The selected patients had the same number of implants of each connection, which allowed the implementation of a crossover design in which each patient was his or her own control, with each of the implants as the unit of analysis.

2.1 INCLUSION CRITERIA

1. Patients of legal age.
2. Upper or Lower Partial Edentulous.
3. Bacterial plaque index less than 15%, measured by the O'Leary Index.
4. Systemically suitable for implant placement.
5. Acceptance to participate in the study, signing the provided informed consent.
6. That they will have a complete institutional dental medical history, with their respective informed consents filled out and signed.

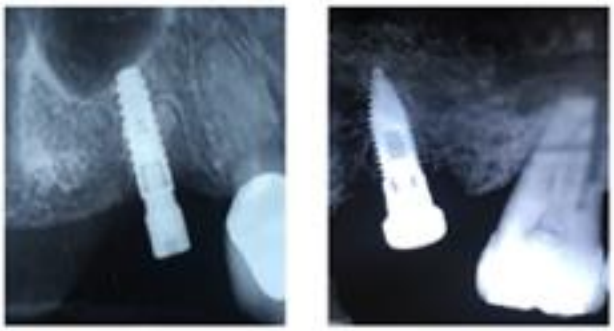
2.2 EXCLUSION CRITERIA

1. Pregnancy or breastfeeding status.
2. Systemically compromised where the placement of implants is not suitable, including diseases such as diabetes, immunological alterations, cognitive disability or any condition that may alter the course of treatment.
3. Reported allergy to any of the medications and devices to be used during the study.
4. Patients undergoing treatment with bisphosphonates and/or corticosteroids.
5. Smokers.

The clinical characteristics were collected through the elaboration of an oral clinical examination that included a complete periodontogram including the dental implants, periapical x-rays were also taken of the alveolar areas where the implants were installed. To analyze the behavior of the peri-implant tissues around the two types of connection, 2 controls were carried out, the first one 1 month after the placement of the implants and the second 3 months after the first control, both clinical and radiographic data were collected. Variables such as probing depth (PS), i.e., the distance from the

gingival margin to the depth of the gingival sulcus, the presence of bleeding, redness, and gingival exudate were measured. In the radiographic images , the distance between the bony crest and the implant platform was measured with a scale (scale 1:100 millimeters), taking into account the mesial and distal surfaces.

Figure 1 X-ray of implants with conical and internal hexagonal connection



In addition, the data obtained in the clinical and radiographic controls were entered into a Microsoft Excel database (Office 2013) and all data management and statistical tests were performed using the SPSS statistical program.

3 RESULTS

In the radiographic analysis, an average of the measurements of the mesial and distal areas obtained by each implant was made, obtaining as a result a single measurement for each one. After this, the averages were grouped according to the implant design in order to consolidate the information for analysis.

In a similar way, it was carried out with the clinical component, for which the depth of probing was measured, all the areas that were probed were averaged (mesial vestibular, medial vestibular, distal vestibular, lingual or mesial palatine, lingual or middle palatine and lingual or distal palatine), and accordingly a measurement was obtained for each implant. which was then consolidated and classified according to the implant design, the variables of bleeding and exudate were also examined and grouped. (Table 1).

Table 1: *Averages of quantitative variables.*

I am a student	**Number of implants**	**Control 1**		**Control 2**	
		Average (mm)	**Standard deviation**	**Average (mm)**	**Standard deviation**
X-ray control	10	1,35	0,875	1,30	0,761
Drillhole depth	10	3,09	0,968	2,60	0,966

On the other hand, Table 3 shows that radiographic bone loss in the hexagonal connection group was greater than that in the conical connection group. In addition, in the hexagonal it increased; while

in the conical it decreased. However, the probing depth behaved differently: in the HI group it decreased and the CC group remained stable, this can be explained by the greater retraction of the soft tissues that occurred in the first group according to the radiographic examination of bone loss. (See Table 2)

Table 2: *Averages of quantitative variables, according to the design of the implant connection.*

I am a student	Implant Type	Number of implants	Control 1		Control 2	
			Average (mm)	Standard deviation	Average (mm)	Standard deviation
X-ray control	Hexagon	5	1,75	0,750	1,85	0,487
	Conical	5	0,95	0,873	0,75	0,559
Drillhole depth	Hexagon	5	3,45	1,018	2,80	1,303
	Conical	5	2,73	0,865	2,40	0,547

Later, qualitative variables can be observed during the first and second controls, where it was determined whether or not there was the presence of bleeding (See Table 3), the presence or not of exudate (See Table 4) and the presence or not of redness (See Table 5) for each connection design, in none of these variables was a difference observed.

At the radiographic level and in terms of probing depth, there was a decrease in the distance between the bone crest and the implant platform in both types of connections, however, in the conical connection a lower depth to the probing and a shorter distance were identified radiographically. On the other hand, as for the sign of bleeding, no hexagonal connection implant presented it in the first control, but there was one of them that bled in the second. Regarding the gingival exudate, no implant presented this sign in either the first or the second control. On the other hand, redness was found in the second control in a conical connection implant, where it should be noted that this event did not occur during the first control.

The analysis of the quantitative variables did not show a difference for either of the two connections, since the averages of all implants remained within a similar margin within the standard deviation.

Table 3: *(Qualitative variable) Presence of bleeding at clinical check-ups.*

Bleeding on probing		Number of implants	Control 1		Control 2	
			No	Yes	No	Yes
Implant Type	Hexagonal	5	0	5	1	4
	Conical	5	2	3	2	3
Total		10	2	8	3	7

Table 4: *(Qualitative variable) Presence of exudate in clinical controls.*

Presence of exudate		Number of implants	Control 1		Control 2	
			No	Yes	No	Yes
Implant Type	Hexagonal	5	5	0	5	0
	Conical	5	5	0	5	0
Total		10	10	0	10	0

Table 5: *(Qualitative variable) Presence of exudate in clinical controls.*

Presence of redness		Number of implants	Control 1		Control 2	
			No	Yes	No	Yes
Implant Type	Hexagonal	5	5	0	5	0
	Conical	5	5	0	4	1
Total		10	10	0	9	1

4 DISCUSSION

The main focus of this research was to identify clinical differences between the conical and hexagonal connection to support decision-making in the practice of implantology in dentistry.

In line with these approaches, D'Ercole, et al.(3) found that the presence of spaces in the connections undoubtedly facilitates bacterial migration, which could be the result of contamination in the stages of implant placement or transmission of the oral environment, which automatically facilitates the development of peri-implant inflammation.

Yepes and Balseca (4) compared in vitro the bacterial colonization of the abutment-implant interface between dental implants with an internal hexagon connection design and a conical connection. However, for this particular project, implants with an internal hexagon connection design showed lower bacterial permeability than conical connections.

On the other hand, Khorshidi, et al.(5) also conducted an in vitro study with follow-up for 14 days in which, according to the results, the conical connection seems to be more efficient in controlling filtration. All this coincides with the argument of Huang, et al. (6), where it was evident that the conical design decreased the tensions by up to 32% in the cortical region and by 17% in the trabecular region, therefore, their conclusion is based on the fact that the use of conical implants could reduce the maximum tension in both the cortical and trabecular bone. Morris, et al. (7) who found that the internal taper shape of the implant allows for secure settling of the prosthetic abutment Which is why, the precision fit of the tapered abutment inside the implant prevents loosening and rotation of the abutment, as well as the invasion of food residues and bacteria.

In this order of ideas, it can be concluded that, based on the results, the conic connection obtained better results compared to the hexagonal one. However, it is necessary to emphasize that not only do the results vary according to the connection of the implant, but they are also subject to the habits of each patient, including oral hygiene and their biological characteristics. Additionally, this study is subject to review and possible deepening, since the sample is relatively small and does not allow us to establish with certainty and veracity which of the two connections has a better prognosis than the other.

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The quality of sleep of nursing professionals and the Covid-19 pandemic

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Mauricio Picoli
City: Porto Alegre - RS
ORCID:https://orcid.org/0000-0001-5606-2022

Giane Alves Santos
City: Porto Alegre - RS
ORCID: https://orcid.org/0009-0004-4242-9363

Elisiane de Oliveira Machado
City: Porto Alegre - RS
ORCID: https://orcid.org/0009-0002-9227-1213

Simone Thais Vizini
Affiliation: Luiz carlos Vizini and Ivone Fischer Vizini -
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0002-4929-1406

Fabio Silva da Rosa
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0001-5608-714X

Suimara Santos
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0002-8739-4385

Maicon Daniel Chassot
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0001-7017-6982

Rejane Silveira de Campos
City: Porto Alegre – RS
ORCID: https://orcid.org/0009-0008-0986-1612

Vanessa Frighetto Bonatto
ORCID: https://orcid.org/0000-0002-1614-774X

ABSTRACT

Objective: to compare the quality of sleep of nursing professionals who worked in an adult intensive care unit with nursing professionals who worked in inpatient units during the Covid-19 pandemic. Method: This is a cross-sectional study. The selection of participants occurred intentionally using the snow ball methodology. The study included 27 participants, nurses and nursing technicians who worked in adult intensive care or adult hospitalization units caring for patients affected by Covid-19 and excluded professionals who regularly use sleep-inducing medications prior to the Covid-19 pandemic. Covid-19; or Individuals with sleep apnea. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (IQSP) instrument. The independent variables were classified as sociodemographic, work situations, lifestyle habits, nutritional status and presence of comorbidities. The analysis was carried out using descriptive and inferential statistics using SPSS v25.0 software. Data normality was tested using the Shapiro-Wilk test. Results: The sample of the present study was composed of men (22.4%) and women (77.8%) with an average age of 34.2 (±6.2) years. No significant correlations were found between the Sleep Quality Index and the analyzed variables. However, when analyzing whether there was any correlation between the questionnaire score and some continuous variables, such as the participants' weight, a moderate correlation was observed between the questionnaire score and the participants' weight r =0.469 p = 0.025. Conclusion: Despite not demonstrating statistical significance for the variables studied, the study considers the relationship between sleep quality and obesity, demonstrating statistical significance and corroborating the scientific literature.

Keywords: Nursing, Sleep-Wake Disorder, Stress, Coronavirus.

1 INTRODUCTION

The year 2020 was marked by the pandemic caused by the new coronavirus, COVID-19, a

respiratory disease that had its first appearance in China and quickly spread to all continents. Considered a pandemic due to its high contagion at the beginning of 2020 according to the World Health Organization (WHO), it caused more than 4,602,882 million deaths worldwide. Brazil is one of the countries hardest hit by COVID-19, reaching the mark of 610,000 deaths in November 2021 and which only showed a significant decrease in the mortality rate after vaccination coverage with the various vaccines that were developed, in addition to protective measures such as the use of masks, social distancing and hand hygiene with alcohol gel. (WHO, 2021; PAHO 2021).

The high rate of contamination generated an overload on health systems worldwide, since no country was prepared to accommodate a large number of patients with severe acute respiratory syndrome, causing overcrowding in hospitals and causing the need to expand beds in intensive care units (ICU), an appropriate place for severe cases. However, in a short time, in some regions where the contagion rate presented a very high curve, there was no longer any physical structure, supplies and equipment such as mechanical ventilators for all patients, making the possibility of treatment and survival for those patients who were able to access institutions minimally prepared to offer care (MARMELSTEIN; MOROZOWSKI, 2020).

On the front line in the fight against the COVID-19 pandemic, health professionals around the world have faced and still face a battle, carrying out their care activities with long working hours, high workloads generating overload that leads to fatigue, difficulty in dealing with the increase in cases, and stress-causing concerns. (HORTA, et al. 2021). Nursing makes up the largest number of the workforce in the health area and represents 59% of the professionals within care, which also generates the largest number of professionals affected by the pandemic. A study of nursing professionals in the city of Wuhan, China, found that they presented signs and symptoms of stress, depression, anxiety, and insomnia, in addition to the fear of contracting the virus, getting sick, or contaminating their family members (SOUZA; MARCHIORI; DIAZ, 2020; HORTA et al. 2021).

The impact caused by the pandemic reflects not only on professional performance, but also on their daily lives, sleep quality has been extremely impaired and mental health is intrinsically related. Sleep deficiency affects both physical and mental health, which in the long term can cause irreversible damage such as: mood and emotional changes, cardiovascular, metabolic and immune functions (WU; WEI, 2020).

Nursing professionals work daily with long working hours, often in more than one shift, followed by exhausting activities that generate emotional exhaustion. The night period, especially, is the one that most affects sleep quality, as it requires an adaptation to the period that would be ideal for effective sleep (SILVA et al. 2019).

In a study conducted by Simões and Bianchi (2016) with 47 nursing technicians, it was found that 70.2% had symptoms of anxiety, stress, panic and difficulty concentrating and that among these

professionals, 74.5% manifested poor sleep quality due to the conditions and influence of nursing work. In a study conducted in Wuhan with frontline workers, many professionals reported difficulty in both initiating and maintaining sleep, triggering nightmares sometimes related to anxiety and depression caused by the coronavirus (TU et al., 2020).

Given the context presented, the following question arises: Did nursing professionals who worked in adult intensive care units compared to nursing professionals in inpatient units have changes in sleep quality during the Covid-19 pandemic?

2 OBJECTIVE

To compare the sleep quality of nursing professionals working in adult intensive care units with nursing professionals working in inpatient units during the Covid-19 pandemic and correlate sociodemographic data, work situations, lifestyle habits, nutritional status, and comorbidities with sleep quality.

3 METHOD

This is a cross-sectional study. Quantitative research starts from the definition of the problem and the selection of concepts that will be focused on to arrive at the solution. It gathers empirical data that have their roots in objective reality and that are grouped through the senses rather than personal beliefs or hunches. (POLIT; BECK, 2011).

The selection of participants occurred intentionally with the *snow ball* methodology, where the initial participants indicate new participants, who in turn indicate other new participants, and so on until the expected number of participants is reached. The "snowball" technique is a form of non-probabilistic sampling used in social research, in which the initial participants of a study indicate new participants who, in turn, indicate other participants, and so on, until the proposed goal, i.e., the saturation point, is reached. (APPOLINÁRIO, 2012).

A total of 27 participants were included in the study according to the inclusion criteria: a) nurses and nursing technicians who worked in adult intensive care or adult hospitalization units in the care of patients affected by Covid-19 and the following exclusion criteria were: a) professionals who regularly used sleep-inducing medications prior to the Covid-19 pandemic; b) Individuals with sleep apnea. These exclusion criteria were used because it was understood that these professionals already had disorders in the pre-pandemic period that could alter sleep quality.

Data collection was performed by sending the *access link* to the questionnaire. We opted for the use of an *online* questionnaire due to the restrictive effects due to the pandemic and the practicality of including participants in the *snow ball* method. The average response time to the questionnaire was

30 minutes, taking into account that the participants are health professionals who use digital media and are familiar with this technology.

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). The independent variables were classified as sociodemographic (age, sex, self-reported skin color), work situations (profession, sector, shift, number of employment contracts, total weekly workload, total monthly income), lifestyle habits (smoking, alcohol consumption, physical activity), nutritional status (body mass index) and presence of comorbidities. All information was collected through the participant's self-report.

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), validated in Brazil. This instrument consists of 19 self-reported items and five items directed to the room companion, arranged in seven domains: (1) subjective sleep quality; (2) sleep latency; (3) sleep duration; (4) habitual sleep efficiency; (5) sleep disturbances; (6) use of sleep medications; and (7) daytime sleep dysfunction. (BERTOLAZI, et al. 2011).

Each item of the PSQI was measured on a four-point *Likert* scale , whose levels range from zero (no difficulty) to three (severe difficulty). The overall score of the instrument is obtained from the sum of the scores of the seven domains and ranges from 0 (zero) to 20 points, so that higher total scores indicate poorer sleep quality. The result can be classified as: good sleep quality (from 0 to 5), poor quality (> 5). (BERTOLAZI, et al. 2011).

The analysis was performed using descriptive and inferential statistics using the SPSS v25.0 software. Data normality was tested using the *Shapiro-Wilk test*. Descriptive statistics were performed to present the sociodemographic characteristics of the participants and the percentiles of responses to each question of the questionnaire used. The inferential analysis consisted of Spearman's correlation test , seeking to correlate the Sleep Quality Index with sociodemographic questions of the participants. In addition, to compare the sleep quality of participants working in the Intensive Care Unit and participants working in the Hospital, an independent Studant's t-test was used . The level of significance was set at 0.05. The correlations, if identified, were classified as very low (between 0.0 and 0.1), low (between 0.1 and 0.3), moderate (between 0.3 and 0.5), high (between 0.5 and 0.7), very high (between 0.7 and 0.9) and practically perfect (between 0.9 and 1.0).

The research took place after the approval of the project by the Research Ethics Committee of the University of Vale do Rio dos Sinos and followed the norms and guidelines according to Resolution 466/2012 of the National Health Council, which encompasses research carried out with human beings, while respecting the complementary norms of CNS Resolution No. 510/2016. (BRAZIL, 2013; CNS, 2016).

4 RESULTS

The sample of the present study was composed of men (22.4%) and women (77.8%), with a mean age of 34.2 (±6.2) years. Of these, 61.1% declared themselves white, 16.7% declared themselves black, and 22.2% declared themselves brown. It is also observed that 61.1% of the study sample was composed of nursing technicians and 38.9% of nurses. According to the survey, the average weekly hours worked by the participants is 45.6 (±17.9) hours and 55.6% of the participants, in addition to having more than one employment relationship, while only 44.4% work in only one location.

When comparing the Sleep Quality Index of the professionals who worked in the Intensive Care Unit with the professionals who worked in the Inpatient sector, no significant difference was identified (T= -0.047, p= 0.963).

Table 1 shows the results regarding the correlations between the sleep quality index and the other questions in this questionnaire. No significant correlations were found between the Sleep Quality Index and the variables analyzed. However, when we analyzed whether there was any correlation between the questionnaire score and some continuous variables, such as the weight of the participants, we observed a moderate correlation between the score on the questionnaire and the weight of the participants r = 0.469 p = 0.025.

Table 1. Correlation between the sleep quality index and the questions addressed in the questionnaire.

Research Questions	**Sleep quality index (n=13)**	
	Rho	p
Were you already on sleeping pills before the pandemic?	0,170	0,251
Have you been diagnosed with sleep apnea before the pandemic?	0,217	0,437
What is your gender?	-0,374	0,063
What color is your self-reported skin?	0,186	0,230
What is your profession?	0,345	0,080
Did you work more than one employment relationship during the pandemic?	0,339	0,085
Total number of hours worked per week (if there is more than one employment relationship, add the weekly workload)?	0,012	0,481
What is your unit of work?	0,498	0,059
What is your monthly income? (in reais)	0,386	0,057
How many minutes a week do you exercise?	-0,115	0,324
Are you a smoker?	-0,199	0,214
Do you think you consumed too much alcohol during the week?	-0,055	0,414
During the pandemic, did you start using sleeping pills?	0,017	0,473
Are you being treated for any chronic illnesses?	0,027	0,457

5 DISCUSSION

Sleep is an important moment in the daily cycle for all individuals, sleep is essential for numerous functions in the body, one of the main ones is the recovery of expenses suffered while awake. Sleep has several phases and for each of them an important attribution for maintaining homeostasis, memory, recovery of the body, strengthening the immune system and prevention of diseases. Sleeping

well and getting adequate sleep is essential for quality of life. (KRYGUER M., AVIDAN A., BERRY R., 2015).

Since how important and meaningful sleep is, an adult needs at least 7 to 9 hours of sleep a day, let it be good and constant sleep. Among the habits that help when sleeping we have: a suitable and conducive environment, staying relaxed before going to bed, avoiding heavy foods, maintaining a regular schedule, avoiding the use of substances that interfere with sleep, and once these habits are maintained, it is possible to maintain a good quality sleep. (KRYGUER M., AVIDAN A., BERRY R., 2015).

Poor sleep quality is highly related to overweight and anxiety, which becomes a trigger for binge eating. In the current study conducted with people with an average BMI of 33.71 kg/m², it was found that 96% had a moderate level of anxiety according to the STAI classification and 49.81% had poor sleep quality according to the PSQI index. (FUSCO et al*tag.*, 2020).

The pandemic has further accentuated vulnerable groups in mental health, reports from the population of the predominance of anguish, insomnia, anger, stress, fear, irritability and feeling of powerlessness have been recorded by several surveys, which are linked to several disorders that could not be treated due to isolation and social exclusion. The lack of government strategies and policies are pointed out as problematic, as well as the lack of mental health care (PAVANI et al., 2021).

Nursing professionals working in the pandemic are the vast majority of the health workforce, are responsible for most tasks and are directly in contact with patients with suspected Covid (SILVA et al., 2019).

The stress load manifested at the beginning of the pandemic was high due to factors that influenced both professional and social life, issues such as: professional qualification, weekly workload, severity of patients, diet and sleep were the most cited and are very significant for nurses. With irregular routines, lack of adequate nutrition and rest, the influence of insomnia can lead to problems in the workplace (SILVA, MINAYO, 2020).

Góes et al., (2020) highlight the main words listed by nursing professionals that refer to Covid-19: patients, fear, PPE, contaminate, team, care, difficult, exhausting, tense, stressful, and exhausting. These are feelings and perceptions that professionals consider most impactful in their daily experience with coronavirus.

Evidence associated with poor sleep quality by nursing professionals was highlighted in a survey conducted by Kantorski et al. (2022), with 8090 professionals, the main findings are related to workload, precarious conditions, use of psychotropic drugs, and sociodemographic issues.

In a study carried out with 18 nurses at the João Murilo de Oliveira Hospital in Vitória de Santo Antão - PE, 50% worked in the morning and 50% in the intermediate, it was identified that 50% reported good sleep quality, 33% had a disorder, and 17% had poor sleep quality. Regarding the use of

medications, 27.7% used some psychotropic drug, signs of anxiety (33.3%) and depression (27.7%) were found among professionals, which indicate an association between sleep quality and mood disorders (MARTINS et al., 2020).

The number of patients per nurse is proportionally related to the higher risk of failures and errors, the more patients, the greater the risk. Overload involves both physical and mental conditions and exerts an important factor in the performance of nurses, the main errors that occur in the routine are: medication errors, falls, invasive devices and skin integrity, failures not only harm patients as well as professionals, because when you are about to make mistakes it means that the worker's life is already being harmed, the impact will be on both sides, both for those who provide assistance and for those who are provided (SANTOS, et al., 2020).

6 CONCLUSION

Although it did not demonstrate statistical significance for the variables studied, the study contemplates the relationship between sleep quality and obesity, demonstrating statistical significance and corroborating the scientific literature.

The present study has as a limitation the participation of few health professionals, which prevents the generalization of the results. This can be justified by the choice of the data collection technique, which was via *an online* form, for safety reasons, since we were still under the distancing policy due to the pandemic. Therefore, it recommends other information collection techniques for further studies on this topic.

It is suggested that further studies may investigate the issue of sleep quality among health professionals related to obesity, as it directly affects the quality of life of health workers. And it is hoped that this study can raise the debate about the quality of sleep of health professionals, since it is fundamental for quality of life.

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Risk assessment scale for the development of injuries resulting from surgical positioning: Nurses' knowledge

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Giane Alves Santos
City: Porto Alegre - RS
ORCID: https://orcid.org/0009-0004-4242-9363

Mauricio Picoli
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0001-5606-2022

Elisiane de Oliveira Machado
City: Porto Alegre - RS
ORCID: https://orcid.org/0009-0002-9227-1213

Simone Thais Vizini
Affiliation: Luiz carlos Vizini e Ivone Fischer Vizini -
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0002-4929-1406

Fabio Silva da Rosa
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0001-5608-714X

Suimara Santos
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0002-8739-4385

Maicon Daniel Chassot
City: Porto Alegre - RS
ORCID: https://orcid.org/0000-0001-7017-6982

Rejane Silveira de Campos
City: Porto Alegre – RS
ORCID: https://orcid.org/0009-0008-0986-1612

Vanessa Frighetto Bonatto
ORCID: https://orcid.org/0000-0002-1614-774X

ABSTRACT
Objective: To evaluate nurses' knowledge about the applicability of the scale for assessing the risk of injuries resulting from surgical positioning in adult patients. Methodology: Exploratory research focusing on a qualitative approach. The selection of participants occurred intentionally using the snow ball methodology, where the initial participants nominated new participants. Data analysis followed the steps of organization, exploration and interpretation of the collected material. Results: The collection was carried out with 23 nurses, their ages ranged from 28 to 67 years old, in relation to gender, 20 were female and three were male. The time of professional training ranged from five months to 43 years and the time of professional activity ranged from four months to 43 years. Of the 23 nurses, 16 had specialization in surgical services, 14 nurses had employment in a private hospital, of which 11 knew the ELPO scale and of these, six applied the ELPO scale, three used the Braden scale and one the Munro. Conclusion: The ELPO scale still needs to be widely disseminated and put into practice by institutions, in order to add to the safe surgery checklist, which in turn has already been implemented in order to ensure safe surgery for the patient.

Keywords: Perioperative Nursing, Nursing care, Pressure Injury, Patient Positioning.

1 INTRODUCTION

Surgical positioning is defined by the position in which the patient will be placed on the operating table and undergo a certain surgical procedure and its specialty. The main goal is to maintain body alignment and reduce pressure injuries (LP). These injuries are defined as one of the patient's

adverse events, so before starting surgery, preventive measures should be applied. (BIRTH; RODRIGUES, 2018).

In order to minimize and prevent events during the intraoperative period, nurse Camila Mendonça de Moraes Lopes, during her doctorate in 2014, developed a risk assessment scale for the development of lesions resulting from the patient's surgical positioning (ELPO), at the University of São Paulo at Ribeirão Preto College of Nursing - EERP-USP. (LOPES, et al. 2016).

Based on the studies developed and in the course of its applicability, ELPO, once developed and validated in Brazil, directly assesses the risk of pressure injury with a score from 0 to 35 points, evidenced by the higher the score, the greater the risk of developing pressure injury. (PEIXOTO, et al. 2019). The items applied range with a score of 1 to 5 points and are characterized by surgical time, type of surgery, type of anesthesia, degree of mobility, comorbidities, and age. From 19 points, the patient is already at risk of pressure injury, leading the professional to assertively apply the appropriate means of surgical positioning, referring to a certain surgical specialty. (LOPES, et al. 2016).

The nurse's knowledge regarding the physiology and anatomy of each patient and their singularities reverberates from a complication-free transoperative period to recovery in a hospital environment and discharge. (LOPES, et al. 2016).

The ELPO Scale is of paramount importance with regard to its applicability by operating room nurses, following its norms and scores. It can be considered a tool that is easy to implement and contributes to the entire multidisciplinary team, and it is questioned what is the knowledge and mastery of nurses about the applicability of the scale for the assessment of the risk of injuries resulting from surgical positioning in adult patients?

2 OBJECTIVE

To evaluate nurses' knowledge about the applicability of the ELPO scale for assessing the risk of injuries resulting from surgical positioning in adult patients.

3 METHOD

Exploratory research with a focus on the qualitative approach. Qualitative research brings questions that relate to experiences, concerns, priorities, and preferences, thus generating knowledge about aspects of the human experience, which are fundamental to know and understand the understandings that people have according to their experience. It allows nursing to outline strategies, forms and resources for interventions based on lived experiences (SOUZA; ERDMANN; MAGALHÃES, 2016). Therefore, the qualitative approach has a subjective character to interpret personal experiences in order to demystify their origin. (MINAYO, 2015).

The selection of participants occurred intentionally with the *snowball* methodology, where the initial participants indicated new participants, who in turn indicated other new participants, and so on. The inclusion criteria were: being interested in the topic, being a nurse in an operating room, and the exclusion criteria were: nurses who do not work in an operating room.

Data collection was carried out after approval by the Research Ethics Committee of the University of Vale do Rio dos Sinos (UNISINOS). The initial participants were selected by invitation sent by e-mail with an invitation letter to participate in the research and the *access link* to read the Free and Informed Consent Form (ICF), which was formulated *online*.

Data analysis followed the stages of organization, exploration and interpretation of the collected material. The first phase consists of organizing the material through reading, seeking punctual and specific information, according to the objective of the study; in the second phase, the material was explored in order to establish the relationships between the content reported in the research forms and the sociological structure of the research; the third phase consisted of data interpretation, which seeks to synthesize the results in an interpretative way and seeks valid meanings based on the findings of other studies (GOMES, 2015).

Ethical aspects were respected, in accordance with Resolution 466/2012 of the National Health Council, which encompasses research carried out with human beings, and together with the complementary norms of CNS Resolution No. 510/2016. (BRAZIL, 2012; CNS, 2016). It was submitted to the Research Ethics Committee of the University of Vale do Rio dos Sinos – UNISINOS and approved under opinion No. CAEE 54248721.00000.5344 CEP.

4 RESULTS

Regarding the profile of the participants, the age ranged from 28 to 67 years, in relation to gender, 20 were female and three were male. The time of training and professional performance ranged from five months to 43 years. Of the 23 nurses, 16 had specialization in surgical services, 14 nurses had a job in a private hospital, of which 11 knew the ELPO scale, six of which applied the ELPO scale, three used the Braden scale, and one the Munro scale. Nine nurses worked in public hospitals and of these, seven knew the ELPO scale, but only one used it, five of whom used the Braden scale and one the Norton scale.

When the research participants were asked about the application in hospital practice in the operating room, it was possible to identify that six of the 23 nurses answered that they use the ELPO scale. In the nurses' statements, it was possible to identify that the difficulties in the implementation of the scale occur due to work overload, lack of support from managers and lack of use of tools (scales) to prevent the risk of injury associated with surgical positioning.

Work overload. (E19)

> It was not possible to implement due to non-acceptance by the nursing and medical heads. (E18)
> It is not routine in the institution where I work to use a scale to avoid injuries during surgery. (E17)

The advantages of using the ELPO scale are well known among the nurses studied, ranging from care planning, identification of possible harm, and prevention of PL. In relation to care planning and the individualization of the care process to maintain patient safety, it was identified in the following statements:

> Identify each patient's injury risks, personalize preventive care according to risk, facilitate communication, facilitate patient risk recording. (E03)
> Care planning for safe care. (E04)
> Safety and prevention of patient injury and estimation of risk of injury development. (E11)

Nurses recognize that the main objective of using the ELPO scale is to avoid PL, since surgical procedures can last many hours and the lack of planning and prevention can generate complications resulting from positioning during the surgical intervention process.

> Prevent tissue damage to the patient. (E01)
> Avoids injuries to the patient by surgical positioning, in all surgeries, especially major ones. (E08)
> They avoid injuries, which is very important, especially in major procedures, elderly patients and surgeries with decubitus alterations. (E17)
> Prevent injuries resulting from surgical positioning and thus reduce the length of hospital stay and risk of infections. (E18)
> Avoid injuries resulting from surgical positioning. (E05)

The risks of hospitalization are increasingly evidenced in the literature, and nursing professionals are concerned with reducing these risks so that the patient is not compromised.

> Lower risk to the patient. (E15)
> Decrease the risk of injury. (E19)
> It reduces the risk of complications [...] decreases the risk of pain [...] social and economic impact for both the hospital and the patient. (E23)

Regarding the disadvantages of applying the ELPO scale, more than half of the nurses answered that it does not exist. The manifestations related to the disadvantages were restricted to the factor of time to start the surgical procedure, manifested by only four professionals.

> I don't see any significant drawbacks, it just postpones the start of the surgery and involves the whole team so that the positioning is satisfactory (E08)
> Longer surgical procedure time. (E15)
> It delays the start of surgery, which causes a delay in the scale of surgeries. (20)

The ELPO, developed and validated in Brazil, arose from statistical nonconformities by professionals in the area, which in view of the reality was then elaborated, developed, and implemented

a scale specifically for surgical patients in order to remedy and/or reduce factors resulting from such procedures. This scale has a score ranging from 7 to 35 points, which include: type of surgical position, surgery time, type of anesthesia, support surface, limb position, comorbidities, and patient's age. (PEIXOTO, et al. 2019).

ELPO uses the surgical positions of lithotomy, prone, *trendelemburg*, lateral and supine as the initial item for scoring the scale's score, which are more exposed positions in operating rooms. Lithotomy appears at the top with a score of 5, as *the* ranking of PL predominates in the intraoperative period. (LOPES, *et al. 2016*).

The prolonged surgical time, above 6 hours, also represents a score of 5, which can be revalidated at the end of the procedure and associated with other items such as the type of anesthesia, which with two concomitant techniques presents a higher risk of developing associated injury. Support surfaces, such as mattresses, leggings and cushions, depending on the structure and presentation, can develop serious risks and short- and long-term injuries. Comorbidities are always at the top of studies and research and their results in relation to the appearance of pressure injuries, related to neuropathies, thus investigating the presence of obesity, malnutrition, diabetes mellitus due to its pathophysiology, as there is decreased blood flow and impairment of tissue perfusion; Vascular diseases and deep vein thrombosis are scores related to this item. (LOPES, et al. 2016).

The patient's gender and age are also part of the ELPO scoring process, although gender is not an item on the scale, but it is always relevant in studies and research related to it. In the age item, the score is between 18 and 80 years or older, and these are more affected. At the end of the evaluation and when a denominator is reached, the patient is classified as more likely to develop a lesion according to the score, the higher the score, the greater the probability of developing a pressure injury. (LOPES, et al. 2016).

In the practice of implementing the use of the ELPO scale, it was recommended by working professionals to use the cut-off point to classify each patient. The operation characteristic curve (*ROC-Receiver-Operating Characteristic curve) was implemented*, which consists of a cut-off point of score 20 for risk classification, with a score of up to 19 points the risk is considered low, from 20 the risk presented is greater. (LOPES, et al. 2016).

Other scales were mentioned by the research participants, the most mentioned was the Braden scale that evaluates the risk of developing PL, it covers the care of prevention of pressure ulcers in its totality of patient care, regardless of the hospital unit in which the patient is, it does not specify intrinsic items and score of the operating room, On the other hand, it does not include surgical position, surgery time, anesthesia time, support surface, limb position, comorbidities, and patient age. The Braden scale assesses the patient's nutritional status, mobility level, physical activity level, sensory perception, friction and shear, and the patient's moisture level. These are graded from 1 to 4, except for friction

and shear, which are from 1 to 3. The degree of risk ranges from 6 to 23 and in the end, the lower the score, the greater the risk of developing PPL. (SARAIVA, 2015).

On the other hand, the second most cited scale was the Norton scale, developed in the early 1960s and defined as the first scale aimed at reducing PPLs, the Norton scale evaluates five risk parameters: physical condition, level of consciousness, activity, mobility and incontinence. Each parameter has a score of 1 to 4 points, the scale does not include friction and shear, age and skin conditions of the patient. (ARAÚJO, et al. 2011).

In this sense, it was also found that one participant mentioned the Munro scale, an American scale validated in Brazil, which assesses the patient's risks in three phases of the perioperative period, all phases contribute to the risk of developing pressure ulcers. These phases comprise the preoperative, intraoperative, and postoperative periods, subdivided into risk categories; Assessment: mobility, nutritional status, body mass index (BMI), recent weight loss, age and comorbidities; Intraoperative: classification according to the *American Society of Anesthesiologists* (ASA) scale, type of anesthesia, body temperature, hypotension, humidity, surfaces and surgical position; Postoperatively: duration of the perioperative period and blood loss. The benefits of the Munro scale is the process of communication and transfer of care between inpatient units. (SOUSA, 2021).

Thus, the ELPO scale, in its purpose and through evidence, provides nurses with the ability to make correct decisions, ensuring their protection and safety in accordance with the Systematization of Perioperative Nursing Care (SAEP), an indispensable and extremely important protocol that allows for better evaluation, according to the needs of each patient. (GONZAGA, 2021). Because the ELPO scale is easy and quick to apply by nurses, since they are aware of all its items and sub-items, it is recommended to apply it when positioning the patient on the operating table and, if it is repositioned during surgery, to apply it again, and at the end of the surgery, to make a new evaluation. (LOPES, et al. 2016).

In the period prior to the surgery, in the preoperative period, the patient is accompanied at the admission to the operating room, at this time the nursing team takes the patient's anamnesis through an institutional protocol and the nurse in an observational way, and in the patient's report, the care plan is already elaborated, in addition to information pertinent to the patient's health status. (PEIXOTO, et al. 2019).

In the operating room, the follow-up is performed hour by hour, from the beginning of anesthesia and the surgery itself. After this period, the patient is inspected immediately before leaving the operating table for the stretcher. As an evaluative and preventive measure, a protocol of inspection and evaluation is followed daily until the patient is discharged. (PEIXOTO, et al. 2019).

Aiming at excellence in the care of surgical patients, continuing education through educational programs in the care process by all working professionals, nursing staff, anesthetic and surgical staff

plays an important role, as well as a flow of care to establish the preoperative visit as an essential procedure to know the particularities of each patient, this procedure would be a way to prevent and be ahead of the curve of the inherent risks possible to this patient. (PEIXOTO, et al. 2019).

In the study conducted by Menezes, et al. (2013), the author states that all care and injuries resulting from physiological changes, including respiratory and cardiovascular changes, pressure ulcers, alopecia, peripheral nerve injuries, and blindness, are the responsibility of the surgical team as a whole. In the study with 172 patients, pressure point pain + neuropathy was identified in 12.2% of the patients, 9.9% complained of severe pain, according to a visual analog scale, with a score of >7 in pressure points. Peripheral neuropathy affected 4.7% of the patients and 0.6% had erythema. The most relevant risk presented in this study was the body mass index >30 kg/m2, which was related to the occurrence of neuropathy. Age between 45 and 64 years, female gender, and ASA II/III classification had a higher percentage according to the related variables.

In order to cover more clearly the reduction of risks resulting from surgical positioning, the ELPO scale showed more intrinsically the work of the nurse and its implementation with the surgical patient and the team. The responsibility remains between surgeons, anesthesiologists and nursing staff, but with the implementation of the ELPO Scale, nursing plays a fundamental role in the applicability of this scale. (PEIXOTO, et al. 2019).

In another, more recent study, data collected over the course of a year with 278 patients who underwent elective surgeries, in addition to ELPO, used a questionnaire with sociodemographic and clinical characteristics. As a result, the inherent risks were high, with a percentage of 56.5% for perioperative lesions resulting from surgical positioning. Female patients, the elderly, and altered BMI were the relevant factors for the increase in LP in the surgical patients included in this study. (PEIXOTO, et al. 2019).

Even with all the technological advances, PL still appears frequently and recurrently in surgical patients. The most diverse factors, such as pressure, friction, shear, humidity and heat, favor the appearance of these lesions. Intrinsic factors include age, body weight, nutritional status, presence of comorbidities, immobility or reduced movement, incontinence, infection, low hemoglobin levels, and surgical risk (anesthetic and positional). Regarding the specific intraoperative factors, prolonged surgical time, use of anesthetics, sedation, vasoconstrictor drugs, surgical specialty, surgical positioning, body temperature related to hypothermia, intraoperative hypotension, heating, type of mattress and other devices. (PEIXOTO, et al. 2019).

The studies do not indicate disadvantages of the applicability of the ELPO scale, however four participants in this study manifested a disadvantage to the factor of time to start the surgical procedure, causing longer procedure time, which may cause delay in the surgical scale.

All the scales mentioned in this study collaborate with the prevention of LP, providing the patient with an environment with greater comfort and safety in their intraoperative process. The ELPO scale provides nurses and staff with greater security, as this tool records all the measures and conducts that were applied to the patient.

Intraoperative patient safety in the analysis of scientific evidence points to the implementation not only of ELPO, but also of a safe surgery *checklist*, as is already part of a protocol in institutions, aiming at reducing risks. Such initiatives promoted by the World Health Organization (WHO), following the example of the global challenge "Safe Surgery Saves Lives" in 2009, aim at the concomitant applicability of the ELPO scale at the same time. (ESPÍNDOLA, et al. 2020).

Since 2013, in Brazil, the National Patient Safety Program has included Safe Surgery in its protocols, a protocol that is essential for quality patient care in the intraoperative period. These measures reduced the occurrence of adverse events and since then it has been recommended to apply them to all surgical procedures. All these measures are preventive and try to minimize the risks of LP and other adverse events. In view of all these data and protocols, the operating room nurse, through evidence, must apply, control and monitor the patient submitted to the proposed procedure. (ESPÍNDOLA, et al. 2020).

5 FINAL THOUGHTS

The proposal of this study highlights the importance of the applicability of the ELPO scale by operating room nurses. However, the ELPO scale still needs to be widely disseminated and put into practice by the institutions, in order to add the *safe surgery checklist*, which in turn has already been implemented in order to ensure a safe surgery for the patient.

However, the limitation of this study consists in the fact that there is a restricted number of nursing professionals, and it is important to consider the development of new multicenter studies with methods that enable analysis and understanding of the application of preventive scales, considering them as routine measures.

As a relevant contribution of this study to the surgical area, I suggest that the ELPO scale be disseminated by nursing leaders, through workshops, training and continuing education to all teams involved in the surgical procedure, in order to optimize the time of its applicability, always considering patient safety.

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Aromatherapy in primary health care

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Sacha Manoela Oliveira Paiva de Azevedo Queiroz
Occupational Therapist at the Municipality of Campos dos Goytacazes-RJ, Student of the Medicine Course at Faculdade Metropolitana São Carlos – FAMESC - BJI-RJ

Maria de Lourdes Medeiros de Matos
Doctor student in Religious Sciences at Faculdade Unida-Vitória-ES, Hospital Psychologist in
Hospital São Vicente de Paulo and Professor of Medicine at Faculdade Metropolitana São Paulo
Carlos – FAMESC - BJI-RJ

Alcemar Antônio Lopes de Matos
Graduated in Medicine (UNIG-Campus Itaperuna-RJ), Master's Degree in Cognition and Language -UENF, Post-graduate in Pediatrics, Neonatology and Children's ICU (FG) and Professor of Medicine at Faculdade Metropolitana São Carlos – FAMESC - BJI-RJ

Bianca Magnelli Mangiavacchi
Graduated in Biological Sciences – UENF-RJ, Graduated in Pedagogical Complementation in Biology – FIES, Degree in Pedagogy – UNOPAR, Master and PhD in Bioscience and Biotechnology – UENF, Member of the Animal Committee – CEUA/IFF, Tutor of the CECIERJ/CEDERJ Consortium, Institutional Evaluator of INEP, Professor and Director of Research and Extension of Faculdade Metropolitana São Carlos – FAMESC - BJI-RJ

ABSTRACT
The use of complementary health therapies, also called Natural or Alternative, has been highlighted in the developed countries of the West and in poor and developing countries, thanks to the stimulation made by the World Health Organization. In Brazil, especially, since 2018, public policies have undergone a process of expansion and integrative health practices such as Aromatherapy have been added to the Unified Health System (SUS). In this sense, the main objective of this study is to briefly report the history of aromatherapy, present its methodological trajectory, identify its functions in health care and defend its effectiveness in the field of Primary Health Care. This is a literature review, with a qualitative approach found in the Scielo and PubMED databases, available in Portuguese and English, without a specific temporal locus. The descriptors used in the search were: aromatherapy, primary health care, integrative and complementary health practices (PICs), and the Unified Health System (SUS). It is hoped that this research will contribute to the field of academic training and professional practice.

Keywords: Primary Health Care, SUS, PICS, Quality of Life.

1 INTRODUCTION

In March 2018, Brazil, through the actions of the Brazilian Ministry of Health, published Ordinance No. 702 (Brasil, 2018). In it, there is the announcement of the expansion of policies for integrative health practices in the domain of the public system, that is, in the Unified Health System (SUS), which incorporated new practices, including aromatherapy, into the list of procedures available until then. This, in turn, could thus be present in all Health Care devices, primarily in Primary Care or, also called, Primary Care, one of the most important gateways to the health system, identified by its structuring and strategic character, by its proximity to the daily life of people and collectives in their

territories and which requires paths and lines of care that cross other modalities of services, precisely, in order to be able to meet health needs in a comprehensive way (Brasil, 2013a).

Integrative and Complementary Health Practices (ICPs) correspond to therapeutic practices and resources that seek to prevent diseases and injuries and restore health, with a focus on listening and welcoming, on the development of the therapeutic bond and the integration of the human being with the environment and the society in which he lives (Brazil, 2013b). They have the power to be innovation and to constitute networks of communication and services. The applicability of the term innovation here lies in the understanding of what Lorenzetti *et al.* (2012):

> Health is a good or value that occupies the top of people's pyramid of priorities. (...) Therefore, today, under accelerated scientific and technological development (technoscience) and a real frenzy for the new (innovation), it would be expected that the health sector would be strongly impacted by this process. Because it deals with biological bodies marked by finitude, with human beings who relate to each other and to nature. The dream or desire to prolong life as much as possible, to cure diseases and disabilities is nurtured (Lorenzetti, 2012, p. 436).

The term "aromatherapy" was first used in 1920 by chemist René de Gattefossé and was referring to art and science that sought to promote health in its entirety (Velozo *et al.*, 2023; Andrei; Peres; Del, 2005). Thus, involving the well-being of the mind, body and emotions, through the therapeutic application of the organic perfume emitted by plants and their essential oils, aromatherapy is able to stimulate the olfactory nerve cells that induce the transduction process which, in turn, culminates in the interpretation given by the brain (Velozo *et al.*, 2023; Andrei; Peres; Del, 2005), the most important organ of the nervous system that controls the entire body.

Among the methods used in aromatherapy, one of the oldest practices in the world (Pessoa *et al.*, 2021), the main ones are: inhalation, which is a procedure that can be employed in a variety of ways, including mixing oils and water and the use of dispersion devices such as fragrance diffusion devices and nebulizers; the aromatic bath, which consists of benefiting from the aroma exhaled after the oil is dripped on the floor of the bathroom stall; and, aromatic application, which is a way of administering the oil to the skin tissue or specific site (Velozo *et al.*, 2023; Andrei; Peres; Del, 2005).

Considering that the peculiarities and indications of essential oils are extremely numerous, in order to ensure the success of the therapy, it is essential that there is follow-up by a properly trained professional (Pessoa *et al.*, 2021, as the global trend is towards increasingly individualised and appropriate prescribing.

Another important fact is the quality of the essential oils, the methods of application and the results after their use (Andrei; Peres; Del, 2005).

Among the immense variety of essential oils, we can mention rosemary, mugwort, vanilla, bergamot, German chamomile, cinnamon, citronella, eucalyptus, ginger, geranium, mint, lavender, patchouli, pepper, *tea-tree* and *ylangue-ylang*, each with its own characteristics.

2 MATERIAL AND METHOD

The study was based on a survey of bibliographic material, with a qualitative approach, with a search in the Scielo and PubMED databases, available in Portuguese and English, without date limitation. The descriptors used in the search were aromatherapy, primary health care, unified health system, primary health care; integrative and complementary health practices.

3 DEVELOPMENT

3.1 METHODOLOGICAL TRAJECTORY OF AROMATHERAPY

Since times prior to the birth of Christ (B.C.), human beings have used plants and their elements for religious, medicinal purposes and to improve aesthetics (Brasil, 2013a; Almeida, 2011; Pasin, L.; Pasin, L.A., 2020).

The possibility of making tools from raw stone chips, during the Paleolithic (10,000 B.C.), allowed humans to establish tribal communities (rather than being nomadic). In the Neolithic period (4000 B.C.), the tribes began to cultivate plants and learned to extract fatty oils by pressing on the stones. At that time, the toxicity levels of certain plants were already known, which resulted in a more careful use (Brasil, 2013a).

The trajectory of the therapeutic application of plants probably began around the second century B.C., with Mithridates, considered the pioneer of experimental pharmacology. The Ebers Papyrus, dated to 1550 B.C. and discovered in Luxor, Egypt, about fifty years ago, contained the record of 700 assorted substances, including plant extracts (Andrei; Peres; Del, 2005).

During this period, in the rituals that involved fire, men often burned aromatic plants in bonfires and discovered that their smoke was responsible for different sensations such as drowsiness for some and invigoration for others. These different sensations ended up revealing that the aromas provoked could have healing properties in some cases. Thus, in examining the effects of 'smoke' on consciousness, humanity began to attribute influence to it (Andrei; Peres; Del, 2005).

The origin of the word "perfume" dates back to the Latin *"perfumum"* and its etymology denotes "through smoke". The ancients used to use fragrances in religious ceremonies with the purpose of satisfying the deities (Juttel, 2007 *apud* Barros, 2007)

In 1975, in Iraq, archaeologists discovered, along with deposits of herbs, pollen and hyacinths, a human skeleton, aged six thousand years. This skeleton is believed to have been of a religious leader with deep knowledge in botany, named Shanidar IV. He is believed to have pioneered rituals that involved the use of plants, flowers, and fragrances (Andrei; Peres; Del, 2005).

The ancient Egyptians practiced burning frankincense at dawn as a way of revering the sun god, Ra, and at dusk they used myrrh for the same religious purpose. They also used the oils for personal hygiene and to contemplate vanity. In the preservation of bodies, they employed a

combination of cinnamon, pure ground myrrh and various essences, and in the area of medicine, they made use of myrrh as an anti-inflammatory, in addition to treating bone fractures with mixtures of oils and plants, this being a common practice among them (Andrei; Peres; Del, 2005; Barros, 2007).

In the period between 2551 B.C. and 28 B.C., after the improvement of the papyrus production technique, the first records of the use of herbs in medicine were dated (Andrei; Peres; Del, 2005).

Andrei, Peres and Del (2005) based on the studies of Corazza (2002), states that research points to the use of frankincense and frankincense and frankincense as devotional offerings in the tomb of Chefén, a pharaoh, under the protection of the Sphinx of Giza. In the tomb of Pharaoh Tutankhamun (1550-1295 B.C.), historians refer to the use of aromatic oils of juniper, frankincense, myrrh, coriander and cedar.

Hatshepsut, the sovereign of the 18th dynasty (1550-1295 B.C.), used myrrh to massage and make her legs fragrant (Andrei; Peres; Del, 2005).

However, it was only between 800-700 B.C., the time of reign under the order of the Ramses, that the care for beauty, more precisely, for appearance, reached its peak, thanks to the custom of the Egyptians to perfume the water for bathing with fragrant herbs, frankincense being the main herb (Andrei; Peres; Del, 2005).

In the realm of seduction, however, it was Cleopatra (69-30 B.C.) who stood out, using the perfume cyprinum, made from the essential oil of juniper flowers, saffron, henna and mint (Andrei; Peres; Del, 2005; Barros, 2007).

Rare peoples dedicated themselves with care to the production and use of perfumes (Kaly, 1963 *apud* Gnatta; Day; Silva, 2011).

For the Greeks, scents were related to the gods of Olympus. They had, like the Egyptians, the custom of anointing the dead with oils, of burning incense, and of perfuming themselves, that their beauty might be perceived. They also had the habit of making garlands of roses to make the manifestations of migraine milder (Andrei; Peres; Del, 2005).

In Greece, aromatic herbs such as saffron, Cretan pine and cypress were used to prevent the proliferation of bacteria, viruses and other harmful microorganisms capable of causing infections, that is, as antiseptics (Andrei; Peres; Del, 2005; Barros, 2007). It was also there that a treatise on smells was created, which contains recipes for aromatic combinations with respective indications, including for emotional and mental states (Barros, 2007)

In the oracle of Delphi, frankincense and myrrh were burned by the priestesses who also macerated the flowers (Andrei; Peres; Del, 2005).

At the Olympics, the winner was rewarded with a fragrant laurel wreath (Andrei; Peres; Del, 2005).

According to Grace (1999), Ibn Sina, also identified as Avicenna (980-1037) was responsible for the invention of the distillation method. This process allowed the extraction of essential oil from roses and gave rise to rose water from Rosa centifolia, on the European continent, during the period of the Crusades (Andrei; Peres; Del, 2005).

In harem dwellings, women scented their breath and body using fenugreek-based soaks and plasters (Andrei; Peres; Del, 2005).

In the Middle Ages, the time of the invasion of the Black Death in Europe, the smell exhaled by plant oils was extremely relevant, as it was believed that they could purify contaminated air. Thus, when visiting the sick, the doctors set fire to the aromatic herbs. However, it was only in the eighteenth century that the importance of plants, flowers and their perfumes was reaffirmed (Kaly, 1963 *apud* Gnatta; Day; Silva, 2011).

The pharmacists Cajola, Cadeac, Chamberland Meunir and Gaffi exerted a strong influence on the study of perfumes, but it was René Maurice Gatefossé who was the first person to name art and science as aromatherapy, in 1928 (Andrei; Peres; Del, 2005).

In feudal France, seeds and aromatic compounds from lavender, orange blossom and violet were traded to be used as a defense against pests. However, with the decline of feudalism and the birth of urban commerce, the production of fragrances began, in an organized manner. It was not until the thirteenth century, however, that there was the first authentic and detailed description of essential oils, made by Arnold Villanova de Bachuone, relating rosemary, sage and turpentine. Soon after, a variety of other fundamental oils went through the distillation process, including sandalwood, cinnamon, and rue (Andrei; Peres; Del, 2005).

Around the year 1200, the official recognition of the profession of perfumer by King Felipe Augusto II took place, who authorized the opening of establishments for the sale of essences. Consequently, the first educational institutions emerged, focused on the training of apprentices and supervisors specialized in pressing and kneading techniques and in the creation of combinations for aromatic compositions (Andrei; Peres; Del, 2005).

In the year 1370, Queen Isabella of Hungary witnessed the development of Eau de Toalete [Eau de toilette], a mixture of essential oils in combination with alcohol (Barros, 2007).

In the 14th century, precious metal receptacles, worn as adornments around the neck or waist, known as "*pommanders*", were also employed to store a fragrance made from resins and essential oils. The purpose was to protect the bearer against epidemics and diseases (Andrei; Peres; Del, 2005).

According to Cardoso (2022), with the discovery of America, many plants that were not known to Europeans arrived in Europe.

In the period from 1560 to 1580, José de Anchieta, a priest, called peppermint a "beneficial herb", since the indigenous natives used it to relieve digestion problems and reduce nerve pain, in addition to treating rheumatism and nervous disorders (Andrei; Peres; Del, 2005; Brito *et al.*, 2013).

In 1654, Nicholas Culpeper, stated that nature was like a natural pharmacy, where plants and herbs contained medicinal properties that could be used to treat a variety of health conditions. He made contributions to the distillation of essential oils from them and his work was a precursor to modern approaches to treatment with essential oils and medicinal herbs. (Cardoso, 2022)

By the sixteenth century, about seventy essences in perfumery and cosmetics were used, but it was only in the following century that the existence of perfumery spread throughout the world. However, in this same century there was an advance in research in scientific terms due to the discovery of other new chemical substances, this time with an improved ability to recover in less time than fundamental oils. This caused the latter to fall into disuse, as they were replaced by synthetic substances. Thus, these oils came to be understood, strictly, for their property in giving perfume (Andrei; Peres; Del, 2005).

Then, in 1714, in France, Jean-Marie Farina created Eau de Cologne. This country, then, began to stand out in the development of new olfactory compositions, with the aim of perfuming the gloves of people of the nobility (Meira, 2019).

In 1791, with the advent of the discovery of saponification through caustic soda, the production of soaps contributed to further stimulate perfumery. From then on, the houses and bathrooms and the toilet were created, which brought back the habit of aromatized baths (Andrei; Peres; Del, 2005).

"Perfumes Guerlain", the first perfume house, came into existence in 1828, with the subsequent creation of the fragrance of Eau de Cologne, which is still marketed today. In the nineteenth century, gaining "status" and even being used to treat diseases, more precisely of the nervous system, perfumes came back to prominence and, in the twentieth century, revived the industry's interest in the synthesis of substances (Andrei; Peres; Del, 2005; Meira, 2019).

In 1920, with advances in chemistry and the invention of aldehydes, the perfume Chanel number 5 (Andrei; Peres; Del, 2005; Meira, 2019).

In 1928, in France, René Maurice de Gatefossé, used lavender essential oil to heal several burns he had when he was in the laboratory, starting his journey in the use of essential oils in beauty products and establishing the concept of aromatic therapy, instituting the term "aromatherapy". (Andrei; Peres; Del, 2005; Brito *et al.*, 2013).

In 1949, six major perfumery industries founded *The Fragrance Research Foundation*. All of them, with the purpose of studying fragrances among North American people and with the idea that the various categories of perfume can be used in a more appropriate way for each stage of life (Corazza, 2002 *apud* Gnatta; Day; Silva, 2011).

In 1964, the aromatherapy practices used in World War II to treat the wounded are reported in the book "Aromatherapie", written by Jean Valnet. However, although some important names have already been mentioned, it is essential to highlight that of Marguerite Maury (1895-1968), a nurse and surgical assistant who was born in Austria and is known as the mother of aromatherapy today. She combined the massage technique characteristic of the Orient with the distinctive healing properties of fundamental oils, creating formulations that took into account the particularities of each person and was responsible for the foundation of the first aromatherapy clinic in the English capital. He also published in 1961, in France, his book, a reference work when it comes to essential oil. In 1962, she was awarded an international award for her contribution to the treatment of the skin, considering the therapeutic and cosmetic fields (Andrei; Peres; Del, 2005).

3.2 ESSENTIAL OILS

Extracted from various parts of a plant, essential oils are volatile concentrates made up of highly complex chemical molecules that exude perfume when exposed to air and at room temperature (Gnatta; Day; Silva, 2011; Andrei; Peres; Del, 2005) and have numerous chemical functions (Pessoa *et al.*, 2021; Barros, 2007).

In general, they have a liquid and translucent texture, but they can change their state and color depending on temperature. They are also soluble in ether, alcohol, and other fatty compounds, but are mixed with water. In its compositions, organic elements such as oxygen, hydrogen and carbon are found. With the exception of sandalwood, whose composition is 95% of the same component, santalol and the others, remaining (5%) are of different composition, most essential oils have a complex composition (Andrei; Peres; Del, 2005).

Perfume and its therapeutic characteristics constitute the main attributes of essential oils. As a rule, the latter, when they have a high content of alcohol and esters, are safer to use, as they have moderate healing properties. Essential oils with high concentrations of phenols, aldehydes and ketones are rarely used in aromatherapy, as they can cause adverse effects. Thus, they end up being used only when necessary and in small quantities (Andrei; Peres; Del, 2005).

The constitution and quality of essential oils can vary depending on the climate, the region of cultivation, the relief, the age and exposure of the soil to microorganisms and pollutants in general, the harvesting process and the extraction method (Meira, 2019).

> As for cultivation, the content and composition of the essential oil of aromatic plants depend on different factors. Soil conditions, climate, geographical origin, harvest time, fertilizers, and mineral nutrition can greatly affect the production and quality of essential oil (Sales *et al.*, 2009 *apud* Luz *et al.*, 2014, p. 553).

In plants, essential oils play a role in defending against parasites and diseases, fertilizing, pollinating, and protecting from the sun's rays. In humans, they have several applications that will be addressed later (Andrei; Peres; Del, 2005).

According to Andrei, Peres and Del (2005), the chemical functional groups that constitute the essential oils most used in aromatherapy are:

- Monoterpenes/Sesquiterpenes: exert antiviral, antiseptic, bactericidal and anti-inflammatory effects. They act on the liver and stimulate glandular functions. Sesquiterpenes act on the brain, contributing to an increase in the amount of oxygen in the pituitary and pineal glands. They are present in frankincense, pine and lemon.
- Esters: act as fungicides, sedatives, and antispasmodics. In the product, they are responsible for the characteristic fruity aroma. They are present in lavender, bergamot and sage.
- Aldehydes: They act as a sedative, antiseptic and anti-infective agent. They are present in citronella, melissa and lemongrass.
- Ketones: exert a decongestant action in cases of colds, asthma and bronchitis. However, they can be toxic. They are present in ginger, fennel and hyssop.
- Alcohols: exert antiviral, antiseptic functions and stimulate the immune system. They are present in sandalwood, rosewood and geranium.
- Phenols: act as bactericides, disinfectants, anti-inflammatories. However, they can be irritating to the skin. They are present in thyme and cloves.
- Oxides: act as bactericides and expectorants. They can be present in tea tree and rosemary.
- Acids: exert antiseptic, diuretic and antipyretic functions. They have vitamins and antibiotics. They are present in melissa and benzoin.

Understanding that synthetically produced essential oils do not have the same therapeutic potential as natural botanical oils is of paramount importance. Researchers argue that the effectiveness of natural essential oils lies in their vitality, which is a unique feature of living matter. Therefore, although synthetic oils may resemble natural oils in terms of aroma, their therapeutic properties are remarkably distinct (Andrei; Peres; Del, 2005).

3.3 TOXICITY OF ESSENTIAL OILS

The substantial majority of poisonous plants are fragrance-free, however, although essential oils are natural botanicals, they are not free of toxic elements. On several occasions, the essential oil of a plant may contain toxic substances, while the plant itself does not have them, since most essential oils have a higher concentration than the original plant from which they were extracted (Andrei; Peres; Del, 2005).

> The essential oils with different degrees of toxicity are, in descending order: mustard (Brassica nigra), rue (Ruta graveolens), mugwort (Artemisia vulgaris), hyssop (Hyssopus officinalis), wormwood (Artemisia absinthium) and fennel (Foeniculum vulgare). Examples of essential oils that can cause skin sensitization include, in descending order: bergamot (Citrus bergamia), clove (Syzygium aromaticum), cinnamon (Cynnamomum zeylanicum), pine (Pinus pumilho) and juniper (Juniperus comunis) (Andrei; Peres; Del, 2005, p. 62).

Prolonged inhalation of essential oils can cause allergies (Oliveira *et al.*, 2023), headaches, nausea, and other symptoms once it affects the nervous system. When inhaling a composition of essential oils, the danger of harmful effect will not be as if they were several oils separately, because the mixture is harmonious, so that one aromatic oil complements the properties of the other (Andrei; Peres; Del, 2005).

3.4 THE OLFACTORY PROCESS

Humans have the ability to identify several distinct odors in less than a second, accurately at concentrations as low as atograms per gram (ag/g, where 1 ag = 10^-18 g), while the most advanced machines can detect concentrations on the order of phentograms per gram (fg/g, where 1 fg = 10^-15 g) (Andrei; Peres; Del, 2005).

According to Corazza (2002), the process of odor perception is a set of interconnected reactions, involving chemical and electrical aspects, which occurs as follows: an aromatic substance is transported through the air, enters the nostrils and reaches the olfactory cells. These cells form a layer of mucus and respond to different odors by binding to specific molecules. This triggers chemical and electrical reactions, stimulating the olfactory cilia. The proteins that function as receptors for odoriferous substances, located in the cilia, are in charge of transmitting signals to the central nervous system, passing through the crivosa plate, a region with perforations where the nerves connect to the glomeruli.

As Bellinello (2022) states, along with the chemical process of odor detection, there is also a vibratory mechanism, through which it is possible to detect odors even when odorous molecules do not reach the nose.

According to Grace (1999), the limbic system is where the cells responsible for processing information from the nerve terminals connected to the olfactory bulb are located. The first evidence that the limbic system participated in emotional processes was in 1933, when Herrick contacted that this system could interfere with the emotional mechanisms of the body (Andrei; Peres; Del, 2005).

3.5 AROMATHERAPY APPLICATION METHODS

When it comes to aromatherapy, Corazza (2002), in practice, states that the most common methods of administration include spraying and diffusion in the air, inhalation, baths, compresses and

massages. The choice of the most appropriate method depends on the recommendation of a doctor or specialist, taking into account the essential oil to be used. In addition, treatment may involve mouthwash and gargle, as well as oral ingestion. However, before starting any treatment, it is essential to check the expiration date of the oils and perform an allergy test beforehand, at least 24 hours before the first application.

The following are some essential oils, their properties and the effectiveness of their uses in clinical practice (Andrei; Peres; Del, 2005).

ROSEMARY (Rosmarinus officinalis). Its main constituents are: limonene, pinene, linalool, borneol, eucalyptol, terpineol and camphene. Mainly used for arthritis, asthma and bronchitis, joint pain, mental tiredness, mange, lice and weakness.

ARTEMISIA (Artemisia vulgaris). An oil that has camphor, thujone, borneol, linalool, alpha-cadinol, 4-terpinolene and 1,8-cineole as its main components. It can be used as a regulator of menstrual disorders, antispasmodic, analgesic and mental stimulant. Indicated for amenorrhea, dysmenorrhea, epilepsy, pinworm and ascariasis.

VANILLA (Vanilla planifolia). Its main components are: acetic acid, methylprototecchic aldehyde, vanillin, isbutyric, hydroxybenzaldehyde, caproic eugenol and furfural. It works as a menstruation stimulant, as an antispasmodic and aphrodisiac.

BENZOIN (Styrax tonkinensis). Consisting of: benzoic acid, conifheryl benzoate, cinamyl benzoate, vanillin and sia-resinolic acid. It is an oil that has intense antioxidant properties and can be indicated in the treatment of colds, bronchitis, laryngitis, cough and respiratory tract infections. It also stimulates circulation and is useful in cases of rheumatoid arthritis, gout disease, as well as helping to combat stress, cracked skin, and anxiety.

BERGAMOT (Citrus bergamia) Its main constituents are: linalyl acetate, linalool, linalyl acetate, pinene, neryl acetate, nerol, neryl acetate, geraniol, terpineol, bergaptene and dipentene. It can be used to fight fever and worms, treat eczema, seborrhea, acne, psoriasis, boils, vaginal itching, cystitis, vaginal itching, loss of appetite, digestive problems, stress, depression, anxiety, halitosis, infections of the mucosa of the mouth and throat, because it has bactericidal action, acting on staphylococcus, gonococcus, meningococcus and also on the diphtheria bacillus. In addition, it has antiseptic, analgesic, healing, energizing and sedative power. It is widely used in the food and fragrance industries (Andrei; Peres; Del, 2005; Araújo; Farias, 2003).

GERMAN CHAMOMILE (Matricaria chamomilla). In its composition, it has azulene (main component), alpha-bisabolol, tujanol, farnesene, flavonoids (quercitin, apigenin and luteolin) and glycosides. It is used as an antianemic, antispasmodic, anti-inflammatory, immunostimulant and healing agent. Indicated for the treatment of gastrointestinal ulcers, boils, dermatitis, skin inflammations, acne, dysmenorrhea, amenorrhea, menopause, premenstrual syndrome (PMS), cramps,

headache, migraine, earache, insomnia, stress, toothache, insect bites, nausea, digestive problems, arthritis and rheumatism. It is also considered a mild sedative and can be used by infants as a popular rebalancing of emotions.

CINNAMON (Cinnamomum zeylanicum). Its main components are: benzene aldehyde, eugenol, cinnamic acid, cinnamic aldehyde, safrole, dipentene, cymene, furfurol, benzyl benzoate, pinene and phellandrene. It is used as an antispasmodic, analgesic, powerful antiseptic, diuretic, and antipruritus. It serves to stimulate the digestive system and circulation, fight infections such as flu and intestinal complications, impotence, constipation, nausea, stress, kidney stones and muscle pain. It is popularly known for its stimulating power and helps control blood sugar and other conditions.

CITRONELLA (Cymbopogon nardies). Often used as a deodorizer, this is an oil consisting of bourbonene, caryophyllene, hydrocyanic acid, citral, borneol, camphor, citronellol, camphene, farnesol, limonene, citronellal, ethanol, linalool, eugenol, menthol, furfurol, nerol, geraniol, terpinolene and pinene. It can also be used as an antiseptic, antidepressant, antispasmodic, digestive stimulant, cadiotonic, anti-inflammatory, and even an insect repellent. It is indicated for situations of tiredness, excessive perspiration, oily heads and skin, headache, treatment in cases of poor circulation, muscle pain, stomach pain, and also to stimulate menstruation when it is deficient.

EUCALYPTUS (Eucalyptus globulus). Its main constituents are: citronellal, camphene, eucalyptol, pinene, eugenol, limonene, terpineol, phellandrene and pinocarvone. It is an oil with antiviral, antiseptic, anti-inflammatory, expectorant and astringent potential. It also helps to stimulate the respiratory system and activate circulation. It may be indicated to treat colds, asthma, bronchitis, cough, phlegm, herpes simplex, diabetes, urinary tract disorders, sinusitis, muscle aches, poor circulation, urinary tract disorders, snakebite and rheumatism. When it is applied directly to a wound, it causes a reduction in pain and shortens the lifespan of the virus. It is often used to cause rebalancing of breathing. In the context of comb and emotions, eucalyptus essential oil can be indicated for people with rigid thinking, pessimists and obsessives. In the physical domain, it dilates the muscles of the bronchi, lungs and trachea, reduces runny nose and minimizes fever, and clears or clears the airways. When it is combined with rosemary and peppermint essential oil, it can be indicated to treat breathing difficulties. When combined with lavender, for cases of colds, runny nose, and chest pain; And with marjoram oil, it may be indicated for sciatic nerve pain relief.

GINGER (Zingiber officinalis). It is an oil whose main constituents are pinene, camphene, nerol, borneol, cineole, linalool, zingiberene, graniol, terpineol and betabisabolene. It has therapeutic properties aimed at analgesia and tonicity, also working as a general stimulant, antiseptic, carminative, antispasmodic, digestive, astringent and very aphrodisiac. It can be indicated for tonsillitis, sinusitis, sore throat, aerophagia, muscle pain, poor circulation, fatigue, migraine, mental tiredness, poor memory and even impotence. It can be considered an oil capable of providing the user with more

determination and self-confidence. It is an oil that promotes the reduction of nausea and vomiting after major abdominal surgeries, when used by the inhalation route, in addition to being cheap, easy to administer and having no known side effects (Lee; Shin, 2017 *apud* Andrei; Peres; Del, 2005).

GERANIUM (Pelargonium graveolens): Its main constituents are: linalyl acetate, eugenol, menthan, citronellol, geraniol, limonene, and caryophyllene. It can work as an astringent, antiseptic, healing and diuretic and be indicated to treat acne, tonsillitis, cellulite, sore throat, diabetes, hemorrhoids, premenstrual tension, menopause, burns, dermatitis, oily skin, inflammation of the vaginal mucosa, kidney stones, nervous tension and depression. It can also help people gain more self-confidence, creativity, determination, courage, and inspiration. It is an essential oil known to help clear up mental confusion and put an end to or reduce the fear of something unknown. When it is combined with rosemary, it is more suitable for treating menstrual tension; with tea tree, for seborrhea, acne and dermatitis. When it is combined with lavender, it is more suitable for poor circulation and depression. Geranium oil has the ability to stimulate the cortex of the adrenal gland, where sex hormones are produced, and can therefore act as a stimulant and stabilizing agent of the nervous system and female organs (Andrei; Peres; Del, 2005; Gnatta; Day; Silva, 2011).

PEPPERMINT (Mentha piperita). Its main constituents are: mentyl acetate, linalool, limonene, cineole, caryophyllene, menthol, nicotinamide, pipene, eucalyptol, carvone, menton and phellandrene. It can work as an antispasmodic, antiseptic, analgesic, anti-inflammatory, astringent, decongestant, carminative, emmenagogue, expectorant, refreshing, vermicide, vasoconstrictor, tonic, and promoter of digestion and the nervous system. It helps in reducing fever and cold and flu symptoms like nasal congestion followed by headaches. It also acts on asthma, bronchitis, laryngitis and sinusitis problems, digestive discomforts such as poor digestion, colic and flatulence, and also acts on muscle and joint pain, migraine, diarrhea and mental fatigue. When it comes to emotions, it can be suitable for shy and depressed people, thanks to its stimulating properties. It is very aphrodisiac and is used to treat impotence problems. It is an oil known to promote the "whitening" of ideas, until then obscure, providing the individual with more initiative and dynamism.

LAVENDER (Lavandula officinalis or Lavandula angustifolia or Lavandula vera). Its main components are: lavandulol, camphor, eucalyptol, limonene, linalool, camphene, lavandyl acetate, caryophyllene, phellandrene, nerol, bisabolol, pinene, geraniol, terpinene, cineole, borneol, and some acids such as valeric, coumaric and benzoic acids (Barros, 2007). Regarding its therapeutic properties, we can mention the analgesic, antidepressant, antistress, antibiotic, antiseptic, antiviral, antitoxic, bactericidal, decongestant, healing, sedative, carminative, diuretic and insect repellent effects. It is also indicated for skin lesions, cases of burns, flu, sore throat, asthma, migraine, bronchitis, cystitis, depression, insomnia, leucorrhoea, dysmenorrhea, amenorrhea, premenstrual tension, menopause, oily skin, acne, insect bite, allergy, flatulence, chicken pox, hypertension, rheumatism, wounds and bruises.

It can be useful in labor situations, as its scent favors the mother's relaxation (Andrei; Peres; Del, 2005; Velozo *et al.*, 2023) and significantly reduces pain intensity (Velozo *et al.*, 2023). Another relevant fact is that it also acts on the respiratory system by minimizing the discomfort caused by colds and bronchitis and sinusitis. It is important to inform you that lavender oil is the only one that can be applied directly to the skin, without prior dilution, that is, in its pure state. In open cuts or wounds, it can be applied in its pure form to prevent the appearance of infectious conditions and assist in the healing of the epithelial tissue. It is a compound that can also be used as a skin sedative to provide refreshment to skin exposed to the sun or insect bites. Some scholars believe that this oil can restore mental balance, harmonize feelings, raise awareness about reality and provide calm, exerting immediate action on the body and mind as a result of its high vibration (Andrei; Peres; Del, 2005).

Domingos and Braga (2015) carried out a study that included the application of Lavender oils, together with Geranium oils, in patients with Adult Behavior and Personality Disorder. The route used was massage by straightening. The purpose of this study was to reduce their anxiety, a fact that was verified through the parameters of Respiratory and Heart Rate. For these authors, linalyl acetate and linalool, present in lavender and geranium essential oils, are substances that inhibit cholinergic action by altering the way ion channels work in the regions of neuromuscular junctions. In addition, by interacting with the dopaminergic system and the action of the neurotransmitter GABA, they favor the inhibition of tone in the central nervous system.

Farahani *et al.* (2019) argued that aromatherapy can be used as an alternative therapy to treat patients diagnosed with cancer and undergoing chemotherapy treatment, promoting improvement in the general condition and acting on anxiety, especially when the route used is massage and inhalation with lavender essential oil, which was also proven by the results found, in other studies carried out with patients undergoing dialysis, with the elderly, and also with women in labor situations.

The treatment of the symptoms of both anxiety and depression constitutes, for the vast majority of studies, the main therapeutic use of aromatherapy (Pessoa *et al.*, 2021) However, as found by Gnatta, Dornellas and Silva (2011), lavender essential oil favored the reduction of the state of anxiety in the sample of cancer patients, but in a not statistically significant way.

PATCHOULI (Pogostemon cablin or Pogostemon patchouli). The main constituents are: cadinene, cinnamaldehyde, eugenol, patchulipyridine, patchulol, phenol, caryophyllene and pogostol. It is an oil that, according to Wei and Shibamoto (2007) has antioxidant therapeutic properties. In addition, it can have anti-inflammatory, decongestant, healing, regenerating, fungicidal actions (Andrei; Peres; Del, 2005) and helps repel insects, as stated by Salerno *et al.* (2004), too. It can be indicated for acne, skin treatment (cracked, dry and even oily), dermatitis, dandruff, seborrhea, stress, anxiety, obesity, mental fatigue, water retention and depression. On the skin, it acts as a rejuvenator. The exhaled aroma exerts an action on the psychic centers, stimulating the central nervous system.

Thus, it can help in retrieving memories of youth and stimulate creativity. In the endocrine glands, more precisely, it acts as a good aphrodisiac. It is widely known for collaborating with the balance between the mental, physical, and spiritual bodies (Andrei; Peres; Del, 2005; Barros, 2007).

TEA-TREE (Melaleuca alternifolia). Its main constituents are: eucalyptol, 4-terpineol, pinene and sesquiterpenes. Regarding its therapeutic properties, we have its antiviral, antiseptic, healing, insecticide, fungicidal and stimulant action. It has a remarkable inhibitory capacity acting especially on Gram-positive bacteria and can be indicated for infections, cystitis, candidiasis, herpes (both labial and genital), vaginitis, warts and cold sore. Its most important function is to act as a stimulator of the immune system. It is common, in practice, to use this oil on wounds, cuts, scrapes, acne, gingivitis, nasal congestion and for foul odor on the feet (Andrei; Peres; Del, 2005; Pasin, L.; Pasin, L.A., 2020).

YLANG-YLANG (Cananga odorata). It is an oil that has in its constitution some main elements such as: pinene, farnesol, ylangol, granial, cadinene, benzyl acetate, safrole, geraniol, linalool and eugenol. It can be used therapeutically as a sedative, antispasmodic, soothing and uplifting, slightly euphoric. It is an oil that can help reduce the symptoms of anxiety and stress, which, in turn, can positively interfere with self-esteem, as feelings of anxiety and low self-esteem are often interconnected. It is also indicated for frigidity, tachycardia and depression. Because it is used in cases of sexual impotence as a potent aphrodisiac. In practice, it is widely used to increase self-esteem and sexual appetite (Andrei; Peres; Del, 2005). However, Gnatta *et al.*, (2011) found that the essential oils of *ylang ylang* and rose could interfere in the reduction of anxiety, however, the results were not statistically expressive.

3.6 MECHANISM OF ACTION OF ESSENTIAL OILS

The aromatherapy effectiveness of an oil is closely linked to how its molecules are administered. When administered through inhalation, the molecules travel through the upper respiratory tract and into the lower airways, where they are absorbed into the bloodstream through the pulmonary vessels. In this process, the molecules stimulate the olfactory nerves, which have a direct connection to the Limbic System, which plays a key role in emotions, feelings, memories, and impulses Gnatta *et al.*, 2011).

The substances that make up essential oils (EO) act by sending biological signals to the receptor cells that are located in the region of the nostrils. Once received, these signals are routed to limbic areas and the hypothalamus in the brain, via the olfactory bulb. As a consequence, the central nervous system releases neurotransmitters that can promote a balance between both mental and physical well-being, generating a sense of relief. (Ali *et al.*, 2015; Sundays; Braga, 2015).

If the contact occurs through the cutaneous route, the stimuli penetrate the skin or mucous membranes and, due to their small molecules with low molecular weight, are absorbed and then

distributed to the tissues of the body through the bloodstream. If contact happens through ingestion, its molecules enter the intestinal mucosa and reach the bloodstream. From there, they are distributed in the body (Gnatta *et al.*, 2011, 2016).

In studies by Kawai *et al.* (2017), it was found that some fragrances have inhibitory effects on the brain and autonomic nerve functions. For example, inhalation of chili oil induces an increase in adrenaline concentration compared to the resting state; while inhaling rose oil causes a reduction in adrenaline concentration. Thus, what they concluded is that the inhalation of essential oils can work by modulating sympathetic activity.

For Montibeler *et al.* (2018), volatilized chemical molecules exert an influence on the reduction of the sympathetic activity of the nervous system concomitantly with the stimulation of the parasympathetic system.

As for the limbic system, research highlights the connection of a molecular mechanism in which essential oils send a biological signal to receptor cells in the nose. This information is transmitted to the hypothalamus, resulting in the release of neurotransmitters (Montibeler *et al.*, 2018).

Studies also show that essential oils have antimicrobial properties due to their influence on the cell wall structure of microorganisms, causing denaturation and coagulation of proteins. This effect occurs thanks to changes in cytoplasmic membrane permeability resulting from the lipophilic nature of these molecules. This disrupts the cell's vital processes, including electron transport, protein translocation, phosphorylation, and other enzyme-dependent reactions. These actions lead to the loss of osmotic chemotic control of the affected cell, leading to its destruction (Gnatta *et al.*, 2016).

3.7 THE PANORAMA OF PRIMARY HEALTH CARE

Primary Health Care, often referred to as primary health care, is, in fact, the gateway to the health system and is designed to meet the health needs of the majority of the population.

> In addition to being one of the main gateways to the health system, primary care has to be an "open door" capable of providing "positive" responses to users, and cannot simply become a bureaucratic and mandatory place of passage for other types of services (Brasil, 2013a, p 15).

It is a level of health care that, in order to be effective, recognized and legitimate, "cannot be the place where only promotion and prevention are carried out at the collective level (although these are highly necessary actions), nor can it be restricted to carrying out consultations and procedures, even though they constitute mandatory and essential actions" (Brasil, 2013a, p. 14).

Montibeler *et al.* (2018) points out that the patients who are indicated for Primary Health Care are:

- Individuals of all ages: Primary care is aimed at people of all ages, from the infant group to the elderly group.

- Healthy patients: Primary Care is not limited to treating diseases; It is also aimed at promoting health and preventing numerous pathologies. In this way, healthy patients are encouraged to seek preventive care, such as vaccinations and routine exams, precisely so as not to get sick.
- Patients with chronic diseases: Many chronic diseases, such as diabetes, hypertension, asthma and heart disease, are managed in basic health services, that is, in the Primary Care network. Patients with these conditions, in the corresponding units, receive regular medical follow-up to monitor and control their diseases and can also receive the care of some other health professionals who, together, add forces in the direction of care. Speaking of interdisciplinary care, it must be mentioned that even the professionals who care for it can benefit from aromatherapy. Proof of this appears in a study involving nurses that showed that it provided a statistically significant reduction in blood pressure and heart rate, biophysiological parameters. However, with regard to the psychological aspects, the measures did not indicate an effect on stress, and this would be an indication for research in this sense to be carried out in order to quantify the evidence of its use in contexts characterized by high complexity.

According to Huang and Capdevila (2017), aromatherapy is established as an effective therapeutic in cases of stress in the workplace. That is, it can contribute to the reduction of this stress and, consequently, improve performance at work.

Data from a scientific experiment showed that massage with essential oil and other ways of doing aromatherapy were favorable in reducing anxiety in patients with a history of cancer. (Aragon *et al.*, 2003).

A scientific study carried out with epileptic patients showed a satisfactory effect in the treatment with the use of aromatherapy associated with hypnosis, although the patient needs to make more personal effort (Betts, 2003). There is also evidence that there was a reduction in nausea and pain in this group of patients. (Fellowes; Barnes; Wilkinson, 2008).

- Patients with minor acute conditions: Cases of respiratory infections, allergies, colds, mild cuts, and other minor acute conditions can be treated in Primary Care.
- Pregnant women and women of childbearing age: Prenatal care, family planning, and gynecological examinations are an integral part of Primary Care. Childbirth, a unique moment in women's lives, is a continuum of sensations that culminate with the birth of the baby. However, the phases that precede it, finding out about the pregnancy, carrying out tests and even the moment itself, are often permeated by anxiety. Every birth is a particular and unique process, regardless of whether these women are in their first pregnancy (nulliparous or primiparous) or if they have already gone through one or more pregnancies

(multiparous). Aromatherapy is an efficient non-pharmacological resource for reducing pain and anxiety levels associated with labor (Velozo *et al.*, 2023).

- Children and adolescents: Child care, including vaccinations, growth and development screenings, as well as health education, is part of Primary Care.
- Older Adults: Primary Care plays an important role in the care of the elderly by addressing age-related health issues such as preventing falls and managing chronic diseases.

According to Domingos and Braga (2015), aromatherapy is beneficial in the treatment of various dementias, regardless of the type and degree of severity, in relation to agitation and other neuropsychiatric symptoms. The authors also mention that more information is needed to reach safer conclusions.

- Patients with mental health problems: Numerous primary care teams include mental health professionals, including nurses, occupational therapists, and psychologists who can help diagnose and treat mental health problems such as anxiety and depression.

According to Domingos and Braga (2015), the application of aromatherapy, through massage, in users during psychiatric hospitalization, favors multiple benefits, causing the reduction of anxiety symptoms. However, they point out that, although aromatherapy is becoming a promising technique in the treatment of anxiety, depression and other psychiatric disorders, there is still a lack of studies with the public with mental disorders.

- Patients in situations of social vulnerability: Primary Health Care also prioritizes equity in health care, providing care to communities in situations of vulnerability, including homeless individuals, migrants, and refugees.
- Patients with special needs: Primary Care also proposes to be a healthcare facility accessible to patients with special needs, including people with physical or intellectual disabilities.

> [...] we highlight the structuring and strategic character that PRIMARY CARE (or Primary Health Care) can and should have in the constitution of health care networks, to the extent that (primary care) is characterized by great proximity to the daily lives of people and collectives in their territories, since basic units are the type of health service with the highest degree of decentralization and capillarity. Primary care teams have the possibility of bonding, taking responsibility and acting in the realization of collective actions of promotion and prevention in the territory, in individual and family care, as well as in the (co) management of users' unique therapeutic projects, which sometimes require pathways, trajectories, lines of care that cross other modalities of services to meet health needs in a comprehensive way (Brasil, 2013a, p.13-14).

Thus, Primary Care can be understood as a Public Health strategy designed to meet a wide range of health needs and promote equitable access to health care. It plays an essential role in health promotion, disease prevention, and the management of chronic and acute health conditions.

> Primary care, as one of the structuring axes of the SUS, is experiencing a special moment when it is assumed as one of the priorities of the Ministry of Health and the federal government. Among its current challenges, those related to access and welcoming, the effectiveness and problem-solving capacity of its practices, the recruitment, provision and retention of professionals, the capacity for management/coordination of care and, more broadly, its bases of support and social legitimacy stand out (Brasil, 2013a, p. 8).

As a practice recognized for the possibility of being used both individually and collectively (Pessoa *et al.*, 2021) aromatherapy in Primary Health Care is an effective and low-cost therapy (Gnatta; Day; Silva, 2011; Gnatta *et al.*, 2011), and helps to enhance satisfactory responses in the treatment of many pathologies. In addition, it contributes to preventing the installation of others, being applicable in various clinical scenarios, including in the workplace itself (Pessoa *et al.*, 2021).

However, it is necessary to consider that for it to be performed, it is necessary that the professional has knowledge and practice in its application (Pessoa *et al.*, 2021).

The well-known ICPs effectively build a new understanding of the health-disease process and care promotion, by seeing the patient as a whole, and need to be valued, encouraged, and disseminated.

4 FINAL THOUGHTS

The Unified Health System (SUS) undeniably represents one of the most expressive examples of public policy in Brazil today. This system, the result of extensive debates and the democratic mobilization of civil society, as well as of the institutional spaces of the Brazilian State, especially the health reform movement (a "movement of movements"), was incorporated into the 1988 Constitution. It is based on the premise that health is a right of all and a responsibility of the State, based on principles and guidelines such as universality, equity, comprehensiveness, decentralization, and social control.

Over the last two decades, it has been observed that the SUS has experienced a paradoxical development, since it has implemented comprehensive health policies, despite chronic challenges, including the issue of insufficient and unequal funding. This evidences, on the one hand, the resilience of the ideal and the joint effort of various actors and institutions that contributed to the construction of the SUS, making it an invaluable public asset that requires careful preservation. On the other hand, the SUS needs continuous "support" and "cultivation", not only to avoid setbacks in the broad social agreement that conceived it, but also because there is a long way to go to effectively consolidate this system. This will allow all Brazilian citizens to feel supported in their health-related needs and demands.

Unlike allopathy (conventional treatment), which can present side effects and adverse responses, aromatherapy, a practice incorporated into the SUS in Brazil, stands out as a holistic, gentle therapeutic option, covering the body and mind, and is gaining increasing acceptance among the population, because, as a Complementary Integrative Practice, it focuses on the prevention of diseases, the recovery of health, in addition to promoting self-care.

Therapy that uses substances, essential oils (EO) through inhalation, olfactory or topical application, with the purpose of reducing anxiety, promoting well-being, constituting itself as an expanding practical tool to avoid or reduce harm, relieve suffering, help improve self-esteem and prolong life, in addition to favoring the creation of positive bonds, reducing isolation and abandonment, and also that it can contribute to interprofessional work little by little, has been incorporated into Brazilian culture.

It is capable of acting on physical and psychological imbalances, helping to rescue, above all, the human essence; This essence, which is increasingly forgotten, to the detriment of the "rules" imposed by society. The characteristics of this society are the unbridled competition, both in personal and professional life and, consequently, physical and psychological fatigue, as well as extreme materialism. In this context, essential oils have the power to make the air that will be breathed purer and, at the same time, promote relaxation, stimulate or relieve feelings, by inducing reflective moments.

It should be noted, however, that there is a resistance on the part of the population in not believing in the effects provided by aromatherapy treatment, since it is not a common practice of daily life, but, thanks to the numerous benefits it can bring to the community, and the positive reports of those who have already undergone to try it, it can be said that aromatherapy is at the beginning of a long journey. It has to be established all over the world, but there is also still much to be researched and invested, so that it effectively becomes a therapeutic approach widely recognized as conventional and scientific medicine, thus gaining more credibility and respect.

The term "integrative practice" commonly refers to the incorporation of complementary approaches to the health system, and for this reason the acronym PICS. This means that there needs to be a clear understanding of what is considered a "complementary" practice and what is considered an "alternative" practice. When it is a non-conventional practice and is used in conjunction with traditional (conventional) medicine, it is considered "complementary". In contrast, when a non-traditional (unconventional) practice is used to replace conventional medicine, it is considered "alternative."

It is infrequent to apply purely alternative approaches, taking into account that individuals who use non-conventional approaches, in the vast majority, use them in parallel with conventional medicine. However, through integrative and complementary therapies, it is perfectly possible to bridge the gap between traditional and modern medicine."

Complementary health practices, so to speak, can be classified as those that make use of natural products or practices of the body and mind to stimulate natural mechanisms to prevent diseases and recover health, with a focus on welcoming listening, which can collaborate in the prevention of diseases and also in the treatment of chronic diseases.

Aromatherapy is inserted in this context and contributes significantly to the "quality of life" factor of the population, seeking an integral and holistic view of the individual. However, their effectiveness and safety, and subsequently the cost and financial impact, need to continue to be researched and evaluated to guide the incorporation of these practices into the health system, not only in the public sphere.

In one way or another, it is a *sine qua non condition that the* health professionals involved are engaged in order to contribute to the demystification of the science that covers aromatherapy, in order to increase the understanding of effective and safe practices for the scientific community and, also, for the non-scientific and scientific community. in the face of empiricism and the denial of the reality of this technique.

Thus, based on the assumption that the use of aromatherapy, in practice, has known beneficial effects on various clinical scenarios, and that it can, in fact, be an effective practice in the care of the Primary Health Care network, this study does not intend to be the last to address this topic. Further work should be carried out in order to further support aromatherapy, because, in addition to it not being seen as a substitute for conventional medical treatments, taking into account the Brazilian context that faces challenges of funding and limited access to services, it is essential that it is an approach used responsibly, as a complementary therapy and not as an exclusive alternative and so that we can open new perspectives for the health, well-being and quality of life of citizens.

It is important to understand that, despite the therapeutic potential in various clinical scenarios, more studies on Aromatherapy need to be carried out in the sense that they encompass important points regarding the forms of administration, time to provide the desired effect of reduction, for example, of some symptoms, choice and seals of the quality of the essential oils used and, and possible interferences and associations with medications.

However, thanks to the benefits already demonstrated and taking into account the reality of Primary Health Care in Brazil, the level of care of the Brazilian SUS, it is possible to accept and support the use of aromatherapy as an expanding practice, not only favoring the individual but also the collective level. The incorporation of teams as a form of collective care for the community should be a common occurrence in health services. The intention is, through the structuring of these teams, to improve the efficiency of the work process and involve users and other team members in the educational process, which is aligned with interdisciplinary practice.

Although the physician can be an important agent of medicalization, other health professionals can also act, in some way, in this process, making their list of action broader for dimensions that life has, until then, in part, absent from this type of intervention.

Numerous challenges are presented, and among them, issues related to financing, the workforce, and health care management and care models stand out. With regard to the latter, referring

to the way of conceiving and organizing health systems and services based on technical and political choices, they deserve special attention. This is because they exert a substantial influence on how people and communities receive care in their everyday lives.

Therefore, it is crucial that not only is there an adequate amount of health services, but also that these services are coordinated collaboratively, rather than competitively, following a networks of care approach. These networks must be able to meet individual and collective needs in a comprehensive, equitable, integrated, and shared manner.

Finally, it is hoped that, through actions and in cooperation with other measures carried out by the Ministry of Health, professionals qualified to perform Aromatherapy in Brazilian Primary Health Care, including physicians, will be able to play a fundamental role in the production and comprehensive administration of care in a network, having a positive impact on the lives of people and communities.

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Nurses' role in acute coronary syndrome in emergency patients

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Rafael de Carvalho dos Santos
Nurse from Faculdade Bezerra de Araújo, First Responder of the Military Fire Brigade of the State of Rio de Janeiro, Professor from Faculdade Bezerra de Araújo, coordinator of the postgraduate course in urgencies and emergencies for nurses, Master in local development from Universidade Augusto Motta. Specialist in Urgency and Emergency by Uninter, Specialist in Intensive Care by Uninter, Specialist in Cardiology and Hemodynamics by Unyleya,
ORCID: 0000-0002-4219-0151
E-mail: santoscbmerj@hotmail.com

Camile Lourenço da Silva Teixeira
Institution: Faculdade Bezerra de Araújo
ORCID:0009-0005-8369-0127
E-mail: Camilelourenco5@gmail.com

Camilla de Carvalho Dovales
Educational institution: Faculdade Bezerra de Araújo
ORCID:0009-0000-1149-6230
E-mail: dovalesccamilla@gmail.com

Renata Dantas de Souza
Educational institution: FABA
ORCID: 0009-0008-1686-9823
E-mail: renatadantasmraone@gmail.com

Isabela Aparecida Rodrigues Brazil
Educational institution: Faculdade Bezerra de Araújo
ORCID:0009-0009-4712-5461
E-mail: isaabellaa.br@gmail.com

Laryssa de Abreu Fialho Silva Pereira
Educational institution: Faculdade Bezerra de Araújo
ORCID:0009-0003-7881-9358
E-mail: lary.spsilva@gmail.com

ABSTRACT

Acute coronary syndrome (ACS) is a pathology that annually leads to the death of thousands of people around the world. Every year new statistics emerge, and every year they get worse on the global stage. Thus, the following question was asked: "what would be the role of the nurse in the face of a victim with acute coronary syndrome in the emergency department?" That is why the objective of this study was to describe the performance of nurses in a qualified way in the face of the clinical manifestations of Acute Coronary Syndrome. In view of the severity of the pathology and the high rate of morbidity and mortality, further studies on the subject are extremely relevant to better instruct professionals and disseminate the new protocols for the care of these patients. To do this, we chose to use the methodology in the form of an integrative review, to which throughout the research we came across a total of 35 articles talking about this theme. From this number, we excluded 16 because they were outdated and used 19 to carry out this work. We conclude that good care provided in the emergency room quickly and effectively significantly increases the chances of patient survival and, therefore, we can affirm that the initial approach with emphasis on the prevention of lesions secondary to ischemic myocardial injury is extremely important. Therefore, the health professional should be aware of the signs of poor tissue perfusion, thus preventing these secondary lesions.

Keywords: Acute coronary syndrome, Ischaemia, Acute myocardial infarction.

1 INTRODUCTION

It is notorious that Brazilian public health is still a slow system, but cardiovascular diseases still have a high rate of morbidity and mortality in Brazil and worldwide. Research showed that in 2012, in the period between January and October, heart disease was one of the main causes of death

(20.6%) affecting adults aged 20 to 59 years (24%). Acute myocardial infarction accounted for 12.1% of deaths in this group at the time. (Lopes et al. 2014)

The study of the etiology of ACS is essential so that this pathology affects the population less and less. ACS occurs due to any action that causes myocardial ischemia, since by generating a blockage in the coronary arteries, the affected vessels are unable to fulfill their function of irrigating the heart muscle, producing acute myocardial infarction or angina. (Carvalho, 2022)

There are risk factors that can contribute to the onset of ACS, among the non-modifiable risk factors is biological sex, considering that women spend most of their time being asymptomatic presenting symptoms only late, age group (men over 60 years and women over 70 years) and family history. Among the modifiable risk factors are arterial hypertension, diabetes and dyslipidemia (these are diseases that, when controlled, promote a better quality of life for the individual, reducing the chances of the appearance of other pathologies), alcohol consumption, smoking, sedentary lifestyle and obesity. (SANTOS et.al, 2017)

ACS has multiple complications and one of them is Acute Myocardial Infarction (AMI), in which the partial obstruction of a vessel can already cause it. It is noticeable that AMI is a huge problem in the health of Brazilians and that many of them die at home, even before they can get to the hospital to receive the necessary care and half of the deaths occur two hours after the episode. (PESARO et. al, 2008)

Acute Coronary Syndrome (ACS) has been receiving greater attention, since a large part of the population has turned to a change in habits that compromise quality of life, however, cardiovascular diseases are still positioned as the major cause of non-violent death in the country, causing the hospital environment to receive a large number of patients with symptoms focused on this health problem. (MAGEE et. al, 2012)

The development of more effective treatments and prevention measures would be ways to reduce the impacts caused by cardiovascular diseases. It is essential that the nursing team has full control of the risk factors that cause acute coronary syndromes in order to act more actively in the development of campaigns and programs to reduce their mortality rate (LOPES et. al, 2014)

The Resolution of the Federal Council of Nursing - COFEN-423/2012 prescribes the specification of the risk scale and how the private performance of the Nurse with his team has to be prepared to perform and perform care with excellence. The Nurse is the one who has the first contact and has to be ready to perform the care in the emergency services with the hypothesis of a possible ischemia, to be proven we perform the first electrocardiogram (which has the function of seeing the electrical activities of the heart through the electrodes that are fixed on the patient's skin) and the intervention of the doctor is already requested to see what the treatment measures and the Nursing will

be He is always around, in direct care of the patient and usually reassuring and assisting during treatment. (NUNES et.al,2020)

2 DATA ANALYSIS

2.1 DESCRIPTION OF THE ANATOMY AND PHYSIOLOGY OF THE MYOCARDIUM

The heart is a vital organ of the body responsible for pumping blood and maintaining good capillary perfusion to all organs. It is composed of specialized muscle tissue, being supplied by the coronary arteries that ascend from the aorta and ensure the necessary supply for the body's demands. (BAPSTITELA, 2021)

The myocardium must receive a good blood supply so that there is a supply of nutrients and oxygen and it can produce enough energy for it to be able to perform its contractions, therefore, the first branches that come out of the aorta (right and left coronary artery) are directed to the myocardium itself, to ensure the blood supply of the heart muscle itself and the acute myocardial infarction happens exactly when the irrigation of the same by the coronary arteries is impaired, i.e. there is an obstruction. (SANT'ANNA et.al, 2022)

The heart muscle, myocardium, has its musculature formed by cardiomyocytes (cardiac striated muscle fibers) that are individual and located around the heart. These fibers on the surface of the atria and right ventricles form two layers, while in the left ventricle they can form up to 3 layers and, therefore, it is concluded that the left ventricle is much thicker because it must pump blood with a higher pressure in the systemic circulation than the right ventricle. (Sobotta, 2019)

In the heart we have afferent nerve pathways and it is through them that stimuli are transmitted and reach the CNS (Central Nervous System) and, from there, these pathways approach the dermatomes (nerve fibers from the cutaneous areas) and direct to the spinal cord. The myocardium is directly related to the T3 and T4 dermatomes, also called the Head Zone. This is a cutaneous region where chest pain manifests, this can be caused by a reduction in blood flow causing angina pectoris or even infarction. (Sobotta, 2019)

The coronary arteries get their name because they form a crown at the base of the heart, both coronary arteries (right and left) originate from the aortic artery, specifically in the upper part of their origin, in the left ventricle and posteriorly to the pulmonary trunk. The left coronary artery arises in the left aortic sinus and in its posterior course to the pulmonary trunk it bifurcates to form the anterior interventricular and circumflex branches, while the right coronary artery originates in the right aortic sinus and irrigates the right ventricle (RV), a posterior part of the left ventricle (LV), also irrigates the posterior interventricular septum, the right atrium (RA) and the interatrial septum, in this way contributing to the conduction system of the heart. (MENDES, 2019)

2.2 CLASSIFICATION OF ACUTE CORONARY SYNDROMES

When the patient receives the diagnosis of acute coronary syndrome, he goes through a classification of this pathology, which is stable angina, which is when there is an increase in oxygen consumption, since the coronary wall is obstructed, unstable angina that occurs when there is a decrease in the supply of oxygen transiently, since the plaques that are obstructing the coronary rupture and become loose, Non-ST Elevation AMI (Acute Myocardial Infarction), which is when there is a partial myocardial injury without an electrocardiogram change, and ST-segment AMI, which is when a transmural myocardial injury occurs with an electrocardiogram change. (PESARO et.al, 2008)

Angina pictoris: discomfort in the chest or precordial region, caused by myocardial ischemia, its main cause can be atherosclerotic disease, but it can also be caused by embolism, vasculitis or aortic dissection. (NICHOLAS, 2021)

Angina of recent onset, pathology that appears in a period of less than two months and worsens when performing usual efforts. (KLONNER, 2007)

Caused by a focal spasm of a coronary artery, which can lead to severe coronary ischemia, diagnosis is by ECG and sublingual calcium channel blockers and nitroglycerin. (FERREIRA, 2015)

Acute coronary syndrome (ACS) is a group of clinical symptoms that are linked to myocardial ischemia, such as ST-segment elevation acute myocardial infarction (STEMI) and non-ST-segment elevation acute myocardial infarction (NSTEMI) and unstable angina (UA). It is of paramount importance to identify the changes in symptoms in order to choose immediate treatment with repercussions, such as thrombolytics or primary angioplasty. (SOUZA, 2019)

Cardiovascular diseases, also identified with the acronym CVDs, are the major causes of morbidity and mortality in the world and among them is Acute Coronary Syndrome. ACS is an emergency situation because its clinical symptoms are compatible with the symptoms of acute myocardial ischemia. (CARVALHO, et.al 2019)

STEMI with STEMI (STEMI) and AMI Without STEMI ST-segment elevation (NSTEMI) has as its main characteristic the increase and/or decrease in biomarkers of myocardial injury other than Unstable Angina (UA), which represents chest pain specific to myocardial ischemia, but there is no change in these biomarkers. The Electrocardiogram (ECG) is a test commonly performed in patients with suspected ACS, in which the ST segment and the AVR lead are evaluated, the elevation of both may be associated with a severe coronary lesion. (BORN et.al, 2021)

2.3 SIGNS AND SYMPTOMS OF ACUTE CORONARY SYNDROME

The signs and symptoms of Acute Coronary Syndrome should be analyzed carefully, since the symptoms are not always as evident as the typical pain, for example when we have tightness, burning, radiation to the left upper limbs, pain greater than 10, 20 minutes. It may happen that the symptoms come from an anginal equivalent, where syncope, dyspnea, nausea and vomiting may present and the patient is sudoreic and therefore it is extremely important to be aware of all the signs. (VASCONCELOS et.al, 2021)

One of the main reports is chest pains or a strong feeling of oppression radiating to the upper limbs and epigastric. The duration of this pain is a factor of paramount importance, because a duration of more than 20 minutes with no improvement at rest or with drug interaction increases the chances of accurate diagnosis. (PAIVA, 2021)

The pain of infarction is usually similar to the pain of angina, but with greater intensity and duration greater than 20 minutes. The patient is dyspneic and has palpitations, nausea and has cases of emesis (MAGEE, 2012).

Patients who are affected by ACS, in addition to angina pain, also have symptoms such as pain in the thoracic region, asthenia (weakness), excessive fatigue and vertigo. It is common for the pain to start in the mandibular region and extend to the umbilical scar (navel), and can even affect the stomach. In order to have an accurate diagnosis, it is necessary to provide agile and effective care as soon as the patient goes to the care unit. (MOURA, 2021)

ACS is defined as an obstruction, which can be permanent or temporary, of a coronary artery and this obstruction is usually due to the accumulation of lipid plaques inside the artery, causing a blockage. The clinical manifestation is characterized by myocardial oxygen imbalance, presenting as STEMI (ST-Elevation Myocardial Infarction), NSTEMI (Non-ST-Elevation Myocardial Infarction) and UA (Unstable Angina). (SOUZA, 2019).

2.4 PROTOCOL FOR DEFINING THE DIAGNOSIS OF ACUTE CORONARY SYNDROME

It is important that the diagnosis of ACS (Acute Coronary Syndrome) is made as early as possible, since a large part of the deaths that occur due to this pathology happen 1 hour after the discovery, for this it is necessary to have ECG monitoring, as well as oxygen therapy and a fight against the patient's suffering through medications, Because the pains cause an increase in heart rate that results in the worsening of the patient's case. (Bassan, 2006)

Investigation of the clinical history is essential to make the differential diagnosis of ACS etiologies and appropriate management. Chest pain is the most common clinical manifestation of myocardial ischemia, being present in about 80% of cases. It is usually a pressure pain in the

retrosternal region and can radiate to the upper limbs, neck, and jaw. Concurrently, diaphoresis, dyspnoea, abdominal pain and syncope may be present. (Carvalho, 2022)

Every diagnosis is concluded based on the information and tests requested, and we are able to identify the problem through an electrocardiogram that shows us the electrocardiogram changes. Depending on the symptoms, the change in markers begins six hours after the onset of pain (PESARO et.al, 2004)

The ECG tracing has to be controlled because it is essential to continue its treatment and to be attentive to the evolution of the disease. The alterations will decrease through a correct diagnosis and treatment, it leads us to therapeutic success, but if the electrical alterations persist, it shows us that there was a discourse in the diagnosis and treatment, promoting more invasive conducts (MAGEE et.al, 2012)

Newly diagnosed with ACS, it is extremely important to understand the clinical acts in order to circumvent the pathology. Some of the procedures performed on patients with ACS are myocardial revascularization and the use of balloon angioplasty (a procedure that increases the width of the arteries). For patients who are over 75 years of age, the ideal is the use of beta-blocker medications, and in patients under 75 years of age, it is common to perform the PCI (Percutaneous Coronary Intervention) procedure. (BEGNINI, et.al, 2021)

The initial care of the patient is given by the nurse in the triage, so the professional must be extremely qualified to provide the necessary support to the patient right from the beginning, such as monitoring in order to control vital signs, the administration of oxygen for a good tissue perfusion

It is of paramount importance to make an early diagnosis of primary diseases that cause imminent risk of death for ACS, pulmonary thrombosis and aortic dissection, for example. (SON, 2020)

To classify the severity of ACS, we used the HEART and GRACE scores. In the HEART score, we evaluated the following data: family history, ECG, age, risk factors, troponin, TIMI, and gender. The HEART score has a low risk score of less than 3, a medium risk of 4 to 6, and a high risk of 7 or higher. (FEITOSA , 2021)

In the GRACE score, we evaluated eight markers: age, blood pressure (systolic), pulse rate, serum creatinine, cardiac arrest on admission, elevated cardiac biomarkers, ST-segment deviation, and Killip. Low risk 1-108, intermediate risk 109-140 and high risk greater than 140. (FEITOSA, 2021)

2.5 TREATMENT OF ACUTE CORONARY SYNDROME

In order for there to be an effective result in the treatment against ACS, it is essential to have an early risk stratification, recognizing and classifying the risk to which the patient is, which is carried

out during the hospitalization period and can be done in different ways. This process is essential for professionals to be able to direct themselves to the best therapeutic strategies. (Pesaro et, al 2008)

In cases of hypoxemia with saturation less than 92%, O2 supplementation should be introduced. Situations that are offered without its need cause complications, because O2 increases vascular resistance, thus reducing flow and increasing mortality. The recommended standard would be to start with the supplementation of a mask or nasal catheter at 2-4l/min accompanied by blood gas analysis. (Aguiar, 2022)

Therefore, the most effective way to reduce the impact of cardiovascular diseases, especially ACS on the population, is through the development of preventive actions and treatment of modifiable risk factors, such as systemic arterial hypertension (SAH), diabetes mellitus (DM), dyslipidemia, sedentary lifestyle and smoking, in addition to early diagnosis and treatment. in order to ensure better survival for carriers. (SOUZA et al.2022)

We can say that morphine is effective for pain relief and its action is vasodilator, and doses of 4-8mg intravenously can be administered, but its side effects cause bradycardia and hypotension. Nitrates, on the other hand, are used to relieve symptoms and decrease AMI mortality. (PESARO. et al, 2004)

Anticoagulants are drugs that will inhibit the generation of thrombin and some anticoagulants have been tested and used in studies but only four drugs are available for use, unfractionated heparin, enoxaparin, fondaparinux and bivalirudin. (SILVA, et.al 2015)

Beta-blockers are used in ACS because it slows the heart rate and lowers blood pressure, and should be a routine and early medication in patients with ACS, except in situations where the patient has some contraindication, for example chronic lung disease or severe liver disease. (Souza, 2021)

3 RESULTS AND DISCUSSIONS

The 19 selected articles underwent a detailed analysis, and data pertinent to this research were extracted. Chart 1 shows the main variables of each of them, containing year, author, journal, objectives, and main results and discussions.

Chart 1: Main variables of the 19 articles selected from the electronic databases

Year	Title	Authors	Newspaper	Objectives	Results and discussions
2006	Approach to acute coronary syndrome	Fernando Bassan and Roberto Bassan	Journal of the Society of Cardiology of Rio Grande do Sul – year XV n 07	To verify the importance of the diagnosis of acute coronary syndrome for the clinical status of the patient.	Early diagnosis of ACS is essential, because if it is too late, the vast majority of patients die.
2008	Acute coronary syndromes: treatment and	Antonio Eduardo Pereira Pesaro, Paulo	Brazilian Journal of Intensive	To know how risk stratification influences the best	An effective treatment is essential so that the patient gets out of the

	risk stratification.	Cesar Gobert Damasceno Campos, Marcelo Katz, Thiago Domingos Corrêa, Elias Knobel.	Care – vol 20 n° 2	therapeutic strategies.	acute phase and does not run an imminent risk of death.
2022	Acute coronary syndrome: an approach to its impact on cardiology	Lanna do Carmo Carvalho, Nuno Brandão di Barros Cachapuz Caiado, Sofia Carneiro Mansur Silva, Jehovah Guedes de Lima, Rilávia Eneiha Monteiro Alves, Marina Gabriela Magalhães Barbosa Murta, Edivaldo Bezerra Mendes Filho, Wilkie Azevêdo Machado, Heitor dos Santos Leão, João Pedro Sasso, Isabella Gomes Tenan	Research, society and development , vol. 11 n°9	Understand the etiology and appropriate treatment for acute coronary syndrome.	The study of the etiology of ACS shows that this pathology increasingly affects the population that several tests must be done to isolate it.
2018	Predominant Risk Factors in the Population With Acute Coronary Syndrome	Amanda Francielle Santos, Rafaela Ribeiro Machado and Míriam Geisa V. Menezes	ver.Saúde.com 14(2)	To report the risk factors of higher incidence in individuals with Acute Coronary Syndrome.	It is concluded that a large part of the population studied with ACS suffers more from modifiable risk factors, especially hypertension and smoking.
2021	Association and Comparison of high-risk electrocardiographic alterations with coronary lesion findings and out-of-hospital clinical outcome in patients with Acute Coronary Syndrome	Rodrigo Freitas do Nascimento, Reginaldo Cipullo, Lucas Magalhães dos Reis and Seleno Glauber de Jesus-Silva	Ver. Ciênc. Avg. 2021	To differentiate the changes in the electrocardiogram that present angiocoronary lesions, presenting a clinical outcome.	It was impossible to differentiate the clinical outcomes, such as length of hospital stay and death, in any of the groups analyzed, because the high-risk patterns were associated with severe coronary lesions, triggering an invasive treatment, whether endovascular or surgical, similar to AMI with or without ST-segment elevation.
2021	Nursing Care for Patients with Acute Coronary Syndrome.	Josué Moura do Nascimento	Dspace/Manakin Repository	To identify the main nursing care for patients with Acute Coronary Syndrome.	The professional quoted to carry out the accurate risk classification is based on technical and scientific knowledge to be able to identify an

					SCA.
2019	The Role of Nurses in the Fight against Acute Coronary Syndrome: Literature Review	Mariana Rocha de Souza	CEUB Higher Education	To describe the role of the nurse in the classification of risk or in care with chest pain suggestive of ACS.	The greatest efficacy for the improvement of a patient who has suffered myocardial ischemia is the rapid identification of this clinical picture.
2023	The new classification of chronic coronary syndrome and the currently available methods of diagnosis and treatment.	Amanda P. Santos, Henrique Viviani, Jaqueline Rossi Marim and Márcio Marins Peixoto	Cardiology in Focus: prevention, diagnosis and current treatments. Epitaya Publishing House	Demonstrate the updates of the protocols for classification, diagnosis and treatment of the pathology in a clearer and more accurate way.	It is concluded that we currently have several ways to make a diagnosis, including non-invasive monitoring, which is less harmful to health, and its treatment includes other classes of drugs.
2022	Profile of individuals with acute coronary syndrome treated at an urgent and emergency hospital in Acre.	Mathews Barbosa Santiago, Christopher Wando da Silva Souza, Matilde da Silva Conceição and Ruth Silva Lima da Costa	Ver Soc Arm Clin Med. 2022; 20(1):28-34	OBJECTIVE: To describe the profile of individuals with acute coronary syndrome treated at an urgent and emergency hospital in Acre.	The results reflected the profile of the patient admitted to the unit studied, in addition to the identification of associated risk factors and the use of invasive procedures to obtain the diagnosis of acute coronary syndrome.
2012	Acute Coronary Syndrome: a review	Raquel Ferreira Magee, Estefânia Cardoso Trindade Lacerda, Guilherme de Freitas Braga Borges, Gibran Antonio Garcia Daher, Rhaisa Ghannam Macedo, Ana Cláudia Cavalcante Nogueira and Alexandre Visconti Brick	See Med Saúde Brasília 2012; 1(3):174-89	To review the ACS theme from its fundamental concepts, through the pathophysiological process, correlate it with the clinical picture and finally highlight the approach for rapid and accurate diagnosis.	ACS is a pathological entity of great importance because it causes risk of death, in addition to being responsible for large health care costs. Thus, the physician who receives the patient in the emergency service must be prepared for emergency care of those who are admitted with chest pain, or even atypical conditions, especially in the elderly, women and diabetics, quickly and effectively.
2021	Signs and symptoms of acute coronary syndrome in the elderly: an integrative review.	Bruno Castro de Paiva	Fabiana Gulin Longhi Library (CRB-8:7257)	Identify the signs and symptoms of acute coronary syndrome in the elderly.	Almost all studies have reported the occurrence of angina pain, which may be typical or atypical. The pain could or could not be associated with some other factor and/or ischemic equivalent, such as ischnea, sweating, nausea and emesis.
2014	Association of cardiovascular risk factors with the	Evelise Helena Fadini, Reis Brunori, Camila Takáo Lopes,	Ver. Latino-Am. Nursing	To identify the relationship between the different presentations of acute	Hypertension and high levels of low-density lipoprotein were associated with

	different presentations of acute coronary syndrome.	Agueda Maria Ruiz Zimmer Cavalcante, Vinicius Batista Santos, Juliana de Lima Lopes and Alba Lucia Bottura Leite de Barros		coronary syndrome and cardiovascular risk factors among hospitalized individuals	different presentations of coronary syndrome. The results can provide subsidies to health professionals for secondary prevention programs aimed at behavior change.
2010	Prevalence of risk factors for acute coronary syndrome in patients treated in an emergency room	Karine Franke Lemosa , Roberta DAVISb , Maria Antonieta MORAESc and Karina AZZOLIN	See Gaúcha Enferm., Porto Alegre	The objective of this study was to characterize the profile of patients with Acute Coronary Syndrome (ACS) treated at an emergency service in Porto Alegre, Rio Grande do Sul, Brazil, with regard to risk factors.	The results of this study demonstrate lifestyle habits that condition the development of coronary artery disease. It was possible to verify a high prevalence of risk factors for acute coronary syndrome in the population treated in the emergency room of a general hospital in Porto Alegre, among which sedentary lifestyle, overweight and obesity, and systemic arterial hypertension were significantly present in the sample.
2020	Acute Coronary Syndrome: a review	Raquel Ferreira Magee, Estefânia Cardoso Trindade Lacerda, Guilherme de Freitas Braga Borges, Gibran Antonio Garcia Daher, Rhaisa Ghannam Macedo, Ana Cláudia Cavalcante Nogueira and Alexandre Visconti Brick.	Vol. 1 No. 3 (2020): Journal of Medicine and Health of Brasília	The objective of this article is to review the ACS theme from its fundamental concepts, through the pathophysiological process, correlate it with the clinical picture and finally highlight the approach for rapid and accurate diagnosis.	Acute Coronary Syndrome (ACS) is an important problem in the contemporary world since it is a medical emergency, one of the main causes of non-violent death. This syndrome, in terms of its spectrum of presentation, can be classified into three forms: Unstable Angina, ST-segment Elevation Acute Myocardial Infarction, and Non-ST-segment Acute Myocardial Infarction.
2019	Early identification of acute coronary syndrome: a literature review	Anderson Cavalcante, Alessandra de Andrade Alves dos Santos, Dalayne Deysi Silva Braz, Lenilson Santos da Trindade, Ângela Maria Melo Sá Barros and Diego Santos de Souza	Vol. 4 No. 2 (2019)	The present study aimed to investigate the factors that influence the search for health services; recognize the relevant aspects in the care of patients with acute coronary syndrome; and, to identify the main protocols applied in the care of patients with acute	Cardiovascular diseases (CVD) represent a serious public health problem worldwide. In Brazil, CVD is the leading cause of death, accounting for almost 32% of deaths.

				coronary syndrome.	
2019	Suspicion of Obstructive Sleep Apnea defined by the Berlin Questionnaire predicts events in patients with Acute Coronary Syndrome	Eryca Vanessa S. de Jesus	Vol. 10 No. 2 (2019)	To investigate whether a standardized clinical diagnosis of OSAS in patients with ACS predicts the risk of cardiovascular events during hospitalization.	From a mechanistic point of view, obstructive sleep apnea (OSAS) can cause extra disturbances to cardiovascular homeostasis in the presence of acute coronary syndrome (ACS).
2015	Current treatment of non-ST-elevation acute coronary syndrome	Fernando Morita Fernandes Silva1, Antonio Eduardo Pereira Pesaro1, Marcelo Franken1, Mauricio Wajngarten	Thematic Review: Intensive Care • EINSEinstein (São Paulo) 13 (3) • Jul-Sep 2015	When the team is qualified for such treatment, they have fewer keys to make mistakes and thus promoting the well-being of that patient.	There will always be the clash of which treatment is better or which drug will have the most effect. But we have to take into account the patient's entire history and risk.
2020	Care for patients with Acute Coronary Syndrome: an integrative review	Flávia Maria Palmeira Nunes, Amanda Benício da Silva	Vol. 18 No.2 (2020) Journal of Health Sciences Nova Esperança	It aims to show the role of nursing in welcoming and how an adequate form of care needs to be established.	It showed that when we in Nursing provide quality care, we achieve better care for patients.
2004	Acute Myocardial Infarction: ST-segment elevation Acute Coronary Syndrome	Antonio Eduardo Pereira Pesaro, Carlos Vicente Serrano Jr, José Carlos Nicolau	Journal of the Brazilian Medical Association	Acute myocardial infarction is one of the main and major causes of mortality and a large part of the population does not receive adequate treatment.	He notes that the disease can be treated by major therapeutic advances and by specific units.

Source: prepared by the authors, 2023

In order for there to be an effective result in the treatment against ACS, it is essential to have an early risk stratification, recognizing and classifying the risk to which the patient is, which is carried out during the hospitalization period and can be done in different ways. This process is essential for professionals to be able to direct themselves to the best therapeutic strategies. (Pesaro et, al 2008)

Confirming what Pesaro says, the immediate treatment to be done is consistent with minimizing the risk to the patient's life, taking him out of that state of urgency, so that when he is stable, the necessary tests can be done. It is known that the electrocardiogram is essential in ACS and it should be done within 10 minutes after the patient's entry, reducing the risk of death, as well as beta-blockers are essential to reduce the heart rate, diuretics, oxygen supplementation, anticoagulant and antiplatelet therapy and coronary revascularization are essential for the intervention of this pathology. (Carvalho et., al 2022)

Pesado and Carvalho are succinct in what leads to the necessary treatment, since the correct thing would be to have a lifelong medical follow-up to know if the patient has the predisposition to

this pathology that affects a large part of the population and the electrocardiogram is an essential test that many people spend their entire lives without performing one.

One of the main reports is chest pains or a strong feeling of oppression radiating to the upper limbs and epigastric. The duration of this pain is a factor of paramount importance, because a duration of more than 20 minutes with no improvement at rest or with drug interaction increases the chances of accurate diagnosis. (PAIVA, 2021)

Confirming what was reported by Paiva, the main clinical manifestation of ACS is pain in the thoracic region that spreads to the upper limbs, both right and left, and can also reach the mandibular region. He also added changes in consciousness and abdominal pain as symptoms. (MAGALHÃES et.,al 2022)

As reported by Magalhães and Paiva, Acute Coronary Syndrome is an emergency case that is extremely characteristic in its symptoms, so I believe that the immediate action is to reduce damage and stabilize the patient, leaving the closure of the diagnosis for post-stability. After stabilization, the diagnosis is made and the most important thing is to investigate the trigger point that caused the ACS.

Patients who are affected by ACS, in addition to angina pain, also have symptoms such as pain in the thoracic region, asthenia (weakness), excessive fatigue and vertigo. It is common for the pain to start in the mandibular region and extend to the umbilical scar (navel), and can even affect the stomach. In order to have an accurate diagnosis, it is necessary to provide agile and effective care as soon as the patient goes to the care unit. (MOURA, 2021)

Acute Coronary Syndrome (ACS) is associated with myocardial ischemia (heart muscle) that occurs through inconsistency of atherosclerotic plaques associated with the rupture of blood vessels. There is a grouping of symptoms that characterize ACS, with chest pain as the main one, which can be prolonged affecting the right and left upper limbs and also the mandible, in addition this syndrome can be associated with other symptomatic manifestations such as nausea, sweating, pain in the abdominal region and lipothymia (feeling of fainting). (NUNES et.al, 2020)

Affirming what Moura and Nunes say, it is necessary to provide quick and resolute care immediately and this is done through a professional trained to make a quality assessment during the triage so that there is no negligence, leaving the patient to wait longer than he should.

Therefore, the most effective way to reduce the impact of cardiovascular diseases, especially ACS on the population, is through the development of preventive actions and treatment of modifiable risk factors, such as systemic arterial hypertension (SAH), diabetes mellitus (DM), dyslipidemia, sedentary lifestyle and smoking, in addition to early diagnosis and treatment. in order to ensure better survival for carriers. (SOUZA et al. 2022)

According to PEIXOTO in 2023, an essential aspect of the management of patients with CCS is the importance of controlling risk factors – smoking, hypertension, diabetes, dyslipidemia, and

lifestyle factors – in order to reduce symptoms and improve overall prognosis1. Evidence considers that the most effective method to achieve this is a combination of behavioral and pharmacological approaches, which includes regular physical exercise, capable of significantly decreasing cardiovascular risk factors, including blood pressure, insulin resistance, and blood lipids. (Peixoto, 2023)

As mentioned during the article, prevention is the best treatment for the pathology, since a large part of the population has systemic and cardiovascular diseases, such as diabetes and hypertension. The change of daily habits, such as healthy eating and physical exercise, are the most difficult steps to be completed by society, as they do not have incentive or family monitoring, causing neglect in basic treatment.

The ECG tracing has to be controlled because it is essential to continue its treatment and to be attentive to the evolution of the disease. The alterations will decrease through a correct diagnosis and treatment, it leads us to therapeutic success, but if the electrical alterations persist in showing us that there was a discourse in the diagnosis and treatment, promoting more invasive conducts. (MAGEE et.al, 2012)

In 2019, Souza reaffirms that the initial clinical evaluation and interpretation of the ECG indicate the procedure that should be taken later and, in cases suggestive of ACS, it is essential to perform risk stratification that will score the patient in the standardized score that will determine the therapeutic conduct that meets all basic human needs such as oxygenation, ventilation, circulation, perfusion, comfort and pain control, safety, among others, are subjective to each individual, in addition to verifying the possibility of morbidity and mortality. (Souza, 2019)

Magge and Souza were precise when they stated that early diagnosis is essential for adequate treatment, the qualified ECG reading will score the risk classification of this patient on a standardized scale to perform the therapeutic conduct in a qualified and humanized way, providing the lowest type of biological and surgical risk.

It is important that the diagnosis of ACS (Acute Coronary Syndrome) is made as early as possible, since a large part of the deaths that occur due to this pathology happen 1 hour after the discovery, for this it is necessary to have ECG monitoring, as well as oxygen therapy and a fight against the patient's suffering through medications, Because the pains cause an increase in heart rate that results in the worsening of the patient's case. (Bassan, 2006)

Going against what Bassan says, Vasconcelos confirms that the patient must receive the diagnosis through an electrocardiogram precisely within 10 minutes of the individual's entry, requiring oxygen, as well as venous access so that the drugs can be administered quickly. (Vasconcelos et., al 2021)

I believe that all the screening for the diagnosis of ACS should be done immediately so that it meets the correct treatment, because it is a disease in which everything occurs very quickly and the risks that the patient runs must be removed as soon as possible.

Beta-blockers are used in ACS because it has the function of slowing heart rate and lowering blood pressure, and should be a routine and early medication in patients with ACS, except in situations where the patient has some contraindication, for example chronic lung disease or severe liver disease. (Souza, 2021)

Beta-blockers should be used consciously because they have some cardiac and non-cardiac adverse effects, such as precipitation or worsening of congestive heart failure, slowing of the resting heart rate and the development of sinus bradycardia. Non-cardiac adverse effects include increased airway resistance, exacerbation of peripheral arterial disease, hypercalcemia, and hypoglycemia. (COLOMBO, 2021)

As Souza and Colombo say, the use of beta-blockers should be used consciously so that it does not cause harm to the patient, because as mentioned above they can be harmful if not used consciously, this drug can be used in a reduced way when associated with other drugs, thus mentioning vasodilators, morphine and anticoagulants.

It is of paramount importance to make an early diagnosis of primary diseases that cause imminent risk of death for ACS, pulmonary thrombosis and aortic dissection, for example. (SON,2020)

The initial approach to a patient according to the Ministry of Health reaffirms that it is of paramount importance to diagnose or rule out a possible ACS, in addition to diagnosing life-threatening diseases such as pulmonary embolism. Recognize individuals with a higher propensity to develop ACS. (Mathias, 2021)

According to the authors Filho and Mathias, we can affirm the importance of early diagnosis of primary diseases to reduce the progression to ACS. It is important to closely monitor patients with a greater predisposition to this disease.

ST-segment elevation AMI (STEMI) and non-ST-segment elevation AMI (NSTEMI) have as their main characteristic the increase and/or decrease in the biomarkers of myocardial injury other than Unstable Angina (UA), which represents chest pain specific to myocardial ischemia, but there is no change in these biomarkers. The Electrocardiogram (ECG) is a test commonly performed in patients with ACS, in which the ST segment and the aVR due are evaluated, the elevation of both may be associated with a severe coronary lesion. (BORN et.al, 2021)

According to Mathews Barbosa Santiago, Acute Coronary Syndrome is diagnosed based on UA (Unstable Angina), and is related to ST-segment elevation non-ST AMI (NSTEMI) and ST-segment elevation AMI (STEMI), affirming what Nascimento reports. (SANTIAGO et., al 2022).

According to Nascimento and Santiago, it is necessary to perform tests to be able to diagnose AMI (STEMI) and AMI (NSTEMI) and one of these tests is the electrocardiogram that we can see if there is any change.

Cardiovascular diseases, also identified with the acronym CVDs, are the major causes of morbidity and mortality in the world and among them is Acute Coronary Syndrome. ACS is an emergency situation because its clinical symptoms are compatible with the symptoms of acute myocardial ischemia. (CARVALHO, et.al 2019)

According to Carvalho, Pellense points out that CVDs are the leading causes of death, in low- and middle-income countries 88% of deaths occur due to CVD. Other countries have adopted a healthier lifestyle, thus promoting measures for a better quality of life. (PALLENSE, et.al 2021)

That is why the actions that CMS carry out to make the population aware of the risks of cardiovascular diseases are so important. It is of paramount importance to show the population how serious cardiovascular diseases are and that they can be prevented with simple changes in habits.

4 FINAL CONSIDERATIONS

According to what has been presented, we can conclude that agile and quality care from the screening is the differential for the patient's clinical condition, considering that there is a reduction in sequelae since treatment and diagnosis would be carried out early. In addition, the studies presented pointed out that ACS has avoidable risk factors that can be spared by simple changes in habits, such as changing diet, stopping alcohol consumption and smoking, and practicing physical activities routinely. In view of this, the nurse's function is to qualify as a professional for the brief identification of the pathology presented during the anamnesis, to welcome the patient by promoting well-being activities, specialized and humanized care, seeking an efficient nursing diagnosis so that there is a nursing implementation and evaluation in a qualified way, bringing benefits to the patient's health status.

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Difficulties in urgent and emergency care in small municipalities: Literature review

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Edenílson Leonardo Vendrameto de Moura
Nurse
SMG University Center – Maringá

Gabriel Zanin Sanguino
Doctor
State University of Maringá

Flávia Cristina Vieira Frez
Doctor
State University of Maringá

Heitor Hortensi Sesnik
Undergraduate in Nursing
State University of Maringá

Larissa Carolina Segantini Felipin
Doctor
State University of Maringá

Lorraine de Souza Santos
Undergraduate student in Nursing
State University of Maringá

Ana Luísa Serrano Lima
Undergraduate Nursing Student
State University of Maringá

Maria Eduarda Itikawa Fernandes
Undergraduate Nursing Student
State University of Maringá

Franciele Emily Iamaguchi
Master
Unicesumar

Kelly Cristina Suzue Iamaguchi Luz
Doctor
State University of Maringá.

ABSTRACT
The objective of this study was to point out the difficulties faced in urgent and emergency care for critically ill patients in small municipalities, according to the current literature. This is a bibliographic research, with a qualitative, retrospective approach, of a basic nature, with the exploratory purpose of data, having as a data source articles published between the years 2006 and 2021. From February to November 2021, 576 articles were collected, but only 13 met the inclusion criteria, and 563 articles were discarded. The results were separated into axes. Axis 1 grouped articles that discuss the management and conditions of the urgency and emergency service in small municipalities. Axis 2 describes elements that identify and report all the difficulties faced by nurses on a daily basis in the urgent and emergency service. Axis 3, on the other hand, contains the reports that express all the feelings of stress and suffering experienced in the hospital environment. The first axis is headed for 3 articles, the second axis is 7 for articles and the third axis is for 3 articles. The difficulties faced by small municipalities involve issues related to the physical structure, the excessive demand for work that could be reviewed and distributed among the less complex services, and the feelings generated by the obstacles experienced, such as the work overload that causes stress.

Keywords: Difficulties in the Emergency Room, Hospital emergency service, Cities.

1 INTRODUCTION

The health professional who is part of the front line of a hospital must always be prepared to identify and recognize a critically ill patient, classifying him efficiently and correctly (MELO E SILVA, 2011).

Since 2004, the Ministry of Health (MH), through the National Humanization Policy (PNH), has recommended that services seek training and qualification of nurses for the implementation of Reception with Risk Classification.

According to the PNH Booklet (2004), "the Risk Classification Assessment technology presupposes the determination of agility in care based on the analysis, from the perspective of a pre-established protocol, of the degree of need of the user, providing care centered on the level of complexity and not on the order of arrival".

After classifying the patient who seeks an emergency room, he can be referred to the red axis – patients at risk of death – or he can be referred to the blue axis – patients classified as urgent, slightly urgent or non-urgent (WHITAKER, 2015). Critically ill patients treated in a small municipality are referred to the stabilization room, established and provided by the urgency and emergency network (RUE) for the care of critical or severe patients, with the condition of guaranteeing 24-hour care, linked to a health equipment articulating and connecting to other levels of care (BRASIL, 2011).

After the stabilization of this patient, the transfer to the referral service in the case of hospitalization is carried out by the SAMU (Mobile Emergency Care Service), where, through a regulation center, with the proper collection of data regarding the patient's health status, the regulation of this patient is made for acceptance by the referral service and transportation (CONSÓRCIO INTERMUNICIPAL DE URGÊNCIA E EMERGÊNCIA DO NOROESTE DO PARANÁ, n.d.).

In Brazil, about 62% of hospitals are considered small, that is, they have up to 50 beds registered in the National Registry of Health Establishments (CNES), and small municipalities are those with up to 20 thousand inhabitants (BRASIL, 2010) and according to Ugá and López (2007), these municipalities have significant importance in the Unified Health System (SUS). because they are strategic elements for the formulation of the care model for a given territory.

In 2004, the Ministry of Health published Ordinance No. 1044/04, which established the National Policy for Small Hospitals (PNHPP), where financing was organized and stimulated the insertion of Small Hospitals in the health care network (BRASIL, 2004).

Health care networks or systems (HCN) are "organizational arrangements of health actions and services, of different technological densities, which, integrated through technical, logistical and management support systems, seek to ensure the comprehensiveness of care" (WHITAKER, 2015).

However, municipalities with small hospitals face difficulties in caring for the population, whether with the availability of resources, with the structuring of the unit or with the structuring of the team. In a study carried out by Souza and his collaborators (2019), in small municipalities in the State of Paraná, it was found that there is a desire to maintain small hospitals, even if they do not respond resolutely to the demands of the population, but their closure would cause a negative impact on the legitimacy of the managers in office. And, the same authors also emphasize that these hospitals should

participate in the RUE, even if they do not solve many of the problems, but they manage to play the role of regulator and their users are referred to larger hospitals.

According to the IBGE (Brazilian Institute of Geography and Statistics), 3770 Brazilian municipalities (67.7%) have less than 20 thousand inhabitants and concentrate 31.6 million inhabitants, which corresponds to 14.8% of the population (IBGE, 2021). As there is an important number of municipalities in this condition, it is worth emphasizing the importance of studying the difficulties faced by them, therefore, this study sought to point out the difficulties faced in urgent and emergency care for critically ill patients in small municipalities, according to the current literature.

2 METHODOLOGY

This is a bibliographic research, with a qualitative, retrospective approach, of a basic nature, with the exploratory purpose of data.

This study was based on articles published between 2006 and 2021, and the year 2006 was chosen, as it was when the reception policy began to be structured in the services and from that date on there was a risk classification, based on the 2004 NHP. The articles were found in the Bireme, Google Scholar and *Scielo* articles databases, and should answer the guiding question "What is the difficulty faced in urgent and emergency care in small municipalities?". And the descriptors used were: emergency hospital services, difficulty and urgency and nursing in the emergency service, emergency treatment.

The inclusion criteria were: Brazilian articles in Portuguese, which had in their context reports experienced by nursing professionals as nurses, nursing technicians and auxiliaries, during urgent and emergency care, and answered the guiding question.

Exclusion criteria were: articles that did not have reports and descriptions of nursing professionals in the urgency and emergency service in their context were excluded. And the research of the works took place between the months of February and November 2021.

The results were separated into categories, according to the content extracted from the articles, one of which was in the content analysis based on Bardin's content analysis, but with analysis of articles and were arranged in tables.

As this is a literature review, there is no need for a Human Research Ethics Committee.

3 RESULTS AND DISCUSSION

From February to November 2021, 576 articles were collected, but only 13 met the inclusion criteria, and 563 articles were discarded.

For better visualization, the titles of the articles, the objectives and the data related to the publications are shown in Table 1.

Table 1: Presentation of the analyzed articles regarding their title, objectives, and publication data, MARINGÁ, PR 2021.

Title	Authors	Magazine	Year of publication	Objective	Axis
The structure of a public emergency service, from the workers' point of view: quality perspectives	Larissa Gutierrez da Silva , Laura Misue Matsuda , Maria Angelica Pagliarini Waidman	Texto Contexto Enferm,	2012	To apprehend the perception of workers of a public emergency service in relation to the quality of the local structure.	1
Conditions and motivations for the work of nurses and physicians in high-complexity emergency services	Antonio da Cruz Gouveia Mendes; José Luiz do Amaral Corrêa Araújo Júnior; Betise Mery Alencar Souza Macau Furtado; Petra Oliveira Duarte; Ana Lúcia Andrade da Silva; Gabriella Morais Duarte Miranda	Rev. Bras Enfermagem	2013	To investigate the motivations for work and to evaluate the working conditions offered to nurses and physicians in the care of users in emergency services.	1
Challenges for emergency care management from the perspective of nurses	José Luís Guedes dos Santos; Maria Alice Dias d Silva Lima; Aline Lima Pestana; Estela Regina Garlet; Alacoque Lorenzini Erdmann	Acta paul. enferm	2013	To analyze the challenges for care management in an emergency hospital service, based on the perspective of nurses.	1
Nursing in the process of hospital accreditation in an urgent and emergency service	Suzinara Beatriz Soares of Lima; Alacoque Lorenzini Erdmann[I]	Acta paul. enferm	2006	build nursing actions to restructure the Emergency Room of a university hospital according to the standards of Hospital Accreditation in urgency and emergency according to the Ministry of Health.	2
Evaluation of emergency hospital services of the QualiSUS program	Gisele Oliveira O'Dwyer; Sergio Pacheco de Oliveira; Marismary Horsth de Seta	Ciênc. saúde coletiva	2009	evaluate the emergencies of the QualiSUS program.	2

Patient safety in emergency situations: perceptions of the nursing team	Andréa Tayse de Lima Gomes Federal University of Rio Grande do Norte. Natal, Rio Grande do Norte, Brazil. Marcos Antônio Ferreira Jr Pétala Tuani Candido Oliveira Manacés dos Santos Bezerril Flávia Barreto Tavares Chiavone Viviane Euzébia Pereira Santos	Rev. Bras. Enferm	2019	To know the perception of nursing professionals regarding the essential aspects for the provision of safe care to polytrauma patients in the emergency service.	2
The humanization of emergency care from the perspective of nurses: focus on polytrauma patients	Jéssica Siqueira Perboni Renata Cunha da Silva Stefanie Griebeler Oliveira	Interações	2018	to understand the perception of the nurses of the emergency unit about the humanized care of polytrauma patients.	2
24-hour UPA Emergency Care Unit: Perception of the disease	Saionara Nunes de Oliveira Bianca Jacqueline Ramos , Marina Piazza , Marta Lenise do Prado, Kenya Schmidt Reibnitz , Adalbi Cilonei Souza	Texto Contexto Enferm,	2015	to describe the perception of the nursing team about the UPAs, as well as to know the weaknesses and potentialities found by the professionals inserted in this service.	2
Mobile care for psychiatric urgencies and emergencies: perception of nursing workers	Lucidio Clebeson de Oliveira Harlon França de Menezes Richardson Lemos de Oliveira Dhyanine Morais de Lima Sâmara Fontes Fernandes Richardson Augusto Rosendo da Silva	REBEN	2018	To understand how nursing workers perceive the care of people in situations of psychiatric urgencies and emergencies in SAMU.	2

Work process of nurses in an emergency hospital service	Simone Kroll Rabelo Suzinara Beatriz Soares de Lima José Luís Guedes dos Santos Valdecir Zavarese da Costa Emilene Reisdorfer Centennial College, Tanise Martins dos Santos Jocelaine Cardoso Gracioli	Rev. Bras. Enferm	2020	To analyze the work process of nurses in a hospital emergency service.	2
Symptoms of stress in nursing workers in an emergency room	Maycon Rogério Seleghim Monica Augusta Mombelli Magda Lúcia Félix de Oliveira Maria Angelica Pagliarini Waidman Sonia Silva Marcon	Rev. Gaúcha Enferm	2012	OBJECTIVE: To identify the association of sociodemographic, occupational, and economic data with the presence of stress symptoms in nursing workers at an ED unit in southern Brazil.	3
Work in hospital emergencies: suffering and defensive strategies of nurses	Maria de Lourdes Custódio Duarte Cecilia Helena Glanzner . Leticia Passos Pereira	Rev. Gaúcha Enferm	2018	2018To analyze distress factors and defensive strategies of nurses who work in an emergency room of a university hospital	3
Feelings experienced by nursing professionals working in an emergency unit	Salomé, Geraldo Magela; Maria de Fátima Moraes Salles; Victoria Helena Cunha Sposito	Revista Brasileira de Enfermagem (Online)	2008	To know the meaning of working in an emergency unit for nursing professionals.	3

Source: Survey data

The selected articles were separated into 3 thematic axes, namely: Axis 1: Physical conditions and challenges in the structure of the urgency and emergency service; Axis 2: Nurses' perception of the urgency and emergency service; Axis 3: Symptoms of stress and suffering experienced in urgent and emergency care.

Axis 1 grouped articles that discuss the management and conditions of the urgency and emergency service in small municipalities. Axis 2 describes elements that identify and report all the

difficulties faced by nurses on a daily basis in the urgent and emergency service. Axis 3, on the other hand, contains the reports that express all the feelings of stress and suffering experienced in the hospital environment. The first axis is headed for 3 articles, the second axis is 7 for articles and the third axis is for 3 articles.

3.1 THEMATIC AXIS 1: PHYSICAL CONDITIONS AND CHALLENGES IN THE STRUCTURE OF THE URGENCY AND EMERGENCY SERVICE

In this axis, it was observed that nursing goes through many challenges in its work environment on a daily basis, which, due to the lack of good physical structure, materials, good management and professional organization, affect care.

In emergency situations, care is difficult when conditions are not favorable, such as, for example, many stretchers on site, the non-separation of patients, the lack of organization of the sector and the lack of qualified professionals, in addition to the lack of responsible physicians with good coordination with the team.

An example is the fragment below:

> [...] The management of overcrowding, of the excess of patients with our conditions [..] I like to have the unit as organized as possible within the disorganization of the emergency, we live and coexist with it, always trying to alleviate it, but a sector that soon has 20, 60, 100 patients, and you are seeing things, one patient on top of the other[...] (SANTOS et al, 2013).

In this case, in order to improve the service, it would be important to invest in professional qualification and team management. The increase in beds is not always a feasible condition, as public services depend on government offices (SANTOS et al 2013).

The difficulties faced during the working day of the nurses in the emergency unit were highlighted. Dissatisfaction with material resources that often do not work or are in a precarious situation, making professionals feel insecure, as excerpted from the article by Perboni et al (2019).

> [...] The quality of the equipment, it arrives on time and things don't work as they have to, we never work alone, or sometimes divergences of ideas with the medical team are complicated also because you have a vision, you try to do the best and they, have a focus, don't even understand each other.
> [...] With the lack of equipment or equipment that works properly during an emergency, it is very complicated to have a good quality of care, and with that, it ends up generating discussions between doctors and nurses [...]. Perboni et al (2019).

To program and implement changes aimed at improving care and emergency services, leadership emerges as an important managerial tool for nurses. Exercising it is a challenge in relation to the resistance of the nursing and health team in the face of the proposition of new actions (SANTOS et al, 2013).

The above description of the problems is common in emergency rooms, even in small municipalities, as they face a lack of material and crowded services, often without the capacity to solve the patient's condition.

3.2 AXIS 2: NURSES' PERCEPTION OF THE URGENCY AND EMERGENCY SERVICE

The Emergency Hospital Service (EHS) is a complex scenario in health care in Brazil and in the world. Despite the increasing implementation of care protocols and policies, the care provided by EHS still presents weaknesses, especially due to the lack of back-up beds and the continuous demand for care that characterizes these care scenarios. (RABELO et al,2020)

In addition to cases that are treated in the UPAS (Emergency Care Units) that do not qualify as emergencies, generating a flow of patients, which exceed the capacity of the service. The care of these cases becomes time-consuming, causing stress, not only for the patient who waits, but also for the team that faces this situation on a daily basis, having to repeat the purpose of the UPAS for each patient, according to Oliveira et al (2015).

> [...] Here it should only be urgency and emergency to try to stabilize cases of more serious patients, to refer more and quite different patients to the hospital; They [the population] come for outpatient cases that should be treated at the clinic, such as ringworm, foot bugs [...] Oliveira et al (2015).

In this case, it is observed that the lack of orientation of the population leads to conflicts and stress because they do not know what urgent and emergency care is and the cases that should be treated in a UBS (Basic Health Unit), and the patient ends up seeking the emergency service because he thinks he will be treated faster. This reality also happens in smaller cities. (OLIVEIRA et al, 2015)

Emergency service professionals recognize that this is due to the failure of the health system to absorb this demand in primary care, as we can see in the following statement taken from Oliveira et al, 2015.

> [...] It's not the patient's fault, it's the system's fault that can't accommodate this patient. This guy even tried to go to the clinic, we see the record in the medical record, but they told him that there was no doctor, or that there was no vacancy on the agenda, or that he had to make an appointment, as it is difficult to access the clinic, they come to the UPA because they know that we cannot deny care, So they think it's easier to come here than to go there at dawn to get a token [...] Oliveira et al (2015).

It was also observed that the insecurity in relation to the medical team could be related to the lack of preparation and segmentation of the care provided in the emergency service. (PERBONI et al, 2019).

> [...] It's with the relationship with some surgeons, I see that some surgeons get very nervous [...]. The technicians here are very well trained, so, as there are many attendances, polytrauma

> patients arrive several times, they are already ace like this, in knowing what the care is like, the sequence of care [...].
> [...] The biggest difficulty for us is because we don't have a back-up to hold us together [...] I think the service here is very good in terms of nursing, but in the medical part we often don't have it, our back-up, which would be the medical team, doesn't give this security, you know [...] here we have residency right now, there are residents entering the surgery and everything new [...] Perboni et al (2019).

In view of the obstacles experienced by urgent and emergency workers in their practice related to the lack of an articulated and integrated mental health care network, they report that they do not have training in the area of mental health, which shows the need to work on this issue, since the number of users in emergency situations is increasing every day. according to Oliveira et al (2020).

> [...] In addition to the obstacles in the care of psychiatric patients, such as the health network that is not articulated and integrated, we are not prepared to serve these users [...] so the care will never be comprehensive [...]. We have frequent training aimed at pre-hospital care, such as updating basic and advanced life support, but directed to psychiatric urgencies and emergencies specifically was never offered [...] what I know about psychiatry I saw in college [...]

Oliveira et al, 2020, further write:

> SAMU concerns situations that affect the intersubjective premises of humanization and comprehensiveness
> [...] the care provided to the SAMU to the mentally ill and inhumane user is not comprehensive [...] and a violence to the user [...] practically based on sedation and restraint [...] the abuse of these drugs is great [...] there should be a better alternative for our work: to be more humane [...] the psychiatric user and a human being.
> [...] Thinking about our own safety and that of the team and the family, sometimes we end up being a little inhumane, making it difficult to provide comprehensive care [...] and to contain and sedate [...] I have seen colleagues even assaulting patients. Oliveira et al, (2020).

When the nursing team takes over the shift, it is a great challenge, since it basically starts by "putting out fires", due to lack of medication, excess of patients, insecurity in the environment (RABELO et al, 2020).

It is observed that the perception of the workers is that the emergency services are crowded due to the lack of orientation of the population regarding the difference between the Emergency Room and the UBS. It is noted that the lack of backup in the emergency services is something that is worrisome, because the lack of assistance or the non-continuity of care is eminent, in addition to the need for specialized care, where we do not have a specialized network for care, and SAMU, as a mobile regulator, ends up paying for the care of victims where the smaller municipalities are not able to attend.

3.3 AXIS 3: SYMPTOMS OF STRESS AND SUFFERING EXPERIENCED IN URGENT AND EMERGENCY CARE

Tiredness, exhaustion, anguish, impotence and pain due to work overload caused by the lack of material, structure and professionals are signs pointed out by SALOMÉ et al (2009), it is observed

that the activities of nursing professionals, whether care or administrative, require a high degree of agility, physical dexterity and energy. (SALOMÉ et al, 2009)

> [...] When I am alone on duty I get very tired and stressed during and after the shift, for the reason that we have a reduced number of employees in the EU and in addition to being a clinical nurse I have to work in administrative work.
> [...] The shift in the EU is usually stressful, mainly because during the night the patients are not evolved and I end up doing all the systematization of the patients and the worst thing is that I have to collect all the routine exams [...]
> [...] The stress is so much that when the shift ends I feel that my whole body hurts, too much in the lumbar and cervical region. I don't feel like leaving the house and going for a walk [...] Salomé et al (2009)

Something that is observed is the night work hours of nursing professionals and the continuous delay in sleep due to work schedules, leading to insomnia and, consequently, stress. Shift workers or night shift workers usually have poor quality sleep during the day because of social conflicts, things we do during the day and things we do at night – excessive daytime noise. (SELEGHIM et al, 2012)

With the overload in night care, professionals end up being more worn out, tired with a heavy body, due to the fact that they cannot have a moment of relaxation and tranquility, because they do not have professionals to take turns and with that they end up working at night without resting, and over time it can lead the professional to have depression and loss of sleep. (SELEGHIM et al, 2012).

In smaller cities, sometimes there are not enough professionals to take turns and rest, especially at night, causing the overload and stress of an isolated job.

4 FINAL THOUGHTS

Through this study, it was verified that the difficulties faced by small municipalities involve issues related to the physical structure, the excessive demand for work that could be reviewed and distributed among the less complex services, and the feelings generated by the obstacles experienced, such as the work overload that causes stress.

Even though this is the reality of an important portion of Brazilian municipalities, we still realize that the activities carried out by these cities are still quite exhaustive, but necessary, because sometimes it is the only health offer for the population living in these municipalities.

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Hypertensive kidney disease in Brazil between 2011 and 2021

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Lais Kaori Sato Murrugarra
Undergraduate Nursing Student
State University of Maringá

Kelly Cristina Suzue Iamaguchi Luz
Doctor
State University of Maringá

Gabriel Zanin Sanguino
Doctor
State University of Maringá

Jéssica Vitória Nunes da Silva
Undergraduate student in Nursing
State University of Maringá

Flávia Cristina Vieira Frez
Doctor
State University of Maringá

Heitor Hortensi Sesnik
Undergraduate in Nursing
State University of Maringá

Isabela Tatiane de Oliveira
Undergraduate student in Nursing
State University of Maringá

Gabriel Vale dos Santos
Undergraduate in Nursing
State University of Maringá

Ana Clara Luckner
Undergraduate Nursing Student
State University of Maringá

Larissa Carolina Segantini Felipin
Doctor
State University of Maringá

ABSTRACT
Hypertensive kidney disease (HCD) is a progressive kidney injury that has its origin due to long-term poorly controlled arterial hypertension, even with prevention campaigns, hypertension is still an important public health problem. The aim of this study was to describe the number of deaths caused by hypertensive kidney disease in Brazil from 2011 to 2021. This is a descriptive, exploratory study with a quantitative approach, with data collected through access to the DATASUS health data platform. Within the period analyzed, the total number of deaths was 106,973. In the ten years evaluated, the year with the highest number was 2021, totaling 10,979 deaths due to hypertensive kidney diseases. Regarding gender, there were 1,360 deaths in men and 1,185 deaths in women. In view of the data obtained, it is observed that male and elderly patients (60 to 80 years or older) have a greater susceptibility to the development of comorbidities associated with hypertensive renal crisis. This trend can be explained by the fact that men, in general, tend to show less concern with health and lower adherence to self-care practices when compared to women.

Keywords: Renal Hypertension, Causes of Death, Brazil.

1 INTRODUCTION

Hypertensive kidney disease (HCD) is a progressive kidney injury that has its origin due to long-term poorly controlled arterial hypertension (GRECIO, MAIA, LOPES, 2022). In addition, the clinical diagnosis of hypertensive kidney disease begins with the suspicion of an increase in serum creatinine and consequently a reduction in glomerular filtration rate, associated with proteinuria (WILLIAMS, et al, 2018; UNGER, et al, 2020). Consequently, when the lesion compromises a large extent of renal function, the treatment may require hemodialysis and for this, patients need a vascular

access that allows the connection of the patient's circulation to the external hemodialysis circuit (GRECIO, MAIA, LOPES, 2022).

Arterial hypertension can be considered one of the most common risk factors for strokes, cerebrovascular accidents, myocardial infarction and progressive kidney diseases. And despite the numerous health promotion campaigns, linked to the population's health education for the practice of healthy habits such as a balanced diet and physical exercise, the consequences of hypertensive problems entail a high cost for public health (SCHMITZ, 2012). In addition to long-term complications, such as changes in family dynamics, absenteeism, cardiovascular complications, among others.

According to DATASUS, diseases of the circulatory system are found in chapter IX of the International Classification of Diseases and Related Health Problems (ICD), which includes groups of diseases ranging from acute rheumatic fever (I00-I02) to other disorders, and unspecified diseases of the circulatory system (I95-I99). In the third group of hypertensive diseases (I10-I15), specifically in category I12, there is hypertensive kidney disease (HRD), which includes the following diseases: renal arteriosclerosis; arteriosclerotic nephritis, whether chronic or interstitial; hypertensive nephropathy; nephrosclerosis or any condition classified within the renal system1 which is a progressive kidney injury caused by long-term poorly controlled arterial hypertension (DATASUS).

It should be noted that HRD is a multicausal disease, since risk factors may be associated with therapy, presence of comorbidities; presence of acute diseases; age, hydroelectrolyte disorders; acid-base balance disorders, changes in fluid balance; in addition to individual susceptibility that may have repercussions on renal function (BENICHEL, MENEGUIN, 2020; DANTAS, et al, 2021).

Nurses play a crucial role in educating patients about the importance of adopting healthy habits to prevent HRD, in addition to assisting in the early identification of signs and symptoms and monitoring appropriate treatment. Prevention of the disease is of paramount importance so that the long-term repercussions are minimized. For this reason, and due to the various repercussions for the individual's health, the following question was raised: What are the rates of deaths from hypertensive kidney disease in Brazil?

2 OBJECTIVE

To describe the number of deaths caused by hypertensive kidney disease in Brazil from 2011 to 2021.

3 METHODS

This is a descriptive, exploratory study with a quantitative approach. Data were collected through access to the DATASUS health data platform. The search was conducted in August 2023.

Deaths from 2011 to 2021 were selected using the International Classification of Diseases (ICD) Diseases of the Circulatory System, belonging to chapter IX. After this analysis, the following filters were used: a) Gender b) Age to verify which gender and age group were most affected by hypertensive kidney diseases, and this item was grouped into: < one year; one to four years; five to 19 years; 20 to 59 years old and 60 to 80 years old or older.

As this is a research carried out exclusively with data in the public domain and in accordance with the guidelines established by Resolution 674/2022 of the National Health Council, the present study does not require consideration by the Ethics Committee.

4 RESULTS AND DISCUSSION

Within the period analyzed, the total number of deaths was 106,973 thousand. In the ten years evaluated, the year with the highest number was 2021, totaling 10,979 deaths due to hypertensive kidney diseases. Considering that the first three most affected cities were São Paulo (23% - 2,545), Rio de Janeiro (11% - 1,200) and Minas Gerais (9% - 1,047), it was decided to stratify the age groups only in these three municipalities.

After using the filters, the following results can be observed: for males, in São Paulo, 2 deaths (< 1 year); 0 deaths (1 to 4 years and 5 to 19 years); 282 deaths (20 to 59 years old) and 1,076 deaths (60 to 80 years old or older), totaling 1,360 deaths.

In Rio de Janeiro, no deaths due to hypertensive kidney disease were reported for the first three groups; 129 deaths (20 to 59 years old) and 462 (60 to 80 years old or older), totaling 591 deaths. And in Minas Gerais, no deaths due to hypertensive kidney disease were reported for the first two groups, 2 deaths (5 to 19 years); 125 deaths (20 to 59 years old) and 418 deaths (60 to 80 years old or older), totaling 545 deaths.

For females, in São Paulo, 0 deaths (< 1 year); 0 deaths (1 to 4 years); 2 deaths (5 to 19 years old); 257 deaths (20 to 59 years old) and 926 deaths (60 to 80 years old or older), totaling 1,185 deaths; in Rio de Janeiro, no deaths from hypertensive kidney disease were reported for the first two groups; 2 deaths (5 to 19 years old); 123 deaths (20 to 59 years old) and 484 (60 to 80 years old or older), totaling 609 deaths. In Minas Gerais, no deaths due to hypertensive kidney disease were reported for the first three groups; 86 deaths (20 to 59 years old) and 416 deaths (60 to 80 years old or older), totaling 502 deaths.

The results show that the incidence of hypertensive kidney diseases is more present in the age group of 60 to 80 years or older and the most affected sex is male. This outcome is in line with another study published in the literature, where males, as well as advanced age, were more susceptible to chronic kidney problems (BIAZE, et al, 2022).

Studies indicate that renal failure affects around twice as many men (14.7%) as women (5.9%), so the sex is more likely to develop the final stage of chronic renal failure, that is, hypertensive nephropathy. It is noteworthy that advanced age is one of the risk factors for chronic renal failure (NOBLAT et al, 2004). In addition, taking into account that hypertensive kidney diseases arise when not treated in the long term, it should be taken into account that the lifestyle that women lead is superior when compared to men (COSTA et al, 2015).

In addition, studies indicate that males may face greater health challenges due to their reluctance to seek care. This can be attributed, in large part, to the presence of cultural, socioeconomic, educational, and bureaucratic obstacles that act as barriers to the effective participation of men in the Brazilian public health scenario (SANTOS et al, 2022). In addition, men tend to seek care at longer intervals (DIAS et al, 2022), when the signs and symptoms are possibly already well aggravated.

5 CONCLUSION

In view of the data obtained, it is observed that male and elderly patients (60 to 80 years or older) have a greater susceptibility to the development of comorbidities associated with hypertensive renal crisis. This trend can be explained by the fact that men, in general, tend to show less concern with health and lower adherence to self-care practices when compared to women. These long-term behavior patterns can influence the onset not only of hypertensive kidney crisis, but also of other health conditions. Therefore, it is essential to recognize these specific risk factors in order to implement promotion, prevention, and targeted intervention strategies for this population.

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Rare diseases: What information is available on social media?

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Brenda de Oliveira Lima
Nurse
SMG University Center – Maringá-PR

Kelly Cristina Suzue Iamaguchi Luz
Doctor
State University of Maringá

Gabriel Zanin Sanguino
Doctor
State University of Maringá

Flávia Cristina Vieira Frez
Doctor
State University of Maringá

Ana Luísa Serrano Lima
Undergraduate Nursing Student
State University of Maringá

Maria Eduarda Itikawa Fernandes
Undergraduate Nursing Student
State University of Maringá

Edicleia Martins Rampani
Master
Unicesumar

Fábio Luiz Vieira Frez
Graduating in Nutrition
Unicesumar

Franciele Emily Iamaguchi
Master
Unicesumar

Larissa Carolina Segantini Felipin
Doctor
State University of Maringá

ABSTRACT
Rare diseases are those that affect up to 65 people per 100,000 individuals, that is, 1.3 people per 2,000 individuals, and are classified in their nature as: genetic and non-genetic in origin. Considering the difficult access to the correct diagnosis and treatment of rare diseases, the internet, through virtual social media, has been a tool for support and clarification of patients and families. The aim of this study was to verify the information available on rare diseases on the internet, using the virtual social media Facebook and Instagram and to evaluate the quantity and relevance of the published material. This is a cross-sectional, descriptive study, using social media Facebook and Instagram, data collection took place from September 7 to November 10, 2022, and this period was established for convenience. For research on social media, the words "rare diseases" were used; "rare diseases in Brazil" and the question: "What are rare diseases?". In the search carried out in the virtual social networks, profiles of support groups and associations with individuals with rare diseases (04), profiles that presented concepts and clarification about rare diseases (04), profiles that disseminated the laws of support for patients with rare diseases (04) and content producers (04) were identified. Virtual social networks are tools used on the internet, being useful and easy to access and with thousands of simultaneous accesses worldwide and with a wide range of information being shared every second. Unfortunately, on the other hand, it is observed that the publications are lacking in depth and, at times, in content quality. While there are pages and profiles dedicated to rare diseases, the vast potential of this digital environment remains underutilized.

Keywords: Rare diseases, Use of the Internet, Information Systems.

1 INTRODUCTION

Rare diseases are those that affect up to 65 people in every 100,000 individuals, that is, 1.3 people for every 2,000 individuals (Micheleti and Oliveira, 2023), being classified in their nature as:

genetic and non-genetic in origin (Brasil, 2014) and there are between 6 and 8 thousand rare diseases in the world, and for 95% of them, there is no specific treatment to date (Brasil, 2019).

In 2014, the Ministry of Health instituted the Guidelines for Comprehensive Care for People with Rare Diseases in the Unified Health System (SUS), which determines that Specialized Care Services and Reference Services for Rare Diseases will be components of the Health Care Network, in the National Policy for Comprehensive Care for People with Rare Diseases in the SUS. and should offer specialized and comprehensive care, being responsible for both prevention and therapy in these cases.

Thinking about the best approach to the patient with rare disease, two axes of rare diseases were listed, the first axis being composed of diseases of genetic origin: 1-Congenital Anomalies or Late Manifestation, 2-Intellectual Disability, 3-Inborn Errors of Metabolism; and the second axis formed by diseases of non-genetic origin, being Rare diseases of a non-Genetic nature - the following groups of causes were proposed: 1- Infectious, 2- Inflammatory, 3- Autoimmune, and 4 - Other Rare Diseases of Non-Genetic origin (Brasil, 2014).

In order to provide care to individuals with rare diseases or at risk of developing them, the network needs to be structured to ensure comprehensive and coordinated care, from reception and support to resolution and follow-up of the patient. However, families of people with rare diseases are treated unequally in health services, but not exactly because of prejudice, but often because the services do not have the technological resources to treat a rare condition or because professionals are not prepared (Luz, 2015).

In an attempt to fill the gaps found in health services, individuals who do not find answers to their questions turn to the internet, especially after the SARS-CoV-2 pandemic in 2020. Virtual social networks became part of the daily life of the population that was in social isolation, and in addition to entertainment, they were used to validate information (Nascimento, 2023).

The role of technologies and virtual social networks in the midst of the pandemic was significant and the use of technosociality, which can be delineated as the socialization of users through technologies, characterizes a change in society, in the individual and collective way of living (Maffesoli, 2016).

Nowadays, social networks are no longer limited to relationships, but also as a source of research and news, with interactivity and participation as attributes, enabling not only access to information, but the ability to produce it (Barros, 2022). It is estimated that social networks are relationship tools and are responsible for 62% of internet traffic and about 4 billion people have access to the internet, representing 52.63% of the world's population, with 476 million Internet users in Europe and 215 million Internet users in Latin America and in Brazil there are about 120 million active users (Netherlands, 2021).

Considering virtual social networks as potential tools for the dissemination of knowledge,

considering the intensification of their use after the COVID pandemic, this study aimed to verify the information available on rare diseases on the internet, using the virtual social media *Facebook and* Instagram *and to evaluate the quantity and relevance of the published material.*

2 METHODOLOGY

This is a cross-sectional, descriptive study using the virtual social media *Facebook* and *Instagram*. Data collection took place from September 7 to November 10, 2022, and this period was established for the convenience of the authors. For research on social media, the words "rare diseases" were used; "rare diseases in Brazil" and the question: "What are rare diseases?", these are not called descriptors, as they are not standardized terms defined by experts to identify subjects published in scientific articles, but words that could identify the profiles in the aforementioned networks.

The participants in this research were the social media themselves, who presented the data used as results.

For the search, the contents or profiles should be related to the theme of rare diseases and/or answer the question: what are rare diseases? Profiles or content found that were not related to rare diseases were not included in the study.

Regarding research conducted on social networks, it is important to highlight that, in the case of public and open profiles, it is not required to obtain a Human Research Ethics Committee (UNICAMP, 2016). The data obtained were meticulously organized and subjected to a qualitative analysis, in which the content published on virtual social media platforms was presented in the form of categories.

3 RESULTS AND DISCUSSION

In the search carried out in the virtual social networks, profiles of support groups and associations with individuals with rare diseases (04), profiles that presented concepts and clarification about rare diseases (04), profiles that disseminated the laws of support for patients with rare diseases (04) and content producers (04) were identified.

For this reason, The results were separated and presented in categories, which were called: Category 1 - family support; category 2- content producers; Category 3 - Produced Content and Category 4 - Laws to Support People with Rare Diseases.

3.1 CATEGORY 1 - FAMILY SUPPORT

In this category we will present the creation of the institutions/associations, their objectives and check the reach on social media. Associations are groups of people who come together voluntarily because they share interests and goals. They play an important role in the development of a society

because they constitute a common voice (Lima, 2018). Associations on social networks aim to help family members to "guide" themselves in search of medical care or support networks.

Sometimes, rare diseases are difficult to diagnose and cure, the support of other families becomes important for the sharing of anxieties and doubts, making the experiences of other people serve as encouragement for parents of children with rare diseases, their families and those who seek information about some type of rare disease (Luz, 2015).

Among the organizations we have the "Rare Team", being a NGO (Non-Governmental Organization), created in 2022, with page both in the *Facebook e Instagram,* and in the *Instagram* They have 234 followers and 9 publications, formed by women activists in favor of rare diseases.

Another association, "Casa Hunter", also a non-profit organization, was created in 2013 and is made up of researchers and health professionals, as well as parents of children with rare diseases. The institution's goal is to welcome patients with rare diseases and their families, promoting activities aimed at diagnosing, preventing, and treating rare and related diseases. Her Instagram page *has more than* 13,000 followers and 2,039 publications, and on Facebook she has more than 17,000 followers, making daily publications to raise awareness of each rare disease in order to encourage actions to combat prejudice.

The "Association of Relatives, Friends and Carriers of Serious Diseases - AFAG" is a national non-profit association that fights for the defense of the rights of people with rare and serious diseases, using *#SomosTodosRaros,* arose from the work of lawyer Dr. Maria Cecilia Mazzariol Volpe, who was diagnosed with colon cancer and decided to combine her personal experience with her professional qualification. In addition, it aims to research, seek and fight for all the rights of the sick citizen. Her Instagram page has 2.7 thousand with 1,022 publications and her *Facebook* with 19.8 thousand followers.

The NGO "Instituto Amor e Carinho – IAC" was created in 2018 and aims to welcome patients with chronic, serious diseases with mobility disabilities, bringing them to knowledge and interacting with the best professionals, thus reducing the time to search for solutions, increasing assertiveness in diagnoses and ensuring a better and higher quality of life for patients and their families. Her *Facebook* page has 751 followers and her *Instagram* has 775 followers (with 213 publications), however her posts are not frequent.

These associations help the entire population, not just the friends and family of people with rare diseases. In most cases, rare diseases are difficult to diagnose and cure, and the support and experience of other families is an important tool for sharing anxieties and doubts, making the experiences of other people serve as encouragement for parents of children with rare diseases, family members and those who seek information about some type of rare disease (Lima, 2018).

3.2 CATEGORY 2 - CONTENT PRODUCERS

The content produced for the internet is all the material aimed at achieving results. Entertainment on social networks is the most accessed and because of this, some content producers use *Instagram* and *Facebook* for greater reach. According to Luca (2018), reports from *We Are Social* and *Hootsuite* show us that Brazilians spend an average of 9 hours a day on social media. And knowing the strength that these channels have in the life of society, some researchers and websites in the scientific and academic area are using them in favor of scientific dissemination.

Four profiles of female content producers were found, one nurse, two doctors and one patient with a rare disease. It is observed that the contents produced are simple and didactic so that lay people can have access and understand the information, but not all profiles are exclusive of publications on rare diseases.

For Gacia (undated), the internet is a medium that can lead us to a growing homogenization of culture in general and is also a channel for the construction of knowledge based on the transformation of information. Electronic networks are establishing new forms of communication and interaction where the exchange of group ideas, essentially interactive, does not consider physical and temporal distances.

3.3 CATEGORY 3 - CONTENTS

The total content found corresponds, on average, to 6,500 publications on the two viral social networks. Despite the amount of published materials, the problem found is that there is no periodicity in the publications and no way to "supervise" or correct the publications, and content with untrue information can be published on the internet.

Currently, Instagram *is one of the most used social networks by the general population, but when evaluating the number of media users and the number of profiles and content related to rare diseases, the percentage is small.*

In view of the study, a comparison was made between Facebook and *Instagram* and it was observed *that Facebook* has more users disseminating information about rare diseases, it is in this social network that the associations are more active and make daily publications. There are also several private communities in which family and friends expose the situation of the rare patient. Unlike *Instagram*, which has few professionals who disseminate information about rare diseases.

Regarding content, only one content producer was found that brings direct information about rare diseases, with clear and objective publications, but it is still not enough to clarify the doubts and curiosities of the population that seeks that information.

3.4 CATEGORY 4 - LAWS TO PROTECT PEOPLE WITH RARE DISEASES.

This category reveals that on social media have been found pages or profiles that have published laws to support people with rare diseases.

The SUS has its bases established in Arts. 196 to 200 of the Federal Constitution. According to article 198 of the Federal Constitution (1988), health is a right of all and a duty of the State, guaranteed through social and economic policies aimed at reducing the risk of disease and other health problems and at universal and equal access to actions and services for its promotion, protection and recovery.

According to Aith (2014), the objectives of the SUS must be achieved in accordance with fundamental principles and in line with guidelines expressly established by the Constitution and the Organic Health Law (Law 8080/90).

Brazil adopts the National Policy for Comprehensive Care for People with Rare Diseases, which since 2014 has organized the care network for prevention, diagnosis, treatment and rehabilitation. The SUS provides care for prevention, diagnosis, treatment and rehabilitation of people with rare diseases, in addition to treatment of symptoms. All this care is done through individualized evaluations of multidisciplinary teams in the various health services in the country, such as primary care units, university hospitals, specialized rehabilitation centers and home care. Since the creation of the policy in 2014, SUS has incorporated 19 diagnostic tests, in addition to organizing the care network. (Brazil, 2021).

The municipality of Maringá, in the north of the state of Paraná, instituted Law No. 10,793 on January 14, 2019, which provides for priority care for patients with rare diseases and establishes guidelines for the promotion of education for rare and genetic diseases at the municipal level, in addition to providing other measures, This law institutes the Municipal Week for Attention to Rare Diseases, to be held annually in the last week of February. (PREFEITURA DE MARINGÁ, 2019).

On March 3, 2022, the Federal Government, through the Ministry of Health, launched the Rare Handbook, which establishes the monitoring of people with rare diseases in health services, hospitalizations, emergencies, trips, vaccination campaigns, enrollments in daycare centers, schools, associations or when there is a demand for social assistance services. The document also provides information on the adequate, safe, comprehensive, and free diagnosis and treatment performed in the Unified Health System (SUS) for rare diseases. (Brazil, 2022).

4 FINAL THOUGHTS

Virtual social networks are tools used on the internet, being useful and easy to access and with thousands of simultaneous accesses worldwide and with a wide range of information being shared every second. Association pages are important in expanding support networks for patients and their families, since the content published on social networks can help clarify doubts, due to health

professionals who use *Facebook and* Instagram *pages as promoters and disseminators of knowledge.*

Unfortunately, on the other hand, it is observed that the publications are lacking in depth and, at times, in content quality. While there are pages and profiles dedicated to rare diseases, the vast potential of this digital environment still remains underutilized. Even with access to information at everyone's fingertips, the production of content on rare diseases remains limited and needs greater engagement.

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Deaths due to accidental submersion in southern Brazil

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Rafael Brendo Novais
Undergraduate Nursing Student
State University of Maringá

Lais Kaori Sato Murrugarra
Undergraduate Nursing Student
State University of Maringá

Kelly Cristina Suzue Iamaguchi Luz
Doctor
State University of Maringá

Flávia Cristina Vieira Frez
Doctor
State University of Maringá

Isabelly Leal de Oliveira
Undergraduate Nursing Student
State University of Maringá

Heitor Hortensi Sesnik
Undergraduate in Nursing
State University of Maringá

Jordhan Abner Teixeira Murilho
Undergraduate Nursing Student
State University of Maringá

Giovana Munhoz Dias
Undergraduate student in Nursing
State University of Maringá

Gabriel Vale dos Santos
Undergraduate in Nursing
State University of Maringá

Rafaely de Cássia Nogueira Sanches
Doctor
State University of Maringá

Roberta Tognollo Borotta Uema
Doctor
State University of Maringá

Gabriel Zanin Sanguino
Doctor
State University of Maringá

ABSTRACT

Introduction: Drowning is the alteration of respiratory function at the level of the trachea, bronchi or lungs, through airway obstruction resulting from submersion/immersion in a liquid medium. The main risk factors for drowning include alcohol and drug use, lack of swimming skills, and a variety of circumstances, including natural disasters and maritime incidents. Drowning mostly happens in children under the age of five, adolescents under the age of 15, and the elderly. Objective: To identify and understand the rates of deaths due to accidental submersion in adults in the southern region of Brazil in 2021. Method: This was a descriptive exploratory study with a quantitative approach. Data collection took place through access to the Ministry of Health's health data platform DATASUS, in the Tabnet health information tab originating from the Mortality Information System (SIM). Results and discussion: In 2021, 79 deaths due to drowning were identified in the southern region of Brazil. Of these, 67 (85%) were male and 12 (15%) were female. Regarding male deaths, 37 (47%) occurred in the hospital and 30 (39%) were identified at home. For females, 4 (33%) deaths occurred in the hospital and 8 (67%) at home. There was a prevalence for both sexes and in both environments, whether hospital or home, they are adults between 20 and 59 years old, with a mean age of approximately 38 years, and most of the time associated with the lack of appropriate supervision. The predominance in relation to race/color was white, with an average of 100% for females, and 49 males (73%), followed by 24% for brown race/color and 3% for black race/color. Conclusion: The incidence of deaths from drowning in the southern region of Brazil in 2021 was higher among hospitalized adult men aged 20 to 59 years, according to literary information. It is understood that drowning is a public health problem and that the spheres of power should spare no effort to reduce the number of deaths from this preventable cause.

Keywords: Drowning, Wounds and Injuries, Nursing.

1 INTRODUCTION

Drowning is the alteration of respiratory function at the level of the trachea, bronchi or lungs, through the obstruction of the airways resulting from a submersion/immersion in a liquid medium and which, by influencing the supply of blood oxygenation, causes a systemic compromise to all organs and tissues. It is one of the leading causes of preventable death in the world (NETO, 2022).

Drowning can lead to two outcomes, the death of the drowning individual or recovery through rescue that interrupts drowning (BERNOCHE et al., 2019)

In the last decade, more than 2.5 million deaths have occurred due to drowning, with 236,000 people dying each year and 40 every hour. It should be noted that 90% of these deaths occur in low- and middle-income countries (PAHO, 2023).

Risk factors for this trauma include alcohol and drug use, lack of knowledge of swimming and aquatic risks, and water transport (WHO, 2014). Drowning deaths can occur accidentally, related to natural disasters, maritime transport (CENDERADEWI; DEVINE; SARI; FRANKLIN, 2023).

Drowning mostly happens in children under the age of five, adolescents under the age of 15, and the elderly. When looking at the main causes or responsible for the occurrence of this emergency situation, men are listed, age less than 25 years, inadequate adult supervision, alcohol or other substance introxication (present in up to 70% of cases), undiagnosed cardiac pathologies, epilepsy, trauma, hypothermia, suicide and homicide, and hyperventilation prior to diving (NETO et al., 2022).

The abuse of illicit and psychoactive substances, such as cocaine, when associated with the use of alcoholic beverages, was considered a factor directly proportional to the increase in the number of accidents due to submersion with consequent death. These data reflect the situation in Rio Grande do Sul, where associations were also found with male gender, age group between 30 and 50 years and medium to low income. (TOWERS; ARBO, 2020)

The Pan American Health Organization (PAHO) points out six low-cost evidence-based drowning prevention interventions, namely: 1) training people in safe rescue and resuscitation; 2) establish and comply with safety standards for navigation, shipping, and ferries; 3) improve flood risk management at the local and national level; 4) install barriers to control access to water; 5) provide safe places away from water for preschoolers, with trained child care; 6) teach school-age children basic swimming skills, water safety, and safe rescue (PAHO, 2023).

In this context, it is necessary to identify how mortality rates from the disease behave in other regions of the country, considering that many risk factors are avoidable and/or preventable, so the following question was raised: What are the rates of deaths due to accidental submersion among adults in the southern region of Brazil in 2021?

2 OBJECTIVE

To identify and understand the death rates due to accidental submersions in adults in the southern region of Brazil in 2021.

3 METHOD

This was a descriptive, exploratory study with a quantitative approach. Data collection took place through access to the Ministry of Health's health data platform DATASUS, in the Tabnet health information tab originating from the Mortality Information System (SIM).

The data search was carried out in August 2023, using the following filters: I) Age, II) Sex, III) Color/Race, IV) Place of occurrence, which was divided between hospital and home death. Schooling was not assessed due to the lack of registration in the DATASUS system. The "accidental drowning and submersion" segment of the ICD-10 group was also used as a filter that allowed the identification of only data referring to deaths due to drowning that occurred in 2021.

The collected data were organized and tabulated in Microsoft Excel software, version 2019, for follow-up with statistical analysis and interpretation. After data collection, the analysis was performed using descriptive statistics grouping the selected variables, namely: sex, age, color/race (white, black, yellow, brown, indigenous).

Regarding the ethical aspects of research development, as these are data in the public domain and linked to the Ministry of Health and in accordance with Resolution 674/2022 of the National Health Council, it was not recommended to submit it for consideration by the Research Ethics Committee (CEP).

4 RESULTS AND DISCUSSION

In 2021, 79 deaths from drowning were identified in the southern region of Brazil. Of these, 67 (85%) were male and 12 (15%) were female. Regarding male deaths, 37 (47%) occurred in the hospital and 30 (39%) were identified at home. For females, 4 (33%) deaths occurred at home and 8 (67%) at home.

In terms of age, there is a prevalence for both sexes and in both environments, whether hospital or home, they are adults between 20 and 59 years old, with a mean age of approximately 38 years, and most of the time associated with a lack of appropriate supervision (GOMES, 2017).

The predominance in relation to race/color was white, with an average of 100% for females, and 49 males (73%), followed by 24% for brown race/color and 3% for black race/color.

The data found in this study are corroborated by Nunes et al. (2023), who identified the variables related to drowning in the State of Alagoas. The above-mentioned authors reinforce the prevalence of deaths of men due to drowning, but it differs when observing the color of the individuals,

and in the south of the country the prevalence is of white men and in the state of Alagoas the prevalence is of brown men.

When analyzing both sexes and the areas where the deaths occurred, it is evident that the male population is the most vulnerable to drowning accidents, corroborating the fact that men tend to take more risks. The data also suggest that men are more frequent in jobs that involve water activities and are less afraid, compared to women, of venturing into dangerous, unknown, and deep aquatic areas (KOON et al., 2021).

The evaluation of the use of alcohol, drugs, and pharmaceuticals in victims who died by drowning was the subject of an investigation in the State of Rio Grande do Sul by Torres and Arbo (2020). The authors reinforce the prevalence of the male profile and the contribution of the use of these substances to the unfavorable outcome of drowning patients.

In females, it is observed that although the results found are much lower when compared to males, they are still present. The results of this study are consistent with other studies that aim to identify data related to the epidemiology of drowning, since the morbidity of this condition is still underestimated.

Considering that death by drowning is a serious injury that requires rapid intervention, it is recommended that more effective educational campaigns be planned for its prevention, especially aimed at the adult male population, given the high incidence in this age group, as well as the need to obstruct places of high risk for drowning, such as non-coastal and non-tourist areas (GÓMEZ et al., 2019).

Because it is a preventable death, management, and identification of signs of drowning are essential for the survival of drowned individuals. In this sense, educational activities, and the use of resources for popular and professional training can influence the drowning rates. The dissemination of the steps to be followed in Basic Life Support and Advanced Life Support should be tools of continuous use by the community (CIBULSKI et al., 2023).

5 CONCLUSION

The incidence of deaths from drowning in the southern region of Brazil in 2021 was higher among hospitalized adult men aged 20 to 59 years, according to literary information.

Acknowledging the gender disparity in drowning incidents leads us to foster a sense of responsibility and vigilance, and underscores the importance of collaborative efforts among public health institutions, communities, and individuals to protect the health and lives of men in adulthood.

It is understood that drowning is a public health problem and that the spheres of power should spare no effort to reduce the number of deaths from this preventable cause.

In addition, the importance of health education, popular education and professional education is emphasized, which, when carried out, have the potential to significantly reduce mortality rates and poor outcomes of drowning individuals.

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The use of acupuncture as a complementary treatment for endometriosis: A systematic review

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Ana Luisa Serrano Lima
Undergraduate Nursing Student
State University of Maringá
E-mail: analuisa095@gmail.com

Kelly Cristina Suzue Iamaguchi Luz
Doctor
Adjunct Professor, Department of Nursing, State University of Maringá - UEM
State University of Maringá
E-mail: kcsiluz@uem.br

Gabriel Zanin Sanguino
Doctor
Adjunct Professor, Department of Nursing, State University of Maringá - UEM
State University of Maringá
E-mail: gzsanguino2@uem.br

Larissa Carolina Segantini Felipin
Adjunct Professor, Department of Nursing, State University of Maringá - UEM
State University of Maringá
E-mail: lcsfelipin2@uem.br

Giovana Tófoli Sampaio
Undergraduate Nursing Student
State University of Maringá
E-mail: giovanatofoli@gmail.com

Lais Kaori Sato Murrugarra
State University of Maringá
Undergraduate Nursing Student
E-mail: kaori.laiss@gmail.com

Giovana Munhoz Dias
Undergraduate student in Nursing
State University of Maringá
E-mail: giovanamunhoz15@gmail.com

Ana Clara Luckner
State University of Maringá
Undergraduate Nursing Student
E-mail: analuckner@gmail.com

Lorraine de Souza Santos
Undergraduate student in Nursing
State University of Maringá
E-mail: lorraine.souza.1806@gmail.com

Fernanda Furlan Santoro
Nurse
Municipality of Maringá

Rita de Cássia Pereira Carvalho
Nurse
Municipality of Maringá

Flávia Cristina Vieira Frez
Doctor
Adjunct Professor, Department of Nursing, State University of Maringá - UEM
State University of Maringá
E-mail: fcvfrez2@uem.br

ABSTRACT

Endometriosis is a multifactorial estrogen-dependent and inflammatory gynecological condition characterized by the presence of fragments of endometrial tissue outside the uterine cavity. Due to the negative impact on the physical and psychological appearance of women, endometriosis is considered a public health problem. The Ministry of Health presents the National Policy on Integrative and Complementary Practices (PNPIC), which aims to incorporate and implement experiences outside of Traditional Medicine, among which Acupuncture stands out, a Chinese technique that has proven to be effective for treating pain . This work aims to identify evidence-based recommendations in the literature on the use of Acupuncture and its resources for the adjuvant treatment of endometriosis and is a systematic review of the literature using a pre-established protocol for the search, selection and extraction of data. From this review study, it was possible to verify the therapeutic efficacy of acupuncture as a complementary and integrative treatment for endometriosis, as the technique excites receptors and nerve fibers leading to the release of endogenous opioids, resulting in continuous pain relief. Furthermore, studies have shown that the practice of acupuncture provided

greater relief from pelvic pain when compared to the use of drug therapy, in addition to improving the quality of life of women affected by this disease.

Keywords: Endometriosis, Acupuncture, Systematic Review.

1 INTRODUCTION

Endometriosis is a multifactorial and inflammatory gynecological condition, characterized by the presence of fragments of endometrial tissue, outside the uterine cavity, usually in the female pelvic region, although not exclusively. This disease is considered benign, but chronic, and multifactorial in nature. Although it is more common in women of reproductive age, cases of endometriosis can also be observed in patients before menstruation and after menopause (FEBRASGO, 2018).

According to the Ministry of Health (2022), it is estimated that one in 10 women suffers from the symptoms of endometriosis and is unaware of its existence. According to the Outpatient Information System (SIA) and the Hospital Information System (SIH), in the SUS, in 2019 there were 24,560 outpatient visits for patients with endometriosis and 11,989 hospitalizations were carried out in the hospital network. The study carried out by Costa (2023) pointed out that 119,467 hospitalizations for endometriosis were recorded between 2013 and 2022.

The disease can be peritoneal, ovarian, or profound. Peritoneal endometriosis is characterized by the presence of superficial endometriotic tissues in the peritoneum. Ovarian endometriosis involves superficial tissues or cysts (endometriomas) in the ovary. And in deep endometriosis, the lesion reaches the retroperitoneal space or wall of the pelvic organs, reaching a depth of 5 mm or more (Nisolle; Donnez, 1997).

The pathogenesis is not yet fully understood. Sampson (1927) proposed the theory of retrograde menstruation, in which, due to some tubal reflux, endometrial cells could implant in the peritoneum and other pelvic organs, which would initiate the development of the disease. Several factors could influence this, such as early menarche, nulliparity, increased menstrual flow, etc. Another theory is that of coelomic metaplasia, which proposes the transformation of the coelomic epithelium, mainly in the ovary and peritoneum, into endometrial tissue, suggesting that endometriosis could originate from a process of metaplastic differentiation (Vercellini et al., 2014).

The imbalance of the sensory and autonomic nerve fibers that innervate the extrauterine lesions can keep the inflammatory process active, and secondary ischemic reactions in the local tissue and local nerve lesions (painful distortion or nerve damage) have been known to be the sources of pain related to endometriosis, which can be long-lasting, intermittent or continuous (Mckinnon, 2015).

According to Patel et al. (2018), evidence indicates that hormonal and immunological factors create a pro-inflammatory microenvironment that favors the persistence of endometriosis. This is related to the two main symptoms of the disease: pain and infertility. Dysmenorrhea, chronic pelvic

pain that can worsen over time, dyspareunia, urinary changes, bowel changes that can occur or worsen during the menstrual period, are considered as the main symptoms of endometriosis.

Endometriosis impairs women's quality of life, with consequences such as depression, anxiety, guilt, impairment of interpersonal relationships, lower productivity at work, and thus ends up affecting different aspects of women's lives, requiring professional articulation to promote multidisciplinary care (Ruzsala *et al*. 2022).

Endometriosis lesions can be treated surgically, but the risk of recurrence is high. Drug therapy involves the use of oral contraceptives, progesterone and androgen derivatives, gonadotropin-releasing hormone (GnRH) agonists, and aromatase inhibitors. Because they are associated with significant adverse effects, the demand for integrative practices, such as acupuncture, for symptom relief has increased significantly (FEBRASGO, 2018).

2 OBJECTIVES

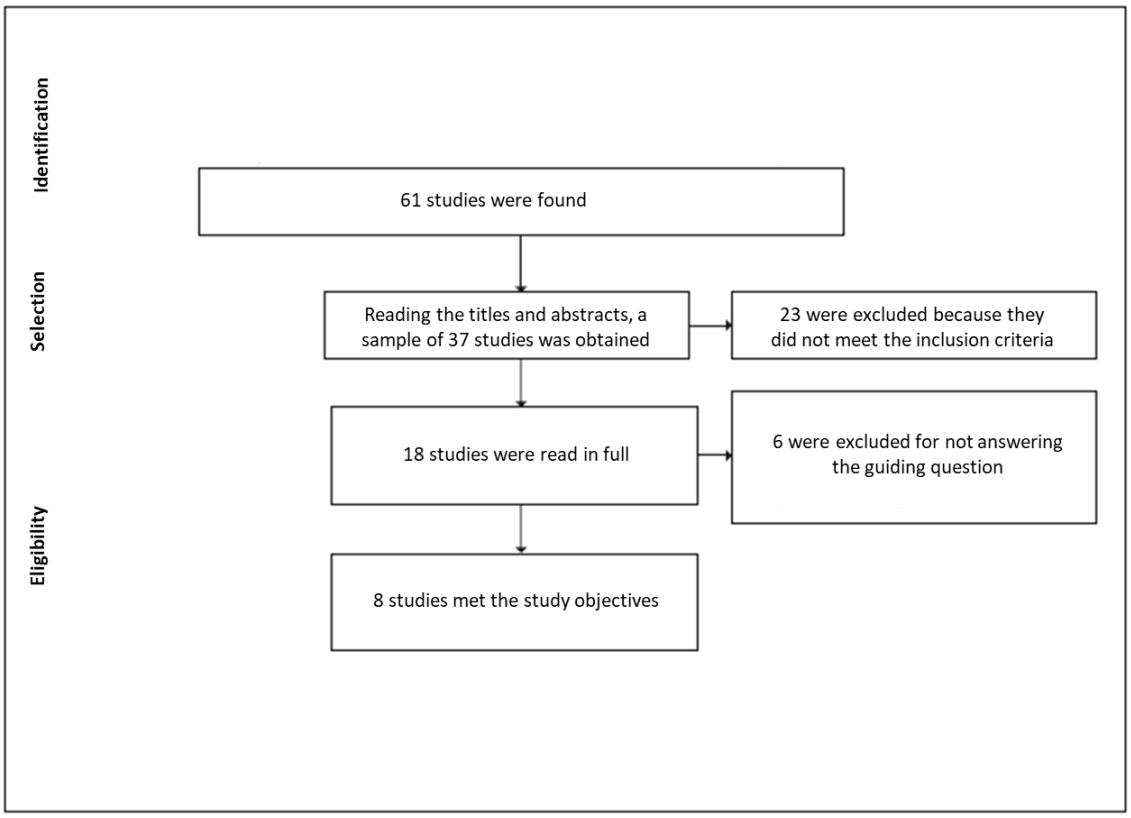
To identify evidence-based recommendations in the literature on the use of acupuncture and its resources for the adjuvant treatment of endometriosis in the context of Primary Health Care.

3 METHODOLOGY

A systematic review of the literature was conducted using a pre-established protocol for search, selection and data extraction. For the construction of this work, the search for articles took place in the Virtual Health Library (VHL) and in the CAPES Journal Portal, with the help of the databases Latin American and Caribbean Literature in Health Sciences (LILACS), *Index Medicus* of the Western Pacific (WPRO), Health Models and Traditional, Complementary and Integrative Medicines in the Americas (MOSAICO). and *Medical Literature Analysis and Retrieval System Online* (MedLine). In this systematic review, the methodological tool *Preferred Reporting Items for Systematic Reviews* (PRISMA) was used. The following steps were followed: definition of the theme and elaboration of the research question; elaboration of the inclusion and exclusion criteria for the studies; definition of descriptors, literature search, and data collection; analysis of the included studies and presentation of the summary of the review. Studies published from 1995 onwards were included due to the difficulty of finding publications with scientific evidence, in the languages Portuguese, English, and Spanish, that were available in full, collected between June and July 2023. Studies that did not correspond to the guiding question and/or the objective of the research were excluded. It was the research question "How does the literature describe the use of acupuncture in the treatment of endometriosis?". The articles were collected from June to July 2023. The descriptors used were: "Acupuncture" and "Endometriosis" and "Woman", crossed with the Boolean operator "AND", located in the list of Health Sciences Descriptors - DECs.

4 RESULTS AND DISCUSSION

A total of 61 studies were found, of which 23 were excluded because they did not meet the inclusion criteria. After reading the titles and abstracts, a sample of 37 studies was obtained. In the second stage, 18 studies were read in full, of which 6 were excluded because they did not answer the guiding question, leaving 8 studies that met the objectives of the study. Chart 1 presents the studies that made up the systematic literature review, with their respective authors and the main results.



Sources: authors

From the studies, it was possible to observe that about 18% of women with dysmenorrhea do not respond to non-steroidal anti-inflammatory drugs, which are considered the basis of treatment, and women who receive hormone replacement therapy are at higher risk of some types of cancer and cardiovascular diseases (Guo Y, 2021).

In her investigation, Ruszala (2022) highlights that endometriosis affects several aspects of women's lives, completely interfering with quality of life, such as hypochondriasis, depression, hysteria, and anxiety, which were present in the groups of women studied who had pain, in addition to a 38% reduction in work productivity attributed to pelvic pain.

In this sense, integrative practices have been increasingly studied as a complementary way to treat endometriosis, since the effects of acupuncture as a treatment for pain relief was presented in Antunes (2021) as a safe alternative therapy, with few and small side effects for the management of

endometriosis symptoms, being able to relieve pain and increase quality of life in women with pelvic pain related to endometriosis.

Acupuncture, according to Andersson (1995), excites receptors and nerve fibers in the stimulated tissue, physiologically activated by strong muscle contractions and thus produces rhythmic discharges in the nerve fibers and causes the release of endogenous opioids and oxytocin essential for the induction of functional changes in different systems and organs. In his study, he illustrated that beta-endorphin levels, important in pain control as well as in the regulation of blood pressure and body temperature, were observed in greater quantities in brain tissue after acupuncture (Andersson, 1995).

De Sousa (2016) also explains that acupuncture-induced analgesia involves differential threshold stimulation of small-diameter nerves. These nerves, located in the epidermis, send messages to the spinal cord, which activates neurons in the brainstem and hypothalamus, systematically triggering endogenous opioid secretion. This response promotes changes in plasma levels of endorphins, enkephalins, and stress hormones, such as adrenocorticotropic hormone (De Souza, 2016).

From the acupuncture method, variations have been created, each with different mechanisms of action, such as moxibustion, acupoint catgut implantation therapy, electroacupuncture, auricular acupoint treatment, and acupuncture combined with other therapies. All of these methods can effectively relieve the symptoms of dysmenorrhea caused by endometriosis. These mechanisms include relaxation of meridians and promotion of blood circulation, modulation of immunity, activation of various neurotransmitters, reduction of VEGF (provascular endothelial cell growth factor) and regulation of abnormal prostaglandins, *such* β-endorphins, dynorphin, electrolytes among others (Guo, 2021).

VEGF reduction is found because of the association of acupuncture with Chinese medicine, promoting increased vascular permeability, extracellular matrix degeneration, and vascular endothelial cell migration, proliferation, and angiogenesis (Guo, 2021).

The studies included in this systematic review (1, 4, 6, 7 , 9 and 12) demonstrated that the practice of acupuncture as a form of treatment for endometriosis was effective when compared with other pain relief mechanisms. Shen and Lu (2017) evaluated the effect of acupuncture and moxibustion on patients with endometriosis in a randomized clinical trial. They used two groups, 1 of them as a control group and the other as a treatment group. The treatment group received acupuncture-moxibustion, while the control group received Mifepristone tablets (a medication used for pain relief). After 6 months of treatment, symptoms, including abdominal pain, decreased in the treatment group.

In studies 4, 6 and 7 , a reduction in pain intensity was found after treatment when compared to the beginning. De Sousa et al. (2016) evaluated the effects of acupuncture on chronic pelvic pain, dyspareunia, and quality of life in women with endometriosis. The study was conducted with 42 women selected according to inclusion criteria in the study, 20 women in the experimental group and

22 in the control group, acupuncture was shown to be beneficial in reducing pelvic pain and dyspareunia and improving quality of life in women with endometriosis. The absence of side effects and maintenance of the effect were observed 2 months after treatment. The mean level of relief obtained for other types of pelvic pain (associated with dysmenorrhea, fibroids, and ovarian cysts) was reported in this study to be greater than 40%, in contrast to the drug therapy studies (<30%), as well as improvement in quality of life.

Wayne (2008) compared acupuncture and placebo (needles that penetrate only the skin tissue and were placed at points not indicated for endometriosis) for 8 weeks. The treatment resulted in a considerable reduction in pain levels in the first 4 weeks. However, there was no difference in the frequency of pain after 8 weeks of treatment or within 6 months of treatment.

Xu et al. (2017) designed a review and meta-analysis including ten studies, totaling 295 patients with endometriosis-related pain treated with acupuncture and 194 patients in a control group. Among the ten studies, six compared the variation in pain level between the acupuncture and control groups, and four studies compared the variation in serum CA125 level, seven studies compared the clinical effective rate. In all cases, they found that acupuncture treatment showed better results in the level of pain at CA125 compared to the control groups.

In the study conducted by Payne (2019), the author makes a case report presenting a 43-year-old nulliparous woman with endometriosis and fibroids, treated twice a week for a period of 6 months at a Traditional Chinese Medicine clinic in Berkley, CA. Treatment included 6 months of acupuncture at the following points: VC3, VC4 and VC5; E25 and E36; VG20; IG4; F3; R3; BA6 and BA9; and Zi Gong Xue and Ah Shi points along with 1 month of herbal treatment in the form of tea and pills. The result was a reduction in the level of pain and symptoms assessed by the patient through the Pain Quality Rating Scale. The patient's overall mood and pain level improved. In conclusion of the case , acupuncture helped with excessive uterine bleeding, it helped to warm the uterus which would relieve back pain due to the cold, so it was considered effective for this patient.

5 CONCLUSION

From this study, it was possible to verify the therapeutic efficacy of acupuncture for the treatment of endometriosis, since it excites receptors and nerve fibers leading to the release of endogenous opioids, resulting in continuous pain relief. It has been shown that in addition to pain, acupuncture has been shown to be anti-inflammatory and increase capillary permeability, reducing, at least in part, retrograde menstruation. The studies compared the use of this practice with placebo, and in all cases there was a significant reduction in pain reported for at least 6 subsequent months. When contrasted with drug therapy, the use of this integrative practice presented a higher average pain relief

than the drug of choice, and with few or no side effects, which was pointed out as one of the reasons why this practice has been increasingly used by the affected population.

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Table 1

Title and Authorship	Type of Study	Country	Content
Acupuncture--from empiricism to science: functional background to acupuncture effects in pain and disease (Andersson S, Lundeberg T)	Randomized clinical trial	Sweden	Acupuncture excites receptors or nerve fibers in the stimulated tissue that are also physiologically activated by strong muscle contractions and the effects on certain organ functions are similar to those obtained by prolonged exercise. Both exercise and acupuncture produce rhythmic discharges in nerve fibers and cause the release of endogenous opioids and oxytocin essential for the induction of functional changes in different organ systems. Beta-endorphin levels, important in pain control as well as in regulating blood pressure and body temperature, have been observed to increase in brain tissue in animals after acupuncture and strong exercise. Evidence suggests that acupuncture may affect the sympathetic system through hypothalamic and brainstem mechanisms, and that the hypothalamic beta-endorphinergic system has inhibitory effects on the vasomotor center, VMC. Post-stimulatory sympathetic inhibition reaches a maximum after a few hours and can be sustained for more than 12 hours.
The effect of acupuncture on pain, dyspareunia, and quality of life in Brazilian women with endometriosis: A randomized clinical trial. (De Sousa, Tatiane Regina)	Randomized clinical trial	Brazil	These investigations demonstrated that CPD is one of the most characteristic symptoms in this patient population, defined as a non-cyclical pain lasting 6 months or more, localized to the pelvis, abdominal wall, lumbosacral region, or buttocks, and severe enough to interfere with common activities or require medical care. Previous studies have established that acupuncture-induced analgesia involves a differential threshold stimulation of small-diameter nerves. These nerves, located in the epidermis, send messages to the spinal cord, which activates neurons in the brainstem and hypothalamus, systematically triggering endogenous opioid secretion. This response promotes changes in plasma levels of endorphins, enkephalins, and stress hormones such as adrenocorticotropic hormone, which partially explains why PCP and dyspareunia decreased by more than 60% in EG. The mean level of relief obtained from acupuncture for other types of pelvic pain (associated with dysmenorrhea, fibroids, and ovarian cysts) has been reported to be greater than 40%, in contrast to drug therapy studies (<30%). In addition to its physical effects, acupuncture has a major impact on emotional problems. In contrast, in Western medicine, the treatment of these conditions involves prescribing more medications, the side effects of which can be undesirable or even cumulative, depending on the duration of their administration. The absence of side effects and the maintenance of improvements were observed 2 months after therapy in the EG.

Complementary and Alternative Medicine for Dysmenorrhea Caused by Endometriosis: A Review of Utilization and Mechanism (Guo Y.)	Review Article	China	Acupuncture has evolved from its original methods to include moxibustion, acupoint catgut implantation therapy, electroacupuncture, auricular acupoint treatment, and acupuncture combined with other therapies. All of these can effectively relieve the symptoms of dysmenorrhea caused by MS. The different acupuncture treatment mechanisms for dysmenorrhea include relaxation of meridians and promotion of blood circulation, modulation of immunity, activation of various neurotransmitters, reduction of VEGF, and regulation of abnormal prostaglandins, *such* β-endorphins, dynorphin, electrolytes, and substance P levels in the body Acupuncture can relieve pain in the central and peripheral regions by activating various neurotransmitters or modulators, including serotonin, norepinephrine, and adenosine. Xu et al. conducted a systematic review and meta-analysis to determine the effects of acupuncture in the treatment of MS-related pain. Patients in the intervention group were treated with acupuncture and patients in the control group were treated with sham acupuncture, TCM, or Western medicine. The results showed that the total effective rate of the intervention group reached 95%, and acupuncture had obvious advantages in relieving pain, reducing CA-125 concentration, and improving clinical symptoms Acupuncture combined with moxibustion is a common practice in TCM and can effectively stimulate the regulatory function of meridians and collaterals, thereby improving local blood stasis. Pan treated 35 MS patients with existing dysmenorrhea with moxibustion with a heating needle at the following acupuncture points: Zusanli (ST36), Siman (KI14), Sanyinjiao (SP5), Qihai (RN6), Shuidao (RN9), Tianshu (ST25), and Zhongwan (RN12). After 3 months of treatment, the pain score decreased significantly compared to the Western medicine group.
Is acupuncture effective in the treatment of pain in endometriosis? (Lund I, Lundeberg T)	Randomized Clinical Trial	New Zealand	In all three studies, reduced pain intensity was found to be at lower levels after treatment than before initiation. In two of these, effects on HRQoL assessments were also reported at a higher level after treatment than before. In the two studies that aimed to test the effectiveness of the treatment by comparing the results of an acupuncture-treated group with a placebo-treated group, one showed systematic effects between the groups with an advantage for acupuncture use. The effects of acupuncture as a treatment for pain relief have been presented in several studies as a globally safe alternative treatment with very few and small (harmless) side effects and, moreover, no effect on the environment at all.
Systematic review and meta-analysis of	.	United States	Wayne and others compared acupuncture and placebo (needles that penetrate only skin tissue and were placed

complementary treatments for women with symptomatic endometriosis. (TAA Look,)	Systematic review and meta-analysis		at points not indicated for endometriosis) for 8 weeks. Treatment resulted in a considerable reduction in pain levels in the first 4 weeks, as measured by the visual analogue scale (P *<0.004) and pelvic pain (*P = 0.020). However, there was no difference in the frequency of pain after 8 weeks of treatment or within 6 months of treatment. There is an estimated high prevalence of psychological symptoms among women with endometriosis. An earlier study comparing three groups of women, one with pelvic pain without disease, one with pelvic pain and endometriosis, and a control group without endometriosis or pain, noted that hypochondriasis, depression, hysteria, and anxiety were present in both groups of women with pain. Another study described a 38% reduction in work productivity attributed to pelvic pain.
Acupuncture for Endometriosis: A Case Study. Med Acupunct	Payne Case Study	United States	Also, it helped with excessive uterine bleeding. It also helped warm the uterus which would relieve back pain due to the cold. *Zi Gong Xue* was needled bilaterally to help stop excessive bleeding and as a general point for endometriosis. The acupuncture treatment used in this case helped with both the patient's mood and pain levels.
Quality of Life in Women Suffering from Endometriosis (Moving M)	Randomized clinical trial	Switzerland	Women with confirmed endometriosis have significantly more symptoms of depression (standardized mean difference and anxiety compared to healthy women. In addition, the research also revealed that patients with severe pain had a higher incidence of multiple psychiatric disorders. Patients avoid sex, for fear of suffering. Women with endometriosis desire more sexual activity than their current level. "Approximately 42.3% of women affected by endometriosis and 30.5% of control women desired a higher frequency of sexual activity. The presence of adhesions, cysts and foci of endometriosis in the vagina and cervix and the infiltration of the surrounding tissues lead to immobilization of the reproductive organ, anatomical changes and, therefore, pain during penetration or sexual intercourse. This leads to a decrease in libido, desire, and lack of orgasm in patients. Lack of satisfaction in such an important sphere of life as sex leads to decreased mood, anxiety disorders, and even depression
Effects of acupuncture for the treatment of endometriosis-related pain: A systematic review and meta-analysis. (Xu Y)	Systematic review and meta-analysis	China	Among the 10 RCTs included, six reported variations in the level of core pain, four reported variations in CA-125 levels in peripheral blood, and seven reported the clinical effective rate of acupuncture as a treatment for endometriosis-related pain. Participants in the active acupuncture group (n = 9) experienced a mean reduction of 4.8 points (SD = 2.4 points) on an 11-point scale (62%) in pain after 4

			weeks; this differed significantly from the control group's mean reduction (n = 5) of 1.4 points (SD = 2.1 points; P = 0.004). The reduction in pain in the acupuncture group persisted during the 6-month evaluation. Four of the RCTs included selected Western medicine as the control intervention. Specifically, the studies used danazol, mifepristone, or goserelin acetate and showed that acupuncture was better than Western medicine at relieving pain and reducing the concentration of CA-125. Thus, the effect of acupuncture in the treatment of endometriosis-related pain is likely mediated by endocrine and cytokine changes, as well as anti-inflammatory and analgesic effects.

Prescribed versus *infused enteral diet* and clinical outcome in critically ill elderly

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Camila Melo de Araújo
Paraíba Foundation for Health Management (PB Saúde) – Hospital Metropolitano Dom José Maria Pires
Hospital Health Specialist with emphasis on critical patients

Adriana Gomes Cézar de Carvalho
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Master in Biotechnology and Innovation in Health

Janine Maciel Barbosa
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Doctor in Nutrition

Gina Araújo Martins Feitosa
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
MSc in Gerontology

Edcleide Oliveira dos Santos Olinto
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Specialist in Parenteral and Enteral Nutritional Therapy

Pollyana Paula Almeida de Araújo
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Clinical Nutrition Specialist

Isabel Carolina Pinto Cavalcanti
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Master of Science in Nutrition

Débora Silva Cavalcanti
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Doctor in Nutrition

Aline Honor Lacerda
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Specialist in Nutritional Bases of Physical Activity

Caroline Sousa Cabral
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Doctor in Nutrition

ABSTRACT

The nutritional status of individuals is directly related to inadequate intake, absorption and utilization of nutrients in general. The changes resulting from aging associated with the continuous use of medications accentuate this picture. In the context of intensive care, this reality is even more challenging, since the severity of the patients' clinical condition, associated with the constant use of antibiotics and opioids, corroborate in worse tolerance to the diet offered. In view of the above, this study aimed to evaluate the association between prescribed versus infused enteral diet and the clinical outcome of elderly patients admitted to an Intensive Care Unit. This was a cross-sectional study conducted with elderly patients in the Intensive Care Unit of a University Hospital. Data collection was carried out using the nutritional follow-up form used in the nutritionist's daily routine and adopted by the nutrition service. The data obtained were analyzed using the statistical program SPSS version 13.0. Associations were tested using Pearson's chi-square test, where associations reaching $p < 0.05$ were considered significant. A total of 79 elderly patients of both sexes admitted to the Intensive Care Unit with exclusive Enteral Nutrition Therapy were evaluated, most of whom were female (62%), with a mean age of 72.5 years. Regarding nutritional status, in relation to Body Mass Index and Arm Circumference, there was a prevalence of underweight (43.7) and malnutrition (57.8%), respectively. Regarding enteral nutrition, 54.7% of the patients reached the prescribed volume. It was possible to list the main complications related to nutritional therapy, with the open nasal tube being significantly associated with the unsatisfactory volume infused versus prescribed.

Keywords: Aged, Enteral Nutritional, Intensive Care Unit.

1 INTRODUCTION

The nutritional status of individuals is directly related to inadequate intake, absorption and utilization of nutrients in general. The changes resulting from aging associated with the continuous use of medications accentuate this situation (SOUZA; GUARIENTO, 2009). The elderly are at greater risk of developing nutritional deficits, since there is an impairment of physiological function, reduction of lean mass and basal metabolic rate, sensory alterations, cardiac and respiratory complications, and a higher number of hospitalizations, infections, and pressure ulcers (SILVA; MANNARINO; MOREIRA, 2014). In the context of intensive care, this reality is even more challenging, since the severity of the patients' clinical condition, associated with the constant use of antibiotics and opioids, corroborates in worse tolerance to the diet offered (TEXEIRA, CARUSO AND SORIANO, 2006). In this sense, measures to cope with hospital malnutrition are urgent, especially in the context of Intensive Care Units (ICU).

The clinical prognosis of critically ill patients is closely related to adequate nutritional support (CUNHA; SALLUH; FRANCE, 2010). An adequate supply of nutrients, especially calories and proteins, is essential to reduce the incidence of hospital malnutrition, making it possible to reduce the morbidity and mortality of critically ill patients (GRACIANO; FERRETTI, 2008).

The monitoring of nutritional therapy in ICUs has been widely discussed in clinical practice. In Brazil, this continuous evaluation is possible through the use of the Nutritional Therapy Quality Indicators (IQTN). Such parameters contribute to the management of the quality of nutritional therapy, aiming at better clinical outcomes for the patient (ILSI, 2018).

Considering the importance of adequate protein-caloric intake, one of the indicators related to this quality management is the evaluation of the adequacy rate of the infused volume in relation to that prescribed in patients using enteral nutritional therapy. The evaluation of this parameter is essential for the nutritionist to be able to evaluate whether or not the planning in relation to the protein-caloric supply has been achieved. This understanding is fundamental, since the identification of the factors that hinder the progression of the diet guarantees the professional the best clinical management of the patient, in order to outline corrective measures necessary to ensure adequate caloric-protein intake (ILSI, 2018).

In view of the above, this study aimed to evaluate the association between prescribed *versus* infused enteral diet and the clinical outcome of elderly patients admitted to an Intensive Care Unit.

2 METHOD

This is a cross-sectional cohort study developed with the elderly population hospitalized in an intensive care unit, whose length of stay was equal to or greater than 72 hours and who used enteral nutritional therapy at a University Hospital located in the city of João Pessoa. The sample consisted of

79 forms of elderly patients hospitalized from March 2018 to March 2019. The construction of this instrument was based on studies and bibliographic references on nutritional therapy in critically ill patients, as well as on the researcher's experience with nutritional care in patients hospitalized in intensive care units, using as a reference the model proposed by (SOBOTKA *et al*., 2011). To enable the analysis of association, some variables were categorized as follows: Complications associated with Nutritional Therapy were categorized as present and absent. With regard to the clinical outcome, the categories of hospital discharge and death were created. Regarding the length of hospital stay, it was categorized by adopting as a cut-off point the moment of hospitalization in which these patients tend to become chronic < 21 days and > 21 days (TOLEDO & CASTRO, 2015). The follow-up time of the patients followed in this study was equivalent to the length of stay in the ICU.

The data were tabulated in Microsoft Excel® and analyzed using SPSS version 13.0. Then, the chi-square test, continuity correction and Fisher's exact test were used. Descriptive analyses of the study variables were performed by identifying absolute and relative frequencies of the data, as well as appropriate measures of central tendency and dispersion, assuming a significance level of $p < 0.05$ as the reference value for statistical significance. The research met all requirements and was approved by the Research Ethics Committee of the Lauro Wanderley University Hospital of the Federal University of Paraíba, according to opinion No. 3,449,341.

3 RESULTS AND DISCUSSION

Secondary data from the medical records of 79 elderly patients admitted to the ICU with exclusive Enteral Nutrition Therapy (ENT), of both sexes, were evaluated, most of whom were female (62%), with a mean age of 72.5 years. The length of stay ranged from 3 to 57 days, with a median of 14 days. The main clinical outcome was hospital discharge (55.7%). Regarding nutritional status, in relation to BMI and AC, the prevalence of underweight (43.7) and malnutrition (57.8%) was observed, respectively. Regarding enteral nutrition, 54.7% of the patients reached the prescribed volume. The mean length of hospital stay was 17.35 days (± 12.42), while the mean time of use of enteral nutritional therapy was 12.46 days (± 10.98). Descriptive data related to the characteristics are available in Table 1.

Table 1. Demographic and nutritional characteristics of patients using ENT in an ICU. João Pessoa, 2019.

Variable	n	%
Gender		
Male	30	38,0%
Female	49	62,0%

Age		
60-69,9	34	43,0%
70-79,99	28	35,4%
>=80	17	21,5%
Nutritional status (BMI)		
Low weight	31	43,7%
Eutrophy	25	35,2%
Overweight	6	8,5%
Obesity	9	12,7%
Nutritional status (BC)		
Severe/moderate malnourished	13	28,9%
Mildly malnourished	13	28,9%
Eutrophy	14	17,7%
Overweight	2	2,5%
Obesity	3	3,8%
Length of hospital stay	17.35 days ± 12.42	
Time of use of TN	12.46 days ± 10.98	

AC = arm circumference; BMI = body mass index; TN = nutritional therapy

Regarding the complications related to Nutritional Therapy, constipation was more frequent among the individuals evaluated (62%), followed by diarrhea (34.6%), open tube (32.9%) and vomiting (16.5%). Table 02 shows the association of these complications in relation to the Prescribed Volume indicator *versus* Infused.

Table 02. Association of the prescribed *versus* infused volume indicator and the complications related to Nutritional Therapy. João Pessoa, 2019.

Intercurrence	**Prescription vs . infused volume**		**p-value**
	Satisfactory	**Not satisfactory**	
Constipation			0,281
Present	29 (59,2%)	20 (40,8%)	
Absent	12 (46,2%)	14 (53,8%)	
Diarrhoea			0,613
Present	16 (59,3%)	11 (40,7%)	
Absent	25 (53,2%)	22 (46,8%)	
Open SNG			0,007
Present	8 (32,0%)	17 (68,0%)	
Absent	30 (65,2%)	16 (34,8%)	
Puke			0,498
Present	6 (46,2%)	7 (53,8%)	
Absent	35 (56,5%)	27 (46,5%)	

SNG= Nasogastric tube

According to the data shown in Table 02, the use of open NGS was significantly associated with the prescribed volume *versus* infused not satisfactory. Of the total number of patients who presented this complication, 68% did not have the volume infused according to what was prescribed (p=0.007). Regarding the other complications, none of them was significantly associated with non-compliance with this indicator.

Table 3 presents an analysis of the association between the care or not of the prescribed *versus* infused volume indicator in relation to the respective clinical outcomes, as well as in relation to the days of hospitalization.

Table 3. Association between prescribed *versus* infused volume indicator with days of hospitalization and clinical outcome in a university hospital in João Pessoa - PB, 2019.

	Prescription vs . infused volume		**p-value**
	Satisfactory	**Not satisfactory**	
Length of Stay			0,014
≤ 21 days	26 (46,4%)	30 (53,6%)	
> 21 days	15 (78,9%)	4 (21,1%)	
Denouement			0,010
Discharge	29 (69,0%)	13 (31,0%)	
Death	12 (36,4%)	21 (63,6%)	

The data showed a significant association between the variables evaluated. Regarding the length of hospital stay, 15 (78.9%) patients whose volume was prescribed *Versus* were hospitalized for more than 21 days (p=0.014). Of the total number of patients discharged from the hospital, 29 (69.0%) satisfactorily received the prescribed volume *Versus* Infused. On the other hand, 21 (63.6%) of the total number of deaths were associated with non-compliance with this indicator (p=0.010).

4 DISCUSSION

Regarding the indicators of nutritional status, the BC showed a higher frequency of malnutrition (57.8%) versus (31.1%) normal weight and BMI higher frequency of underweight (43.7%) versus (35.2) normal weight. Similar findings were found by Detregiachi, Quesada and Marques (2011) regarding BMI, in which a frequency of underweight (54.2%) versus (32.2) normal weight was observed. Martins et al. (2017) found that most patients were malnourished, which is in line with the present study. The importance of perceiving the patient's nutritional status through BMI and AC as soon as admission makes the professional have an incipient notion of the risk of malnutrition or already installed, being able to use an appropriate and individualized therapy. The lack of early detection of nutritional status is a risk factor for mortality, slower wound healing, increased length of hospital stay, increased number of complications, and thus higher costs related to the treatment of hospitalized patients (DETREGIACHI; QUESADA; MARQUES, 2011).

Anthropometry is an important predictor of nutritional status. As for elderly individuals, there are limitations of this age group in relation to the measurement of measurements (skinfolds, weight, height), thus using the reference standards for the elderly. BMI is widely used as an indicator of nutritional status, but its limitations in this population (decrease in height, increase in adipose tissue, reduction in lean mass and in the amount of water) should be considered (FIDELIX; SANTANA; GOMES, 2013). The literature does not show a "gold standard" method for assessing the nutritional status of ICU patients, hence the importance of adding nutritional information to objective methods, which makes the nutritional diagnosis more real (MARTINS *et al*., 2017)

Regarding the prescribed vs. infused volume indicator, 54.7% (n = 41) of the hospitalized patients reached the appropriate value, which should be ≥ to 70%. Similar data were found by Ypi,

Rai and Wong (2014) in a study with 77 patients on mechanical ventilation in enteral nutrition, in which 66% of patients reached 80% of caloric requirements.

The analysis of the Regarding gastrointestinal complications observed in hospitalized older adults, similar findings were found in the study by Medeiros et al., 2019, where complications related to enteral nutrition were evidenced in 65.3% of patients, with constipation being the most prevalent (20.8%) followed by diarrhea (18.1%). The literature shows that some factors influence the adequacy of the infused volume supply, such as internal causes (gastrointestinal complications, extubation, tube problems, routine procedures, and reintroduction of enteral nutrition) and external causes (fasting for tomography, bronchoscopy, upper gastrointestinal endoscopy, or tracheostomy) (RIBEIRO *et al*., 2014).

Therefore, the benefits of ENT are known, however, its use can often cause complications, which are the factors responsible for the interruption in the supply of the diet, causing a nutritional offer below the real needs of the patient, which can be deleterious, as it will affect their nutritional status.with reduced lean body mass (TELLES *et al*., 2015). No correlations were observed between most of the complications related to Enteral Nutritional Therapy and the volume prescribed *Versus* infused, except for an open tube, being directly related to the low volume of diet offered. Showing that other external factors, other than gastrointestinal complications may be related to the non-optimal achievement of the prescribed volume indicator *Versus* Infused. This is similar to the study by Poltronieri (2006), which showed that of the total of 308 reasons related to non-administration of the diet, the following were more representative: incorrect calculation of the infusion speed practiced by the nursing team, performance of diagnostic or therapeutic tests, surgical procedures, attempted intubation and extubation. Factors such as lack of justification for the event, obstruction or displacement of the tube, introduction of the insulin pump, and failure or delay in the delivery of the EN by the nutrition service were also reasons found, but less frequently. Other important findings found by the authors were that avoidable motives, i.e., preventable motives, were more representative than non-avoidable ones, incurring in the non-administration of the volume of enteral diet prescribed.

The study by Santos and Alves (2018) found that patients with fewer complications had average intake volumes between 90 and 100%. In the same study, a significant percentage received a volume considered low or very low, which reflected in a worsening of nutritional status. Other findings of the authors show that the main causes for not receiving the diet as prescribed are logistical problems, gastric stasis, and accidental loss of the tube.

The results showed that there was an association between infused x prescribed volume and clinical outcome, which can be inferred that patients who received a higher volume of diet throughout hospitalization had a high outcome. Showing how the adequacy closer to the ideal (≥ 70%) provided a more favorable evolution to the prognosis of these patients.

Vieira (2019), in a study with 155 patients with a mean age of 73 years, analyzed daily EN infusion values at 5 to 10 days, seeking to investigate the association of caloric adequacy through a cut-off point (> 70% of the prescription and < 70%) with the outcomes. When comparing patients who received more than 70% of the diet with those who received < 70%, the former had a lower number of deaths in the last 30 days. The length of hospital stay can affect the supply of energy, since patients with longer stays tend to achieve a greater adequacy relative to the proposed calorie goal, because in the first days patients tend to present a more unstable condition, that is, some studies show that a low-calorie diet has beneficial effects on clinical results. because it would represent a lower physiological load and a lower risk of autophagy suppression for ICU patients, considering that feeding becomes more difficult in critically ill patients, since they cannot tolerate higher caloric intake (Tsai *et al*., 2011).

Singh *et al*In a prospective cohort study with 93 patients over 15 years of age, they found that the supply of 50% of daily calories constitutes a risk factor for mortality, additional findings of these authors showed that patients who died took longer to start nutritional support after admission to the ICU, and this factor is related to the greater severity of critical illness in this group. Also related to discrepancies between calorie prescription and delivery, factors such as intolerance to enteral feeding and diagnostic procedures.

Choi, Park and Park (2014) point out that to date there is no ideal intake of NE calories for critically ill patients, emphasizing that the literature provides conflicting data and recommendations for both complete calorie support and permissive underfeeding. In this context, studies show that undernourishment of critically ill patients can lead to malnutrition and will result in several adverse effects, particularly infections, longer duration of mechanical ventilation and muscle loss. Therefore, increased intake may be associated with reduced mortality in critically ill patients. A counterpoint of this meta-analysis shows that patients who received a diet beyond the ideal were more vulnerable to death or were dependent on mechanical ventilation for a longer time. Although it is difficult to provide 100% of the goal, studies show that the use of a protocol to increase volume delivery of enteral nutrition, where the level of calories and protein provided is closer to the goal, improves outcomes such as fewer infectious complications, shorter hospital stay, and lower mortality than patients who received lower volume (McClave *et al*., 2009).

5 CONCLUSION

This study concluded that the complications related to Enteral Nutritional Therapy can impact the offer of enteral diet, it also found a significant association between reaching the goal ≥ 70% and higher ICU discharge, as well as a higher volume of infused diet in a longer hospitalization time. There are controversies about the optimal offer of diet infusion in critically ill patients. It is important to consider that hyponutrition may be feasible in the first few days, given the seriousness of the condition.

Once these patients become stable and chronic, a greater supply is ideal for the prevention of malnutrition. It can be observed in the literature that death is associated with an inadequacy of the volume infused and prescribed. Due to those who were discharged, it was noted that most of them satisfactorily received the volume prescribed versus infused, showing that mortality may be associated with non-compliance with this indicator, since quality nutritional therapy is needed more broadly to improve the evaluation of nutritional care for elderly people in the ICU.

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Nutritional counseling as a nutrition strategy in palliative care

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Raquel Bezerra Barbosa de Moura
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
MSc in Gerontology

Gina Araújo Martins Feitosa
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
MSc in Gerontology

Edcleide Oliveira dos Santos Olinto
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Specialist in Parenteral and Enteral Nutritional Therapy

Pollyana Paula Almeida de Araújo
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Clinical Nutrition Specialist

Isabel Carolina Pinto Cavalcanti
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Master of Science in Nutrition

Débora Silva Cavalcanti
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Doctor in Nutrition

Renan Gondim Araújo
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Palliative Care Specialist

Aline Honor Lacerda
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Specialist in Nutritional Bases of Physical Activity

Caroline Sousa Cabral
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Doctor in Nutrition

Flávia Nunes de Lima Barroso
Brazilian Company of Hospital Services (EBSERH) – Lauro Wanderley University Hospital (HULW/UFPB)
Palliative Care Specialist

ABSTRACT

Palliative care is an approach that aims to alleviate suffering and improve the quality of life of patients facing a life-threatening illness, as well as their families and/or caregivers. The nutritionist is an important member of the multidisciplinary team who must act observing the pillars of palliative care, using strategies that seek to relieve symptoms related to food, as well as seeking to nourish the patient in line with their physical, psychological, religious and social aspects. Nutritional counseling is the first nutritional intervention strategy used by nutritionists. Regarding symptom management, this intervention had positive effects on a greater number of symptoms, namely: digestive symptoms, fatigue, dyspnea, inappetence, caloric-protein intake, anorexia, nausea/vomiting, xerostomia, and dysgeusia. Regarding quality of life, early and intensive nutritional counseling, in addition to the use of oral nutritional supplementation, offered positive results in cancer patients receiving radiotherapy, as well as in cancer patients in physical, emotional and social functioning scores. Several studies have also shown that nutritional counseling and the use of oral nutritional supplements, when indicated, lead to improvements in the nutritional status of patients in palliative care. Nutritional counseling is a fundamental step to facilitate nutritional therapy, including strategies that converge expertise and theoretical knowledge and considering each person's feelings, experiences, beliefs, and attitudes. Therefore, it is necessary to establish a bond between the nutritionist and the patient, which will allow them to guide them to necessary changes and improve adherence to nutritional therapy.

Keywords: Palliative Care, Nutrition, Counselling.

1 INTRODUCTION

The palliative care approach aims to improve the quality of life and alleviate the suffering of individuals facing a life-threatening illness, as well as their family members, with impeccable pain control, as well as other physical, psychological, social, and spiritual symptoms (1).

Towards Better effectiveness in the provision of palliative care, a trained multidisciplinary team is necessary, so that care is carried out in a comprehensive manner, including evaluation in all dimensions of the individual. In this context, the nutritionist is an important actor in the evaluation process in palliative care and should seek appropriate strategies to nourish the patient, considering their physical, psychological, religious and social conditions, which may interfere in the improvement of the patient's quality of life (2).

It is important for the nutritionist to be aware of the prognosis and stage of the underlying disease, so that his intervention is based on the maintenance or restoration of the nutritional status, however, promoting well-being and relief from suffering. As the end of life approaches, the objectives of nutritional intervention are more related to quality of life than to nutritional adequacy, and it is necessary for the nutritionist to seek first to provide comfort and assist in the control of symptoms (3,4).

Nutritional counseling is usually the first nutritional intervention strategy used by nutritionists and consists of individualized guidance regarding the quantity and frequency of meals, changes in consistency, fortification of foods and preparations, taking into account the patient's clinical condition and the symptoms presented, also promoting family support, a pleasant environment for the meal and the need for effective communication for greater success in adherence (5).

Therefore, this chapter aims to address nutritional counseling as an important and effective nutritional intervention strategy in the context of palliative care.

2 THEORETICAL BACKGROUND

2.1 NUTRITIONAL COUNSELING FOR SYMPTOM CONTROL IN PALLIATIVE CARE

It is common for patients in palliative care to have various symptoms related to eating, such as lack of appetite, lack of interest in food, and food refusal. In this way, as a consequence we have low food intake and weight loss. In addition, due to the use of various medications, adverse effects constantly occur, such as: nausea; Vomiting; diarrhoea; early satiety; Malabsorption; constipation; xerostomia; dysgeusia; dysphagia; among others (6).

To assess symptoms in palliative care, there are validated tools widely used to assess objective and subjective components and, thus, guide professionals in the assessment of pain and other sources of suffering, such as *Edmonton Symptom Assessment Scale* (ESAS) (7).

Oral feeding, as it is more physiological, should be prioritized, as recommended by the American Dietetic Association, as long as the gastrointestinal system is intact, the patient has a desire and has clinical conditions to eat by this route (8). Oral nutritional care comprises several approaches, including nutritional counseling, meal enrichment, provision of intermediate snacks, and oral nutritional supplements. Supplementation or enrichment of the diet can be carried out by adding natural foods or specific nutrients to meals (examples: protein powder modules, maltodextrin, medium-chain triglycerides, etc.), which can increase the caloric and protein density of meals and beverages, without a large increase in volume (9).

Recently, in 2022, a scoping review was published that brought the most used nutritional interventions in older adults in palliative care. Among them, nutritional counseling was the intervention that had positive effects on the largest number of symptoms, namely: digestive symptoms, fatigue, dyspnea, inappetence, calorie-protein intake, anorexia, nausea/vomiting, xerostomia, and dysgeusia (10). The selected studies brought the following results: significant reduction in total digestive symptom scores (11); Greater control for fatigue, dyspnea, and loss of appetite (12); Significant improvement of appetite in cancer patients with nutritional counseling associated with simple pharmacological measures (13); Better average energy and protein intake with nutritional counseling in association with oral nutritional supplement use (14); The reduction in anorexia, nausea/vomiting, xerostomia, and dysgeusia in cancer patients was 90% in the nutritional counseling group, 67% in the oral supplemental group, and 51% in the control group. In addition, there was an increase in energy intake in the group that received nutritional counseling and it was maintained throughout the 3 months (15).

2.2 NUTRITIONAL COUNSELING AND ITS EFFECTIVENESS IN QUALITY OF LIFE IN PALLIATIVE CARE

The concept of quality of life is considered broad and diverse, providing a view of the level of well-being, considering the result of the evaluation of the various domains and attributes of individual life and the perception of health status (16).

In their scoping review, Moura et al. presented four studies that addressed nutritional counseling and its effect on the quality of life of older adults in palliative care (17). Of those, only one reported that there was no positive effect on cancer patients and weight loss on chemotherapy (18). The other results showed that: early and intensive nutritional counseling, in addition to the use of oral nutritional supplementation, offered beneficial results in terms of overall quality of life and physical function in patients receiving radiotherapy (19); In cancer patients, all quality-of-life function scores improved, whereas in the control group all quality-of-life function scores worsened (15) and that this type of intervention in cancer patients showed that the intervention group had higher scores of

functional quality of life scores for physical, emotional, and social functioning compared to the control group (20).

Considering these results, we observe the recommendation of the *European Society of Parenteral and Enteral Nutrition* (ESPEN) that for individuals undergoing radiotherapy, nutritional intake should be ensured mainly by individualized nutritional counseling and/or with the use of oral nutritional supplements, leading to improved nutritional intake, body weight, and quality of life, which benefits patients and avoids interruptions in treatment (21).

Although some studies do not report a positive impact of nutritional counseling on survival and response to treatment, the recommendation of this intervention is observed by the reports of many patients regarding the greater benefits in health and general well-being when compared to those who do not receive it, thus, a better quality of life is demonstrated by patients in palliative care who receive nutritional counseling. This highlights the importance of the nutritionist in the management of the patient, in an individualized way, with guidelines and recommendations aimed at well-being and comfort (5,22).

2.3 NUTRITIONAL COUNSELING AND ITS EFFECTIVENESS ON NUTRITIONAL STATUS IN PALLIATIVE CARE

Several studies have shown improvement in nutritional status of patients in palliative care when they are offered nutritional counseling and the use of oral nutritional supplements, when indicated.

Arnold and Rochter observed that albumin levels in cancer patients remained stable with the use of this type of intervention (23). In patients undergoing radiotherapy, nutritional counseling and oral nutritional supplementation offer benefits in terms of weight loss and deterioration of nutritional status (19). Silvers et al. observed that in cancer patients, body weight was higher and nutritional risk was lower in the group that received this type of intervention (20). Corroborating these findings, Del Fabro et al. found that nutritional counseling associated with pharmacological measures resulted in improved weight gain in cancer patients (24).

Administration of oral nutritional supplements is a simple, non-invasive strategy to increase nutrient intake by patients (25). It is indicated in patients who are weight loss, malnourished, or have insufficient nutrient intake (< 70% of nutritional requirements) (26). In patients with chronic diseases, this intervention has been shown to be beneficial in terms of physical function and weight gain. In addition, in patients with a BMI < 20kg/m² these beneficial effects were even more pronounced (27). In general, oral nutritional supplementation is carried out in line with nutritional counseling.

It is important to remember that nutritional assessment should be carried out respecting the principles of the palliative care approach, according to the patient's situation and the stage of the underlying disease, essentially considering their comfort and autonomy (28). Therefore, it is essential

to establish the relevance of the nutritional assessment method to be used, and it should not be used in case of futility or physical or emotional discomfort for the patient (29).

3 CONCLUSION

Through the studies analyzed, it was observed that nutritional counseling is an important and effective intervention strategy in patients in palliative care and the one that offers better results in all aspects, and it is necessary for the nutritionist to be attentive to the specific recommendations for each patient, in an individualized way to the needs of each one.

Nutrition counseling is a critical step in facilitating nutritional therapy. In addition to including strategies that converge *expertise and* theoretical knowledge, it involves considering the feelings, experiences, beliefs and attitudes of each one, requiring the establishment of a bond between the nutritionist and the patient, which will allow guiding them to necessary changes and improving adherence to nutritional therapy.

Thus, it is important for the nutritionist to have a broader view of the different roles that food can have: more than a means to nourish the body, food also has a role of comfort, pleasure, commensality, celebration and care. In palliative care, it is imperative that the nutritionist takes into account the physical, emotional, psychological and religious aspects of the individual, in addition to building a bond between the team, family members and the patient.

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The Manaus industrial hub and the preservation of the standing amazon rainforest

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Michele Lins Aracaty e Silva
Doctor in Regional Development (UNISC)
Professor at the Department of Economics (UFAM)
E-mail: michelearacaty@ufam.edu.br

ABSTRACT

The socioeconomic importance of the Manaus Free Trade Zone model and its longevity of 56 uninterrupted years is an unquestionable reality, but the discussion about the contribution of the model in the environmental sphere has long been raised. To this end, we aim to analyze the Manaus Free Trade Zone model as a regional development policy and an instrument of environmental protection. Methodologically, it is a qualitative, exploratory, and descriptive, bibliographic and documental research with content analysis. Amazonas preserves a vast region made up of conservation units, indigenous lands and primary public forests (only 1% of the state's area is under pressure and with deforestation rates). The predominance of an industrial model, the supply of jobs in the manufacturing industry, population concentration, transport logistics, waterway transport, as well as the presence of conservation units and indigenous lands contribute directly and indirectly to the low rates of deforestation in Amazonas. If the main regional development model called the Manaus Free Trade Zone were to be extinguished, we would have a collapse in the entire macroeconomic scenario, which would stimulate a resumption of the process of exploitation of natural resources, mining, cattle ranching, illegal logging, as well as deforestation throughout the region.

Keywords: Manaus Industrial Complex, ZFM model, Forest Preservation, Socioeconomic and Environmental Sustainability, Deforestation.

1 INTRODUCTION

The Manaus Free Trade Zone (ZFM) is considered the most successful regional development model when analyzing the sustainable development indicator. The generation of employment and income implemented after the installation of the Manaus Industrial Pole (PIM) is, for many scholars, a defining factor so that the people of the region did not need to seek their sustenance in the exploitation of natural resources.

The studies that support this thesis have already been carried out by SUFRAMA itself, Fundação Getúlio Vargas (FGV) among other institutions, showing the direct relationship between the maintenance of the model and the preservation of the forest over the last decades.

Given the hypothesis of the organizational structure of the industrial base model that concentrated industrial and logistical activities in Manaus, making the capital of Amazonas attractive to the population and concentrator of income and wealth. On the other hand, the effort to expand areas of environmental conservation and preservation of indigenous lands contribute to Amazonas being the state in the Northern Region of Brazil with the highest percentage of preserved area.

To this end, we aim to analyze the Manaus Free Trade Zone model as a regional development policy and an instrument of environmental protection. Having as The following issue is addressed: what are the possible consequences of a possible extinction of the PIM? If the economic activity of the PIM were to collapse, the immediate effect would be unbridled exploitation of natural resources in search of job and income generation and, consequently, the increase and uncontrolled deforestation.

Methodologically, we have a qualitative, exploratory, descriptive and explanatory research, based on the application of the observational method. As for the media, it is characterized as bibliographic and documentary, with the use of secondary material already published on the subject. As for the instrument of analysis, we will base the observations on the content analysis.

The presence of the Manaus Industrial Pole contributes to curbing deforestation and the preservation of natural resources because it inhibits activities with greater environmental devastating potential, since industrial activities do not require forest resources and boost other sectors of the economy with the same production pattern, such as services.

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Structurally, this article is organized as follows: introduction, development, divided into the following items: The Manaus Free Trade Zone model: historical aspects; The metropolis of Manaus and the Amazon rainforest; Population Attractiveness and Urban Growth and Tax Aspects, Model Performance and Environmental Dynamics. Subsequently, we will have the Methodological Aspects, Conclusion, Final Considerations and finally, the References used for the construction of the text.

2 MANAUS FREE TRADE ZONE MODEL: HISTORICAL ASPECTS

Throughout the process of economic development of the State of Amazonas, two relevant models of regional development have gained prominence: the Rubber Monoculture and the Manaus Free Trade Zone (ZFM).

The Manaus Free Trade Zone duly created by Law No. 3173 of June 6, 1957, the Manaus Free Trade Zone (ZFM) is the result of a national integration policy of the period of the military governments. Having the prerogative to meet the following proposals: to create regions with an infrastructure capable of attracting people to sparsely populated places and to boost the industrialization process that was located more in the southeast region of the country. Therefore, the model would serve as a solvent for these needs in order to promote and stimulate the productive and social association of the Amazon region.

Ten years after its origin, the Federal Government reformulated the proposal, transforming it into a developmentalist model centered on Manaus, and which in its structure comprises three economic poles: commercial, industrial and agricultural, with the industrial pole as a pillar of support. Implemented after this reformulation, the Manaus Industrial Pole (PIM) is the largest industrial hub in the region and one of the largest in Latin America. (SUFRAMA, 2019).

According to the legislation that supports the creation of the Manaus Industrial Pole (Decree-Law 288/67), the Free Trade Zone is presented as an area of free trade of imports and exports, benefiting from tax incentives, in order to strengthen, and generate a foundation for an industrial, commercial and even agricultural pole, with favorable conditions for its permanence and maintenance. Despite being established in Manaus, the model covers other states and municipalities in the northern region of the country, extending to: Acre, Rondônia, Roraima, Amapá and the rest of the Amazon (DECREE-LAW 288/67).

The Manaus Free Trade Zone (ZFM) has the fundamental mission of ensuring the functioning of a relevant system with a geopolitical role of deconcentration of investment and capitalization of income, being public and private, influencing the way of income generation, collaborating for the preservation and reduction of deforestation in the Amazon region, where its investment model moved away from the exploitation of natural resources, such as the extraction of timber and mineral resources. Thus, most of the activities that generate wealth are located in Manaus (FAS, 2022).

The ZFM model presents a system that emphasizes the differential treatment of federal and state taxes, in addition to the exemption from the Tax on Industrialized Products (IPI). The Manaus Free Trade Zone emerged at a time when it presented industrialized products that were not often seen in most Brazilian capitals, in addition to the introduction of multinational companies offering cultural and linguistic enrichment (FAS, 2022).

The Superintendence of the Manaus Free Trade Zone (SUFRAMA) is responsible for managing the model, promoting the development of the municipalities of the Western Amazon through Free Trade Areas (FTAs), covering the states of Rondônia, Roraima, Acre and Amapá and Amazonas) (SUFRAMA, 2019).

Since its inception in 1957, the model has gone through at least five phases in different periods and characteristics within industrial policy. Currently, it is the main public policy put into practice by the Federal Government with a legacy of regional development (SILVA, LUCAS and OLIVEIRA, 2021).

The first phase is configured as the period of a predominant commercial model that goes from 1967 to 1975, initially created to be a free port for the storage and sale of imported products, with its industrial policy aimed at serving the domestic market. Subsequently, until 1990, we have the second phase, where the PIM already competed directly with the large Brazilian industrial centers, through

measures that boosted the country's input industry. It is also during this period that we have the first extension of the model, extending it until 2003 (2021).

The third phase covers the period from 1991 to 1996, when the ZFM began to adapt to the new industrial and foreign trade policy, characterized by economic opening and the reduction of import taxes (II). This phase is also marked by the extensive process of modernization in the PIM due to the implementation of technical quality and standardized standards by the National Institute of Metrology, Standardization and Industrial Quality (INMETRO).

In the fourth phase, from 1996 to 2002, it is marked by a more consolidated industrial policy, capable of adapting to the globalization process, it presents some evident characteristics, such as: the inclusion of imports to boost sales, the creation of criteria for the promotion of regional development, the search for new technologies for industries and the creation of a center for the so-called bioindustries (2021).

The current phase of the model comprises the period from 2003 to the present day (fifth phase), the Productive Development Policy (PDP) is in force, which in short aims to achieve a more efficient production, with more modern industries through technological development, the constant search for the expansion of exports and the expansion of investments for the infrastructure of the municipalities that make up the area covered by the model. It is also in this fifth phase that the extension occurs through Constitutional Amendment n. 83/2014, 05.08.14, expanding tax incentives until the year 2073 (SUFRAMA, 2019).

Even though it has existed for more than half a century, and is valid until 2073, the Manaus Free Trade Zone has been the subject of sometimes heated debates, but little substantiated in in-depth technical studies and one of the most recent concerns is centered on the Tax Reform proposal that would change the tax characteristics of the model. Another group of scholars call for a sustainable tax reform that takes into account regional peculiarities (FAS, 2022).

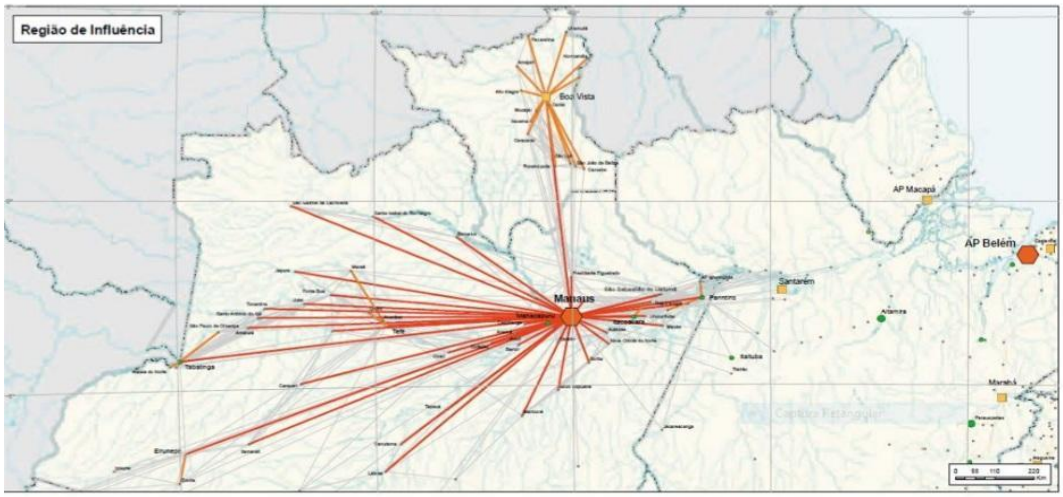
2.1 THE METROPOLIS OF MANAUS AND THE AMAZON RAINFOREST

With approximately 2,255,903 inhabitants (2,063,547), with a population density of 158.06 inhabitants/km², Manaus is the 7th most populous city in Brazil, being the most populous city in Amazonas, in the North Region and in the entire Brazilian Amazon, connecting with numerous municipalities around it, building a hierarchy system with the regions that are under its influence (IBGE, 2020).

According to the study Regions of Influence of Cities (Regic), by IBGE, (2018), Manaus is configured in the category of metropolis where its influence affects several cities around it, generating a process of socioeconomic and political dependence in other regions. In total, according to the study, there are 71 cities that suffer dominance from the capital of Amazonas, where the residents of these

cities carry out their movement in search of job opportunities, basic services and acquisition of goods. As we can see in Figures 1 and 2, below:

Figure 1: Manaus and its influence



Source: IBGE/ RECIO, (2018)

Manaus presents a huge variety of cultures and peoples, who since the Golden Age of Rubber have contributed with architectural structures inspired by cities in Europe, with emphasis on the Teatro Amazonas, located in the majestic Largo São Sebastião, accompanied by materials that were transferred directly from Europe, to satisfy the colonels of the rubber period. However, after the end of this glorious period, a capital emerges with complex problems related to the environment and social inequality, ignoring its natural wealth of resources and not understanding the importance of rivers, streams and native afforestation (IBGE/ REGIC, 2018).

Figure 2: Size of top-level networks (Metropolises)

Redes de primeiro nível (Metrópoles)	Dimensão									
	Capitais Regionais	Centros Sub-Regionais	Centros de Zona	Cidades	População 2018	Área (km²)	Densidade demográfica (hab./km²)	PIB *per capita*	PIB total (R$1 000)	PIB Metrópole/ região de influência
AP São Paulo/SP	26	77	51	679	49 295 747	688 624,1	71,59	42 373,50	2 088 833 313	52,95
AP Brasília/DF	8	25	24	277	11 649 359	1 753 408,9	6,64	39 251,94	457 259 929	53,89
AP Rio de Janeiro/RJ	5	11	3	63	17 296 239	48 796,4	354,46	37 156,08	642 660 440	75,70
AP Belém/PA	4	10	8	157	9 335 660	1 374 601,9	6,79	16 270,49	151 895 774	25,78
AP Belo Horizonte/MG	12	52	65	752	21 069 799	571 747,7	36,85	25 954,38	546 853 629	31,57
AP Campinas/SP	1	10	1	34	4 396 180	14 073,0	312,39	48 902,34	214 983 509	60,52
AP Curitiba/PR	5	30	32	373	11 654 092	210 851,5	55,27	35 143,78	409 568 832	35,49
AP Florianópolis/SC	10	16	27	265	7 138 738	96 954,4	73,63	36 348,80	259 484 525	14,05
AP Fortaleza/CE	5	34	58	630	20 109 664	764 171,9	26,32	13 561,33	272 713 836	29,93
AP Goiânia/GO	3	21	34	364	8 269 552	964 430,5	8,57	26 706,14	220 847 808	30,39
Manaus	1	4	2	71	4 490 260	1 624 605,2	2,76	21 985,26	98 719 516	71,21
AP Porto Alegre/RS	6	39	37	417	11 293 956	266 877,9	42,32	36 069,72	407 369 834	38,97
AP Recife/PE	10	36	45	720	23 601 254	345 048,8	68,40	16 304,43	384 805 000	26,21
AP Salvador/BA	6	24	39	402	14 471 227	479 065,0	30,21	17 538,67	253 806 046	45,22
AP Vitória/ES	1	8	8	85	4 468 927	67 117,8	66,58	26 307,95	117 568 317	51,83

Source: IBGE/ RECIO, (2018)

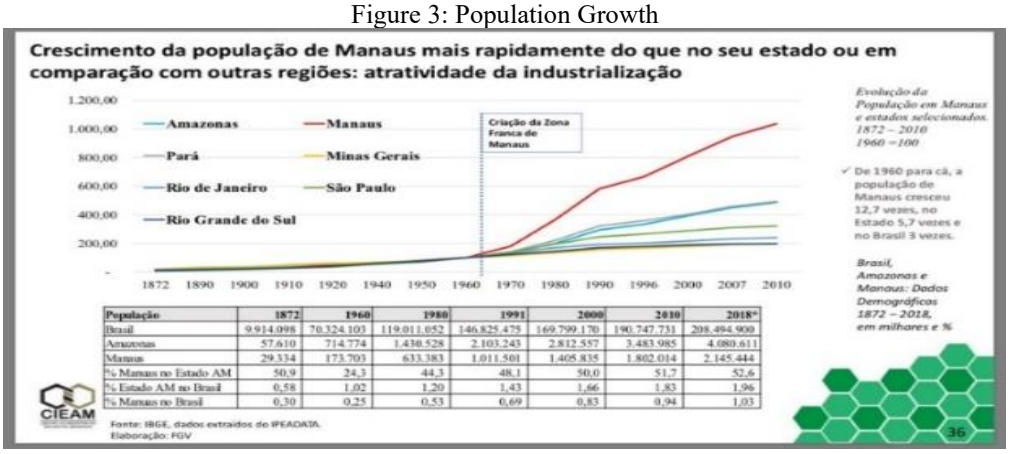
Also according to the study, Manaus is a capital with economic dynamism, where such growth was not accompanied by its structure, with problems related to housing deficit, invasions of

environmental preservation areas, lack of regular water supply, health, logistics infrastructure and development in education (2018).

2.2 POPULATION ATTRACTIVENESS AND URBAN GROWTH

According to Silva et al., (2022), Manaus since the implementation of the Manaus Free Trade Zone Industrial District has been the capital that most attracts the population in search of employment, education, quality of life, and opportunities, as we can see in Figure 3. This phenomenon is responsible for the disorderly growth and spread of the city to the most peripheral areas. These, in turn, are without adequate infrastructure to receive this population volume, which sometimes has a negative impact on the green areas around the capital and near the sources of rivers and streams.

Figure 3: Population Growth



Source: SILVA et al., (2022) adapted from CIEAM, (2021)

Also for the authors (2022), some factors such as migration and vegetative growth (birth x mortality) are determinants for the population increase in cities. The last IBGE census was carried out in 2010, but there are several projections of estimates of this population, both from the IBGE and from the government agencies of the state of Amazonas.

According to the data presented in the Figure above, the city of Manaus, considering the determining factor of population migration, probably encouraged by the Industrial Pole and other opportunities, had an exponential growth of its urban population in recent decades, especially from the 1990s in which the urban population jumped from 633,383 thousand to 1,011,501 million inhabitants. In 2018 to 2,145,444 million and from 2020 onwards, despite the low population caused by the misfortune of the pandemic, IBGE data pointed to 2,219,580 million and in 2021 the estimates were for 2,255,903 million inhabitants in the capital Manaus. The population of the state of Amazonas is estimated by IBGE (2021) at 4,269,995 million inhabitants.

The demographic increase in Manaus is visible mainly after the creation of the ZFM. The attractiveness of industrialization led to a strong migratory flow to the capital of Manaus, as population

growth can be observed after 1960. Urbanization is often a consequence of industrialization, which may explain this increase over time (FGV, 2019).

According to FGV studies (2019), something interesting to point out is that the Gini coefficient of the State of Amazonas, which measures inequality in the region, has exceeded the national average since 2013. The evolution of the GDP of the state of Amazonas in relation to other states in the country, especially those in the North region, is impressive. Finally, tax incentives have proven to be effective in improving the educational system, increasing population and per capita income.

2.3 TAX ASPECTS, MODEL PERFORMANCE AND ENVIRONMENTAL DYNAMICS

The Manaus Free Trade Zone (ZFM) has, as its main economic instrument, federal taxes, which are imposed with differentiation, such as Tax on Industrialized Products - IPI, Import Taxes - II, PIS, Cofins, and, mainly, the state tax of ICMS. It is important to note that there was a national policy in the 1990s, which fostered the IT sector, exempting these products from IPI in the ZFM and partially reducing this tax in the rest of the country. In addition, it established a percentage of 5% of this turnover in Research and Technology (R&D). It is important to note that since colonial times, several attempts have been made to incorporate the Amazon into the Brazilian economic space (MATTOS, 1980).

In 1954, there was an attempt at global planning for Amazonian development, with the creation of the "Emergency Program" of the SPVEA, which became SUDAM. SUFRAMA was also created, aimed at attracting investments, representing a geopolitical device to accelerate the process of internalization. In the 1970s, the National Integration Plan (PIN) was implemented, inserting the Theory of Development Poles (PERROUX, 1955).

The Tax Reform is the Federal Government's proposal to simplify the Brazilian tax system by extinguishing taxes such as PIS, Cofins, IPI, ICMS and ISS by a Tax on Transactions with Goods and Services, IBS. (PL 3887/2020).

The reform seeks to modernize tax collection in order to favor the competitiveness of companies. However, whatever the reform needs to be consciously engendered in the regional needs of environmental preservation, fostering sustainable and intelligent development (FAS, 2022).

Also according to the Foundation (2022), the changes in the tax system need to consider the Manaus Free Trade Zone (ZFM) with a renewing economic perspective. In view of this need, scholars from various fields, with in-depth knowledge of the ZFM, came together to present proposals for a new tax regime to be presented to governments, companies, decision-makers and society in general.

> "The Brazilian economy is crying out for the modernization of the tax regime, and this process needs to better understand the historical contribution of the ZFM to the Amazon and to Brazil, so that it can be improved and have the positive effects enhanced" (FAS, 2022, p. 21).

The State of Amazonas has a different tax policy in relation to ICMS, as products manufactured within its limits are taxed in different percentages, according to their nature. Such tax action will be in effect until 2023. Thus, this needs to be reviewed in order to adopt a vision that takes into account the dynamism of economic, social and environmental demands, providing a harmonious adaptation to changes, seeking to achieve the optimization of tax incentives, in addition to reevaluating sectors to which federal incentives are exceeded to make local production competitive with international products (FAS, 2022).

The proposals presented hope to consolidate a model that will increase competitiveness and diversification, including the internalization of development. Developing and conserving the ZFM is essential to conserve the forest and use it for sustainable development (FAS, 2022).

The creation of a Sustainable Development Fund for Amazonas is also foreseen in the proposals, which would be managed by resources from a new private foundation, in a clear and efficient manner. In addition, investments and new economic matrices, and in environmental conservation, are based on two main tax sources: amounts transferred by ZFM companies (an example would be a fraction of the tax of the current Information Technology Law); and changes in state ICMS incentives, mentioned above, which would reinforce the government budget in health, environment, and education infrastructure investments (FAS, 2022).

The economic, social and environmental importance of the ZFM, to which it has contributed for decades to the reduction of deforestation, attracting populations in search of better living conditions. Social benefits are also expanded throughout Brazil, improving rainfall regimes, which are essential for agriculture, hydroelectric plants and water supply in urban centers. In this way, the tax reform processed in the National Congress is addressed with due importance, in the issues related to ZFM and the environmental impacts they may cause. The contemporary conflict of climate change on the planet provides the valorization of the Amazon, inserting new opportunities to the region, bringing social, environmental and business investments, in an intelligent and modern perspective (FAS, 2022).

For Araújo and Paula (2009), despite the favorable figures, the ZFM model, as well as any other model of regional development, is not totally perfect and has deficiencies or weaknesses: inefficient leasing of factors of production; distortion of markets and production chains; absence of conditionalities and targets and constitutes a model that generates dependence, and presents an urgent need for a productivity and competitiveness agenda given industry 4.0, integration of production chains, as well as adjustment in the fiscal and tax context, in addition to reducing production subsidies.

Also for the authors (2019), in relation to the environmental aspect, the studies that support the hypothesis that the ZFM contributes to preservation, in general, bring the perception that the PIM does not harm the local environment and that the industrial activities of the ZFM do not require the intensive use of natural resources (such as land and wood). unlike other primary activities (mineral extraction,

logging, extensive agriculture, which are associated with land grabbing and real estate speculation), which occur recurrently and constantly in the Amazon in general.

Rivas, Mota and Machado (2009) state that the growth process of the Pole was detached from the significant use of existing natural resources, while in the state of Pará the development took place through the exploitation of natural resources.

Teixeira (2013), Pereira Junior (2015), Costa and Biderman (2014) and Galinari et al., (2007) also discuss the benefits that industrial development and concentration can bring to the region of the Manaus Industrial Pole, reducing the attention given to activities intensive in natural resources.

For FGV (2019), results of the computable general equilibrium model indicate that the Free Trade Zone has an inhibiting effect on activities that involve areas that are not within the PIM, putting pressure on them. That is why the attractiveness of intense activities is lower, since most of the opportunities come from industries. Thus, the ZFM contributes to the reduction of deforestation.

A simple demographic analysis, based on the 1960 Census, can demonstrate that economic dynamics had an impact on demography and was decisive in the environmental aspect. If we compare the population evolution of Brazil and with the two largest states in the region and their capitals, we can see that the dynamics of deforestation is related to the spatial distribution and nature of economic activities (FAS, 2022).

Few studies have empirically analyzed the effect of the ZFM on deforestation within the Amazon Region where the PIM is located. Carvalho and Domingues (2016) say that, between 1960 and 1980, the Amazon had the highest rates of urban growth in the country. However, with the exploitation of natural resources in a disorderly manner, inappropriate predatory activities in most of the occupied areas, and high rates of deforestation for agricultural enterprises and the opening of roads and infrastructure and mining projects in the region.

On the other hand, Nogueira, Sanson and Pessoa (2007) state that the urban area of Manaus is going through a process of unsustainability, aggravated by demographic growth, urban expansion and modernization of interurban spaces, generating predatory and environmentally harmful environmental practices.

As for the perspective of the environmental development of the Manaus Free Trade Zone (ZFM), a pioneering study organized by SUFRAMA stands out, in which it confirmed the indispensability of the PIM for the preservation of the green cover of the Amazon. The research resulted in the work "Virtuous Impact of the Manaus Industrial Pole on the protection of the Amazon Forest", developed by researchers from UFAM, UFPA, the Piatam Institute and IPEA. According to the research, the Manaus industrial park contributed to a 70% reduction in deforestation in Amazonas between 2000 and 2006 and, until 1997, by approximately 85%. This contribution resulted in the preservation of 98% of the state's vegetation cover (RIVAS, MOTA and MACHADO, 2009).

According to Silva (2015), there are numerous social and environmental conditions to be observed by industries to take advantage of PIM tax incentives, not to mention the need to pay attention to the principle of reciprocity, so that a percentage of their revenues is reverted through the payment of contributions, funds related to the internalization of development, scientific and technological research, and tourism. In this sense, the ZFM presents itself as a model capable of sustainably developing the western Amazon region and, consequently, Brazil.

However, one cannot forget the urban impacts generated by the concentration of industrial activity in Manaus. The capital of Amazonas attracted a large contingent of population from the interior and other states in search of opportunities, but without greater qualification – which occurred on a significant scale and speed, over time. This has prevented the planning of urban infrastructure in a way that is compatible with the challenge, with the continuous expansion of irregular occupations and deficiencies in the supply of water, energy, and basic sanitation, among other degradation factors (FAS, 2022).

For FAS (2022), the ZFM contributed objectively to the reduction of deforestation in Amazonas. Although this was not an explicit objective of the Public Policy instruments that created it, this was one of the main justifications for a vote that obtained a large majority in the National Congress to approve the constitutional amendment that extended the validity of the ZFM until 2073. The environmental benefits of ZFM are clearly recognised.

The existence of the Manaus Industrial Pole (PIM) proved to be a successful experience, since it was key in controlling deforestation in the Amazon, which brings great benefits to all of Brazil, by maintaining the rainfall regime, essential to agricultural production, hydroelectric power generation and urban water supply. The indirect environmental benefits of the PIM, although not initially foreseen, represent the fundamental reason for maintaining its differentiated tax regime. However, additional mechanisms need to be put in place to ensure direct environmental benefits (FAS, 2022, p.3).

It should be recognized that the preservation of the Manaus Industrial Pole is beneficial and strategic for Brazil as a whole, as it generates positive results from an economic, social and environmental point of view, generating strong tax collection for the Union, functioning as an axis of dynamization of the economy of the entire Western Amazon and providing the conservation of the forest. In addition, recognizing that there is a tendency for industrial activity to shrink in the country, especially that with higher technological content, the loss of the PIM may further accentuate the external dependence on these products. In this sense, the involvement of its companies in conservation activities of the largest tropical forest on the planet generates benefits for Brazil that outweigh the arguments to the contrary (FAS, 2022).

It was the industrial concentration in Manaus, with the offer of formal employment, whether in manufacturing or related services, that boosted the migratory movement from the interior to the capital

and – although unintentionally foreseen – inhibited the pressure of predatory economic activities in the interior, favoring a scenario of less deforestation and degradation. In addition to physical concentration, the production processes applied in the ZFM, based on the incorporation of technologies for higher value-added products and not on primary commodities, which do not require the intensive use of natural resources, end up protecting the forest, unlike what occurs in neighboring states (2022).

For FGV (2019), while the ZFM is strongly recognized and defended by both public managers and regional political representatives, for whom the ZFM is seen as a successful regional development dynamic from an economic, social, and environmental point of view. With regard to the environmental impacts of the ZFM, does its creation contribute to containing or accelerating deforestation in the State of Amazonas? Or has it not had or does not have any relevant influence on the environment? The causes of deforestation are diverse, and they can be correlated both to the industrial development of the city (via population increase, urbanization process, migration, infrastructure and logistics improvements, among others) and to the development of the primary sector (through agricultural, mining and cattle ranching activities).

There is no consensus in the literature on these issues. On the one hand, it is possible to argue that the expansion of the industry, by increasing income in the region, has contributed to accelerating deforestation, since the demand for agribusiness products and the need to improve the region's infrastructure and logistics must have increased. However, it is also possible to argue that deforestation would have been even greater if the local population had to seek their income from agricultural and extractive activities (FGV, 2019, p. 42).

Costa (2016) states that the existence of the PIM could inhibit activities that would have a greater impact on the environment, such as cattle ranching or logging. In the same sense, according to Brianezi (2013), the ZFM incentives do not include industrial production with local natural resources, in addition to concentrating investments and the population of workers in the state capital.

In the studies by Rivas, Mota and Machado (2009), based on mathematical and econometric models for this purpose, identifying causality between deforestation and variables such as: agricultural area; adults enrolled in primary and secondary education; rural credit; cattle herd. In addition, they identified that deforestation is more concentrated in the municipalities in the south of the state of Amazonas, due to the expansion of the agricultural frontier coming from the border states. Regarding the effect of the PIM on deforestation, they conclude that it inhibits the activities with the greatest environmental devastating potential, since the economic activities of the PIM do not require forest resources and boost other sectors of the economy with the same production pattern, such as services.

According to the conclusion of FGV's studies (2019), the ZFM has an inhibiting effect on activities that put pressure on the opening of new areas and, consequently, deforestation. Thus, it does not allow us to refute the hypothesis that the ZFM contributes to the reduction of deforestation. The

explanation for this result can be based on the discussion presented in the literature review, present in other studies, that the industrial activity of the ZFM and PIM reduces the attractiveness of intensive land use activities. In this way, investments and labor in the region find better opportunities in industrial activities, thus reducing the pressure on deforestation. However, if the attractiveness of the ZFM's industrial activities is reduced, part of the labor and capital of the State of Amazonas would be allocated to agricultural and extractive activities

In addition, the economic modeling exercise suggests that the effect of the ZFM on activities that pressure deforestation contributes to mitigate deforestation and promote conservation, but in a mild and indirect way, and it is possible to reverse this effect under some conditions.

In view of these results found in the analysis of the environmental effects of the ZFM, it is recommended that explicit actions to encourage environmental preservation and discourage deforestation be implemented by agents and companies interested in the continuous development of the ZFM, in order to consolidate the role of the ZFM for the preservation of the Amazon biome and the State of Amazonas. Such actions would allow the direct and unequivocal attribution of the ZFM to environmental conservation and the strengthening of the discourse of its relevant role for the sustainable development of Amazonas and the country.

Also for FGV (2019), in a cross-sectional balance of the studies, it seems fair to conclude that the program of tax incentives aimed at the PIM has been successful. Some indicators allow this finding: the evolution of per capita income in both the metropolitan region of Manaus and the state of Amazonas, the performance of some education indicators, access to services such as water and sanitation, and income inequality indexes. It is also worth considering that the constitution of an industrial pole seems to be an inhibiting element of deforestation in the Amazon forest, both according to panel data analysis techniques and through synthetic control analyses.

It is very difficult to estimate the impacts of the eventual destructuring of the Manaus Industrial Pole (PIM); However, it can be inferred, from the studies presented here, that, among others, there would be a strong drop in the employment generated, currently around 500 thousand, an intense emigration flow, a consequent relevant reduction in the level of per capita income, disincentive to improve education, among others.

Interestingly, the Federal Government's fiscal efforts to sustain a minimum of urban activity and income can be very similar to the net expenditure (incentives received from the Federal Government minus federal revenue in the region), without the positive consequences in terms of education and labor income.

It is worth emphasizing, once again, that the Manaus Free Trade Zone is a regional development program aimed at consolidating productive activities in a region considered remote from the

perspective of the Brazilian consumer market. Since its creation in 1967, the ZFM has fulfilled the role of ensuring the integrity of the national territory, and being a national security imperative.

The industrial activity in the Manaus Free Trade Zone is composed of large international companies, with the best competitive practices. There have been great advances in the region due to the program, with the establishment of a strong regional consumer market, a broad and diversified labor market, universities and applied research institutes, among others.

It is a region rich in natural resources, many of which are highly valuable, and of great biodiversity. This provides a solid basis for the development of a broader regional development programme.

These studies derive directly and indirectly from public policy recommendations for the region. In a vision of the future, it seems fundamental to us to maintain the constitutional precepts so as not to put at risk the existing industrial park, which generates about 500 thousand direct and indirect jobs.

Likewise, there seems to be no doubt about the importance of strengthening the development of the North region, and particularly of the state of Amazonas, based on the following. It is necessary to increase the region's contribution to Brazilian exports. Investments in road and port infrastructure are essential for this. It is necessary to make strong investments in the port structure, allowing modernization in customs clearance, in the same way as in central highways in the region, such as the BR-31925 and BR-230 highways (known as the "Trans-Amazonian").

Investments in infrastructure in the region should extend to the rail, road, river and telecommunications networks. These investments should generate, over time, stimuli for the productive diversification of the region, attracting new investments in new economic sectors beyond manufacturing activity.

Second, it is very important to allocate RD&I resources to activities based on the region's natural resources and to excellent technical-professional training. Associated with this, it is necessary to develop productive activities in the interior of the state, stimulating projects based on mineral resources (potash, gas, bauxite, niobium, etc.), important for the promotion of new economic poles (fertilizers, metallurgical, chemical) and on natural resources aimed at the development of food, personal hygiene, perfumery and cosmetics poles.

Last but not least, the region lacks a structured program for the development of tourism activity, whether business or not. The immense tourism potential of the region, comparable to the most attractive places on the planet, has been economically exploited far below its potential. It is necessary and urgent to design a structured program in a joint act with the three federative entities (Union, State and municipalities of Amazonas) for the development of a sustainable business chain aimed at attracting national and foreign tourists. This program has the function not only of generating employment and income in the region, but also of preserving the environment.

3 METHODOLOGICAL ASPECTS

According to Alves (2003), the methodology is considered a necessary tool of the researcher, because it is in it that the paths to be adopted are specified and creativity is allowed to be delineated and to define the how, where, with whom, with what, when and in what way it is intended to capture reality and its phenomena.

According to Galliano (1986), all the meanings of the word "method" recorded in dictionaries are linked to the Greek origin methodos - which means "path to reach an end".

The methodological procedures of this work have a qualitative approach with the objective of analyzing the Manaus Free Trade Zone model as a regional development policy and an instrument of environmental protection. To this end, this research is characterized as bibliographic and documentary, since it was based on material already elaborated, consisting mainly of books, scientific articles and documents, reports and technical studies.

We can also classify it as descriptive, whose main function is the analysis of the object, seeking to describe the state of the art in the chosen themes: The Manaus Free Trade Zone model: historical aspects, The Manaus metropolis and the Amazon forest, Population attractiveness and urban growth and Tax aspects, model performance and environmental dynamics. Descriptive research, according to Mattar (1993), serves to discover and observe phenomena, seeking to describe, classify and interpret them. This assertion is endorsed by Vergara (1997), when he points out that descriptive research studies the characteristics of a specific phenomenon or population.

In a complementary way, it is possible to classify the present research also as exploratory, because the knowledge about the themes raised. As for the analysis of data and results, a content analysis based on observations of the facts and understanding of the texts used in the construction of the text prevails.

4 CONCLUSION

We begin this discussion with the objective of analyzing the Manaus Free Trade Zone model as a regional development policy and an instrument of environmental protection. Taking into account that the ZFM model is relevant to the state, regional and national economy and that its configuration focused on industrial activity discourages the predatory activity of exploitation of natural resources.

Undeniably, the preservation of the Amazon rainforest guarantees numerous benefits for Brazil and the world. In addition, only the State of Amazonas, even after more than five decades of intense industrial activities, maintains approximately 98% of its vegetation cover, an unparalleled mark that proves that it is possible to harmonize a high degree of technological advancement and respect for the environment.

Amazonas preserves a vast region made up of conservation units, indigenous lands and primary public forests, second only to the state of Amapá in this regard (considering the states that make up the

northern region). In the State of Tocantins, only 37% of the territory is made up of conserved areas (MapBiomas).

Only 1% of the territory of the state of Amazonas represents areas that are under pressure, in which deforestation rates are concentrated compared to the state of Maranhão, this same rate is 24%.

The ecological footprint of Amazonas in 2014 was 1.16 km² per unit of GDP, while that of Pará was 11.84 – a value about ten times higher. The direct and indirect environmental benefits of the ZFM include: (i) reduction of deforestation and (ii) reduction of fires, associated with favorable conditions for the implementation of public policies aimed at (iii) the creation of conservation units, (iv) a low density of the road network and (iv) the promotion of sustainable development (VIANA, 2014).

In the past, we raised a question that often arises in regional and national debates. It is considered a ghost that threatens us, we are referring to the possible extinction of the PIM and its probable consequences.

The literature that supports the relationship between the PIM and its contribution to environmental preservation is little explored, especially with regard to scientific works that make use of quantitative methods, but we highlight the pioneering spirit of the work: Economic Instruments for the Protection of the Amazon: the experience of the Industrial Pole of Manaus (RIVAS, MOTA and MACHADO, 2009) which elucidated in its analysis that the presence of the PIM in Manaus, and the fact that it develops economic activities with absence or low use of forest resources, in its inputs and by boosting other sectors of the economy with the base and production pattern such as services, it boosted and collaborated for the reduction of 85 to 86% in deforestation in the Manaus region.

In a scenario where PIM were to lose If it were to play a leading role, SUFRAMA would inevitably lose investment power, which would increase its ability to avoid deforestation. Still on SUFRAMA's investments, they contribute on two main fronts: the first is an income-generating factor and a contribution to the improvement of local purchasing power. Increased purchasing power makes it possible for consumers to purchase manufactured products manufactured at regional and national level, which helps to reduce pressure on local natural resources. The second, on the other hand, occurs through the improvement of infrastructure of material resources and human capital.

From the two forms of contribution of the effects of investments, their reduction would lead to a drop in the level of income and direct changes in the expectations of individuals and their families, who would seek income from the exploitation of natural resources, increasing deforestation and environmental degradation in an unbridled way.

Firms would also be affected and we would have unemployment and migration of a large population contingent to the border regions or to cattle ranching and soybean exploitation.

Another point that deserves to be highlighted is the phenomenon of globalization that makes it possible for a company to settle anywhere in the world and certainly a company that decides to leave

the PIM would be destined for any country in Latin America or Asia and not another Brazilian state. In this way, the Manaus Free Trade Zone and Brazil lose, which once the migration process occurs, this company will generate employment and income in another nation.

The weight of the collection from the activities related to the PIM, which make up a significant part of the state revenue, would cause a hole in the public coffers and cause a significant impact on the Federal Government, states and municipalities.

Despite the limitations of the research, the authors who have focused on the theme are unanimous in establishing that the PIM contributes to the population concentration and the attractiveness of labor in the capital and that its absence would increase the pressure on the exploitation of natural resources.

5 FINAL THOUGHTS

According to the discussion raised here, there are numerous factors that combined contributed directly and indirectly to the permanence of forest cover in the State of Amazonas, with emphasis on: industrial concentration in Manaus and manufacturing with the offer of formal employment (direct, indirect and temporary), the migratory flow from the interior to the capital, which inhibited the pressure of activities related to extractivism, mining and timber activity.

The population concentration in Manaus, as well as the production processes applied in the ZFM, which is based on the incorporation of technologies for higher value-added products *and not primary commodities*, do not require the use of natural resources and do not cause damage to the forest. This is different from what happened in the neighboring state (Pará), where economic activity was concentrated in the primary sector and the exploitation of natural resources (agriculture and mining), reflecting more positive results for Amazonas in the environmental aspect.

Given the structure of the ZFM model, we can affirm that the PIM contributes to the control of deforestation, generates benefits for the maintenance of the rainfall regime that supplies a large part of Brazil, with positive influences for agricultural production, hydroelectric power generation and urban water supply. In addition, by reducing fires, it reduces air pollution and, therefore, brings enormous benefits to public health, for the urban and rural population.

According to Imazon (2005), the population concentration in Manaus reduces the human presence in the forest and inhibits the pressure on natural resources, considering that the PIM acts as a buffer of this pressure.

Another relevant characteristic in this scenario is the predominant modal in the region, the logistics infrastructure developed as a local solution, almost entirely waterway and without road connection, causes less damage to the environment. In this case, the isolation and river roads are

favorable to the preservation of the forest and cause lower greenhouse gas emissions per unit of product transported.

As it was possible to observe, several factors together contribute directly and indirectly to low deforestation indicators in Amazonas in relation to neighboring states and added to these we have the presence of Conservation Units and Indigenous Lands.

The commitments based on Agenda 2030 has strengthened the involvement of ZFM companies more directly in environmental conservation, with a positive effect against future risks to the economy. Given the commitments made so that together we can seek solutions for the preservation of the forest and the lessons learned from facing the Covid-19 pandemic and its social and economic impacts, associated with the evidence on the origin of the virus in the forest, it brings the alert and the collective obligation so that we can know, preserve and conserve so that we can avoid the emergence of new pandemics originating in the Amazon.

Maintaining the ZFM is essential to protect the Amazon and use it sustainably. Thus, two current movements need reflection: the Tax Reform and the role of forests for environmental balance and any path of economic and social recovery of the country must necessarily pass through the protection and sustainable use of the biodiversity of the Amazon.

Finally, to look, research, dialogue, discuss and reflect on the Amazon is to invest in its future, it is to think about conditions that enable paths that can contribute to the Economy of the Amazon (Economy of the Forest), and thus face the dilemmas and challenges that are projected on the region in the face of the challenges of the globalized world that impact on biodiversity, forest culture and peoples (SILVA, 2022).

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Education and Pandemic: Covid-19 and its effects on learning

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Everton Carlos Farias Gaia
Bachelor of Business Administration.
Degree in History and Geography.
Specialist in Africanities and Afro-Brazilian Culture; Methodology in History Teaching. He holds a master's degree in Educational Sciences from the Inter-American School of Social Sciences (FICS).
PhD student in Education at FICS.
E-mail: everton.farias.gaia@hotmail.com

Silvio Augusto de Almeida Hingel
Bachelor's degree in Industrial Chemistry.
Degree in Chemistry.
Master's Degree in Educational Sciences from the Inter-American School of Social Sciences FICS. PhD student in Education at FICS.
E-mail: Silviohingel@gmail.com

Mílvio da Silva Ribeiro
Doctor in Geography PPGEO/UFPA
Professor at the Faculty of Theology, Philosophy and Human Sciences, Gamaliel, FATEFIG, Tucuruí-PA
E-mail: milvio.geo@gmail.com
ORCID: https://orcid.org/0000-0002-1118-7152

ABSTRACT
The article relates to the COVID-19 pandemic and education, aiming to reflect on its implications for school learning in the pandemic context. It has interfered with the educational reality of students at all levels of education. Furthermore, it has also had an impact on the way modern society operates and lives since 2019. The concept of the COVID-19 pandemic and current educational thinking are developed in contrast to deficient educational systems, based on studies of the pandemic's occurrence and educational practices during and after the peak of pandemic events. In this context, potential classifications, and typologies of educational systems in response to the pandemic reality are explored in a general sense. The conclusion is dedicated to evaluating the implications and challenges resulting from the COVID-19 pandemic, which has left significant marks on learning and the educational process in our educational institutions.

Keywords: Pandemic, Education, Learning, Teaching.

1 INTRODUCTION

Education is a fundamental human right and its promotion and guarantee is the responsibility of the State through the implementation of public policies aimed at establishing quality educational practices.

The month of December 2019 ended with the alert of the World Health Organization (WHO) about cases of pneumonia in the city of Wuhan, Hubei province, People's Republic of China. It was a new strain (type) of coronavirus, which around seven classifications, caused more severe illness in humans than the common cold. It was SARS-CoV-2, which is responsible for causing the disease COVID-19.

In March 2020, COVID-19 was characterized by the WHO as a pandemic, establishing itself in several countries, mandatorily changing the way society should behave, changing everyday habits, entering systems already established in the life of society, such as work, leisure and also in education,

inserting social distancing precautions and remembering hygiene habits, such as washing hands frequently with soap and water, sanitizing them with 70% alcohol, being careful when coughing and sneezing, and using protective masks, which should cover the mouth and nose, in order to minimize the possibility of transmission and contagion of the disease.

Thus, classes had to be remote, with more virtual classrooms and fewer physical classrooms, using remote teaching as a means of continuing the practice of education, in an online teaching, which carried out the pedagogical processes through the use of electronic devices that students could access, such as smartphones, laptops and computers.

This article addresses the relationship between education and emergency e-learning of students during the COVID-19 lockdown period, and the impacts caused on the educational process, since technology and its use in education brought serious changes to pedagogical practice, to be completely assimilated by students and teachers as well.

Thus, this study aims to critically analyze the advent of the covid-19 pandemic, its influence on the educational process, and the implementation in many cases, of a kind of pseudo-education, where technological resources appear only as a means to facilitate the propagation of education, and not as an agent of actual learning, without taking into account social, educational, to the detriment of quality educational practices.

The text of the article specifically aims to evaluate the advent of the covid-19 pandemic and its implications on education and the teaching practices adopted, aiming to expose the need to implement public policies for the recovery of learning, to improve the quality of educational practices, shaken by the restrictions left by the pandemic, and also, to study and evaluate the social aspects, The aim of this study was to analyze the educational, scientific and cultural aspects of COVID-19 in education, in relation to the use of information and communication technologies (ICTs), working to identify the main challenges and opportunities for the establishment of quality educational practices, in a digital environment, which uses technological resources as "educational crutches", to the detriment of effective learning.

This article is justified by the fact that the covid-19 pandemic has left serious gaps in the educational process and the recovery of affected learning needs to be explained and discussed by society, in different educational contexts. However, it is necessary to understand that such discussions encompass social, educational, scientific and cultural aspects of the construction of quality educational practices.

In addition, it is important to identify the challenges and opportunities for building quality educational practices, which take into account the adoption of digital technologies, not as "educational crutches", but as effective and pedagogical support, with consistent methodologies that take into account social differences, intrinsic to human reality.

Methodologically, a qualitative, exploratory and descriptive approach is adopted in this research. The investigation is based on the analysis of scientific documents and materials obtained from sources available on the internet. The main objective of this research is to examine the impacts of the post-COVID-19 pandemic period in the area of education. In addition, the research addresses aspects related to the use of digital technologies in education and how these technologies affect the learning process, considering the teaching techniques implemented during the post-pandemic period.

1.1 THE PANDEMIC ON EDUCATION AND ITS INFLUENCE ON LEARNING

The covid-19 pandemic brought serious changes to education systems, especially in relation to classes, which had to be remote. And due to the speed with which everything happened, with virtual classrooms, the use of cell phones, tablets, video classes and all the technological resources available, those involved in the educational process had to adapt, or even get used to, or even more, "tolerate" the presence of technology in their lives.

The end of face-to-face activities decreed the use of forms manufactured in association by humans and algorithmic devices, leaving students with scars on their psychological organization, formulating ways of attention, guilt, desires, impulses, resentments, and emotions, as "the virus isolated and individualized" people.

According to Ribeiro and Paz (2016), the world has changed in a rapid and frightening way in the pandemic, and, as a result, values, customs, and ways of living have also changed due to the massive introduction of technologies. Because of such transformations, people began to have different interests and began to follow these changes, since the computer and other ICTs offered a different way of knowing until then.

The covid-19 pandemic brought serious changes to education systems, especially in relation to classes, which had to be remote. And due to the speed with which everything happened, with virtual classrooms, the use of cell phones, tablets, video classes and all the technological resources available, those involved in the educational process had to adapt, or even get used to, or even more, "tolerate" the presence of technology in their lives.

The end of face-to-face activities decreed the use of forms manufactured in association by humans and algorithmic devices, leaving students with scars on their psychological organization, formulating ways of attention, guilt, desires, impulses, resentments, and emotions, as "the virus isolated and individualized" people.

Thus, even in a period when the pandemic reality plagues only the most audacious dystopias of modern science fiction, the topics shown here have the function of reporting, in a more innovative way, on the ongoing change, considering global changes and digital societies.

The repercussions of digital growth and the speed of change in the world of research and society take place in many contexts. As Fortified; According to Alvim (2020), technological unfolding intercedes in the way we construct history. Alvim (2020) emphasize the dissemination of resources acquired in Artificial Intelligence and the probabilities they present for the course of history, driven by the absurd amount of digital information.

Technologies have influenced all sectors of society, and, therefore, in order for teachers to recognize and, more than that, use technologies to their advantage, they need to understand that the computer, the internet and the media are powerful allies in pedagogical practice, as they bring together visual and musical resources that can stimulate knowledge (Pereira; Saito, 2018; Medeiros et al, 2018; Parents; Bittar; Freitas, 2018).

> The reality is that there are still few technical texts on the influence of the pandemic on education. There is a need for exhaustive and in-depth assessments and research on the impact of ICTs in the classroom and education systems. They would give us clarity about the reasons for successes and failures, as well as the challenges we must face. There is also a lack of studies that analyze ICTs in relation to the social, political, and cultural transformations that they promote within our societies, and consequently, [that allow] to identify the educational responsibilities and challenges involved in order to promote greater social justice and democratic progress (Tedesco, 2020 apud Ribeiro; Peace, 2020, p. 16).

The citation points to a significant gap in research and analysis of the impact of the pandemic on education, highlighting the need for a more in-depth and exhaustive approach. Several points can be highlighted in the analysis of this quote. In the foreground is the scarcity of technical literature. Tedesco, 2020 apud Ribeiro; Paz, (2020) note the lack of technical texts and comprehensive studies on how the pandemic has affected education. This indicates that there is a pressing need for more in-depth research and analysis on this crucial topic.

In the background, the authors show the impact of ICTs in the classroom, highlight the importance of understanding how New Information and Communication Technologies (ICTs) have affected classroom dynamics and educational systems. This is crucial given the rapid advancement of technology and its influence on how education is delivered and received.

Thirdly, they draw attention to the evaluation of successes and failures. They suggest that research should not only focus on the positive or negative aspects of integrating ICTs into education, but also on the motives behind these results. This can provide valuable insights to improve educational practices.

Ultimately, they recall the social, political and cultural transformations. They point to the need to understand the broader impact of ICTs on society, including social, political and cultural aspects. This comprehensive analysis is important for identifying educational responsibilities and challenges related to the promotion of social justice and democratic progress.

Overall, they highlight the importance of more comprehensive and in-depth research on the impact of the pandemic and ICTs on education and society at large. This research can provide valuable information to guide education policies and promote a fairer education system that is adapted to the challenges of the 21st century.

1.2 KEY ASPECTS OF THE PANDEMIC ON EDUCATION AND ITS INFLUENCE ON LEARNING

It is well known that school institutions must evolve and also keep up with the country's development and social demands (Kasper, 2016; Alves; Tatsch, 2017; Pear tree; Saito, 2018). Thus, new information technologies are increasingly present in our lives, altering communication, work, decision-making, and ways of thinking and acting (Ribeiro; Peace, 2016). In this context, its relevance in the context of the Covid-19 pandemic cannot be denied.

Thus, according to studies by the Anísio Teixeira National Institute of Educational Studies and Research (Inep), released from July 2022, 99.3% of Brazilian schools suspended face-to-face activities during the Covid-19 pandemic.

The Abrinq Foundation (BRAZIL) brings the main information about an important study that reveals that the Brazilian average was 287 days of suspension of face-to-face activities during the 2020 school year, considering public and private schools.

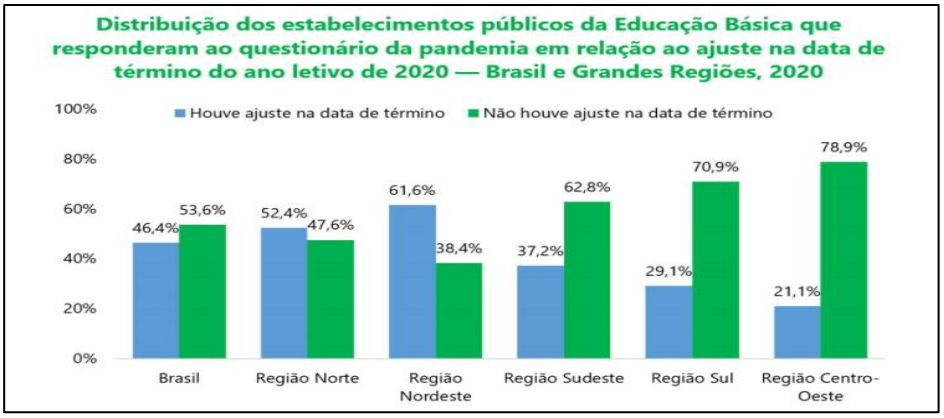
The survey, called Educational Response to the Covid-19 Pandemic in Brazil, points out that just over 53% of public schools managed to maintain the original school calendar last year. In private education, about 70% of schools were able to keep the forecast unchanged.

The survey was carried out between February and May 2021, with the second stage of the 2020 School Census. In all, 94% of the schools answered the questionnaire applied by Inep as a complement to the School Census. The percentage corresponds to 97.2% and 83.2% of the public and private networks, respectively.

The data show that 99.3% of Brazilian schools have suspended face-to-face activities. As a result, some of them also adjusted the end date of the 2020 school year, aiming to face the pedagogical consequences resulting from the suspension of face-to-face activities. Public schools felt a greater need to make this adjustment.

The observation of the measures to adjust the school calendar by the major regions of the country, even when considering only public schools, reflects unequal conditions of planning, execution and infrastructure of these educational establishments. In the North and Northeast regions, the use of adjustments occurred in most public schools, especially in the last of these regions, where more than 61.6% of the establishments made use of this strategy.

Conversely, in the Southeast region, just under one in five (37.2%) establishments reported having made adjustments on the end date of the 2020 school year. In the South (29.1%) and Midwest (21.1%) regions, on average, a quarter of the public basic education schools reported these adjustments in the school calendar.



Source: Ministry of Education (MEC) / National Institute of Studies and Anísio Teixeira Educational Research (Inep) / Directorate of Educational Statistics (Deed).

The percentage of Brazilian schools that did not return to face-to-face activities in the 2020 school year was 90.1%, and in the federal network, this percentage was 98.4%, followed by municipal (97.5%), state (85.9%) and private (70.9%) schools. In this context, more than 98% of schools in the country have adopted non-face-to-face teaching.

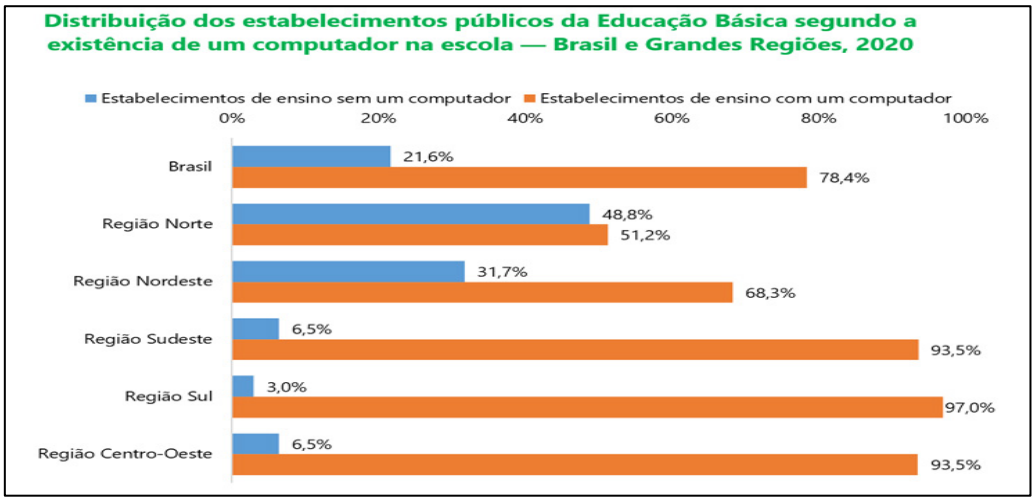
Holding virtual meetings to plan, coordinate and monitor activities was the strategy most adopted by teachers to continue their work during the suspension of face-to-face classes in Brazil. This is followed by the reorganization or adaptation of the lesson plan, with the aim of prioritizing specific skills and content.

In more than 2,600 public schools in Brazil, the suspension of face-to-face activities, due to inadequacies in school and home infrastructure, made it impossible to adopt non-face-to-face teaching and learning strategies.

Considering only those public educational establishments that reported not having adopted online classes, more than 88.4% of them are located in the North (1,185) and Northeast (1,172) regions. In this group of more than 2.3 thousand public basic education schools, no remote teaching-learning strategy was adopted during the 2020 school year, even though face-to-face activities had been suspended, an amount seven times higher than the total number of public schools in the remaining regions combined.

When it comes to free or subsidized access to internet at home, the survey carried out by Inep shows that 15.9% of the Brazilian state network has adopted measures in this regard; In the municipal network, the number recorded was 2.2%.

The existence of a computer in public schools of basic education, regardless of its use (administrative or by students), is one of the aspects that exposes the regional inequalities of school infrastructure. Of the 29,900 public schools that do not have a computer available, 26,300 are located in the North (10,245) and Northeast (16,104) regions, representing 80.5 of the Brazilian establishments in this condition.



Source: Ministry of Education (MEC) / National Institute of Studies and Anísio Teixeira Educational Research (Inep) / Directorate of Educational Statistics (Deed).

The same inequality is observed in the distribution of access to the internet network for the exclusive administrative use of public establishments. In the North region of Brazil, more than four out of five (81.5%) public schools do not have access to the internet for this form of use and just under three out of four are in the same situation in the Northeast region (73.8%), these being the regions with the lowest access to the internet, even if for exclusively administrative and non-pedagogical purposes.

However, the absence of this mode of use of the internet is the average reality of just over one third of the schools in the Southeast (38.2%), South (30.3%) and Midwest (36.9%) regions. With regard to strategies and tools for the development of teaching-learning activities, the availability of printed materials for collection at school is among the most used.

When it comes to live (synchronous) classes, it can be seen that 72.8% of state schools and 31.9% of municipal schools have implemented the strategy. In 2,142 cities, none of the municipal schools adopted this measure.

In all, 28.1% of public schools planned to complement the curriculum with the extension of the school day in the 2021 school year. In the private network, 19.5% of the schools opted for this alternative. In addition, 21.9% of private schools returned to classes with the concomitant realization of face-to-face and non-face-to-face activities, the so-called hybrid teaching. The strategy was also recommended by the National Council of Education (CNE). In the public network, 4% of schools have adopted this measure.

The improvement of connectivity in schools evidenced difficulties in most Brazilian schools, especially in public units, where it was possible to add technological unpreparedness to the lack of knowledge of how to teach through virtual means. The chaos was even greater for those who cannot count on devices (computer, tablet or cell phone) at home, much less with adequate access to the internet.

According to Professor Luiz Henrique Aguilar (UNICAMP, 2020), teachers, whether in elementary, secondary or higher education, did not know what to do in front of a computer. In a few months, they had to learn how to teach with technology. It has greatly impoverished the content of learning. "We're very unequal."

But this situation could be different. This is what the reality experienced by the municipal school system of Itajaí (SC) indicates. The experience of working since 2017 *with the Google for Education* platform in municipal schools allowed a differentiated practice for students and teachers from the 116 teaching units in the municipality, who were able to count on *Google Classroom* — a virtual classroom equipped with sharing materials and activities — during the pandemic period.

2 FINAL THOUGHTS

The article sought to emphasize that education must keep up with the social and cultural changes of society as a whole, however, it is necessary to recognize that new technologies and their inclusion in the most diverse sectors are a frequently demanded demand, especially in the field of education, and that the Covid-19 pandemic has influenced the way we do and think about education. Thus, in order for teachers to be able to integrate digital tools into their practice, they need to know how to use such resources. This is an urgent and necessary reality for educational institutions. In this context, in order for innovation to be present in the school context, teacher training needs to be continuous, as new tools emerge every day.

Therefore, the research sought to demonstrate that, in the context of the pandemic, the New Information and Communication Technologies (ICT) have proven to be powerful instruments, as they are capable of facilitating and contributing to the construction of learning, but it is necessary to pay attention to the way in which technologies were introduced in the school context, in an abrupt way, forcibly even obligatory, so to speak.

For the most part, the impacts of the pandemic on education in Brazil were mapped and confirmed by DataSenado, an agency linked to the Brazilian government, in qualitative research. The participants – Brazilians who have children or are responsible for children or adolescents in the school environment – pointed out the difficulties experienced in the last two years and what could be done to help in the recovery of learning.

Parents also saw how much the change in routine affected the learning of children and adolescents. For them, the 2020/2021 biennium was lost in terms of teaching. Although it was not possible, some even mentioned the failure of their children as a way out so that they could complete these two years in person.

In terms of barriers to the learning process, the lack of structure, both at home and at school, and the format of online classes were the most cited by parents during the pandemic. But there were mentions of providing support to families, with the offer of reinforcement for students who had difficulties.

Some limitations of online teaching are: difficulties in teaching skills, difficulties in receiving *feedback* from students, limited attention span and lack of discipline in following classes.

In addition, special attention is needed to the existing inequalities in the educational system, since students of low socioeconomic status had difficulties in accessing the technological resources necessary to follow the activities, unable to receive stimulation during this period.

The use of the internet and social networks in the school environment and in the teaching-learning relationship has been a reality since before the pandemic. Although the internet is present, for a better use of the content, it is necessary to help and guide an educator.

There is evidence in the literature indicating that a considerable period without stimulation has a negative impact on children's learning. An example of this impact is the phenomenon known as *Summer Learning Loss (SLL),* defined as a loss in school skills during the academic vacation period, which can be observed both in reading skills and in others such as mathematics. According to the researchers, the effect may be greater for low-income children, mainly due to the lack of resources and difficulty in accessing materials when away from the school environment.

Thus, it is possible that a period of absence of school stimulation brings negative impacts to academic learning, bringing negative consequences to the learning of preschoolers and schoolchildren because of social physical isolation during the COVID-19 pandemic.

What has been learned from the pandemic and inequalities in access to information and communication technologies is that inequalities, which are the main socioeconomic mark of Brazilian society, have marked the country's response to the pandemic and will necessarily mark the development of the next steps for both students and education systems.

During the pandemic, technology was how students were able to follow classes remotely. In this context, those who did not have access to material or the internet were left out. There are also criticisms raised about how efficient "hastily" distance education would have been.

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SEVEN publicações acadêmicas

Applications for the social inclusion of people with disabilities and reduced mobility: A systematic literature review

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Maria Elizete Kunkel
Federal University of São Paulo, São José dos Campos, Brazil.
ORCID: orcid.org/0000-0003-1711-9289
E-mail: elizete.kunkel@gmail.com

Anderson da Silva Lima
Federal University of São Paulo, São José dos Campos, Brazil.
ORCID: orcid.org/0009-0004-1567-0186
E-mail: anderson.lima26@unifesp.br

Leonardo Henrique Fazan
Federal University of São Paulo, São José dos Campos, Brazil.
ORCID: orcid.org/0000-0002-6070-0776
E-mail: leonardo.fazan@unifesp.br

ABSTRACT
Information and Communication Technology (ICT) can potentially enhance the independence of people with disabilities using mobile applications. Comparing the results of various applications in the literature can be challenging. This systematic literature review reveals the development of applications on mobility, spatial orientation, obstacle prevention, and access to urban information. The findings highlight the complexity involved in the development and the relevance of these tools in promoting the independence of users with disabilities, as well as collaborative efforts. Developing such applications is a complex task due to the heterogeneity of the end-users, requiring the identification of the necessary resources for each group. Innovations in modifying the urban environment allow everyone to enjoy life in the city. Conclusion: Social inclusion demands collaborative action from professionals from diverse fields, the general population, and the government in developing applications that meet the needs of all.

Keywords: Mobile Device, Application, Assistive Technology.

1 INTRODUCTION

The global population of individuals aged 60 years and older has doubled since 1980, and it is projected to reach 2 billion by 2050 [1]. People with disabilities account for approximately 650 million individuals, representing 15% of the world's population. Consequently, public authorities are striving to implement policies that effectively and adequately serve this segment of the population. By 2025, it is anticipated that 5.9 billion, or 71% of the world's population, will have access to mobile services. Information and Communication Technology (ICT) comprises a suite of integrated resources employed in various sectors, including education. ICT, particularly through mobile applications, has the potential to enhance the independence of individuals with disabilities [2].

A mobile application (App) is a program designed for mobile devices, tailored to execute specific functions. Mobile device-based assistive technology, featuring Apps, can significantly enhance autonomy and overall quality of life for individuals with disabilities and the elderly [3]. The interactions and collaborations of experienced users can further assist others, thereby fostering the

creation of new services and tools capable of addressing the accessibility and information challenges arising from shared data [4].

The existing body of literature contains numerous research studies focused on developing mobile Apps catering to individuals with disabilities or limited mobility. Nevertheless, comparing the outcomes across different platforms and applications is challenging. A Systematic Literature Review (SLR) has been conducted with a specific focus on mobility, spatial orientation, obstacle prevention, and access to urban information.

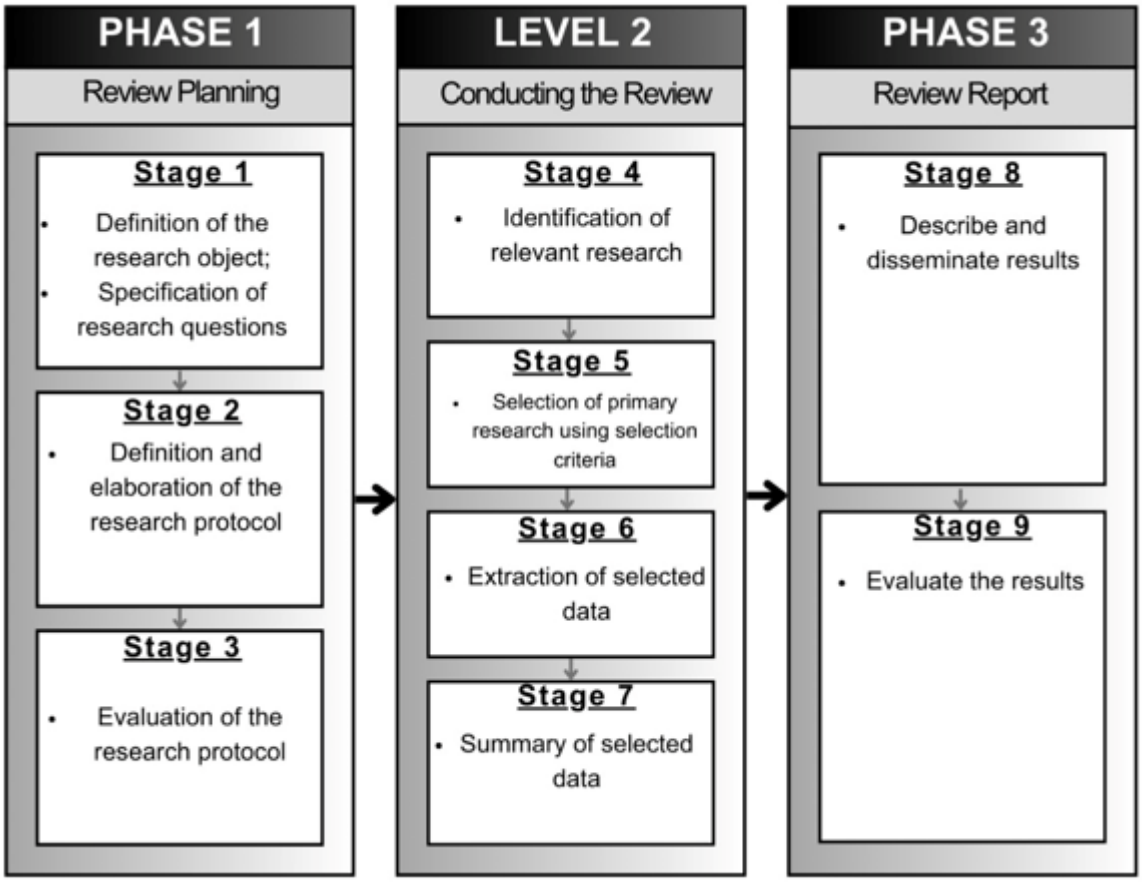
2 METHODOLOGY

In this Systematic Literature Review (SLR), three research questions were delineated to guide the inquiry:

1. What technologies have been employed in mobile applications designed to assist individuals with disabilities or reduced mobility?
2. What were the challenges encountered during the development of these applications, and what solutions were implemented to address them?
3. In what manner has the collective collaboration system been harnessed in the development and maintenance of these applications?

Following the methodology devised by Brebeton, the SLR was partitioned into three distinct phases: planning, execution, and the compilation of the review report (Figure 1) [5]. These phases offer a comprehensive framework for conducting the review, enabling a systematic and rigorous approach to sourcing and analyzing relevant literature concerning the development of mobile applications for individuals with disabilities or reduced mobility. They also ensure that the review is carried out transparently and thoroughly documented, facilitating the presentation of reliable and pertinent outcomes.

Figure 1 – Phases of the Systematic Literature Review



Source: The authors

In Phase 1 of the systematic literature review (SLR) planning, a research protocol was established to delineate the search criteria for studies published in the English language between 2008 and 2021. The search was conducted across the following databases: Scopus, SpringerLink, ScienceDirect, and the Integrated Digital Library of the Institute of Space Technology, using specific search strings.

Phase 2 of the SLR execution comprised four stages: identification, selection, extraction, and synthesis of studies. In this phase, relevant studies were identified through the search process, repeated studies were excluded, and those meeting the inclusion criteria were selected.

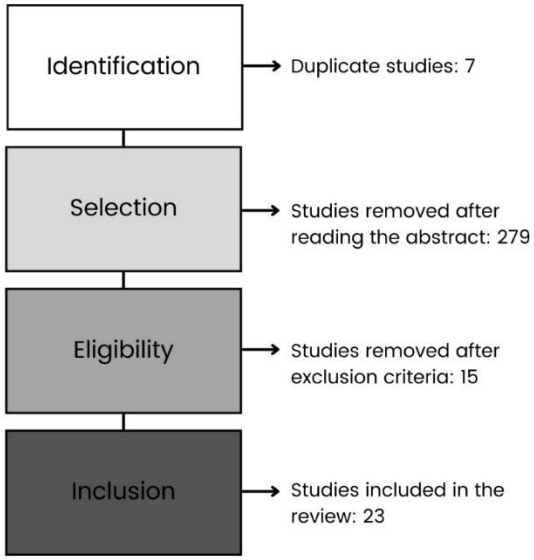
Phase 3 entailed the synthesis of the selected studies to address the research questions. In the study selection process, inclusion and exclusion criteria were defined. Excluded were studies lacking data to address the research questions (such as editorials, abstracts, book chapters, and studies presented at events), and only primary studies that underwent peer review and fully or partially addressed the research questions were selected.

3 RESULTS

A total of 23 studies were selected to form the SLR. Figure 2 illustrates the study selection process based on the inclusion and exclusion criteria established in the protocol. Across all databases,

an initial set of 324 studies was selected, of which 7 were excluded due to duplication in more than one database. Following the review of titles and abstracts, 279 studies were excluded in adherence to the exclusion criteria. The remaining studies were examined in their entirety, and after this step, an additional 15 studies were excluded.

Figure 2 – Studies Selection process



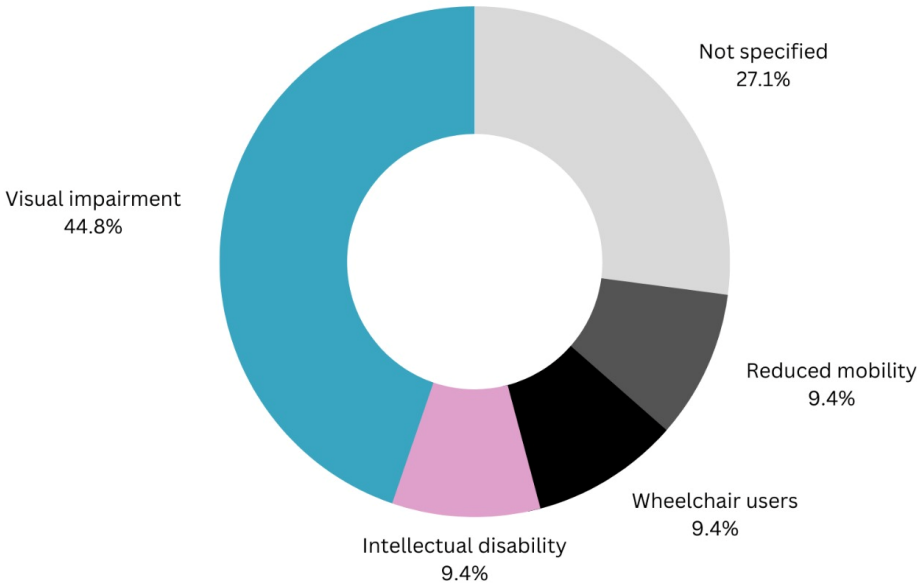
Source: The authors

The preliminary results of the search on the Scopus database using the search strings "(TITLE-ABS-KEY (application or app or 'mobile app' or health) AND TITLE-ABS-KEY (collaborative or collaboration or crowdsourcing) AND TITLE-ABS-KEY ('assistive technology' or 'assistive devices' or devices or 'adaptive technology') AND TITLE-ABS-KEY(Accessibility) WITHIN ARTICLE" returned 102 studies, with only 1 selected for inclusion. The search on SpringerLink with the search strings "(TITLE-ABS-KEY (mobile or smartphone) AND TITLE-ABS-KEY (collaborative crowdsourcing) AND TITLE-ABS-KEY ('assistive devices' or 'people with disabilities' or disabilities) WITHIN ARTICLE" yielded 49 studies, of which 6 were selected. The search on the ScienceDirect database with the search strings "(FIND ARTICLES WITH THESE TERMS (smartphone and 'people with disabilities' or 'assistive technology' and collaborative)" resulted in 53 studies, with 7 of them being selected. The search on the Integrated ITA database retrieved 120 studies, with 9 being selected. The applied search strings were: "('assistive devices' or 'people with disabilities' or disabilities) AND (mobile or smartphone or app) AND (collaborative or crowdsourcing or crowdfunding) AND (orientation or mobility) AND ('assistive technology' or 'assistive devices' or devices or 'adaptive technology')." In this database, the option "Peer-reviewed articles only" was selected.

Out of the 23 studies selected for the SLR, the results provided insights into the development of applications for individuals with various types of disabilities: visual (10), mobility impairment (2),

cognitive disabilities and the elderly (3), wheelchair users (2), and 6 articles did not specify the type of disability (Figure 3). Six of the devices were designed for indoor environments, 11 for outdoor environments, and 6 for both outdoor and indoor environments. Table 2 outlines the objectives of the selected applications.

Figure 3 - Types of Disabilities Investigated in the App Development Studies



Source: The authors

Table 2 – Objectives of the selected applications

Objective	Reference	Application
Monitorem	[6] [9]	Ecaalyx
Mobility	[7]	PERCEPT
Orientation	[1] [8] [11] [13] [14][17][24][26-27]	IMAGO, ZebraRecognizer, All-SMAII
Information	[10][15]	SoNavNet, Ebsar
Assistance	[12]	-
Informação	[15-16][18-23]	SIMON, GAWA, AR Application
Auxílio	[18-23]	
Transporte	[25]	Tiramisu

Source: The authors

3.1 WHAT TECHNOLOGIES HAVE BEEN EMPLOYED IN MOBILE APPLICATIONS TO ASSIST INDIVIDUALS WITH DISABILITIES OR REDUCED MOBILITY?

In this study, 12 studies were identified regarding orientation and navigation systems for drivers. Although the Global Positioning System (GPS), a satellite navigation system launched in the 1990s, is widely used for smartphone navigation, it remains inaccurate in rural areas and indoor locations. However, other systems are available and were identified in the SLR as technologies for the location and orientation of people with disabilities.

The PERCEPT app [7] allows independent access for visually impaired individuals to public health facilities. The system includes a glove with a microcontroller, RFID reader and tags, antenna, Bluetooth chip, buttons, speakers, rechargeable batteries, and a power regulator. Tags are strategically placed, and the glove allows the user to scan them, sending the data to the microcontroller via Bluetooth. Navigation instructions are provided in audio through a text-to-speech converter system. In a smart city, smart mobility is essential for daily life, providing information about transportation, urban barriers, facilities, pedestrian pathways, and travel planning. The Smart Mobility for All (SMAll) system [24] is an urban mobility service management platform that tracks the real-time position and availability of trains, buses, subways, bicycles, and shared cars. It also allows user collaboration through crowdsourcing.

Internet of Things (IoT) technologies provide tools to include citizens in smart cities, such as the AR Application interactive system [22]. This system allows wheelchair users to shop and navigate independently, privately, and autonomously by digitally interacting with physical items on store shelves. Interaction methodologies include product selection, information retrieval, location, indoor navigation, and shopping. The system interface is designed in HTML5 using the Jquery and Javascript libraries, with access to a database through web services periodically updated by the RFID system. Web interfaces provide real-time information on the presence and location of products on store shelves, thanks to real-time inventory updates.

Accessibility and mobility are fundamental issues in both indoor and outdoor environments, especially for people with disabilities. The GAWA app was developed to facilitate access for people with disabilities to information in indoor and outdoor environments via smartphones [27]. The app includes content management services, mobile information and navigation, wayfinding, search, and the evaluation of various orientation systems for defining routes for a given trip. Wayfinding is crucial to improve the orientation of visually impaired individuals in unfamiliar locations and complex environments, such as urban centers, health units, education facilities, and transportation installations.

As architectural environments become more complex, people need visual cues, such as maps, directional signs, and symbols, to help them reach their destinations. Currently, smartphone cameras allow the use of visual techniques, such as Simultaneous Localization and Mapping (SLAM), to create apps that assist people with disabilities in locating and navigating in public places. Visual SLAM (vSLAM) uses the smartphone camera as an input source and calculates the 3D geometry of the explored environment. This method provides a much higher positioning accuracy than that achieved by GPS sensors. The IMAGO app uses vSLAM and has an average location error of 0.51 meters when compared to the average GPS error of 34 meters.

The SIMON app [24] contributes to improving access for people with disabilities to public parking spaces. The system uses mobile technologies that integrate solutions to support user

identification on existing city parking meters, preserving citizen privacy. Two tags have been physically incorporated into the system, one Near Field Communication (NFC) tag with electronically written user identification, and an adhesive tag with a QR code (QR-Code) containing user identification. The NFC tags contain a magnetic induction reading chip that can be read through mobile phone cameras. The smartphone camera reads user identification through these tags, which must be affixed to the windshield of the parked car. This system should be used both by the user and by parking controllers to check the validity of the card or any other relevant system information on the tags affixed to the car windshield.

Brock et al. [13] compared the usability of a classic tactile line map with an interactive multitouch screen map with tactile lines and audio output. The test involved 24 visually impaired participants and showed that replacing the Braille system with a simple audio-tactile app significantly improved user efficiency and satisfaction. Although tactile maps are a traditional tool used by visually impaired individuals to navigate urban environments, they are not automatically updated. An alternative approach is the use of Voluntary Geographic Information (VGI), an open-source system that provides updates on local infrastructure and can be used in conjunction with an audio, text, and email system. These evolving technologies and apps aim to improve the accessibility and mobility of people with disabilities in urban environments, offering innovative solutions to assist them in achieving independence and autonomy.

The ZebraRecognizer mobile application [17] was developed to assist individuals with visual impairments in recognizing pedestrian crosswalks. The system is based on the ZebraX application and comprises three main modules: Navigator, Logic, and ZebraX. The Navigator module transmits audio instructions to guide the user along the crosswalk, while the Logic module calculates these guidance instructions. The ZebraX module receives the crosswalk's position, recognizes pedestrian crosswalks, calculates the safest path, and provides audio feedback to guide the user. ZebraRecognizer utilizes image processing capabilities to remove projection distortions and enhance recognition accuracy.

Sendra et al. [9] proposed an intelligent collaborative system based on sensors integrated into mobile devices to monitor the well-being of individuals with reduced mobility or elderly people. The application utilizes a smartphone equipped with various sensors and transducers, including proximity sensor, light sensor, acoustic sensor, microphone, compass, gyroscope, accelerometer, barometer, GPS locator, among others. The system collects information such as falls, changes in position, and levels of sunlight to monitor the individual's status.

The assistive technology device [27] was developed to assist pedestrians with visual impairments in navigating external environments independently, safely, and efficiently. This device utilizes the positioning and computing capabilities of a wearable touchscreen integrated with a smartphone to locate and guide users in urban settings. It employs a GPS sensor and a haptic device

embedded in a shoe to ensure accurate positioning, tracking, and guidance. The device complements the use of white canes or guide dogs, providing a comprehensive mobility solution for blind pedestrians and individuals with visual impairments in urban environments. Navigation instructions are transmitted via Bluetooth. The electronic module is an embedded system equipped with an ATMEL-ATtiny2313 microcontroller that translates instructions into actuator commands and transmits them to the tactile display. A tactile feedback module located in the shoe provides tactile cues to the user's foot, delivering the necessary navigation instructions to reach the chosen destination. The device's interface is innovative, as it provides tactile feedback to the user, enhancing the intuitiveness and efficiency of navigation.

3.2 WHAT DIFFICULTIES HAVE BEEN ENCOUNTERED IN THE DEVELOPMENT OF THESE APPLICATIONS, AND WHAT SOLUTIONS HAVE BEEN IDENTIFIED?

People with disabilities represent a highly diverse group, making it challenging to develop specific solutions for individuals that can also be viable for others. Considering the wide variety of existing platforms, developing systems for mobile devices is a complex task. Mobile devices possess specific characteristics such as screen size, resolution, the presence or absence of a keyboard, format, and various technologies employed, which vary with the level of hardware and software. These differences raise an additional concern regarding the means of delivering and presenting content to mobile users in an accessible manner [28].

When it comes to data sharing in applications, several limitations were identified in terms of collaboration for individuals with disabilities in public road mobility. The rapid obsolescence of this data is a recurring issue due to factors like inadequate public road maintenance, emergency evacuations, and congestion resulting from irregular events such as parades or festivals [10]. Another limitation is the difficulty in obtaining sufficient participation from external sources and relevant data on mobility and orientation, as well as the qualification of data contributors to assess routes for different disabilities [23]. While it is common for groups to share information on barrier-free routes in applications for people with disabilities, it is essential to note that individuals with mobility impairments constitute a highly heterogeneous group with varying physical or functional characteristics, ages, and specific transportation needs that are often not met by available applications [23].

The issue of users' different age groups is also a complex problem since teenagers, adults, and elderly individuals with disabilities have grown up in different times with varying levels of acceptance of mobile device-based systems [26]. However, it is crucial that the response to overcoming accessibility barriers meets the specific needs of each end user after identifying the requirements for each user type.

To provide a service to a target group that usually lacks familiarity with technology, a continuous and autonomous mobile platform is essential for efficient operation, such as alert generation [6]. It is also vital for the system to use different sensory channels, such as visual, auditory, and tactile, to make information delivery accessible to all users, regardless of age, disability type, or user sensory preference [1].

A study evaluating an application targeting visually impaired individuals found that 40% of participants encountered difficulties in understanding synthetic voice and following the application's instructions [7]. Therefore, it is essential to consider that in certain circumstances, an excessive use of audio messages can distract the user, harming the application's usability. It is crucial that the application provides alerts only for essential information, such as the proximity of vehicles, cyclists, and pedestrians, for instance [17]. Additionally, navigation information must be clear and intuitive [8]. It is essential to emphasize that regarding tactile maps, information overload can impair readability, becoming confusing and hindering the user's perception [13].

In a practical test with an application for visually impaired individuals, all participants preferred the combination of an auditory and tactile guidance system [1]. In response to the difficulties encountered by users of the PERCEPT application, modifications were made to the system to include proximity information in step-by-step guidance, provide instructions for users with guide dogs, allow adjustments to the application's voice rhythm, and offer short or abbreviated instructions, such as "turn left" or "turn right" [7]. To ensure the accessibility of interfaces for different users, it is essential to provide alternative media features that can cater to specific interaction needs. Digital resource description information models can help balance system features and individual user needs, enabling access for all users [29].

Mobile devices with location recognition technology have the potential to collect, store, and disclose an abundance of confidential data, raising security and privacy concerns [8]. [16] addresses two main challenges: reducing cyberfraud in system implementation and proposing a specific multimodal navigation solution for the elderly and individuals with disabilities. Both cases require extensive integration of multiple databases with personal information collected. Therefore, a viable solution for the project would be the implementation of a proven methodology to preserve data privacy and authenticate users.

A study by [22] on individuals with reduced hand mobility, the elderly, and individuals with brain damage concluded that wheelchair users felt more comfortable with smartphones than tablets because handling a tablet in a wheelchair is challenging, and a smartphone can be operated with one hand. User interfaces can be designed with large fonts, buttons, and images, facilitating application usability [22].

GPS systems are often used for pedestrian navigation, but they suffer from inaccuracies, especially in rural areas where navigation is typically needed more [14], and weak signals in enclosed spaces such as museums or facilities where access points are weak or obstructed [24]. Furthermore, GPS does not determine the user's location within a building [15]. Some location and orientation technologies are used to replace or complement GPS functions: infrared light, photographic camera, Bluetooth, Zigbee, Location Based System (LBS), and IoT [22]. The use of the accelerometer and compass for user tracking, as employed by the Ebsar mobile device, has proven to be superior and more available than GPS tracking, which requires a wireless connection to function. To enhance accuracy, the application uses location markers as checkpoints to ensure that even in cases of deviation from the path and accelerometer and compass failures, a scanned digital QR code allows the system to adjust the user's location and continue guiding them [15].

To enhance the functionalities of tools, several improvements should be planned for the short and medium term, combining various services and technologies available to enhance the quality of applications [29].

3.3 HOW HAVE COLLABORATION SYSTEMS BEEN UTILIZED IN THE DEVELOPMENT AND MAINTENANCE OF THESE APPLICATIONS?

The following systems have been identified: information exchange via applications among end users; collaboration of formal and informal caregivers; sharing experiences through social media; and collaboration of volunteers with and without disabilities [6, 10, 12, 20, 21, 25-26]. Smart cities represent a broad and integrated approach to improving the efficiency of a city's operations, the quality of life for the population, and the regional economy. One crucial dimension is enhancing the quality of life for people with disabilities who often face inequalities in accessing government-provided facilities. Collaboration among various stakeholders is essential for the city's design, processes, and improvements. Communication between the population and government institutions is fundamental to this. As [31] emphasizes, communication systems form the foundation of collaborative systems, enabling different people to act together towards a common goal.

In the field of travel and tourism for people with disabilities, applications can be used to provide personalized and suitable information for tourists, including the ability to know in advance if their needs can be met at their intended destination. Furthermore, the opinions of other tourists with similar needs can be used to improve the system and the accuracy of the information and recommendations provided. The study [23] highlights that these recommendations are a way to enhance the travel experience for people with disabilities. A collaborative approach that aims to capture feedback on sidewalk information in public roadways, such as slope, width, length, damages, among other parameters, can be adopted by wheelchair users. In this research, end users share and exchange

experiences by following the route suggested by the application to reach their destination. During the walk, the user is queried about the sidewalk quality through the application, and the collected feedback is incorporated into a database. This database is periodically adjusted to provide other users with a more satisfactory route [20].

The SoNavNet application is a collaborative and user-experience-based approach through communication on social media platforms. This platform enables people with disabilities to find suitable routes that meet their needs in outdoor and indoor environments [10]. Additionally, customers have instant access to information about barrier-free vehicles, driver ratings, driving routes, estimated arrival times, discount information, cost estimates, and travel records, and they can share their experiences and information through social media platforms [26].

The orchestration of microservices results in a workflow in which crowdsourcing and crowdsensing assist in user planning, travel, and reporting phases, considering their needs and preferences. Crowdsourcing is a production and process structuring model that uses collective wisdom and insights to solve problems or develop solutions. Crowdsensing occurs when a large group of individuals with mobile devices collectively detect, compute, and share data and extract information to measure, map, analyze, estimate, or infer any common processes of interest. Through these microservices, users can fill datasets related to their points of interest, such as monuments, public service stops, parks, historical sites, among others. They can also collaborate by providing information about accessibility points of interest, such as barriers, stairs, urban facilities, gaps, obstructions, etc. Crowdsensing functions automatically with the acquisition of various types of information and sources, including real-time GPS and access point information. This information is gathered to generate notifications about route availability, streets, and public service schedules [30].

The Wayfinding application has functionality for sending messages to users about physical barriers, such as trash bins or crosswalks. To provide information to visually impaired users, the best combination found was auditory and tactile feedback. When tactile feedback is provided, the application vibrates at a specific rhythm, alerting the user when they are walking in the correct direction. If the user is close to their destination, the smartphone vibrates at a faster pace to signal their location [1].

A study aimed to increase interaction between end users and formal and informal caregivers through collaboration and tutorials for caregivers [12]. The discussion and interaction helped both the elderly and people with disabilities as well as caregivers to learn from each other, share experiences, and communicate. In this regard, collaboration can go beyond the exchange of information among people with disabilities, including doctors and other healthcare professionals [6].

The Tiramisu application was developed to improve urban mobility through crowdsourcing, allowing passengers with or without disabilities to share location and transit data on their smartphones

[25]. It offers users the ability to indicate bus boarding, whether the bus has passed, or whether it was crowded to board, through a pop-up dialog box. When indicating that they are boarding a bus, users choose a destination stop and evaluate the bus's crowding upon boarding, selecting "record" to share a location tracking. The application automatically stops sharing location information when the vehicle reaches the desired stop. To enhance the system's efficiency, it is expected that other experienced users will provide route recommendations to users in a specific manner. However, it is possible that the system may not find the optimal route when only inexperienced users or users with disabilities are considered. To mitigate potential feedback errors, a combined approach was proposed, where the path suggested by the application is not based solely on the feedback of inexperienced users or users with disabilities. A mitigation coefficient based on the user type was included in the system [19].

A case study with five applications investigated how users, including the elderly, wheelchair users, visually impaired individuals, and volunteers without disabilities, collaborate in providing environmental accessibility information [21]. Individuals from different user groups exhibited distinct behaviors when collaborating on accessibility information. On the other hand, volunteers without disabilities had some limitations in identifying environmental accessibility issues.

4 CONCLUSIONS

The present Systematic Literature Review (SLR) aimed to analyze studies on the development of assistive technology based on mobile devices. The results emphasize the complexity involved in the development of these applications and underscore the significance of mobile applications in promoting the independence of users with disabilities, as well as understanding the importance of the collaborative aspect of these tools. This kind of development is a complex task due to the heterogeneity of end users.

The challenges of accessibility that society currently faces are more pronounced in urban areas. It is of utmost importance to differentiate between the resources needed for each group since each individual has specific needs and preferences. The application of technological mechanisms can yield positive outcomes in social inclusion and the daily lives of individuals with disabilities. The results of this SLR can guide professionals in projects aimed at developing applications for people with disabilities, not only by identifying challenges but also by describing solutions found by researchers. This can serve as guidance for defining the functional requirements of applications based on end-user needs.

Demonstrating a commitment to innovation in urban environment transformation allows all individuals, including those with disabilities, to fully enjoy city life. The inclusion of these individuals is a complex task that necessitates collaborative action from professionals across various fields, the population, family members, and governmental authorities.

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SEVEN publicações acadêmicas

Challenges and impacts of the Covid-19 pandemic in Brazil: Perspectives on coping policies and their consequences on public health

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Sergio Dionízio de Oliveira
Master's student of the Stricto Sensu Graduate Program in Public Policy and Local Development – EMESCAM

Roberta Ribeiro Batista Barbosa
Professor of the Stricto Sensu Graduate Program in Public Policies and Local Development - EMESCAM.

Laércio da Silva Paiva
Professor, FMABC University Center, Santo André, SP, Brazil.

Fernando Rocha Oliveira
Professor of the Stricto Sensu Graduate Program in Public Policies and Local Development - EMESCAM.

ABSTRACT
The COVID-19 pandemic brought an overload of health systems, with the search for beds to support the demand of patients hospitalized for COVID-19, the heterogeneity and availability of resources in the public and private spheres, was evidenced throughout the pandemic, demonstrating different organizational policies in different regions of Brazil to face the pandemic. To understand the challenges and impacts of the COVID-19 pandemic in Brazil, focusing on the coping policies adopted and their consequences on public health, a literature review was conducted. There was a need to understand the panorama of government actions and their effects on reducing the transmission of the virus, on the response capacity of the health system, and on the social impacts. This review is based on the investigation and analysis of the existing scientific production in the literature, providing a comprehensive compilation of information, covering various topics, allowing the identification of relevant knowledge gaps that can serve as a basis for future research. The country's economic policy needed to use financial resources to face the crises of the pandemic in the sectors of science, education, health, technology and social protection. This crisis resulting from the pandemic on a global scale also provided a crisis of the sustainable development goals (SDGs), fostering reflections to restore the progress of the SDGs. It is observed that the COVID-19 pandemic has provided negative impacts on the entire world population, stimulating a gap for the reflection of policies to cope with pandemic outbreaks.

Keywords: COVID-19, Coronavirus, Public policies, Health Policy.

1 INTRODUCTION

The COVID-19 pandemic began in the city of Wuhan, China, at the end of December 2019, and has since spread to several countries, causing thousands of deaths worldwide. Although its origin is related to a zoonotic source, the transmission of the coronavirus occurs mainly through the air, through the inhalation of particles coming from infected people or through direct contact with a person or with contaminated objects and surfaces (Umakanthan *et al*., 2020).

In Brazil, the first case was confirmed on February 26, 2020, and the pandemic was officially declared on March 11, 2020. On June 19, 2020, the country reached the milestone of 1 million confirmed cases of COVID-19. Due to the growing number of cases, the World Health Organization (WHO) has developed recommendations to be followed, such as social distancing, use of masks, and

hygiene of hands and objects, which has impacted several sectors of society, reducing non-emergency hospitalizations in hospitals (Schapira; Fernandes; Fernandes, 2023).

Simultaneously with the increase in cases, the pandemic has brought an overload on health systems, such as the search for intensive care unit (ICU) beds, to support the demand of hospitalized patients. This overload evidenced the heterogeneity and availability of resources in the public and private spheres, demonstrating different organizational policies in different regions of Brazil to face the COVID19 pandemic. (Fields *et al*., 2022).

Some Brazilian localities in situations of social vulnerability suffered greater impacts on basic sanitation and health conditions during the COVID-19 pandemic, demonstrating the inefficiency of the system accentuated in periods of emergency, thus denoting the lack of preparation of public policies to combat this type of situation, making it necessary to assess the conditions of fragility of the Brazilian population, in search of solutions for future pandemic conditions (Silva *et al*., 2023).

As a result of a pandemic scenario in the national territory, the impacts on socioeconomic inequalities and public health crises contributed to the worsening of living conditions, placing the states as responsible for containing or minimizing the disasters that the pandemic may cause (Paula; Pear tree; Giordani, 2022).

In addition, the pandemic brought as an immediate consequence the urgent need to control and prevent the disease, initially with limited knowledge about the etiology, resulting in the lack of preparation of health professionals to act in the face of COVID-19, from which it was necessary to develop strategies for care activities to deal with this new challenge, thus making a qualified workforce essential (Vieira *et al*., 2022).

The importance of understanding the policies to confront COVID-19 in Brazil made it possible to reduce or interrupt the chain of transmission of the disease between individuals who may be infected and those who are healthy, already based on previous data from successful experiences of other epidemics, in addition, the reduction of the aggravations of adverse situations, on the social and economic impacts on society could face (Martins; Guimarães, 2022).

Thus, the present study aims to carry out a narrative review to describe the challenges and impacts of the COVID-19 pandemic in Brazil, focusing on the coping policies adopted and their consequences on public health. We sought to understand the panorama of government actions and their effects on reducing the transmission of the virus, on the response capacity of the health system and on the social impacts.

2 METHODS

This is a narrative review of the literature, which adopts a broad approach, with the objective of understanding the development of the challenges and impacts of the COVID-19 pandemic in Brazil:

perspectives on coping policies and their consequences on public health in a theoretical or contextual way. This review is based on the investigation and analysis of the existing scientific production in the literature, providing a comprehensive compilation of information, covering various topics, allowing the identification of relevant knowledge gaps that can serve as bases for future research.

Through this review, it is possible to gather a collection of current materials, which explore the theme and seek public policy strategies to confront COVID-19. Thus, this research used the *Scientific Electronic Library Online* (Scielo), Latin American and Caribbean Health Sciences Literature (Lilacs) and *the National Library of Medicine* (PubMed) as databases. In addition, consultations were carried out on the websites of the World Organization and the Ministry of Health to verify regulations and legislation throughout the period. The keywords used were: COVID-19; Coronavirus; SARS-CoV-2; public policies; Unified Health System (SUS); In order to cope with COVID-19 and Brazil, the Boolean operator "AND" was used for the search.

The inclusion criteria of the materials addressed were articles and research sources pertinent to the proposed theme and with a technical-scientific approach correlated with the policies to combat COVID-19 in Brazil. Content and articles that were not freely available in full were excluded.

3 RESULTS/DISCUSSION

This discussion will address the COVID-19 pandemic, an unprecedented event that surprised the world from December 2019 onwards. The rapid spread of the SARS-CoV-2 virus, its identification, containment actions, prevention measures, and its impacts on the social, political, and economic spheres are crucial issues for understanding the complexity of this global crisis. This descriptive analysis will cover everything from the early stages of the pandemic to its current implications, highlighting ethical challenges, public health strategies, and the road to recovery.

3.1 ORIGIN AND FIRST CASES: THE BEGINNING OF THE EPIDEMIC AND ITS SPREAD

The COVID-19 pandemic presented itself as an outbreak on a global scale, affecting almost all countries and territories (Pokhrel, 2020). Its identification occurred in Wuhan, China, Hubei province on December 31, 2019, through cases of pneumonia with unknown etiology, in which the government of China reported to the World Health Organization (WHO). However, there are hypotheses of the appearance of this virus before this date, where researchers in France identified SARS-CoV2 in a sample from a patient with pneumonia on December 27, 2019 (Silva Martin *et al*., 2020).

On January 3, 2020, the government of China reported to WHO the identification of 44 cases of pneumonia of unknown etiology in Wuhan. On January 7, the recognition of the new coronavirus or SARS CoV-2 was identified. Between January 11 and 12, China's National Health Commission reported on the possibility of this new disease being associated with exposures in a seafood market

located in the city of Wuhan and on January 13, 2020, it was confirmed by a laboratory, being identified outside China, in Thailand (Da Silva Martin *et al*., 2020).

In February 2020, the first cases of the disease were identified in Brazil, marking the beginning of a significant challenge for the country's healthcare system. Faced with this scenario, the Brazilian government took swift measures to contain and slow the spread of the virus. Thus, on February 3, 2020, a Public Health Emergency of National Concern (ESPIN) was officially declared, recognizing the seriousness of the situation and mobilizing resources and efforts to face the pandemic (Cavalcante Junior, 2020).

The World Health Organization declared the COVID-19 pandemic on March 11, 2020, where the concern consisted around the lack of action by governments confirmed by the WHO Director-General (Cavalcante Junior, 2020; WHO, 2020a). Alongside the declaration, the WHO presented strategies to prevent the spread of the virus, including measures such as social distancing, the use of masks, frequent hand washing, and the acceleration of vaccine research and development (WHO, 2020a).

These strategies have been widely adopted by several countries around the world, which has triggered a series of global responses, such as the importance of international cooperation, preparedness for public health emergencies, and addressing fundamental issues of health inequality and vulnerability (WHO, 2020b; Ventura, 2020).

In Brazil, the Ministry of Health, through the Health Surveillance Secretariat, has monitored Severe Acute Respiratory Syndrome (SARS) since the Influenza A(H1N1) pandemic in 2009. In response to this situation and in the face of the global COVID-19 emergency caused by the new Coronavirus, the Ministry of Health further expanded its surveillance in 2020, including COVID-19 monitoring (Brasil, 2022).

Continuous monitoring of respiratory diseases, such as COVID-19, has played a crucial role in the effective implementation of control and prevention strategies. This active surveillance has made it possible to identify trends, assess the impact of public health measures, and make informed decisions to protect the population. Such measures reflected the Ministry of Health's commitment to promoting the health of the population by detecting outbreaks of severe respiratory diseases early and responding effectively to these public health challenges (WHO, 2020; Brazil, 2022).

3.2 COVID19: CLINICAL AND IMMUNOLOGICAL IMPLICATIONS

COVID-19 is a virus that, installed in the human body, is associated with a potent induction of antiviral response, initially inherently with less immunopathological repercussions. When the coronavirus presents itself aggressively, it promotes an increase in pro-inflammatory responses, infiltration of immune cells, including the recruitment of defense cells, such as inflammatory

monocytes, neutrophils and activated T cells to the lungs, leading to injury to the structure. After the resolution of the acute picture of the coronavirus, a post-COVID-19 process occurs, in which, if not resolved, it can cause the permanence of inflammation of cells such as neutrophils, macrophages and monocytes, which can cause tissue damage (Mehandru; Merad, 2022).

The way the coronavirus is transmitted can occur through direct contact with the respiratory droplets of an infected person, or through contact with contaminated objects and surfaces. The manifestation of the symptoms of the disease can vary, and asymptomatic cases are related to an incubation period, lasting an average of 5 to 6 days, and extending up to 14 days, the latter being considered rarer according to the literature. As for symptomatic symptoms, symptoms can appear up to 2 days after exposure and transmission of the virus occurs up to 3 days after the onset of symptoms (Malik 2020; Souza, 2021).

The symptoms of the disease are perceived differently in clinical evaluation, such as fatigue, headaches, dyspnea, cognitive impairment, alteration of the senses, intolerance in the standing posture, decreased tolerance to exercise, palpitations, tachycardia in the standing posture, malaise, sleep alteration, neuropathic pain, gastrointestinal dysfunctions, and renal alterations (Larsen *et al*., 2021).

The persistence of these symptoms may be associated with the severity of inflammatory reactions and the possibility of new infectious reactions, leading to a delay in the healing process, thus resulting in difficulty in resolving the pathology, thus fostering the persistence of symptoms in the respiratory system. In extreme conditions of persistence of the inflammatory process, damage to the lung tissue may become irreversible, with severe involvement of the respiratory part (Mehandru; Merad, 2022).

The precautionary measures to prevent the contagion of the coronavirus, based on data from the WHO coronavirus platform, instruct the population on: Frequent hand washing with soap and water or sanitizing with 70% hydroalcoholic alcohol gel, eliminating germs that may be present and/or viruses. As for coughing or sneezing, cover your nose and mouth with a handkerchief and/or your arm and not your hands, and when using a handkerchief, dispose of it in a trash can with a lid, after washing your hands (WHO, 2022).

According to WHO guidelines, people infected with the coronavirus (COVID-19) should avoid physical contact with others and stay at home for 10 days from the onset of symptoms and for another 3 days after the symptoms disappear, contact a health professional, or request help from the health telephone service. If you need to leave the house, wear a mask for protection. It is also recommended to avoid touching the eyes, nose and mouth, with unwashed hands and when touching, wash hands, do not share personal objects such as cutlery, plates, glasses and towels, avoid crowds in closed, congested places and close contact, keep environments ventilated to improve the flow of natural ventilation (WHO, 2022).

In Brazil, the National Health Council, through Recommendation No. 067 of 2020, emphasizes the importance of vaccination among the necessary measures for prevention, attributing to regional organizations the responsibility for the implementation of vaccines, including the transportation and care of the entire population (Brasil, 2020).

3.3 CONTAINMENT MEASURES DURING THE PANDEMIC: IMPACT OF GOVERNMENT DECISIONS

Authorities from different regions of the world met to make ethical decisions regarding public health containment measures during the pandemic. In this context, the applicability of the principles of value and science was considered in decision-making. Elements such as non-discrimination, equity, severity, freedom, privacy, proportionality, public protection from harm, solidarity, reciprocity, and public trust were points to be considered (Aliyu, 2021).

In line with the ethical and scientific principles restrictive measures were adopted in Brazil in 2021, the National Council of Health Secretaries (CONASS) implemented a comprehensive set of actions aimed at containing the spread of the disease. This included reducing overcrowding on public transport, promoting remote work in the public and private spheres, expanding testing and monitoring cases, as well as banning face-to-face events and gatherings. In addition, drastic measures were taken, such as the closure of beaches and bars, the implementation of a national curfew, and sanitary barriers, both nationally and internationally (Brasil, 2021). These measures reflected the need to take comprehensive and coordinated actions to address the challenges posed by the pandemic.

Thus, at the beginning of the COVID-19 pandemic, states and municipalities adopted a more proactive stance, supported by the decision of the Federal Supreme Court (STF) in March 2020, which ensured the ability of federal entities to exercise their functions and implement restrictive measures. However, as time progressed, a loosening of these measures was observed, leading the STF to reinforce the importance of maintaining restrictions that were falling into disuse, being neglected during the emergency period (Carvalho *et al*., 2022).

The development of norms in order to assist coping policies was based on Ordinance No. 356/2020, which mentions the restriction of agglomerations of people, public transport and state governments without federal law. The technical note of 04/2020 deals with personal protective equipment (PPE) for health professionals. No. 544 of 06/16/2020, mentions the replacement of face-to-face classes with classes in digital media and its complementary rule, being the official communication about the Coronavirus. Norm No. 652 until 09/24/2020, established epidemiological surveillance in national and international travel. Ordinance No. 630 of 12/17/2020 explains the restriction of international travel (Prado *et al*., 2023).

Complementing the measures implemented, the stance adopted by political and community leaders directly influenced the social adherence to the restriction measures, which played a crucial role in managing the spread of COVID-19 and had a direct impact on social norms, cultural practices and local traditions, playing a key role in promoting behaviors aimed at preserving public health. The World Health Organization has contributed to this approach by providing training to leaders and spokespersons, with the aim of establishing effective and multidirectional communication (Santos *et al*., 2021).

3.4 GLOBAL HEALTH CHALLENGES: TREATIES, TECHNOLOGY, AND SUSTAINABILITY

On May 24, 2021, the World Health Assembly, in a decision-making event on global health, opened a new pandemic treaty established by the European Union and its 27 member states, with the purpose of strengthening preparedness and responses to health emergencies, due to the deficiencies of the international system in addressing issues pertinent to the pandemic. This treaty brings with it the responsibilities of the members of the states in the entire government of our society (Blom *et al*., 2021).

Global strategies to cope with the coronavirus also include integration with the ecosystem and technology, which permeates information systems. Brazil used a fundamental instrument of this policy, adhering to systems such as e-SUS Notifica, SIVEP-Gripe, SUS Card and CNES as monitoring of the pandemic. Through intersectoral mobilization, risk communication and community participation, case control and prevention, suppression of transmission and reduction of mortality, based on the provision of timely and quality health services (Valentim *et al*., 2021).

In line with the guidelines of the World Health Organization, the elements of the ecosystem involved: community communication and participation, education, comprehensive surveillance, monitoring, comprehensive health care, contact tracing and management, maintenance of essential services, planning, regulation, and management and coordination (Valentim *et al*., 2021).

In the context of government action, Law No. 13,979 of February 6, 2020, stimulated the measures to be adopted for health care during the period of the COVID-19 pandemic at the collective level, directing an approximation in parliament of the actions developed by the executive branch, and thus reduce or contain a possible spread of COVID-19 in the national territory (Penaforte, 2022).

Thus, in the face of several government measures adopted to reduce the impacts of the pandemic, there was a process of intense attack on the constitutional principle of universality, of the Unified Health System (SUS), with the aim of maintaining neoliberal policies, promoting interests that aimed to stimulate the continuity of sectoral activities, with the purpose of safeguarding the stability of the national financial system (Mendes *et al*., 2023).

The country's economic policy needed to use financial resources to face the crises of the pandemic, in the sectors of science, education, health, technology and social protection. This crisis,

resulting from the COVID-19 pandemic, on a global scale, also provided a crisis of the sustainable development goals (SDGs), fostering reflections for the restoration of progress on the SDGs. (Lima, 2022).

According to Marques and Ferreira, (2023), there was an increase in public spending during the pandemic, to face the health crisis and alleviate the consequences of the paralysis of activities in employment and income. Data from the International Monetary Fund in 2021 reported that about 7.8 trillion in 2020 were disposed of globally and that 1.0 trillion was allocated to face the consequences of the pandemic on health, where the 6.8 trillion were willing to face the other socioeconomic impacts of this ill.

Despite the public resources employed during the pandemic period, in Brazil from the beginning of the pandemic until the first half of 2023, 37,601,257 cases of people infected by the virus were registered, with an incidence of 17,892.8 per 100 thousand inhabitants, of which 36,850,916 patients recovered and 702,907 died, according to the record of the coronavirus panel Brazil (Coronavirus Brazil, 2023).

Thus, despite the considerable investments in health in Brazil during the pandemic, the worrying numbers of cases and deaths reveal the complexity of the challenges faced. Although a considerable portion of the resources have been directed to health, socioeconomic impacts persist as a central concern. In times of crisis, the allocation of public resources must be carefully planned and monitored to efficiently meet the needs of the population.

4 CONCLUSION

The COVID-19 pandemic has caused serious impacts around the world. In this scenario, the need for effective policies to combat global health emergencies has become undeniable. Authorities have played a key role in addressing these problems, and while government interventions have proven effective in many cases, at critical moments, such as a pandemic, these policies could have been optimized to achieve even higher levels of efficiency, potentially saving significantly more lives. Therefore, during global challenges such as pandemics and global health issues, the need for effective preparedness policies, accompanied by excellent research and sensitive to local contexts, is essential to ensure the safety, health and well-being of populations around the world.

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Digital competencies of nurses: An interdisciplinary approach

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Robson Santos da Silva
PhD UFSC

Fernando José Spanhol
Ph.D., UFSC

ABSTRACT
The digitalization of information has brought advances and challenges for human beings, with direct impacts on personal, social and professional lives. In the specific case of nurses, considering the importance of the work they perform in different areas of health, the need for studies that identify foundations and alternatives that enable the development of the digital skills of these professionals so that they can work efficiently and effectively, especially from the perspective of digital health, is highlighted. Thus, the objective of this article is to analyze, from an interdisciplinary perspective based on health, education and technology, fundamental aspects that need to be considered, within the scope of scientific research, for the development of digital competencies of nurses as agents of innovation in health. The adoption of bibliographic research in articles, legislation, and reports as a methodology has enabled results that can contribute to the advancement of these studies, including: the recognition of the importance and essentiality of digital skills; the educational perspective as a basis for the interdisciplinary development of these competencies; and the peculiarities of digital health as a driver and result of innovation.

Keywords: Digital skills, Education, Interdisciplinarity, Health, Nurses.

1 INTRODUCTION

The global scenario, according to Sá and Paixão (2016), has been characterized by complexities, unpredictability, and interdependence, generating challenges for countries, institutions, organizations, and individuals. Considering this scenario, the European Union, an economic bloc that is currently composed of twenty-seven countries, has issued, since 2006, recommendations for the members of the Bloc to invest in the development of skills considered essential for their citizens to be able to deal with these factors.

> Key competences are the skills that all people need for personal fulfilment and development, employability and social inclusion, and to adopt a sustainable lifestyle, live a successful life in peaceful societies, lead healthy lives and exercise active citizenship. They are developed in a lifelong learning perspective, from early childhood and throughout adulthood, through formal, non-formal and informal learning and in all contexts, including family, school, workplace, neighbourhood and other communities (COUNCIL OF THE EUROPEAN UNION, 2018, p. 7).

In addition to emphasizing the importance of essential competencies for issues related to personal, social and economic aspects that permeate the lives of individuals and society, the recommendations of the European Union also highlighted the importance of education for the

development of these competencies. According to UNESCO (2016), the provision of adequate educational conditions facilitates learning, which is an essential factor to enable the knowledge, skills and attitudes necessary for the full exercise of citizenship and access to job opportunities in a world that is undergoing rapid transformations.

In 2022, the *Educase Horizon Report* ratified the recognition of this scenario and identified strategies that can be adopted so that education can adequately respond to these demands, including: use of deeper learning approaches; focus on measuring and measuring learning; fostering cultures for innovation; learning analytics and *Big Data*; competency-based learning; restructuring of learning spaces; networked collaborative learning; and learning through hybrid environments, combining face-to-face and online actions (PELLETIER et al., 2022).

This position is amplified by Velenzuela and Cuéllar (2022) when they consider that education, due to the social and economic context, now requires: greater versatility, with the ability to reach more people for longer and with varied options; more personalization; support through ecosystems arising from interaction; and training based on skills, competencies and areas of interest to deal with the challenges of a digitized and ever-changing world.

However, according to Tosta et al. (2012), educational issues capable of supporting the development of competencies are not established spontaneously, and scientific studies and research are needed that effectively address the acquisition and expansion of essential competencies; and conditions for full access to citizenship and professional practice. This is a complex issue since, according to Spencer and Spencer (1993), a person's skills also depend on intrinsic factors such as motivation, values, self-image, personality and behavior.

Among the internal and external factors that have impacted and demanded more investments in the development of essential skills, the exponential technological advancement that has been experienced by humanity in the last hundred years stands out. By incorporating these technologies, especially digital ones, according to Oliveira et al. (2020), historical, social, and cultural transformations are effected that influence people's way of life and their relationships in society.

In this scenario, according to Roblek, Meško and Krapež (2016), computers, internet, smartphones, mobile devices, applications, programming languages, artificial intelligence, *big data*, internet of things (IoT), augmented and virtual reality, among other digital technologies, are increasingly being incorporated into people's daily lives and strengthening themselves as pillars of the economy and, therefore, the digital skills necessary for the use of these devices have also been considered essential.

The creation of the European Digital Competence Framework for Citizens (DigComp), the first version of which was published in 2013, is one of the main documents that exemplifies the efforts of European countries to face the new challenges. According to Vuorikari et al. (2022), the different

versions of the document, including the current one, DigComp 2.2 (2022), have been well accepted since they offer foundations considered efficient for developing digital skills, including the perspective that the learning that characterizes this development should occur throughout a person's life. Since then, several other initiatives, in several countries, have been consolidated around this theme.

According to Pereira et.al (2019), to be considered digitally competent, a person must have knowledge, skills, and attitudes that go beyond the simple use of these technologies. Ghomi and Redecker (2019) add to this perspective considerations that, in addition to enabling the critical and creative use of Information and Communication Technologies (ICT), digital competencies are considered transversal because they permeate and support the development of other competencies.

In 2021, UNESCO, according to Grizzle et al. (2021), published a document in which it highlighted the importance of policies, strategies, and action plans related to information literacy and skills development. In Brazil, according to Schuartz and Sarmento (2020), the need to address the development of digital skills from the perspective of education has also aroused the interest of professionals, researchers, institutions, and governments.

Among the Brazilian initiatives, Law No. 14,533, of January 11, 2023, which instituted the National Digital Education Policy; the significant increase in scientific publications on the subject; and the approaches of the National Common Curriculum Base (BNCC) that recognize the implications of the digitization of information and propose actions that instrumentalize individuals and societies for full citizenship in the face of new ways of working, communicating, establishing relationships and learning (BRASIL, 2017).

Considering the importance of this theme also for the health area, the objective of this article is to analyze, from an interdisciplinary perspective based on health, education and technology, fundamental aspects that need to be considered, in the scope of scientific research, for the development of digital competencies of nurses as agents of innovation in health.

2 DIGITAL SKILLS

According to UNESCO (2016), there are six sets of domains, represented by skills, values and attitudes, considered transversal to the formation of human consciousness: critical and innovative thinking; interpersonal skills; intrapersonal skills; global citizenship; media and information literacy; and others, the latter being an opening to different domains, according to the specificities of each situation presented.

In the context of this understanding, although media and information literacy is configured as another domain, the exponential advance of digital transformation in which, according to Vilaplana and Stein (2020), analog data is converted into digital data from the conjunction between information, informatics, communication and connectivity technologies, has fostered changes even in conceptual

terms, since, Gradually, the expression "digital skills" has been consolidated, encompassing understandings of literacy and literacy.

In 2006, the Council of the EU had already issued recommendations to its member states considering the scenario of changes that, at the time, pointed to the advancement of the globalized and knowledge-based economy. It was an action that, according to Mattar et al. (2020), although it was directed to the European continent, had repercussions and served as a reference for initiatives around the world, including Brazil.

These recommendations have been brought together in a document entitled the European Reference Framework. The objective was to present the context, objectives and essential competencies that citizens should develop throughout their lives so that they could face new social and economic challenges. Subsequently, in 2018, the eight core competencies were revised and currently include:

> literacy skills; multilingual skills; mathematical and science, technology and engineering skills; digital skills; personal and social skills and the ability to learn how to learn; citizenship skills; entrepreneurship skills; cultural sensitivity and expression skills (COUNCIL OF THE EUROPEAN UNION, 2018, p. 7).

According to the Council, these are skills that a person needs to acquire and develop in order to enjoy a healthy, inclusive, responsible, civic life and inserted in the labor market, and in order to develop these skills, a combination of knowledge, skills and attitudes is necessary where

> Knowledge is made up of facts, figures, concepts, ideas and theories that already exist and that facilitate the understanding of a particular sector of knowledge or discipline; Competences are defined as the ability and ability to execute processes and use existing knowledge to achieve results; and attitudes describe the willingness and mindset to act or react to ideas, people, or situations (COUNCIL OF THE EUROPEAN UNION, 2018, p. 7).

In the context of the recommendations,

> Digital skills involve the confident, critical and responsible use and use of digital technologies in learning, working and participating in society. These include information and data literacy, communication and collaboration, media literacy, digital content creation (including coding), security (including digital wellbeing and cybersecurity-related skills), intellectual property issues, problem-solving and critical thinking (COUNCIL OF THE EUROPEAN UNION, 2018, p. 9).

It is an approach from the perspective that people need to understand how digital technologies can support communication, creativity and innovation while being aware of their capabilities, limitations, impacts and risks. To this end, they consider that people must know the general principles, mechanisms and logic that underlie the development of digital technology, the basic functioning and use of different devices, networks and software.

It also highlights the need for critical attitudes towards the validity, reliability and impact of information and data provided through digital media, being aware of the legal and ethical principles

involved in the use of digital technology. In addition, according to the recommendations, people should be able to use digital technology to support active citizenship, inclusion, creativity and collaboration with others, in the personal, social or commercial spheres from an ethical, secure and responsible approach to the management and protection of digital information and identities.

Such conditions show recognition of the ubiquity of digital skills. According to Santaella (2013), this ubiquitous condition is identified because the technologies they use enable a continuous connection with information, communication and knowledge acquisition. The use of the plural and not the singular was also highlighted, that is, instead of digital competence, digital skills were used. This is a relevant aspect because it shows that the concept recognizes the factors that transcend the use of technologies from an operational point of view, giving it a strategic and permanent character in the personal, social and economic lives of citizens.

The EU Council's recommendations on digital skills have been used as a benchmark for numerous initiatives in Europe and several other countries outside the continent. In addition to DigComp and other documents derived from it, including DigCompConsumers; DigCompOrg; According to Santos et.al (2021), DigCompEdu and DigComp at Work also stand out: Enlaces (Chile), Competencias TIC para el desarrollo profesional docente (Colombia), Digital Teaching Professional Framework (United Kingdom), Digital Competency Framework (Canada), INTEF (Spain), and INCoDe 2030 (Portugal).

Analyzing these documents, it is possible to verify that they provide relevant parameters and content so that managers, educators, researchers, institutions and governments can formulate specific strategies and actions for the development of digital skills of a given target audience. Studies that evaluate trends in education, such as the *Educause Horizon Report* (2022), ratified this perspective while identifying the need for more studies, integrating different areas of knowledge, to take place in view of the ubiquity of these skills.

The interdisciplinary and ubiquitous nature of digital skills also leads to considerations about the importance of education so that people can develop them. This is a perception ratified by Siemens (2004) according to which the network society is a phenomenon that results from interconnection through digital technologies, generating changes not only in the way people share information, but also in how they learn.

3 EDUCATIONAL PERSPECTIVE

According to Hübner et al. (2018), the interest in the contributions of education to the development of digital skills is related to the advancement of ICT and the need to reduce knowledge gaps. It is an interdisciplinary perspective that was corroborated in the identified references,

considering that in them it was possible to observe the existence of an inseparable relationship between the development of digital skills and education.

In 2021, the Parliament and the Council of the European Union reinforced the recommendations issued in 2006 and 2018 by issuing a new document with a strong educational dimension called the Guide to the Digital Decade. The aim of this guide is to set the conditions for at least 80% of people aged 16-74 to have developed at least basic digital skills by 2030.

> Digital training and education should support a workforce where people can acquire specialised digital skills to obtain quality jobs and rewarding careers [...]. In the future, digital skills, both basic and advanced, will be essential to strengthen our collective resilience as a society: only digitally empowered citizens and a highly skilled digital workforce can be masters of their own destiny, confident and assertive about their means, value and choices (COUNCIL OF THE EUROPEAN UNION, 2021, p. 1).

It is a document that reinforces the perception that the digitalization of information has connected people and societies on a global scale, generating opportunities and challenges in a knowledge-based world economy (OECD, 2005). In this scenario, there is a growing search for strategies that are capable of anticipating and providing solutions in a scenario in which, according to Latour (2012), human and non-human actors act in an integrated manner.

The guide is presented as a reinforcement of the need to propose more studies and initiatives that collaborate for the creative and critical use of ICTs both in personal and professional life. It is also a document that recognizes the importance of education as a phenomenon that, through the teaching and learning processes, enables the development of digital skills.

Ferrari (2012) also aligns himself with this perspective of relationship with education by considering that digital competencies are constituted from 05 (five) dimensions: learning domains, including knowledge, skills, attitudes and strategies; means, considering what is necessary for the use of technologies; areas of competence, within the scope of problem solving, management, communication and collaboration; attitudes related to efficiency, effectiveness and autonomy; and purposes, referring to the context of work, consumption and citizenship.

The points of convergence with education can also be identified in Tinmaz et al. (2022) when they identified that, in scientific research related to digital competence, the terms digital literacy, digital skills, and thinking stand out. According to Reyes et.al (2021), digital literacy is a composition that includes computational, media, and information literacy. It is a condition that identifies digital literacy from a perspective that goes beyond the simple accomplishment of specific tasks.

Pengel et.al (2022) goes further by considering that, by bringing together technological, cognitive, and social skills, the term digital literacy gives way to competence because it does not only refer to essential technical skills, but also to the wise use and thorough understanding of information. Thus, digital skills, in addition to covering all types of literacy, go further because they use them, in

personal life and at work, for problem solving, security, information processing, content creation and communication, translating, once again, the essence of what is considered to be education.

For Pangrazio et al. (2020), the concept of digital competence is dynamic and its development is associated with issues that are based on learning actions that, according to Männistö (2020), must be collaborative and effective. A condition that necessarily goes through educational agents, since these professionals also need to present digital skills developed so that they can act as active agents in actions to support the development of other people. These are aspects that, according to Marzal et al. (2019), make digital skills play a relevant role in the generation and management of knowledge.

Fernández and Román (2021) reinforce these perspectives by proposing that improvements take into account advances in both technological and pedagogical areas. For this to happen, however, according to Choudhary et al. (2022), there is a need for changes in learning environments because, for the most part, they end up contemplating only the search for information and communication.

Projects capable of developing skills, at the same time based on pedagogical and digital foundations, could thus point out effective solutions, as is the case, according to Tomte and Buskovist (2015), of the TPACK framework (Technological Pedagogical Content Knowledge Structure) in which pedagogical, technological and content knowledge form an inseparable and productive context.

For Pérez et al. (2017), these changes and new needs were caused by the intensive and continuous use of the internet, since they resulted in changes in the way learning occurs. The possibilities arising from new ways of communicating and interacting are factors that, in the case of education, according to Torres et al. (2020), require new ways of teaching and evaluating. This also requires continuous evaluation of the use of digital resources and materials that are able to contribute to the implementation of active learning methods, including, for example, 3D technologies, immersive virtual environments, and mobile learning (DULEAVY et.al, 2019; IT WAS et.al, 2016; SILVEIRA, M and PETERSEN, 2017).

In the health area, ICT-related issues, according to Brink et.al (2022), have also been at the center of attention of governments and institutions because different indicators have been signaling the need for professionals working in these areas to also need to develop their own digital skills. For Basilotta et al. (2022), these agents have also recognized their deficiencies and, therefore, have been clamoring for support to train themselves and service users to use technologies such as augmented reality, mobile technologies, and telemedicine.

The intrinsic relationship between education and digital competencies in health is also an essential factor for improving the efficiency, effectiveness and capacity of its professionals to solve problems. In this context, Ferreira and Gomes (2009) consider that effectiveness consists in the relationship between what is intended to be achieved and the results achieved after the application of

available resources; while efficiency translates from the analytical relationship between the results obtained and the resources employed, considering a certain standard or reference.

These are aspects that, according to Matthews (2021), justify the need for actions aimed at the development of digital skills to consider the dynamic, disruptive, and progressive nature of ICT, and it is up to institutions to provide conditions and infrastructure for their employees to develop. Therefore, institutional support, based on innovation and infrastructure provision, is considered fundamental. According to Pinto-Santos (2022), however, these conditions are still far from the reality of several institutions and professionals due to, according to Artacho (2020), the lack of investments in the development of skills so that the effectiveness of actions is expanded.

For Hobbs and Coiro (2016), an approach that aims to support the development of these skills must consider, at least, the context and need; the objectives and expected outcomes of such learning; the contents; the practices to be adopted in the teaching and learning processes; the evaluation and how these actions and tasks will be connected to people's real needs.

In this dynamic context, Flores et al. (2020) identify educational agents as facilitators and motivators of the learning process. Thus, they need to be able to act effectively in the face of emerging challenges arising from the use of digital technologies. This includes, for example, the ability to deal with different teaching and learning methods and techniques, intelligent systems, open and disruptive technologies. For Brown et.al (2020), this is a situation that also strongly affects health since professionals in this area, including nurses, will increasingly use technologies to access data, manage records, provide online services, and use increasingly advanced equipment.

This is a scenario in which competency-based education has occupied a prominent place.

> In the context of a didactic-pedagogical approach that shifts its attention from the teacher to the student, from teaching to learning, encouraging student autonomy and the use of technologies to facilitate, expand and mediate the educational and social process, especially when having ICT as the object of teaching and study, the development of skills is understood as inherent to this training and education process (Mendes et al., 2020, p.307).

Torres-Alzate (2019) ratifies this understanding by considering that competency-based education presents itself as the best alternative since its approach is based on the perspective that a person's competencies are the result of the combination of educational processes, work, and life experiences. Frank et al. (2010) also have this understanding when considering it an appropriate approach to preparing health professionals to achieve results and solve problems.

> Competency-Based Education has the potential to improve community health only to the extent that context-specific health issues are used to determine desired competencies. Developing competency-based curricula to meet the health needs of the population is a process that begins first by identifying what those population health needs are; then defining the outcomes needed to meet those needs; and, finally, adapting the curriculum to achieve these outcomes (WHO, 2022, p.3).

According to Mendes et al. (2020), this view is based on the perspective of Perrenoud (2000, p.19) who defines competence as the "ability to mobilize a set of cognitive resources, such as knowledge, information, and skills, to solve a series of situations with relevance and effectiveness". Therefore, being competent means being able to mobilize specific knowledge to do something well. This mobilization process, however, is considered complex because it uses the analysis of probabilities, establishment of diagnoses, selection and criticism of information to make a decision.

> Competence, which can also be considered as a social construction, represents the way in which a person can equip himself with possibilities to build his action in the world around him, relating knowledge and its application. The understanding of competence in its cognitive, social and psychological natures (knowledge-skills-attitudes) reveals the complexity of the learning process that relates thought to action. What determines the competence of the individual is social knowledge and practical intelligence (MIRANDA, 2006, p.111).

In the case of digital skills, Cinque and Bortoluzzi (2013) consider them transversal because, from their mastery, it is possible to acquire other skills. This position is strengthened from the perspective of Giglio et al. (2015) that humanity is experiencing a socio-technological development characterized by interactive processes, where communication between people has become more agile and accessible, giving rise to a virtual network of relationships. It is thus a network society which, according to Castells (2007), can be understood as a social structure in which the technological paradigm has become the basis for the relations of production, consumption and experiences.

Siemens (2004) aligned himself with this view when addressing the theory called Connectivism, whose essence lies in the integration of principles explored by chaos, network, theories of complexity and self-organization. Thus, learning is conceived as a process that takes place within environments where the core elements are changing and only partially under the control of people. In addition, it is based on the notion that decisions are based on fundamentals that change rapidly and constantly.

> Connectivism also deals with the changes that many corporations encounter in knowledge management activities. The knowledge that sits in a database needs to be connected with the right people in the right contexts so that it can be classified as learning. Behaviorism, cognitivism, and constructivism do not refer to the challenges of organizational knowledge and transfer (SIEMENS, 2004, p. 6).

In Connectivism, it can be observed that the application of the concept of "Networks" in the epistemological and learning process is also one of its structuring axes. For Witt and Rostirola (2019), this theory of learning seeks the basis to understand how each individual, in connection with the world, constructs and produces interactive knowledge through the concept of Network. In this context, according to Siemens (2004), a network is understood as the physical or virtual space in which multiple connections occur through links or nodes for new knowledge.

Ausubel (2003) helped to consolidate this understanding by emphasizing the importance of what the author called meaningful learning, that is, a learning action that, in order to occur, depends on some fundamental premises, including: the fact that the quality and the way in which new information is processed by people depend on cognitive structures (subsumptive) and sensory experiences that individuals already had; the need to consider the social, cultural and economic context in which people are inserted; the student's willingness to learn; and the significant potential of the contents to be learned. Novak and Gowin (1999) added affective issues to this perspective as factors that also influence learning.

In view of the above, it is evident that the theories and currents corroborate the perspective that the development of competencies depends on the context, people's needs and the ability of educational agents to act as facilitators of this process, including, according to Brown et al. (2020), nurses whose eclectic nature of the profession requires both acting as educators and on the front line of care, in equipment operation and online services.

When addressing issues related to the development of digital skills, Basilotta et al. (2022), Brink et.al (2022), Torres et al. (2020), Guillén et al. (2020) and Pérez (2016) bring to light issues related to the use of media and technologies that are in use or are trends in health. This is an important aspect that is directly related to education because professionals, including nurses, need to be prepared to work and train other professionals to properly use these ICTs, including 5G technology, artificial intelligence, machine learning, blockchain, 3D printing, augmented reality, metaverse, internet of things (IoT), big data, smart devices (biosensors, trackers, wearables and apps), telemedicine, laboratory tests.

The importance of this set of factors collaborated, according to Tomczyk and Fideli (2021), for the creation of specific frameworks for the development of educators' digital skills, such as *Technological Pedagogical Content Knowledge*, UNESCO ICT *Competency Framework for Teachers* and ISTE *Standards*. DigCompEdu (2017) also highlights that, according to Lucas and Moreira (2018), the structuring aimed to configure a secure basis for guiding public policies based on logic, clear language and structures that can serve as a basis for technologies and other references that guide the development of digital skills of educators and teachers.

Brazil is not part of the European Union. However, this condition does not invalidate the recognition of the importance of the recommendations and frameworks aimed at the development of digital skills produced in that continent. Although there are differences between the challenges of other countries and those of Brazil, the bases have more similarities than differences. According to Mattar et al. (2020, p. 25), "these frameworks are important milestones for the understanding and development of digital skills, and there is no wealth and series of similar documents prepared in Brazil". In addition, according to Santos et al. (2021), compared to other initiatives, the DigComp series has been well

evaluated because the documents produced are part of a differentiated ecosystem where research and reports have been prepared by different actors in a collaborative way.

As already presented, it is understood that the contributions from documents aimed at the development of digital skills, including DigComp and its derivatives, are important references. However, the lessons learned from these experiences can only be used, according to Costa et al. (2022), if they are critically analyzed and combined with the specificities of the target audience.

4 DIGITALIZATION AND HEALTH

In healthcare, these aspects also stand out. The feasibility of cyberspace, which, according to Lévy (1999), is the means of communication that arises from the worldwide interconnection of computing devices, has highlighted potentialities and challenges that still need to be explored, mainly because it is an area whose advances depend significantly on the levels of competence of its professionals. Rowthorn and Olsen (2014) highlighted, for example, the need for health professionals to be able to deal with different types of ICT and care models, including virtual ones, so that personalized therapies, interventions, remote monitoring, and training can be implemented (RIZVI, 2022).

Also from the perspective of cyberspace, we highlight the considerations of the World Health Organization, which issued guidelines for the education of health professionals to be based on competencies based on the mastery of people-centered content, decision-making, communication, collaboration, evidence-based practices and personal conduct, factors considered fundamental for the development of a framework for global health (WHO, 2022).

In Brazil, the need to develop the digital skills of health professionals has also intensified, mainly as a result of strategies that have been adopted for the development of digital health, including telehealth and telemedicine, according to the regulations provided for in CFM Resolution No. 2,314, of April 20, 2022. Also noteworthy is CFE Resolution No. 0696, of May 17, 2022, which provides for the performance of nursing professionals in digital health based on parameters that include:

– Digital health understood from the use of ICT to produce and make available reliable information about the health status of those who need it, at the time they need it;

– Recognition of the possibility of nursing consultation, interconsultation, consulting, monitoring, health education and reception of spontaneous demand through ICT;

– Use of appropriate platforms capable of ensuring data storage and security, as recommended in the current General Data Protection Law;

– Observance of ethical standards compatible with the exercise of the profession.

In terms of international initiatives, the work of the World Health Organization (WHO) stands out, which has intensified its efforts to support governments and institutions in the development of

programs and strategies that enable the preparation of professionals for the appropriation of domains aimed at the full exercise of citizenship, improvement and expansion of services provided to the population.

Among the efforts already undertaken by the WHO, the creation of the Global Framework of Competencies and Results for Universal Health Coverage stands out, whose guidelines are aimed at

> Member States and educational institutions to support them in identifying the outcomes of the education of health professionals; integrate these skills into education programmes; establish standards for practice; and to construct performance evaluation instruments oriented to health services with quality standards that meet the health needs of the population. With this framework, WHO sets out its recommended approach to competency-based education outcomes for health workers; in doing so, it also provides conceptual and terminological clarity (WHO, 2022, p.5).

It is a document in which 24 (twenty-four) competencies, organized from 06 (six) domains: people-centered, decision-making, communication, collaboration, evidence-informed practice and personal conduct. According to Cometto et al. (2020), this is a recognition of the integration of skills at different levels, including the digitalization of information as a technology that enables connection on a global scale; the role of institutions as promoters of skills development; and the perspective that competency-based education is the most effective in preparing staff for professional practice.

In Brazil, there are also efforts to develop the skills of health professionals. Specifically in relation to nurses, we highlight, for example, the National Curriculum Guidelines for the Undergraduate Nursing Course (BRASIL, 2001) which are aligned with the WHO Global Competency Framework (2022), including in relation to the importance of education by highlighting: health care, decision-making, communication, leadership, continuing education, administration and management. Comparing the documents, it can be seen that the domains, competencies and skills can be grouped based on 04 (four) central themes: values, ethics and education; skills for communication, interpersonal relationships and teamwork; professional practice; management, leadership and decision making.

According to the International Council of Nurses (ICN, 2005), it should also be noted that the universe of work of these professionals depends on numerous conditions and factors and this means that the competencies necessary for each situation are translated through the combination of knowledge, skills and attitudes to be demonstrated by a professional in their daily practice or in the performance of their work. The presence of digitalization on a permanent basis also in this scenario reflects its importance and implies the need for constant studies aimed at identifying and developing the essential digital skills that are necessary for professional health practices, including nursing.

According to Egbert et al. (2018), in a study conducted to identify the essential competencies in informatics for nurses, in Austria, Germany and Switzerland, 15 (fifteen) areas that require more attention for the performance of these professionals in these countries were described: principles of informatics in nursing; applied informatics; data protection and security; nursing documentation;

information and communication systems for nursing; telematics and e-health; information management in research; information management in education; decision support; image and signal processing; quality assurance and management; biostatistics; project and process management; resource planning and logistics; and information and knowledge management in patient care.

Another work that has also contributed to the understanding of this scenario are the recommendations of the Technology Informatics Guiding Education Reform (TIGER). According to Thye (2019), it is a document that has been serving as a basis for institutional and public initiatives at the regional, national, and international levels. Its main objective is to support the formulation of frameworks so that nursing professionals can develop their essential digital competencies.

According to Hübner et al. (2019), the TIGER recommendations were designed based on the use of different methods and instruments, the use of scientific evidence, and the participation of nursing professionals. In its last update, which took place in 2018, according to Hübner et al. (2018), the 05 (five) of the main functions that these professionals can perform were considered, including: clinical nursing, quality management, interprofessional care coordination, nursing management, and nursing IT management.

In relation to clinical nurses, i.e., those who have direct contact with patients, the following essential digital competencies were listed by TIGER (2018): nursing documentation (including terminologies); information and knowledge management; Principles of Nursing Informatics; data protection and security; ethics and IT; information and communication systems (including interoperability); quality management; IT decision support; eHealth, telematics and telehealth (including interoperability); and assistive technology for aging people.

In this context, it is noteworthy that digital health, considered by the document as another competence in the form of eHealth, is an expanding area that, to a greater or lesser extent, encompasses all the other competencies identified in this framework.

> Digital health has been changing the way health services are organized and offered around the world, and Brazil is no exception. Health activities are closely linked to information and communication and depend on knowledge and technology to enable innovative, effective, effective, and efficient mechanisms that expand the reach and increase the quality, problem-solving, and humanization of the various aspects of health care (CRUZ et al., 2022, p.65).

According to Cruz et al. (2022), the need to develop digital skills as a result of the advancement of digital health has been recognized through international efforts, as it is an innovation in full development.

> The concept of innovation in health is the introduction and adoption of new processes, products, practices, programs or policies created to address a real problem and that are intended to bring significant benefits to individuals, groups, societies or organizations and privilege the social value of innovation, that is, it is not enough to be new or only a technological sophistication. but rather the positive results it produces for individuals or collectivities. Thus,

> innovation only exists when it generates value for people and society (SILVA et al., 2018, p.39).

Among the main tools in use that consider the inseparable relationship between digital health and the development of digital skills, the Global Digital Health Index (GDHI) stands out. It is an interactive service that enables the tracking, monitoring and evaluation of digital health around the world. Through online surveys, data are collected in collaboration with the ministries of health or digital health agencies of the countries, considering 07 (seven) categories of key indicators: leadership and governance; strategy and investment; legislation, policy, and compliance; standards and interoperability; infrastructure; services and applications; and, finally, deserving special attention, human talents (workforce).

The GDHI also presents itself as a platform for learning in which countries can inform, analyze and direct their investments in digital health, including in relation to the development of digital skills, considering the following indicators: digital health integrated with health and professional training; digital health integrated with health and in-service professional training; training of professionals to work in digital health; digital health; maturity of Careers for Digital Health Professionals in the Public Sector.

In the indicators of the GDHI model, according to Cresswell (2019), essential aspects are highlighted so that human talents can be able to work with digital health, including: the need for training that includes issues related to digital health for managers, technicians, community agents, support staff, nurses and doctors; permanent in-service training programmes through continuing education; and the training of manpower for health informatics, information systems and biomedicine.

In this context, Van Dijk (2020) observes that full and critical access to digital technology needs to be enabled through four (4) complementary phases:) motivation, attitude, intention and social support - by starting with motivation, the author signals that its absence or presence is the result of the personal, structural and cultural context in which the individuals find themselves;

b) physical access – represented by the availability and quality of access to devices, software and the internet;

c) access to skills – including skills related to the environment (operational; and formal); and related to content (information; communication; content creation; and strategic); and

d) Use – represented by the effective use of technologies according to need.

For Meira (2021), all of this is included in a new type of dimension called digital space, where, through articulation, the physical environment began to be enabled, augmented, and extended by the digital medium being, in real time, orchestrated by the social environment. For health, it is a process that gives rise to the need to put into practice an efficient strategic management of the health information life cycle where education, reliability, privacy, and economy are used in an

interdisciplinary way to enable agile, simple, easy-to-use, and measurable solutions. This is a context in which the development of nurses' digital skills is fundamental, given that these professionals are essential for the maintenance and innovation of health services.

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Incidence of metopism in dried skulls of adults from the osteological collection of the faculty of medicine of FAP-Araripina (PE)

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Larissa Luana Lopes Lima
Undergraduate student of Medicine
Institution: Faculdade Paraiso - Araripina
E-mail: laraluall@hotmail.com

Regina Moura de Oliveira
Undergraduate student of Medicine
Institution: Faculdade Paraiso - Araripina
E-mail:reginamoura20032003@gmail.com

Ana Hester Silva Santos
Undergraduate student of Medicine
Institution: Faculdade Paraiso - Araripina
E-mail:anahester20177@gmail.com

Maria Eduarda Gomes Freires
Undergraduate student of Medicine
Institution: Faculdade Paraiso - Araripina
E-mail:eduardagomesfreires@gmail.com

Jonatas Monteiro Simião
Graduating from the Medicine Course
Institution: Faculdade Paraiso - Araripina
E-mail:jonatasmonteiro-star@hotmail.com

Alexandrino José de Carvalho Neto
Graduating from the Medicine Course
Institution: Faculdade Paraiso - Araripina
E-mail:alexandrinoartesa@hotmail.com

Erasmo de Almeida Júnior
Doctor in Interactive Processes of Organs and Systems
Institution: Faculdade Paraiso - Araripina
E-mail: erasmoalmeidajunior@gmail.com

Émerson de Oliveira Ferreira
Doctor in Medical Sciences
Institution: Faculdade Paraiso - Araripina
E-mail: emersonoliveira.ferrer@gmail.com

ABSTRACT
During fetal life and childhood, the bones of the skull and face are separated by dense connective tissue membranes with large amounts of collagen fibers that constitute the sutures. One of these is the metopic suture, which joins the two frontal bones in the embryonic period and in the newborn. This suture appears approximately at the end of the second month of intrauterine life between the two ossification centers of the frontal bone, being considered as an anterior extension of the sagittal suture and its total fusion can occur from the end of the first year to the eighth or tenth year of life. , and may persist in adults. The objective of our study was to verify the incidence of metopic suture in dry skulls of adults in the Northeast region of Brazil. A sample of 474 dry skulls of adults, 294 male and 180 female, belonging to the Forensic Anthropology Center of the Faculty of Medicine of FAP-Araripina was used. In general, 84.6% of the skulls did not have a persistent metopic suture, with 3.6% having a complete metopic suture, 10.3% an incomplete metopic suture of the nasion type and 1.5% an incomplete metopic suture of the nasion type. bregma type. Complete metopic suture was more frequent in males (2.3%) than in females (1.3%). Due to the large territorial extension of Brazil and the great miscegenation of the population, in our view, it is necessary to carry out more studies in Brazilian individuals through dry skulls or images, especially if carried out in different regions of our country.

Keywords: Incidence, Metopism, Dry skulls.

1 INTRODUCTION

During fetal life and in infancy, the bones of the skull and face are separated by membranes of dense connective tissue with a large amount of collagen fibers that constitute the sutures (MOORE; PERSAUD, 2002; GENESER, 2007). This tissue will allow these bones to follow the growth of the

brain during intrauterine life, as well as in the first years of life, and the maintenance of these bones during childhood is a precondition for the continued growth of the vault bones and as an indirect factor of normal skull growth (WATZEK et al., 1982). Eventually, over the years, these sutures fuse together, forming a synostosis between the bones of the skull and face. One of them is the metopic suture, which joins the two frontal bones in the embryonic period and in the newborn**.** This suture appears approximately at the end of the second month of intrauterine life between the two ossification centers of the frontal bone, and is considered an anterior extension of the sagittal suture, and its total fusion can occur from the end of the first year to the eighth or tenth year of life (ROA; MORAGA; CANTIN, 2011; KIMAPORN et al., 2015). It has been reported that in some cases this suture can persist into adulthood, closing much later than the rest of the other sutures, even in very old people. The condition in which the metopic suture persists completely in the adult is called metopism (NAKATANI; TANAKA; MIZUKAMI, 1998; MADEIRA, 1995). Metopism can be related to various causes, such as abnormal growth of cranial bones, pathological metopism triggered by hydrocephalus, growth arrest, heterospecific factors, sexual influence, heredity, atavism, stenocrotaphy, plagiocephaly, scaphocephaly, mechanical causes, hormonal dysfunction, and genetic influence (DEL SOL et al., 1989; CASTILHO; ODA; SANTÁNA, 2006). Different classifications according to layout and shape were described, thus allowing complete and incomplete metopic sutures. Complete suture extends from the nasion to the bregma uninterruptedly, and incomplete when it extends from the nasion or bregma to several points of the frontal bone, and is classified into two subtypes: incomplete metopic suture "bregma" and incomplete metopic suture "nasium" (ROA; MORAGA; CANTIN, 2011; KIMAPORN et al., 2015). Regarding the frequency of metopism, it is known that ethnic diversity plays an important role in the different incidences of metopism, and it is reported that this situation varies from 0.8% to 15% in different populations (NIKOLOVA; TONEVA, 2012). Clinically, persistent metopic suturing can confuse radiologists and neurosurgeons when reading X-rays, CT scans, or MRI scans in misdiagnoses in emergency situations (KIMAPORN et al., 2015). Bearing in mind the importance of persistent metopic suture and its variations in different population groups, the present study reports the incidence of metopism in dry skulls of adults belonging to individuals from the Northeast region of Brazil.

2 MATERIAL AND METHOD

For our study, 474 dried skulls of adults were used, 180 females and 294 males. The sample was between 20 and 95 years old, all from the Northeast Region of Brazil, especially from the State of Sergipe. These skulls had a known sex and age with absolute certainty and were obtained in accordance with law No. 8501 of 1992, which deals with the use of unclaimed corpses for the purpose of studies and research. All the skulls belong to the collection of the Center for Forensic Anthropology of the

Faculty of Medicine of FAP-Araripina, located in the State of Pernambuco, Brazil. Our Osteological Collection is composed of 500 skeletons cataloged by sex and age and is registered on the website of the *Forensic Anthropology Society of Europe* (FASE). The inclusion criterion for this study was to select these skulls with intact and pathologies involved. For data collection, the inductive approach method was used with a systematic and direct observation technique for data collection (cranioscopy) in frontal norm and a descriptive procedure for data analysis. The observations were made by two researchers duly calibrated in relation to the theme.

3 RESULTS AND DISCUSSION

At the end of the observations and after cataloguing all the data, we verified the presence of the two types of metopism in our study: complete (Figure 1) and incomplete, nasion type (Figure 2) and bregma type (Figures 3 and 4).

Figure 1. Full mettopism



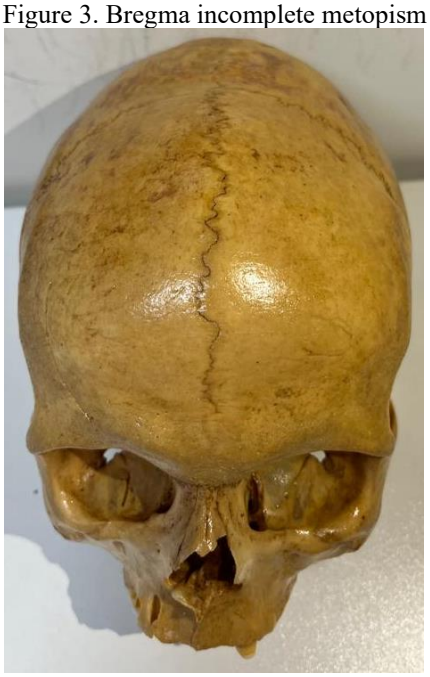
Source: personal collection

Figure 2. Incomplete Metathermism Nasion



Source: personal collection

Figure 3. Bregma incomplete metopism



Source: personal collection

Figure 4. Bregma incomplete metopism



Source: personal collection

According to data collection, we obtained the following results. In general, including the 474 skulls, the metopic suture was absent in 401 (SMA), representing 84.6% of the cases. Complete metopic suture (CMS) was found in 17 skulls (3.6%). Regarding incomplete nasium-type metopic sutures (INMS), they were found in 49 skulls (10.3%) and incomplete bregma-type sutures (IBMS) appeared in 7 skulls, with a percentage of 1.5% of the skulls examined (Table 1).

Table 1 – Quantity of the total number of skulls evaluated and the percentages of absent (SMA), complete (SMC) and incomplete nasium-type (SMIN) and bregma-type (SMIB) metopic sutures

Grand total	SMA (absent)	SMC	SMIN	SMIB
474	401 (84,6%)	17 (3,6%)	49 (10,3%)	7 (1,5%)

Source: prepared by the authors.

Using the male sample (n=294), we found the following results. In 245 skulls, there was no presence of a complete or incomplete metopic suture, representing 51.7% of the cases. In 11 skulls (2.3%) the metopic suture appeared in its complete mode. Regarding incomplete metopic sutures of the nasian type, we found 35 cases (7.4%) and incomplete bregma was found in 3 skulls, representing 0.6% of the cases (Table 2).

Table 2 – Quantity of total male skulls and percentages of absent (SMA), complete (SMC) and incomplete nasion-type (SMIN) and bregma-type (SMIB) metopic sutures

Total male sex	SMA (absent)	SMC	SMIN	SMIB
294	245 (51,7%)	11 (2,3%)	35 (7,4%)	3 (0,6%)

Source: authors' elaboration

Regarding the female gender, of the 180 skulls, the metopic suture was absent in 156, representing 32.9% of the cases. A total of 6 skulls were found with complete sutures in 1.3% of the cases. Incomplete nasion sutures were found in 14 skulls (3.0%) and incomplete bregma sutures were found in 4, representing 0.8% of the cases (Table 3).

Table 3 – Quantity of total female skulls and percentages of absent (SMA), complete (SMC) and incomplete nasion-type (SMIN) and bregma-type (SMIB) metopic sutures

Total female sex	SMA (absent)	SMC	SMIN	SMIB
180	156 (32,9%)	6 (1,3%)	14 (3,0%)	4 (0,8%)

Source: authors' elaboration

A comparison between males and females showed that the percentage of cases with absence of metopic suture was higher in males than in females. Complete metopic suture was more frequent in males (2.3%) than in females (1.3%). Nasion-type metopic suture was also more frequent in males than in females, with 7.4% and 3.0%, respectively. On the other hand, metopic bregma sutures were more frequent in females, with 0.8% of cases versus 0.6% in males, with a slight difference.

During the last few years, some studies have been carried out on the subject, in national samples and in foreign populations. In a study conducted in the 1980s, Del Sol et al. (1989) examined a sample of 400 dried skulls of Brazilian adults, finding that in 2.75% of the cases the complete metopic suture was found, while the incomplete suture appeared in 28.75% of the skulls examined. Another study

using a sample of Brazilian individuals was carried out by Castilho, Oda and Santána (2006), in which the authors used 71 skulls of adults, of which 7.04% had complete metopic sutures while 32.39% had incomplete sutures, the latter being more frequent in women (60.86%) than in men (31.13%). In our study, incomplete sutures appeared more frequently in males, a result that differs from the present study. In another more recent study, da Silva et al. (2013), in a sample of 134 dried adult skulls, found complete metopic suture in 4.48% of cases, while incomplete suture appeared in 5.22% of the skulls examined. Comparing these three studies, we found that the incidence of complete metopic suture was below 8% of the cases. Regarding incomplete sutures, the incidence was higher, with 28 and 32.39% in the first two studies, respectively, which did not occur in the study by da Silva et al. (2013), with an incidence well below the previous ones (5.22%). Comparing these three studies in a national sample with ours, we found that the incidence of complete metopic suture was close to that of our results, which was 3.6%. Regarding incomplete sutures, two studies mentioned above showed a higher number of cases than ours, while in the third the presence of this type was much lower. Other studies were carried out with foreign samples, aiming to verify the incidence of metopism. On the African continent, a study by Ajmani, Mittal and Jain (1983) was carried out on 206 dried skulls of Nigerian individuals, with complete metopism appearing in 3.4% of the cases, while 34.97% had incomplete metopic sutures. The incidence of complete metopic suture in this study is close to the results of the three studies previously cited in a national sample, including ours. Baaten et al (2003) investigated the incidence of metopism by means of anteroposterior radiographs in 968 adult Lebanese individuals, and of the total only 0.82% had complete metopism, while incomplete sutures had an incidence of 0.93%. Both results are noteworthy because they are very low compared to the studies mentioned above and to ours. With respect to Indian subjects, we selected three studies. Chandrasekaran and Shastri (2010), studied metopism in 160 dried skulls of South Indian adults, complete metopism was found in 5% of cases, while incomplete metopic suture was seen in 40% of skulls. Another study was conducted by Sudhakar et al (2010) with 253 dried skulls from individuals from Central India. In this study, complete metopism appeared in 3.95% of the cases, while incomplete metopic suture was identified in 52.96%. In another study using dried skulls also from individuals from Central India, Sathe and Sathe (2016) observed 70 skulls, of which 2.85% had complete metopism while 4.28% had incomplete sutures. Apparently, the incidence of complete metopic suture in Indian individuals is also close to the studies mentioned above, including in national samples. In another study, carried out on the Asian continent, Khamanarong et al. (2015) used 706 dried skulls of adults belonging to Thai individuals in order to verify the presence of metopism, among these 53 skulls (7.51%) had metopic sutures, 20 skulls with complete metopism (2.83%) and 33 (4.67%) with incomplete metopism. In this case, we also found a low incidence of incomplete metopism. This is another study in which the frequency of complete metopic suturing was close to the studies mentioned above and also when compared to ours.

4 CONCLUSION

Due to the large territorial extension of Brazil and the great miscegenation of the population, in our opinion it is necessary to carry out more studies on Brazilian individuals, by means of dried skulls or images, especially if carried out in different regions of our country. Knowledge of the metopic suture and its variations according to ethnicity becomes important in clinical medicine, thus avoiding misdiagnoses, in addition to being important in human identification in forensic anthropological expertise.

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Psychological violence against women: A silent pandemic

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Luiza Moura de Souza Azevedo
Doctor in Mental Health – H.C. from the International Institute of Business Management & Research Technology (IIBMRT), Recognized by UDSLA -USA.
E-mail: lmsn_91@hotmail.com
ORCID: https://orcid.org/0000-0003-4026-8098

Uanderson Pereira da Silva
Doctor in Health Sciences, Logos University International (UNILOGOS), 4300, Biscayne Blvd, Miami, FL 33137, United States.
E-mail: dr.uandersops@gmail.com
ORCID: https://orcid.org/0000-0001-8927-78476

ABSTRACT
Currently, there is a wide discussion around the issue of violence against women; it is still worrying to observe that the number of women who continue to suffer from different forms of violence continues to increase. Given this aspect, the objective of the article was to reflect, through a psychoanalytical approach, on the underlying aspects and manifestations of psychological violence directed at women. A qualitative research, of the literature review type, was carried out based on bibliographic research carried out in the search engines: SciELO (Scientific Electronic Library Online), BVS (Virtual Health Library) and Lilacs (Latin American and Caribbean Literature). in Health Sciences), using the following descriptors: psychoanalysis, women and violence against women. Inclusion and exclusion criteria were used, including the publication period of the analyzed materials (2018 to 2023) and Portuguese and English language. The results indicate that psychoanalysis reveals that this violence is linked to factors such as: narcissistic traits in the aggressors and fragility in the victims' self-esteem, influenced by ingrained gender norms and power inequalities. Cultural normalization of violence and stigmatization of victims also perpetuate the problem. Addressing violence requires a multidisciplinary approach involving mental health, public policy, education and awareness, which is vital for a just and safe society for all women.

Keywords: Psychoanalysis, Women, Violence against women, Gaslighting.

1 INTRODUCTION

Violence directed at women has deep historical roots, dating back to the dawn of society. It has been shaped by a system of power relations that establishes a hierarchy of domination and subordination, influencing the roles assigned to each gender. This dynamic is underpinned by subjective constructions, cultural representations, and patterns of behavior that originate from essentialist discourses. These discourses often perpetuate the idea that biological characteristics determine in an undeniable and immutable way the way women feel, think and understand the world (Siqueira; Rocha, 2019).

Psychological violence against women is a global phenomenon that transcends cultural, economic, and social boundaries (Almeida, 2020). Although often associated with physical aggression, an equally destructive and often cunning form of violence occurs in the psychological and emotional

domains. This form of abuse, called psychological violence, acts as a silent pandemic, eroding the mental health and dignity of women around the world (Riguini; Marcos, 2019).

Psychological violence may not leave visible bruises, but its emotional and mental scars are intense and long-lasting. Controlling behaviors, manipulation, humiliation, verbal threats, and isolation are weapons often used to contain and dominate women (Alves; Targino, Oliveira Junior, 2022). The Covid-19 pandemic and social isolation measures have deepened women's vulnerability to this form of violence, since the safe space that should be home has often become an emotional prison (Vieira; Garcia; Maciel, 2020).

The problem question that supported the study was: How do psychological, social and cultural aspects contribute to the perpetuation of psychological violence?

Psychological violence is a reality that affects millions of women around the world, leaving profound consequences on their mental and emotional health (Siqueira; Rocha, 2019). In view of this, the work is justified by the need for a psychoanalytic approach to understand the complex and often subtle aspects of this form of abuse, allowing a deep analysis of the unconscious dynamics and relationship patterns that sustain it. Therefore, it is relevant to understand these aspects that contribute to the development of strategies for prevention and intervention, in addition to promoting awareness and empowerment of women.

This article is structured in four chapters, each analyzing a fundamental aspect of psychological violence against women. Chapter 1, entitled Introduction, provides a comprehensive presentation of the scope of the research, contextualizing the importance of addressing the topic.

Chapter 2, in turn, is dedicated to detailing the methodology used in this study. In it, the procedures carried out are meticulously exposed, from the definition of methodological guidelines to the collection and analysis of data.

Chapter 3 is an essential theoretical pillar, comprising several sections that explore the underlying theory of psychological violence against women. The first section introduces the basics of this form of abuse, providing a solid foundation for understanding the dynamics involved. The psychoanalytic approach is especially noteworthy, as it offers deep insights into the unconscious motivations behind this aggressive behavior.

In the second section of Chapter 3, the analysis deepens by exploring the psychological, social, and cultural factors that contribute to the perpetuation of psychological violence. In this regard, emphasis is placed on the influence of the unconscious, as well as the entrenched gender norms and toxic relationship patterns that often perpetuate this form of abuse.

In the third section of Chapter 3, the focus is on the profound impacts that psychological violence has on women's mental and emotional health. Using the lens of psychoanalytic theory, this section seeks to comprehensively analyze the long-term repercussions of this silent pandemic,

providing an enriching understanding of the consequences for victims. The fourth and last chapter of this study presents the discussion of the research carried out. In this segment, the findings and results obtained throughout the investigation are described and analyzed.

The objective of this study was to reflect, through a psychoanalytic approach, on the underlying aspects and manifestations of psychological violence directed at women. The specific objectives are: to analyze the psychological, social and cultural factors that contribute to the perpetuation of psychological violence; Identify the impact of psychological violence on the mental and emotional health of affected women. Discuss possible intervention and prevention strategies based on the psychoanalytic perspective.

2 METHODOLOGY

To investigate the theme of psychological violence against women, a qualitative approach was chosen, specifically through a literature review. According to Gil (2019), this is a systematic process of analysis and synthesis of information available in bibliographic sources, such as: scientific articles, books, theses, dissertations, and other academic materials related to a given research topic. It seeks to identify, evaluate and integrate existing knowledge on the subject, in order to provide a critical and consolidated view of the current state of knowledge in the area in question.

Data collection was carried out through bibliographic searches in the following search sites: SciELO (Scientific Electronic Library Online), VHL (Virtual Health Library) and Lilacs (Latin American and Caribbean Health Sciences Literature).

To guide the search and selection of materials, the following descriptors were used: psychoanalysis, women, *gaslighting* and violence against women. These keywords were selected based on the central theme of the study and the psychoanalytic approach adopted.

The selection of materials was carried out according to predefined inclusion and exclusion criteria. Studies published in the last five years were included, ensuring the relevance and timeliness of the contents addressed. In addition, only studies available in Portuguese and English were considered, to enable the analysis and comprehension of the materials. Studies that had the descriptors in the abstract or in the title, available in full and free of charge, were also included.

Studies that did not meet the inclusion criteria and that presented characteristics such as: publication date greater than five years, languages other than Portuguese and English, absence of research descriptors in the abstract or title, and paywall were excluded.

The material selection process followed careful steps. First, searches were performed in the search engines using the previously defined descriptors. Then, the titles and abstracts of the articles were analyzed to assess their relevance to the study. Subsequently, the selected studies were read in full, considering their adherence to the research objectives.

Chart 1 presents the 8 studies that were selected for the development of the research:

Chart 1 – Description of the studies selected for literature review

Name/author	Title	Objective	Methodology	Main results/Conclusion
Pinheiro (2023)	Silenced subjectivities: domestic violence under The Psychoanalytic Perspective and the Myth of Romantic Love	Discuss domestic violence, the myth of romantic love with fragments of psychoanalytic theory.	Literature review	The relationship between concerns about honor, emotional suppression, and psychological violence was moderate, and greater adherence to cultural honor norms resulted in a higher probability of responding with psychological abuse in the face of experiences of psychological violence.
Azevedo; Telles (2023)	Psychological violence and the role of the psychiatrist: a narrative review.	Discuss state of the art and knowledge update on psychological violence against women.	Narrative review.	Psychological violence is a public health problem with serious consequences. As a health professional, the psychiatrist has the potential to work in several areas of the fight against domestic violence.
Chagas; Martins (2022)	Gaslight Phenomenon: From Psychological Manipulation to Women's Empowerment	To analyze women's empowerment in the face of psychological violence practiced by the oppressor.	Literature review.	The results indicate that psychological violence compromises women's self-esteem and shame appears as the predominant feeling
José; Santos (2021)	Violence against women: feminine issues in/for psychoanalysis.	To identify how psychoanalysis has been addressing psychological violence.	Qualitative research	The articulation with gender theories points to paths to violence against women, since the dialogues between psychoanalysis and gender are always very thorny and permeated by conflicts.
Vasconcelos et al (2021)	Prevalence and factors associated with intimate partner violence against adult women in Brazil: National Survey of Health, 2019	OBJECTIVE: To estimate the prevalence and factors associated with intimate partner violence against adult women in Brazil.	Quantitative research.	Violence against women involves young and low-income women, underscoring the urgency of intersectional policies to address social inequalities and combat intimate partner violence in adult women.
Souza (2020)	Psychoanalytic contribution to the memory of violence against women	To highlight the importance of the concept of feminine in psychoanalysis, for a better understanding of	Qualitative method with a focus on literature review	Analysis of Freud's writings on the drive revealed a link between masochism, the death drive, and the feminine context. The resumption of Lacan's conceptions of women broadened the

		violence against women.		understanding of the distinction between the feminine and femininity.
Ferreira; Danziato (2019)	Psychological violence in women under the light of psychoanalysis: a case study.	To investigate the reasons that determine why some women remain in marital relationships in which they experience psychological violence.	Case Study	Many issues influence a woman's decision to stay in a violent relationship, leading her to neglect protective measures such as femininity and masochistic traits.
Alencar (2019)	Psychological violence in the couple: gender, honor culture and emotional regulation	Investigate the case of psychological violence by an intimate partner, in its relational character.	Qualitative and quantitative research	Concerns about honor and emotional suppression moderate the relationship with psychological violence, with concerns about honor showing an inverse moderating effect: greater adherence to cultural honor norms increases the likelihood of an abusive response to psychological violence.

Source: authors (2023).

The selected materials were submitted to a qualitative analysis, seeking to identify patterns, trends and relevant knowledge related to psychological violence against women. The psychoanalytic approach served as an interpretive lens to understand the underlying aspects and complex dynamics involved in this phenomenon.

3 PSYCHOLOGICAL VIOLENCE

It should be noted that there are several types of abuse against women, among them the following stand out: physical, psychological, sexual, patrimonial, moral, institutional violence, among others (Silva, 2022). However, this research has psychological violence as its object of study.

Before, the only mechanism to combat this type of abuse was the Maria da Penha Law, recently, Law No. 14,188/2021 came into force, which brought modifications to several legal provisions, including the Maria da Penha Law. This new law introduced Article 147-B, which addresses the concept of an act of psychological violence against women. In this context, the article states that:

> Article 147-B Causing emotional harm to women that harms them and disturbs their full development or that aims to degrade or control their actions, behaviors, beliefs and decisions, by means of threats, embarrassment, humiliation, manipulation, isolation, blackmail, ridicule, limitation of the right to come and go or any other means that causes harm to their psychological health and self-determination. Penalty - imprisonment, from 6 (six) months to 2 (two) years, and fine, if the conduct does not constitute a more serious crime (Brasil, 2021)

Thus, from the analysis of this device, it can be concluded that there are several manifestations

that are configured as acts of psychological violence directed at women, resulting in the restriction of these victims through several different approaches.

3.1 FOUNDATIONS OF PSYCHOLOGICAL VIOLENCE: A PSYCHOANALYTIC PERSPECTIVE

Psychological violence is a type of aggression that almost always manifests itself through verbal, emotional, or symbolic behaviors that aim to cause emotional, psychological, or mental harm to a person. Unlike physical violence, psychological violence does not involve direct physical aggression, but instead uses tactics of manipulation, intimidation, humiliation, control, and threat to exert power and control over the victim (Ferreira; Danziato, 2019).

The understanding of the foundations of psychological violence has a new dimension when analyzed from a psychoanalytic perspective. Psychoanalysis, developed by Sigmund Freud, offers fundamental information about the unconscious processes that relate to human behaviors, including those linked to psychological violence (Rodrigues, 2022).

From this perspective, psychological violence is not just a set of superficial actions, but is driven by dynamics intensely rooted in the unconscious (Alves; Ta; Oliveira Junior, Teodoro, 2022). It can be rooted in power issues, inferiority complexes, unresolved traumas, emotional repressions, and unworked psychic conflicts. Psychoanalysis reveals that, many times, those who perpetrate psychological violence may be projecting their own insecurities and anguish onto the victim, thus seeking to relieve their own emotional tension (Rodrigues, 2022).

In addition, psychological violence is intrinsically linked to cultural and social norms that reinforce gender stereotypes, traditional roles, and social expectations. The psychoanalytic perspective analyzes how these external influences can shape patterns of behavior and thought, often leading to abusive and disrespectful behavior (Simon; Santos, 2023).

Thus, by adopting a psychoanalytic approach, it is possible to assess the dense categories of the human psyche that contribute to the perpetuation of psychological violence. This analysis not only sheds light on the underlying causes, but also offers information on possible therapeutic and preventive strategies (Simão; Santos, 2023).

The understanding of the psychoanalytic foundations can contribute significantly to the creation of more effective interventions, prevention policies and support for victims of psychological violence, thus promoting a healthier society free from this type of aggression (Ferreira; Danziato, 2019).

3.2 PSYCHOLOGICAL, SOCIAL AND CULTURAL FACTORS IN THE PERPETUATION OF PSYCHOLOGICAL VIOLENCE

The complex phenomenon of psychological violence against women is influenced by an intersection of psychological, social and cultural factors that intertwine and contribute to its perpetuation. Understanding these factors is essential for a complete analysis and an effective search for prevention and intervention strategies (Ferreira; Danziato, 2019).

According to Ferreira and Danziato (2019), psychological, social, and cultural factors play a fundamental role in the perpetuation of psychological violence against women, interacting in a complex way to maintain this harmful pattern. Psychoanalytically, these are: psychological factor – narcissism and control; low empathy and fragility of self-esteem.

Alves, Targino and Oliveira Junior (2022) point out that the social aspects involve: gender norms, power inequality and social isolation. Cultural sexism, on the other hand, include: cultural machismo, naturalization of violence, and esteem and shame.

In the psychological factor, psychological violence reflects imbalances of power and control. Individuals who perpetrate this type of violence may experience a desire for domination over the victim as a way of dealing with their own insecurities and weaknesses (Chagas; Martins, 2022).

Unresolved internal conflicts, low self-esteem, and emotional management difficulties can manifest themselves through manipulative, humiliating, and coercive behaviors. Psychological violence can be an attempt to compensate for a feeling of powerlessness by projecting the feeling of control onto the victim (Alencar, 2019).

On the social level, the influence of cultural norms and standards plays a significant role in the perpetuation of psychological violence. Gender socialization, for example, can result in the internalization of stereotypes that praise male dominance and reinforce female submission. This cultural dynamic can contribute to attitudes of devaluation of women and to the belief in the acceptability of violence as a way to maintain control (José; Santos, 2021).

According to Ferreira and Danziato (2019), it is essential to highlight the influence of the culture of silence that often surrounds psychological violence. Social norms that minimize the impact of this form of abuse can make it difficult for victims to seek help, perpetuating their vulnerability. The perception that psychological violence is less visible or less serious than physical violence may contribute to its underreporting and, consequently, to its perpetuation.

Today, Chagas and Martins (2021) point out that psychological violence is called by the *gaslight phenomenon*, which indicates psychological manipulation. Therefore, it is a form of psychological abuse in which there is false information that leads the woman to doubt her own memory, perception and analysis. "It is a subtle aggression against the woman where the aggressor manipulates, deceives, confuses, hides, disrespects, has aggressiveness and intoxicates the identity of

the victim" (Chagas; Martins, 2021, p. 1).

Reflecting on these factors, it is important to consider how they intertwine and reinforce each other. A critical analysis of the psychological, social and cultural dynamics behind psychological violence against women makes it possible to question power structures and the need to promote profound changes in society (Cunha; Valiense, 2021).

For Alves, Targino, and Oliveira Junior (2022), awareness and education are essential steps to challenge harmful norms, empower women to recognize and confront psychological violence, and thus work to eradicate this silent pandemic. Effective transformation requires the collaboration of all of society, including institutions, support systems, and individuals, in the pursuit of equitable and healthy relationships.

3.3 IMPACT ON WOMEN'S MENTAL AND EMOTIONAL HEALTH: A PSYCHOANALYTIC ANALYSIS

The impact of psychological violence on women's mental and emotional health is profound and long-lasting, leaving invisible scars that can reverberate over time. A psychoanalytic analysis reveals the complex interactions between the emotional traumas caused by violence and the psychic structure of the victims (Silva, 2022).

According to Silva (2022), there are many impacts on women's lives, some of them are: low self-esteem, anxiety, depression, social isolation, trauma, feelings of guilt, shame, sleep disorders, difficulty in relationships, among others; varying from person to person.

Continuous exposure to psychological violence can trigger a range of psychological symptoms, such as: anxiety, depression, post-traumatic stress disorders, and low self-esteem. Women who suffer this type of abuse often experience a state of constant hypervigilance, anticipating imminent threats and experiencing a state of constant emotional tension (Chagas; Martins, 2022).

The psychoanalytic approach considers the defense mechanisms that victims can develop as a way to cope with violence. Denial and repression can be used as strategies to avoid direct confrontation with emotional pain, allowing victims to continue to function in their everyday lives. However, these defense mechanisms can come at a cost, contributing to the accumulation of anguish and the maintenance of the cycle of violence (Vasconcelos *et al,* 2021).

In addition to emotional symptoms, psychological violence can have an impact on identity construction and the formation of interpersonal relationships. The internalization of messages of devaluation and control can lead to a distorted perception of oneself, damaging self-image, and self-confidence (Silva, 2021). The ability to establish healthy bonds and trust others can also be affected, as traumatic experiences shape the way women relate to the world around them (Simão; Santos, 2023).

Psychoanalytic analysis leads to reflection on how psychological violence can penetrate the depths of the unconscious, influencing dreams, fantasies, and thought patterns (Silva, 2021). Understanding these internal processes can provide data for effective therapeutic interventions, allowing victims to work on the elaboration and transformation of the traumas experienced (Ferreira; Danziato, 2019).

In this context, the importance of psychological and therapeutic support is evident. Through the exploration of the underlying meanings of psychological violence, women can rebuild their self-esteem, process trauma, and develop healthy coping strategies (Alencar, 2019). Psychoanalytic analysis offers a sensitive lens through which to understand the complex interactions between the psychic and the emotional, providing a space for healing and resilience (Ferreira; Danziato, 2019).

Reflecting on the impact on the mental and emotional health of women who are victims of psychological violence, it is essential to consider the need for a holistic and compassionate approach. According to Chagas and Martins (2022), understanding the psychoanalytic implications can inform more effective support practices, restoring emotional well-being and building healthy and empowering relationships.

4 DISCUSSION

This chapter presents the discussion of the studies analyzed, approaching psychological violence as a complex phenomenon that involves intricate dynamics and implications for the mental and emotional health of women who are victims of this practice. The categories of analysis of the results include: the manifestations of psychological violence, the underlying factors and the importance of the intervention of psychoanalytic therapy.

4.1 MANIFESTATIONS OF PSYCHOLOGICAL VIOLENCE

The results of this study corroborate the investigations of Ferreira and Danziato (2019), who explored psychological violence in women from a psychoanalytic perspective. The manifestations of psychological violence include behaviors of control, manipulation and humiliation that compromise the victim's autonomy and self-esteem.

When compared to other types of violence, psychological violence occurs primarily in the domestic environment and is predominantly perpetrated by family members or acquaintances of the victims (Siqueira *et al,* 2018).

Chagas and Martins (2022) described the *gaslight* phenomenon, highlighting how psychological manipulation affects women and how female empowerment can emerge from this context. The need to recognize and confront this insidious form of violence is important, since the manifestations can lead to irreparable damage, such as suicide or femicide.

Psychological abuse, while common, is often more challenging to recognize. Without leaving physical evidence on women's bodies, these forms of aggression are hidden behind actions such as: jealousy, manipulation, depreciation, belittling, coercion, sarcasm, and insults (Ferreira; Danziato, 2019).

According to Silva (2022), the vivid expression of psychological violence goes far beyond communication, including the multiple dimensions of women's lives. From blatant exploitation to subtle criticism of sexual performance, from the curtailment of their individual freedom to the implementation of constant surveillance, from acts of confinement to strategies of deprivation of essential resources, this toxic manifestation occurs through the perpetuation of repeated verbal offenses. Such situations add to the deep understanding of the manifestations of psychological violence, further broadening the understanding of its devastating and subversive nature.

4.2 UNDERLYING FACTORS OF ABUSE

The analysis of the dynamics underlying cases of psychological violence provides a significant deepening of the understanding of this phenomenon. Pinheiro's (2023) research highlights the presence of narcissistic traits in aggressors, perceived through the psychoanalytic perspective. The role of these narcissistic traits is essential in the search for power and control in relationships, as evidenced by Ferreira and Danziato (2019) in their exploration of psychological violence in women.

In addition to narcissistic traits, other psychological, social, and cultural factors contribute to the perpetuation of this type of violence. Azevedo and Telles (2023), when analyzing the role of the psychiatrist in addressing psychological violence, highlight the importance of early identification and psychiatric support for victims. This point highlights the interconnection between individual psychological factors and the manifestation of violence, demonstrating how emotional vulnerabilities can be exploited by aggressors.

Chagas and Martins (2022) described the *gaslight* phenomenon, revealing psychological manipulation as a central mechanism in the perpetuation of abuse. Victims' meticulous manipulation of reality and deliberate confusion not only erode self-esteem, but can also make it difficult for victims to perceive their own abusive situation, contributing to their continued vulnerability.

In considering the intersection between gender and culture, Alencar (2019) highlights how cultural norms and conceptions of honor can play a key role in perpetuating psychological violence. The influence of these social and cultural factors can shape the expectations, behaviors, and dynamics of relationships, establishing a fertile ground for the manifestation of violence.

4.3 PSYCHOANALYTIC INTERVENTION

The application of psychoanalysis as an intervention and therapy in psychological violence has shown to be a promising approach to understanding, treating, and preventing this type of abuse. The principles of psychoanalysis offer insights into the underlying dynamics, toxic relationship patterns, and psychological factors that contribute to the perpetuation of psychological violence (Souza; Cunha, 2018).

One of the therapeutic approaches that stands out is psychoanalytic psychotherapy, which focuses on exploring the unconscious and bringing out intense and repressed aspects of the victim's psyche. Through analysis of internal conflicts, past experiences, and interpersonal relationships, this approach can help victims understand the patterns of behavior that keep them trapped in abusive relationships. Psychoanalytic therapy can also provide tools to increase self-awareness, promote self-esteem, and develop healthy coping mechanisms (José; Santos, 2021).

In addition, José and Santos (2021) highlight psychoanalytic intervention for aggressors, with the aim of exploring the deep roots of abusive behaviors. Understanding the narcissistic traits, underlying insecurities, and unconscious motivations of abusers can offer a foundation for behavior change and accountability. Psychoanalytic therapy can help abusers face their own internal issues, promoting empathy and understanding of the consequences of their actions on victims.

The inclusion of couples therapy or family therapy can also be beneficial, as it addresses the relational dynamics that underpin psychological violence. This approach can help identify dysfunctional communication patterns, promote healthy expression of emotions, and develop conflict resolution strategies that do not involve manipulation or humiliation (Souza; Cunha, 2018).

According to Azevedo and Telles (2023), the psychiatrist plays an essential role in treating the consequences of psychological abuse, offering pharmacological and psychotherapeutic support to victims. In addition, they provide emotional support and guidance in situations of reporting or ending the relationship. Due to the association with substance use disorders among offenders, the psychiatrist is essential in rehabilitation programs, preventing recurrences of aggression.

Therefore, José and Santos (2021) point out that interventions and therapies based on psychoanalysis offer a holistic approach to dealing with psychological violence. By exploring the unconscious, emotional, and relational aspects involved, these approaches have the potential to promote healing, empowerment, and transformation for both victims and perpetrators, thereby contributing to breaking the cycle of abuse and establishing healthier, more equitable relationships.

5 FINAL CONSIDERATIONS

One of the most frequent forms of psychological violence against women is known as "gaslighting". The term refers to a manipulation strategy in which the aggressor uses words and

behaviors to distort the victim's reality, leading them to doubt their own perception and memory. This practice has serious detrimental consequences for the victim, who may experience confusion, anxiety, depression, and even the loss of their self-confidence and autonomy.

Psychological aspects represent an essential factor, showing how narcissistic traits in aggressors can motivate the search for power and control in relationships. In addition, the fragility of victims' self-esteem makes them more susceptible to manipulation and emotional weakening, perpetuating the abusive dynamic.

In the social sphere, gender norms and power inequality play an important role. The persistence of traditional ideas that emphasize female submission and dominant masculinity strengthens behaviors of control and humiliation. Lack of support networks and social isolation also contribute to keeping victims trapped in abusive relationships.

Culturally, the normalization of violence and the stigma associated with victims perpetuate the occurrence of this phenomenon. The naturalization of violence and the reluctance to report it due to fear of social judgment contribute to the invisibility of psychological violence.

Thus, it is evident that psychological violence is a complex problem that extends to several layers of society. Addressing it requires multidisciplinary actions involving mental health professionals and the implementation of policies that challenge harmful gender norms, including the support of psychoanalysis.

Education and public awareness also play a key role in deconstructing these cultural patterns and creating a more equal and violence-free society. Understanding these factors and coordinated actions are essential to effectively stop the perpetuation of psychological violence against women.

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Adverse events associated with the vaccine and SARS-CoV 2 virus in patients with facial aesthetic procedures

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Luana Beatriz Miranda Moreli
Master in Orofacial Harmonization
E-mail: luanab_miranda@hotmail.com

ABSTRACT
Objective: To identify adverse events associated with the vaccine and the Sars-Cov 2 virus in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers) through a systematic literature review. Methodology: The Methodi Ordinatio methodology was used to select the portfolio of the most relevant articles in the area. The search was conducted in the PubMed database considering the period from 2019 to 2023. The final portfolio consisted of 33 articles. Results: The results show events that include filler site reactions, such as pain, edema, erythema, pruritus, bruising, infection, hypersensitivity, nodules, asymmetry, facial contour defects, skin discoloration, side effects, and tissue necrosis. Conclusion: The main contribution of this study was to share information on adverse events, considering the risks and implications arising from the vaccine and the Sars-Cov 2 virus along with facial aesthetic procedures, in order to guide injecting professionals on how to act in the market considering the pandemic.

Keywords: Covid-19, Filler, Vaccines, Botulinum toxin, Hyaluronic acid.

1 INTRODUCTION

It is observed that the use of tissue fillers is among the most popular non-surgical aesthetic procedures worldwide and is currently being used for both facial and non-facial areas. Aesthetic medicine has become more pronounced in recent years for many reasons, such as the constant search for youthfulness, the influence of artists, or even premature aging caused by stress, anxiety, and depression (Cassaniti et al., 2020).

There are different types of biostimulators and tissue fillers, such as hyaluronic acid (HA), calcium hydroxyapatite (CaHA), polymethylmethacrylate (PMMA), poly-L-lactic acid (PLLA), and collagen-based products. It is believed that an ideal dermal filler should be safe, non-allergenic, non-immunogenic, non-carcinogenic, non-migratory, cost-effective, and stable for the desired time in the target tissue. However, several adverse reactions associated with dermal fillers have been reported in scientific research (Guo et al., 2021).

Complementing facial aesthetic procedures, botulinum toxin type A is also among one of the alternatives for rejuvenation within aesthetic clinics. It acts through the action of relaxation of the muscles. The addition of botulinum toxin type A (BTX)-induced facial muscle paralysis to target the muscles of the upper (visible) half of the face, especially the corrugator and procerus muscles, may act

as a therapeutic solution by its suppression of glabellar lines. The treatment of the glabella complex allows to inhibit the negative emotions of the treated individual (Nestor et al., 2020).

Since the emergence of the coronavirus pandemic in 2019, caused by the Sars-Cov 2 virus, several vaccines have been marketed to people around the world. And, several adverse events associated with the different COVID-19 vaccines have been reported and, notably, cases of adverse events in patients with tissue filler after vaccination (Beamish et al., 2022).

COVID-19 emerged in the midst of the high number of aesthetic procedures, significantly affecting the immune system, disfavoring the performance of aesthetic procedures and impacting on several factors, including the decrease in the durability of botulinum toxin and causing inflammatory processes in patients with facial fillers, caused by the side effects of vaccines and also during infection with the SARS-CoV-2 virus (Beamish et al., 2022).

COVID-19 can present several signs and symptoms, adverse events, which are still being studied. However, many cutaneous, respiratory, and muscular manifestations, among others, have already been analyzed and reported, for example, patients with facial fillers may present an ETIP-type reaction (delayed intermittent edema), triggered by SARS-CoV-2 infection or vaccines (Zhang, 2020).

These reactions are mediated by T lymphocytes and can be triggered by influenza-like illnesses, including SARS-CoV-2 infection. The authors Cavallieri et al. (2017) contribute by stating that vaccination can also induce a response leading to hypersensitivity of fillers in the body, also causing PITT.

The COVID-19 pandemic then led to research on the relationship between facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers) as well as the development of inflammatory reactions in patients infected with SARS-CoV-2 or after vaccination (Naouri et al., 2023). There are already studies that report that SARS-CoV-2 binds to and blocks angiotensin-converting enzyme 2 (ACE2) via the S (spike) protein to access the cell, which may be a potential mechanism for the development of adverse events in those vaccinated or infected with COVID-19 in patients who have received HA filler injections or botulinum toxin type A, for the purpose of facial aesthetic procedures (Li et al., 2023).

In human cells, ACE2 is expressed in keratinocytes, fibroblasts, dermal vascular endothelium, and adipocytes of the subcutaneous tissue, where HA is deposited. The accumulation of angiotensin II triggers a pro-inflammatory reaction and increases the activity of CD44 glycoprotein, which has an affinity for pro-inflammatory properties and are present in the infiltration that develops around the deposits injected into the skin in the subcutaneous tissue (Azzouz et al., 2023).

It is important to emphasize that there is a need to discuss clinical considerations for aesthetic procedures, even if all safety protocols against COVID-19 are respected based on the competent health agencies and scientific evidence, they still bring uncertainties about the sensitivity of the tests and the

incubation time of the virus, as well as the systemic and immunological mechanism of action of the infection in asymptomatic patients (Cassaniti et al., 2020; Zhang et al., 2020).

Therefore, this study is justified by the lack in the research area, considering the limited number of studies that investigate adverse events related to the influence of the vaccine on minimally invasible aesthetic procedures performed in offices, such as the application of botulinum toxin type A and facial fillers with absorbable hyaluronic acid. To this end, a systematic bibliographic search was used in the PubMed database, considering the works published in the period between 2019-2023, to find out which are the most relevant publications on the subject.

Thus, the objective of this study is to evaluate the adverse events of the vaccine and the Sars-Cov-2 virus in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers)through a systematic review of the literature.

The study may provide a comprehensive overview of reported cases of reactions to fillers and application of botulinum toxin type A after COVID-19 vaccination, as well as in patients who have had the disease, in order to address various considerations that should be taken into practice and also bring better guidance to injecting professionals and the general population.

2 METHODOLOGY

In order to identify adverse events related to the vaccine and the Sars-Cov-2 virus in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers)through a systematic literature review, a survey of materials published in the PubMed database from 2019 to 2023 was carried out.

To achieve the proposed objective, we opted for the methodology for systematic literature review proposed by Pagani, Resende and Kovaleski (2017), the Methodi *Ordinatio.* Relevant articles published with significant impact factors used the methodology to conduct systematic reviews, validating the method developed by the authors, such as Cunha et al. (2019), Gao et al. (2019), Muller et al. (2019), Pinto et al. (2019), Souza et al. (2019), Corsi et al. (2019) and Salvador et al. (2019).

The methodology provides a sequence of nine steps, which were used to follow the methodological path:

Table 1: New passos to Methodi Ordinatio

STEPS	DEVELOPMENT
Step 1: Establish search intent;	We sought to delimit the existing research gap considering the Theme – adverse events associated with the vaccine and the Sars-Cov-2 virus in patients with facial aesthetic procedures.
Step 2: Preliminary exploratory search with the keywords in the databases;	The preliminary research consisted of inserting the following keyword combinations: Covid-19 **AND** the toxin* Covid-19 **AND "**hyaluronic acid ***"** vaccines **AND "**botulinum toxin ***"**

	vaccines" **AND** "hyaluronic acid *"
Step 3: Definition and combinations of keywords and databases;	After the preliminary exploratory research, the following combinations were defined: Covid-19 **AND** the toxin* Covid-19 **AND** "hyaluronic acid *" vaccines **AND** "botulinum toxin *" vaccines" **AND** "hyaluronic acid *" To define the databases, we chose the most widely used database in the health area: PubMed.
Step 4: Definitive search in the databases;	As shown in Table 2.
Step 5: Filtration procedures;	As foreseen in the methodology, the filters were as follows: Duplicates; Conference papers, books, and book chapters; InOrdinatio Negatives and By Title.
Step 6: Identification of the impact factor, year and number of citations;	For this step, the Journal Citation Reports (JCR) metric was *considered as the first option for impact factor,* and in case the journal did not present JCR, the Cite Score metric was chosen. To obtain the citation number of each article, a Google Scholar search was performed.
Step 7: Ordering of the articles by means of *InOrdinatio*;	To order the articles, the equation InOrdinatio = (Fi / 1000) + α* [10 - (APe – APu)] + (∑ Ci) was applied, in which the established α value was 10, prioritizing the most recent articles. At this stage, it was possible to locate 1 article with negative InOrdinatio, which was excluded from the research as foreseen in the methodology used.
Step 8: Localization of the articles in full format;	The articles were located using the selected databases, the Capes portal and Google Scholar.
Step 9: Systematic reading and analysis of the articles.	The readings and analyses were performed with a focus on the established theme, following the exclusion criteria in Table 3. Excel was used to organize the information and systematically analyze the articles.

Fonte: Pagani; Resende; Kovaleski (2017).

After defining the databases for the research, the searches for documents were carried out using the descriptors established in step 3. As a result, the number of documents from each database was obtained, as shown in Table 2.

Table 2: Number of documents from the database used in the search

Key words and combinations **Period** (2019 to 2023)					
Databases	((Covid-19 OR (Sars-Cov 2)) AND (botulinum toxin*)	((Covid-19 OR (Sars-Cov 2)) AND (botulinum toxin*) AND **("**hyaluronic acid *"**)**	((Covid-19 OR (Sars-Cov 2)) AND (Vaccines) AND **("**hyaluronic acid *"**)** "botulinum toxin *"	((Covid-19 OR (Sars-Cov 2)) And (Vaccines) AND **("**botulinum toxin *"**)**	**Total**
PubMed	Search results: **67** results Search fields: Article title, abstract, keywords.	Search results: **78** results Search fields: Article title, abstract, keywords.	Search results: **29** results Search fields: Article title, abstract, keywords.	Search results: **6** results Search fields: Article title,	**180**

	Document type: Newspapers	Document type: Newspapers	Document type: Newspapers	abstract, keywords. Document type: Newspapers	
Total	**67**	**78**	**29**	**6**	**180**

Source: Prepared by the author (2023).

After searching the databases, the filtering procedures were performed, as described in step 5. Exclusion by title and abstract followed the criteria described in Table 3.

Table 3: Filtering (exclusion) procedures performed in the survey.

Exclusion Criteria	Total
Duplicate	18
Books, Book Chapters & Conferences	79
Title and abstract (papers that are not directly related to the research theme)	74
Total	**33**

Source: Prepared by the author (2023).

Inclusion and exclusion criteria comprised all original studies that presented cases that manifested adverse reactions of fillers or botulinum toxin type A, after receiving COVID-19 vaccines or studies of patients who had the disease and had associated adverse events. Only studies that were directly related to the objectives of this research were included. The exclusion criteria considered duplicate articles, books, book chapters and conferences, and materials that did not present a case related to the research theme. Exclusion criteria were also considered to be studies that reported only reactions and adverse events in isolation, with an approach to other types of vaccines or only with the use of fillers or botulinum toxin type A, not associated with the object of study of this research.

Based on these exclusion criteria, a total of 33 articles were obtained, which gave rise to the final portfolio for the construction of the systematic literature review. This selection of articles allowed us to carry out comparative analyses between them, in order to achieve the objective proposed in this study.

2.1 REVIEW AND DATA COLLECTION PROTOCOL

Research questions: What are the adverse events associated with the vaccine and the Sars-Cov-2 virus in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers)? In this way, the systematic bibliographic analysis provides an overview of the research that can contribute to the proposed theme. To this end, the following questions were also asked:

i. How many works are published per year? This question aims to demonstrate when this type of research was of interest in the academic community.

ii. What are the main media in which these studies were published, as well as which works were most referenced by the body of literature evaluated? These questions can determine which *journals* and authors show greater interest in the topic addressed, enabling the creation and solidification of a theoretical basis for the study, in order to list the most significant authors in the field.

iii. Which articles have a central theme similar to the one addressed in this systematic review? The identification of studies that are similar to the study discussed here can foster ideas about the means of conducting the research, as well as allow interaction between related researchers.

Thus, the theme addressed in this article may offer some answers to the challenge of understanding whether there are adverse events/influence of the vaccine and the Sars-Cov-2 virus in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers).

3 RESULTS AND DISCUSSION

The results and discussions section is divided into *literature exploration* and adverse events of the vaccine and the Sars-Cov 2 virus in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers).

3.1 LITERATURE EXPLORATION

According to the inclusion and exclusion criteria of the materials from the systematic literature review and taking into account the objective of the research, 33 scientific articles that presented similarity with the theme and central objective of this research were analyzed. All of them deal with the subject and base their analyses on the perspective of presenting adverse events, reactions to the vaccine and the Sars-Cov-2 virus in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers), to carry out an evaluation, a clinical study, an analysis of results or a literature review. Table 4 summarizes the results of the systematic review, grouping the studies that were directly related to the objectives addressed in this research. The table made it possible to answer the research question that guided the study: what are the adverse events associated with the vaccine and the Sars-Cov-2 virus in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers)?

Table 4: Summary of published articles on adverse events in patients with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers)

Study	Historical	Symptoms	Research contributions
Aryanian et al . (2022)	Reports of some skin reactions in patients undergoing various cosmetic procedures, including butolinum toxin filling or injection	Oedema, erythema and tenderness in the injected areas and lip angioedema	Most vaccine-induced reactions in previously cosmetically manipulated areas are delayed reactions, usually occurring within 10 days of vaccination.
Azzouz et al. (2023)	Case of a 43-year-old woman with a type 4 delayed hypersensitivity reaction to hyaluronic acid cosmetic filler triggered by COVID-19 mRNA vaccination	Late-onset nodule formation after filler injection, inflammatory reaction, and delayed hypersensitivity reaction	Delayed hypersensitivity type IV/delayed inflammatory reactions usually manifest as induration, edema, nodules, and granuloma at the injection site. The mechanism of the delayed/type IV inflammatory reaction has yet to be elucidated, but one theory is that the LMW-HA and HA oligosaccharides may haptenize the autoprotein and make them immunogenic
Batifol et al. (2022)	Comparative studies, over three months, of the impact of SARS-CoV2 in patients injected with botulinum toxin for functional purposes	Protective effect	Botulinum neurotoxin type A (BoNT/A) is known to block acetylcholine (ACh) as well as many other neuroreceptors and neuromodulators. The recent mention of a potential protective effect of nicotine on COVID 19, through the blocking of ACh.
Beamish et al. (2022)	Association of Delayed Inflammatory Reactions to Dermal Fillers in Response to mRNA COVID-19 Vaccination	Induration, edema, painful nodules, and discoloration at dermal filler injection sites	The symptoms appeared suddenly 6 weeks after receiving the second dose of the Pfizer vaccine. This may represent a potential delayed inflammatory reaction to vaccination, but alternative immunogenic triggers cannot be ruled out
Bono et al. (2021)	Best practice recommendations on how to organize the work of a clinic	Protective effect	Effective injection method that can prevent SARS-CoV-2 virus infection. In order to

	performing botulinum toxin treatments.		minimize the risk of transmission of SARS-CoV-2 during botulinum toxin treatment in the COVID-19 era
Calvisi (2022)	Three cases of dermal filler reactions after mRNA vaccination against SARS-CoV-2; All patients received the filler months or even years before the vaccine	Delayed inflammatory reaction after vaccination	Adverse Events in Patients With Dermal Fillers After Receiving SARS-CoV-2 mRNA Vaccine. Cases of an inflammatory reaction triggered by the COVID-19 Spike protein to HA dermal filler. Prevention of delayed reactions or type IV hypersensitivity should include a thorough patient history and education and a waiting window between vaccine and dermal filler
Cavallieri et al.	Reports of 33 cases of local edema associated with the presence of hyaluronic acid. Episodes of edema have been reported as recurrent, either in the previously affected area or at another injection site	Late complication after facial filling with hyaluronic acid Edema local	Use of the term intermittent and persistent late edema to group late adverse reactions to hyaluronic acid, which translate into late local edema, of an intermittent nature, triggered by specific triggers and which persists as long as there is the presence of hyaluronic acid in the tissue.
Dresler and Saberi (2020)	Research through a standardized questionnaire on the therapeutic forms of butolinum toxin	Protective effect	Therapeutic forms of botulinum toxin type A applications can be considered as a potent treatment against Covid-19
Goodman et al. (2020)	Study of the application of botulinum toxin type A during the pandemic in patients who need follow-up in neurological conditions	Protective effect	Therapeutic forms of botulinum toxin type A applications in patients with neurological conditions

Guo et al. (2021)	2 subacute cases of allergic reactions to BTA in facial cosmesis after Covid-19 vaccination	Hypersensitivity reaction	Infection and vaccination by Corona virus disease 2019 (Covid-19), can induce specific and non-specific activation of the immune system, induce delayed inflammatory reactions to previously injected hyaluronic acid fillers.
Hamed et al. (2022)	Study of immediate or early-onset side effects (occurring up to several days after treatment)	Injection site reactions such as pain, oedema, erythema, pruritus, bruising, infection, hypersensitivity, nodules, asymmetry, facial contour defects, skin discolouration, adverse reactions and tissue necrosis	Reduced Efficacy and Safety of Botulinum Toxin Type A (BTA) Injections After COVID-19 Vaccination
Kalantari et al. (2022)	Systematic search conducted in the Scopus, Web of Science, and PubMed/MEDLINE databases for articles published from the beginning of the pandemic until October 21, 2021, in order to determine the characteristics of patients with filler reaction after vaccination against COVID-19 and to address various considerations that should be made in practice	Injection site reactions such as oedema, pain, erythema, pruritus and ecchymosis, hypersensitivity reactions, herpes simplex virus infections, abscess or cellulitis, surface irregularities and nodules, vascular occlusions such as local tissue necrosis and blood vessel embolisation	All patients who developed delayed-type reaction (TRD) after COVID-19 vaccination were middle-aged women with no known history of food or drug allergy. All patients had a history of hyaluronic acid (HA) filler injection in the head and neck and demonstrated particularly swollen symptoms, from <1 day up to 10 days after the first or second dose of vaccines. Lisinopril, hyaluronidase, and corticosteroids appear to have good treatment results
Kandasamy (2020)	Overview of SARS-CoV-2-Mediated Pathological Impact on the Lungs, Heart, and Brain, Therapeutic Uses of Butolinum Toxin Against Lung Failure, Cardiac Arrest, and Neurological Deficits	Therapeutic effect	Botulinum toxins are potent neurotoxins that can induce muscle paralysis and acute respiratory arrest in humans. A mild dose of the purified form of butolinum toxin may attenuate the chronic cough, dyspnea, pneumonia, acute respiratory failure, abnormal circulation,

			heart defects, and various neurological deficits that have been recognized as the prominent clinical symptoms of COVID-19
Kato et al. (2022)	Study of Patients With Symptoms of Acute Inflammatory Reactions After HA or Human Collagen Filler Injection in a Clinic	Acute inflammatory reactions	The sharp increase in acute inflammatory reactions coincided with the COVID-19 pandemic. Possible explanations include immune system changes caused by extensive changes in household and personal hygiene, prolonged and elevated stress levels, and subclinical COVID-19 infection
Li et al. (2023)	Case study reporting delayed inflammatory reactions in a patient whose neck erythema appeared three weeks after injection of hyaluronic acid into the necklines and a delayed inflammatory reaction was diagnosed	Delayed inflammatory reactions	Delayed inflammatory reactions are a relatively rare complication and are often confused with common or non-HA-related infections due to their insidious onset and diverse manifestations. The study highlights the need for attention from health professionals
Lopes (2022)	An observational, retrospective, comparative, multicenter, non-interventional study in a real-life setting was conducted with patients treated with facial injections of hyaluronic acid from May to September 2021, with testing to rule out SARS-COV 2 or who had been vaccinated	Reactions in Unvaccinated and Vaccinated Patients	Adverse events following facial hyaluronic acid injections were higher among patients with a history of, but not among those diagnosed with COVID-19. The new scenario related to COVID-19 infections or vaccines would require readaptation criteria for the application of hyaluronic acid injections
Lopes et al. (2023)	This article reviews the pathophysiological mechanisms and symptomatology of dermal filler RITs associated with COVID-19 infection. At the same time, an analysis is	Reactions to fillers in times of COVID-19	RITs secondary to HA dermal fillers are classified according to the time of onset: early, from 14 days to one year after filling, or late, when they appear more

	made of the most frequent alterations of dermal fillers described secondary to vaccination campaigns, as well as their diagnosis and treatment		than one year after the procedure
Michel (2023)	The purpose of the study was to determine whether delayed-fill granulomas are more common after the onset of the COVID-19 pandemic	Presence of granulomas in patients with filler	Granuloma formation is a rare complication of hyaluronic acid injection that appears to be occurring more frequently in the wake of the COVID-19 pandemic. Practitioners administering dermal fillers should be aware of this complication and its apparent increased incidence
Michon (2021)	A 39-year-old woman who previously had her tear area treated with soft tissue filler with hyaluronic acid developed swelling days after receiving the Pfizer-BioNTech mRNA COVID-19 vaccine	Edema after vaccination	The late-type inflammatory reactions observed in this case report are likely to be immunologically related to the interaction of incoming COVID-19 mRNA vaccine and HA soft tissue fillers
Munavalli et al. (2022)	4 cases with clinical histories of inflammatory reactions at the filling site	Inflammatory reactions at the filling site	The interaction of the Spike protein with dermal ACE2 receptors favors a pro-inflammatory locoregional TH1 cascade, promoting a CD8+T cell-mediated reaction to incipient granulomas, which have previously formed around residual HA particles.
Naouri (2023)	Research on the relationship between facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers) as well as the development of	Inflammatory reactions	The frequencies of complications linked to facial aesthetic procedures may be high due to the increased rate of vaccination and also of infection in the population

	inflammatory reactions in patients infected with SARS-CoV-2 or after vaccination		
Nestor et al. (2020)	Study of the protective effect of botulinum toxin type, where the authors highlighted the benefit of maintaining care with one's appearance in times of pandemic. Procedure in which it provides benefits to the patient even with the use of the mask, since the medication is used in the upper use of the face	Protective effect	The authors concluded in their research that the application of botulinum toxin is indeed a positive solution to reduce negative emotions and promote the well-being of the individual
Ortigosa et al. (2022)	5 cases describing delayed reactions in patients undergoing facial rejuvenation treatments and vaccinated against COVID-19	Late Adverse Events	All case reports showed a hypersensitivity reaction to HA dermal filler more than 24 hours after vaccination for COVID-19, characterized by a delayed hypersensitivity or type IV reaction, a cell-mediated hypersensitivity triggered by T lymphocytes
Owczarczyk-Saczonek et al. (2021)	Risk of late-onset immune-mediated adverse reactions related to dermal fillers in patients carrying HLA-B*08 and DR1*03 haplotypes. This combination of HLA subtypes has been linked to a nearly four-fold increase in the likelihood of developing adverse reactions	Immune-mediated adverse reactions	After regression of inflammation and elimination of the remnants of tissues injured by macrophages, the LMW-HA molecules are removed via CD44-dependent endocytosis.
Pajo et al. (2021)	The effects of COVID-19 violate not only the realm of public health, but also psychosocial interaction and	Psychosocial interaction	Botulinum toxin can offer a positive solution to decrease negative emotions and promote well-being for both the

	communication, particularly with the advent of mask-wearing		mask wearer and everyone who comes into contact with that individual.
Roncati et.al. (2020)	Severe Acute Respiratory Syndrome (SARS-CoV-2), the etiological agent of the disease, triggers a T-helper immune response	Immune response	Illustration of the immune mechanism to train the immune system for a more effective and less symptomatic T-helper 1 immune response, to be explored against SARS-CoV-2.
Rowland-Warmann et al. (2021)	Case report on delayed-type hypersensitivity after hyaluronic acid dermal filler treatment of the nose and subsequent SARS-CoV-2 infection	Hypersensitivity reaction in hyaluronic acid filler in the nose region	The incidence of hypersensitivity reactions to hyaluronic acid dermal fillers is between 0.3 and 4.25%, mediated by T lymphocytes.
Sapphir et al. (2022)	Delayed inflammatory reactions (DIRs) to hyaluronic acid-based dermal fillers following COVID-19 vaccination have been reported in a few anecdotal reports and in small case series	Delayed inflammatory reactions	The delayed inflammatory reaction associated with BNT162b2 vaccination is rare and tends to resolve spontaneously or with short-term medical intervention
Savva et al. (2021)	Case study of a 38-year-old female patient with a confirmed hypersensitivity reaction after administration of BNT162b2 vaccine (Pfizer, USA)	Hypersensitivity reaction	Dermal fillers have a very low risk profile, with side effects that include local and transient bruising and edema. They are non-allergenic, non-carcinogenic, and generally represent a stable and cost-effective choice for the patient

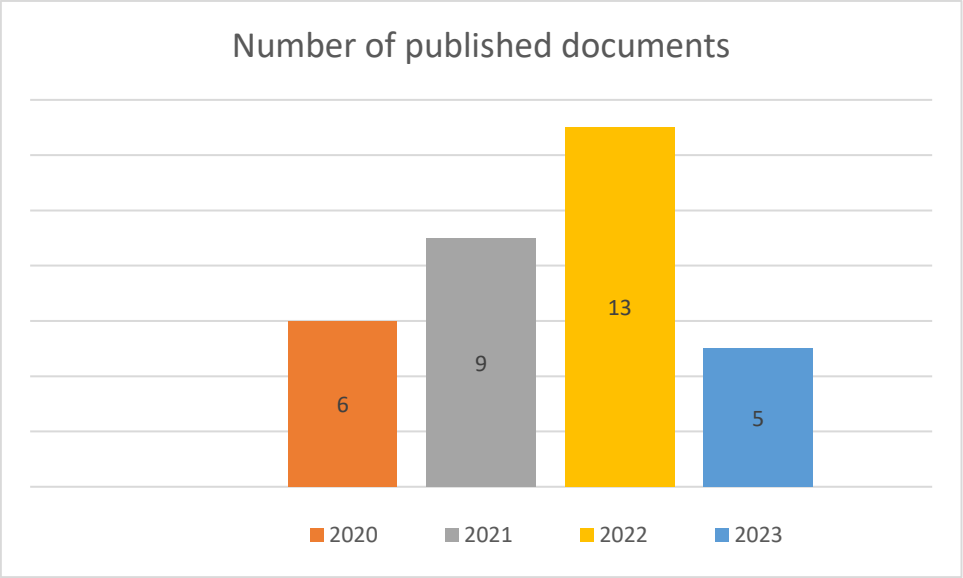
Shome et al. (2021)	Clinical case of a 32-year-old woman treated at The Esthetic Clinics, Mumbai, in February 2020 for facial rejuvenation. She was rejuvenated by using dermal fillers in various locations on her face	PITT (Delayed Intermittent Edema)	The exact etiology of the delayed reaction in relation to HA fillers and influenza virus/COVID-19 antibody infection remains incompletely understood and needs further research and discussion. This will certainly help in the future management of reported cases
Tarantino et al. (2021)	The COVID-19 pandemic has had a negative effect on the care of patients with neurological conditions, as it is well known that all chronic neurological conditions require regular and accurate follow-up	Neurological conditions	The importance of BT therapy to treat these patients and the need to administer it regularly and without major interruptions are essential in order not to lose its clinical benefits, so any type of suspension or delay in treatment should be absolutely avoided
Zhang (2020)	Aim to investigate clinical and coagulation features in patients with Coronavirus 2019 (COVID-19) critical illness and acro-ischemia.	Coagulation	Coagulation parameters should be closely monitored in critically ill COVID-2019 patients. The timing and protocol of anticoagulant therapy are still under investigation based on more clinical data

Source: Prepared by the author (2023).

In the studies presented, the inflammatory reactions at the filling site are highlighted; pain, edema, pruritus, bruising, and hypersensitivity were the adverse reactions most reported by the authors.

The number of papers published per year is shown in graph 1 below.

Figure 1: Number of publications per year

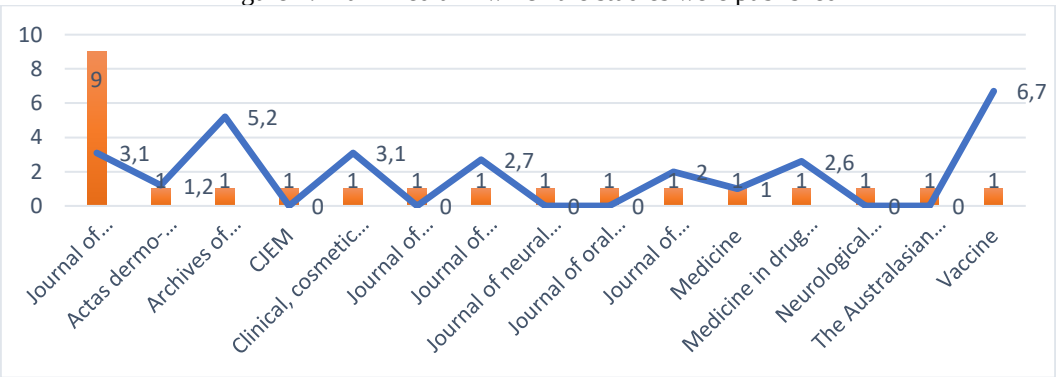


Source: Prepared by the author (2023).

According to the inclusion/exclusion criteria of the works in the sample of this research, the works referring to the period from 2019 to 2023 were selected. In 2019, no publication was found referring to the theme studied in this research, given that it may be related to the beginning of the emergence of cases of the disease related to the Sars-Cov-2 virus. It can be observed that the largest number of publications takes place in the years 2021 and 2022, portraying the important development in the research area, even considering the novelty of the theme. The year 2023 presents the continuity of interest in the theme addressed.

Regarding the main media in which these studies were published, Graph 2 presents the synthesized information, including the value of the *Journal Citation Report* (JCR) of the journals.

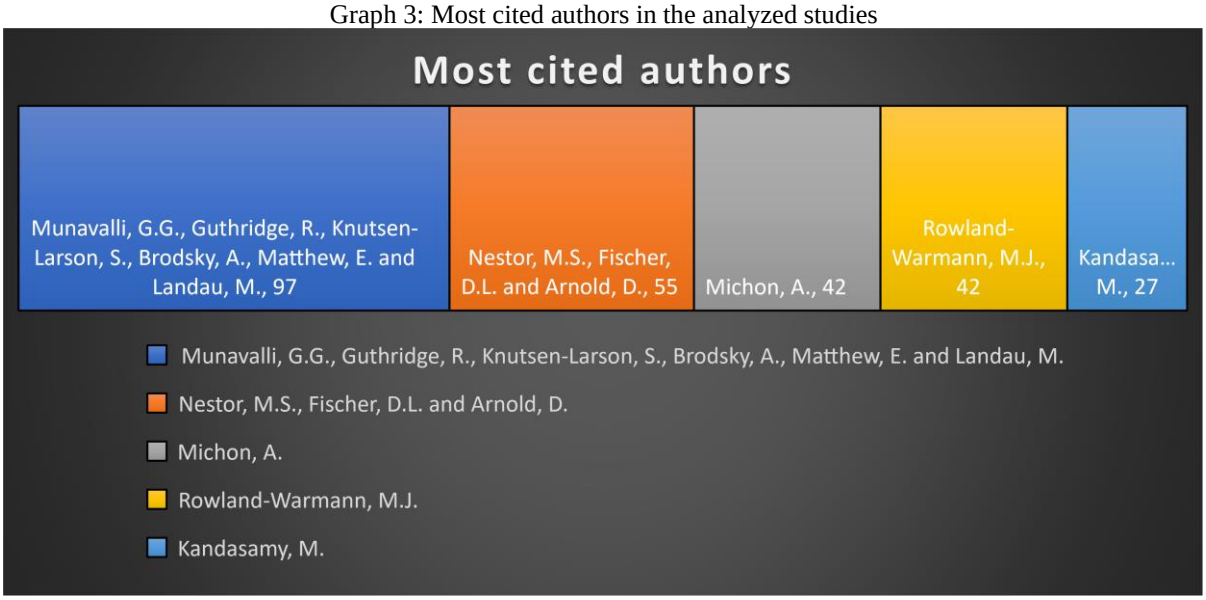
Figure 2: Main media in which the studies were published



Source: Prepared by the author (2023).

The other research question that guided the development of the study was "which works were most cited by the body of literature evaluated"? Graph 3 shows the grouping of the five most cited authors in the studies analyzed.

Graph 3: Most cited authors in the analyzed studies



Source: Prepared by the author (2023).

3.2 ADVERSE EVENTS OF THE VACCINE AND THE SARS-COV 2 VIRUS IN PATIENTS WITH FACIAL AESTHETIC PROCEDURES (BOTULINUM TOXIN TYPE A AND HYALURONIC ACID FILLERS)

According to the criteria established for this systematic review, 33 articles were included in the research that address the possible reactions caused in patients with hyaluronic acid fillers and patients who use botulinum toxin, whether for aesthetic purposes or not, in the face of the Covid-19 vaccine or even Covid-19 infection.

The following text presents the synthesis of the research of the articles addressed in the systematic literature review.

Facial rejuvenation or shaping with hyaluronic acid (HA) and botulinum toxin have been on the rise recently due to their results and safety. However, several factors have been identified that can also increase the incidence of side effects, such as skin infections or inflammation, systemic diseases, viral diseases, and metabolic or coagulation disorders, among other conditions. Different causes may be responsible for delayed inflammatory reactions after hyaluronic acid and botulinum toxin injections, including several mechanisms of SARS-CoV-2 (Lopes, et al., 2023). For the authors Lopes, et al. (2023), several studies have shown a relationship between the patient's inflammatory and immunological status and the development of dermatological changes.

Munavalli et al. (2022), reported cases of immediate side effects to HA fillers. In the study, the authors presented cases of reaction after the administration of the first dose of the mRNA-1273 vaccine (Moderna, Cambridge, MA); another case, after administration of the BNT162b2 vaccine (Pfizer, New York, NY). According to the authors, Munavalli et al. (2022), inflammatory reactions in patients with hyaluronic acid filler may also have been triggered due to the COVID-19 spike protein. This protein

generates a pro-inflammatory response in the localization of dermal fillers by blocking one of the pathways, in the case of cutaneous inhibitory ACE2.

Savva et al. (2021) also published the case of a 38-year-old patient, with no history of allergy, who had been injected with HA on the lips and had a moderate adverse reaction after vaccination with the Pfizer vaccine. Michon (2021), published two cases of women aged 39 and 61 years who developed a late AS after vaccination with the Pfizer-BioNTech mRNA vaccine. Michon (2021), in his article, also points out that delayed inflammatory reactions in patients who have dermal fillers are self-limiting, with frequent spontaneous resolution. However, considering the worldwide demand for vaccines against Covid-19, professionals working in the field of aesthetics should be aware of the risks presented by the interaction of such vaccines in patients who have already undergone aesthetic procedures or who will undergo them.

Ortigosa et al. (2022) published five cases describing delayed reactions in patients undergoing facial rejuvenation treatments and vaccinated against COVID-19; three of them with the Pfizer-BioNTech mRNA vaccine and two with the AstraZeneca vaccine. The authors reported late adverse events after SARS-CoV infection, such as those seen after COVID-19 vaccination.

Rowland-Warmann et al. (2021) reported the case of a 22-year-old female patient, with no history of allergies, who underwent non-surgical rhinoplasty with hypertension and subsequently developed moderate symptoms compatible with SARS-CoV-2 infection. Three weeks later, the patient developed an adverse reaction with edema, hardening, erythema, moderate tenderness, and tightness in the radix area. The authors add in their case report that they realized that these reactions triggered by hypersensitivity to hyaluronic acid dermal fillers are between 0.3 and 4.25% mediated by T lymphocytes, that flu-like illnesses can trigger immunogenic reactions at the site of filler placement (Rowland-Warmann et al., 2021)tag.

Shome et al. (2021) published the case of a patient with no history of AEs undergoing treatment with HA who contracted COVID-19 9 months after facial rejuvenation treatment with HA and who developed AS 1 month after infection (at 10 months of treatment) in the treated area. Calvisi (2022), contributes by stating that these reactions are self-limiting and that even the reinforcement of vaccination can cause these symptoms.

Owczarczyk-Saczonek et al. (2021), point out that the occurrence of unpredictable reactions to hyaluronic acid indicates that they cannot be treated as neutral or non-allergenic. According to the authors Safir et al. (2022), the volume of filler used may be associated with greater severity of reactions, however, reactions are rare and tend to resolve spontaneously or with short-term intervention.

Beamish et al. (2022), highlighted the importance of the growing number of cases suggesting that delayed inflammatory reactions to fillers may occur after vaccination, more specifically to mRNA

Covid-19 vaccines. However, the overall risk of these delayed inflammatory reactions in response to the vaccine is probably very low. However, they can result in adverse events and complications for patients.

Kalantari et al. (2022), analyzed through a systematic literature review 13 cases of patients who developed a reaction after vaccination against Covid-19, with no known history of allergy to food or medications. All selected patients had hyaluronic acid fillers and demonstrated symptoms of swelling from 1 day to 10 days after the first or second dose of the vaccine. And, although it is rare to happen, injecting professionals should be aware of this phenomenon. The application of hyaluronidase and administration of corticosteroids had good results in the treatment of adverse events.

Two cases of subacute hypersensitivity reactions to botulinum toxin after Covid-19 vaccination were reported in the article by Guo et al. (2021). The two main concerns of the reported cases were the previous vaccination to Covid-19 and the subacute progressive manifestation of allergic reaction that was different from the anaphylaxis that the authors previously reported in the patients in the study. Naouri et al. (2022) mention that the frequencies of these complications may be high due to the increase in the vaccination rate and also the rate of infection in the population.

The authors Nestor et al. (2020), in their research, addressed the protective effect of botulinum toxin type A and highlighted the benefit of maintaining care with one's appearance in times of pandemic. Procedure in which it provides benefits to the patient even with the use of the mask, since the medication is used in the upper use of the face. The authors concluded in their research that the application of botulinum toxin is indeed a positive solution to reduce negative emotions and promote the well-being of the individual. Batifol et al. (2022), in their published work reported that botulinum neurotoxin type A is known to block acetylcholine as well as other neuroreceptors and neuromodulators. The study was due to a potential protective effect of botulinum toxin against Covid-19, this is due to the fact that acetylcholine is blocked.

Bono et al. (2021) state that it is necessary to follow the instructions of good practices and safety regarding aesthetic procedures. These, when followed, make the procedures safe for the patient and the professional. In addition, new knowledge about SARS-COV-2 infection may lead to changes in the rules of good practice. The authors stress the importance of recommended intervals after vaccination or illness, a period in which the immune system undergoes repairs.

In the studies by Aryanian et al. (2022), the therapeutic forms of botulinum toxin type A applications can be considered as a potent treatment against Covid-19, however, high precautionary measures should be taken. Another article by Dresler and Saberi (2020) is also based on this same theme and states that botulinum toxin type A applications are important in times of Covid-19, as a protective effect, as they rescue the self-esteem of the individual who receives the application.

The authors Tarantino et al. (2021), and Goodman et al. (2020), reported the importance of continuing the application of botulinum toxin type A during the pandemic in patients who need follow-up in neurological conditions, as it is known that all neurological conditions require regular and accurate follow-up. Therefore, any type of suspension or delay in botulinum toxin treatment should be avoided.

From the systematic review, it was possible to observe that cases of adverse events and also of the influence of the vaccine with facial aesthetic procedures (botulinum toxin type A and hyaluronic acid fillers) are reported, where the authors present the main implications arising from these processes: hypersensitivity reactions, reduced efficacy, inflammatory processes, triggered by vaccination or Covid-19 disease.

Immediate or early-onset adverse reactions (occurring up to several days after treatment) include injection site reactions such as pain, oedema, erythema, pruritus, bruising, infection, hypersensitivity, nodules, asymmetry, facial contour defects, skin discolouration, side effects, and tissue necrosis (Hamed et al., 2022). Case reports of late adverse reactions (occurring weeks or even years after treatment) in addition to edema, nodules, pain, and infection have also been observed, including foreign body granuloma, migration, infection, immune reactions, persistent scarring, accumulated discoloration, and skin affectation (Kato et al., 2022).

Finally, there were some research findings where the authors reported the importance of the use and continuity of botulinum toxin type A in times of pandemic, considering the action of the aesthetic procedure beneficial for self-esteem; there are also studies where they consider botulinum toxin type A as a potent treatment against Covid-19, in neurological cases and, other researches, where they presented the case of the action of botulinum neurotoxin type A acting on the blockade of acetylcholine, as well as other neuroreceptors and neuromodulators

4 FINAL THOUGHTS

SARS-CoV-2 infection and associated vaccines have given rise to several dermatological reactions in individuals previously undergoing aesthetic procedures or aesthetic interventions. It is observed from the cases presented in this review that adverse reactions in relation to soft tissue filling occur after SARS-CoV-2 infection or vaccination. The relationship between these factors seems to be possible, as they occur within a few hours up to several weeks after an infection or vaccination. The underlying mechanism includes the immune response to the viral spike protein and the resulting skin reactions.

However, to avoid these complications, some recommendations can be made: first, advise pre-vaccination in patients who want to perform aesthetic procedures. Subsequently, before the procedure, patients should be asked about allergies, medications to obtain a patient history and avoid possible

adverse events related to botulinum toxin filling or application. A 2- to 4-week window between filler and botulinum toxin injections with vaccination in general and two months longer for immunocompromised patients (i.e., patients on immunosuppressive medications, chemotherapy, or immune disorders) should also be considered. In cases of residual complaints, studies have shown that hyaluronidase can be effective. Although not all studies report on the type of filler used, those that do report mention AH as the largest filler injected in these patients. If patients seek filler treatments in the months prior to vaccination, other filler options (e.g., calcium hydroxyapatite, poly-L-lactic acid, or laser resurfacing) may be prioritized. These recommendations are for HA fillers, since these fillers are the most used worldwide in most aesthetic clinics.

Lastly, the risk of becoming infected with SARS-CoV-2 outweighs the risk of developing adverse events related to botulinum toxin type A filler and reduced efficacy. Currently, the only option to reduce the number of infections and deaths is through global SARS-CoV-2 vaccination programs. Therefore, patients with fillers are advised to participate in current vaccination programs, as complications related to fillers seem to be extremely rare and SARS-CoV-2 infections are of great risk, and may lead to future sequelae.

It is suggested for future research to deepen knowledge regarding vaccination and the disease in the face of the immune system's response in injectable aesthetic procedures, since the number of aesthetic procedures performed in the world is increasing.

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SEVEN publicações acadêmicas

Study on the toxicological effect of synthetic marijuana, it's compounds and derivatives in society

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Aldryelle de Souza Barbosa
UniFBV University Center, Brazil
E-mail: dryellebarbosa@hotmail.com
ORCID: https://orcid.org/0009-0002-7665-9680

Salatiel Henrique Pereira de Lima
UniFBV University Center, Brazil
E-mail: salatielhenrique@hotmail.com
ORCID: https://orcid.org/0000-0001-9876-0398

Bianca Sheila Conceição de Andrade
UniFBV University Center, Brazil
E-mail: biandrads@hotmail.com
ORCID: https://orcid.org/0009-0002-8256-9462

Sammuel Welton Eloy Salles
UniFBV University Center, Brazil
E-mail: s.salles07@hotmail.com
ORCID: https://orcid.org/0000-0003-0800-9897

Liliane Bezerra de Lima
UniFBV University Center, Brazil
E-mail: liliane.lima@unifbv.edu.br
ORCID: https://orcid.org/0000-0002-7153-1517

ABSTRACT
In Brazil, there was a more than significant increase in the use and commercialization of synthetic marijuana over an average of 5 years. Also known as "K2", "K9" or "Spice", it's a chemical substance that simulates the effects of Cannabis Sativa, but is produced in the laboratory and may contain different chemical compounds. The reason for it's increase has been mainly due to its relatively low price and the lack of traditional drug tests, making it attractive to vulnerable groups such as the poor, people below the poverty line, children and adolescents who see the opportunity to enter the world of drugs. In this way, the work seeks to elucidate the toxicology of synthetic marijuana and its dangers for human use, focusing on possible compounds and their consequences.

Keywords: Cannabis sativa, Spice, K2, Toxicology.

1 INTRODUCTION

Cannabis sativa has pharmacological importance due to its therapeutic potential and its effects within toxicology (MLOST, BRYK & STAROWICZ, 2020). This exposed the plant as a therapeutic compound for pain, anxiety, and depression (GILMAN, SCHISTER, POTTER, SCHMITT, WHEELER, PACHAS & EVINS, 2022).

In the years between 2000 and 2008, synthetic derivatives of *Cannabis sativa appeared* in Europe and the United States . As of July 2012, synthetics have been considered phytocannabinoids through their chemical structures, inhibition constant (Ki) and major discoveries by the *Drug Enforcement Administration* (DEA). In its commercialization, it is common to come across a mixture of herbs, commonly known as "*Spice*" or "K2", as a consequence of its rapid growth as a drug of abuse, it was banned in 2010 (BUKKE, ARCHANA, VILLANI, SERVIDDIO & CASSANO, 2021).

Spice or K2 contains a combination of several types of highly potent synthetic cannabinoid agonists, as well as other psychoactive components, many of which are unknown. Its effects are similar to those of cannabis, usually causing relaxation, euphoria, perceptual disturbances, and changes in cognitive abilities, however, the adverse effects are more intense and long-lasting than those of natural cannabis that range from nausea to symptoms such as psychomotor agitation, sweating, palpitations (COHEN, MAMA, ROSCA, PINHASOV & WEINSTEIN, 2020).

Due to the lack of any qualitative report of the substances, all K and Spice drugs are classified as synthetic cannabinoids. In recent years, there has been a considerable increase in the use of synthetic drugs, with the percentage of consumption that was previously approximately 5% tripling to 15%, showing that the use and trafficking of these substances are not future trends, but rather a present reality that is intensifying in a worrying way, mainly affecting the young, poor and vulnerable population (PAIVA & BRANCO, 2023).

In order to clarify information and aggregate facts, this project was conceived and developed, seeking to raise through an analysis of synthetic marijuana, its derivatives and compounds, evaluating its harmful effects on the human body and understanding the implications of its use.

2 METHODOLOGY

This is a bibliographic and observational review, which used research and studies related to the toxicology involved in the use of synthetic marijuana, popularly known as Spice/K2, which is in emergency in Brazil, compromising health from children to adults. Such data were extracted through scientific publications found on the PUBMED and Google Scholar article search platforms, news in online newspapers and disclosures (initially used as information consultation) from the National Health Surveillance Agency and the World Health Organization.

As an inclusion criterion, we used current articles, in the period from 2019 to 2023, in English and Portuguese, which portrayed the proposal of the chosen theme, found through the descriptors "Cannabis sativa", Spice/K2 and Toxicology. As exclusion, articles that did not have the descriptors, predecessors to 2019 and unrelated to the theme were excluded.

In order to select the articles found, a previous analysis of the titles was carried out, to which they were related, the abstracts were also analyzed and, after the application of the inclusion and exclusion criteria, the full reading of the works was carried out to choose the articles with greater affinity to the theme.

In total, 90 articles were found in the searches with the descriptors, however, after the criteria described above, only 8 articles were chosen to start this project.

3 THEORETICAL FRAMEWORK

3.1 *CANNABIS SATIVA*

The medicinal virtues of Cannabis Sativa were first documented in the pharmacology textbook Materia Medica by Greek and Roman physicians in the first century A.D. However, a more accurate description of the physiological effects was recorded by ancient Asian writers (BUKKE ET AL., 2021).

The Cannabis Sativa plant contains more than 100 types of phytocannabinoids, chemical compounds capable of interacting with the cannabinoid receptors present in our bodies, they are best known and predominant are tetrahydrocannabinol (THC) and cannabidiol (CBD). THC is found in the largest amount and it is responsible for its popular psychoactive effects, such as euphoria, dizziness, impaired coordination and recent memory, however, it also has benefits in controlling pain, nausea, anxiety, insomnia, anorexia and spasticity. CBD has antiepileptic, analgesic, anxiolytic and sedative properties, with less pronounced psychoactive effects. Both phytocannabinoids have anti-inflammatory effects, and the effect is enhanced when THC and CBD act together (CHAVES, BITTENCOURT & PELGRINI, 2020).

Subsequently, THC has been the subject of studies related to its pharmacology, toxicity and therapeutic potential as cannabinoids, research has resulted in the discovery of an entire endocannabinoid system. Unlike CBD, which has been a difficult substance to study and understand, as it does not have the typical behavioral effects of cannabis, it is believed that it is not responsible for psychotropic effects (MLOST, BRYK & STAROWICZ, 2020).

3.2 SYNTHETIC MARIJUANA

Synthetic cannabinoids are an emerging class of psychoactive substances that have propagated globally through structural alterations of existing molecules, generating new analogues with potentially serious adverse health effects. They represent the predominant category of drugs identified by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), with 207 substances identified as of October 2020. Acting as total agonists on receptors confers a much greater potency than natural cannabis, which has led to acute and chronic intoxication, including deaths (BUKKE ET AL., 2021).

These products can also be identified as herbal or liquid incense, mimicking the effects of marijuana by acting on the same synthetic receptors as THC, the psychoactive component of marijuana. Although they are labeled as "not for human consumption," these products are often smoked, resulting in a marijuana-like feeling of euphoria along with other effects. They are marketed as "legal" and "safe" alternatives, but they are dangerous and can affect the brain more intensely than marijuana itself, with variable and, in some cases, fatal effects (BASAVARAJAPPA & SUBBANNA, 2019).

3.3 EPIDEMIOLOGY IN BRAZIL

During an extensive scan of several databases of the Toxicological Information Centers across the country, in the period from 2010 to 2019, no records of notifications related to poisoning by synthetic cannabinoids, such as Spice and other similar substances, were found. Of the centers that responded, some reported that they did not have data on notifications of poisoning by synthetic cannabinoids, however, the Belo Horizonte center stressed that the absence of registration does not necessarily mean the non-existence of cases, but rather that these cases may not have been identified by the patients or professionals who performed the care. In addition, other databases, such as the SUS Department of Informatics (DATASUS) and the Oswaldo Cruz Foundation (Fiocruz), also did not present notifications or epidemiological data related to any type of drug (SILVA & MOURA, 2022).

Synthetic marijuana has spread throughout Brazil, especially in the city of São Paulo, expanding its presence in relation to traditional drugs. In the last five years, there has been a significant increase in the seizure of these substances, which now accounts for 15% of seizures, previously the number of seizures was 5%. Drugs are predominantly impacting poor and vulnerable young people, representing a worrying and accelerated presence in the epidemiological context of K drugs (G1, 2023).

4 FINAL THOUGHTS

There is a complexity of the therapeutic and psychoactive properties *of Cannabis Sativa*, mainly through its main components, THC and CBD, has aroused a growing interest in the scientific community as alternative routes for the treatment of diseases because it has a high therapeutic potential in a variety of medical conditions. The emergence of the "K drug" has proven to be a serious threat to public health, the substance that is marketed as a "safe" and cheap alternative to marijuana, has demonstrated a toxcicological potential and adverse effects incomparable to the natural plant, leading to worrying consequences, including cases of acute and chronic intoxication.

Although the study is about its incidence, because its chemical composition is extremely variable, the "K drug" makes it highly dangerous, especially among young and more vulnerable people, thus highlighting the urgent need for regulation and public education to try to mitigate as much as possible the damage associated with its increasing consumption.

The present study exposed that the imminent public health crisis raises issues such as the need for further studies and research involving the subject, in order to obtain solutions, as well as the promotion of discussion among young people, who are the main risk group.

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SEVEN
publicações acadêmicas

What does the Brazilian Unified Health System offer in terms of care technologies for people with Autism Spectrum Disorder?

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Emanuela Machado Silva Saraiva
Doctoral student in Clinical Nursing and Health Care
State University of Ceará
E-mail: emanuela.machado@aluno.uece.br

Ana Raquel Bezerra Saraiva Tavares
PhD in Clinical Care in Nursing and Health
University of Pernambuco
E-mail: raquel.tavares@aluno.uece.br

Vanusa Maria Gomes Napoleão Silva
Doctoral student in Clinical Care in Nursing and Health
State University of Ceará
E-mail: vanusa.napoleao@aluno.uece.br

Maria Solange Nogueira dos Santos
Doctoral student in Clinical Care in Nursing and Health
State University of Ceará
E-mail: solange.nogueira@aluno.uece.br

Maria Isabel Ribeiro de Andrade Maia
Specialist in Nutrition from Preconception to Adolescence
Cruzeiro do Sul University
E-mail: isabelmaianutricionista@gmail.com

Gislei Frota Aragão
PhD in Pharmacology
State University of Ceará
E-mail: gislei.frota@uece.br

Edna Maria Camelo Chaves
PhD in Pharmacology
State University of Ceará
E-mail: edna.chaves@uece.br

ABSTRACT
Autism spectrum disorder is a neurodevelopmental disorder characterized by impairment in communication and social interaction and behavioral problems, such as repetitive behaviors and restricted patterns of interest. The treatment of people with autism should be based on the implementation of multidisciplinary strategies that aim to prevent and intervene early in behavioral excesses and deficits through rehabilitation therapies that should be directed according to the needs of each person. Within the scope of the Unified Health System, the document entitled Line of care for the care of people with autism spectrum disorders and their families in the Psychosocial Care Network of the Unified Health System, lists 07 (seven) technologies aimed at the care of these individuals. It is possible that health professionals will find it difficult to apply the proposed technologies, as well as the availability of these technologies will be limited, requiring the government to develop and implement public policies that guarantee the necessary infrastructure for the best possible care for people with autism spectrum disorder and their families.

Keywords: Rehabilitation, Unified Health System, Health Technology, Autism Spectrum Disorder.

1 INTRODUCTION

Autism or autism spectrum disorder (ASD), a term used in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) and in the WHO International Classification of Diseases, 11th revision (ICD-11), is a highly heritable and heterogeneous neurodevelopmental disorder (FERNANDES; TOMAZELLI; GIRIANELLI, 2020; LORD et al., 2020) *characterized by impairment in communication and social interaction and behavioral problems, such as repetitive behaviors and restricted patterns of interest (LORD* et al.,

2018). The term heterogeneous describes the diversity of ways in which autism manifests among different people who have the condition and in the individual themselves throughout life (LORD *et al*., 2020).

In view of this heterogeneity, the treatment of people with ASD should enable them to participate actively and independently in the activities presented to them (BRASIL, 2014), and should be based on the implementation of multidisciplinary strategies that aim to prevent and intervene early in behavioral excesses and deficits through rehabilitation therapies that should be directed according to the needs of each person. The main goals of treatment are to improve social functioning and communication skills and reduce negative and non-functional behaviors and thus contribute significantly to the quality of life of people with ASD and their family members/caregivers (JANG *et al*., 2011).

In the context of the Unified Health System (SUS), there is a national document entitled *Line of care for people with autism spectrum disorders and their families in the Psychosocial Care Network of the Unified Health System* (BRASIL, 2015), published by the Ministry of Health in 2015, is aimed at managers and professionals of the Psychosocial Care Network (RAPS) and aims to contribute to the expansion of access and qualification of care for people with Autism Spectrum Disorders (ASD) and their families.

This document bases the care of people with ASD on the concept of comprehensiveness, recognizing this subject as an integral and singular being, as well as the indispensability of organizing the care network to meet the multiplicity of demands of this subject. The text also categorically states that a fragmented view of the subjects and a segmentation of actions and services cause consequences such as segregation and exclusion of these.

It is evident that there is a need to provide care to people with ASD through a multi- and interdisciplinary team, considering that this care should be extended to the individual's family. On the other hand, the construction of a singular therapeutic project (PTS) is an important strategy to be implemented (DA ROCHA et al, 2017), and should be built with the family and the person himself, as well as involving a multidisciplinary team and be open to propositions that will improve the subject's quality of life (BRASIL, 2015).

Referring to the document of the Line of Care for people with ASD, some care technologies are presented, however, it highlights that "there is no single approach to be privileged in the care of people with autism spectrum disorders. It is recommended that the choice between the various existing approaches consider their effectiveness and safety and be made according to the uniqueness of each case." Below we will present the 07 (seven) technologies listed in the document, as well as some considerations.

The psychoanalytically-based clinical treatment considers the singularity of the subject, how he relates to the environment, what his interests are, seeking to enhance the conditions to relate to others, since in ASD social interaction is impaired (BRASIL, 2015). Since the last decade, studies have demonstrated the increase in symbolic capacity and the emergence of symbolic play in patients' activities as a sign of positive evolution resulting from the psychoanalytic therapeutic process (WAJNTAL, 2013; KAUFFMAN, 2014; LEIRAS, BATISTELLI, 2014; SILVA, 2014).

Applied Behavioral Analysis (ABA) consists of analytical-behavioral interventions that contribute to the autonomy of people with ASD in the execution of routine activities, in addition to reducing non-adaptive behaviors, such as stereotypies (BRASIL, 2015). Especially in the school environment, an ABA-based intervention aims to promote and expand socially important behaviors and reduce disruptive behaviors, such as inappropriate stereotypies, inflexibility and attachment to routines, aggression, self-aggression (CAMARGO; RISPOLI, 2013; DUARTE; SILVA; VELLOSO, 2018).

Supplementary and Alternative Communication (CSA) consist of devices, methods or systems used to complement speech or for communication itself when there is no speech development on the part of the child with ASD, including sign and gesture language and the use of symbols and figures. This technology has the potential to improve communication, language, and literacy for children with complex communication needs (ANDZIK, SCHAEFER, NICHOLS, and CHUNG, 2018). This fact was observed in the studies by Bondy and Frost (1994), who developed the training protocol called Picture Exchange Communication System (PECS), where 76% of children with ASD who used this protocol began to use speech concomitantly.

Sensory Integration aims to qualify occupational performance in daily activities in children with ASD who present impairment due to sensory processing disorders. The occupational therapist uses this technology to increase the repertoire of adaptive responses and reduce high levels of activity in children with ASD (BRASIL, 2015), since in the disorder there is a loss in the processing of sensory flows and the adaptive responses of the subjects (CASE-SMITH and O'BRIEN, 2010) in the face of stimuli from the visual, olfactory, gustatory, tactile, auditory, vestibular and proprioceptive.

The Treatment and Education for Children with Autism Spectrum Disorder (TEACCH) will support the development of the child with ASD to achieve the greatest possible autonomy in adulthood. The goal is to achieve independence through education, so the learning environment should visually expose the routine or activities in a clear way, using materials appropriate to the child with ASD. This technology highlights the essentiality of the articulation between health and school (BRASIL, 2015).

Therapeutic Accompaniment (TA) is considered an expansion of the form of care, expanding the autonomy of these subjects and promoting social reintegration (BRASIL, 2015). According to Bertazzo (2014), the professional who acts as a therapeutic companion plays a decisive role as a

facilitator of socialization, contributing to the appropriation of the public space by the accompanied subject and seeking through the support offered his inclusion in society and his place as a citizen.

In addition to technologies aimed at behavioral interventions, the document includes drug therapy as an alternative to be considered in specific cases to treat accessory symptoms, such as aggressiveness, restlessness, motor stereotypies, among others. When it is necessary to introduce psychotropic drugs, it is essential that the prescriber discuss with the members of the care team the benefit of the medication to the detriment of the side effects that may arise. Likewise, discontinuation of medication should be carefully considered with the family. It should also be noted that medication should not be used as the only or main resource for the care of people with ASD (BRASIL, 2015).

Finally, the achievement of the proposed objectives based on the implementation of the care technologies presented follows the construction of the bond involving care professionals, people with ASD and their families. For Merhy (2002), the production of bonding is an example of relationship technology, classified by the author as light technology, which occurs through an open dialogue and a qualified listening to the subject's needs. This linkage is independent of the physical infrastructure of the health units, based on the professionals' ability to welcome, understand and intervene in the patient's desires.

In the context of the Brazilian Unified Health System, it is possible that health professionals encounter difficulties in building bonds, either due to work overload, or due to the short time of care in the face of the growing demand or even due to the lack of training to care for people with autism spectrum disorder.

In addition, the availability of the technologies presented may be limited and difficult to access, requiring the development and execution of public policies that guarantee the necessary infrastructure for the best possible assistance to people with autism spectrum disorder and their families.

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Gynecologic oncology

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Júlia Bretas Borges Lopes
Student – Barbacena School of Medicine, Minas Gerais State.

Karolayne Joyce Oliveira
Student – Barbacena School of Medicine, Minas Gerais State.

Laís de Souza Almeida
Student – Barbacena School of Medicine, Minas Gerais State.

Marcela Victoria Goulart Melo de Oliveira
Student – Barbacena School of Medicine, Minas Gerais State.

ABSTRACT
Cancer is the main public health problem in the world, being one of the main causes of death and, therefore, one of the main barriers to increasing the life expectancy of women worldwide. In most countries, it is the first or second leading cause of premature death before the age of 70 in females. The impact of cancer incidence is rapidly increasing on the world stage, even with the increased information that social media makes available (SUNG et al., 2021).

Keywords: Gynecologic, Cancer, Health.

1 INTRODUCTION

Cancer is the main public health problem in the world, being one of the main causes of death and, therefore, one of the main barriers to increasing the life expectancy of women worldwide. In most countries, it is the first or second leading cause of premature death before the age of 70 in females. The impact of cancer incidence is rapidly increasing on the world stage, even with the increased information that social media makes available (SUNG *et al*., 2021).

Gynecological cancer has been one of the most serious threats to women's lives, as it has a high incidence in Brazil and is one of the most relevant causes of death in the world. Cancer triggers devastating reactions both in the physical-biological and emotional spheres, causing feelings, imbalances and internal conflicts in the patient and everyone around her. In other words, cancer has a strong impact on the psychological and emotional aspects of affected patients (SILVA, 2019).

Gynecological oncology comprises the area of expertise specialized in the approach of pelvic tumors. Malignant tumors can originate in the ovaries, fallopian tubes, peritoneum (membrane that covers the pelvic and abdominal organs), uterus (uterine body, endometrium, and cervix), vagina, and vulva. Although access to preventive screening has increased and become more accessible, it has not been enough to reduce the trend of female mortality. The diagnosis, when not made previously, can bring several future complications to the patient. In this context, it is essential to develop actions that

articulate the spaces for promotion, prevention, and care, aimed at the recovery and maintenance of the health of individuals with information about this disease (ANTURI, 2020).

Thus, the main objective of this study was to show the importance of gynecological oncology in the treatment of cancer of the female reproductive system. Thus, also showing the fundamental role of the gynecological oncologist in the early treatment of malignant pelvic tumors.

The present study is an integrative literature review, carried out in July and completed in August 2023, through searches in the online databases: Google Scholar, Scielo and PubMed. The following descriptors were used: Cancer, Health and Prevention. From this search, 15 articles were found, which were later submitted to the selection criteria.

The inclusion criteria were: articles in English and Portuguese; published in the period from 2018 to 2023 and that addressed the themes proposed for this research, studies of the type (review, meta-analysis), made available in full. The exclusion criteria were: duplicate articles, available in the form of abstracts, that did not directly address the proposal studied and that did not meet the other inclusion criteria proposed.

After the selection criteria, 11 articles remained that were submitted to thorough reading for data collection. The results were presented in a descriptive way, divided into thematic categories addressing: describe the subheadings or points that were mentioned in the discussion on the theme addressed.

Several studies on gynecologic oncology can be found in the literature. Thus, Gynecology Oncology is a recognized specialty in the United States since 1969, which has resulted in a significant improvement in outcomes in women with gynecological cancer. This professional should conduct clinical and/or surgical treatment of malignant neoplasms of the female genital tract and practice Gynecology Oncology in a multidisciplinary context. Their training should be directed to gynecological cancer, with specific knowledge about pathophysiology, tumor biology, pathology, radiotherapy, chemotherapy, and palliative care. This professional needs targeted training for the acquisition of advanced surgical skills (LOPES, 2021).

Training in Gynecology Oncology is demanding, demands time, resources, and dedication in specialized centers. New technologies are constantly being incorporated and new paradigms are being incorporated into protocols in an increasingly faster manner. The training time is much longer than the few weeks of specific training included in the medical residency programs in Obstetrics and Gynecology, which are insufficient for graduates to provide adequate care to women with gynecological cancer (MAGALHÃES *et al*., 2018).

Gynecological oncology in the treatment of cancers of the female reproductive system and brings with it specialists who have extensive training in the diagnosis and treatment of the most diverse

types of cancers that can affect women, including: ovarian cancer, uterine cancer, vaginal cancer, cervical cancer and vulvar cancer (MARTINHO *et al*., 2020).

Cervical cancer is the most frequent malignant tumor in the female pelvis, with more than 15000 cases diagnosed each year in Brazil. This is because this disease is related to infection by the human papillomavirus (HPV) that can be easily found when the patient undergoes Pap smears or more commonly called a preventive exam. This disease progresses in stages, passing through precursor lesions called CIN (cervical intraepithelial neoplasms) 1, 2 and 3. It becomes invasive only after going through these stages, which can take up to 10 years to occur. The most common symptoms of this type of cancer are recorded as bloody discharge and bleeding during sexual intercourse. Thus, the patient who has these symptoms should undergo a preventive exam, which is the most effective screening method for this type of disease (ANTURI, 2020).

Endometrial cancer is also among the most frequent cancers among women. This cancer is generated from a malignant tumor. Cure rates for this type of cancer are very high when it is diagnosed in its early stage and with proper treatment. In this type of cancer, the symptoms that may indicate that something is wrong are vaginal bleeding in women and in premenopause, which is often accompanied by thickening of the inner layer of the uterus, called the endometrium. It is important to note that the Pap smear or preventive test is not effective in preventing endometrial cancer. For this type, the most indicated for the discovery is pelvic/transvaginal ultrasonography that evaluates the thickness of the endometrium, in this way it is possible to guide the patient if she has any abnormality during the examination (MAGALHÃES *et al*., 2018).

The third cancer that most affects women is ovarian cancer, which is responsible for 6000 diagnoses in Brazil. This is the most lethal tumor in the gynecological sphere. This fact is due to an effective and more accurate screening, thus, patients diagnosed with this type of cancer only receive a diagnosis when the disease is already in its advanced stage, thus hindering the chances of successful treatment.

2 STATISTICS FROM OTHER COUNTRIES

Cervical cancer was the fourth most frequent cancer in women worldwide, with an estimated 604,000 new cases, representing 6.5% of all cancers in women. This value corresponds to an estimated risk of 13.30 cases per 100 thousand women, and the highest incidence rates were estimated for countries on the African continent (FERLAY *et al*., 2021; SUNG *et al*., 2021).

In terms of mortality in Brazil, in 2020, there were 6,627 deaths, and the crude mortality rate from cervical cancer was 6.12 deaths per 100 thousand women. The development of effective HPV vaccination and screening programs has made cervical cancer a largely preventable disease. In 2020, the World Health Organization (WHO) announced a goal to accelerate the elimination of cervical

cancer as a public health problem to reduce the incidence below the threshold of four cases per 100,000 women per year in all countries by 2030 (BRASIL, 2022).

Known cofactors associated with disease progression include human immunodeficiency virus (HIV) infection and other immunosuppressive conditions such as smoking, multiparity, and long-term use of oral contraceptives (WILD *et al*., 2020).

Currently, gynecological cervical cancer is eligible for eradication through vaccination against the most prevalent oncogenic HPV types and screening and treatment of precursor lesions. The global strategy proposed by the World Health Organization (WHO) to accelerate the elimination of the disease as a public health problem includes the following targets, which must be achieved by 2030: 90% of girls fully vaccinated against HPV by the age of 15; 70% of women undergo a high-performance screening test at age 35 and 45; and 90% of women identified with precursor lesions and cancer receiving treatment (FERLAY *et al*., 2021; SUNG *et al*., 2021).

This study indicates that the earlier gynecologic cancer treatment is started, the more effective the outcome will be. Therefore, it also made it possible to understand the importance of gynaecological oncology in these treatments. It also showed that the cancer that most affects women is cervical cancer, about 15000 diagnoses per year.

However, other cancers are also known to lead to the death of female patients, such as ovarian cancer, uterine cancer, vaginal cancer, cervical cancer, and vulvar cancer. However, with the appropriate and correct treatment at the beginning of the diagnosis, it is of paramount importance for the patient to have the best chances of cure. Thus, several medical studies prove that an untimely or clumsy approach by a professional who is not properly experienced in the area can compromise the patient's oncological safety and reduce the expectations of cure for this type of cancer.

It is concluded, then, that gynecological oncology, with its specialized approach to the treatment of cancers treated in its initial phase, the chances of cure are enormous. Currently, the search for preventive exams has increased in Brazil, thus making the detection and treatment of diseases to be detected at the beginning, there is still a portion of the.

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Carbohydrate counting and insulin therapy: A strategic association for autonomy and quality of life of patients with type 1 diabetes mellitus

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Taciana Uchôa Passos
Doctor. Resident in Internal Medicine at the Oswaldo Cruz University Hospital of the State University of Pernambuco.

Tatiana Uchôa Passos
Nutritionist. She holds a PhD in Public Health and a master's degree in public health from the State University of Ceará.

Rafaella Maria Monteiro Sampaio
Nutritionist. She holds a PhD in Public Health and a master's degree in public health from the State University of Ceará.

Fernando César Rodrigues Brito
Nutritionist. Doctor in Biotechnology and a master's degree in public health from the State University of Ceará.

ABSTRACT
Carbohydrate Counting is a nutritional strategy to determine the amount of carbohydrates contained in meals consumed by diabetic patients and must be inserted in the broad context of health care for these patients. The importance of associating Carbohydrate Counting with Insulin Therapy is emphasized and the need for health professionals involved in clinical monitoring to train these patients in the knowledge of their therapy, through educational strategies, aiming to improve their quality of life and autonomy. The association of Contagem with insulin therapy, combined with knowledge about the different glycemic responses, application methods and types of insulin and other concepts inherent to the routine care of diabetic patients, can promote greater flexibility and assertiveness in food choices.

Keywords: Carbohydrate Count, Insulin Therapy, Diabetes Mellitus.

1 INTRODUCTION

1.1 TYPE 1 DIABETES MELLITUS: DEFINITION, NUTRITIONAL THERAPY AND INSULIN THERAPY

Diabetes Mellitus (DM) is defined, at diagnosis, as a condition of sustained hyperglycemia under fasting conditions or in situations of overload, such as after the ingestion of meals or predetermined portions, per protocol, of glucose (Sociedade Brasileira de Diabetes, 2023a).

Among the most cited types of diabetes in the literature is Type 1 Diabetes Mellitus (DM1), whose diagnostic particularity is the absence of insulin production, a fact that occurs with even greater prevalence during the first and second decades of life, but which can also be detected in the adult phase of patients (*Latent Autoimmune Diabetes in Adults* – LADA) (Ross et al., 2016).

Diet associated with insulin therapy and physical exercise correspond to the main pillars for optimal glycemic control, significantly reducing the chances of DM complications. In the case of patients with DM1, for whom the application of insulin is a mandatory protocol, this association has

unique particularities. This is because the insulin applied has, in general terms, two basic objectives. The first contributes to the basal control of blood glucose and the second ensures the metabolization of glucose from the patients' diet. The two cases are known as basal bolus application and prandial bolus or meal (Fritz et al., 2020).

1.2 INSULIN THERAPY

According to the Carbohydrate Counting Manual revised and published in 2023, there are three types of insulin therapies. Traditional Therapy uses intermediate-acting (basal bolus) and rapid (meal bolus) insulins; Multi-Dose Therapy, with ultra-slow or intermediate-acting insulins (basal bolus) and ultra-fast or rapid insulins (bolus meal); and Continuous Insulin Infusion Therapy (Insulin Pump), which uses only ultra-rapid insulin, managing it according to the baseline goal or meal.

Insulin applications are organized and prescribed schematically so that the patient's blood glucose is controlled under the conditions in which they are fed and in the interval periods between meals, as well as fasting periods (such as night sleep) (Oliveira et al., 2022).

Considering that there is an average recommendation of six meals a day and observing that there are patients with large fluctuations in blood glucose, frequently configuring states of hyper and hypoglycemia, the importance of organizing these therapies becomes evident: diet and insulin (Cuppari, 2018; SBD, 2023a).

2 CARB COUNTING: INITIAL REFLECTIONS

In this context, more than 20 years ago, the Carbohydrate Counting strategy was created. According to the Carbohydrate Counting Manual (SBD, 2023b), the goal of this strategy is to understand and account for carbohydrates ingested by the patient. To this end, it is remembered that not only the carbohydrates themselves must be considered, but also the sources of fat and protein, which are partially converted into glucose during the digestive process. In addition to the known macronutrients, fiber is also considered in this accounting since it is not absorbed and must be reduced when in significant amounts in the portions consumed.

The prescription of diets is the exclusive responsibility of the professional nutritionist and the prescription of insulin dosages is a medical activity. The multidisciplinary team, partially represented here by these two professionals, needs to understand all the dynamics that involve the choice, purchase, and access to food, as well as the access, storage and management of insulin application, not forgetting other organic dysfunctions that the patient may have. For this reason, nurses, social workers, physiotherapists, dentists, among many other professionals, are fundamental in the multidisciplinary team (Oliveira et al., 2022).

Faced with this complex network of health care for diabetic patients focused on insulin administration *versus* food and glycemic control, there is the main character, who is the patient. Although evident, it is always necessary to emphasize that knowledge guarantees the autonomy and quality of life of patients with chronic non-communicable diseases such as Diabetes Mellitus. Knowledge brings awareness of the disease and the appropriation of care methods (Muttoni, Maria and Fulginiti, 2020).

In the case of food, specifically, the possibilities of food choices are diverse. There is a range of food possibilities, according to financial availability and accessibility, which can be in the daily lives of patients with DM1. However, this range can be very restricted when the patient has not been guided to make their own choices in a safe way (Miranda, Reis, and Oliveira, 2023).

In the application of insulin for the bolus meal, also called prandial bolus, the goal is that the amount applied is sufficient to metabolize the amount of food ingested. Specifically, metabolizing the amount of glucose that will be produced from that consumption. Thus, to determine the amount of insulin to be applied, there are two ways according to the guidelines of the Carbohydrate Counting Manual of the Brazilian Society of Diabetes (SBD, 2023b).

In the first (ideal) way, the patient knows how to identify the amount of carbohydrates contained in the meal that will be consumed and has the knowledge to convert this amount into the insulin dosage that will be applied. For this, other knowledge besides Carbohydrate Counting will be necessary. One of them is the concept of Insulin-Carbohydrate Ratio, which corresponds to the amount of carbohydrates that 1 unit of insulin is capable of metabolizing, and this insulin is of the fast or ultra-fast acting type, exactly those used for the bolus meal. Thus, we have the example of a patient whose Insulin-Carbohydrate Ratio is 1:15 (1 unit of insulin for 15 grams of carbohydrates) who will consume a lunch with 60 grams of carbohydrates, identified in his count, and, for this reason, will apply 4 units of insulin prescribed by the doctor.

At first, these calculations seem complex, but routine, exercise, and clinical follow-up make this flow operationalized in an organic way, due to the numerous repetitions. After all, the patient eats several times a day and counting will be exercised in a way that corresponds to this frequency.

However, explaining the second way of determining the insulin dose to be applied, the patient's lack of knowledge regarding Carbohydrate Counting is put on the agenda. In this case, the choices become limited and the guidelines and calculations prescribed by the nutritionist become the only guidelines and options for the patient's daily menu. On the prescribed diet, the nutritionist may be based on information pre-defined by the doctor, such as the Insulin-Carbohydrate Ratio and possibly a fixed dose of insulin to be applied before meals. In this case, the conversion of the previously prescribed fixed dose into the amount of carbohydrates to be consumed will be done by the nutritionist, based on the patient's Insulin-Carbohydrate Ratio. An example of this situation is a patient referred to

a nutritionist with 5 units of insulin for lunch and an Insulin-to-Carbohydrate Ratio of 1:10. In this case, the nutritionist will calculate a lunch whose amount of carbohydrates should be 50 grams.

As part of dietary planning, the dietitian will take care to calculate more than one lunch option (as well as the other meals of the day) for the patient in order to avoid food monotony. However, as much as there are options, it is evident that there is still a restriction and a limit on the patient's autonomy of choices in common everyday situations, such as the lack of a prescribed item or a change of routine (travel, celebrations, etc.).

If the objective of health professionals is to contribute to the quality of life of patients in their various areas of activity, it is notorious to highlight that having freedom with adequate knowledge is an important part of this definition of quality of life. To this end, each professional should guide their patients regarding the established therapy (Ribeiro et al., 2023).

Doctors and nurses should differentiate between the types of insulin prescribed, their purposes, storage methods, hygiene care, and application. Nutritionists should promote nutrition education in addition to the diet that can be prescribed. And, for patients with DM1, the main goal of nutritional education is to empower the patient regarding Carbohydrate Counting (Gabriel et al. 2016; Cunha et al., 2020).

3 CARBOHYDRATE COUNTING METHODS

In several Carbohydrate Counting Manuals (SBD, 2023b, Lamounier, 2020, Muttoni, Maria, and Fulginiti, 2020), the two counting methods described below are mentioned.

3.1 DIRECT COUNT

In this method, also called the carbohydrate gram method, the count is based precisely on the nutritional composition found in centesimal nutrient composition tables or even on labels. Generally preferred by professional nutritionists, as they already have the habit and access to bibliographic sources that provide this information, the direct counting method is often used in the prescription of diets and meal plans. Nutritional composition tables, such as the Brazilian Table of Food Composition (TACO, 2011), can be sources of more accurate information.

For the patient, the use of this method is more challenging due to the difficulty of accessing food composition tables that are typically specific to the work routine of nutritionists. However, with the advent of apps and the great expansion of mobile access, much of this data has been compiled into the databases of these apps. This now allows users to enter the food and its quantities consumed and, in return, obtain the carbohydrate values corresponding to that portion. Some of these applications even allow the insertion of data such as the Insulin-Carbohydrate Ratio, enabling the final conversion calculation to determine the amount of insulin to be applied at that time (Ribeiro et al., 2023).

Technology has brought a greater possibility of access to this method to patients, however, it is also important to emphasize the need to have a telephone with this technology and to know how to handle it. Because of this and other factors related to knowledge and literacy, the next method is important.

3.2 METHOD BY EQUIVALENTS

This method is recognized by some authors, such as Lamonier (2020), as the Substitute Method or List of Equivalents. In it, foods are organized in tables by groups, in which the association depends on the characteristic of the dominant nutritional composition in that item. Thus, there is the list of foods in the group of starch, fruits, other vegetables, meats, etc., as mentioned in the SBD (2023) and other nomenclatures and groups, such as the proposal by Lamounier (2020) and Muttoni, Maria and Fulginiti, 2020), placing, for example, the rice group.

In these lists, foods are organized into distinct portions and individualized according to the amount of carbohydrates they can provide. The concept of equivalent arises, for which the carbohydrate content that that individual portion of the list contains is defined.

A particularity and a challenge of this method are the different references of values contained in the Carbohydrate Counting Manuals. In the Manual previously proposed by the SBD (2009), 1 equivalent of the starch group contains 15 grams of carbohydrates, and this amount is provided by different amounts of each food in its group. As an example, 2 tablespoons of rice or 4 tablespoons of beans provide 15 grams of carbohydrates. In the Manuals of Lamounier (2020) and Muttoni, Maria and Fulginiti, 2020), the similar group is from the rice group whose homemade measurements are different and the respective amounts of carbohydrates as well, being 6 grams of carbohydrates for 1 tablespoon of rice and 2 grams for 1 tablespoon of beans.

Therefore, the guidance is that the nutritionist, recognizing the patient's profile and monitoring his/her glycemic evolution after the beginning of treatment, indicates a more appropriate manual and, if necessary, makes adaptations, changes or adjustments throughout the nutritional follow-up (Gabriel et al., 2016).

4 PROTEIN, FAT, FIBER, AND POLYOLS IN CARBOHYDRATE COUNTING

In the knowledge of carbohydrate counting, it is necessary to understand that other macronutrients have partial conversion to glucose throughout the digestive and absorptive process. Carbohydrates are the only ones with full conversion, but proteins and fats, despite partial conversions, also lead to an important impact on blood glucose with the added particularity of the later response time. This is because carbohydrates, in general, convert into glucose and raise patients' blood glucose

within 2 hours of ingestion. Proteins, on the other hand, have an average time of 3 to 4 hours and fats 5 hours postprandial (SBD, 2023b).

Of the total protein consumed, 35 to 60% is converted to glucose, and of the total fat, 10% is the conversion rate. In the case of proteins, there is a significant variation in the percentage conversion margin, but this can be adjusted in the calculations for the Carbohydrate Count according to the blood glucose monitoring recorded by the patient. The recommendation is that the value of 35% be used and later, if necessary, the conversion estimate can be adjusted.

In the case of fats, when calculating a 10% conversion in the lipid content consumed in food portions, in general, low values are obtained that, at first, do not seem to have an impact on the count. However, it is essential to understand that counting and insulin therapy also depend on a relative association with postprandial response time. A fattier food that contains other nutrients in its composition, such as fatty meats or preparations with high-fat sauces, is likely to bring about later responses. This implies that the time of action of the insulin applied before consumption may not be sufficient to cover the entire glycemic response expected for that meal. The result of this combination is delayed hyperglycemia caused by poor food choices and lack of knowledge of the association between food and insulin therapy.

Regarding fiber, technically called non-digestible polysaccharides, as its name suggests, there is a need for a discount of the total carbohydrates in that portion because they are not absorbed. The SBD (2009) suggests that this discount should be made in portions with amounts starting from 5 grams of fiber. The goal is to avoid overestimating the amount of carbohydrates capable of raising blood glucose. In addition, fibers delay gastric emptying and influence intestinal absorption and fecal bolus formation, also influencing the speed of glycemic alteration.

More recently, the SBD (2023b) also proposes that fibers should be reduced to the margin of 50% of their content, still considering portions equal to or greater than 5 grams as significant.

Also in this update, the concepts of polyols are highlighted, that is, sugar alcohols or sweeteners such as sorbitol, maltitol, xylitol, erythritol and lactitol. The recommendation is similar to that of fiber, reducing 50% of its content from the total amount of carbohydrates. For example, if a food has 16 grams of carbohydrates and 10 grams of maltitol (a type of polyol), the carbohydrate effectively absorbed will be 11 grams. This concept of absorbed carbohydrate is also given a specific nomenclature of "net carbs".

4.1 BOLUS MULTIONDA

As already shown, carbohydrate counting should be included in the context of insulin therapy, also based on knowledge about the different postprandial glycemic responses.

Foods high in fat and protein generate responses like "two or more waves of elevation." This is due to its digestion and absorption times. To this end, insulin application can be divided according to the expected response times in the food consumed (SBD, 2023a).

4.2 EXTENDED BOLUS

Food consumption at some social events and types of restaurants are good examples for understanding. Parties lasting hours and rotations are situations in which food intake fluctuates and/or becomes intermittent, with sporadic "pinching" and without programming. For patients whose knowledge of counting is well established, it is possible to make an average estimate of consumption and, based on it, convert it into the amount of insulin needed for those hours, and there may be adjustments during the process. In these cases, continuous insulin infusion is more appropriate, being regulated as to the time and speed of administration (SBD, 2023a).

5 LABELS AND CARB COUNTING

In 2020, Anvisa published new rules on nutrition labeling, which came into force in 2022. With these modifications, some information about the content of fats and sugars became more evident to the consumer (BRASIL, 2022). Even so, the information contained in the nutritional information tables refers to the direct counting method of Carbohydrate Counting and lacks greater knowledge on the part of the consumer. In addition, depending on the type of product, it is necessary to perform calculations such as rules of three, since the portion consumed is not always exactly the one reported as a reference in the table.

In this context, the reflections previously pointed out regarding the knowledge passed on to the patient by the team, the choice of the most appropriate method for the patient's level of understanding, and the need for follow-up are reinforced, a clarifying and adjustable follow-up throughout the care process (Gabriel et al., 2016; Cunha et al., 2020).

6 OTHER CONCEPTS RELEVANT TO CARBOHYDRATE COUNTING

The definition of Carbohydrate Counting refers to the definition of the carbohydrate content of a portion consumed. However, for the count to be effectively inserted into the general context of glycemic control, it needs to be associated with the patient's entire therapeutic regimen. And, still in this line of reasoning, the reciprocal is also true. This is because it is not the diet that always needs to be adjusted to the prescribed medication. The opposite, when possible, can also be an extremely efficient strategy, i.e., medication being incorporated into the patient's eating routine (Cunha et al., 2020).

To do this, we start from two basic assumptions. The first is that food is already part of the patient's daily life. It will be adjusted by the nutritionist trying to preserve the life routine as much as possible, after all, this is a determining factor for treatment adherence and quality of life. Thus, medication schedules, as well as other particularities of prescribed medical therapy, if adjusted to this routine, will make the impact of the care process less costly on the patient's mental health and individual and family dynamics (Ross et al., 2016; Cuppari, 2018).

The second assumption is in line with what is evidenced in this chapter regarding the greater objective of empowering the patient regarding the scope of their autonomy. He needs to learn how to do carbohydrate counting to have more freedom in his choices and flexibility of schedules. From the moment this learning is consolidated, insulin applications will follow this new habitual routine of the patient, in which there are diverse choices and greater flexibility and variations in the amounts consumed (SBD, 2023b).

Still in this context of autonomy and, at the same time, of learning and adjustments, glycemic variations may be more significant than expected. Episodes of hypoglycemia and hyperglycemia also need to be explained and the management oriented to the patients (Cuppari, 2018).

Thus, in case of mild to moderate hypoglycemia, the immediate intake of carbohydrate portions that can vary from 5 to 30 grams, according to the age group and glycemic level, are recommended. For this, knowledge of carbohydrate counting is also necessary (SBD, 2023b).

On the other hand, in cases of hyperglycemia, these can be evaluated as results of failures in carbohydrate counting and/or in the conversion and application of insulin in previous meals, generating a delayed effect of elevation of blood glucose. In general, they are checked preprandially, that is, before the consumption of the next meal and currently many patients are afraid to eat due to hyperglycemia (Lamounier, 2020).

The guideline in these cases is to correct blood glucose. And, to understand how this correction is made, it is necessary to briefly explain the concepts of Sensitivity Factor (FS) and Bolus Correction. The SP is related to the reduction in blood glucose that the application of 1 unit of rapid or ultra-rapid insulin can generate. Thus, if a patient's FS is 1 to 50 mg/dL, it means that it is expected that their blood glucose can reduce by 50 mg/dL after application. If he has a preprandial blood glucose of 150 mg/dL and should be at 100mg/dL, he can apply this 1 unit with the objective of reduction (Bolus Correction), which can be applied together with the amount of insulin used in the Bolus Meal, according to medical guidance (SBD, 2023b).

7 FINAL THOUGHTS

Carbohydrate Counting is inserted in the context of the care of the diabetic patient, especially those with type 1 Diabetes Mellitus. For its greater effectiveness, it is essential to understand its

association with insulin therapy to promote greater flexibility in food choices. In this sense, expanded knowledge about the different glycemic responses, application methods and types of insulin are necessary, as well as other concepts inherent to the routine care of diabetic patients. Professionals need this knowledge and the sensitivity and responsibility of sharing it with patients, through clear and accessible educational strategies, aiming to improve their quality of life and autonomy.

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SEVEN
publicações acadêmicas

Laser therapy in the treatment of peripheral neuropathy induced using paclitaxel in breast cancer: An integrative review

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Suzana Grings de Oliveira da Silva
Nurse at Hospital de Clínicas de Porto Alegre, Master in Nursing at UFCSPA

Yanka Eslabão Garcia
Nurse Graduated from UFRGS

Kimberly Bueno
Nursing Student at UFCSPA

Eliane Goldberg Rabin
Doctor in Medical Sciences from UFCSPA

Bibiana Fernandes Trevisan
Nurse at the Hospital de Clínicas de Porto Alegre and Specialist in Oncology at Faculdade Moinhos de Vento

Vanessa Belo Reyes
Master's degree from UFRGS

Mariana Cardoso de Oliveira
HCPA nurse and oncology specialist

Maryana Schwartzhaupt de Matos
Nurse from HCPA and specialist in oncology

Carla Patrícia Michelotti Pereira
Nurse at HCPA and specialist in Oncology

ABSTRACT
Objective: To synthesize knowledge about the use of photobiomodulation for the treatment of peripheral neuropathies induced by paclitaxel, seeking evidence for the care of patients undergoing treatment for breast cancer. Method: this is an integrative review between the years 2018 and 2023, using the Embase, Latin American and Caribbean Health Sciences Literature (LILACS), and PubMed databases. Results: 28 articles that met the inclusion criteria were reviewed, of which, based on the most prevalent outcomes, three topics were evidenced that discuss chemotherapy-induced peripheral neuropathy; treatments used; and photobiomodulation and peripheral neuropathy. Conclusions: paclitaxel proved to be the main causative agent of neurotoxicity, requiring urgent coping strategies. The benefits evidenced by photobiomodulation therapy in peripheral neuropathies are directly proportional to the damage that paclitaxel causes to the peripheral nerve, providing recovery from deterioration.

Keywords: Breast neoplasms, Paclitaxel, Low-level light therapy, Peripheral nervous system diseases.

1 INTRODUCTION

Breast cancer is a disease with multiple factors, manifesting itself in different clinical and genetic ways, as well as its effects on treatments. Treatments for breast cancer may include surgery, radiotherapy, adjuvant, neoadjuvant or palliative systemic chemotherapy, adjuvant hormonal treatment, and immunotherapy[1 2 3].

The therapies can be adjuvant or neoadjuvant, the latter being advised in advanced cases in which the breast tumor has no surgical indication or it is not possible to be resected. The recommendation, according to the classification of the disease, is also for high-risk patients. The use of anthracyclines followed by taxane is recommended when this therapy is chosen, and the sequential

use of taxane as a neoadjuvant regimen for breast cancer more than doubles the complete response rate[4] [5].

Among the types of treatments aimed at this disease, antineoplastic drugs called taxanes are widely used for the cure or control of the disease, and among the toxicities caused by the use of this drug, peripheral neuropathy occurs in approximately 62% of cases; It is characterized by paresthesia, numbness and pain in the hands and feet, fine motor changes, loss of tendon reflexes, among others[6]. A 2014 systematic review with meta-analysis included 31 studies on the incidence, prevalence, and predictors of Chemotherapy-Induced Peripheral Neuropathy (CIPN), and when stratified by drug, paclitaxel alone, used for the treatment of breast cancer, accounted for 70.8% of CIP[7] prevalence.

CIPN affects the quality of life of these patients, directly affects functionality due to pain, loss of sensitivity, muscle weakness and paresthesias, which brings serious complications to the performance of activities of daily living. Low-level laser therapy has been shown to be effective in analgesic control of neuropathic pain[8]. Studies point to the positive action of photobiomodulation to induce trophic-regenerative, anti-inflammatory and analgesic effects in tissues[9]. Specifically in use in CIPN, about 90% of patients had a significant clinical response of symptom improvement with its use[10].

2 METHOD

This is an integrative review (IR), which searched for studies within the literature on the use of laser therapy as a treatment purpose for peripheral neuropathy induced by the use of paclitaxel, with a filter of publications from the last 5 years. The method was chosen due to the fact that it is an important tool in the synthesis of available research on the subject to be studied, being a valid instrument for evidence-based practice.

To guide the study, the following steps were followed: 1) elaboration of the guiding question; 2) literature search or sampling; 3) data collection; 4) critical analysis of the included studies; 5) discussion of the results and 6) presentation of the integrative review. As a first step of the process, the question was "What is the evidence available in the literature on the use of laser therapy (FBM) to reduce the symptoms of Paclitaxel-Induced Peripheral Neuropathy in women with breast cancer?". The PICO strategy, an acronym that describes Population (women with breast cancer undergoing treatment with Paclitaxel), Intervention (Laser Therapy), and Outcome (Paclitaxel-Induced Peripheral Neuropathy), was used to elaborate the research question and the choice of descriptors. It is noteworthy that for the Control or Comparison element, although it is not directly implicit in the guiding question, treatments related to drug therapy, other complementary therapies or no treatment at all were considered.

The following databases were used: MEDLINE/PubMed, Embase, and Latin American and Caribbean Health Sciences Literature (LILACS) with the following descriptors: Breast Neoplasms, Paclitaxel, Low-Level Light Therapy, and Peripheral Nervous System Diseases. Inclusion criteria included fully published studies with human beings, and exclusion criteria were publications that were not indexed articles.

3 RESULTS

A total of 131 articles were found as a result of the search in the databases, 8 of which were excluded before selection because they were duplicates or unavailable in full. Of the 116 articles selected, 88 were excluded because they did not answer the research question. A total of 31 articles were eligible to be read in full, and of these, 3 did not meet the inclusion and exclusion criteria. In total, 28 articles were considered in a CIPN category and 8 articles in Paclitaxel-Induced Peripheral Neuropathy.

Regarding the level of evidence, four studies are systematic reviews of randomized clinical trials, three systematic reviews of cohort studies, one systematic case-control review, two controlled clinical trial studies, ten cohort studies, two case-control studies, and six observational studies of therapeutic outcomes. The results are presented according to the most prevalent topics found in the articles of this review, the first being related to paclitaxel-induced peripheral neuropathy.

Among the main results found in these studies are the morphological characteristics of the CIPN related to paclitaxel, in which apoptosis, oxidative stress and axon morphology were evidenced as the main triggers of neuropathy. Six studies showed a higher incidence of CIPN in patients treated with paclitaxel compared to docetaxel or other neurotoxic drugs. Table 1 describes the studies included in the integrative review.

Chart 1 - Description of articles included in the integrative review in terms of title, objective, methodological design, and results and conclusions. Porto Alegre, RS, Brazil, 2023.

Title	Objective	Method	Results and conclusions
Expression of mitochondrial dysfunction-related genes and pathways in paclitaxel-induced peripheral neuropathy in breast cancer survivors[11]	To evaluate the differential expression of genes and disturbed pathways between breast cancer survivors with and without paclitaxel-induced peripheral neuropathy.	Prospective Cohort Study; Gene expression in peripheral blood was tested using RNA-seq. Differentially expressed genes and pathways associated with mitochondrial dysfunction were identified among survivors who	No difference between the groups was found in the dose cumulative paclitaxel received or the percentage of patients that have had a reduction or dose delay due to PN. Five differentially expressed genes

		received paclitaxel and developed (n:25) and did not develop (n:25) paclitaxel-induced peripheral neuropathy.	and nine disturbed roads were associated with dysfunction mitochondrial related to the oxidative stress, homeostasis of the iron, mitochondrial fission, Apoptose is auto-driven.
Long-term peripheral neuropathy symptoms in breast cancer survivors[12]	To explore the symptoms of peripheral neuropathy and associated risk factors among breast cancer survivors at least 2 years after diagnosis.	Retrospective observational study; The prevalence of numbness, tingling, and anesthesia symptoms reported by the patient as a surrogate for PN in breast cancer survivors was investigated.	Overall, 17% reported long-term PN symptoms after no chemotherapy, 20% non-taxane chemotherapy, 31% docetaxel chemotherapy, and 44% paclitaxel chemotherapy.
Patient-Reported and Clinician Reported Chemotherapy Induced Peripheral Neuropathy in Patients With Early Breast Cancer: Current Clinical Practice[13]	Inquire incidence of neuropathy peripheral chemotherapy-induced (CIPN) moderate to severe for Schemes chemotherapy commonly used in current clinical practice for the treatment of patients with Mother song.	Cohort study prospective; Patients filled out a *monitoring of patient-reported symptoms* and oncologists filled out a *Common Form of terminology criteria for adverse events*. Reports of Peripheral Neuropathy Induced by Chemotherapy were prospectively collected during infusion visits scheduled regularly throughout the duration of chemotherapy.	The dose of chemotherapy was reduced in 52 patients (28%), and in 15 it was due to PN. Chemotherapy was discontinued in 26 patients (14%), 8 because of PN. Reports of moderate to severe PN were higher for paclitaxel compared to docetaxel. Pre-treatment arthritis and/or rheumatism and paclitaxel-containing regimens were associated with higher severity of NP . In addition, a discrepancy was observed between the patients' reports and the

			doctors' evaluations.
Persistent taxane induced neuropathy in elderly patients treated for localized breast cancer[14]	Report to frequency and Neuropathy Risk Factors persistent induced by Taxane between Elderly patients treated for localized breast cancer and propose a Score of prognosis to help clinicians choose the right treatment most appropriate in your daily practice.	Cohort study prospective; The sample included all women over 65 years of age treated between 2001 and 2016 at the Paul Strauss Regional Comprehensive Cancer Center with taxane chemotherapy for localized breast cancer. All included cases were followed up for at least 2 years, with deaths from causes unrelated to PN were excluded.	Among the 302 patients included, 21% and 9% developed grade 2 and 3 persistent PN, respectively. Two patients died from complications of grade 3 PN. Risk factors for persistent neuropathy grade 2 and higher included age, BMI, and diabetes. Persistent PN was more frequent with paclitaxel than with docetaxel. Patients With all four major risk factors, they had a 97.2% probability of developing long-term symptoms, versus 1.2% for patients who had no risk factor.
Risk of Incident Claims for Chemotherapy Induced Peripheral Neuropathy Among Women with Breast Cancer in a Medicare Population[5]	Compare to Occurrence of neuropathy peripheral induced by chemotherapy (CIPN) by Different Chemotherapeutic Agents Received To explain to heterogeneity in the risk of CIPN among patients with cancer of breast.	Cohort study retrospective; We examined predictors of PN among 11,149 women aged 66 years and older with stage AJCC II-IV breast cancer (and no diagnosis of secondary cancer or pre-existing neuropathy) who received chemotherapy.	Overall, the risk emerged ± 3 months after starting chemotherapy and increased over 1 year. Paclitaxel as part of therapy first-line increased the risk of PN 2.7-fold relative to non-neurotoxic agents. And it is concluded that the rate of The incidence of PN was higher for women who, at the time of diagnosis, were relatively

			younger, in AJCC stage II and III, and had less comorbidities, but did not differ by race/ethnicity or poverty level.
Signaling pathways and gene co-expression modules associated with cytoskeleton and axon morphology in breast cancer survivors with chronic paclitaxel induced peripheral neuropathy[16]	Assess whether the differential gene expression and CO Standards expression in these pathways are Associated with with peripheral neuropathy induced by paclitaxel.	Cohort study Exploratory; Signaling pathways and gene co-expression modules associated with the cytoskeleton and morphology of the axon were identified among the survivors who received paclitaxel and developed (n = 25) or no (n = 25) induced PN. These patients were the sample for the study.	The track impact analysis identified four pathways of signage related to cytoskeletal and axon morphology significantly Disturbed. The weighted analysis of the gene co-expression network identified three modules, one of which was associated with adherence to the paclitaxel-induced peripheral neuropathy group. Functional analysis found that This module was associated with four signaling pathways and two ontology annotations related to the cytoskeleton and morphology of axons.
Taxane-Induced Peripheral Neuropathy: Objective and Subjective Comparison Between Paclitaxel and Docetaxel in Patients With Breast Cancer[17]	Compare neuropathy peripheral induced by taxane (TIPN) between docetaxel and paclitaxel in breast cancer patients and examine the Consistency of TIPN measurement between researchers and patients.	Observational study retrospective; Data were The study included 64 breast cancer patients from two university hospitals in Taiwan. Peripheral Neuropathy Taxane-Induced objective and subjective were measured.	The study indicated that the paclitaxel-treated group had a higher prevalence and severity of NP objective than those of the docetaxel group. However, no significant difference was found in the subjective PN between the two groups. In addition, sensory neuropathies and motors were highly

			detected and reported among patients who were undergoing taxane treatment.
The revalence and pattern of chemotherapy induced peripheral neuropathy among women with breast cancer receiving care in a large community oncology practice[18]	Describe prevalence severity and risk of neuropathy peripheral induced by chemotherapy and its impact on women's quality of life treated for breast cancer in a large Community of oncology practice in the USA.	Retrospective observational study; Women previously treated with taxane-based chemotherapy for cancer of Early-stage breast completed Questionnaires from Quality of Life (QLQ) of the European Organization for Research and Cancer Treatment, including QLQ-C30, QLQ-BR23, and QLQ CIPN20. The subscales were scored from 0 to 100, with higher scores indicating greater symptom severity. Pre-hypotheses specified were Tested.	73.0% of patients reported PN. The mean CIPN20 QLQ scores for the subscales sensory, motor and autonomic scores were 18.9, 18.6 and 17.1, respectively. Thus, it was concluded that NP affects significantly improve function and quality of life. In addition, it was not associated with age, body mass index, diabetes, or cumulative chemotherapy, but it was higher for black or African-American women. Also, the Sensory impairment of PN was slightly higher for patients treated with paclitaxel compared to docetaxel.

4 DISCUSSION

The pathophysiology of paclitaxel-induced peripheral neuropathy is not completely known, but the findings corroborate the literature that points to the use of taxanes associated with degeneration and interference in axonal transport[1920]. The damaging effects of oxidative stress are mainly linked to the formation of free radicals that lead to aging and cell death[21 22]. Paclitaxel acts on microtubules and not on DNA or RNA like many chemotherapy drugs[3]. Cellular microtubules are responsible for shaping the cell, and during cell division, there is a need for balance between tubulin association and dissociation, ensuring that the process occurs in a stable way[24]. Due to these characteristics described, paclitaxel is shown to be a potent neurotoxic agent, potentially causing CIPN.

Among the risk factors for the development of CIPN, advanced age is mentioned in the studies, however, an impasse is established regarding age and taxane, because advanced age is a known risk factor for the incidence of breast cancer as well as this drug causes CIPN, which may have established a relationship between both[25]. Nutritional status had an impact as a predictor and severity of CIPN, and obesity or high body mass index was considered a risk factor for the development of CIPN. A study carried out at the Cancer Institute of the State of São Paulo (ICESP) highlights that patients in a nutritional status of obesity had a 2 times higher risk of developing CIPN, in an earlier and more severe form, correlating the appearance of this symptom with patients with this nutritional profile[26]. The relationship between overweight and CIPN seems to be associated with the health conditions that obesity predisposes to, such as diabetes and dyslipidemia. It is also related to the fact that obese patients have a larger body surface area, thus increasing the dose of the chemotherapy drug[51] However, clinical and sociodemographic parameters alone may not influence the development of CIPN, which is more related to the use of a chemotherapeutic agent to which the patient was exposed and its respective neurotoxic potential[27].

On the other hand, a study with 126 women in the United States showed no association with age, preexisting chronic diseases, or nutritional status, but found a relationship with race, showing a higher incidence of CIPN in black or African-American women[28]. The mortality of black women is also higher when compared to the white population with the same pathology, which leads us to believe that socioeconomic differences may influence this correlation, as well as the inequity of access to treatment faced by black women[29]. When compared to black women, they have less education, less access to diagnostic tests, and therefore a higher risk of not having been evaluated for the early detection of breast cancer. Thus, the race/ethnicity variable can be a demographic marker of inequality, with black women being in a state of greater economic, social and health care vulnerability[30].

Six studies showed a higher incidence of CIPN in patients treated with paclitaxel compared to docetaxel or other neurotoxic drugs. Due to the action of paclitaxel, microtubules become non-functional, inhibiting the usual dynamics of reorganization of their network, which is essential in the establishment of cellular functions. This process is believed to lead to the induction of peripheral neuropathy induced by this drug. There was also evidence of a significant impact on the function and quality of life of patients who had paclitaxel-related CIPN, with sensory impairment being the most affected, with considerable impact occurring within 3 months after the start of paclitaxel treatment. The CIPN causes damage and serious limitations to patients, which directly reflects on quality of life, causing deficits in the execution of daily activities, work, social, family and leisure relationships[31].

5 FINAL THOUGHTS

Although there is no consensus among the authors regarding age, weight and ethnicity as risk factors for the development of CIPN, paclitaxel has been shown to be the main causative agent of neurotoxicity, which leads to urgent thinking about strategies to cope with these symptoms presented by women undergoing breast cancer treatment. by the health team. Thus, the benefits evidenced by FBM therapy in Peripheral Neuropathies correspond to the supply of the demand that the damage of Paclitaxel exposes to the peripheral nerve, providing recovery of these deteriorations.

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Gestational diabetes and its impacts on pregnancy, childbirth and puerperium

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Gabriel Barbosa de Matos
Student of the 12th semester of the Medicine Course at the University Center – UniFG

ABSTRACT

Gestational diabetes is a significant concern for women during the gestational period, triggering metabolic dysfunctions and substantial changes. The general objective of this study is to understand the approaches adopted by family health professionals to reduce the incidence of diabetes during pregnancy, focusing on the influence of lifestyle change (SEM) and the provision of appropriate guidelines for the provision of effective care to this specific group of patients. The methodology adopted for this research comprised an integrative literature review, of a quantitative nature. This methodological approach seeks to analyze and identify knowledge produced related to the topic in question, aiming to deepen and adapt the available theoretical basis. During the review, 6 publications in Portuguese and 9 in English were considered, addressing different aspects of effectiveness in primary prevention, prophylactic measures, consequences of drug use, and the role of nurses in prevention and care. The discussions and results obtained focus on the need for targeted strategies to deal with the complications associated with gestational diabetes during pregnancy, highlighting the appropriate approach for affected newborns. The study emphasizes the importance of professional support in the face of clinical complications resulting from gestational diabetes, especially in situations of cyanosis and breathing difficulties after childbirth, emphasizing the importance of oxygen therapy to enable lung expansion and hematosis.

Keywords: Gestational diabetes, Prenatal interventions, Neonatal complications, Prevention strategies.

1 INTRODUCTION

Gestational diabetes mellitus is a metabolic condition that commonly affects women during pregnancy, this period is characterized by significant hormonal fluctuations, necessary to provide nutrients to the fetus. Due to these hormonal changes, a deficiency in the production, storage, and proper distribution of insulin in the body can occur.

Therefore, gestational diabetes is scientifically defined as metabolic adaptations during pregnancy. The lack of a proper diet and the absence of physical activity can result in physiological imbalances during this period (BOLOGNANI, 2011).

The complexity of gestational diabetes mellitus is highlighted, highlighting its association with the hormonal fluctuations inherent to pregnancy, in which hormonal changes can impact the production, storage and distribution of insulin, leading to metabolic challenges for pregnant women. The mention of metabolic adaptation during pregnancy shows how the body adjusts to meet the nutritional demands of the fetus, thus pointing to the importance of a balanced diet and physical activity to mitigate physiological imbalances, evidencing the relevance of self-care during this delicate period.

It is important to highlight the global epidemiological data related to glucose intolerance, affecting approximately 415 million adults, regardless of gender, being more prevalent among women during the gestational period, hyperglycemia triggers a variety of hormonal secretions, leading to insulin resistance, even when the pancreas produces insulin properly. In the national context, the Unified Health System (SUS) points to a prevalence of about 7.6% of cases of gestational diabetes (GDM) in Brazil, with approximately 94% of cases referring to impaired glucose tolerance and 6% diagnosed as gestational diabetes.

Recent studies, such as the one by Salvadori and Silva (2022), highlight that factors such as body weight, age, gender, and educational level exert a significant influence on the development of gestational diabetes. These authors highlight the importance of continuous and systematic monitoring of the mother and fetus to ensure a healthy development and adequate treatment of gestational diabetes, also pointing out that this condition is one of the main causes of hospitalizations in the Unified Health System (SUS), contributing to the emergence of heart and brain diseases and systemic arterial hypertension. This overload on the public health system reveals the lack of physical structure and human resources to meet the current demands in Brazil (SALVADORI; SILVA, 2022).

In this study, we emphasize the importance of continuous follow-up by health professionals throughout pregnancy, including periodic examinations in the different trimesters. These practices play a direct role in the prevention and treatment of gestational diabetes, in line with health policies aimed at women and the principle of continuity in public health care in Brazil.

It should be noted that gestational diabetes mellitus (GDM) seeks to analyze the complications resulting from this condition during pregnancy, affecting approximately 6% of women. Thus, this study seeks to understand the factors that trigger this pathology and how professional intervention can open ways to promote body stability and a healthy pregnancy, free of complications.

The research has significant social relevance, since it is directly linked to the development of strategies for the well-being of pregnant women. In the academic sphere, it encourages the exploration of studies related to the theme, contributing positively to research (BRASIL, 2013).

Thus, the general objective of this research was to understand the ways in which health professionals of the family health strategy can impact the reduction of cases of gestational diabetes and how these interventions can influence changes in lifestyle, aiming to provide essential guidelines to offer effective care to this public. More specifically, we sought to understand the epidemiological profile of neonatal complications related to diabetes mellitus, to analyze the epidemiological profile of pregnant women with diabetes mellitus, to evaluate the nursing care provided to pregnant women with diabetes mellitus; To identify nursing care practices for newborns with complications resulting from pregnancies with diabetes mellitus in primary care.

2 METHODOLOGY

In order to understand diabetes mellitus, we propose an integrative review of the literature. According to Souza, Silva and Carvalho (2010, p. 102), the integrative review is a method that synthesizes knowledge and incorporates the applicability of the results of relevant studies in practice. Based on this premise, this literature review was conducted to explore the main factors associated with this condition.

This literary study focuses on the analysis of the results obtained in a specific theme, allowing a systematized and comprehensive organization within the context of the research. It is critical to explore the manifestations that may arise during childbirth and its execution, especially with regard to fetal well-being and the circumstances of birth, which may result in classifications such as small for gestational age (SGA) or large for gestational age (LGA). It is noteworthy that the status (LGA) can present several risk factors for extrauterine life, including the risk of brachial plexus detachment during vaginal delivery maneuvers (ORIENTE, 2015).

To delimit the period of analysis, the years 2018 to 2022 were considered from the following databases: Lilacs (Latin American and Caribbean Literature in Health Sciences), Scopus (Elsevier), DECS, VHL (Virtual Health Library) and CAPES. The investigation was conducted during the months of September and October 2023. The search terms used were Hyperglycemia, obesity and insulin, and their respective translations into English: Hyperglycemia, Insulin and Obesity.

Using the Boolean operators provided by the VHL system together with the search formulation for scientific research, it was possible to elaborate the following expression to validate the descriptors: Hyperglycemia AND Insulin AND Obesity AND health care OR medical assistance.

3 RESULTS

Considering that Gestational Diabetes Mellitus is part of a group of metabolic disorders that share hyperglycemia as a common characteristic, it is essential for the health team to recognize that it should not be seen as an isolated disease. Thus, early diagnosis and appropriate treatment play a key role in mitigating or eradicating these problems.

However, it is important to emphasize that the Unified Health System (SUS) has adopted educational measures and campaigns aimed at pregnant women affected or susceptible to GDM, aiming to avoid complications for both patients and their babies.

The literature highlights that the manifestation of hyperglycemia during pregnancy can present itself through symptoms such as polyuria, polydipsia, weight loss, polyphagia and blurred vision, or through acute complications, representing risks to life. It is essential that health professionals, from community agents to the entire medical team, be attentive to any sign of these symptoms, emphasizing, therefore, that the effectiveness of treatment is amplified when prevention is early.

During pregnancy, the presence of diabetogenic hormones is observed, due to the hyperinsulinemic state, which reduces insulin sensitivity. Hormones such as progesterone, cortisol, prolactin and placental lactogenic hormone are naturally produced in the female body during this period.

For this reason, it is essential to control Gestational Diabetes Mellitus (GDM), as inadequate control can considerably increase the risks for both the pregnant woman and the baby during the prenatal and neonatal stages. Contracting GDM can increase the likelihood of developing other types of diabetes, such as type 2 diabetes mellitus, for women after childbirth, further increasing the risk of the disease manifesting itself in future pregnancies and children.

Therefore, proper diagnosis and treatment of GDM plays a crucial role in ensuring the health of the pregnant woman, the baby, and future pregnancies, as well as reducing the risks to future children.

It is important to identify the group of women with greater susceptibility to the development of Gestational Diabetes Mellitus (GDM), factors such as age, weight, family history, height of the woman, fetal growth, presence of polyhydramnios, hypertension or preeclampsia during the current pregnancy, as well as obstetric history of fetal or neonatal death and macrosomia are considered significant for the emergence of GDM.

Age over 25 years is an indication of risk, as well as excessive weight gain during pregnancy, family history with affected first-degree relatives is also an important indicator. A clinical look is essential for pregnant women with a height of less than 1.50m, as well as those with non-standard fetal growth.

Healthcare professionals should be on the lookout for any abnormality or behavior that is not expected for GDM, as many pregnant women have little information on the subject, for example, the overgrowth of the fetus can be interpreted as simply a large and healthy baby, but in reality, it can indicate GDM.

For this reason, an accurate diagnosis is essential, usually made by tests such as the Oral Glucose Tolerance Test (OGTT), which should be requested between the 24th and 28th week of pregnancy, if the pregnant woman has other risk factors, as mentioned earlier, OGTT can be performed early, around the 20th week.

The care of GDM does not end with childbirth. After delivery, women diagnosed with GDM need to be reassessed, either by measuring fasting glucose or by OGT, approximately six weeks postpartum, in order to reclassify their metabolic status.

It has been identified that patients can monitor their blood glucose through capillary tests, this procedure requires multiple daily measurements to accurately reflect the actual glycemic profile, stored in the device's memory.

Once GDM is properly controlled, complications can be prevented. However, the patient's cooperation is essential to follow the recommended procedures, such as daily monitoring of capillary blood glucose, adherence to the prescribed diet, physical activity and, if necessary, insulin therapy, these self-care practices, although they depend mainly on the patient, require professional evaluation and follow-up.

Based on the knowledge acquired, it was noticed that pregnant women with excellent metabolic control and without obstetric history such as perinatal death, macrosomia or associated complications, such as hypertension, can have a normal delivery. GDM is not an automatic indication for cesarean section; This decision is made by the obstetrician after assessing the ratio of the maternal pelvis to fetal size to determine the feasibility of vaginal delivery or the need for surgical intervention.

Prolonged deliveries require special attention, and it is necessary to carefully evaluate the proportions between the fetus and the pelvis to avoid shoulder distortion. If signs of disproportion are noticed, the obstetrician may indicate a cesarean section, in scheduled deliveries, the pregnant woman should remain fasting, and if it is a spontaneous normal delivery, blood glucose monitoring is recommended, during labor, blood glucose levels should be kept below 120 mg/dl.

After the baby is born, blood sugar levels are expected to return to normal. Generally, this is observed, however, it is crucial to carry out a medical evaluation, with a glucose tolerance test between 6 and 12 weeks after delivery, this follow-up is of great importance to avoid complications in future pregnancies or the development of type 2 diabetes in the woman.

Table 1. Detailed description of the items found.

No.	Author	Type of study	Title	Objective	Result/Conclusion
01	Salvadori and Silva 2022	Literature Review	Gestational Diabetes Mellitus – Literature Review	"To present the relationships between maternal and fetal conditions, emphasizing the relevance of early identification and follow-up of GDM." (SALVADORI; SILVA, 2022, p. 73).	"Early identification of GDM, appropriate follow-up, and the use of appropriate pharmacological therapy can have a positive impact on the quality of life of the pregnant woman, as well as the future health of the mother and baby." (SALVADORI; SILVA, 2022, p. 73).
02	Caldas et al., 2021	Literature Review	DIABETES IN PREGNANCY AND ITS INFLUENCE ON EMBRYO FORMATION	Address the most frequent risks of congenital anomalies associated with diabetes during pregnancy, as discussed in the publications	"Diabetes has a significant impact on the development of congenital anomalies, triggering malformations that affect the continuity of pregnancy and the various stages of organ formation in fetal development. These conditions can result in congenital anomalies that

				(CALDAS et al, 2022, p. 387).	compromise survival after birth (CALDAS et al, 2022, p. 387)."
03	Bertoli, et al. 2022.	Case Study	Gestational diabetes mellitus: symptoms, diagnosis and treatment.	Analyze the care, complications, and risks associated with gestational diabetes, as well as examine treatment options and challenges faced by patients with this condition during pregnancy (BERTOLI et al, 2022, p. 10052).	"Gestational diabetes is usually identified during routine examinations and often does not manifest evident symptoms, making blood tests crucial for early diagnosis (BERTOLI et al, 2022, p. 10059)."
04	Mathias et al., 2022	Literature Review	Gestational diabetes mellitus: a review of the literature	To analyze gestational diabetes mellitus, addressing epidemiological and pathophysiological aspects, clinical manifestations, diagnostic methods and therapeutic options.	"This condition is often asymptomatic and affects a significant portion of pregnant women. If not identified and treated promptly, it can lead to substantial complications for both mother and fetus (MATHIAS et al, 2022, p. 37194)."
05	Silva et al (2022).	Integrative literature review	CARE OF THE MULTIDISCIPLINARY TEAM IN THE PREVENTION OF DIABETES MELLITUS GES	"To conduct a literature review on the role of the multidisciplinary team in the prevention of diabetes mellitus during pregnancy." (SILVA et al, 2022, p. 01) ".	The work of the multidisciplinary team is essential in the prevention of gestational diabetes mellitus, using health promotion approaches aligned with the guidelines of the Ministry of Health. "The aim is to prevent and reduce incidences of gestational diabetes through humanized follow-up, minimizing the risk of associated morbidity and mortality." (SILVA et al, 2022, p. 06-07).
06	Araújo; P; Paiva 2022.	Literature Review	Gestational Diabetes: Evolution of Diagnostic and Therapeutic Criteria.	To analyze the evolution of diagnostic and therapeutic criteria for gestational diabetes over time.	After extensive research in the area of gestational diabetes (GD), there is still a lack of consensus in its approach, both in relation to diagnostic criteria and therapeutic strategies. In recent years, several scientific societies have adopted the guidelines proposed by the IADPSG/WHO, resulting in an increase in GD diagnoses on a global scale and allowing therapeutic interventions to improve perinatal outcomes." (ARAÚJO; P; PAIVA, 2022, p. 52).

07	REIS; VIVIAN; GUALTIERI (2019)	Literature Review	GESTATIONAL DIABETES MELLITUS: MATERNAL-FETAL PATHOPHYSIOLOGICAL ASPECTS	Describe the clinical aspects related to gestational diabetes, focusing on its pathophysiology for both mother and fetus. (KINGS; VIVIAN; GUALTIERI, 2019, p. 32).	By drawing attention to the clinical aspects of gestational diabetes, particularly its maternal-fetal pathophysiology (REIS; VIVIAN; GUALTIERI, 2019, p. 32), it is important to understand that this condition impacts a broad spectrum of people, regardless of their diverse social conditions around the world. This condition manifests itself when the hormones that antagonize the action of insulin are at high levels, resulting in a challenge for the pancreas, which cannot, as a compensation mechanism, produce insulin in sufficient quantities.

Source: Elaboration of the authors according to the articles found.

4 DISCUSSION

According to Salvadori and Pereira Silva (2022), gestational diabetes mellitus is a public health challenge that, according to epidemiology, most frequently affects women with a lower level of education, brown or black, living in peripheral areas and belonging to economic strata C, D and F.

The Ministry of Health also adds that this condition affects approximately 18% of the almost 3 million births performed annually in Brazil.

Considered a global health problem, the World Health Organization (WHO, 2013) classifies gestational diabetes mellitus as the increase in blood glucose during pregnancy. Importantly, the following:

> Gestational diabetes mellitus is a serious condition that impacts a large number of people from diverse social conditions around the world. It occurs when the hormones that antagonize the action of insulin are elevated and the pancreas is unable to produce a sufficient amount of insulin as a compensatory mechanism (REIS; VIVIAN; GUALTIERI, 2019, p. 44).

In addition, gestational diabetes mellitus is understood as 'a silent condition that affects many pregnant women and, if not identified and treated in time, can lead to significant complications for both mother and fetus.' (MATHIAS et al, 2022, p. 37194).

When correlated with the pathophysiological profile, it is noted that gestational diabetes (GD) is characterized by an abnormality in carbohydrate tolerance, diagnosed or treated for the first time during pregnancy, leading to varying levels of hyperglycemia in the mother. (ARAÚJO; P; PAIVA, p. 47).

It is relevant to point out that,

> Most authors, as well as the Ministry of Health and the World Health Organization, recommend that the screening period should be performed at the first prenatal visit and the repetition between the 24th and 28th week of gestation, and only a small portion suggest that screening should be started at the 20th week of gestation. It is interesting to note that the Ministry of Health recommends screening for all women during pregnancy (SALVADORI; PEREIRA SILVA, 2022, p. 74).

The study by Caldas et al. (2022) addressed the risks of teratogenicity and the pathologies associated with gestational diabetes mellitus, emphasizing the relevance of health prevention. From this research, it was possible to reach the conclusion that:

> The multidisciplinary team is extremely important in the process of preventing gestational diabetes mellitus, through health promotion interventions with guidance in accordance with the guidelines of the Ministry of Health in order to prevent and reduce cases of gestational diabetes mellitus and aiming at a humanized follow-up, reducing risks of morbidity and mortality (SILVA et al, 2022, p.06-07).

By highlighting the role of the multidisciplinary health team, in short, in the prevention of gestational diabetes mellitus. We emphasize the importance of interventions focused on health promotion, in line with the guidelines of the Ministry of Health, aiming at reducing cases of this specific condition, whose main objective is to provide humanized follow-up, which can result in a reduction in the risks of complications and mortality associated with gestational diabetes, which highlights the relevance of multidisciplinary support to effectively address and deal with this condition during pregnancy.

Going back to the topic in question, which points to significant progress in the development of treatment protocols for gestational diabetes over the years. The advancement of research and investments in continuing education for health professionals are highlighted as factors that have driven this evolution.

However, it does suggest that there is something relevant to be highlighted, something that perhaps deserves more emphasis or consideration. This caveat may indicate that there are ongoing challenges or specific areas that need further attention or improvement in gestational diabetes treatment protocols.

In this context, it should be noted that:

> After decades of research in the field of GD, its approach is still not consensual, either in terms of diagnostic or therapeutic criteria. In recent years, several scientific societies have adopted the IADPSG/WHO recommendations, leading to an increase in the diagnosis of GD worldwide, and enabling therapeutic intervention with improved perinatal outcomes. (ARAÚJO; P; PAIVA, 2022, p. 52).

It is noteworthy that the lack of consensus in the approach to gestational diabetes, especially in relation to diagnostic and therapeutic criteria, thus pointing to the adoption of global recommendations

by several scientific societies as an advance that has led to an increase in the diagnosis of GD worldwide, improving perinatal outcomes. However, it also highlights that, although studies have contributed to treatment policies and health protocols, there is still a long way to go in terms of health education, which is essential to promote self-care and, consequently, expand preventive measures for this public health problem on a global scale.

5 FINAL CONSIDERATIONS

The authors' understanding of GD as a public health challenge is reinforced, showing its prevalence in women with a lower level of education, in peripheral regions, and in less favored economic groups. The study highlighted the relevance of specialized support in the face of clinical complications associated with gestational diabetes, especially in cases of cyanosis and postpartum breathing difficulties, emphasizing the decisive value of oxygen therapy to facilitate the expansion of the lungs and adequate oxygenation of the blood, and also emphasizing the categorical role of the multidisciplinary team in the prevention of GD. through interventions based on public health guidelines and the search for humanized follow-up to reduce the risks to the mother and fetus.

In the context of the present study, prevention and early diagnosis are essential to preserve the health of women and developing fetuses. It is important to expand public policies to address this condition.

Continuous follow-up by health professionals during pregnancy, along with the repetition of exams in the corresponding trimesters, plays an essential role in the prevention and treatment of gestational diabetes, in line with women's health guidelines and the principle of continuity in public health care in Brazil.

The research issue that surrounds this work highlights the advances in the GD approach, especially in diagnosis and treatment, promoted by global recommendations. However, the lack of consensus regarding diagnostic and therapeutic criteria is highlighted, pointing to the continuous need for health education to promote self-care and expand preventive measures.

The in-depth understanding of these aspects emphasizes the importance of the multidisciplinary approach to effectively deal with GD, while pointing to the need for greater clarity and consensus in the definition of diagnostic and treatment protocols.

This review highlights both advances and persistent challenges, highlighting key areas for future research and interventions.

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Glycemic index and glycemic load: Challenges and benefits of clinical applicability

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Taciana Uchôa Passos
Doctor. Resident in Internal Medicine at the Oswaldo Cruz University Hospital of the State University of Pernambuco.

Tatiana Uchôa Passos
Nutritionist. Doctor in Public Health and a Master's degree in Public Health from the State University of Ceará.

Rafaella Maria Monteiro Sampaio
Nutritionist. Doctor in Public Health and a Master's degree in Public Health from the State University of Ceará.

Fernando César Rodrigues Brito
Nutritionist. Doctor in Biotechnology and a Master's degree in Public Health from the State University of Ceará.

ABSTRACT
More than 40 years ago, studies about the glycemic index (GI) and glycemic load (GL) began. However, nowadays there is still no consensus regarding dietary prescription based on these indices in the main national and international guidelines. Paradoxically, there is a growing number of research studies pointing to the benefits of diets with low GI and GL. The literature shows that there are still limitations regarding determination protocols, gaps regarding regional foods and the GI's focus on the glycemic response two hours after ingestion. On the other hand, the interest of the scientific community is growing and further studies on the effect of different carbohydrate sources on blood glucose are quite attractive. Evidence of the harm caused by blood glucose and insulin spikes in the development of chronic non-communicable diseases is also an important justification for the emergence of new investigations, despite the limitations highlighted by health guidelines.

Keywords: Glycemic index, Glycemic load, Chronic non-communicable diseases.

1 INTRODUCTION

The use of adjuvant and complementary strategies to nutritional therapies for health promotion and prevention of various diseases is already common in the scientific literature and in the clinical practice of numerous professionals. The intention of applying these therapies is essentially to enhance and/or accelerate the results of traditional or classically adopted therapies, which may generate even better results in some cases (Ross et al., 2016).

The concept of Glycemic Index (GI) has more than 40 years of history (Jenkins et al., 1981), but the consolidation of its definition and the consensus regarding its clinical application are the subject of several discussions. As for the definition, there is little doubt. It is known that any food that contains carbohydrates in its composition can raise blood glucose after ingestion (Passos et al., 2015).

The speed and intensity of this rise translates into an index that is the GI. According to one of the most widely disseminated early definitions of GIs, this index is a categorization of GIs based on

the effect of a food's carbohydrate content and type on blood glucose. In other words, this elevation behavior is a reflection of the composition and cooking methods, for example, of each food (Brand-Miller et al., 1999).

In addition to the glycemic index, the amount of carbohydrate in a food is also considered an important determinant of fasting glucose tolerance and postprandial glycemic response (Atkinson et al., 2021). In this way, another indicator emerges, the glycemic load (GL), which was initially defined as the product of the GI of the food by its glycemic carbohydrate content, being, therefore, a measure that involves the quantity and quality (GI) of the dietary carbohydrate (Danone Vitapole/FAO, 2001).

The glycemic load (GL) reflects the impact of food on blood glucose, considering its quantity (translated into glycemic carbohydrate content) and its quality (characterized by GI). The glycemic load expresses the amount of glucose that must be consumed (in grams) to obtain the same glycemic response as the portion of food in question. It makes it possible to compare glycemic responses of portions consumed from different foods, while the glycemic index allows comparing glycemic responses of different foods, but of the same category and with the same glycidic load (Passos et al., 2015; Atkinson et al., 2021; Manta et al., 2023).

Elevation of blood glucose stimulates the release and production of postprandial insulin. This hormone has an anabolic effect and the overload in its use can favor weight gain, glycemic decompensation and other effects of oxidative stress and inflammation. As a result, several studies have, for many years, pointed to the relationship between low GI diets and the prevention and control of Chronic Non-Communicable Diseases (NCDs), such as Diabetes Mellitus, Obesity, Cancer, Cardiovascular Disease, in addition to improving mental and physical performance (Livesey et al., 2019; Jenkins et al., 2021; Du et al., 2022; Manta et al., 2023).

Most of the literature is focused on the study of the relationship between GA and Diabetes Mellitus (DM) due to its more "immediate" perception of blood glucose. However, there is a lot of research evidence revealing the potential of this index in the prevention and treatment of NCDs (Livesey et al., 2019).

The American Diabetes Association (ADA), an organization that has great repercussions in the world, took many years to endorse GI-based dietary prescription, believing that it does not have a great impact on glycemic control. It was only in 2009 that the ADA began to consider that the indicator deserved attention, although there were still no proposals for operational strategies for its inclusion in the therapeutic and control routine (ADA, 2009).

Years later, in 2015, the discourse evolved, already evidencing the importance of adjuvant therapies, such as the glycemic index and glycemic load in individuals with diabetes, still pointing to the indexed literature as complex and controversial (ADA, 2016). Currently, the guidelines of the ADA (2023) and the Brazilian Society of Diabetes (SBD, 2023) put the GI on the agenda, with less criticism

and considering it as a recommended adjuvant therapy, but not neglecting to emphasize the complexity of the subject, its limitations, and the fact that they should be treated as adjuvants. In other words, basic diet therapy, following the prerogatives of a healthy diet, remains the main objective of nutritional therapy.

Despite the measured recommendations of the aforementioned guidelines, several studies are emphatic in emphasizing significant correlations in their findings and evidence reaffirmed in systematic reviews (Livesey et al., 2019; Jenkins et al., 2021; Du et al., 2022; Manta et al., 2023). Apparently, there is a trend towards updates of the guidelines in this regard as well.

At the time of the emergence of the GI concept, fats were pointed out as great villains of the diet and, therefore, there was a tendency to restrict them and increase the consumption of carbohydrates. As a result, new doubts have arisen regarding the management of carbohydrates in the diet (Brand-Miller et al., 1999).

In the same way that many concepts have evolved since the initial studies on GA and GC (Jenkins et al., 1981) to the present day, the applicability of these tools has been evidenced in a diversified way and positively demonstrated in studies published in important international journals (Manta et al., 2023)

At the beginning of the investigations, the idea would be to better understand how the body could behave after the consumption of different sources of carbohydrates, simple or complex, with high or low fiber content, with a greater or lesser degree of processing. At the time, these were common doubts that should be clarified so that the prescription of carbohydrates could be safer.

As it is a categorization based on carbohydrate response, it is important to note that this evaluation of post-ingestion behavior focuses on the 2 hours post-consumption, since this is the average time needed for carbohydrate digestion and absorption to be completed. With this particularity, it is understood that the protein and fat content of the ingested food does not have a direct evaluation (Passos, 2015; Kim, Kim, & Lim, 2019).

Despite this, it is notorious that the presence of these in foods, in significant quantities, modifies the glycemic curve, response time, peaks in blood glucose, etc. Thus, the behavior generated by the presence of protein and fat in food can influence the glycemic curve of the first 2 postprandial hours, but it will also bring a continuity of this curve after this period (Kim, Kim, and Lim, 2019).

One of the most cited protocols for determining GA and GC is the FAO/Who Expert Consultation (1998), which consists of checking the blood glucose of healthy volunteers in fasting and at 6 moments after ingestion of the test food: at 15, 30, 45, 60, 90 and 120 minutes. In this way, what happens to blood glucose after 120 minutes will no longer be considered.

The facts mentioned in the previous paragraphs, the limitation with the evaluation time and the focus only on carbohydrates, make evident some of the restrictions of the GI and contribute to the difficulties in reaching a consensus regarding its applicability.

On the other hand, these same characteristics can be understood not as limitations, but as potentialities depending on the type of analysis that wishes to be carried out. The specificity of the carbohydrate assessment and the emphasis on the immediate post-ingestion glycemic response may translate the GI as a tool with a higher degree of refinement and focus on the critical moments of peak insulin response after consumption.

Thus, there is a more punctual and accurate glycemic assessment of the immediate behavior after meals, but for this reason, it lacks common sense in its interpretation. It should not be inferred that the performance observed in the first 2 hours post-ingestion will be definitive or will not continue after this period. It is essential to broaden the view of the digestive and absorbed process as a whole, based on the nutritional composition of the food (Kim, Kim, and Lim, 2019).

Having made these reflections, it is reinforced that there is still no consensus regarding the main national and international guidelines regarding the application of the GI (ADA, 2023; SBD, 2023). However, this concept has been frequently suggested in these guides for years, so the discussion still persists and is valid.

Several studies point to positive results regarding the use of this method in dietary assessment and prescription, strengthening the suggestion of its applicability in diet therapy and justifying its mention in the main Brazilian and global guidelines (Livesey et al., 2019; Jenkins et al., 2021; Du et al., 2022; Manta et al., 2023).

The SBD highlighted the methodological limitations of the GI, which generates controversy regarding its recommendation. Although interesting in theory, the practical application is still a challenge. There are many influencing factors, such as origin, climate, soil, preparation, cooking time, and other components of the meal, such as fat content, protein, temperature, and acidity.

Therefore, the clinical application of the glycemic index is controversial, although there is agreement that the quantity and quality of the carbohydrate consumed affect the glycemic response, as well as that the glycemic index and load can bring additional benefits when the total carbohydrates of the meal are accounted for (Atkinson et al., 2021).

Following this thought, researchers have advanced their studies of food GI identification, finding interesting data (Paiva; File; Sousa, 1998; Carreira, 2001; Lemos et al., 2002; Cardoso, 2003; Brand-Miller; Foster-Powell, 2011; Passos, 2015; Kim, Kim, & Lim, 2019).

Passos et al. (2015) refer to several existing tables, which contain the glycemic index produced by foods from different parts of the world and under different physiological conditions, which are the result of several studies carried out in this field of research. These tables are updated as new GI and

GL determinations occur in different foods. Thus, those initially elaborated by Foster-Powell and Brand-Miller (1995) can be cited; Brand-Miller *et al.* (1999); Sydney University Glycemic Index Research Service (2001); Foster-Powell, Holt and Brand-Miller (2002), Brand-Miller and Foster-Powell (2011), among others.

Atkinson et al. (2021), in their systematic review, emphasize that GI and GL tables are essential for research examining the relationship between the glycemic qualities of carbohydrates in foods, diets, and health. They also highlight the importance of renewing studies and discussing this theme, given that in the survey that new values of known foods were modified. Some by new methods of manufacture and others by investigations of other variations and species of the same food.

From the tables, it is possible to determine the GI and GL of the diets usually consumed by healthy individuals with Chronic Non-Communicable Diseases (NCDs), in order to identify a risk consumption for the emergence or loss of control of these diseases. This is, in fact, one of the most used lines of study within the theme of glycemic index and load. The evaluation of diets in terms of indices, comparing the findings with clinical outcomes, has shown that low GI and GL diets have beneficial effects on disease promotion and prevention (Chang et al., 2020).

However, this assessment requires the consultation of the already discovered values of GI and GL in the published tables and the presence of regional foods is a challenge for this analysis. In Brazil, this obstacle exists due to the great diversity of regional foods, even varying between regions of the country (Passos et al., 2015).

Although the available tables are broad and include several foods from different countries (Atkinson et al., 2021), there are still large gaps regarding the GI and GL of regional foods, such as the Brazilian ones, especially considering the varied availability according to each region of the country.

In Brazil, there are many typical foods, whether from the group of cereals, fruits or vegetables. Some Brazilian scholars have already determined the glycemic index of some regional foods, such as Passos et al. (2015), Paiva, Lima and Sousa (1998), Carreira (2001), Lemos et al. (2002) and Cardoso (2003), but several gaps still remain. Passos et al. (2015) identified a relationship of several regional foods, including tropical fruits.

Thus, there is a significant interest of the scientific community in the subject, but the focus of the analysis and the gaps in the tables seem to slow down the evolution of the studies. For this reason, the IG and GC, understood as more specific tools, continue to have limitations pointed out in the main guidelines and are still awaiting more consensual positions.

Still in this paradoxical line represented by the more conservative guidelines, in view of the positive and beneficial findings of numerous recent articles (Livesey et al., 2019; Jenkins et al., 2021;

Du et al., 2022; Manta et al., 2023), it is essential to point out another critical point in the methodology for determining GA and GC.

GI determination protocols have two foods as a reference: either glucose or white bread (FAO, 1998). Depending on the chosen standard, different results (values) are generated, which in practice is considered by some scholars as another obstacle to methodological standardization and the achievement of a consensus in the *guidelines*.

In view of the above, an important historical evolution of these concepts is evident, but there are still shortcomings of standardization that hinder a clearer consensus in the main national and international guidelines. There is strong evidence of the benefits of adopting low-glycemic index and low-glycemic load diets in preventing diseases and improving numerous ailments.

Advances in research and significant findings have allowed these tools to be considered as adjuvant strategies in clinical and nutritional treatment. The expansion of GI and GL determination studies in foods, especially regional ones, has increased the possibility of more comprehensive and democratically verifiable scientific results in different parts of the world. Apparently, it is a scenario of continuous evolution, with its beginning in the 1980s and new perspectives observed today.

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SEVEN
publicações acadêmicas

Observation of mortality in extremely preterm newborns related to conditions of low or high oxygen supplementation beyond the target saturation range: A literature review

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Jaqueline Fernanda Felix Bertoncelo
Degree in Physiotherapy, HU-FMJ
E-mail: jaqueline.bertoncelo@outlook.com

Alex Oliveira
Doctor of Health Sciences, Jundiaí Faculty of Medicine
E-mail: ftalexoliveira@gmail.com

ABSTRACT
Prematurity is defined as a birth that occurs before 37 gestational weeks, and is often associated with the need for oxygen supplementation, however the saturation target of this population is debatable and is still widely debated, and some negatives were pointed out. This study aims to systematically review the available literature and evaluate the mortality associated with a target range of low and high saturation in extremely premature newborns, and the associated secondary ones as their respective pre-established saturation ranges. A review was performed based on eligible studies found through searches in the Pubmed and Scielo databases. Some negatives were pointed out, such as retinopathy of prematurity, cerebral palsy, neurodevelopmental impairment, septicemia, necrotizing enterocolitis, persistent increase in systolic blood pressure in adulthood, long-term bronchial hyperreactivity and death. Mortality is often related to lower saturation levels, making it relevant to understand this association to better define a target saturation range that minimizes related complications in this population.

Keywords: Oxigen saturation, Premature Infant, Mortality.

1 INTRODUCTION

Prematurity is defined as birth that occurs before 37 gestational weeks, and is subdivided into: moderate prematurity when birth occurs between 26 and 32 weeks of gestation, very premature born between 28 and 31 gestational weeks, and extremely premature those born below 28 weeks. The national health agency (ANS) reports that 11.7% of births in Brazil take place before the 37th gestational week, making the country occupy the 10th place in the world ranking of prematurity.

In this population, among other conditions, we are faced with immaturity of the respiratory system, often resulting in episodes of apnea, irregular breathing pattern, saturation drops, intermittent hypoxemia, among others, and oxygen supplementation is widely used. [1-3 years]

However, the saturation target for extremely preterm newborns is still uncertain and has been debated, since hyperoxemia and hypoxemia carry significant risks, and specifically in this population some negative outcomes have been pointed out, such as retinopathy of prematurity, cerebral palsy, neurodevelopmental impairment, septicemia, necrotizing enterocolitis, persistent systolic blood pressure elevation in adulthood, and mortality [1-7,]

It is not only inadvertent oxygen therapy that is related to high oxidative stress in premature newborns, there are other factors contributing to this condition such as being exposed to inflammation, frequent blood transfusions, parenteral nutrition and having a poorly developed defense system in relation to oxidative stress, so it is possible to understand the multifactoriness of this condition, however, having adequate control of O2 supplementation is one of the fundamental approaches to reduce oxidative stress.[5]

Pulse oximetry is the most commonly used and appropriate tool to monitor bedside O2 saturation, and it is possible to guide the titration of supplemental oxygen to provide it adequately to the patient.[3-6 years]

In view of the above, this study aims to systematically review the available literature and evaluate whether mortality is associated with a deviation from the target saturation range, low and/or high in extremely preterm newborns, as well as the secondary outcomes associated with their respective pre-established saturation ranges.

2 METHOD

It refers to a literature review conducted with the purpose of evaluating, as a primary outcome, the mortality rate associated with high and low saturation targets in extremely preterm newborns.

The descriptors were consulted in the health science descriptors (DECs), and the following descriptors were found: "oxygen saturation", "premature newborn", "mortality", "Oxygen saturation", "infant, premature" and "mortality"

Subsequently, the Pubmed and Scielo databases were searched. The search in pubmed was done with the following combination "Oxygen saturation and infant premature ", initially resulting in 1480 articles, of which after reading the titles and abstracts, 21 were chosen to read in full. With the application of filters (full text, clinical trial, meta-analysis, controlled and randomized test, being published in the last 5 years) to this combination of descriptors, this number reduced to 109 results. After reading the titles, 6 papers remained, and the abstracts were read and 3 were chosen for the complete reading. Performing the same associations of descriptors with the publication date extended to the last 10 years, 16 results were found and 4 articles were selected for full reading. Another combination performed in this database was "Oxygen saturation and infant premature and mortality", applied the same filters mentioned above, with 8 results, after reading the titles and abstracts, an article was selected for complete reading.

The search in the Scielo Database was carried out with the descriptor "premature newborn", with 477 results, after reading the titles, 3 articles were selected for reading in full. Thus, 5 articles were used for this review.

3 RESULTS

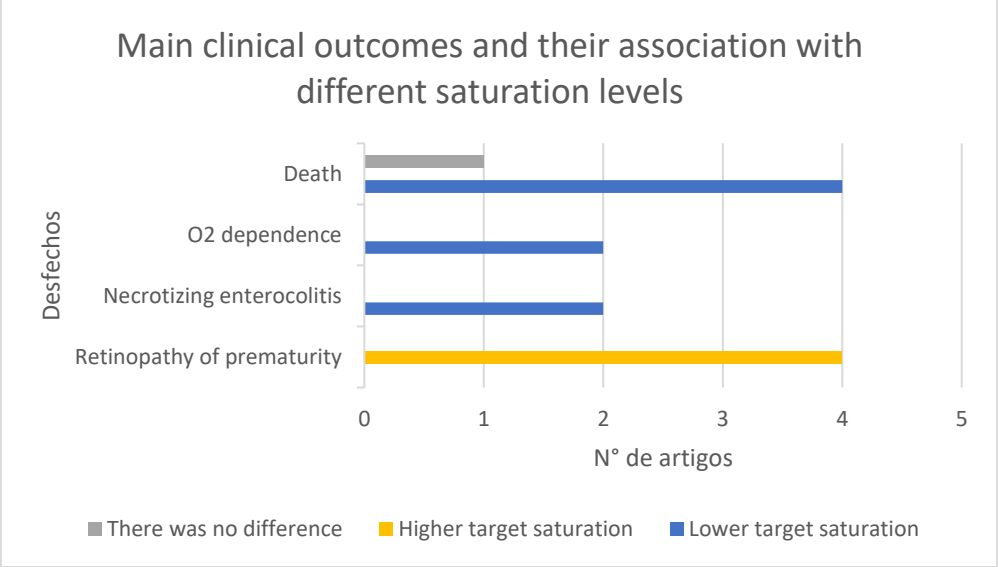
Table 1: Association of mortality to target saturation range

Authors/year	Type of study	Specimen characteristics	Target Saturation	Significant results
Oren et al [7] (2020)	Cohort	387 Neonates aged 24-27 weeks and 6 days were included in the analysis, randomized to lower and upper saturation target	Inferior: 85-89% Superior: 91-95%	The mortality rate was similar between the groups.
BOOST II [13] (2013)	Randomized controlled clinical trial	2448 recruited, born before 28 weeks of gestational age	Inferior: 85-89% Superior: 91-95%	Mortality was higher in the group with lower target saturation than in a group with a higher target.
Schmidt et al [14] (2013)	Randomized double-blind study	1201 babies from 23 weeks to 27 weeks and 6 days	Inferior: 85-89% Superior: 91-95%	51.6% of infants in the lower target range died or had disability, compared to 49.7% of the group with target saturation between 91 and 95%
[2] BOOST-II (2016)	Randomized clinical trial	It involved 15 Australian and 34 UK centres	Inferior: 85-89% Superior: 91-95%	Disability rate and death were more frequent in the group with lower saturation target
Walsh et al [15] 2016	Randomized clinical trial	1316 babies included, divided into AGA and SGA groups.	Inferior: 85-89% Superior: 91-95%	237 of the 1316 children included in the study died, 37 of whom were SGA and 200 AGA.

Legend: GA - gestational age; Fio2 - Fraction of inspired oxygen; SGA – small for gestational age; AGA – suitable for gestational age

Source: table developed by the authors themselves

Graph 1 :P main clinical outcomes and their association with different levels of saturation



Caption: O2 dependence: need for supplemental oxygen after 36 weeks; Lower target saturation: 85% to 89%, higher target saturation: 91% to 95%.

Source: Graph developed by the authors themselves

The main negative outcomes are associated with lower saturation targets, and only retinopathy of prematurity is often related to higher saturation levels. Other outcomes found did not show statistically relevant differences between the saturation targets observed, such as intraventricular hemorrhage, patent ductus arteriosus, hearing loss, blindness, cognitive delay, among others.

4 DISCUSSION

Extreme prematurity is defined as birth occurring between 22 and 28 weeks of gestational age, several conditions are related to the occurrence of prematurity, such as genetic, environmental and pregnancy-related factors.[10]

Prematurity is considered an important cause of neonatal death, and this population has an incomplete fetal development, which brings greater risks of morbidity and mortality, in addition to other factors that develop as a result of these conditions, such as greater manipulation, need for invasive procedures, prolonged stay in neonatal units, also considering the fact that they are more subject to infections. [8,9,10] These situations can lead to neurological, ophthalmological, or pulmonary developmental sequelae.[10] With regard to the respiratory system, due to this immaturity and sequelae, oxygen supplementation is widely used and necessary, but it is still a challenge as to the ideal saturation target for this specific population.

Hypoxia can be defined as the insufficient supply of O2 to meet the demands of the tissues, as opposed to hyperoxia, which corresponds to the excessive supply of O2 in relation to the demand.[11]

In an attempt to avoid periods of hypoxia in patients, it is possible that professionals expose patients to hyperoxemia, being considered an iatrogenic condition, which the body has no mechanisms to deal with, since this does not occur in nature.[11.12]

In the 1950s, studies showed that the supply of O2 without restriction was associated with higher rates of retinopathy of prematurity. On the other hand, lower supply was related to higher mortality. Several studies point to retinopathy as a finding associated with lower target saturation, and its treatment is usually efficient, but it may be associated with the cause of other ocular abnormalities that interfere with the quality of survival. Necrotizing enterocolitis is a consistent finding of the lower target saturation group, requiring surgical procedure and possibly associated with death.[13]

Oren et al [7] (2020) in their study that consisted of analyzing data in a cohort of 387 school-age children, analyzing oxygen saturation and blood pressure, were randomly separated into 2 groups, one group with higher target saturation and the other with higher saturation target, 85-89% and 91-95% respectively, The group with higher saturation target had more reports of retinopathy of prematurity and bronchopulmonary dysplasia. The proportion of mortality did not differ in the two groups, with a survival rate of 94-96%.

Another study shows similar results, where, through a randomized double-blind study conducted in 25 hospitals, the primary outcome observed was death before 18 months (corrected age) or survival with cognitive or language delay, bilateral hearing loss, and severe motor impairment. Among the 1201 babies analyzed, the previously established lowest and highest saturations did not differ significantly in the rate of death or disability, presenting in their results a mortality rate of 16.6% in the lower target group and 15.3% in the upper group. [14th]

This is different from the sample of the BOOST II study (2013), which consisted of evaluating 2448 infants (United Kingdom, Australia and New Zealand) randomized into a group with a pre-established upper target saturation between 91 and 95% and lower saturation between 85 and 89%. In the results presented, there was a difference in the mortality rate between the groups, with the lower group being associated with 23.1% mortality before hospital discharge, compared to 15.9% in the group with higher target saturation. The author also points out that 14 infants who had a saturation target between 85-89% needed to readjust the saturation target to an upper limit in order to avoid death. In this study, retinopathy was more associated with higher saturation (13.5%). Cases of necrotizing enterocolitis that required surgical intervention or were the cause of death were more associated with the lower target group, corresponding to 10.4% of the population. As soon as the analysis of the study showed a greater association of death with a lower target range of saturation, the study was terminated early

In the study carried out in 15 Australian and 34 UK centres, as well as in other studies already mentioned, the oximeters were modified so that the true reading would not be identified by observers, and a saturation of 3 percentage points more and less was displayed in the lower and upper target saturation group, respectively. In the Australian sample, 2454 patients were assessed for eligibility, 2228 of which were eligible and of these 1135 underwent randomization, of these 568 participated in the lower target and 567 in an upper target group. In the UK, 973 infants were enrolled, randomly separated into 366 for the lower target group and 357 for the upper target group. The authors report that the baseline characteristics of the population were similar between the groups. In both trials, with or without reviewed oximeters, disability rate and death were more frequent in the group with lower saturation target. The main causes of death reported included necrotizing enterocolitis, sepsis, intraventricular hemorrhage, and chronic lung disease.[2]

Walsh et al [15] (2016) make an association not only with target saturation levels, but also with the relationship between weight and gestational age and its possible correlation with mortality in preterm newborns. 1316 patients were included, of which 1220 were infants suitable for gestational age (AGA) and 96 SGA (small for gestational age), 237 children died, 37 SGA and 200 AGA infants.

The SGA group had a higher mortality rate associated with lower target saturation, corresponding to 56.1%, compared to 25.5% mortality in the upper target group. AGA babies, even

when exposed to a lower saturation target, did not present the same mortality, which is not usually differentiated in the analyses of the previously mentioned studies. The author suggests that infants considered small for gestational age may present hypoxia in the intrauterine period, reflecting on their respiratory control or affecting pulmonary vascular resistance, generating increased vulnerability to lower saturation targets. [15th]

Another finding is pointed out in the study by Di Fiore et al [1] (2019), which consists of data collection from a cohort in Ohio, consisting of 137 premature newborns with gestational age between 24 and 28 weeks, the primary outcome sought in this study aimed to observe the use of asthma medication in the first two years of life, Bronchopulmonary dysplasia (BPD) was also associated with the use of medications, and intermittent hypoxemia in the first 3 to 7 days may be associated with long-term respiratory morbidity, suggesting that these episodes of hypoxemia associated with oxygen supplementation predispose to long-term hyperreactivity.

Between 2005 and 2007, the collaboration called NeOprom (Neonatal oxigen prospective goal –analysis) included 5 randomized studies comparing lower and upper target saturation in relation to its effects on premature babies. In conclusion, in agreement with other studies cited here, low SPO2 may be associated with higher mortality and necrotizing enterocolitis and higher saturation related to retinopathy of prematurity.[16]

The lower and upper target saturation range ranged from 85-89% and 91-95%, respectively, and intermediate ranges were not addressed in the reviewed studies, compared to a higher target range, and currently evidence suggests that saturation between 91-95% is safer and less associated with death in extremely preterm newborns.[12th]

In view of the above, further research is suggested to elucidate the subject, taking into account the different baseline characteristics of extremely preterm infants and other saturation ranges, since all studies are based on the same saturation range.

5 CONCLUSION

According to the literature review, mortality in preterm newborns has a greater relationship with a lower saturation target, although in some studies the difference is not statistically significant.

An inadequate oxygen supply in this population can result in unfavorable outcomes, such as necrotizing enterocolitis, aiming at a lower saturation target, and with a higher saturation target, the occurrence of retinopathy of prematurity is more frequently found, such as cerebral palsy, neurodevelopmental impairment, septicemia, persistent systolic blood pressure elevation in adulthood, which are not significantly associated with a range of saturation-specific.

New studies with practical perspectives may bring more information on this topic, especially in this population of newborn patients who, due to small adjustments, may not suffer later from permanent damage.

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Clinical and epidemiological profile of patients admitted to a COVID-19 Maternal ICU in the city of Teresina-PI

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Kátya Coeli da Costa Loiola

Bruna Oliveira Evangelista

Natália de Sousa Alves

ABSTRACT

Objective: To trace the clinical and epidemiological profile of pregnant and postpartum women admitted to the COVID-19 intensive care unit in a highly complex maternity hospital in the city of Teresina-PI. Methods: This is a quantitative, descriptive, retrospective chart review study carried out in a maternity hospital located in the city of Teresina-PI. The medical records of pregnant women with a clinical or serological diagnosis of COVID-19 were included. Records with a lot of incomplete data (more than 20), patients without a diagnosis of COVID-19 and whose symptoms appeared after childbirth were excluded. Results: The total sample of this study consisted of 43 medical records of patients who met the established criteria, the majority being women aged between 18 and 30 years (60.4%; N=26), weighing more than 65 kg (60.4%; N=26), multigravida (55.8%; N=24), who had prenatal consultations (88.3%; N=38) and had at least one complication during pregnancy (67.4%; N=29). The most frequently reported clinical manifestations were dyspnea (95.3%; N=42) and cough (81.3%; N=35). In addition, the survey revealed a high rate of premature birth (80%; N=20) and caesarean section (100%; N=25). 69.7% (N=30) of the sample required ventilatory support. Further studies are needed to understand the true profile of this population and the other consequences that the disease has for pregnant women.

Keywords: Sars-CoV-2, COVID-19, Pregnant.

1 INTRODUCTION

The COVID-19 disease, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has rapidly evolved into a global pandemic, which has generated a serious public health problem at a global level.1

Transmission of the virus occurs mainly through contact with respiratory droplets from infected people and the disease causes serious disorders in the respiratory system, but it can also compromise other systems, such as the gastrointestinal system.2 The most prevalent symptoms of COVID-19 are: fever, dry cough, dyspnea, and fatigue, but complications such as pneumonia, severe acute respiratory syndrome, and death are frequent in the most severe cases of the disease.3.4

According to the Ministry of Health, people who have lung disease, cardiovasculopathies, obesity, hematological diseases, metabolic disorders, or are pregnant at any gestational age, are included in conditions and risk factors to be considered for possible complications of flu-like syndrome.5

Pregnancy causes immunosuppressive conditions, so factors such as altered immunity, reduced respiratory capacity, vascular and hemodynamic changes make pregnant women vulnerable to infectious diseases, and consequently, with a higher risk of complications. In addition, the possibility of vertical transmission of the infection from the mother to the fetus is not ruled out.6

The impact of SARS-CoV-2 infection on pregnant women continues to be debated and new information is constantly being published, however, studies end up contradicting each other.7 While early data from China indicate that pregnant and non-pregnant women infected with COVID-19 have had similar reports of the disease, more recent data show that pregnant women are more likely to be admitted to the intensive care unit (ICU), preterm birth, and at increased risk of maternal death.8

Research by Badr et al. (2020) indicated that pregnant women diagnosed with of COVID - 19 in ≥20 weeks of gestation when compared to non-pregnant women, had a higher risk of ICU admission, in addition to greater respiratory decompensation, requiring supplemental oxygen therapy (OT) and endotracheal intubation (FTE). 9 In contrast, a cohort study conducted by Vouga et al. (2021) observed severe outcomes in women exposed to the virus before 20 weeks of gestation.7

Despite the existence of studies that address the repercussions of the coronavirus on pregnant women, more research is still needed to expand scientific knowledge and assist in the early diagnosis and treatment of the disease. Once we are aware of the prevalent risk factors for the worsening of the disease, it will be possible to minimize cases of death and sequelae in pregnant patients.

Thus, the present study aims to outline the clinical and epidemiological profile of pregnant and postpartum women hospitalized in the COVID-19 intensive care unit in a high-complexity maternity hospital, and to allow reflection on possible forms of prevention and care for this public.

2 METHODOLOGY

This is a quantitative, descriptive and retrospective study, based on the analysis of medical records of a high-complexity maternity hospital in the city of Teresina, Piauí. The maternity hospital is the only one in the state that has a maternal intensive care unit for the treatment and isolation of pregnant women with suspected and/or confirmed COVID-19. The study was initiated after its approval by the Research Ethics Committee of the State University of Piauí (CEP/UESPI) and the Ethics Committee of the co-participating institution, by opinion 5.206.814, respecting the ethical precepts in research with human beings, according to resolution CNS/MS 466/12.

The sample consisted of patients admitted to the COVID-19 Maternal ICU of the aforementioned maternity hospital, admitted from January to July 2021, totaling 83 medical records. Of these, 28 were not found and 12 did not meet the inclusion criteria, resulting in the 43 medical records used in this study. Pregnant women with a clinical or serological diagnosis of COVID-19 were included. Patients with very incomplete medical records (>20 blank variables), without a diagnosis of

COVID-19 (clinical or serological), and those who had flu-like symptoms after delivery were excluded.

Data collection was carried out from February to May 2022, in the room of the Medical Archive and Statistics Service (SAME) of the maternity hospital, lasting about 4 hours a day. The medical records were accessed randomly, following the order in which they were made available by the sector team. For data collection, a data collection form developed by the researchers (Appendix B) was used.

Data related to the patient's gestational/clinical history were collected, identifying aspects such as: prenatal, perinatal and postnatal history of the current pregnancy; information on flu-like syndrome, ventilatory and medication support during hospitalization, as well as the need for cardiopulmonary resuscitation.

In addition, prenatal care, number of consultations, maternal weight, mode of delivery, gestational complications, testing for COVID-19 by RT-PCR or through rapid test, hospitalization period, clinical condition during hospitalization, invasive and non-invasive ventilatory support, use of vasoactive drugs and antibiotic therapies were other variables studied. Information on the socioeconomic and demographic conditions of the sample was also collected.

The data were organized and tabulated in an Excel 2007 spreadsheet and then analyzed in the open-source statistical program JASP 16.3 of the University of Amsterdam. Simple descriptive statistics were presented as percentages (%) and absolute frequencies (N), according to the normality of the data collected, which was evaluated by the Shapiro-Wilk test.To identify the association between positive testing, weight and clinical outcome, Pearson's chi-square test ($p<0.05$) was used.

3 RESULTS

A total of 43 pregnant women participated in the study. Of these, 26 were between 18 and 30 years old (60.4%), 13 were between 31 and 40 years old (30.2%), 3 had not yet reached the age of majority (6.9%) and 1 was over 40 years old (2.3%). Regarding demographic data, it was found that 14 mothers were born in Teresina-PI (32.5%), 2 in Timon-MA (4.6%), and the vast majority (62.7%; n=27) from the interior of Piauí. All information regarding the mothers' social and demographic variables is shown in Table 1.

Table 1- Characterization of the studied sample according to sociodemographic variables (N=43), Teresina-PI, 2021.

Characteristics	N	%
Age range (years)		
<18 AM	03	6,9
18 a 30	26	60,4
31 a 40	13	30,2
>40	01	2,3
Weight (kg)		
50 a 65	12	27,9
>65	19	44,1
Obesity	07	16,2
Not in the medical record	05	11,5
Schooling		
Complete Fundamental	03	6,9
Complete High School	18	41,8
Full Superior	02	4,6
Not in the medical record	20	46,5
Marital status		
Single	19	44,1
Married woman	10	23.2
Stable union	13	30,2
Not in the medical record	01	2,3
Colour		
White	01	2,3
Curtain	22	51,1
Black	01	2,3
Not in the medical record	19	44,1
Profession		
Student	03	6,9
From home	03	6,9
Administrative Assistant	01	2,3
Crediarist	01	2,3
Receptionist	01	2,3
Cashier	01	2,3
Rural worker	01	2,3
Not in the medical record	31	72,0
Naturalness		
Teresina-PI	14	32,5
Timon-MA	02	4,6
Interior of Piauí	27	62,7
TOTAL	**43**	**100,0**

Source: SAME from survey site, 2022.

The gynecological and obstetric profile of the sample is described in Table 2. In it, it can be observed that only 5 participants (11.6%) did not have records of prenatal consultations in their medical records, and 29 of them (67.4%) had at least four consultations. Regarding complications during pregnancy, the most recurrent were urinary tract infection (18.6%; N=8) and oligohydramnios (18.6%; N=8) and that more than half had at least one coexisting disease (67.4%; N=29). The sample had 25 deliveries, of which 20 (80%) were premature.

Table 2- Descriptive results of the gynecological and obstetric profile of mothers admitted to the COVID-19 ICU. (N=43) Teresina-PI, 2021.

Characteristics	N	%
Number of pregnancies		
1	16	37,2
2	11	25,5
3	07	16,2
4 or more	06	13,8
Ignored	03	6,9
She received prenatal care during her current pregnancy		
Yes	38	88,3
No	00	0,0
Ignored	05	11,5
Number of antenatal visits		
1 a 3	09	20,9
4 a 6	20	46,5
7 a 10	09	20,9
Ignored	05	11,5
Complications in the current pregnancy		
Gestational Diabetes Mellitus	04	9,3
Hypertension	04	9,3
Preeclampsia	04	9,3
Oligohydramnios 08 18.6	08	18,6
Polyhydramnios	01	2,3
Anemia	03	6,9
Urinary tract infection	08	18,6
Vulvovaginite	03	6,9
Syphilis	01	2,3
Candidiasis	01	2,3
Bleeding	02	4,6
HELLP Syndrome	01	2,3
Lupus	01	2,3
Breast cancer	01	2,3
Asthmatic bronchitis	01	2,3
Pielonefrite	01	2,3
Uneventful	14	32,5
Type of delivery performed (current pregnancy)		
Cesarean	25	58,1
Vaginal	00	0,0
She did not give birth during her hospital stay	17	39,5
Classification of newborns* according to GA at birth**	**N=25**	**%**
Preterm	20	80,0
Full-term	05	20,0
TOTAL	**43**	**100,0**

Source: SAME from survey site, 2022.
*NB= newborn; **GA= Gestational age

Table 3 presents data regarding flu-like symptoms, gestational period in which they started, and the drug treatment administered in the sample. All participants in the research were tested for COVID-19, of which 40 (93%) obtained a positive result. Dyspnea was the most common symptom (95.3%; N=41), followed by cough (81.3%; N=35) and fever (46.5%; N=20).

The pharmacological treatment of these patients was predominantly with corticosteroids (97.6%; N=42), with dexamethasone being the most commonly used drug (88.3%; N=38). Among antibiotics (90.6%; N=39), the use of azithromycin prevailed (92.3%; N=36), followed by ceftriaxone (84.6%; N=33) and, in its minority, vasoactive drugs, in which noradrenaline was the only one mentioned in this group (4.6%; N=2).

Table 3 - Description of flu-like symptoms presented, period of initiation and drug treatment used (N=43), Teresina-PI, 2021.

Symptoms	N	%
Dyspnoea	41	95,3
Cough	35	81,3
Fever	20	46,5
Body aches	10	23,2
Headache	05	11,6
Tiredness	04	9,3
Nausea	04	9,3
Diarrhoea	02	4,6
GI* symptom onset (weeks)	**N**	**%**
1-13	00	0,0
14-26	12	27,9
27-40	31	72,0
Drug treatment	**N**	**%**
Steroids	42	97,6
Antibiotics	39	90,6
Vasoactive drugs	02	4,6
TOTAL	**43**	**100,0**

Source: SAME from survey site, 2022.
*GI: Gestational age

A total of 37 (86%) participants had breathing difficulties; of these, 30 (69.7%) required ventilatory support, of which 27 used noninvasive ventilation (NIV) and 9 (20.9%) used invasive mechanical ventilation (IMV). Most mothers (69.7%; N=30) had a record of computed tomography of the lung in their medical records, which mostly showed pulmonary involvement ranging from 26-50% (23.2%; N= 10) and 51-75% (27.9%; N=12) (Table 4).

Table 4 - Sample distribution based on the use of ventilatory support and pulmonary involvement (N=43), Teresina-PI, 2021.

Classification	N	%
Length of hospital stay (days)		
1 a 5 6 a 15 >15	21 15 07	48,8 34,8 16,2
Ventilatory support	N	%
Yes No	30 13	69,7 37,2
Non-invasive ventilation	N	%
Yes No	27 16	62,7 37,2
NIV support time (hours)		
< 12 12-24 25-48	17 08 02	62,9 29,6 7,4
Invasive ventilation		
Yes No	09 34	20,9 79,0
VMI Support Time (days)		
1-7 8-15 >15	01 03 05	11,1 33,3 55,5
Pulmonary involvement (%)		
0 5-25 26-50 51-75 >75 Not in the medical record	01 04 10 12 03 13	2,3 9,3 23,2 27,9 6,9 30,2
Clinical outcome		
Loud Death	40 03	93,0 7,0
TOTAL	**43**	**100,0**

Source: SAME from survey site, 2022.

The relationship between positive testing for COVID-19 disease, weight, and hospitalization outcome, as shown in table 5, was researched, and it resulted in a p of 0.005, which is statistically significant, which indicates that obese patients infected with the SARS-CoV-2 virus had higher death rates.

Table 5 - Chi-square test: Association of the sample regarding testing for COVID-19 disease and weight with hospital clinical outcome (N=43). Teresina-PI, 2021.

Test Result*	**Hospitalization outcome**		
	Death	**Loud**	**Total**
Negative	0	3	3
Positive	3	37	40
Weight (kg)**	**Death**	**Loud**	**Total**
50 a 65	0	12	12
>65	0	19	19
Obesity	3	4	7
Not listed	0	5	5
Total	**3**	**40**	**43**

Source: SAME from survey site, 2022.
*p=0,623; **p=0.005

When performing Pearson's chi-square test to evaluate the comparison between the variables COVID-19 test and hospitalization outcome, the p-value found was 0.623 and it was verified that the relationship is not statistically significant, therefore, it is inferred that death rates in pregnant women with COVID-19 may be related to some pre-existing comorbidities and not only to infection by the virus.

While correlating weight and hospitalization outcome, it can be observed that obesity is related to death, with a value of $p<0.05$.

4 DISCUSSION

Studies show that cough, fever, body aches, and shortness of breath are part of the predominant symptoms in COVID-19 patients.10-12 In the study conducted by Molina et al., 70% of the sample had fever, 65% cough and 35% myalgia, in addition, only 20% of the participants had a single symptom, which is in agreement with the result found in the present study, where 96.7% of the sample showed a combination of symptoms.13

A study by Yan et al. found that 85 out of 99 pregnant women admitted to hospitals in Hubei Province, China, had a cesarean section.14 These data corroborate the findings of this investigation, in which 100% (N=25) of the deliveries in the sample were surgical. However, a survey conducted by Dollinger et al. between April 2020 and February 2021, with 193 pregnant women positive for SARS-CoV-2, showed 144 (74.6%) deliveries and of these, 115 (80%) were vaginal; however, 43% of their total sample was asymptomatic for COVID-19.15 Therefore, it is suggested that further studies be conducted to compare symptomatic and asymptomatic patients and the type of delivery.

A systematic review published by Matar et al., concluded that the rate of preterm labor (PPT) is considerably higher in pregnancies of coronavirus-infected mothers (especially in the 3rd trimester), when compared to pregnancies without this infection.16 In this context, a study by Antoun et al. reveals

that 37% (N=7) of patients who acquired the infection in the 3rd trimester had preterm birth, a figure that remains higher compared to the national rate of preterm birth (7.3%).17th

The present study found results similar to those of the researchers mentioned above, since 58% (N=18) of the mothers who acquired the virus in the last 3 months of pregnancy had a premature birth. However, it is still believed that it is valid to carry out studies with a larger sample that correlate the trimester of pregnancy in which the disease was contracted with the incidence of premature birth.

In addition to SARS-CoV-2 contamination, multiparity is another risk factor for preterm labor.18 Alves et al. point out that women who have more than three deliveries have a higher risk of PPT and this fact may be linked to the way the fertilized egg is implanted in the uterine wall.19,20 This information is in agreement with the results of this study, in which 13 of the 20 preterm newborns came from multiparous mothers, and of these, 8 were at least in their third pregnancy.

The literature shows that prenatal care is important for the identification of gestational risk factors and aid in prevention and early treatment during pregnancy, and this is of paramount importance for reducing preterm birth rates and for maternal and child health.19,21,22

Regarding complications during pregnancy, most pregnant women presented, in addition to the coronavirus, at least one type of disease, predominantly urinary tract infection (18.6%; N=8) and oligohydramnios (18.6%; N=8), followed by preeclampsia (9.3%; N=4) and gestational diabetes (9.3%; N=4), and that, during prenatal care, some of them could be identified and treated early, such as urinary tract infection and oligohydramnios. When comparing the list of pre-existing comorbidities, it was noticeable that obese patients had the worst outcome of the disease. Of the 7 pregnant women who had BMI above adequate, 3 (42.8%) of them died. One of them, in addition to obesity, also had GDM and chronic arterial hypertension and another had oligohydramnios and urinary tract infection during pregnancy.

Studies show that obesity is a risk factor for hospitalization, ICU admission, and the development of serious consequences leading to death, in case of COVID-19 infection.23-26 During pregnancy, obesity is a risk for several pathologies and complications, such as gestational diabetes, preeclampsia, breathing difficulties, and preterm birth.27 There is a lack of research that addresses this specific topic, so the correlation between obesity, COVID-19 and pregnancy should be further studied, bringing better conclusions.

Regarding drug treatment, the vast majority of the sample in this study used corticosteroids (97.6%; N=42) and antibiotics (90.6%; N=39). The use of corticosteroid administration includes fetal lung maturation, acute flare-up of autoimmune disease, prophylaxis for pneumonia, and relief of inflammation.28 D'Souza et al., in their research conducted in May 2020, state that the use of dexamethasone is proven and recommended for pregnant patients with COVID-19 who are mechanically ventilated or who require supplemental oxygen.29th

The most commonly used antibiotics in this study were Azithromycin (89.7%) and Ceftriaxone (84.6%), most of the time (76.9%), being a combination of these medications, which corroborates the instructions of the Manual of Recommendations for the Care of Pregnant and Postpartum Women in the Face of the Covid-19 Pandemic.30th

Computed tomography (CT) is considered the reference standard for diagnosing pulmonary changes resulting from COVID-19.12 Scientific evidence shows that the majority of patients diagnosed with COVID-19 have CT scans with abnormal results.14,16,31 In the cohort study conducted by Antoun et al., 20 of the 23 COVID-19-positive pregnant women had pulmonary involvement.17 This corroborates the results of the present study, in which only one patient had a CT scan of the lung with no abnormalities.

Respiratory distress was present in 37 patients in this study. To treat this insufficiency of the cardiorespiratory system, 62.7% (N=27) of the sample was submitted to the use of noninvasive ventilation, as in the study by Chen et al, in which all patients received NIV support.32 This type of support is a good alternative to avoid orotracheal intubation and its complications, in addition to reducing the risk of nosocomial pneumonia.

In the sample of this study, 6 patients used both forms of ventilatory support; when NIV proved to be ineffective in supplying the respiratory failure of these mothers, it was necessary to migrate to invasive ventilation. Another 3 patients used only invasive support.

This study had some limitations. The main one was the size of the sample, since 28 medical records were not found on the premises of the maternity hospital, and among them, 12 were from patients who died. Therefore, the results found in this study may not be in accordance with what actually happened with the total number of patients admitted in the study period. Another difficulty encountered was that some of the medical records used were not completely completed, leaving gaps in some of the variables studied and making it difficult to discuss them. Therefore, it is difficult to assess the risk factors for disease severity and mortality.

5 FINAL THOUGHTS

The profile of hospitalized mothers was women between 18 and 30 years of age, weighing more than 65 kg, multiparous, who had prenatal consultations and had at least one complication in pregnancy. The most frequently reported clinical manifestations were dyspnea and cough.

Due to the low rate of deaths present in the study, the severity of the disease cannot be associated with the clinical outcome of hospitalization, but it can be correlated with the high rate of premature births. Maternal-fetal risk factors coincide with COVID-19 risk factors, including obesity, diabetes, hypertensive syndromes, and lung diseases.

Thus, it is necessary to carry out more studies to understand the true profile of this public and to understand the other consequences that the disease brings to pregnant women.

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APPENDIX A - Data Use Commitment Term (TCUD)

I, Kátya Coeli da Costa Loiola, researcher responsible for the research project entitled "CLINICAL AND EPIDEMIOLOGICAL PROFILE OF PREGNANT WOMEN HOSPITALIZED IN A COVID-19 INTENSIVE CARE UNIT IN THE CITY OF TERESINA PI", together with BRUNA OLIVEIRA EVANGELISTA participating researcher, committed ourselves to using the data contained in the medical records of the

Dona Evangelina Rosa Maternity Hospital (MDER) in order to obtain the following objectives: - To outline the clinical and epidemiological profile of pregnant women hospitalized in the COVID-19 intensive care unit in a high complexity maternity hospital in the city of Teresina-PI.

- Describe the clinical and socioeconomic profile of pregnant women;
- Identify the clinical severity of the disease in pregnant women;
- To assess the clinical outcome of the disease in pregnant women diagnosed with COVID-19.
- To verify whether the worsening of the disease in pregnant women is associated with the prevalence of maternal risk factors.

Thus, I inform you of the need to waive the Free and Informed Consent Form, since no nominal data will be collected.

I declare that the information collected will be used solely and exclusively for scientific purposes, unless required by law or competent institution, I also declare that it is our responsibility to take care of the integrity of the information and to ensure the confidentiality of the data.

_____ _____

Prof. Kátya Coeli da Costa Loiola Bruna Oliveira Evangelista

CPF: 038.450.854-52 CPF: 046.169.753-02

Principal Investigator Participating Researcher

APPENDIX B - DATA COLLECTION FORM

Medical Record No.: _____

Age: ( ) < 18 years old ( ) 19 to 27 years old ( ) 28 to 35 years old ( ) 36 to 40 years old ( ) > 40 years old

Weight: ()< 50kg ( ) 50 to 65kg ( ) > 65kg

Marital status: ( ) Single ( ) Married ( ) Widow ( ) Divorced ( ) Common-law union

Schooling:( ) No schooling ( ) Elementary ( ) High School

( ) Incomplete Superior ( ) Complete Superior

Color:( ) White ( ) Black ( ) Yellow ( ) Brown ( ) Indigenous

Place of Birth:___

Family income:( ) < 1 minimum wage ( ) 1 minimum wage ( ) > 1 minimum wage

Habits: Alcohol ( ) Yes ( ) No Cigarettes ( ) Yes ( ) No

Number of pregnancies: ( ) 1 ( ) 2 ( ) 3 ( ) 4 or more

CURRENT PREGNANCY

Prenatal care:( ) Yes ( ) No

Number of consultations: ( ) 1 to 3 ( ) 4 to 6 ( ) 7 to 10

Prenatal exams:

Pregnancy complications: ( ) Preeclampsia ( ) Eclampsia ( ) HELLP

( ) Bleeding ( ) Gestational DM ( ) Vulvovaginitis ( ) Chorioamnionitis

( )Oligohydramnios – ILA ( ) Polyhydramnios – ILA ( ) IUR ( ) RPMP

( ) Hospitalization _____ days ( ) Preterm labor

( ) Other: ___

Medications: ____

Prenatal corticosteroids:( ) No ( ) Yes, number of doses ____

Flu-like symptoms: ( ) Yes ( ) No

( ) Cough ( ) Fever ( ) Tiredness ( ) Body aches ( ) Headache

( ) Sore throat ( ) Nausea ( ) Diarrhoea ( ) Tiredness ( ) Dyspnoea

Gestational age at which symptoms appeared:___

COVID test:( ) Yes ( ) No Result: ( ) Positive ( ) Negative

CT scan of the lung: ( ) Yes ( ) No

( ) between 5% and 25% of pulmonary involvement

( ) between 26% and 50% of pulmonary involvement

( ) between 51% and 75% of pulmonary involvement

( ) greater than 75% of pulmonary involvement

PARTURITION

Gestational age:

Type of pregnancy:( ) Single ( ) Multiple – order _____

Type of delivery:( ) Vaginal ( ) Forceps ( ) Cesarean section – Indication ___

Anaesthesia: ( ) Local ( ) Regional ( ) General

COVID-19 Induced Labor:( ) Yes ( ) No

COVID-19 maternal ICU admission

Number of days: ____

Symptoms present: ____

Breathing difficulties:( ) Yes ( ) No

Antibiotic use:( ) Yes ( ) No

What? _____

Use of vasoactive drugs:( ) Yes ( ) No

What?_____

Use of corticosteroids:( ) Yes ( ) No

What? _____

Other medications: ____

Ventilatory support: ( ) Yes ( ) No ( ) Invasive ( ) Non-invasive

Time of invasive ventilatory support:

( ) between 1 and 7 days ( ) between 8 and 15 days

( ) greater than 15 days

Duration of non-invasive ventilatory support:

( ) <12 hours ( ) between 12 and 24 hours ( ) between 25 and 48 hours

( ) greater than 48 hours

Non-invasive support type and interface:

( ) Epap

( ) Bipap

( ) Total Face Mask

( ) Nasal Face Mask

( ) Helmet type mask

Cardiopulmonary resuscitation:( ) Yes ( ) No

Form of contamination:

( ) Contact with an infected person

( ) Presence in a crowded environment

( ) I don't know

Hospitalization outcome:( ) Discharge ( ) Death

ANNEX - EMBODIED OPINION OF THE CEP

UNIVERSIDADE ESTADUAL DO PIAUÍ - UESPI

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Perfil clínico e epidemiológico de gestantes internas em uma unidade de terapia intensiva COVID-19 na cidade de Teresina-PI

Pesquisador: Kátya Coeli da Costa Loiola

Área Temática:

Versão: 1

CAAE: 54882221.5.0000.5209

Instituição Proponente: Universidade Estadual do Piauí - UESPI

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 5.206.814

Apresentação do Projeto:

Trata-se de um estudo de cunho quantitativo, descritivo e retrospectivo. Será feita a análise retrospectiva de prontuários registrados no período de janeiro de 2021 a julho de 2021 de gestantes internadas no setor COVID-19 em uma maternidade de alta complexidade na cidade de Teresina-PI. Serão coletados dados relacionados ao histórico gestacional/clínico da paciente identificando aspectos como: histórico socioeconômico materno, história pré, peri e pós natal da gravidez atual; informações sobre síndrome gripal, suporte ventilatório e medicamentoso durante internação, bem como a necessidade de reanimação cardiopulmonar. Para isso, além do prontuário, será utilizada uma ficha elaborada pelos pesquisadores. A análise dos dados será realizada de forma descritiva após a escolha de dados paramétricos e não paramétricos e das variáveis dependentes e independentes.

Objetivo da Pesquisa:

Objetivo Primário:

Traçar o perfil clínico e epidemiológico de gestantes internas em unidade de terapia intensiva COVID-19 em uma maternidade de alta complexidade na cidade de Teresina-PI.

Objetivo Secundário:

- Descrever o perfil clínico e socioeconômico das grávidas internas;

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Bairro: Centro/Sul **CEP:** 64.001-280
UF: PI **Município:** TERESINA
Telefone: (86)3221-6658 **Fax:** (86)3221-4749 **E-mail:** comitedeeticauespi@uespi.br

- Identificar a gravidade clínica da doença em grávidas;- Avaliar o desfecho clínico da doença em grávidas diagnosticadas com a COVID-19;
- Verificar se o agravamento da doença em gestantes está associado à prevalência de fatores de risco materno.

Avaliação dos Riscos e Benefícios:

Riscos:

Como provável risco decorrente da pesquisa tem-se a exposição dos participantes a um possível vazamento dos dados do prontuário. O extravio do prontuário também pode aparecer como risco secundário da pesquisa. Neste sentido, com o intuito de minimizar a probabilidade desse possível extravasamento de dados os prontuários dos participantes não serão identificados e será assegurada, por parte dos pesquisadores, a confidencialidade das informações através da assinatura do Termo de Compromisso de Utilização de Dados. Mesmo com esses cuidados, no caso, se alguém entrar na sala no momento da coleta, esta, será suspensa e só retornará quando apenas o pesquisador esteja no local.

Benefícios:

Entre os benefícios desse estudo destaca-se a possibilidade de contribuir com a ciência no desenvolvimento

Comentários e Considerações sobre a Pesquisa:

Pesquisa viável e de grande alcance social.

Considerações sobre os Termos de apresentação obrigatória:

Foram apresentados:

- Folha de Rosto preenchida, assinada, carimbada e datada.
- Declaração da Instituição e Infra-estrutura em papel timbrado da instituição, carimbada, datada e assinada;
- Projeto de pesquisa na íntegra (word/pdf);
- Instrumento de coleta de dados EM ARQUIVO SEPARADO(questionário/entrevista/formulário/roteiro);
- Termo de Consentimento da Utilização de Dados (TCUD).

Conclusões ou Pendências e Lista de Inadequações:

De acordo com a análise, conforme a Resolução CNS/MS Nº466/12 e seus complementares, o

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Bairro: Centro/Sul **CEP:** 64.001-280
UF: PI **Município:** TERESINA
Telefone: (86)3221-6658 **Fax:** (86)3221-4749 **E-mail:** comitedeeticauespi@uespi.br

presente projeto de pesquisa apresenta o parecer APROVADO por se apresentar dentro das normas de eticidade vigentes.

Apresentar/Enviar o RELATÓRIO FINAL no prazo de até 30 dias após o encerramento do cronograma previsto para a execução do projeto de pesquisa.

Considerações Finais a critério do CEP:

APRESENTAR/ENVIAR O RELATÓRIO FINAL APÓS O TÉRMINO DA PESQUISA.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1850174.pdf	06/01/2022 16:21:38		Aceito
Outros	instrumento_de_coleta_de_dados.pdf	06/01/2022 16:18:45	BRUNA OLIVEIRA EVANGELISTA	Aceito
Cronograma	cronograma.pdf	06/01/2022 16:17:24	BRUNA OLIVEIRA EVANGELISTA	Aceito
Orçamento	orcamento.pdf	06/01/2022 16:17:07	BRUNA OLIVEIRA EVANGELISTA	Aceito
Folha de Rosto	folha_de_rosto.pdf	06/01/2022 16:08:29	BRUNA OLIVEIRA EVANGELISTA	Aceito
Projeto Detalhado / Brochura Investigador	ProjetoTCC_Bruna_Evangelista.pdf	21/12/2021 10:07:02	BRUNA OLIVEIRA EVANGELISTA	Aceito
Declaração de Instituição e Infraestrutura	CartadeAnuenciaMDER.pdf	21/12/2021 09:31:02	BRUNA OLIVEIRA EVANGELISTA	Aceito
Declaração de Pesquisadores	declaracaoDeCompromisso.pdf	29/10/2021 16:46:08	BRUNA OLIVEIRA EVANGELISTA	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	dispensa_TCLE_uespi.pdf	29/10/2021 16:42:28	BRUNA OLIVEIRA EVANGELISTA	Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

Endereço: Rua Olavo Bilac, 2335
Bairro: Centro/Sul **CEP:** 64.001-280
UF: PI **Município:** TERESINA
Telefone: (86)3221-6658 **Fax:** (86)3221-4749 **E-mail:** comitedeeticauespi@uespi.br

TERESINA, 20 de Janeiro de 2022

Assinado por:
LUCIANA SARAIVA E SILVA
(Coordenador(a))

Endereço: Rua Olavo Bilac, 2335
Bairro: Centro/Sul **CEP:** 64.001-280
UF: PI **Município:** TERESINA
Telefone: (86)3221-6658 **Fax:** (86)3221-4749 **E-mail:** comitedeeticauespi@uespi.br

The potential of health as a theoretical framework for nursing

https://doi.org/10.56238/sevened2023.004-030

Marcelo da Silva Alves
Graduated in Nursing and Midwifery at UFJF, he is a Full Professor at the Faculty of Nursing at UFJF. She has a degree in Psychiatric Nursing and Mental Health, a Master's degree in Nursing from the School of Nursing at UFMG and a PhD in Collective Health from the Institute of Social Medicine at UERJ. He holds a Post-Doctorate in Social Sciences from UFJF.

ABSTRACT
It proposes a nursing theory based on Health Potentials. This reference works with the humanistic, phenomenological and existential issues of nursing from a post-modern perspective. It aims to be a reference for nurses and nursing students to develop the Systematization of Nursing Care (SAE) based on a simple, far-reaching reference, centered on the demands and expectations of clients, families and communities. It is hoped that this framework will be a facilitator, due to its uniqueness and simplicity of understanding and description, so that nursing can understand the importance of systematizing nursing care based on a theoretical reference focusing on the subjects in their own contexts of life and existence. The theoretical proposition, as well as its paradigms and mataparadigms, meet the ideological determinants of the Brazilian health system, promoting the inclusion of clients, families and communities in their therapeutic plans, overcoming the hard biomedical model and promoting care where the subjectivation of the subjects is the central axis of all actions, values and concepts.

Keywords: Nursing, Theory, Health potentials.

1 INTRODUCTION[1]

Living the experience of Nursing for forty years in various fronts of action such as hospital units and specialized services, made me observe the itinerary of clients and users through the health system, since a time when there was no talk of values and concepts that today are more transversal and discussed such as comprehensiveness, humanization, equity, and others that are so fashionable in health discussions, whether in academia or health services.

Living these experiences means not only observing, but being directly affected by them, whether as a professional or as a client/user. Such affectation refers to the fact that some conditions and situations experienced marked me in an effective and direct way, offering me the opportunity to carry out a conjunctural analysis in search of answers to questions that have always bothered me in the health sector, such as the power relationship that is established between professionals and users, the indifference in relation to individuality that is certainly present in the various behaviors presented by these users, their conditions of adaptation and responses to the various extreme conditions to which they are subjected and, mainly, about the potential that each user has to deal with the adversities that appear to them throughout their life cycle and the health/disease process.

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2 PURPOSE

In the medicalized society in which we live, we perceive a model of health care centered on the disease and health needs that have as their central focus the expectations, practices and knowledge of health professionals. In this model of care, the center of the therapeutic process is the professional, leaving aside the clients' expectations, their knowledge, their potentialities, their self-knowledge and their life experiences.

This model reinforces the idea of dependence and incapacity of clients, who are positioned in the health system as mere objects of health practices, incapable of participating, deciding, choosing and giving their opinion on the ways of living that are more peculiar to them and more in accordance with their realities. It is quite common to see this alienation of health practices when we notice that health care is prescribed without considering the potential that clients have to follow therapeutic plans, whether for cultural, social, physical, emotional or economic reasons.

Since the emergence of the clinic in the eighteenth century (Foucault, 1977), the hegemony of therapeutic actions has been singular in the sense of reinforcing a prescriptive model – like a cake recipe – where the professional holder of medical or biomedical knowledge dominates the client with a proposal that places him, most of the time, in an inferior condition in all senses. which ends up generating attention to the logic of compassion, as shown by Caponi, 2000)

The logic of compassion, and the alienation of health practices, have their origin in modernity, when Enlightenment thought included scientific thinking in the health agenda as a criterion of social justice and a path to the search for social well-being. Despite the reactionary "good intentions" of Enlightenment thought, which sought a way of living and organizing society in a more humanistic way, we can see that much has been lost of the original idea of equality, liberty and fraternity, with the emergence of the industrialization process, which forced health care to be organized around collective needs. This loses the character of the individual uniqueness of health practices, as a way of attending to the organization of large cities that expanded around the industrial centers that emerged at the height of the industrialization era.

The process of industrialization brought the benefits and facilities of technologies, but on the other hand, it brought the loss of individualization, of the singularization of subjects, and of the Human being as the center of the processes, which became the means, and not the end.

Nowadays, after the entire movement of the Brazilian health reform, the issue of health care has strong allies such as the expanded concept of health, comprehensiveness, humanization and the strengthening of the ties between health and social well-being. This alliance, already firmly celebrated between the large area of health and social issues, can be observed in the transit that occurred in the midst of the reformist movement, between medical sociology and sociology of health, placing social issues on the health agenda in a more effective and systematized way (NUNES, 2006)

In contemporary times, social issues related to health care are pointed out and permeated by three essential points: The facts of health, the values and concepts that permeate these facts, showing that care should be treated contextually and not only from a structural point of view with the use of norms, routines and the use of heavy technologies (MERHY, 2002), (LISS, 2003).

Liss (2003) argues that these elements (facts, values and concepts) should be the mainspring of the approaches given to the issue of health care. This makes us think that a new cultural posture is emerging in the health scenario, which removes the weight of the duty to do as a mission of modernity (Maffesoli, 2001), and incorporates a new paradigm of health dictated by the transformations of postmodern thought, such as bonding, flexibility and the new social order that directs the health sector towards a new proposal. From the logic of social relations and the new organizations of society.

Thinking about the flexibilization of health practices, and a new paradigm that can sustain this thought, we can immediately elaborate on the need to relativize the idea of dependence to which users, clients, families, groups and communities are subject in the current model of health care. This dependence characterizes a certain magical thinking, to which users are attached and certain that only the health professional can and has the potential to transform their health, effectively denying any responsibility or potential they may share in the search for a healthier existence.

When we think about health potential, we are talking about delegating to the other a certain amount of responsibility, commitment and even willingness to become a subject of the health and disease processes in their own existence. In this logic, the potential for health needs to be thought of as something archetypal and innate to human beings. Existentially, we need to believe that human beings are capable of taking charge of their demands and needs, and corresponding together with the health and nursing team decision-making, choices and attitudes that are more compatible with a fuller, healthier and more fulfilling existence.

To practice nursing based on this principle is to believe in the inherent capacity of each human being, respecting, of course, their personal singularities. It is to share the humanities present in each person. It is to contribute so that each individual, family, group or community can be an effective agent of transformation of their reality, adjustment of their potential and development of their humanistic aspects.

Human potential, thought of as an opportunity for nursing care, is, therefore, a new way of thinking about practice. It is a sympathetic look at the other who seeks help, helping them to perceive themselves "with the world and not only in the world (Freire, 1982)". It is a new way of taking care of oneself, which begins with valuing the other as a whole, competent and existentially capable person. It is also to think about nursing practices based on the ideological principles of the Unified Health System, whose parameters rescue the right to social well-being as one of the main characteristics, and

is therefore a theory related to the reality of the Brazilian health system that can collaborate with the materiality of its principles.

No matter how bad the health situation of individuals, families, groups or communities may seem, there is always something to value as a potentiality, as a becoming, which can be stimulated, valued and understood as a new way out, as a new opportunity for the most diverse human, cultural and/or biological situations and conditions.

In this way, we will revisit the prescriptive, drug-based, hospital-centric and alienating model from another perspective, which effectively places the critical subject at the forefront of their existence, knowing as caregivers the existential reality of each one, avoiding fanciful prescriptions, discrepant with the reality of the other. Before any prescription is ready, we will have to think about the possibilities that are involved for the prescription to be effective. Before any consideration of disability, we must value what is healthy and then move on to solving problems.

Of course, in our alienating culture, so accustomed to receiving things ready-made from the top down, with years of colonialist, slave-owning and militarizing experience, this attitude surprises and can even frighten us. That is why working with the potential for health is to be in favor of the active, creative and responsible subject in the process. For Brazilian nursing, this model of social division of labor and delegation of practices is a unique opportunity to relight the lamp, to reorganize our practices, our training, and to offer society a unique opportunity to participate, to be an active subject and to be an existential authenticity.

Working in the logic of health potential is not just believing in the potential of the other, in their demands and needs. First of all, it is to believe in the capacity of nursing itself to adopt a less reductionist, less dependent and more problem-solving posture, based on the subjects themselves in their own contexts of existence, life and death. Thus, we will realize that nursing will also be affected by the potential of the other. It will be more dynamic, more involved, more responsive, and more dialogical in the search for health care and attention.

Nursing as a health potentiality does not deny dependence, disease and needs. It just doesn't overvalue these elements, giving greater emphasis to the other variables that are usually hidden, undervalued, not perceived in the context of care. The potentialities inherent to each situation will be revealed by this new look, by this new possibility of thinking about care that begins with the set of beliefs and values linked to solidarity and humanistic aspects of nursing actions, pointing to the social responsibility of the profession, as it stimulates the growth and personal maturation of clients and nurses.

As a proposition of a theoretical framework for nursing, the constitution of the health potential framework was elaborated following the recommendation of McEwen and Wills (2009:104), whose components are described below.

3 THEORETICAL FRAMEWORK

3.1 HUMAN POTENTIAL IN ABRAHAM H. MASLOW

Maslow (1962:26) in his work Introduction to the Psychology of Being was emphatic in arguing that human potentialities should be encouraged and expressed in favor of a search for happiness, self-fulfillment, and happiness. The author states that the search for the realization of the potentialities of his human contributes to automatic solutions of many personality problems of the future, as shown in the paragraph below in his work:

> "Perhaps we will soon be able to use as our guide and model the fully developed and realized human being, the one in whom all his potentialities are reaching full development, the one whose inner nature expresses itself freely, instead of being perverted, distorted, suppressed, or denied."

Thus, the author already points out to us the importance of valuing human potential as a response to a new model of understanding human nature. A proposal that values the available potentialities more than the observable or noticed restrictions, as usually happens in health care, where we are always, or almost always, stuck to deficiencies and limitations to the detriment of what is healthy.

For Maslow, by devaluing his potentials, man runs the risk of ceasing to be what he could be, devaluing his natural talents and potentialities, losing the authentic path to a dynamic and effective existence. Also contributing to the author's ideas is the fact that in the logic of health, the valorization of human potentiality collaborates in the improvement of life, existence and in the formation of more complete and complex human beings, and points out that this valorization should be more efficient than asking: "how not to get sick?".

"Not getting sick" may seem like a proposal of the healthy, the desirable; But as we have already discussed, such a statement or proposition values disease as a certain kind of natural state of man, from which he has to flee in search of being healthy as something unnatural or abnormal.

To propose the valorization of the potentialities of the human self as a basis for health is, on the contrary, to consider human nature with its diversities as natural and archetypal; It is therefore characteristic of human existence, where disease arises as a rupture of this natural state. The focus then should be on the natural state of things. Normality, potentialities, physical, emotional and affective skills as the background of existence.

Maslow (1962:28) points out in his work that there is a certain awareness of man in relation to his potentialities, what he calls "intrinsic consciousness", as being "unconscious or preconscious perception of our own nature, of our own destiny or of our own capacities, of our own 'vocation' in life".

Thus, the author refers to the possibility that human beings have already internalized the necessary conditions for the recognition of their values and capacities that are possible paths to better conditions of life, existence and, therefore, health.

Maslow points to yet another important face of human potential. That of co-responsibility. This is equivalent to thinking that each human being in his existence is responsible for the development of his potentialities, and must bear the variables inherent to his development. Therefore, such existential variables involve dedication, choices, decisions and attitudes that must be part of human existence from which one cannot escape without losing the potentialities that are precisely developed in this exercise.

In this logic of thought, Maslow shows us that it is internally, that is, within us, that this exercise is located and this development occurs. In the self, in the purely individual existence where experiences are accumulated and require a dynamic exercise of overcoming for human development.

In his reflections on human potentiality, Maslow points out a human existential paradox inherent in modern capitalist societies, where what he calls the gap between what human beings are, what they would like to be, and their potentialities will coexist. Thus, Maslow reports that a person is the sum total of his reality and his potentialities.

Maslow also refers to the question of human potential as a path or proposal for old humanistic and existential questions that have been the target of questioning over time, such as the interest in the construction of the ideal, authentic and perfect human being. According to the author, to think about these variables is to think about human potential and human development. Maslow points out the importance of this exercise, since it allows the human being to transcend the process of cultural categories, leaving a space for the authenticity of the being, a space for him to be more connected to issues of his species than of his local groups, showing the essence of human existence.

Such an essence, which is intimately related to existence, also shows us an important way to access human potentiality in Maslow's view. He reports that it is necessary for us to immerse ourselves in people's philosophy of life so that we are able to see the world through their eyes. Hence the existentialist character of human potential in its essence, where a certain solitude is necessary for each one to get in touch with their own philosophy and existence. On these aspects, Maslow points out the importance of systematizing concepts such as expectation and potentiality, as a way of seeking meanings and meanings to terms in relation to their objectives in the process of human development.

The search for these senses and meanings are correlated with the ideas shown by Maslow (1962:36), that "Only the flexibly creative person can truly dominate the future, *only* the one who is able to face novelty with confidence and without fear." Clear and objective assumptions of human potentiality.

Maslow also comments on the contribution of other thinkers such as Fromm and Horney, who bet that even neurotic processes are distortions of human potentiality in the pursuit of human growth and development. For Maslow, the search for the development of human potential is also a form of pleasure and satisfaction, where the human being finds fulfillment in enjoying his own growth and the positive consequences of it.

Among Maslow's (1962:44) reflections on human potential, we can highlight the motivational theme in its strict relationship with that of potentialities, as we can see in the following excerpt:

> "With regard to motivational status, healthy people have sufficiently satisfied their basic needs for security, sonship, love, respect, and self-esteem, so that they are primarily motivated by tendencies toward individuation (defined as the process of realizing potentials, capacities, and talents, as the full fulfillment of one's mission (or vocation, destiny, appeal), as a fuller knowledge of, and acceptance of, one's own self. intrinsic nature of the person, as an incessant tendency toward unity, integration, or synergy, within the person himself)."

Thus, we can infer about the importance of human potential in relation to the development of human nature and in the fulfillment of the human being in his own existence. When we think about human potential, we also think of something positive, constructive and that is directly related to human fulfillment and consequently to health in its broadest concept.

Maslow, when referring to basic human needs, places on a higher plane the development of human potential as something superior together with tendencies, capacities and talents. Such attributes are inherent to the human being in his existential process.

This is the basic idea that underlies the theory of health potentials. A human attribute inherent to one's own being that seeks its improvement and development. An existential human process that needs to be more valued and stimulated in the search for healthier attitudes and behaviors, which I call in this proposal Health Potentiality.

4 CONCEPTUAL DEFINITIONS

4.1 PHILOSOPHICAL AND CONTEXTUAL BACKGROUNDS

4.1.1 Postmodernity, nursing and health

Modernity built on the pillars of work, the traditional bourgeois family, religion and school; With its traditionalist values linked to rigid physics and social laws as a product of modern functionalism, it does not function effectively today as a generator of societal fecundity, which in one way or another ends up translating into a kind of social mutation of language, and of the ways of thinking and signifying things. We can call this movement Post-Modernity (MAFFESOLI, 2012:2)

This movement of mutation or transformation always leads us to fear and dread, as happens with all theoretical and existential conformism (Maffesoli, 2012). An epistemologically and methodologically conformed fear that freezes us in the face of the new and the resignification of things.

The body, for example, as the most punctual target of the health sector, leads us to an idea of control, of anatomical, of formal, of normal, and everything that escapes from this idea frightens and is almost immediately interposed in the idea of control and, consequently, of incapacity, submission and absence of autonomy.

In this new particular logic of Postmodernity, in a very particular way, the valorization of the body emerges very strongly, in an innovative *body ethics*, in which the *consumerism of the* body presents the narcissistic fixation of contemporary society. The health sector shows itself in a social imperative related to the new order, exchanging an elementary "value" for a de facto and de jure (efficacy) enforcement. (TEIXEIRA, 2010)

In this postmodern effervescence, the body is elevated to the category of psychically narcissistic and of duty in the space of the new order. A body that until then served only the pillars of modernity, now finds itself grappling with other possibilities. From Symbol to Sign. From work as duty to work as satisfaction. From God outside to God within. From the necessity of practice to its meaning, to its meaning. Thus, practice is thought of as something that has a meaning in itself, a greater intrinsic meaning, which we can call praxis. (KOSIK, 2011).

When we think about health and nursing practices in this way, we are distancing ourselves from all the expurium that comes from the hegemonic traditional biological medicine, bringing it to the encounter with the body and the subject of the body, now personalized; reintegrated, a new order and a new humanistic possibility of man's interaction with his demands, choices and decisions. Thus, we can think of therapeutic objectives of fact, order and agreed judgment with the new languages and expressions that society has been seeking, bringing things from the outside, from appearances, to the inside and to the essences.

Much has to do with nursing to benefit from this new order. A new logic that enables nursing and nurses to free themselves from an archetypally masculine model of care, which imposes on them a duty to do and a duty to be, which distances them from the primary purpose of acting with the patient in the sense of their own science, object and social intentionality. After all, what is care? What is Nursing? There are many answers. Few are those that have an origin in their own pure essence of nursing, contaminated as they are by the masculine universe of hard technology and the medicalizing and alienating model of care.

Nursing in postmodernity finds a way out of the constant dilemmas that always disturb professionals in their work, as she points out (WATSON, 2004):

- The awakening to a critical awareness of the archetypal feminine essence as the pure practice of nursing
- A transpersonal and therefore significant science of nursing
- Valuing the essence of human phenomena

- Existential performance in nursing practices
- Expansion of concepts, values and intentionalities in nursing praxis
- Means of ensuring the comprehensiveness of humanistic aspects in care
- Revitalize the ontology of nursing care in existential and dialogical actions

In favor of this "disorder" of postmodernity, of the lack of identity, of growing idleness, of the lack of noble and progressive ideals that make individuals seek their dreams of duty, have their ideals, and in the opposite direction of modern thought, which has always praised family, work, spirituality and great ideals as pillars of society, We find human existence as the most important target for the creation of freedom, individuality and a paradigm that values concepts and values as elements underlying the facts of health, contextualizing practices and favoring placing at the center of health attention the subject, free and autonomous, critical and reflective, powerful and sovereign with regard to his own existence, who should be the main character of health and nursing practices and actions.

4.2 EXISTENTIALISM AS A METAPARADYGMA:

Existentialism is a set of philosophical essays that value the observation of the human being in his relationship with the world in which he lives, contradicting the traditional philosophies that created ideals in relation to the condition of the human being (COLETTE:2009)

Existentialism can also be understood as an expression of culture, whether individual or collective, which had its peak in the French movement from the post-war period until the mid-1960s, and which encompassed lifestyle, fashion, the arts and also political activism. (COLETTE:2009)

The French philosopher Jean-Paul Sartre (1905-1980), the greatest defender of existentialist philosophy, defended the following assumption: existence precedes essence. From this, he infers that man first exists in the world, and then realizes himself, defines himself through his actions and what he does with his life.

For Meleis (1985), existentialism is a philosophical current that seeks to understand life in its existence. He considers that the subject is a unique and singular being, who faces several possibilities of choices that determine the meaning and direction of his existence. For her, existentialism does not aim to find the causes of human existence and experiences, but rather only describes what is, emphasizing and valuing the freedom of decision and choice and, as a consequence, the responsibility for existence.

Existentialism perceives subjects as being capable of self-perception, freedom and critical responsibility, and therefore experience situations of fear, anxiety and difficulties in the face of their own existence (GEORGE, 1993).

And it is precisely on these aspects that nursing benefits from this theoretical proposition, with existentialism as a metaparadygm and as a worldview for professional practice. In a vision more

committed to the expectations of customers, their ways of life, their existential culture; Nursing then seeks to find the necessary resources for individuals, groups, families and communities to enhance their own existence based on the possibilities that are already available in various degrees of criticism and awareness, always seeking to make each choice, each decision, each advice, each help and each human response in an advance in favor of their own existence in an increasingly lucid and planned way.

Nursing conceived in this way existentially, with the health potential as its goal, collaborates directly so that individuals, families, groups and communities are increasingly strengthened towards the choices made with a view to self-realization and the continuous development of their diverse potentialities.

4.3 THE HUMAN BEING IS RESPONSIBLE FOR HIS/HER EXISTENCE

If we think that the human being first exists and that in this existence he is built through his existential experiences lived in his day-to-day life, it is worth understanding that he also becomes responsible for his choices, decisions and decision-making in his life.

There is a freedom here that allows the human being to give a certain meaning and significance to his life and existence. He cannot escape this responsibility. This filament of thought is what allows us to understand the humanistic aspects that are present in the existentialist current, and that need to be assumed by health care models.

There is so much talk about humanization, but the central axis that is directly related to the topic is missed. To humanize, then, would be to collaborate so that the human being assumes his role as the subject of his own existence. It is to allow them to take charge of their lives, their choices and decisions, favoring the growth of their potentialities in a conscious, critical and reflective way, so that such decisions are increasingly adequate to their internal demands.

Allowing others to be free to decide and choose, considering their potentialities and expectations, is a new paradigm that emerges as a possibility of inversion of the current care model. When the health professional relinquishes part of his or her controlling power over the body and life of the other, and enables a full, whole and integrated existence. To believe in this possibility is to value the potential that each one has. It is to understand human existence as an intrinsic possibility of self-knowledge and personal growth, giving greater value to the various ways in which the other uses their own experiences to improve others that are less improved, generating lack of health, diseases and existential distortions.

Nursing, as a social practice, which is historically constructed, needs to accompany this human growth through sharing, being together, dialogue and the detection of human potentialities that have not yet been optimized and consciously lived in favor of healthier existential behaviors and behaviors.

There is a variety of human potentialities that are specific to the subjects and that may be unconscious, and therefore do not collaborate effectively for this subject to grow and develop in an existential way.

The nurse can effectively raise these potentialities, highlight them in a critical and conscious way with the individual, families, groups and communities and from there start a new existential journey shaped by the potentials and possibilities of change and existential transformation.

4.4 THE IMPORTANCE OF FREEDOM AS A THERAPEUTIC ACTION:

Considering that every human being is born free and full in their potentialities, we can infer that it is existence that considerably reduces their ability to access their potentialities from social, family and institutional conditioning, which unconsciously shelve their potentials, suppressing the humanistic capacity to choose and decide freely, fragmenting the existence that starts to be lived in favor of social or socio-family interests.

In this sense, the individual loses his ability to deal with his existence in a constructive, critical and conscious way. He subordinates himself to the duty to do and the duty to be, oppressing and repressing his existential vitality, becoming only in the world, living in this world in a certain way in a random way, based on the choices he could not make, the decisions he could not make, and he begins to believe in his perennial incapacity, which is reinforced in him at every moment. at school, in the family, in society as a whole, at work in almost all its life cycle. He is in the world, but not with the world; which would result in a more participatory and, therefore, free attitude (FREIRE, 1982).

In this sense, freedom comes to be understood as a fundamental practice, as a therapeutic action of nursing. An authentic freedom, conquered, critically deliberated, consciously planned in accordance with the subject's expectations and existential vitality. Freedom to assume one's own existence, through the enrichment of one's potentialities through the dialogue lived existentially and consciously with the nurse, remembering that the existence of one subject will collide with the existence of a second subject, and this existence must acquire a borderline condition from the social and behavioral point of view, but by a decision in solidarity with the existence of others, and not normative and punitive.

5 THEORETICAL STATEMENTS

5.1 EXISTENTIALISM AND NURSING

In the 1980s, nursing focused on phenomenological thinking, denouncing the positivist and reductive view of living and health conditions and the relationship of individuals with their adverse conditions of existence. (Paterson and Zderad:2003)

Existentialist thinking applied to nursing practice values dialogue, the experiences of individuals and the exploration of humanistic experiences. (Paterson and Zderad:2003)

Nursing based on existentialist thinking proposes an approach to understanding life and human existence, and all the potential of "becoming" that the risk of existing imposes on human beings in their existential plan. Thus, in the understanding of nursing as an action for human beings, existentialism understands individuals as having the ability to choose, to decide, to fight for their self-realization, in search of a meaning for life, and to develop all their potentialities for this (GEORGE, 2015)

Therefore, at the level of existentialist nursing, the potentialities of individuals, groups, families and communities need to be intensely lived and expressed, experienced by complex dialogues, between the nurse who cares and the client who seeks the meaning and significance of their own existence, or the answers to the existential situations they are experiencing at a given moment. This search for their potentialities, however, is not always consciously available and ready to be put into practice for various physical, emotional, socio-familial, economic, cultural and spiritual reasons.

Therefore, it is up to nursing to collaborate so that this potential is expanded and is consciously recognized and used as a basic foundation for the responses to the health and disease conditions for which subjects, groups, families and communities are living existentially in a given space of life time.

This consciously expanded potential needs to be worked on systematically in a planned way, and directed to the various reactions that the subjects need to present as favorable responses, which will facilitate their promotion, prevention and rehabilitation of health conditions, enabling a more authentic existence in relation to their choices and decisions regarding their ways of life and of existing in the world.

The expansion of health potentialities adds to the existence of the subjects competencies and managerial skills not only for their ability to decide and choose, but also significantly favors their predisposition for therapeutic interventions to have more efficient responses and committed to the expectations of these same subjects.

Nursing actions directed to health potentialities effectively mark human variables that cannot be controlled by the nurse, because it is inherent to the very existence of the subjects, but they also consolidate some assumptions inherent to the health policies themselves, such as the comprehensiveness of care, the humanization of care, the individuality of care and the centrality of health actions in the subject.

At the same time, the nurse who is able to collaborate with the expansion of the health potential of a given subject experiences professional self-fulfillment, and consolidates her professional identity, since it will bring greater resolution to the health demands of the subjects and society as a whole.

5.2 HEALTH POTENTIAL

Health potential is a condition that is present in human beings, and that is accumulated with their existential experiences throughout their life cycle. This potential may be present in your conscious attitudes and behaviors, or it may be obscured by momentary stressful conditions that prevent you from having conscious access to these potentialities. The health potential is an inherent component of human existence, which can be evidenced, stimulated, perceived and made aware of its specific health needs and existence.

5.3 NURSING AS A HEALTH POTENTIAL:

Nursing is an action directed by scientific evidence, which directs its actions to human beings in order to help them perceive and find their potentialities, as a way of actively collaborating in the maintenance and rehabilitation of health conditions, considering the interaction of human beings with their potentialities in relation to the responses they can give to their social demands. mental, physical, spiritual and cultural aspects, as a way to promote expanded well-being, which is compatible with their quality of life, and which is in accordance with their existential expectations.

5.4 THE HUMAN BEING AS A POTENTIAL FOR HEALTH:

The human being is a being endowed with existential experiences that are built and acquired throughout his life cycle, and that accumulates with such experiences, capacities and potentialities that make him the subject of his life history. A subject capable of making decisions, making choices and options in relation to their living and health conditions. A being who, based on his potentialities, can promote the changes and transformations necessary for his social, mental, physical, spiritual and cultural well-being in order to meet his expectations of life in an existential way, based on the references of his own life trajectory, which can move from naïve consciousness to the taking of a critical consciousness in favor of a fuller existence, meeting your personal goals and accomplishments. (FREIRE, 1982)

5.5 HEALTH CARE AND POTENTIAL:

Human care can be directed to health potentialities, as a way of systematically collaborating so that human beings perceive, discover, interact and make the necessary exchanges that correspond in a directive way to their health needs expressed or perceived, consciously or unconsciously, as an individualized way of intervening in these needs, and collaborating so that the human being himself can modify what is necessary. or be more receptive to other health interventions that are necessary for their social, mental, physical, spiritual, and cultural well-being.

6 EXISTENTIAL STATEMENTS OF HEALTH POTENTIAL FOR NURSING

6.1 SUPPLEMENTARY HEALTH POTENTIALS

- Human beings are capable of learning healthier existential ways
- Human beings are capable of changing and transforming their behavior throughout their life cycle
- Human beings are capable of practicing self-care according to the planned and organized recognition of their potentialities
- Human beings are able to accept themselves in a certain existential condition when they perceive the relationship between their condition and the moment of their life cycle, through a conjunctural analysis of their health condition
- Human beings are capable of perceiving themselves in a given reality and in their context of life when they are faced with real conditions of existence that are peculiar to them
- Human beings are capable of directing affection to significant people and to themselves when they consciously perceive the reciprocal in other human beings
- Human beings are able to participate actively, making decisions, making choices and giving their opinion in their existing situations, when they feel safe and perceive openness to their position
- The human being is capable of maintaining his self-control when the conditions for understanding the moment lived and the understanding of his existential condition are clear and offer him security
- The human being is capable of adapting to adverse conditions to which he is subjected, when such conditions are clarified and the moment lived offers conditions to adapt according to his existential expectation
- Human beings are capable of self-realization socially, mentally, physically, spiritually and culturally, when they perceive ambivalence between their expectations and the opportunities that arise in favor of their fulfillment

6.2 ESSENTIAL HEALTH POTENTIALS

- Every anatomical-physiological function has the potential to self-regulate, considering the appropriate conditions that guarantee its integrity
- Every process that involves bodily systems of respiration, circulation, locomotion, absorption, thermal regulation, sensitivities, eliminations, and reproduction is capable of being enhanced by the activation of health potentials not yet perceived and involved in the health-disease process

- Any process that integrates psychic, emotional, affective, cognitive and intellectual activities is capable of being enhanced by the activation of health potentials not yet perceived and involved in the health-disease process
- Any process that is correlated with social, relational, communicational and gregarious activities is capable of being improved by activating health potentials not yet perceived and involved in the health-disease process

7 OPERATIONAL RELATIONAL STATEMENTS

7.1 THE HEALTH POTENTIAL AND THE NURSING PROCESS

The health potential can be captured and perceived through the nursing process in an existential way, when the process is directed to obtain data related to individual ways of life and culture, as a resource to bring out the potentials that are obscured by stressful conditions of the human life cycle. benefiting the awareness of the favorable conditions for the development of potentialities that will benefit the individual himself and the society in which he is inserted, including the environment, the social environment and the family.

Thus thought, the nursing process should be conducted existentially, considering the human being as the center of the process. The phases of the nursing process should be directed in such a way as to create an opportunity to rescue, perceive and apprehend the health potentialities that clients, families, groups or communities may have, and to use a propositional methodology so that such potentialities are clarified, creating conditions for potential patterns to be determined and classified according to their characteristics.

The grouping of potential patterns according to their characteristics should be the basis for the elaboration of the care plan and nursing prescriptions, which will have as their central goal the stimulation and motivation for the development, awareness and clarification of each potential, triggering a feed-back between the potentialities, the health demands and the clients' responses. groups, families, or communities.

The central objective of the application of the nursing process should be the optimization of health potentialities, so that each potential becomes increasingly objective, clear and can be the main starting point for all nursing actions. The use of this systematization of health potentialities makes individuals, groups, families or communities recognize their individual or group competencies and abilities as a way to promote the necessary modifications and transformations in their social, physical, emotional, spiritual and cultural well-being.

The development and improvement of health potentialities will trigger a process of recognition of self-sufficiency and a sense of added value, strengthening the conditions on which the health/disease process is being worked on by the nurse as a whole with their clients, groups, families or communities,

strengthening the links between their potentialities and the real capacities of health consolidation in the sense of promotion. prevention or rehabilitation.

In the data collection phase, the nurse detects the health demands and, in return, establishes the corresponding standard of health potential, through which she will define her care plan and nursing prescriptions, always aiming at expanding the potentials until the client, groups, families or communities are able to respond favorably to the proposed interventions. In this case, we can understand health potentials as the basis of care and, at the same time, it is the energy itself that will be mobilized to produce responses to nursing interventions.

7.2 THE HEALTH POTENTIAL IN YOUR RELATIONSHIP WITH NANDA. NIC AND NOC

The theory of health potentials can be easily applied to the nursing process when using NANDA's diagnostic taxonomies and patterns of nursing interventions and outcomes. In the case of the application of NANDA nursing diagnoses, the nurse must correspond the factors related to the established diagnoses with the standards of health potentials that are capable of optimizing nursing actions that aim to solve the nursing problem perceived or apprehended.

Once the standards of health potentials have been established, the next step will be to optimize them so that their systematization, clarification and awareness can be the basis for the propositions of the solutions that will be proposed by the nurse. The same should occur with the patterns of nursing interventions and outcomes, which should also be correlated with their patterns of health potentials previously established in the diagnosis phase, where the nurse will evaluate each intervention and each result, according to the standard of potentialities previously established, verifying whether there has been an expansion of potentialities. This will lead to an improvement in the perceived problem situations, if there is a need for greater reinforcement of the standard of potentialities, or even a change in the pattern.

7.3 STANDARDS OF HEALTH POTENTIALS APPLICABLE TO THE NURSING PROCESS

- **LEARNING POTENTIAL:**

In this concept, interactions play a crucial and determining role. To define real knowledge, Vygotsky suggests evaluating what the subject is capable of doing alone, and the potential of what he can do with the help of another subject. Thus, the level of richness and diversity of the interactions that will determine the potential is determined. The richer the interactions, the greater and more sophisticated the development.

- **POTENTIAL FOR BEHAVIOR CHANGE:**

It would be interesting to point out that active behavior is interfered with by the dynamics of individuals' lives (work, bodily aspects, psychological factors, beliefs and knowledge)

and environmental factors (safety, housing, economic aspects, basic health, education, transportation and places) that may have a determining relationship

for population involvement in physical activities. This interrelationship between personal factors and environmental factors explains adherence to an active, attitude-based lifestyle throughout life. The perspective of changing population behavior is linked to interferences from personal and environmental barriers, and personal barriers are more easily modifiable than environmental barriers, which initially allows lifestyle changes.

- **POTENTIAL FOR SELF-CARE:**

The term capacities means, in the context of theory, that which a person is capable of accomplishing by himself and for himself. From the point of view of the concept, it refers to the knowledge, skill, and experience that people need to obtain for the accomplishment of self-care.

- **POTENTIAL FOR SELF-ACCEPTANCE:**

To accept yourself is to honor the being that you can be on your journey. It is saying yes to oneself, without waiting for the other person's yes, as often happens. Accepting yourself as you are, when you get it right, when you get it wrong, and with all your problems, indicates respect for yourself, love for yourself, and commitment to yourself. It is an accelerator of change, because contrary to what many think, the attitude of acceptance does not mean an inability to not want to improve, but that one has a commitment to self-improvement. It is the acceptance of all aspects of who you are, which allows you to grow integrally. So say yes to yourself.

- **POTENTIAL FOR SELF-PERCEPTION IN THE CONTEXT OF LIFE:**

This concept, this perception of oneself, of one's own potentials, of limits, and especially of one's desires, will be stimulated throughout our lives, through the various relationships we establish. This means that our family influences the way we perceive ourselves, but does not determine it. Psychological maturity can also be measured by our ability to feed ourselves emotionally, moving from the need for confirmation to just the desire to be accepted.

- **AFFECTIVE POTENTIAL:**

Affectivity is the innate potential that guarantees the preservation of life. Life becomes sacred because we love it. We live in an existential void that we try to fill with the incessant search for youth, beauty, comfort and consumption, distancing ourselves from the essentials

- **PARTICIPATION POTENTIAL:**

The concept of participation comes from a Latin word: *participare*: "to make known", which means the possibility of *communicating*, *being an integral part* of something or *associating through thought*. This means that when we participate in some fact, we intend to take part in decision-making or solving some problem.

- **POTENTIAL FOR SELF-CONTROL:**

Self-control is the preference for a greater reward that will occur in the future, rather than a lesser reward that is available in the present. This definition seems useful, because it portrays well what can be understood as self-control in everyday life.

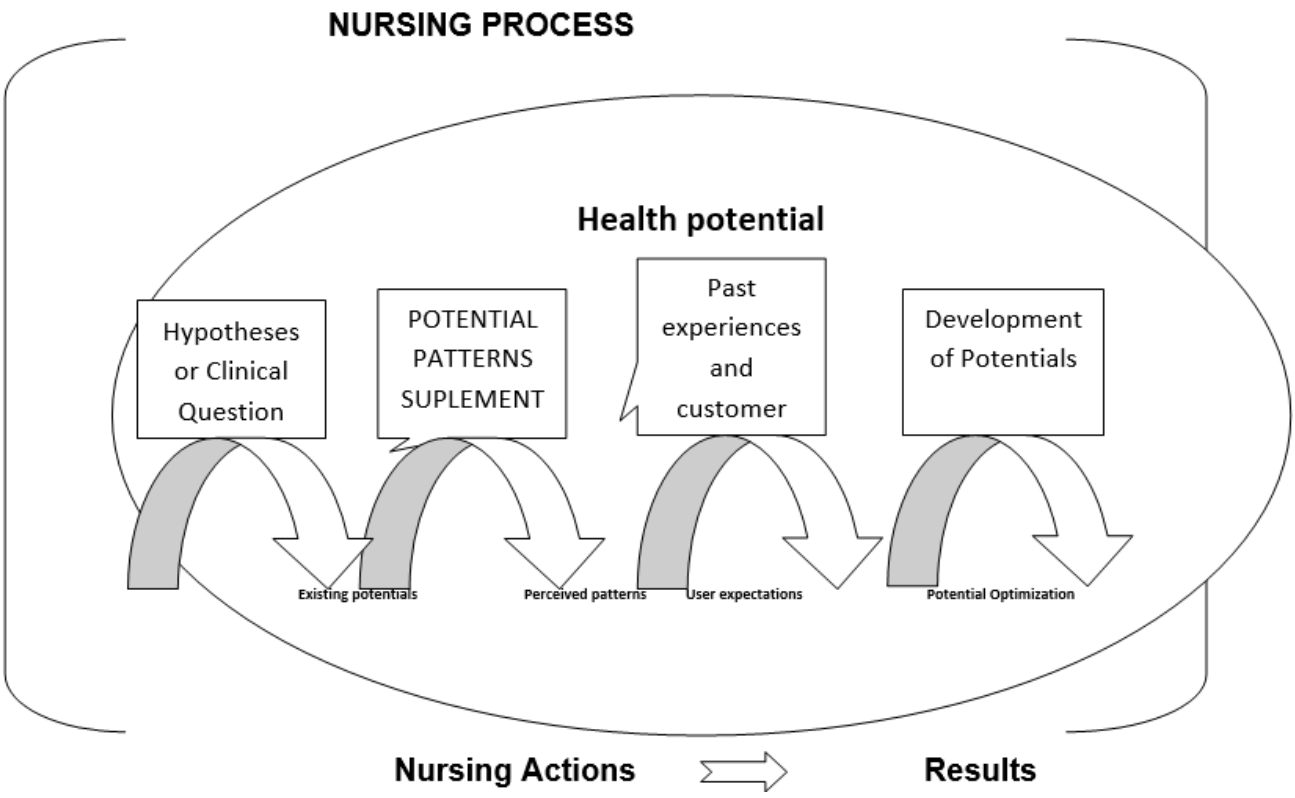
- **POTENTIAL FOR ADAPTATION:**

Behind the apparent naturalness of their existence, not only complex relationships between beings stand out, but also adaptations to the environment in which they live. In other words: no being inhabits a certain place by chance. To survive, this being must possess characteristics that allow it to adapt to the environment in which it lives.

- **POTENTIAL FOR SELF-ACTUALIZATION:**

The concept of *self-realization*, modernly identified as the achievement of satisfaction, success, pleasure, has been increasingly valued, and at the same time, misunderstood. The search for fulfillment is directed to partial aspects of man, to the point that 'fulfillment' is often conceived as synonymous with professional fulfillment, status or success arising from professional practice. Those who have achieved their objectives or are in full development of the plans established for themselves are considered to have been accomplished; Achievement is conceived as the result of commitment and mastery over reality, in order to achieve previously established goals.

7.4 THEORY DIAGRAM


NURSING PROCESS
Health potential
Hypotheses or Clinical Question
POTENTIAL PATTERNS SUPLEMENT
Past experiences and customer
Development of Potentials
Existing potentials
Perceived patterns
User expectations
Potential Optimization
Nursing Actions
Results

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SEVEN
publicações acadêmicas

Oral candidiasis identification and profile of *Candida* in Brazilian patients undergoing radiotherapy in the head and neck region and in patients with removable complete dentures

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Mara Cristina Lopes Amorim
Master of Sciences in Stomatology, Belo Horizonte Militar Police Hospital, Minas Gerais, Brazil.
ORCID: 0009-0000-9404-663X

Susana Johann
Adjunta Professor, PhD in Microbiology, Laboratory of Taxonomy, Biodiversity and Biotechnology of Fungi, Biological Sciences Institute, Federal University of Minas Gerais, Belo Horizonte, Brazil.
ORCID: 0000-0001-8068-1720

Carlos Augusto Rosa
Full Professor, PhD in Microbiology, Laboratory of Taxonomy, Biodiversity and Biotechnology of Fungi, Biological Sciences Institute, Federal University of Minas Gerais, Belo Horizonte, Brazil.
ORCID: 0000-0002-0151-114X

Evandro Neves Abdo
Associate Professor, PhD in Stomatology, Department of Clinic, Pathology and Surgery, Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil.
ORCID: 0000-0002-8753-435X

Vagner Rodrigues Santos
Full Professor, PhD in Oral Pathology, Laboratory of Microbiology and Biomaterials, Department of Clinic, Pathology and Surgery, Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil.
ORCID: 0000-0002-5370-4867
E-mail: vegneer2003@yahoo.com.br

ABSTRACT
Introduction: Candidiasis is the most common oral fungal infection in humans affecting mainly people who are debilitated or immunocompromised patients, such as those irradiated for head and neck cancer. Pourpose: Identifing Candida species in head and neck irradiated patients and in those with total removable dental prosthesis by three microbiological methods. Material and Methods: Samples were collected with disposable sterile swabs of twenty-seven patients through exfoliative cytology. The Sabouraud media containing the inoculum were left in an aerobic environment at 36oC during 24 hours. Thus, yeasts were taken to the Laboratory of Taxonomy, Biodiversity and Biotechnology of Fungi to have the respective test for Candida identification with Candifast®, CHROMagar® and PCR EI1®. Results: The pseudomembranous clinical candidosis was more prevalent in Group 1, while the denture stomatitis was the most frequent clinical form in Group 2. There were differences in identification when comparing the three methods. On the other hand, PCR was faster and more effective when compared with CHROMagar, followed by Candifast®. PCR (EI1 and NLI/NL4) identified in Group 1 as C. albicans (37.1%), C. tropicalis (55%), (7.4%) C. krusei. In Group 2 PCR allowed the identification of 68% C. albicans, 20% as C. tropicalis, 8% as C. glabrata and 4% C. parapsilosis. Conclusion: The Candifast® Kit was found to be defective in the identification of several species of Candida, as compared to the molecular identification method used (PCR EI1 and PCR NL1 / NL4). CHROMagar® Candida medium was a good method for the presumptive identification of Candida species.

Keywords: Radiotherapy, Oral candidiasis, Denture stomatitis, Microbiology methods, Candida identification.

1 INTRODUCTION

Candidiasis is the most common oral fungal disease in humans, and can present several oral clinical manifestations, many times making it a difficult diagnosis [1,2].

In the past, candidiasis was considered as an opportunistic infection only, which affected patients debilitated by other diseases. However, today it is known that oral candidiasis can occur in relatively healthy people as a result of a complex interaction between host and microorganism [3,4].

Among the known species of *Candida*, *Candida albicans* is the most common in the mouth and the most cited in scientific papers [5]. However, other species are being identified in patients with candidiasis, which currently justifies a greater interest in researching other microorganisms of this genus. Advances in medicine have led to prolonged survival of immunocompromised patients and the increasing importance of opportunistic fungal infections [6,7]. *Candida* is the most common opportunistic yeast and causes severe infections characterized by high mortality rates. Antifungal agents are particularly toxic to human cells and the use of such drugs has to obey strict criteria. However, one early and aggressive antifungal therapy that takes the etiologic agent involved into account may improve the prognosis of infected patients [8].

Oral candidiasis is a common comorbidity associated with oral mucositis in patients with cancer and irradiated head and neck region. Complications such as oral mucositis, dysgeusia, interruption of feeding and speech, and of oncological treatment are comorbidities observed in these patients [9]. Candidiasis is usually associated with oral mucositis in these patients, which makes treatment even more difficult. Hyposalivation caused by radiotherapy facilitates the colonization by *Candida* species [10,11].

Due to the fact that the treatment instituted for these patients is not always specific, there is a significant increase in the resistance of the species of *Candida* to the antifungals present on the market. This may be due to the institution of a long treatment and the incorrect selection of active principles in relation to the agent etiology of the infection, or even by the selection of species or strains with resistance intrinsic to the drugs used. This whole process generates side effects such as nephrotoxicity and hepatotoxicity. Therefore, it is of extreme importance to accurately identify the species of infecting *Candida*, as well as the establishment of specific protocols for treatment, for by knowing the microorganism and its susceptibility to antifungals methods can the patient be treated more effectively and less aggressively [12, 13, 14].

Candidiasis epidemiological studies related patients with prostheses are of great importance to assess this fungal prevalence [15]. The correct identification of isolated species, the virulence factors verification and the profile analysis of antifungal susceptibility agents to these microorganisms may contribute to the development of other research controls and determine a new therapeutic proposal for the candidiasis treatment [16, 17]. Conventional laboratory techniques for yeast identification (culture, biochemical, physiological and morphological characteristics) have a long time of release ("turnaroundtime"). Under these conditions, faster and more sensitive, molecular-based techniques are of great value.

In recent years, some chromogenic culture media capable of differentiating the species *C. albicans* and other yeasts of clinical interest have emerged. These means of culture for fungi are based on the color change developed by the colonies through pH indicators and fermentation of specific compounds or chromogenic substrates. The CHROMagar® *Candida* medium produced by Difco has been used to isolate and identify presumably some species of *Candida* present in the oral cavity, including *C. albicans*, *C. krusei*, *C. dubliniensis* and *C. tropicalis*. This method is based on the use of β-glucosaminidase substrate and differentiates yeasts according to the morphology and color of the colonies. Its use facilitates the detection and identification of these yeasts and also provides results in lesser time than those obtained by traditional methods [18, 19].

Biochemical tests for the detection of *Candida* species and for testing the resistance of microorganisms to antifungal agents, such as Candifast®, have been shown to be useful, practical and effective, as well as molecular techniques, such as the Polymerase Chain Reaction (PCR). The secret of PCR's success lies in its ability to amplify a precise DNA sequence allied to its simplicity, accuracy, high sensitivity and specificity [20].

The objective of the present study is to identify *Candida* species in Brazilian head and neck irradiated patients with malignant neoplasms and in the ones who make use of removable dental prostheses, using CHROMagar® culture medium *Candida*, biochemical tests as Candifast® and molecular tests such as PCR (Polymerase Chain Reaction).

2 MATERIAL AND METHODS

2.1 PATIENTS AND SAMPLE UNIVERSE

The project was approved by the Research Ethics Committee of the Federal University of Minas Gerais (COEP/UFMG), with Project number CAAE- 0561.0.203.438-11. The volunteers signed the Free and Informed Consent Term to authorize the collection of samples.

Patients irradiated in the head and neck region were referred by public and private hospitals in Belo Horizonte and were selected at the Dental Care Clinic for Patients with Cancer and Irradiated in the Head and Neck region, of the Faculty of Dentistry of the Federal University of Minas Gerais (FOUFMG). Patients with Denture Stomatitis were selected at the Removable Prosthesis Clinic and at the Dental Pathology and Semiology Clinic at FOUFMG. After clinical diagnosis suggestive of candidiasis, the patients underwent an initial clinical examination (baseline) where the study's own forms were filled out based on medical records from the Semiology and Pathology clinics of the UFMG School of Dentistry. Identification and anamnesis data were collected, followed by general objective and intraoral examinations. All study information was confidential, and the names of the participants, as well as photos of their faces were not disclosed.

2.2 INCLUSION AND EXCLUSION CRITERIA

Patients who presented clinical manifestations of candidiasis, such as the presence of removable white plaques, erythematous areas associated with prostheses or not were included in the study. The head and neck irradiated patients included in the sample were undergoing radiotherapy treatment or had it completed within a maximum of 6 months (Inclusion criteria). Patients who 1) did not have candidosis; 2) had clinical manifestations of candidiasis and did not accept the intraoral collection or did not comply with the consent form; 3) were not physically able to undergo material collection (mucous scraping); 4) had prostheses and were head and neck irradiated took part in our exclusion criteria.

2.3 COLLECTION OF MICROORGANISMS

The sample collection period was from November 2011 to April 2012. Samples were collected from all patients who accepted to participate in the survey and presented with candidiasis, whatever the clinical aspect of the disease. The samples were of the “Convenience” type and there was no predilection for gender, age or race. The collection of the material was done by scraping the mucous membranes/exfoliative cytology using a sterile and disposable swab, which was placed directly in the areas where there was presence of candidiasis.

2.4 YEAST DNA EXTRACTION

After presumptive identification of yeasts using CHROMagar® *Candida*, yeasts of different morphotypes were streaked on Sabouraud agar (each morphotype was placed in a separate Petri dish) so that pure colonies were obtained. Thus, these pure yeasts were reassessed in terms of morphotype and were taken to the Laboratory of Taxonomy, Biodiversity and Biotechnology of Fungi at the Department of Microbiology - ICB/UFMG to have the respective DNA extracted. After DNA extraction from the yeasts, the samples were taken to the Nano Drop ® equipment to assess the quality of the extractions.

2.5 MOLECULAR IDENTIFICATION OF YEAST: PCR-EI1

For the molecular differentiation of yeasts, the PCR method known as "fingerprint" was used using the primer - "primer" EI1 (5'-CTGGCTTGTGTATGT-'), which has complementarity to the intron processing sites. Strains of the same species show similar amplification profiles. Thus, after grouping the species that were similar to PCR EI1, a representative of each group was sent for DNA sequencing through PCR EI1. When the PCR procedure was performed for several yeasts, a mix was made with reagents from numbers 1 to 8 and after filling each eppendorf with the solution, the DNA was added lastly and placed in the PCR machine for the beginning of the cycles. PCR products were analyzed by

electrophoresis on a 1.5% agarose gel in 0.5X TBE buffer, diluted in 6X running buffer and Gel Red for approximately 1 hour at 120 V. The bands present on the gel were visualized under ultraviolet light and photographed using a gel photo-documentation system (Vilber Lourmat, France). The amplification results were compared with the reference samples (standard 1 KB) that were placed in the initial channels of each experiment gel [21, 22].

2.6 SEQUENCING OF THE D1D2 REGION OF THE LARGE SUBUNIT OF RIBOSOMAL DNA

The strains that presented PCR profiles different from the most common species were sequenced in order to confirm the molecular identification. Sequencing was performed in the D1/D2 region of the ribosomal DNA major subunit using primers-"primer" NL1 (5'-GCATATCAATAAGCGGAGGAAAAG-') and NL4 (5'-GGTCCGTGTTTCAAGACGG-'). a MegaBacetm 1000 automatic sequencer (Amersham Biosciences, USA) at the Biodiversity and Molecular Evolution Laboratory (LBEM-UFMG). Sequences were edited using the DNAMAN program (lynnon BioSoft, Vaudreuil, Québec). The sequences obtained were compared with those already deposited in GenBank and analyzed using the BLASTn program (Basic Local Alignment Search Tool - version 2.215 of BLAST 2.0) available on the NCBI portal (http://www.ncbi.nlm.nih.gov/blast /) developed by the National Center for Biotechnology. The isolates that presented the analyzed sequences with ≥98% similarity in relation to the sequences already deposited in GenBank were considered as belonging to the same species or genus; those that presented sequences with similarity ≤9% were considered as belonging to the same genus [23].

3 RESULTS

3.1 DEMOGRAPHIC PATIENTS' INFORMATION

Table 1 shows the demographic informations and individuals' distribution. In Group 1, 13 male patients (86.7%) and 2 female patients (13.3%) were found. Regarding Group 2, 9 patients were female (75%) and 3 were male (25%).

Table 1- Demografic Patients' information.

Patients Group	Group Description	Number	Gender	Age (Mean/Years)	Race
Group 1	Irradiated in Head and Neck Patients	15	M (13) 75% F (2) 25%	55-83 (63,2)	L: 30,7% F: 30,7% M: 38,5%
Group 2	Dentures Removable Prosthesis	12	M (3) 33,3% F (9) 66,7%	54-73 (61,4)	L:66,6% F: 22,2% M: 11,1%

Legend: Gender M= male, Gender F= female; Race: L= leucoderm/White, F= feoderma, M= melanoderm/Black.

In Group 2 prosthesis patients, the clinical diagnosis followed different patterns from those of Group 1. In this group only two clinical forms of candidiasis were observed: Denture Stomatitis was

present in 10 out of the 12 patients analyzed (83.3%) while Angular Cheilitis was identified in 4 patients (33.3%). In two patients (16.6%), the two forms were found simultaneously. Of all the patients evaluated in this group, eleven (91.6%) used a removable total prosthesis and only one patient (8.4%) used a removable partial denture. These data are described in Figure 1 and Figure 2.

Considering all sites, the tongue was the most affected site (7 patients, 46.6%), followed by the palate (40%), alveolar ridge (26.6%), buccal commissure 26.6%), jugal mucosa (20%), buccal floor and oropharynx (both with 13.3%). However, in 4 patients (26.6%), there was a simultaneous affection in several sites (≥ 3), that is, the candidiasis occurred in a generalized way. In relation to Group 2, the only sites containing lesion involvement were the palate (83.3%) and buccal commissure (33.3%).

Figure 1: Clinical aspects of oral candidiasis founded in Group 1 (n=15).

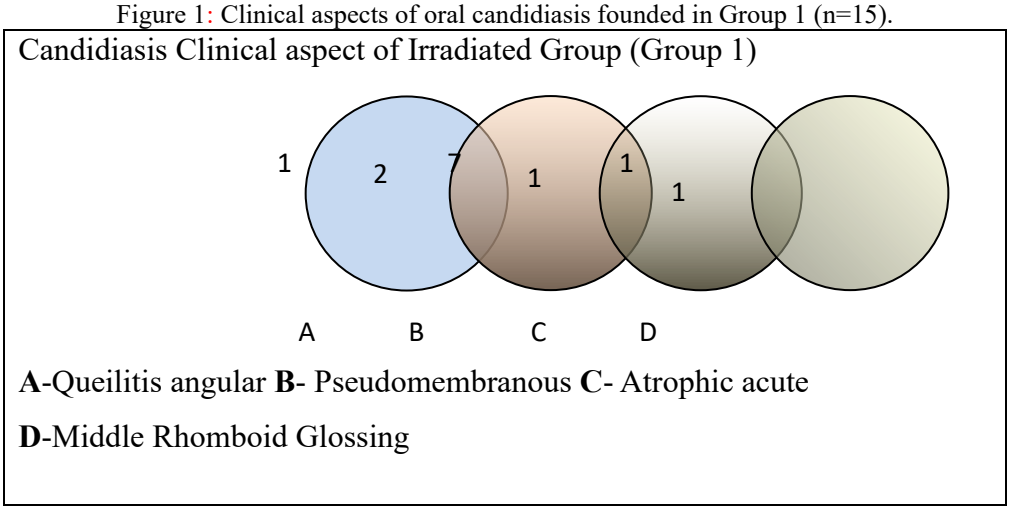
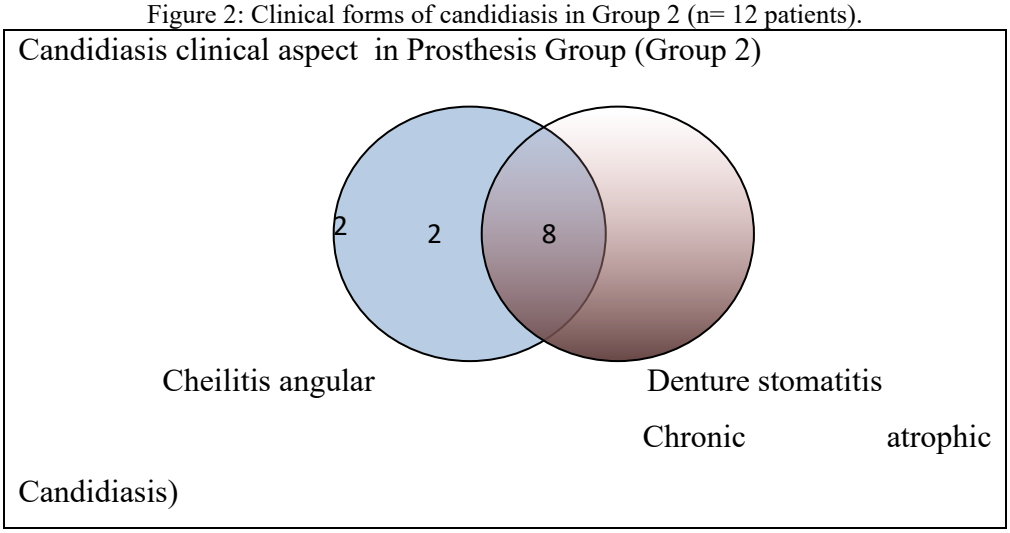


Figure 2: Clinical forms of candidiasis in Group 2 (n= 12 patients).



The identification of the samples was done by using three methods: Biochemical test (Candifast®), physiological test with CHROMagar® Candida medium and PCR EI, to confirm their identification through molecular biology.

3.2 CANDIFAST® IDENTIFICATION TEST

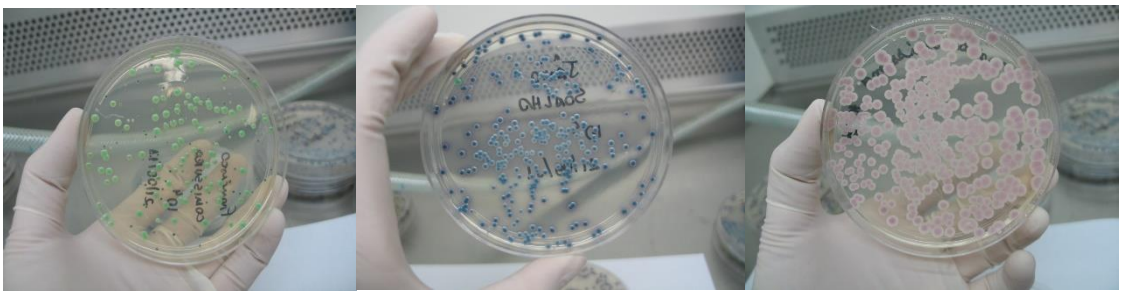
The biochemical test, of the 15 patients of Group 1 (irradiates in the head and neck region) 18 samples were obtained that were inoculated in Sabouraud agar. Two samples were obtained in three patients (20%). Samples I7 (tongue) and I7.1 (palate) presented different clinical forms of candidiasis (Pseudomembranous Candidosis and Acute Atrophic Candidosis, respectively). Samples I9 and I9A presented the same clinical form (Pseudomembranous Candidosis), however the first one affected the tongue, and the second had an oropharynx. In another evaluated patient (samples I14 A and I14B), the colonies presented different morphotypes in the Sabouraud agar, and were thus identified separately. Therefore, out of the 18 samples identified, 7 (38.8%) were identified as *C. albicans* and 7 (38.8%) as *C. tropicalis*. The other four samples were identified as distinct species: one as *C. krusei* (5.5%), one as *C. lusitaniae* (5.5%), one as *C. parapsilosis* (5.5%) and the last one as *C. glabrata*.

For Group 2 (prosthesis carriers), the biochemical test allowed the identification of a total of 14 samples from the 12 patients evaluated. In two patients (16.6%) it was possible to obtain two samples, as they presented two clinical types of candidosis simultaneously: Denture stomatitis on the hard palate and Angular cheilitis in the buccal commissure. In these four described isolates (P2, P2.1, P3 and P3A), the Candifast® kit identified *C. albicans*. The other samples were also identified as *C. albicans* (100%).

3.3 CHROMAGAR® IDENTIFICATION TEST

The CHROMagar® *Candida* medium allowed the presumptive identification of three species of *Candida*: *C. albicans*, which shows green coloration; *C. tropicalis* showing blue coloration and *C. krusei* with pink coloration (Figures 3A, 3B and 3C). Through the CHROMagar® *Candida* medium, 27 samples from Group 1 (irradiated) and 25 samples from Group 2 (Prosthesis holders) were isolated. Out of the samples tested (n = 52), 25 (48%) were identified as *C. albicans*, 18 (34.6%) were identified as *C. tropicalis* and 4 (7.7%) as *C. krusei*. However, 5 samples (9.7%) could not be identified by using this method because the colonies did not present the colour stains described by the manufacturer - green, blue or pink. These colonies showed white, beige and purplish rose colorations, which could not be presumptively identified by the CHROMagar® *Candida* medium.

Figure 3: Presumptive identification of *C. albicans* (A), *C. tropicalis* (B), and *C. krusei* (C). CHROMagar® *Candida* method.



Considering only Group 1, 9 samples (33.3%) were identified as *C. albicans*, 14 (51.9%) as *C. tropicalis*, and 2 (7.4%) as *C. krusei*. 2 samples (7.4%) were not identified because they had other colorations (white and beige) not described by the manufacturer. In relation to Group 2, out of the 25 samples isolated by CHROMagar® *Candida*, 15 (60%) were identified as *C. albicans*, 4 (16%) as *C. tropicalis*, 2 (8%) as *C. krusei* and 3 (12%) were not identified.

Figure 4: Presumptive identification (Group 1=27 samples) using the CHROMagar® medium.

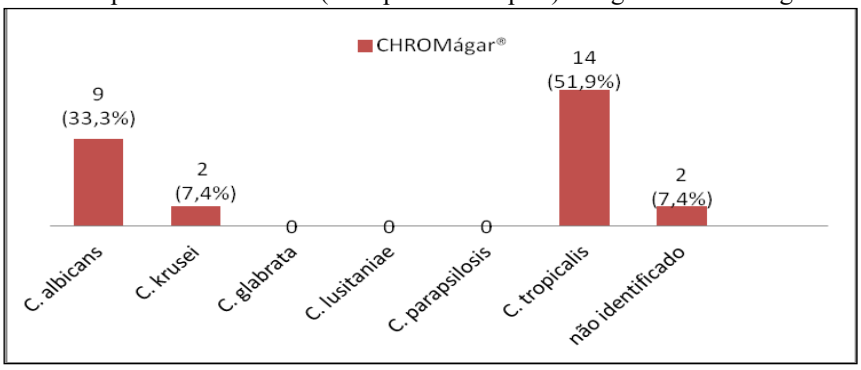
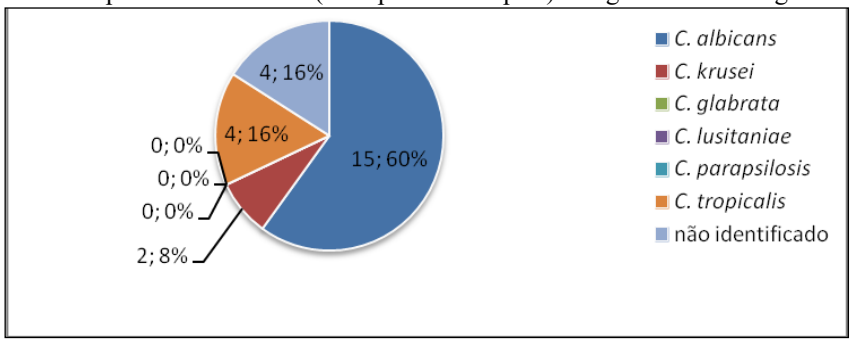


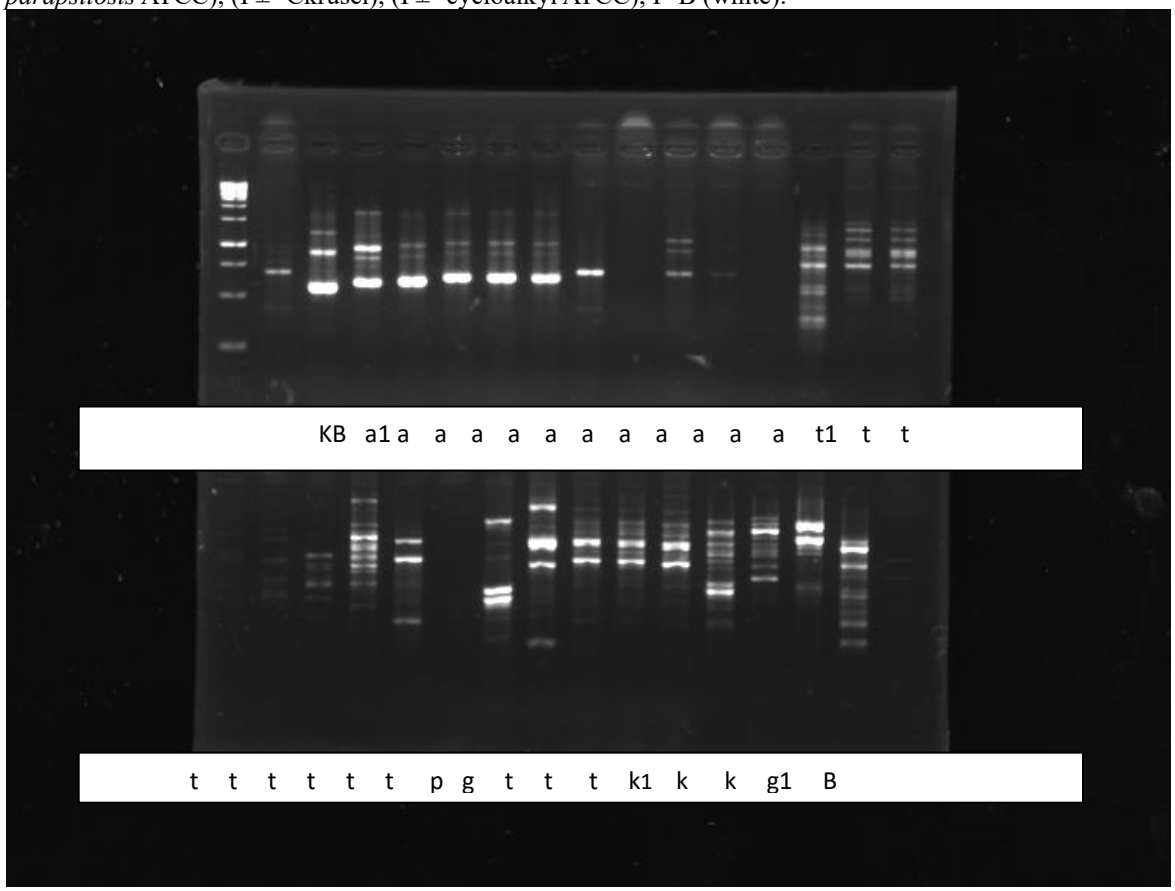
Figure 5: Presumptive identification (Group 2=25 samples) using the CHROMagar® medium.



3.4 FINGERPRINT PCR METHOD

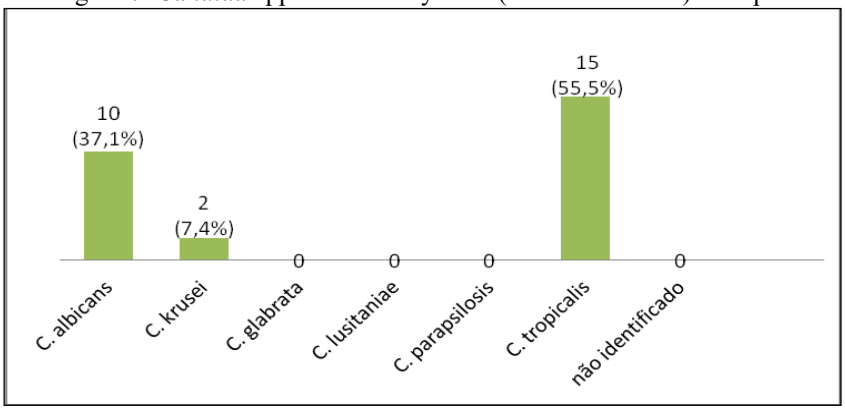
After the identification of the yeasts by the biochemical method and the presumptive identification of the CHROMagar® medium, representatives of each morphotype were selected for the identification confirmation, using the DNA fingerprint technique with the first EI1. When the PCR cycles were completed, the products of each sample were placed on 1.5% agarose gel and analyzed by electrophoresis. Samples that resembled CHROMagar® were placed side by side on the gels and the bands were stained and photographed (Figure 6). Samples that were identical in electrophoresis were considered to be from the same species. Each representative of each group was subsequently sequenced (D1 / D2 region of the major subunit of rDNA) to confirm this identity by comparing the nucleotide sequences obtained in this work with other sequences previously deposited in the bank gene. Two software programs were used: Electropherogram Quality Analysis (Embrapa) and Blast (Basic Local Alignment Search Tool) that found regions of similarity between the biological sequences.

Figure 6: Similar samples in CHROMagar® *Candida* were placed side by side for run on 1.5% agarose gel. (Standard), (a- *C. albicans*), (a1- *C. albicans* ATCC), (t-*C. tropicalis*), (t1- *C. tropicalis* ATCC) (g- *C. glabrata*), (g1 -*C. glabrata* ATCC), (p *C. parapsilosis* ATCC), (Î ± -Ckrusei), (Î ± -cycloalkyl ATCC), Î²-B (white).



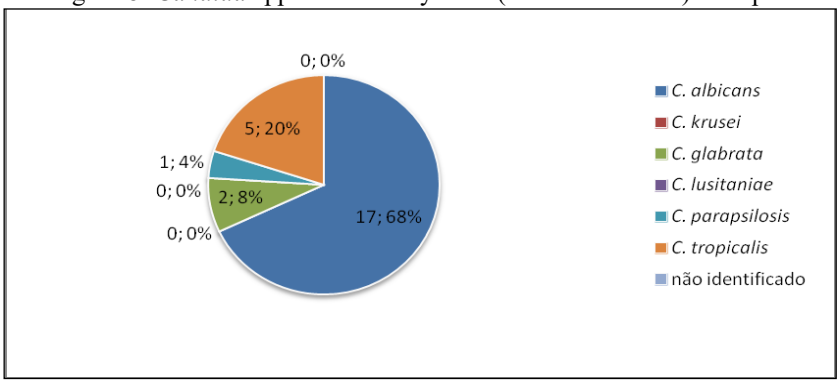
After identification by PCR and confirmation by sequencing, the number of yeasts for Group 1 (Irradiated in head and neck region) was: from 27 isolates, 10 (37.1%) were identified as *C. albicans*, 15 (55, 5%) were identified as *C. tropicalis and* 2 (7.4%) as *C. krusei* (Figure 7). PCR EI 1 did not confirm the identification of *C. lusitaniae*, *C. parapsilosis* and *C. glabrata* as determined by the Candifast® Kit and the 2 samples that the CHROMagar® *Candida* medium had not identified were actually *C. albicans* and *C. tropicalis*.

Figure 7: *Candida* spp identified by PCR (EI 1 e NL1/NL4) Group 1.



In Group 2 (Prosthesis Carriers), 25 yeasts were isolated and 17 (68%) of the samples were identified as *C. albicans*, 5 (20%) as *C. tropicalis*, 2 (8%) as *C. glabrata* and 1 (4%) as *C. parapsilosis*. Figure 15 shows the results described (Figure 8). Thus, the Candifast® Kit allowed the identification of 18 yeast isolates in Group 1 and 14 yeasts in Group 2. By the other two methods of identification, it was possible to isolate a larger number of microorganisms because the CHROMagar® *Candida* medium allows a better visual separation of morphotypes, differently from the Sabouraud agar medium, where the yeast distinction is very difficult.

Figure 8- *Candida* spp identified by PCR (EI 1 e NL1/NL4) Group 2.



Therefore, when comparing the three identification methods used in this present study, it was observed that the results obtained with the CHROMagar® *Candida* medium coincided in almost 100% with those presented with PCR EI1. However, when the PCR was compared with the Candifast® kit, there were divergences in the results in the 2 groups. The kit erroneously identified some yeasts such as *C. lusitaniae*, *C. parapsilosis* and *C.glabrata* in Group 1, which were not confirmed by PCR and in relation to Group 2, Candifast® identified only *C.albicans*, which was not confirmed by PCR EI1, which identified three other yeast species: *C.tropicalis* (5 samples), *C. glabrata* (2) and *C. parapsilosis* (1). Thus, in Group 1, 11 species (4 *C. albicans*, 6 *C.tropicalis* and 1 *C. krusei*) were correctly identified with Candifast® (61.8% of agreement with PCR) whereas in the Group 2 evaluation, 7 isolates of *C. albicans* were found (50% of agreement with PCR).

4 DISCUSSION

This study allowed the identification of the main *Candida* species that colonize the mouth by three methods: the biochemical methods Candifast® and CHROMagar® *Candida* medium and the molecular identification by PCR EI 1 - NLI / NL4 PCR.

Several studies have shown that during radiotherapy, the number of non-albicans species increases significantly, but *C. albicans* is still the most prevalent species [24,25,26]. The present study did not confirm these findings, demonstrating a greater prevalence by *C. tropicalis* (55.5%) of the

samples identified, followed by *C. albicans* (37.1%) and *C. krusei* (7.4%). This increased incidence can be attributed to the intense radiotherapy to which patients undergo, to the association with chemotherapy or to the sometimes variate methods used in the identification of these microorganisms by others authors.

In relation to Group 2, 68% of *C. albicans* were identified, followed by 20% *C. tropicalis,* 8% *C. glabrata* and 4% *C. parapsilosis*. The results of this research are in agreement with Oliveira et al. [27] and Qiu et al. [28], who found a higher prevalence of *C. albicans* in patients with total prosthesis, and the palate was the most affected site by the lesions. In another study [28, 29], which aimed to analyze the genetic variability of *Candida* yeasts in the oral cavity of users of total prosthesis and control individuals, the author also concluded that *C. albicans* was the most often found. However, he cites that *C. glabrata* was the second most prevalent species, followed by *C. tropicalis*, *C. parapsilosis* and *C. krusei*. These results differ from those found in this study. Table 2 shows the comparative results of species identification by the three methods.

Table 2- Comparison of three presunctive identification methods for oral clinical *Candida* species in Group 1 and Group 2 patients.

Microorganisms	Group 1			Group 2		
	Candifast (n=18)	Chromagar (n=27)	PcrEll (n=27)	Candifast (n=14)	Chromagar (n=25)	PcrEll (n=25
	Diagnosed cases number			Diagnosed cases number		
C. albicans	7 (38.8%)	9 (33.3%)	10 (37.1%)	14 (100%)	15 (60%)	17 (68%)
C. tropicalis	7 (38.8%)	14 (51.9%)	15 (55.5%)		4 (16%)	5 (20%)
C. krusei	1 (5.5%)	2 (7.4%)	2 (7.4%)		2 (8%)	-
C. lusitaniae	1 (5.5%)	-	-		-	-
C. parapsilosis	1 (5.5%)	-	-		-	1 (4%)
C. glabrata	1 (5.5%)	-	-		-	1 (4%)
Not identified		2 (7.4%)	-		3 (12%)	-

Identification using the CHROMagar® *Candida* medium coincided in almost 100% with the PCR method. This shows that the first can be used to identify three *Candida* species: *C. albicans* (green), *C. tropicalis* (blue) and *C. krusei* (pink). It is a fast method and easy to implement, however the cost should be considered on choice. Some colonies showed small color changes, which may have occurred due to metabolic changes among the isolates. Most authors agree that other species could not be identified with this method, as they may present several morphotypes and stains not compatible with those described by the manufacturer [30, 31, 32].

Although *C. dubliniensis* may also show green-colored stains, MÄHNß et al. [33] conducted a study for phenotypic differentiation between the *C. albicans* and *C. dubliniensis* species and failed to create a precise way to distinguish them using CHOMagar® *Candida*, which is in accordance with our results.

In the present study it was observed that the colonies of *Candida glabrata* presented a pink color, with a bright appearance. As it was a pink colony, it was identified by CHROMagar® *Candida* as *C. krusei*. However, Madhvan et al. [18] studied the sensitivity and specificity of the CHROMagar® *Candida* medium in the identification of oral yeasts and concluded that *C. glabrata* could also be identified by this method and presented a different morphotype of *C. krusei*: its colonies were convex, more punctiform, with regular edges and darker pink coloring. They did not have the "dry" aspect of a *C. krusei*. Species that were not identified by CHROMagar® had white or beige colorations. They were identified by PCR as *C. albicans*, *C. tropicalis* or *C. parapsilosis*. The latter, according to Madhvan et al. [18] and Sampath et al. [34] can present a huge number of colors and different aspects of morphotype.

The Candifast® Kit showed a 50% agreement with the PCR method for Group 2 and 61.8% agreement for Group 1. The manufacturer cited a degree of agreement above 90% with other biochemical methods, however does not compare it with PCR, which is the gold standard in yeast identification. A negative aspect of the test which can be cited is the subjectivity in reading the results of Candifast®. The degree of turbidity of the dilution vial is measured visually, as well as the color reading in the wells. The manufacturer elucidates that colors "yellow-orange", "yellow" and "fuchsina" are "positive growth" and "reddish orange" is "negative growth". What can be appreciated is that these colors often get confused. The Sabouraud agar medium is the recommended way to use the Candifast® Kit. Due to the fact that this medium most often did not distinguish the yeast morphotypes, the number of isolates determined by the Candifast® Kit was much lower in the two groups compared to the CHROMagar® *Candida* medium. Using the Sabouraud agar medium, 18 samples were identified in Group 1 and 14 samples in Group 2. For CHROMagar® *Candida*, 27 and 25 were isolated, respectively. Thus, the biochemical method allowed a sub-identification of the yeasts and was not efficient in the differentiation of other species tested. This suggests that there is a need to reformulate this kit's methodology. This could be done by replacing Sabouraud agar in the first step of identification with the CHROMagar® *Candida* medium. Thus, after identification of different morphotypes, these samples would now be spiked on Sabouraud agar and the identification process would be continued following the steps described by the manufacturer [19, 35].

Several authors cite the co-infection in their works and their possible relation with the degree of virulence of these microorganisms [11, 17, 36]. Some patients tested in this study had co-infection, where it was possible to detect more than one *Candida* species causing the disease. In Group 1, the presence of two species of *Candida* was detected in four patients, and *C. albicans-C.tropicalis* co-infection occurred in three patients and in one *C. albicans-C.krusei* patient. In Group 2, co-infection occurred in five patients, and in three patients the C. albicans and *C.glabrata* species were present simultaneously, in one case *C. albicans-C.parapsilosis* and *C. albicans-C. tropicalis*. Infections by

multiple species of *Candida* (co-infections) can be considered a response to the resistance of microorganisms to the various antifungals used by patients. In conclusion, *C. tropicalis* was the most found species in Group 1 (Irradiated in the head and neck region). The species *C. albicans* was the most common species in Group 2 (with prostheses). The Candifast® Kit was found to be defective in the identification of several species of *Candida*, as compared to the molecular identification method used (PCR EI1 and PCR NL1 / NL4). CHROMagar® *Candida* medium was a good method for the presumptive identification of *Candida* species. It has limitations when the colors found in the colonies differ from green, blue or pink.

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DECLARATION COMPETING

The authors have declared no conflict of interest.

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AUTHOR CONTRIBUTION STATEMENT

All authors contributed both in the experimental performance and in patient care, as well as in reviewing text.

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DATA AVAILABILITY STATEMENT

Information about the names and clinical information were recorded and filed at the Faculty of Dentistry of the UFMG and will not be exposed to maintain the privacy of each patient. All data were included in this article.

AUTHOR DECLARATION

The authors declare their agreement with the publication of this work publishing as a chapter of the book HEALTH and MEDICINE: Science, Care, and Discoveries, by Seven Publicações.

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The use of quality management tools in the processes of forensic examinations in the institute of criminalistics of the civil police of the federal district: An analysis of its efficiency

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Eduardo Dias Leite
E-mail: eduardo.leite@ifb.edu.br

Alexandre Laval Silva
E-mail: 1928064@etfbsb.edu.br

Lorrayne Pereira da Silva
E-mail: perelorra@gmail.com

Maria de Nazaré Santos Reis
E-mail: maria_santosreis@hotmail.com

ABSTRACT
The general objective of the research is to analyze how the use of quality management tools in the processes of criminal examinations carried out by the Efficiency Sector of the Criminal Police Institute of the Civil Police of the Federal District can improve the performance of this Sector, after the inclusion of management tools in carrying out its processes. The Institute has the task of conducting crime examinations, through the collection, analysis and interpretation of material traces. The Sector responsible for examining the efficiency of objects is called Efficiency, in which the examination is carried out to identify whether the objects collected at crime scenes are suitable for the consolidation of the indicated crime. In 2019, steps were taken to improve the management and administration of processes carried out in the sector, all based on Quality Management principles and tools. In this research the relevance that the use of quality tools had in a public sector will be addressed, being demonstrated through the use of data sample, process mapping, graph with the sample of production variation indicators and an interview with the creator changes, so as to bring a complete understanding of the entire process. It is concluded that: With these changes, improvements were quickly noticed, which led the sector to have a significant increase in its monthly production.

Keywords: Public sector, Processes, Quality Tools.

1 INTRODUCTION

The present work, with the general objective of this study, aims to show how the use of management tools can improve the reality of a sector that provides public services. For a better understanding, it should be noted that public service is an activity developed with the participation of the State, in which it is in charge of providing services that will meet the needs of society.

The work had as its field of research the Efficiency Sector of the Institute of Criminalistics of the Civil Police of the Federal District (IC), which is responsible for carrying out examinations of the corpus delicto, through the collection, analysis and interpretation of material traces, with the objective of producing and perpetuating the material evidence of criminal offense, using scientific knowledge, impartially, in a timely and efficient manner. In this way, to clarify the authorship, the criminal circumstance and the manner in which the criminal offense was carried out, by means of a criminal expert report that points out the material truth, in which the examination is carried out to identify

whether or not the objects collected at crime scenes are suitable for the consolidation of the indicated offense.

In 2019, this sector underwent a reformulation in its processes based on the use of Quality Management tools. This reformulation was carried out using the concepts of the PDCA Cycle and the redefinition of processes and workflows.

The PDCA cycle aims to promote the continuous improvement of processes through a circuit of four actions: plan, do, *check* and act, *and was one of the main tools that guided the continuous improvement in the processes of the efficiency session.* According to Quinquiolo (2002 apud Ingepro 2010), the PDCA Cycle has as its basic function the assistance in the diagnosis, analysis and prognosis of organizational problems, being extremely useful for the solution of problems, being effective in conducting systematic actions in search of continuous improvement.

According to Silva (2014), the use of process mapping brings benefits to organizations, such as cost reduction, reduction of failures, greater speed of information, among others. Process mapping is of great importance within organizations due to the ease of detecting problems, analyzing processes, thus bringing improvements to the institution.

This methodology can be used through tools to organize and standardize work, facilitating the identification of opportunities for improvement for the company, and one of the tools based on these fundamentals would be the flowchart, which was used in this research. The flowchart is a quality tool made by means of symbols to identify each step of a process, all presented in a practical way to obtain an easy understanding.

With this, the research problem will be presented below, considering the reality of the public sector.

1.1 RESEARCH PROBLEM

It is known that in the Public Sector several cases of inefficiency in its processes have already been identified, as argued by Berg et al. (2015), there are some ways where inefficiency can manifest itself, among them, he cites corruption, waste when the cost of executing projects is greater than necessary, poorly designed projects, poor organization of processes and also the misallocation of resources.

With the inclusion of article 37 of the Federal Constitution, which was a response to society's discontent with public services, which says that the Public Administration of any of the Powers of the Union, the States, the Federal District and the Municipalities, must obey the principles of legality, impersonality, morality, publicity and efficiency.

The principle of Efficiency was inserted in the Constitution, based on Constitutional Amendments No. 19/1998 and No. 45/2004. The principle in question points out how managers should

guide their conduct when developing the public service, in order to ensure a satisfactory Public Administration with regard to the satisfaction of the public interest.

Thus, Efficiency has become a fundamental right, enlisted in Article 5 of the Constitution, guaranteeing each and every citizen the right to a speedy procedural process. Thus, for the improvement of processes in a public organization, it is essential that the use of Management tools is implemented.

In this sense, the research question can be defined as follows: How can the use of quality management tools in the processes of forensic examinations carried out by the IC Efficiency Sector improve the performance of this Sector?

1.2 OBJECTIVES

The general objective of this work is to analyze how the use of quality management tools in the processes of forensic examinations carried out by the Efficiency Sector of the IC can improve performance. To achieve the general objective, the following specific objectives have been defined:

Present quality management tools used in the Efficiency Sector;

- Map the efficiency examination process using the notation recommended by the BPM (*Business Process Management*) methodology;
- Conduct a survey on the advances achieved in the Efficiency Sector;
- Analyze the production of the year 2019 in the Efficiency Sector.

1.3 JUSTIFICATION

The research discussed how management tools can contribute to an improvement in the performance of the public service, and thus show how this use can be of great use to organizations that seek to increase their efficiency.

It is believed that the research can contribute in an objective way with regard to the increase in production, optimized organization and process mapping, thus bringing more efficiency, agility and quality in the processes and services provided by State agencies. The description and analysis of the reformulation that took place in the Efficiency sector in 2019 will be of great importance to record the use of management tools, being able to optimize the operation of a session, and obtain better organizational results. As well as documenting the process carried out and publicizing a successful case that occurred in the Public Administration.

2 PUBLIC SECTOR AND QUALITY MANAGEMENT TOOLS USED IN THE EFFICIENCY SECTOR

As provided for in the Federal Constitution of 1988, Public Service is any and all services provided by the Public Authorities in order to meet the needs of Society. In article 175, caput, of the Brazilian Constitution, the provision of public services is classified as a duty of the State in the following terms: "It is incumbent upon the Government, in accordance with the law, directly or under a concession or permission regime, always through bidding, to provide public services."

2.1 WHAT IS THE PUBLIC SERVICE PROVIDED TODAY LIKE?

Public services are provided by the state, and directed to the collective interest. For these services to be available, it is necessary that they are not provided only as an obligation, but with quality and efficiency.

Even with the advances observed in public administration, the services still have a high level of bureaucracy, there is a loss of time, money and productivity, and what was supposed to be a quality and agile service, happens that from the point of view of society the public services provided could have more quality.

With the need to implement efficiency, agility and organization in the services provided by the public sector, the National Program for Public Management and Debureaucratization (GESPÚBLICA) was established on February 23, 2005. The objective of this program is to collaborate so that there is a continuous improvement in the provision of services to society.

Regarding this program, Paula (2005) says:

> According to MARE (Ministry of Federal Administration and State Reform) technicians, the mission of the Program for Quality and Participation in Public Administration is to implement quality and participation programs in all bodies and entities of the Executive Branch.

As stated by Lima (2013), many have translated that efficiency is doing more with less, however, for an organization to really look for ways to make its production have better results, it would be necessary to do the best with what it already has.

In this sense, the implementation of a managerial culture instead of a bureaucratic culture is extremely necessary for the public sector, as it will be able to speed up public processes, thus bringing improvements in the quality of services provided, and meet the demands of society in a more efficient way.

2.2 QUALITY MANAGEMENT TOOLS

According to Pearson (2011), quality tools were not made to be used in isolation, but rather used together to map problems and seek ways to solve them. There is no tool intended for specific

problems, but each tool has characteristics that make it easy to identify which ones and when to use them.

In line with Pearson's (2011) idea, it cannot be assumed that quality tools can be applied identically in all contexts. In other words, the aspects of each company must be taken into account, such as its economic conditions. Currently in Brazil, more companies have been able to adopt quality management, directing it to product quality, waste control, process standardization, etc.

Among a set of principles that can facilitate the application of the tools, the first is the focus on the customer, since markets revolve around competitiveness and meeting the expectations and needs of customers, which leads to the success of the company and its permanence in the market. And in the case of the public sector, the "client" is society, in which the presence of communication between all members is indispensable, and in organizations between levels of hierarchy, as well as between other companies.

According to Rutkowski (1998), the first principle leads to the second, which is the perception of organizations as a series of interconnected processes and activities. In other words, the company is a process that contains several processes. Where employees must know the demands and constraints of their customers' processes.

The third principle, which is the constant search for improvements, is attributed to top management, and is only achieved with the unity and commitment of all. To identify problems and avoid them, it is up to supervisors and managers to come up with attitudes that encourage their subordinates to do so.

The importance of tools for quality is to identify flaws and eliminate these flaws in the process. In this case, it is the method that solves the problems in the production and operational processes, not the tools. Seleme (2012) states that the method can be defined as the logical sequence used to achieve the desired goal, while the tools are resources used in the method. In this sense, the method could be the PDCA cycle, and some of the quality tools would be: the flowcharts used in process mapping, histogram, Pareto diagram, Ishikawa diagram, control chart, dispersion diagram, 5W2H action plan, as some of them will be presented below.

2.3 PDCA CYCLE

According to Silvio Aguiar (2006):

> The PDCA method consists of 4 steps:
> PLAN: In planning, the goal of interest is defined and the means (action plans) necessary to achieve the proposed goal are established.
> DO (Execution) For the execution of action plans, people are trained in these plans. Next, the plans are implemented and data is collected that can provide information on the achievement of the goal.
> With the use of the data collected in the Execution Stage, an evaluation is made of the results obtained in relation to the achievement of the goal.

ACTION In this stage, the action to be taken depends on the results obtained, evaluated in the Verification Stage.

When the goal is reached, it moves on to the stage of the results obtained. When the goal is not reached, a new PDCA rotation is made, in order to overcome the difference between the goal and the result. Depending on the management, the PDCA cycle adopts different characteristics.

Pearson (2011) says that the greatest advantages of the cycle are: it can be used in any instance of the company, producing consistent improvements in processes and activities in general, integrating the production stages, involving all actors and making all of them responsible for the quality of the process.

The PDCA cycle comes as a form of continuous improvement, which can be used several times without being exhausted by it, since it brings with it improvements in the organization's culture, thus encompassing all processes. It is one of the main methods used along with a company's process control tools.

The PDCA Cycle is a tool for continuous improvement, it is a basic means to eliminate problems through actions. This cycle can be applied to any type of project, whether simple or complex.

It is necessary to be careful not to take too long in a certain phase, not to focus on unnecessary details, because if this happens, the other phases run the risk of being harmed. Defining a time pattern would be a very important step, and in cases of realizing the need to add something, it can be used in a next cycle.

When the organization is able to apply the four phases, it increases the chances of improvements and achievement of its objectives. All phases are of great importance in their applications, so planning requires a little more attention with regard to supporting the other phases, as there is a higher degree of difficulty, a more complex phase, making this step well done, the passage of the others is facilitated.

According to Vale (et al. 2017), it shows that the PDCA method was used in the juice production process and had positive and efficient results, providing greater satisfaction for customers and the company. In this case, it has achieved gains in demand and customer confidence.

2.4 PROCESS MAPPING

Process mapping is a tool that allows you to show the moment in which the organization is and serves to analyze all the components of the process through applied techniques. To make a mapping, it is necessary to have a good knowledge of the activities that make up the processes.

In this sense, Azevedo (2016) states that process mapping begins with data collection through interviews, questionnaires, meetings, field observations, and analysis of existing documentation.

Within the current Brazilian scenario, there are several factors that contribute to public agencies using tools that can help improve service delivery. Among these factors we have competitiveness and quality in organizations.

Competitiveness is not only an economic factor, it is not only competed by technical means, but also by institutional means. Institutions are increasingly pressured by the organizations themselves as well as by society, which constantly seeks a better service and better care. To do this, the organization needs efficiency and quality to be prepared to compete with factors that arise both internally and externally. Talking about quality is difficult to define, because everyone has a conclusion about what it is.

According to Oliveira (2014), regardless of the definition of quality of each organization, one should focus on three characteristics: Focus on the customer, because customers know what is best for them, and in cases of public institutions, the focus is on society; Focus on continuous improvement, that is, observing the changes in customer needs and expectations, and as a last focus, the involvement of everyone in the improvement process, taking into account that the phrase "one swallow does not make a summer", can be applied to any and all sizes of organization.

In this context, Costa *at al* (2015) states that the Process mapping can bring benefits to organizations as it offers a set of techniques that can represent in a simplified way the relationships between the various processes of a company. Therefore, Process mapping is a tool used by organizations to understand in a simple and clear way how a business unit is progressing.

In Silva's (2014) work, it shows that with the use of mapping, the most noticed benefit was the complete visualization of the processes, in addition, ANVISA was a reference in the use of the process mapping methodology, in the period in which the research was carried out.

2.4.1 Process Flow Chart

A flowchart is a way of representing a company's processes through symbols, with the aim of making a step-by-step description of these processes. The flowchart establishes a beginning, middle and end, and is always presented in a summarized manner, whether or not there are steps in sequence.

With the flowchart, it is easier to notice the positive and negative points of the analyzed process. This tool allows you to visualize how everything happens at each stage, favoring analysis. If any changes are made, it is notable due to the ease of its visualization and interpretation.

The development of flowcharts collaborates to find better ways to execute the processes, through the AS-IS and TO-BE flowchart. These terms mean the phases of BPM (Business Process Management), a methodology recommended by BPM CBOK (ABPMP 2013) - Business Process Management – Common Body of Knowledge - is a guide consisting of nine areas of knowledge, which

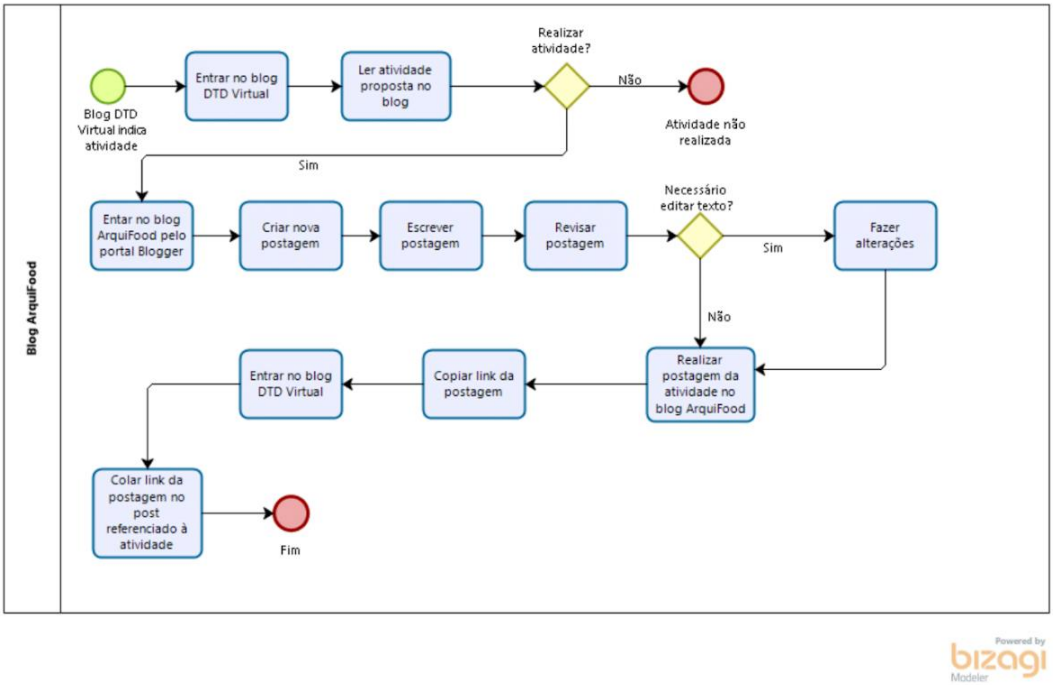
aims to help professionals in the area of business process management. Its main purpose is to detect and provide a broad view of areas that are considered as good practices.

The first term AS-IS is the view of the current moment, where it shows how the organization carries out its activities at a given time. It is at this moment that the processes are analyzed, thus identifying flaws, so that a later moment can be corrected, a moment of improvements, in which it is called TO-BE.

The second term TO-BE, also called process design, is the vision of future processes, a moment that brings the best forms of improvement in an organization. These improvements are made based on the previous AS-IS phase, correcting the identified flaws. In this process design, they involve some definitions, such as roles, responsibilities and workflows.

Azevedo (2016) defines flowchart as the "heart" of process mapping, and is widely used to show various information, as in the following figure:

Figure 1: Flowchart



Source: https://arquifood.blogspot.com/2019/10/atividade-30102019-fluxograma-bizagi.html
Flowchart of the ArquiFood Bizagi Blog

The figure above presents a flowchart elaborated with the objective of guiding through steps how a post on the arquifood blog should be made.

2.5 PERFORMANCE INDICATORS

Performance indicators are means used to evaluate whether certain actions are contributing to the achievement of the company's objectives and goals. These are measures that the company uses over time for its evaluations. The following is a definition of indicators:

> The indicators are concrete data, but they can prove to be false if the information that fed the data has not been verified with the reality of the company. They are the result of two or more factors that will show us how things are going in the company. We can cite as an example an indicator of sales effectiveness, which can be the result of the number of proposals for the orders actually closed or the ratio between the number of store employees and monthly sales. (SILVA; ALEXANDRO, 2013, p. 21).

Data can be false with unrealistic information, such as salary, has a gross value and net value, and what comes in hand is the net value, because in the gross there are discounts. In the company it is no different, as in the example of effectiveness given above, one thing is the sales data together with the number of employees, another thing is what happens behind the scenes, in practice, that is, the amount of sales of each employee.

Performance indicators present the impacts generated in the company through quantitative, qualitative, and even behavioral aspects. If analyzed well, these indicators can better manage company improvements, strategy implementation, as well as financial and performance results.

The indicators seek to examine the functioning aspects of the organization, some of these aspects are: efficiency, effectiveness and effectiveness.

- Efficiency: it is the relationship between the services and products that were generated with what was delivered, the resources used through costs, that is, if there is more efficiency the lower the cost to have or do something;
- Effectiveness: is the quality of products and services, and quantity, in other words, would be, for example, reaching or exceeding a certain production goal;
- Effectiveness: these are the impacts generated by services or products, for example, a campaign to teach literacy to adults over 30 years of age in a certain city, if this campaign reduces the number of illiterate people, then it was effective.

As a result, performance indicators can be adapted according to the reality of each company.

2.6 HOW QUALITY TOOLS CAN HELP IN PUBLIC ORGANIZATIONS' PROCESSES

Quality tools help improve a company's processes by identifying problems and helping to establish resolutions to the impasses encountered, as follows:

> It is important to be aware that quality tools and techniques play an important role in strategic quality. Quality tools aim, by attacking the cause, to extinguish and curb the appearance of problems. (BROW et al 2006, p. 274).

Tools are essential for employees to assess and identify strengths and those that need improvement. They can bring benefits to the company, obtaining more control of expenses and improvement in processes.

It may be that some companies use the tools without a prior analysis, or use something that does not make sense, resulting in possible returns such as demotivation, and spending time on excessive demands. For this reason, it is essential that there is a prior analysis of the tools in order to identify which will be the most appropriate to solve the problem. Tools are indispensable, as they are the basis for the company's progress to flow in a more efficient, effective and effective way.

Once the theoretical framework necessary for the research is presented, the methodology that was used will be presented below.

3 METHODOLOGY

The techniques and methodologies in this course completion work were based on bibliographic research, which enabled the advancement of the work together with the research developed in the researched public organization.

According to Ventura (2007), the case study is a practical investigation, which encompasses a broad method of data collection, analysis and planning. He can cite only one case study, as well as several, being of quantitative and qualitative research.

In order to approach the problem, the research was quantitative, qualitative and bibliographic. Quantitative research is a classification of the scientific method that uses different statistical techniques to quantify opinions and information for a particular study. It is performed to understand and emphasize logical reasoning and all the information that can be measured about human experiences.

Qualitative research is a type of research that can be carried out through interviews, and it is not numerical data, but qualitative, while bibliographic research is carried out through the use of theses, dissertations, articles, books, newspapers and websites on the internet to develop and support the objectives proposed in this research.

According to Strauss at al (1998), the research method is a set of procedures and techniques used to collect and analyze data. The method provides the means to achieve the proposed objective, that is, they are the "tools" that we make use of in the research in order to answer our question.

In this sense, the present research used the following procedures and techniques: data sample, as well as a brief report of the instruments used, a representation of the processes in the form of two flowcharts, one representing the processes before the use of management tools (AS IS) and the other with improvements made (TO BE), and analysis and interpretation of data before and after the performance of the Sector, graphical analyses, together with the PDCA management tool, to improve the institution's performance.

The following table summarizes the procedures and techniques that were used to achieve the specific objectives proposed in the work.

Chart 1: Relationship between the objectives and the methodology (elaborated by the researchers)

Specific objectives	Methodology to achieve them
Present Quality Management tools used in the efficiency sector	**Bibliographic research:** Tools found through books, articles, academic works, and were carried out/included in the theoretical framework;
Map the efficiency examination process according to the BPM methodology	**The mapping of the processes according to the BPM methodology:** with the definition of the flowcharts AS IS and TO BE carried out through information obtained from the interview with the coordinator of the efficiency sector and also considering the knowledge of an intern in the sector;
Conduct a survey on the advances achieved in the Efficiency Sector	Surveys made through the analysis of the process mapping, which are the two flowcharts, report chart and interview. Having as indicators the efficiency and effectiveness, and with this made a comparison of before and after the application of quality tools, and thus identify the advances in the Sector.
Analyze the production of the year 2019 in the Efficiency Sector	**Analysis of Indicators:** data were collected from information provided by the institution, more precisely by the coordinator of the sector, and thus, analyze the indicators through a graph of reports in the period of one year, two flowcharts to represent the functioning of the processes and an interview to describe in more detail the evolution of the processes. **Interview:** with the sector coordinator **Process mapping:** with information provided by the sector coordinator and assembly of flowcharts made by an intern in the sector. **Graphic:** with information also provided by the coordinator and thus expressed in a graph of reports.

Source: Researchers

The interview was conducted by phone call and e-mail, due to the social isolation resulting from the pandemic, these were the means used to carry out this step. The interview consisted of four questions: "What were the tools used by you when the changes in efficiency occurred"; "What changes have you noticed after using these tools"; "Do you consider that the change in processes was important for the improvement of the performance of the sector" and "Is there any performance indicator that shows the improvement of performance in the sector".

3.1 PUBLIC ORGANIZATION STUDIED

The research took place at the IC. This is a sector of the PCDF that is responsible for examining the materiality of the crime.

In 2018, the new headquarters of the Institute of Criminalistics was inaugurated, which replaced the old building, where IC operated from 1984 to 2012, when there was a fire. Since then, the IC has been working in five buildings throughout the PCDF complex. This new IC building, in addition to favoring the integration of all sectors of the Criminal Forensics of the Federal District in a single space,

has an innovative and bold project that meets the new technological and labor demands specific to Criminalistics.

The Institute of Criminalistics is located at SPO, Lote 23, conj. A, Ed. Sede, Subsolo - Brasília/DF - CEP: 70610-907. It is responsible for examining the materiality of the offence. It produces material evidence from traces found at the crime scene, using scientific techniques. It seeks information based on traces, which typify the crimes, and which indicate qualifying characteristics, as well as determine their origin.

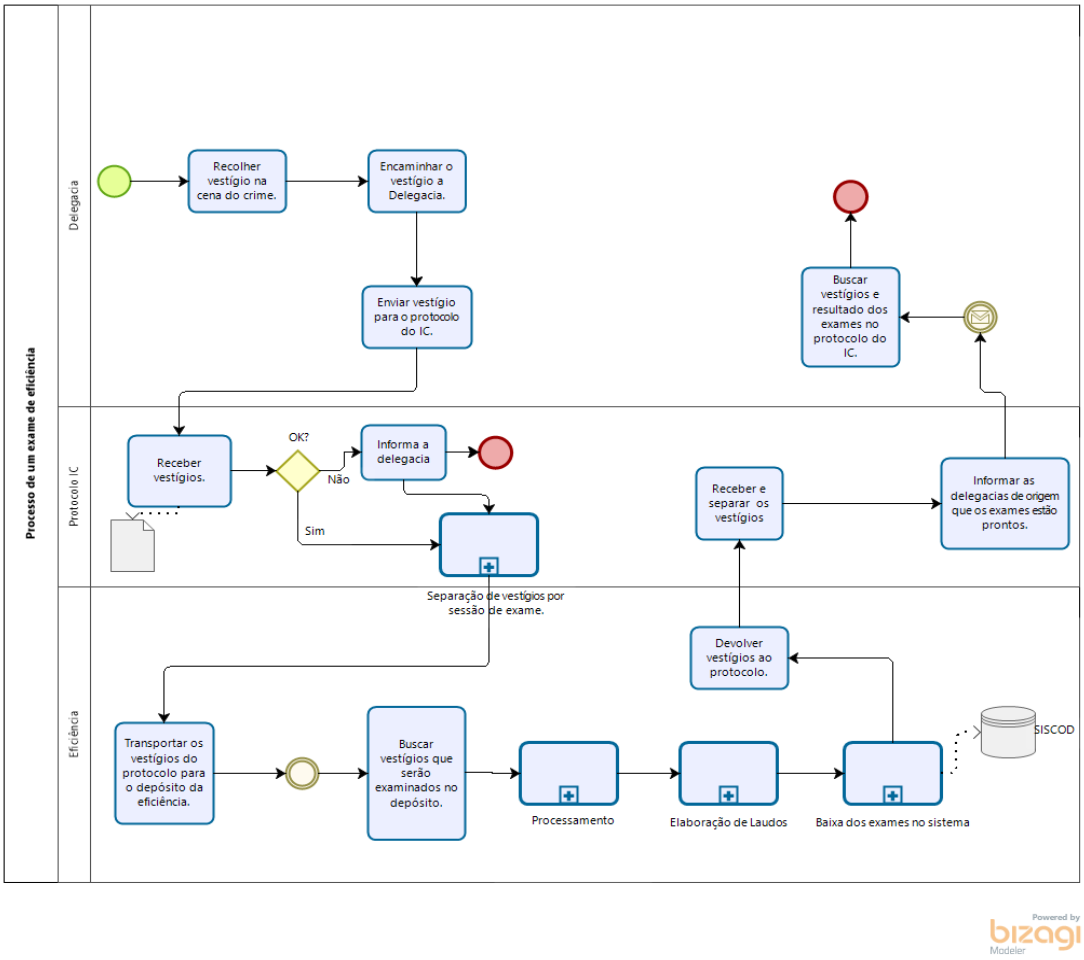
4 RESULTS

The results presented follow the order of the procedures and techniques presented above in Chart 1 of this study. As previously mentioned, the research proposes the analysis of data before and after application of the tools, where the events analyzed occurred in the period of one year in 2019, and will be presented according to the following sequence: flowcharts that represent the before and after of the production process, graphical representation of the monthly production number of the year analyzed, and an interview with the expert who coordinated the sector during the research period.

4.1 EFFICIENCY INDUSTRY FLOW CHART

The flowchart presented in the following figure is the representation of the activities and sub-processes of the Efficiency sector for the production of its exams, before the changes achieved with the use of the tools.

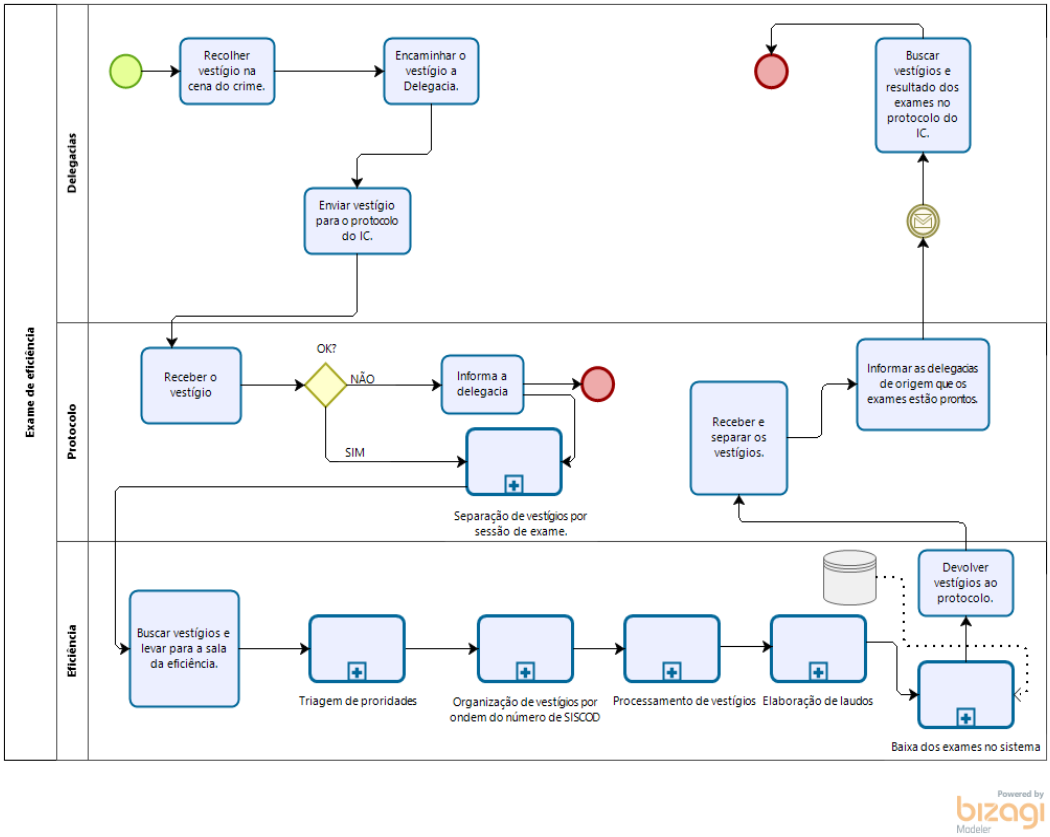
Figure 2: Flowchart prior to the changes



Source: Researcher

In the previous figure, it is possible to visualize how the entire process for the preparation of the exams worked in the efficiency sector, prior to the changes made to improve the performance of the service, it is noted that in the process represented there were no steps for the organization of priorities, where the service was done intuitively and not with an order that enabled an agile service provision according to the needs of the requester.

Figure 3: Flowchart after modifications



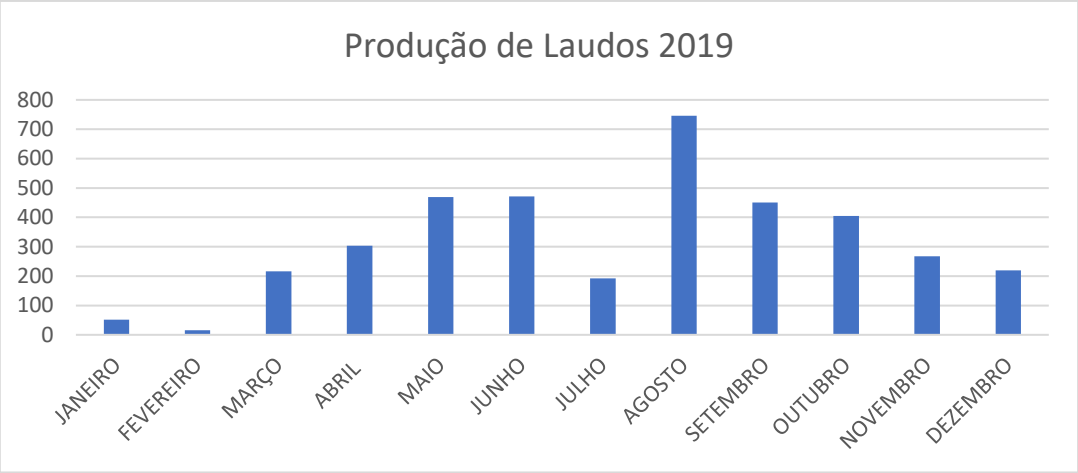
Source: Researcher

In the flowchart in Figure 3, we have the representation of the processes of the Efficiency sector after the strategies used to improve and increase production. It is possible to see that in the process two sub-processes were added that are essential for the results obtained to have been so satisfactory, they are, the priority screening, which aims to select the type of each trace, separating those that have a greater urgency and placing them as a priority and the Organization of traces, where it is time to organize in boxes the order in which the exams will be performed, according to each service priority.

4.2 PRODUCTION OF REPORTS

Figure 4 shows the bar graph with the production of reports, an indicator that was obtained through the use of spreadsheets made available by the organization.

Figure 4: Report Production Chart



Source: Researcher

The graph represents the variations that occurred in 2019 in the Efficiency Sector, and shows the results obtained after the implementation of the management tools. The first two months of the year represent well the production that existed before the implementation of the management tools, the production reached a maximum of 52 reports per month.

In March, the necessary changes were initiated to obtain better results, a total change was made in the organization of the traces, to have a better productivity, with these changes, even with the same number of employees in the sector, a significant increase in completed reports was obtained, closing the month with the production of 216 reports.

In the following months, the number of reports produced gradually grew, such as in April with 303 reports and May with 469 reports, which was a very good increase for the sector. In the month of June, there was a result of 471 reports, thus continuing a great amount of exams, proving that the changes made were very efficient.

In July, the number of reports produced was lower than the previous ones due to the fact that 2 employees of the session were on vacation, but even with this deficit the production was much higher than in the months when the management tools had not been implemented, thus ending the month with 192 completed exams. The month of August was the month with the highest production of the year, as it had the collaboration of 2 more interns in the sector, so the month was closed with the preparation of 746 reports.

In the following months, production continued with a very good number of 451 in September, 405 in October and 267 in November, taking into account that in November the sector no longer had any pending reports from the previous year and was only now producing in one month what was received in the same. The year 2019 closed in December with 219 reports completed. It was a year that achieved surprising results that have never been seen before in the efficiency sector.

4.3 PERCEPTION OF THE COORDINATION OF THE EFFICIENCY SECTOR

The following are the data from the interview conducted on August 12, 2020 with Criminal Expert João Luiz Neves de Oliveira (Coordinator of the Efficiency Sector), about the changes that occurred in the Efficiency Sector of the Criminalist Institute of the Civil Police of the Federal District.

Question 1: What tools did you use when the efficiency changes occurred?

> "With regard to tools, the basic principle of administration, organization, administration, planning and control. We started at that time of last year's carnival. It was in February of last year, when we took all that disorganized liabilities, of traces and organized them in order in SISCOD, among these organized traces, we subtracted what was a priority, that is, police stations that needed prompt care, such as the adolescent police station, the women's police station. The occurrences that already had an investigation instituted, so you would have a deadline to comply and the requests of the justices, most of them the result of reiterations. So, based on this, we used the computerized automation system already present in the Institution, which acted on the documentary record of the remains, in photography, then the organization of the photographic documentation and preparation for return. Once this was done, in the automation for the production of the report, we used the photographic documentation, including the registration of the request, we produced the report, and from this finalization, that is, the production of the report, the identifying and qualifying label of the entire procedure was also produced, to seal the trace previously prepared for return and, consequently, we finalized the process that was to return through the institute's protocol system, that originally received the trace. So, the quality tools were the principles of administration associated with an adequate environment for handling and managing the liabilities of traces and the production of reports within a technology automation system."

Question 2: What changes have you noticed after using these tools?

> "Regarding the changes that were felt, the main change was exactly our ability to manage and adapt production according to demand. Not only did we have, but we still have, about 400 requests per month. Our working capacity used to be restricted to 100, at most, 200. When we carried out this entire management process applied to the production of reports, we started to produce what the demand determined, that is, about four hundred reports per month, and in the month of August last year, as you can see in the graph, from the monthly production spreadsheets, at the end of August and beginning of September, We reached 700 reports produced, that is, we started to produce more than what was demanded, which allowed us to reach the end of the year, with a liability of only 100 reports. At the end of December, we left 100 reports for January, that is, the requests of the week, what arrived in the week, we were responding the other week, this within the criminalistics institute never happened. And so we have reached the ideal condition, which is the prompt service that is expected of both the work of the police and the work of justice, since we are contingent on justice."

Question 3: Do you consider that the change in processes was important for the improvement of the sector's performance?

> "Effectively, yes, since we were able to produce more reports than were produced, because from the numbers I showed you, if you look at the spreadsheets at the beginning of the year, in January and February, the production was lower than that after the month of March, and you saw that from March to August and September it went to an upward progressive line, depending on the application of the procedure. So, as far as the result is concerned, it was effective."

Question 4: Is there any indicator that shows the improvement of performance in the sector?

> "Regarding the performance indicator, it is the number of reports produced, I sent you month by month, January, February, March to December and you can see in the curve that from March we enter an ascendancy of 200 reports, then we get there in August to September at 700, then we fall, why? Because we would already be meeting the monthly demand, actually biweekly, what comes in and what goes out, so in the end we ended up with the pendency from December to January 2019 and in January 2020, we ended up with a pendency of 115 objects to be examined, but what does this represent? The weekly demand. So, our service, which used to take almost six months, that is, it took us six months to give an answer, this in the past, and adopt the system and the entire management methodology, we started to serve with 15 days. So, I think it's a great achievement, and an effective result."

Through the interview and the analysis of the graph of the production of reports (figure 4), it became clear how the production indicators improved, what used to produce 200 reports, started to produce 700, and before it took six months to perform a service and be completed, then it started to be done and completed in 15 days. With the application of the tools together with the PDCA cycle, it had greater control in the management capacity and adequacy of production according to demand, making evident the performance indicators of efficiency and effectiveness, as there were improvements in service, speed without any financial cost.

From the data collected, through the interview, flowcharts and graph the progress of the processes, which provided the basis for the results. Through the analyses, it was possible to notice the indicators of performance, efficiency and effectiveness, and thus show in more detail the evolution of services in the Efficiency Sector.

5 FINAL THOUGHTS

As presented in the results, the intermediate objectives were achieved and the general objective of the present research - to analyze how the use of quality management tools in the processes of forensic examinations carried out by the Efficiency Sector of the Institute of Criminalistics of the Civil Police of the Federal District can improve its performance, was also achieved.

This research, developed in the Efficiency Sector of the Institute of Criminalistics of the Police of the Federal District, was of great relevance to show how improvements in the service to society can be obtained, through commitment and inclusion of tools that seek effectiveness, as well as being useful for the Institute with regard to information on the functioning of the analyzed session.

Important data were obtained for the analysis of the results of this research, after collecting, it was possible to produce two process mappings that represent all the necessary steps for the elaboration of the efficiency exam, that is, the service provided by the Sector. The first mapping shows the complete process of what the actions were like before the changes were made, while the second represents the updated process with all the new steps.

The mappings are a very important representation to be able to visualize the processes in a clear way, and to understand how the workflow was and how it is in the Sector. Production data for each

month of 2019 were also obtained, which are represented by a graph, which shows the variations in the monthly results. And finally, an interview was made with the Expert who was the coordinator of the Sector at the time the research was carried out.

With all the data analyzed, it was possible to conclude that with the use of the tools and following the principles of management, the Efficiency Sector had a surprising improvement in its monthly production, as before 16 reports were produced and completed in one month, and after the application of the tools 746 reports were produced, as was the example of August 2019.

Therefore, answering the main problem of the research: Can the use of management tools in carrying out processes improve the performance of a sector that provides public services? The answer is yes. With the research done, together with the research done and analyzed, it was remarkable and it was clear the improvement of the institution's performances, being straight to the point, what used to produce 200 reports, started to produce 700, which used to take six months to perform a service and be completed, then started to be done and completed in 15 days.

The main results were obtained through the elaboration of mappings, which facilitates the identification of the functioning of the processes of the analyzed Sector, and which can be used by other sectors for future training, or just for a better visualization of their processes. Another significant result was through the graph that clearly represents the progress that the sector has made during the year that the new organization was implemented.

The results obtained in the research corroborate the article published by Vale et al. (2017), which concluded that the use of the PDCA tool was efficient and provided greater satisfaction to the researched company and its customers.

According to the research carried out by Silva (2014), it was clear how easy it was to visualize the processes, and with this visualization it allowed us to see everything that was being done and thus define improvements.

In this sense, in the present research there was a reduction in the rates of problems, and the clients started to trust the process more, results that are identified with the improvements of the research carried out at the Institute of Criminalistics.

For future work, it is recommended that the mapping of processes in other sectors of the Institute be elaborated, as this visualization is extremely important to analyze and obtain a good functioning of the processes, as well as a performance evaluation with the employees, and thus acquire other points of view in the improvement of efficiency as a whole within the organization.

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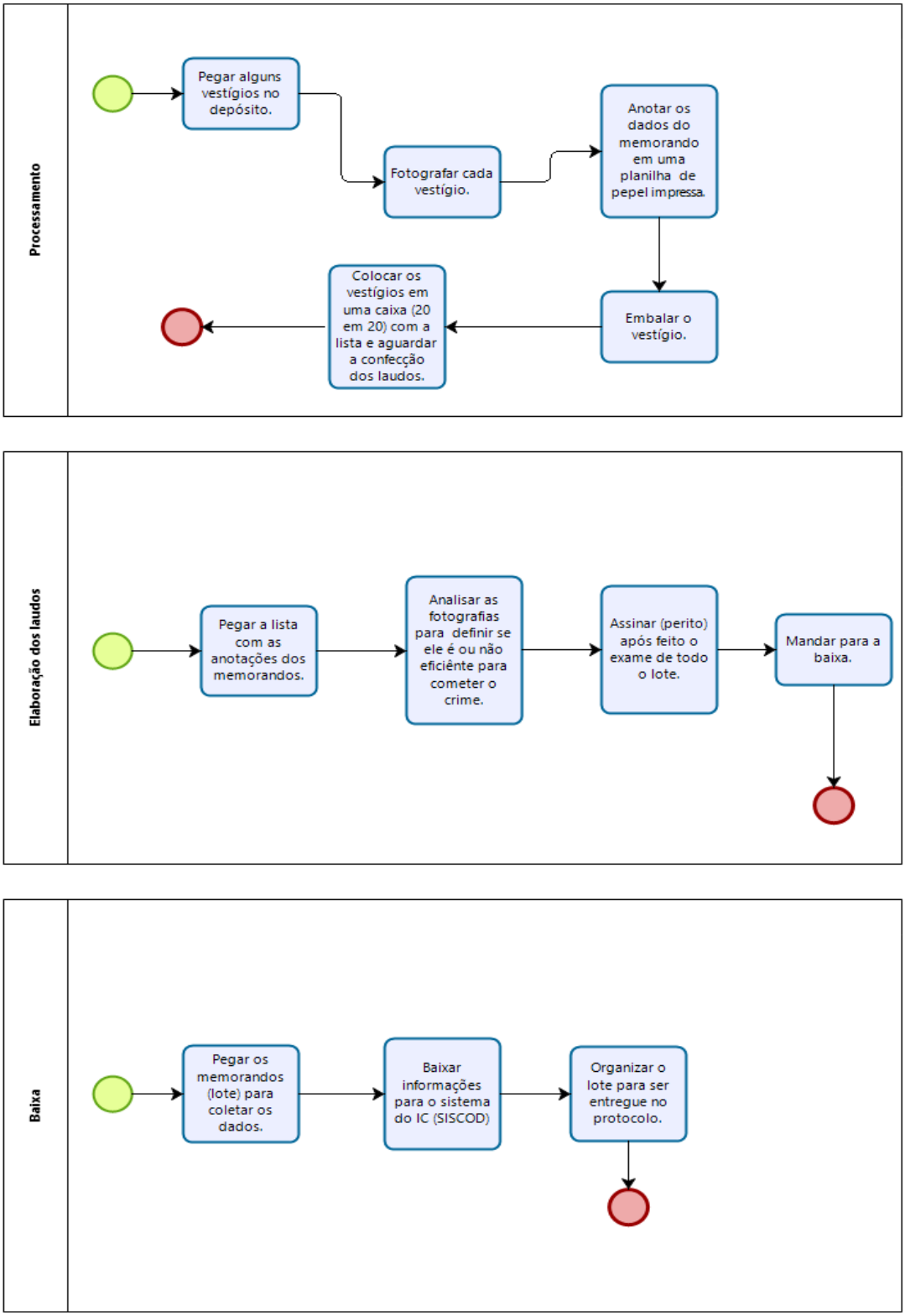
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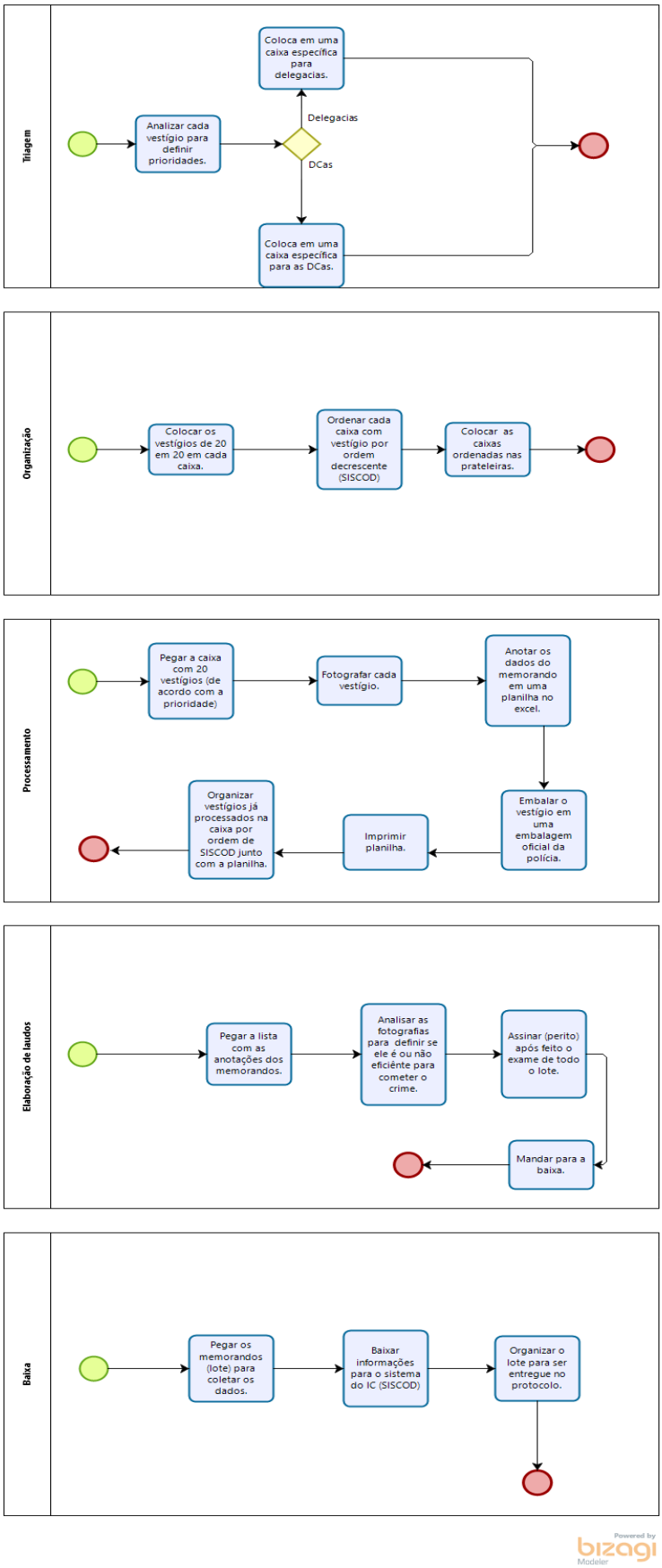
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ANNEX A – FLOWCHART 1 SUBPROCESSES



ANNEX B – FLOWCHART SUBPROCESS 2



ANNEX C - FLOWCHART BREAKDOWN 1

Activity	Executor	Detailing	Registration	Applications
Collect trace at the crime scene.	Agent.	When a crime occurs and at the crime scene there is a trace that may have supposedly been the weapon used, it is collected for a series of examinations.	Trace collection record.	Millenium
Forward the trace to the Police Station.	Agent	After collection, the trace is forwarded to the nearest police station.	X	X
Send trace to the IC protocol.	Delegate	After evaluating which tests are necessary to identify the use of the trace, it is sent to the IC.	Memorandum	Word
Receive traces.	Agent.	In the protocol, the traces are received and recorded in the system.	Record of receipt of traces.	Millenium/SISCOD
Separation of traces per examination session. (sub-process)	Agent, intern.	In the protocol, each trace is separated and which test it requests, so they are stored in a warehouse that has several shelves, each one identified with the CI sessions.	X	X
Look for traces and take them to the efficiency warehouse.	Agent, intern.	The agent goes to the protocol and looks for the traces that have arrived and takes them to the warehouse.	X	X
Look for traces that will be examined in the warehouse.	Agent, intern.	Every day an agent goes to the warehouse and picks up a quantity of traces to be carried out.	X	X
Processing (sub-process)	Trainee.	See sub-processes of **"1.Processing".** In the processing, the photographs of the traces are taken so that the expert can evaluate when the reports are prepared, as well as a new package is placed on the traces and there is a collection of data according to the memorandum of each trace.	Memos data sheet.	Word
Preparation of Reports (sub-process)	Expert	See sub-processes of **"2. Preparation of Reports".** At this stage, the responsible expert analyzes the photos taken of the traces and with his knowledge concludes whether or not the material is	Elaboration of efficiency exams.	Millenium/SISCOD

		efficient to commit the act that is being accused.		
Removal of exams from the system	Agent	View subprocesses of **"3.Low".** The discharge is done by an officer, who collects the memos of each trace, with the results of the examination, and updates the situation of each one in the police system.	Recording of exam results.	Millenium/SISCOD
Return traces to the protocol.	Agent	The agent returns all the material that has already been analyzed to the protocol.	X	X
Receiving and separating traces	Agent	A protocol agent receives this material and separates it according to its place of origin.	Receipt of traces with result.	Millenium/SISCOD
Inform the home police stations that the exams are ready.	Agent	As soon as the material is all separated and organized, the protocol sends a notice to the police stations that the requested exam has already been met.	Publication of exam results.	Millenium
Search for traces and results of the tests in the CI protocol.	Agent	An agent in charge of each police station goes to the IC protocol to look for the trace with its due result.	X	X

ANNEX D - FLOWCHART BREAKDOWN 2

Activity	Executor	Detailing	Registration	Applications
Collect trace at the crime scene.	Agent.	When a crime occurs and at the crime scene there is a trace that may have supposedly been the weapon used, it is collected for a series of examinations.	Trace collection record.	Millenium
Forward the trace to the Police Station.	Agent	After collection, the trace is forwarded to the nearest police station.	X	X
Send trace to the IC protocol.	Delegate	After evaluating which tests are necessary to identify the use of the trace, it is sent to the IC.	Memorandum	Word
Receive traces.	Agent.	In the protocol, the traces are received and recorded in the system.	Record of receipt of traces.	SISCOD/Millenium
Separation of traces per examination session. (sub-process)	Agent, intern.	See sub-processes of **"1.Separation of traces by examination session".** In the protocol, each trace is separated and which test it requests, so they are stored in a warehouse that has several shelves, each one identified with the CI sessions.	X	X
Look for traces and take them to the efficiency room.	Agent, intern.	Every day the intern or an agent goes to the protocol to check if there are new traces to be examined, in order to pick them up and take them to the Efficiency's own warehouse.	X	X
Priority triage (sub-process)	Agent, intern.	See sub-processes of "2**. Screening."** In the triage, the intern or an agent, analyzes trace by trace, to check where it came from, if it came from a DP, or from a DCa (priority), so he puts it in different boxes, so that when there is processing, he always starts with what has to be delivered faster.	X	X
Organization of traces by wave of SISCOD number (subprocess)	Interns	See sub-processes of **"3.organization".** To organize it, it is necessary to separate 20 traces in each box, all in descending order (SISCOD number).	X	X

Processing (sub-process)	Interns	See sub-processes of **"4.Processing".** In the processing, the photographs of the traces are taken so that the expert can evaluate when the reports are prepared, as well as a new package is placed on the traces and there is a collection of data according to the memorandum of each trace.	Memos data sheet.	Word
Preparation of Reports (sub-process)	Expert	See sub-processes of **"5. Preparation of reports".** At this stage, the responsible expert analyzes the photos taken of the traces and with his knowledge concludes whether or not the material is efficient to commit the act that is being accused.	Elaboration of efficiency exams.	Millenium/SISCOD
Removal of exams from the system	Agent	View subprocesses of **"6.Low".** The discharge is done by an officer, who collects the memos of each trace, with the results of the examination, and updates the situation of each one in the police system.	Recording of exam results.	MILENIUM/ SISCOD
Return traces to the protocol.	Agent	The agent returns all the material that has already been analyzed to the protocol.	X	X
Receiving and separating traces	Agent	A protocol agent receives this material and separates it according to its place of origin.	X	X
Inform the home police stations that the exams are ready.	Agent	As soon as the material is all separated and organized, the protocol sends a notice to the police stations that the requested exam has already been met.	Publication of exam results.	Millenium/SISCOD
Search for traces and results of the tests in the CI protocol.	Agent	An agent in charge of each police station goes to the IC protocol to look for the trace with its due result.	X	X

ANNEX E - DETAILS OF THE SUB-PROCESSES

TRIAGE

Activity	Executor	Detailing	Registration	Applications
Analyze each trace to set priorities.	Trainee	At this stage, each trace is analyzed to see whether or not it belongs to the police stations that require priority, such as the Child and Adolescent Police Station, or if it has any repetition and needs urgency.	X	X
Place in a specific box for DCas.	Trainee	After the necessary separation, the traces are separated into different boxes, and those from the DCas are placed in a box and placed at the beginning of the production "Queue".	X	X
Put it in a specific box for police stations.	Trainee	After the necessary separation, the traces are separated into different boxes, and those from the police stations that do not need urgency are kept in a box that goes to the end of the production "queue".	X	X

ORGANIZATION

Activity	Executor	Detailing	Registration	Applications
Place the traces every 20 in each box.	Trainee	A maximum of 20 traces are placed in each organizer box.	X	X
Sort each box with trace in descending order (SISCOD)	Trainee	All traces are sorted by SISCOD number wave.	X	X
Place the ordered boxes on the shelves.	Trainee	The boxes are placed in production order on the shelves.	X	X

PROCESSING

Activity	Executor	Detailing	Registration	Applications
Pick up the box with 20 traces (according to priority)	Trainee	The boxes are picked up in the right order for production.	X	X
Photograph every trace.	Trainee	Each trace is photographed from 2 different angles (front and back) and the memo is also photographed.	Registration in the IC system.	Photolink
Annotate the memo data in an excel spreadsheet.	Trainee	With each trace photographed, the data from your memo is placed in a spreadsheet that is used for archiving.	Memorandum data logging.	Word
Pack the trace in an official police package.	Trainee	All traces are repackaged with official envelopes.	X	X
Print spreadsheet.	Trainee	After all traces of the box that was produced are placed in the spreadsheet, it is printed, and placed inside the box, to identify each piece of content that contains it.	X	X
Organize traces already processed in the box in order of SISCOD together with the spreadsheet.	Trainee	After the boxes are photographed, they are placed in order for the reports to be made.	X	X

PREPARATION OF REPORTS

Activity	Executor	Detailing	Registration	Applications
Take the list with the notes of the memos.	Expert	The expert makes his expertise with the support of the photographs and the list that is made with the data of each memorandum.	X	X
Analyze the photographs to determine whether or not he is efficient in committing the crime.	Expert	In this analysis, the Expert looks at the photos taken of each trace, looking at all the details to define whether or not the object is responsible for the accused crime.	Viewing the photos.	Photolink
Sign (expert) after the examination of the entire batch has been done.	Expert	After the examinations are done, the Expert signs the reports issued.	X	X
Send it to the low.	Expert	After the reports are made and signed, they are sent to the discharge stage.	X	X

LOW

Activity	Executor	Detailing	Registration	Applications
Pick up the memos (batch) to collect the data.	Agent	The first step of the write-off is to get the memos with their reports ready, so that all the data can be included in the system to be used as research when necessary.	X	X
Download information to the IC system (SISCOD)	Agent	The necessary data is all put into the police system.	Low	Millenium/SISCOD
Arrange the batch to be delivered in the protocol.	Agent	After all the reports are downloaded, the box is organized and sent to the protocol.	X	X

SEVEN publicações acadêmicas

Pink october, taking care of yourself is an action for all: A report on health promotion

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Millene Mercadante Mendonça de Mattos
Nursing student
Fluminense Federal University

Victória Soares Sales Dantas
Nursing student
Fluminense Federal University

Jane Baptista Quitete
PhD in Nursing
State University of Rio de Janeiro

Juliet Ribeiro de Souza Lacerda
Nurse specializing in stomatherapy
FACUMINAS

Hilmara Ferreira da Silva
PhD in Nursing
Federal University of the State of Rio de Janeiro

Stephani Ohana Martins Vargas
Nursing student
Fluminense Federal University

Mariana Padilha Gomes
Nursing student
Fluminense Federal University

ABSTRACT

Objective: To report the experience of an academic event on health promotion in the context of breast cancer. Methodology: Descriptive study, of the type experience report on the results of the event "Pink October, taking care of yourself is a fight for all", held in October 2022, by a university in the coastal lowlands of the state of Rio de Janeiro. Extension action coordinated by a teacher, two nurses of the Nursing Clinic, two scholars of the Academic Development Scholarship and nineteen volunteer students of the Nursing Course. Results of the experience: The event took place in four different settings where health education activities, breast cancer screening through clinical breast examination, and test requests were conducted. Approximately 34.3% of the women have never had their breasts examined by a trained health professional, 51.4% are sedentary, 27.5% are overweight/obese, and 28.6% drink alcohol frequently. We noticed women's concerned about inadequate lifestyle habits that are considered risk factors for breast cancer. Conclusion: Health education with emphasis on health promotion and disease prevention can minimize the morbidity and mortality of breast cancer in the population.

Keywords: Women's Health, Professional Training, Breast Neoplasms, Health Promotion, Nursing.

1 INTRODUCTION

Breast cancer is the second most common type of cancer affecting women in Brazil and in the world, after skin cancer.(1) It has become a current public health problem, since there is a significant number of malignant neoplasms leading to death. In 2019, the Atlas of Cancer Mortality identified a total of 18,295 deaths due to this neoplasm.(2) In addition, according to INCA, for the 2020/2022 triennium, it is estimated that 66,280 new cases will be diagnosed, with an estimated risk of 61 cases per 100 thousand women.(3)

Pink October is an international movement that has as its main focus the fight against breast cancer, encouraging the participation of the population in its fight, and providing greater access to diagnostic and treatment services, thus contributing to the reduction of mortality with early diagnosis.[4]

Article 196 of the Brazilian Constitution of 1988 confirms that health is a right for all[5] and, together with the legal norm, the struggles of social movements for sexual and reproductive rights come into play, aiming at improvements in information, contraception, childbirth and prevention of breast cancer. Socioeconomic inequalities are associated with an increase in the number of children per woman, a greater predisposition to cancer risk factors, among others. This leads to a sexual and reproductive life full of aspects that may disfavor women's health, increasing vulnerability to diseases, including breast cancer.[6]

Studies show that the professional practice of nurses in primary health care tends to be restricted to a clinical paradigm focused on the disease, technical procedures and curative actions, in addition to being quite limited to a standardized performance – centered on pre-established routines.[7]

In this context, it is imperative to act in health that is committed to the demands and needs of local contexts, shared with the actors that compose it, and also integrated into the organizational model of the Unified Health System (SUS).

Although the participation of society has been a fundamental guideline of the SUS since its creation - regulated with the Organic Health Laws No. 8.142/90, in addition to the pillar of Health Promotion reaffirmed in the Ottawa Charter, its construction as a right from the perspective of *empowerment*, autonomy and citizenship are still challenging. In this way, critical and participatory pedagogies become fundamental to promote health, which includes preventing diseases and, simultaneously, triggering *empowerment and* community participation mediated by practices of popular health education and (in the context of) continuing education.

To the extent that such practices arise in the teaching-service frontiers, they also foster professional training in health and the reorientation of the techno-care model beyond the biomedical paradigm.[7]

Considering these assumptions, the Nursing Office of the Department of Nursing (REN) of the Fluminense Federal University (UFF) of Rio das Ostras, inaugurated in 2017, is characterized as a scenario of pedagogical innovation for teaching, research and extension in women's health, with priority given to carrying out practical activities aimed at improving nursing students and serving the local population. including the academic community.[8]

Thus, the objective of this manuscript is to report the experience of an academic event on health promotion in the field of breast cancer.

2 METHOD

Type of Study: This is a descriptive study, of the experience report type on the results of the Pink October event, if caring is a struggle for all, carried out by a Higher Education Institution (HEI) in the coastal lowlands of the state of Rio de Janeiro.

Place of study: Due to the commemoration of the popular movement called Pink October, health promotion activities were carried out with the awareness of the female population about breast cancer, risk factors, protective factors and screening exams (clinical breast examination, breast USG and mammography). The event was held during the month of October 2022, in four scenarios: ESF Recanto, Nursing Office/REN/UFF, Ostra Bugs (vintage car meeting), Tesalab (technology company in environmental services), located in the municipalities of Rio das Ostras and Macaé.

Data collection: A standard form was used *check list*, elaborated for this extension action, whose variables studied were: a) regarding the sociodemographic profile of women: age, marital status, education and race/color; b) risk factors for breast cancer: age at menarche, nulliparity, age at first pregnancy, age at menopause, use of hormonal contraceptives, hormone replacement, BMI, family history of cancer/degree of kinship, and whether they breastfed their children/for how long; c) Breast cancer screening: last clinical breast examination, last mammogram, last breast USG. The absolute and relative frequencies of the selected variables were calculated.

Analysis procedure: analysis and processing of the data by means of Microsoft Excel.

Ethical aspects: as it is an experience report related to the daily life of an HEI, this manuscript did not require the submission and approval of an Ethics Committee on Research with Human Beings.

3 RESULTS OF THE EXPERIMENT

In the Nursing Office/REN/UFF, nursing consultations were carried out with the academic and external community, with the objective of screening for breast cancer through clinical breast examination and request for imaging tests, if necessary. In addition, a breast cancer screening workshop was held with an emphasis on clinical breast examination, aimed at students and health professionals.

At the 2nd annual meeting of vintage cars, known as Oyster Bugs, in Lagoa do Iriry, health education actions and awareness of the population for breast cancer (risk factors, protective factors and screening exams) were carried out. In addition, the event was opportune to publicize the services offered in the Nursing Office/REN/UFF and to provide guidance on scheduling appointments.

In addition, the actions of Pink October were replicated in the FHS of Recanto, where activities such as conversation circles, clinical evaluation of the breasts for users with specific demands and request for imaging exams, when necessary, took place.

Finally, health education and awareness actions were also carried out for breast cancer at the Tesalab company, located in Macaé, state of Rio de Janeiro. Women in need of consultations were

advised to seek care at a Basic Health Unit near their homes and at the end of the activities, a *coffee break was shared* among those present.

The activities carried out in the Nursing Office/REN/UFF and in the ESF Recanto included clinical evaluation of the women, in these places the form developed for this action was applied, the results are described in Chart 1.

4 DISCUSSION

The extension action allowed the target audience to receive guidance on health care and the importance of knowledge about protective and risk factors, with a view to health promotion and early diagnosis of breast cancer. The risk factors that contribute to the onset and development of breast cancer are, for example, lifestyle and environmental, hereditary, hormonal and reproductive factors, age, race, body fat, among others. Breast cancer is a rare disease in young women, its incidence increases with age, most of it occurs from the age of 50. The Brazilian guidelines recommend offering mammography to women aged 50 to 69 years, every two years, and periodic examinations in women without signs and symptoms of the disease.[9]

Chart 01 shows that breast cancer screening exams are not accessible to women, since most of them have never had their breasts examined by a health professional trained through clinical breast examination (MCE) (34.3%). The ECM is recognized for its relevance as the first method for the diagnostic evaluation of palpable breast lesions, and is also recommended in several countries as a screening method. Annual MCE in all women over 40 years of age and 35 years of age and in those belonging to groups at high risk of developing breast cancer.[10]

In Brazil, ECM is recommended as a screening strategy for breast cancer, and should be performed annually in women over 40 years of age and is part of comprehensive women's health care, being indicated in all clinical consultations, regardless of age. Unfortunately, studies confirm that, among medical professionals and nurses, almost all of them reported not performing the ECM in all consultations.[11] It is also observed that these professionals show insecurity in performing screening actions in the units in which they work, either due to lack of knowledge of them, or due to the still predominant care model that favors complaint-conduct.[12]

Nevertheless, these results point to the importance of continuing education activities as a strategy to qualify professional practice. It is considered necessary to pay attention to the various aspects that may be influencing the small impact of training activities on actions for the early detection of breast cancer, such as nurses' motivation, didactic-pedagogical strategies used, among others.[13]

It is noteworthy that the ECM does not present evidence that it can be used alone for the early detection of breast cancer. Complementary exams of great importance, especially in countries such as

Brazil, are breast ultrasound and mammography. However, these tests are difficult to access for the female population, and inequality persists in the opportunities for early diagnosis of the disease.[11]

Therefore, self-palpation of the breasts should be recommended whenever the woman feels comfortable, without any recommendation for a specific technique, valuing the casual discovery of small breast changes. And also guide the search for clarification from a health professional whenever there is doubt regarding the findings of breast self-palpation.[12] The Ministry of Health reaffirms that self-examination is not recommended as a screening method for breast cancer.[9]

In this scenario, we emphasize that it is up to nurses, within the scope of primary health care, to carry out the nursing consultation and the ECM according to the age group and clinical condition of the user, request exams according to the protocols or technical standards established by the local manager, as well as develop educational activities, individually or collectively. that promote community mobilization and participation.[9,10] We emphasize that nursing care actions meet one of the eight priority primary care actions proposed by the WHO, which is to stimulate health education for the population with a view to information, prevention measures, and control of their health problems.[10]

Chart 01 also shows the risk factors for breast cancer. In this study, we observed that some risk factors are more prevalent, such as: sedentary lifestyle (51.4%), family history of breast cancer (42.9%), early menarche (31.4%), regular alcohol intake (28.6%) and overweight/obesity (27.5%). Considering that family history and early menarche are considered non-modifiable risk factors, we highlight the relevance of intervening in risk factors that are modifiable and susceptible to awareness and change in women's habits.

The main risk factors for breast cancer are linked to age, genetic and endocrine factors. Age over 50 years is the most important risk factor for breast cancer.[9] Mortality also increases with age. In addition to age, other risk factors are: reproductive and hormonal history (early menarche, late menopause, first pregnancy after the age of 30, nulliparity), genetic factors (mutations of the BRCA1 and BRCA2 genes) and hereditary factors (ovarian cancer in the family), obesity, sedentary lifestyle and frequent exposure to ionizing radiation (environmental and behavioral factors), in addition to regular alcohol intake.[10.15]

Some factors are less amenable to public health interventions, especially in modern societies where women have increased their professional and social participation (pregnancy after the age of 30, nulliparity, for example).[10]) Other known risk factors for the disease (overweight and physical inactivity after menopause) are already the target of prevention actions for other chronic non-communicable diseases, including breast cancer.[14]

Endocrine factors are mainly related to estrogenic stimulation, whether endogenous or exogenous, with increased risk the longer the exposure time. Women with a history of early menarche

(age of first menstruation less than 12 years), late menopause (onset after 50 years of age), first pregnancy after 30 years of age, nulliparity, and postmenopausal hormone replacement therapy, especially if prolonged for more than five years, are at increased risk.[10]

Nulliparity can occur when there is infertility. The causes can be due to female and male factors, with the latter accounting for approximately 40% of cases. To date, the evidence on increased risk of breast cancer with oral contraceptive use is conflicting.

With regard to genetic factors, family history and early age at diagnosis (women under 50 years of age) are important risk factors for breast cancer and may indicate genetic predisposition associated with the presence of mutations in certain genes (BRCA1 and BRCA2). However, hereditary breast cancer (genetic predisposition) corresponds to about 10% of all cases.[9]

Family history as a risk factor includes: women with at least one first-degree relative (mother, sister, or daughter) diagnosed with breast cancer, under 50 years of age; women with a family history of at least one first-degree relative (mother, sister, or daughter) diagnosed with bilateral breast cancer or ovarian cancer; in any age group; women with a family history of male breast cancer; women with histopathological diagnosis of proliferative breast lesion with atypia or lobular neoplasm in situ.[10]

In addition, it is worth mentioning that obesity, especially when weight gain occurs after menopause, as well as a sedentary lifestyle are considered risk factors for breast cancer. Therefore, regular physical activity, in addition to reducing body fat, promotes the balance of circulating hormone levels, such as insulin and sex hormones, reduces inflammation and strengthens the body's defenses, reducing the risk of breast cancer, being considered a protective factor.[2] Breastfeeding is another factor considered protective against breast cancer. Breastfeeding is a way for women to protect themselves from breast cancer at all stages of life, as it reduces a woman's exposure to hormones that increase the risk of cancer and eliminates breast cells with mutations. The longer the breastfeeding time, the greater the benefit.[2]

We emphasize the importance of health professionals having knowledge about risk factors, as they constitute an important step for the identification of women at high risk of the disease, which allows their prioritization in screening and/or early detection actions. It should be noted that annual follow-up is recommended for women at high risk for breast cancer.[12]

Knowing the risk factors and protective factors for breast cancer are essential for women to protect their health, in this scenario again the primary care nurse has a fundamental role as a mediator of health promotion and protection.[2.10]

5 CONCLUSION

Health education with an emphasis on health promotion and disease prevention, in a clear and objective way, can minimize breast cancer morbidity and mortality in the female population. The

accomplishment of this study made it possible to identify some conditions of vulnerability to which this group is subjected, among them: sedentary lifestyle, overweight/obesity and regular alcohol intake, risk factors for breast cancer that are considered modifiable and that deserve intervention by health professionals in the population.

Therefore, it is hoped that health education actions will reach as many women as possible, and that the distribution of support materials will serve as an ally in self-care, ensuring prevention and reduction of mortality from the disease.

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Development of a facial anamnesis form for the pharmaceutical prescription of dermocosmetics

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Ariadine Aparecida de Oliveira
Undergraduate student in Pharmacy at Centro Universitário Guairacá.
E-mail: adyoliveira@hotmail.com

Talita Cristina M. Moraes
MSc in Pharmaceutical Nanotechnology and Professor of the Nursing Collegiate of the Guairacá University Center.
E-mail: talita.moraes@uniguairaca.edu.br

Tatiana Herrerias
Doctor in Sciences: Biochemistry. Professor at the Federal University of Santa Catarina.
E-mail: t.herrerias@ufsc.br

ABSTRACT
The objective of this study was to develop a facial anamnesis form that can serve as an instrument to guide pharmacists in the prescription of dermocosmetics, a special-ized category of skin care products, which differ from traditional cosmetics by provid-ing support in the control of various situations and even pathologies. The anamnesis form was prepared based on the scientific literature of the Scientific Electronic Li-brary Online (Scielo), the National Library of Medicine of the United States (PubMed) and Elsevier and ScienceDirect databases.As a result of this bibliographic survey, information was obtained that described important aspects related to the investiga-tion with the patient for better orientation and pharmaceutical care. The facial anam-nesis form developed after the study of these articles includes the characterization of the participants, their medical and dermatological history, their skin care routine, life-style, and health habits, as well as the objectives and expectations of the patients regarding their dermatological treatment. It is a tool for pharmaceutical professionals who work in health and aesthetics, which will allow them to understand the patient's needs in its totality, admitting an active role in guiding the patient regarding the cor-rect use of these products.

Keywords: Dermocosmetics, Cosmeceuticals, Active Cosmetics, Dermatology, Facial Anamnesis.

1 INTRODUCTION

The steady increase in demand for cosmetic products is driving the continued growth of this sector, especially at the national level. According to the Brazilian Association of the Personal Hygiene, Perfumery and Cosmetics Industry (ABIHPEC) Brazil is currently the 4th largest consumer market in the world for personal care products, perfumery and cosmetics, with the categories of hair care and bath products (4th place), makeup (6th place), and skin care in 8th place (ABIHPEC, 2023).

Skin care products, known as dermocosmetics, do not fit the definition of traditional cosmetics, however they cannot be classified as medicines, thus being called cosmeceuticals, dermocosmetics or active cosmetics (Gonçalves; Pina, 2017)

They represent a specialized category of skin care products, and stand out from traditional cosmetics by providing support in the management of a variety of specific situations and phenotypes.

As a result, they have contributed to a deeper understanding of skin physiology, given its ability to influence skin appearance through physical changes and biological activity (Cavinato, 2018).

However, ANVISA (National Health Surveillance Agency) classifies these products as grade 2, which defines them as personal hygiene products, cosmetics, and perfumes that have specific restrictions, requiring proof of safety and/or efficacy, as well as information presented about their use (ANVISA, 2020).

These products have been used both independently and as a complement to pharmacological treatments, as they play a crucial role in improving photoprotection, hydration, and reducing the signs of skin aging. In addition, they are often used to treat a number of dermatological inflammatory diseases, including acne, rosacea, atopic dermatitis, psoriasis, seborrheic dermatitis, among other dermatological conditions (Gonçalves; Pina, 2017).

Dermocosmetics, together with conventional acne treatment, for example, can increase the effectiveness of the treatment and patient adherence, even reducing the adverse effects caused by pharmacological treatment (Dantas, 2022).

The main distinction between cosmetics and dermocosmetics lies in the incorporation of active ingredients in the formulations of dermocosmetics, which are the key elements that act in the treatment of the problem to be corrected. Although many dermocosmetics can be purchased without a prescription, like cosmetics, some have a medical prescription for their commercialization, given the possibility of adverse effects or cytotoxicity when used in excess (Rocha, *et al*; 2019).

Dermocosmetics can be categorized into six groups: sunscreens, antioxidants, retinoids, depigmenting agents, cleansers, exfoliants, and moisturizers (Cavinato, 2018). This classification makes it easier to choose products for a more effective clinical response, allowing for the combination of different approaches to meet the diverse needs of the skin.

Thus, these products are a powerful tool in the arsenal of dermatological treatments, allowing comprehensive approaches to skin health and well-being, playing an important role in the patient's quality of life (Gonçalves; Pina, 2017). However, these are products that have specific indications and that, if used incorrectly, have the potential to cause harm to patients.

These products may have a toxic potential, being able to promote bioaccumulation, leading to adverse effects (Cork oak; Silva, 2022). These adverse effects can range from a simple hypersensitivity reaction to an anaphylactic reaction or intoxication (Pereira, J.; Pereira, T., 2019). Among the most common adverse reactions, the following stand out: hypersensitivity, contact urticaria, photosensitization, pigmentary disorders, hair and nail damage, acne, and folliculitis. In general, the most affected areas are the head and neck (Pereira, J.; Pereira, T., 2019).

Due to the exponential growth of the cosmeceutical industry in Brazil, it is essential that the consumer of these products has access to quality service and that guarantees the safety of their use.

The pharmacist is often the qualified professional with the easiest access to patients/consumers (Silva, 2023).

The Federal Council of Pharmacy (CFF), in Resolution No. 573 of May 22, 2013, regulates the "attributions of the pharmacist in the exercise of aesthetic health and technical responsibility for establishments that perform related activities", recognizing the importance of the pharmacist's performance in the area of aesthetic health.

The pharmacist has an understanding of several areas of knowledge, such as anatomy, pathophysiology, and symptomatology of diseases, which can be applied in aesthetics, as well as in the prescription of cosmeceuticals (Silva, 2023). As a result, its work includes the possibility of evaluating medical prescriptions, monitoring the clinical situation of the patient to treatment, identifying and preventing adverse reactions (Souza, 2023).

To make a prescription for dermocosmetics, the pharmacist must be qualified to perform a complete anamnesis, being able to identify numerous aesthetic problems, such as facial, body, capillary and other appendages (Silva, 2023).

Thus, the present study aims to develop a facial anamnesis form that can serve as an instrument to guide pharmacists in the prescription of dermocosmetics.

2 METHODOLOGY

2.1 TYPE OF STUDY

It is a qualitative research that is useful to explore situations, clarify experiences and makes it possible to understand, interpret individual experiences and observe the perception of each participant (Driessnack; Souza; Mendes, 2007).

This methodology is considered extremely relevant to the field of Pharmaceutical Care, as it can reproduce descriptive data, such as what is said or written by the individual, in addition to being able to observe their conduct and feelings in relation to what is asked. It also has a humanistic character, since it seeks to understand people, valuing the scenarios and their different perceptions of life (Pádula, *et al*., 2014).

2.2 THEORETICAL FRAMEWORK

To obtain the theoretical framework, the *Scientific Electronic Library Online* (Scielo), the National Library of Medicine of the United States (PubMed) and Elsevier databases were used, more specifically, *ScienceDirect*. The descriptors were determined through search strategies of the Health Sciences Descriptors (DECS) platform. The following descriptors were used as a search strategy in the PubMed database: Pharmacist, Pharmaceutical Professional, Pharmaceutical Care, Pharmaceutical Care, Pharmacy, Anamnesis, Cosmeceuticals, Cosmetics Technology, Cosmetics, Dermatology, and

the Boolean operators AND and OR.

The following inclusion criteria were considered: articles in Portuguese and English, from 2015 onwards, which are available for reading in full. As exclusion criteria, articles addressing the use of dermocosmetics in specific pathologies were discarded.

2.3 PREPARATION OF THE FACIAL ANAMNESIS FORM

For the elaboration of the facial anamnesis form, several essential aspects for the personalized prescription of dermocosmetics were addressed. The form includes the characterization of the participants, their medical and dermatological history, their skin care routine, lifestyle and health habits, as well as the patients' goals and expectations regarding their dermatological treatment. The in-depth data collection provided by this form is essential to ensure the most appropriate and satisfactory dermo-cosmetic treatments, meeting the individual needs of each patient.

3 RESULTS AND DISCUSSION

Considering that cosmetic products are formulated for different purposes, according to the active ingredients present, your choice will depend on the type of skin to which the product should be applied, the ingredient to be included, the formulation, and the desired action (Nogueira, 2023). Thus, the pharmacist plays an active role in guiding the patient/client regarding the correct use of medications, and/or dermocosmetics, therapeutic adherence, and prevention of adverse reactions, with the aim of reducing the risks of their misuse (Maricato, 2017).

A facial anamnesis form was prepared as a tool to guide the pharmacist for the prescription of dermocosmetics (Appendix 1). It was created with the aim of facilitating the work of the pharmaceutical professional and guiding him at the time of the interview so that it is possible to choose the most suitable product according to the needs and characteristics of the patient.

This form should be used in the anamnesis of individuals who arrive at pharmaceutical establishments and wish to purchase products in the area of dermocosmetics**.** Pharmacists should conduct this interview in the shortest possible time, so that it does not hinder the progress of their service and so that there is no loss of quality in their care. The indicated time should not be longer than 30 minutes in the first interview, and a second interview should be conducted in case of return of this patient.

For effective and personalized treatment, it is essential to obtain basic patient information such as name, age, race, gender, address, and contact. In addition, details about the skincare routine, medical history, medications, and family history of skin diseases are crucial to avoid adverse reactions, understand genetic influences, and promote healthy skin (Carmo; Axe; Carobin, 2021).

Based on the literature review, it was possible to identify the key points to be involved in the facial anamnesis form.

3.1 CHARACTERIZATION OF THE PARTICIPANTS

This part of the form will contain essential data such as the patient's full name and date of birth as a way of uniquely identifying the patient and adapting health care. Information such as gender, race/ethnicity is relevant because these are aspects that influence dermatology (Carmo; Axe; Carobin, 2021).

The Brazilian Society of Dermatology (SBD, 2020) reinforces that there is no ideal age to start dermatological treatments, but it is important to always keep your skin healthy, regardless of age. Skin aging is a complex process with unique characteristics. The skin is an organ that ages both due to the passage of time (intrinsic aging) and due to external factors such as sun exposure (extrinsic aging). In addition to the aging common to all organs, the skin is particularly susceptible to photoaging, which results from cumulative exposure to solar ultraviolet radiation throughout life. This process is responsible for the appearance of signs of skin aging, such as wrinkles, blemishes, and loss of elasticity (Oliveira, 2023).

The patient's profession may be important because it may predispose to certain skin conditions, such as health professionals who wear rubber gloves regularly, which causes an increased risk of latex sensitization (Montalvão; Saucer; Mello, 2008). In addition, there will be contact and address information for sending information and prescriptions to patients.

3.2 MEDICAL HISTORY

Medical history is a valuable source of information about chronic diseases and medication use. Some medications may interact with dermocosmetics or influence skin health. In addition, it plays an essential role in preventing allergic reactions to dermocosmetic ingredients, as well as in understanding how preexisting medical conditions such as diabetes, hypertension, heart disease, and autoimmune disorders can impact skin health and the choice of dermocosmetics (Sampaio, 2013).

It is also critical to gather information about allergies to medications, chemicals, and common ingredients in dermocosmetics to avoid adverse reactions.

The history of surgeries will also be questioned in this topic because it is important to record past surgeries, especially dermatological or plastic surgeries, as they can affect the integrity of the skin.

Pregnancy and breastfeeding are conditions that may contraindicate the use of certain substances present in dermocosmetics, such as retinoids, usually present in anti-acne and anti-aging creams, since these substances can be harmful to the fetus and newborn (Santos; Kuhn; Bandeira, 2023).

3.3 DERMATOLOGICAL HISTORY

Dermatological history helps identify the patient's specific needs as well as the effectiveness of previous treatments. Obtaining information about past skin problems, such as acne, eczema, psoriasis, hyperpigmentation or any dermatological treatment previously performed (Carmo; Axe; Carobin, 2021).

The skin acts as an interface between the body and the environment, and is therefore subject to various external aggressions. Exposure to solar radiation has a direct influence on the aging process because it can cause changes in the structure, function and appearance of the skin (Gonçalves; Pina, 2017). In addition to these exogenous factors, there are also endogenous factors, such as those related to hormonal, nutritional, and vascular issues, which are linked to the connective tissue present in the dermis, which can end up directly influencing dermatological aspects (Alves, 2015). Skin type assessment is critical to understanding the patient's individual skin characteristics. Identifying the skin type helps the professional to offer an individualized treatment. The Brazilian Society of Dermatology (2016) classifies skin into four distinct types (Chart 1):

Table 1 - Classification of skin types.

SKIN TYPES	CHARACTERISTICS
Normal	Healthy texture, balanced fat production, small pores and velvety appearance.
Drought	It is characterized by excessive water loss, with barely visible pores, tendency to peeling and redness, and can be influenced by genetic, hormonal and environmental factors.
Oily	Shiny and thick appearance due to exaggerated sebum production, with enlarged pores and a tendency to acne, influenced by hormonal factors, sun exposure, stress and a high-fat diet.
Mixed	It is the most common type, characterized by oiliness in the "T-zone" (forehead, nose and chin), with enlarged pores and a propensity for acne, while the cheeks and extremities may be drier.

Source: Adapted from the Brazilian Society of Dermatology, 2016.

In this item of the anamnesis form, the patient will be asked about his/her main dermatological concerns. This can include issues such as acne, wrinkles, blemishes, sensitivity, or other specific dermatological conditions. Previous dermatological treatments such as laser therapies, *peels*, dermatological surgeries or use of dermatological medications will also be recorded as this helps to understand the patient's skin care history.

In addition, the pharmacist should question his patient about the history of skin cancer in the family (parents, grandparents, siblings) and collect additional information, if applicable. Family history is important, as prolonged exposure to the sun, exposure to tanning beds, and a family history

of skin cancer are risk factors for the development of this disease (National Cancer Institute - INCA, 2019).

3.4 SKINCARE ROUTINE

Obtaining details about the daily skin care routine, including products used, frequency of use, and any recent aesthetic procedures will be obtained from this item of the anamnesis form for the prescription of dermocosmetics. This makes it possible to assess the compatibility of the dermocosmetics to be prescribed with the patient's routine and to understand the needs for improvement or adaptation (Lima*, et al*., 2023).

3.5 LIFESTYLE & HABITS

Health Education is intrinsically linked to health promotion, since health care actions are not limited only to treating or preventing diseases, but also aim to promote child growth and development, with a focus on quality of life. Therefore, health promotion strategies must be carefully planned, actively involving society and families (Costa, *et al*., 2021).

Data on habits that can affect skin health, such as smoking, alcohol consumption, diet, sun exposure, and physical activity are essential as they can play a significant role in skin health (Álvarez-Gallegos; Seijo-Cortés; Hernández-Pérez, 2005).

3.6 PATIENTS' GOALS AND EXPECTATIONS REGARDING THE USE OF DERMOCOSMETICS

Understanding patients' goals and expectations regarding the use of dermocosmetics is key to ensuring that their treatment is personalized and effective. Dermocosmetics play an important role in improving the health and appearance of the skin. They can be used to treat a variety of dermatological concerns, from acne and blemishes to signs of aging and skin hydration.

Pharmaceutical care around aesthetics represents for patients a perspective of improvement in health, observing individualities, identifying possible irritations, allergies and health problems in general. The pharmaceutical professional represents trust, credibility, and efficacy of treatments, as well as the provision of a service provided with excellence (D'agostini, 2018). This requires skills in collecting information, accurately formulating questions, reflecting on the impact of the issues addressed, and assessing the quality of the relationship established with the patient (Soares, *et al*., 2016).

4 FINAL THOUGHTS

The facial anamnesis form is an essential tool for pharmaceutical professionals working in the field of health and aesthetics, as it allows them to collect important information about patients before prescribing dermocosmetics. It is essential that the pharmacist understands the patient's needs, requiring a complete anamnesis.

The importance of the role of the pharmaceutical professional in these cases is highlighted, being able to collaborate with other health professionals, such as dermatologists, beauticians, and physicians, to ensure a comprehensive approach to the care of the patient's skin. This ensures proper coordination of the treatments and products used. In addition, it is also the role of the pharmacist to contribute to updating the bibliography about the area of dermocosmetics.

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APPENDIX A – Facial Anamnesis Form for Prescription of Dermocosmetics

Patient characterization
Name: ___
Date of birth: ___/___/___ Age: ____
Gender: ( ) Male ( ) Female
Race: ( ) White ( ) Black ( ) Yellow ( ) Brown ( ) Indigenous
Profession: ___
Address: ____
Phone: ( ) ____ - ____
E-mail: _____

Medical History
Do you have any chronic medical conditions?
( ) No ( ) Yes. Which one(s)? _____
Are you currently under medical treatment?
( ) No ( ) Yes. Which drug(s)? _____
Have you ever had allergic reactions to dermatological products or cosmetics?
( ) No ( ) Yes. Which one(s)? _____
Have you had dermatological procedures or surgeries?
( ) No ( ) Yes. Which one(s)? _____
When:_____
Are you pregnant or breastfeeding (for women)? ( ) No ( ) Yes

Dermatological History
What is your skin type?
( ) Normal ( ) Oily ( ) Mixed ( ) Dry
What are your main dermatological concerns?
( ) Acne ( ) Aging ( ) Blemishes ( ) Sensitivity ( ) Other. Specify:_____
Previous dermatological treatments?
( ) No ( ) Yes. Specify:_____
History of skin cancer in the family? ( ) No ( ) Yes.
What does your current skincare routine look like?
_____
_____
What cosmetic or dermocosmetic products have you used? Were there any that had positive or negative results?

Product	Result

Lifestyle and Habits
Do you spend a lot of time in the sun? ( ) No ( ) Yes
Do you use sunscreen regularly? ( ) No ( ) Yes
Do you smoke or consume alcohol regularly? ( ) No ( ) Yes
Physical exercise? ( ) No ( ) Yes. How often? _____
What is your diet like? Does it include foods rich in vitamins and antioxidants?
_____
_____

Goals and Expectations
What are your main goals when using dermocosmetics?

_____
_____

Are you willing to stick to a regular skincare routine?
( ) No ( ) Yes
What is your comfort level with more intensive products such as peels or acid treatments?
_____

Additional Notes

SEVEN
publicações acadêmicas

Design with denim. A process that impacts health and ethics

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Luz del Carmen Vilchis Esquivel
Postgraduate Program. National School of Visual Arts.
National Autonomous University of Mexico (UNAM)
E-mail: linusviel@gmail.com
ORCID ID 0000-0002-4180-4764

ABSTRACT
This is a reflection on the ethical and moral implications of the Sandblast Case, named for the technique used to wear down jeans; the issue also includes the trafficking of children to harvest cotton used in the manufacture of denim (each pair of pants can be between 75% and 100% cotton). The media scandal has arisen due to the delicate repercussions on the health and lives of both workers in the fashion industry and consumers of the garments, resulting from this production process. Along with the above, there is the indifference and voracity of transnational brands that have no qualms about continuing these practices by hiring workers in a state of defenselessness, as in the case of children, or risking the lives of many.

Keywords: Health, Children, Denim, Sandblast, Trade.

1 INTRODUCTION

According to Zazueta (2010), in 1870, in England, Benjamin C. Tilgman patented the first device to devastate materials by expelling considerable amounts of abrasives through the air that are used to polish surfaces, smooth them or etch them. The machine has been transformed over the years, although its principle of operation remains. In Mexico, it arrived in the fifties with imported equipment, today it is already manufactured in the country by brands such as Isher or Ceroglass. The word *sandblast* comes from the English roots *sand=sand and blast=pressure because* in the beginning, abrasive was natural sand that was thrown under pressure to carry out surface cleaning.

Initially, the *sandblast* had two uses, the first industrial removing oxidation and lamination layers, preparing spaces for coating processes. The second is artistic, as it is a technique used in the field of engraving to polish and draw on glass. Unfortunately, the indiscriminate use of other elements for abrasion has been resorted to, among which are: silica dust, aluminum oxide, silicon carbide, sodium bicarbonate, garnet, glass bead, plastic abrasive, steel shot, corn corn, walnut shell and copper slag, the latter due to its resistance and deformation support values. (Cendoya, 2009, p, 93)

Employees who work in sandblast processes are recommended to protect themselves with special equipment: helmet, safety boots, face shield with plastic visor and metal mesh, long-sleeved gloves, flesh apron, long-sleeved overalls and special respirators. Workers in these procedures must have proven experience in the execution of this activity. (*Procedures...,* 2012)

Sandblast machines are used in various industries: textile, chemical, metalworking, automotive, petroleum, shipping, construction, as well as glass engraving and promotional items. Among the most important risks are: projection of particles, radiation, noise, aspiration or sedimentation of residues on the skin and orifices such as nostrils, eyes, mouth, etc., the consequences of which include serious diseases similar to those suffered by miners. According to the WHO (2000), three types of silicosis can develop, depending on the concentration of silica dust: chronic, accelerated and acute, the latter being the most delicate and the one usually suffered by workers in the textile jeans industry.

1.1 DENIM MANUFACTURING AND ITS DEVASTATION PROCESS

There are numerous published case reports of adverse health effects from occupational exposure to quartz, in addition to silicosis and lung cancer, there are autoimmune disorders: scleroderma, systemic lupus erythematosus, rheumatoid arthritis, anemia, or skin cancer; In addition, immunological abnormalities such as chronic kidney disease, ataxic sensory neuropathy, chronic thyroiditis, hyperthyroidism, monoclonal gammopathy and polyarteritis nodosa. (Masuda, 1981).

The *Sandblasting* Case has focused on the defense of those who work with this procedure in the production of the so-called "worn jeans". It is not ignored that fashion imposes stereotypes that are sought after and followed by many citizens around the world, particularly if the style is launched by the large transnationals of the clothing and footwear industry. Denim pants, a decade ago, began to be promoted with the fabric already aged, and torn. This absurdity has generated strong consumption trends, especially in the mentality of young people.

The Federation of Non-Governmental Organizations (SETEM) has denounced the health risks, particularly silicosis, involved in the *sandblasting* technique to wear out jeans, banned in the United Kingdom since 1950, in Europe in 1966 and Sweden in 1992, however, it is still used in manufacturing processes of well-known brands in countries such as Mexico, Bangladesh, China, Pakistan, India, Syria or North Africa, and "it is carried out by migrant workers during long shifts in cramped and unhygienic treatment rooms." (Riddselius, 2010). Both in this and in the cotton harvest to make the fabrics, minors, pregnant women, the elderly and the disabled work.

1.2 PATH FROM COTTON TO DENIM

Regarding the cotton harvest, we must not ignore the trafficking of children for the pinches, especially in various parts of Africa, although there are huge plantations in other countries such as India, Pakistan, China, to mention a few, Only in Burkina Faso, the first cotton producer in the world, 400,000 tons of cotton were harvested in 2011-2012, rising 57% in 2012-2013 with 630,000 tons thanks to the use of GMOs in 100 million hectares. (Zamora, 2013)

The description of the exploitation of child workers and the cynicism of the owners of distributors causes surprise and astonishment, they make them work exhausting days that exceed 8 hours, remunerating them 2 euros a month or 7 euros a year with payment in kind, "the exploitation of children continues in the face of general indifference..." (Kanban, 2011) There are plantations that incorporate children from schools and their only reward at the end of the day is a piece of candy, there are more than 80 million minors who work to be a malleable, submissive and obedient force.

Conscience is the main objective of the campaigns carried out against ignominious practices such as those described by the International Labour Organization (ILO) and UNICEF, however, their efforts fail to stop or combat forces such as SOFITEX or ENDT, the large international agencies that distribute cotton. Undoubtedly, there is a delicate ethical and moral problem here.

1.3 ETHICS, HEALTH AND SOCIAL RESPONSIBILITY

The indiscriminate exploitation of human hands and the exposure of people to risks as transcendent as health and life, causes reactions of society against such immoral exercises, the first issue in this regard is the ignorance that exists about the origin of the materials with which denim garments are made. nor the techniques for them to acquire the look promoted by fashion designers.

As soon as the problem is perceived and understood, individuals join all the petitions that fight for the prohibition of the *sandblasting* process, thus preventing the proliferation of all the diseases it causes, and with indignation they also demand the fight against trafficking and child exploitation as they know their subhuman living conditions. with the consent of "educated" adults as school teachers.

I agree with the initiatives that call for modifications "in the labor standards of the garment industry" [so that from the most influential leadership] the multiple domain is generated that promotes the restrictions of the *sandblasting* technique in all supply chains, and with deep irritation I join the lawsuits against the infamies committed against millions of children in the cotton pinch (just a sample of what is happening). Nowadays humanity does with its children). This is a task in which we must intervene together with governments, industries, NGOs, human rights defenders and civil society groups, because we are all responsible for making this happen.

> [...] Experience teaches us that equality is a myth, that even today there are discriminatory practices, customs, habits, stereotypes and attitudes towards others [...] in this situation, it is evident the importance that education in values has in the development of the person [...] (Porta, 2014, p. 43)

It is clear that there is a problem of lack of governmental and business ethics here, the codes and values of responsibility, respect, dignity and freedom are trampled on a daily basis. Fame, capital accumulation and the search for alternatives to cheapen production have become immoral customs that cost the lives of countless human beings.

2 CONCLUSIONS

Currently there is a Solidarity Committee and the *Clean Clothes Campaign* (Núñez, 2011) is expanding, which is responsible for advising the people affected, as a sign that individuals and society can act in accordance with principles and values that protect the integrity, health and well-being of human beings, "freedom, justice, solidarity, tolerance, openness to dialogue, respect for oneself and others are considered ethical values [...] they humanize our lives..." (Evans, 2003, pp. 9-13)

In the same way, there are Non-Governmental Organizations (NGOs) in Africa and the rest of the world working to challenge the abuse that exists today on defenseless beings, particularly and specifically children, in titanic attempts to recover both compassion and humanitarian sense, because the impudence, falsehood and hypocrisy of great executives surpasses all capacity for astonishment. politicians and cotton plantation owners on this issue of child exploitation.

Finally, I consider very important the social responsibility that comes from my own person to the rest of the inhabitants of this planet. Knowing about this problem commits me and questions both my consumption habits, as well as my possible participation in groups and campaigns that contribute to communicating the problem and being part of its fight and eventual solution.

I am convinced that awareness, ethics and moral actions begin with oneself so that the community can apprehend them and ensure that they transcend, spread and spread to all of humanity.

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Efficiency of public hospital services in the state of Pará: An analysis based on the DEA method

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Jessica Ferreira Santos
Bachelor of Nursing
Unama
E-mail: jessica091214je@gmail.com

Lucas Israel Sousa da Conceição
Graduating in Business Administration
UFPA
E-mail: ail.colucasisraelsousa@gmail.com

André Luiz Ferreira e Silva

ABSTRACT

The present study has as its theme "the efficiency of public hospital services in the state of Pará: an analysis based on the DEA method", and its objective is to evaluate the degree of efficiency of the public services offered by medium and high complexity hospitals in the state of Pará. The methodology adopted is a quantitative analysis based on the DEA model, which allows comparing characteristics of the physical, financial and organizational structure of 25 hospitals with more than 50 beds available in 2019, for the interpretation and discussion of the results. The analysis allowed, in a preliminary way, to show that the management of hospitals managed by social health organizations does not present such a differentiated pattern in relation to the average behavior of the group, even though such hospitals are using a diversified set of hospital equipment. It was also found that there is a differential in monetary costs to which hospitals are subject, about the contracting of services. Apparently, some hospitals of the Direct Administration incurred slightly higher costs than those directed by the social health organizations. The results also showed that both under the hypothesis of constant returns (CCR model – Charnes, Cooper, and Rhodes), and variable returns (BCC model – Banker, Charnes and Cooper), five hospitals exhibit maximum efficiency scores equivalent to or very close to 1, three of which are subject to direct administration by the State and only two whose management was subordinated to OSS. In view of the above, the main result of this study indicated that of the 12 decision-making units considered efficient in the DEA BCC model, only four had their management carried out by OSS, while in the DEA CCR model, of the five units that reached the maximum efficiency score, only two were subject to social health organizations. Therefore, it cannot be categorically stated that most hospitals managed by OSS can be considered efficient.

Keywords: Hospital services, Technical efficiency, Data Envelopment Analysis.

1 INTRODUCTION

Since the ratification of the Federal Constitution in 1988 (FC/88), in its article 196, the right to health has been disseminated as a principle that must be guaranteed by the State to all citizens, through social and economic policies that aim to certify universal and equal access to actions and services for its promotion, protection and recovery (BRASIL, 1988). Since then, a Unified Health System (SUS) has been created to reach all citizens in accordance with principles such as universality, equality, equity, transparency, and others (CARVALHO, 2013). To achieve these objectives, decentralization took place, which gave greater autonomy to states and municipalities, intensifying the participation of

society in the elaboration and supervision of public policies, generating greater concern in optimizing expenses and, consequently, the search for better efficiency in the services provided (VASCONCELOS *et al*., 2017).

Since Constitutional Amendment 19/1998, which reformulated the precepts and norms of direct and indirect Public Administration (autarchies, public companies), efficiency has been defended, in its article 37, as a principle that should govern both the powers of the Union and the States, Municipalities and the Federal District (FEDERAL, 1988). According to Silva *et al*. (2017a), efficiency matters because it allows us to compare the management of various inputs used in each operation and the results produced by it. In this sense, efficiency is understood as the ability to make the most appropriate use of resources (called *inputs* due to the methodology used in this work), with the objective of achieving the intended results (FONSECA; FERREIRA, 2009).

The idea behind the modernization of the Brazilian State was that Public Administration should be based on models that would guarantee greater managerial flexibility. In the context of hospital public management, such flexibility should reach several fronts, such as the acquisition of inputs, materials and equipment, the hiring and management of human resources, flexibility in financial management, among others. In addition, it advocated the need to encourage the implementation of a management based on results, combining user satisfaction with the quality of the services provided. According to authors such as Ibañez *et al*. (2001), such transformations would occur through greater public-private interaction. Thus, legal-administrative models were developed with the purpose of promoting a transformation of bureaucratic Public Administration into managerial Public Administration.

In the wake of these changes, the role of the Social Organization (SO) emerged, which would configure private, non-profit entities focused on the management of non-exclusive activities, more specifically services that comprise areas of education, health, culture, and scientific research (BRESSER-PEREIRA, 1998). The regulation came through the Master Plan for the Reform of the State Apparatus (MPRSA), implemented by the Ministry of Administration and State Reform (MARE) of the FHC government (1995-2002).

The State of São Paulo was a pioneer in the adoption of this new management model in hospital units (BARBOSA; ELIAS, 2010; IBAÑEZ *et al.*, 2001). Although it is still considered a controversial topic regarding the limits of the relationship between State and Society, some studies based on the experience of the State of São Paulo point to a competitive advantage of this model in relation to Direct Administration (BUENO, 2007).

That said, given that some regional hospitals in the State of Pará have adhered to the new management model based on SHO, the objective of the present study is to evaluate the degree of efficiency of the public services offered by medium and high complexity hospitals in the State of Pará.

The quantitative analysis based on the DEA method allows us to compare characteristics of the physical, financial and organizational structure of 25 hospitals with more than 50 beds available in 2019, whose management capacity is subordinated to the government policy coordinated by the Health Department of the State of Pará (SESPA).

2 LITERATURE REVIEW

This section aims to describe, analyze, and contrast some theoretical bases and empirical results that support the hypothesis investigated in this study: the management model based on OS is more efficient. To this end, we examine some recent results of studies focused on the analysis of the efficiency of hospital services, obtained through Data *Envelopment Analysis (DEA*).

An important study that guided the elaboration of the methodological structure of this work was that of Bueno (2007). Based on the DEA method, the author evaluated the efficiency of the new hospital management model by Social Health Organizations (SHO) in the State of São Paulo in 1999. The sample contained a total of 64 hospitals, of which 51 were under the Direct Administration of the São Paulo Health Department, 4 under the Direct Administration of other agencies, 7 were Autarchies and 2 were OSS. The results showed that the SHO-based management model is more efficient in terms of resource allocation.

Cesconetto, Lapa and Calvo (2008) evaluated the technical efficiency of services offered by public hospitals in Santa Catarina. The authors delimited the sample to 112 hospitals affiliated with the SUS. The objective was to infer efficient results from the perspective of resource management. Indices obtained through the DEA-BCC model indicated that only 23 hospitals could be considered efficient. The trial also provided guidance on which management models could raise the average efficiency of hospitals.

The study developed by Souza and Barros (2013) is also noteworthy. Using the DEA method, the authors analyzed the degree of efficiency in the allocation of public resources for hospital care in 2009 and 2010. The results revealed that of the 22 DMUs analyzed in 2009, only 6 were considered efficient, while in 2010, there were 7 units. Among the federated states, the research concluded that the State of São Paulo was the one that best allocated public resources to hospital care, while the State of Amapá was the one that had the worst performance in this area.

Another important test using the DEA method was that of Trivelato *et al*. (2015). The study sought to analyze the efficiency of the services provided both in public hospitals and in philanthropic and private hospitals. The aim was to verify which of these groups present better results in terms of resource management. A randomization procedure was used to select 35 hospitals in the State of Minas Gerais. Based on the stratified sample, they concluded that the most efficient results were associated

with public hospitals (80.09%), followed by private hospitals (75.62%), while philanthropic hospitals (64.87%) would be the least efficient.

Another research involving the theme was developed by Souza, Scatena and Kehrig (2016). The authors used the DEA method to investigate whether public hospitals in Mato Grosso could be considered more efficient than private hospitals. Using a sample of only 10 decision-making units (DMUs), the authors concluded that, about total efficiency, private hospitals were more efficient than public hospitals. However, as far as technical efficiency is concerned, all of them proved to be efficient, regardless of their nature.

Silva, Moretti and Schuster (2016) evaluated the productive efficiency of SUS-accredited hospitals in the southern region of Brazil in 2014 and the first half of 2015. The sample consisted of 139 hospitals located in municipalities with more than 100 thousand inhabitants in the states of Paraná (PR), Rio Grande do Sul (RS) and Santa Catarina (SC). First, the authors applied spatial *cluster* techniques to decompose the sample into groups with similar characteristics. The objective of the procedure was to identify the best combination of supplies required by hospitals, according to their location. The results showed that the maximum score was reached by 34% of the hospitals in SC, 35% of those located in PR and 35% in RS. They also concluded that 41% of the hospitals analyzed are efficient in terms of managing their resources.

In their study, which examines hospital efficiency in Brazilian regions through a regionalized DEA model, Silva *et al*. (2017a) found that the North Region was more inefficient compared to the other regions, since no state in the region reached a score of 1. On the other hand, the South Region was the one that showed the most efficient results, followed by the Southeast Region. It is important to note, in this study, that the authors used the following variables to measure *the inputs*: number of hospital beds and number of doctors and nurses; for the *outputs*, they used the number of hospitalized patients and hospital deaths.

The DEA model can also be used in combination with other methodologies, as was applied in the study conducted by Vasconcelos *et al*. (2017), which sought to analyze the efficiency of SUS care in 244 municipalities in Paraná. In methodological terms, the authors employed a technique that combines AED with the Free Disposal Hull (FDH) model. According to the authors, this combination would serve to better assist in the planning of resource allocation and in the making of managerial decisions related to hospital management.

Silva (2019) examined the technical efficiency of public services offered by regional hospitals in Rio Grande do Norte (RN). The author selected six hospital units that are part of the state network, two of each size, in 2014. The best performances were observed in large units, while small units were inefficient and without a problem-solving profile, which entails higher costs for the State of RN and reduces the quality of the service provided to the population.

Finally, employing exploratory analysis on a secondary dataset from the Ministry of Health, Garmatz, Vieira, and Sirena (2021) examined the technical efficiency of the services offered by teaching hospitals in Brazil. The scores extracted from the DEA method revealed that of the 29 large hospitals that made up the sample, only 12 can be considered efficient, therefore, 17 were located below the efficiency frontier. Linked to this, it is pointed out that when efficiency is linked to the legal nature, the DMU called business entities was the most efficient, followed by non-profit entities and Public Administration.

3 METHODOLOGY

3.1 DEA MODEL SPECIFICATION

The DEA (*Data Envelopment Analysis*) method presented in this study adopts hospitals as decision-making units (DMU). The basic assumption is that there is a direct relationship between the use and allocation of resources employed in hospital services and the results produced. Thus, a DMU is said to be inefficient if it produces, in a given period of time, a lower than average level of output, demanding the same set of resources used by the other units. Similarly, any DMU that produces a smaller volume of *output*, requiring a greater volume of resources than any other, will also be considered inefficient. Thus, it is assumed that an efficient DMU is one that is not dominated by any other, such that it is closer to the efficiency frontier (COELLI *et al*., 2005).

Since DMUs use multiple inputs to *generate multiple* outputs, producing comparable indicators is not a simple task, and it is necessary to resort to mathematical programming to find a non-trivial solution. In this sense, the methodology allows the efficiency of complex organizations to be compared, through the observation of best practices (FOCHEZATTO, 2010; SOUZA, 2008). In DEA language, these indicators assigned to each DMU configure scores, ranging from 0 to 1, representative of relative performance. An advantage of the methodology is that it allows us to assess, in each unit, what are the levels of demand for resources and products that would make them efficient.

According to Souza (2008) and Fochezatto (2010), based on the pioneering study by Charnes, Cooper and Rhodes (1978), the DEA method has some important characteristics that can be considered advantageous: there are few methods to analyze and measure the technical efficiency of organizations; Efficiency is not based on theoretical formulas, but on real data; through the DEA method, it is possible to more easily identify which DMUs are inefficient due to the excess of inputs and low level of product in each unit.

One can consider as a limitation the fact that in the DEA method, the choices of DMUs must respect the principle that they have the same specificities, perform the same tasks, and their variables must be the same, that is, the DMUs must be homogeneous. In order not to incur in specification errors, the selection of variables is also a point that must be considered. They should be chosen in such a way

as to represent the most relevant input-output relationship for organizations. Given this limitation, authors such as Fochezatto (2010) argue that the number of DMUs should be at least three times the number of variables selected in the model.

Complementary concepts or different forms of efficiency analysis should also be considered. Fochezatto (2010, p. 4) defines efficiency as "the relationship between the products resulting from a production process and the amount of resources used by the respective organization, defining a numerical measure". In this conceptual scope, changes in relative prices, organizational pattern and/or technological changes affect efficiency. Therefore, the concept is better understood if analyzed from the perspective of technical, allocative, and economic efficiency, the latter being a combination of the first two.

Trivelato *et al*. (2015), for example, argue that technical efficiency is that capable of demonstrating the ability to obtain the largest amount of product, given a fixed amount of inputs. Given the changes in relative prices, allocative efficiency, in turn, refers to the possibility of allocating inputs that must be carried out optimally. The relationship between these two concepts results in economic efficiency. In this sense, Souza (2008, p. 46) argues that "technical efficiency is related to the physical-operational aspect of production, while economic efficiency is concerned with the monetary aspect".

It should also be noted that the permanent search for efficiency is subordinated to the idea of *Benchmarking*. To this end, it is important to subject organizations to a continuous and systematic process of efficiency analysis. The systematic implementation of *Benchmarking* would encourage organizations to adopt routine managerial actions that promote the best results. For authors such as Souza (2008) and Silva *et al*. (2017b), it is an important managerial instrument that enables the improvement of the technical-economic performance of organizations, as it reveals what and how much must be modified in the input-output relationship for organizations to achieve efficiency.

As stated, Charnes, Cooper and Rhodes (1978) were pioneers in the formulation of the DEA model with constant returns. Its development took place through microeconomic hypotheses of the theory of production, in which technologies are subject to decreasing, constant and increasing returns of scale (VARIAN, 2006). In practice, a technology with constant returns indicates that a small variation in the feature set implies an equivalent proportional variation in the output. So, diminishing returns result in less-than-proportional variations in output; whereas a higher increment in output is observed in technologies with increasing returns.

As a result, the CCR model of Charnes, Cooper and Rhodes (1978) began to be directly compared to the *Constant Returns to Scale* (CRS) hypothesis, in which the estimated efficiency frontier is a linear function. In order to maximize the efficiency of each organization (hospital), taking into account the set of resources distributed by the context DMUs, the first CCR *ratio form model* designated by Coelli *et al*. (2005) can be formalized by:

$$\text{Max}_{\mathbf{u},\mathbf{v}} \quad (\mathbf{u}'\mathbf{q}_i/\mathbf{v}'\mathbf{x}_i), \tag{3.1}$$

$$\text{subject to} \quad \begin{aligned} &\mathbf{u}'\mathbf{q}_j/\mathbf{v}'\mathbf{x}_j \leq 1, \quad j = 1,2,...,I, \\ &\mathbf{u},\mathbf{v} \geq 0. \end{aligned} \tag{3.2}$$

In this formulation, each DMU *i* is faced with a set of *inputs and* outputs *quantified* by xi and qi, respectively. Then, the performance measure that must be maximized is a proportion resulting from the weighted sum between *N inputus* and M outputs, such that v and u configure weighting vectors, *of order N ×1 and M ×1, which are determined to satisfy the constraints associated with the set of inputs* and outputs of the other DMUs identified by *j* = 1, 2,...,*I*.

Although simple and intuitive, the lack of uniqueness presented by the CCR *ratio form* model configures a methodological deficiency that compromises its applicability. So, to avoid an infinite number of solutions, Coelli *et al*. (2005) impose the restriction $\mathbf{v}'\mathbf{x}_i = 1$, modifying the structure of the model.

$$\begin{aligned} &\text{Max}_{\mu,\mathbf{v}} && (\mu'\mathbf{q}_i), \\ &\text{subject to} && \mathbf{v}'\mathbf{x}_i = 1, \\ &&& \mu'\mathbf{q}_j - \mathbf{v}'\mathbf{x}_j \leq 0, \quad j = 1,2,...,I, \\ &&& \mu,\mathbf{v} \geq 0. \end{aligned} \tag{3.3}$$

Where μ is a vector *M ×1 with modified weights for the outputs*.

By means of duality in linear programming, it is possible to obtain a DEA model equivalent to (3.3):

$$\begin{aligned} &\text{Min}_{\theta,\lambda} && \theta, \\ &&& -\mathbf{q}_i + \mathbf{Q}\lambda \geq 0, \\ &&& \theta\mathbf{x}_i - \mathbf{X}\lambda \geq 0, \\ &&& \lambda \geq 0. \end{aligned} \tag{3.4}$$

Where θ is a scalar and λ is a vector *I ×1 of constants*.

According to Coelli *et al*. (2005), this model called *Envelopment Form* involves fewer constraints than the *multiplier form* (3.3), so it is less exhaustive to solve. The θ value $\in (0.1)$ *is a* score of the ith DMU efficiency, while 1−θ is the magnitude of the inefficiency. Since it is a problem of minimizing *inputs*, with constant outputs, the specification (3.4) is now better known as input-oriented RCC.

The CCR model is appropriate for cases where DMUs operate at or near optimal scale and are relatively homogeneous with each other. However, the CRS hypothesis is becoming less and less adherent with market imperfections, which can be observed by the differential size of the DMUs, by factors related to the production technology, by the amount of financial capital, among other aspects. Banker, Charnes and Cooper (1984) proposed an improvement in the conventional CCR model, making the hypothesis of constant returns more flexible.

Then, the BCC model with variable returns can be obtained by introducing the constraint $\mathbf{I1}'\lambda = 1$ em (3.4).

$$\begin{aligned} \text{Min}_{\theta,\lambda} \quad & \theta, \\ & -\mathbf{q}_i + \mathbf{Q}\lambda \geq 0, \\ & \theta\mathbf{x}_i - \mathbf{X}\lambda \geq 0, \\ & \mathbf{I1}'\lambda = 1, \\ & \lambda \geq 0. \end{aligned} \qquad (3.5)$$

Where I1 is a unit vector $I \times 1$.

According to Coelli *et al*. (2005), the convexity constraint, $\text{I1}'\lambda = 1$, reduces the set of production possibilities, $\mathbf{T} = \{(\mathbf{x},\mathbf{q}) : \mathbf{q} \leq \mathbf{Q}\lambda, \mathbf{x} \geq \mathbf{X}\lambda\}$, as well as converts a technology with constant returns into variable returns, satisfying the hypotheses of increasing or decreasing returns of scale.

According to the study carried out by Fochezatto (2010), the DEA BCC model is also known as the Variable Return to Scale (VRS) model because it considers the increasing and decreasing returns of the latter, which differentiates it from the model with constant returns, previously demonstrated. This method alludes to its creators Banker, Charnes and Cooper and is a derivation of the CCR model plus the convexity constraint, which "reduces the set of viable production possibilities and converts a constant gain-of-scale technology into a variable gain-of-scale technology" (SOUZA, 2008, p. 54). Cesconetto (2008) presents yet another characteristic of the BCC model, identifying management inefficiency, associated with the managerial ability of organizations.

3.2 DATA AND VARIABLES

Chart 1 – Variables selected to compose the DEA model

Acronym	Description of Variable	Division	Unit	Class
LTS	Beds available	CNES-LT	Unit	Input
HTH	Number of hours worked in hospital	CNES-PF	Hours	Input
EQP	Number of equipment available	CNES-EQ	Unit	Input
DINT	Days of hospitalization	SIH-RD	Days	Output
CTINT	Total cost of hospitalization	SIH-RD	R$/year	Output
CMINT	Average cost of hospitalization	SIH-RD	R$/Day	Output

Source: DATASUS/Ministry of Health.

4 RESULTS AND DISCUSSIONS

4.1 EXPLORATORY DATA ANALYSIS

The exploratory analysis applied to the dataset aims to draw a preliminary diagnosis about the complexity of services in large hospitals. To this end, the sample containing 25 public hospitals was stratified according to the supply of beds in 2019. It is expected that both resource-related variables and those selected to represent the product of hospital services will increase with the size of hospitals, measured by the number of beds.

Table 1 provides a statistical summary of the variables selected to compose the DEA model. The first three relate to the use of resources (*inputs*), while the last two refer to *outputs*. Table 1 shows a frequency distribution organized according to the size of the hospitals. It shows, for example, that: 13 hospitals made 80 beds available, on average, in 2019; aggregating approximately 65,894 hours of work involving specialized professionals (doctors, nurses, nursing technicians, etc.). This class had an average of 2,415 pieces of hospital equipment; with services requiring a total of 14,351 days of hospitalization, implying an average cost equivalent to R$ 181.14 patient/day.

Table 1 – Statistical summary of the variables that make up the DEA model

Class	Frequency	LTS	HTH	EQP	DINT	CMINT
50 to 100	13	80,1	65.894	2.414,9	14.351	181,14
100 to 150	5	114,4	72.049	1.657,6	18.671	223,58
150 to 200	3	178,0	151.891	4.914,7	40.409	236,64
200 to 300	2	242,5	279.713	6.055,0	59.798	291,97
300 to 400	0	ON	ON	ON	ON	ON
400 to 500	1	478	517.068	23.328	81.260	381,28

Note. Mean of the variables. Available beds (LTS), Number of hours worked in hospital (HTH), Number of equipment (EQP), Days of hospitalization (DINT) and Average cost of hospitalization (CMINT).

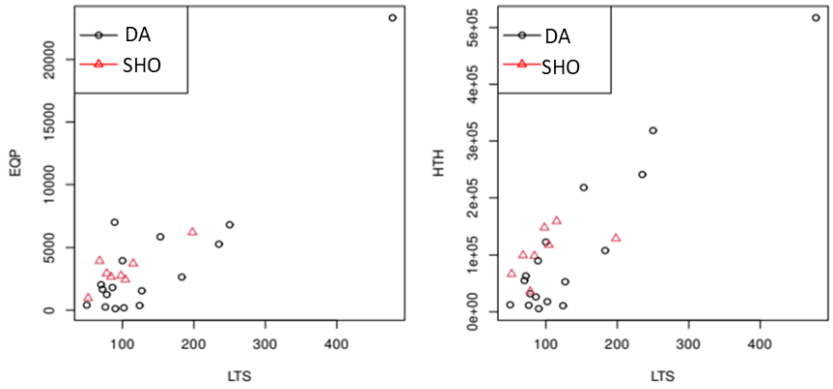
Source: Results of the research and prepared by the authors.

Table 1 also shows the presence of an outlier associated with the characteristics of a large hospital. Fundação Santa Casa is a maternity hospital located in Belém do Pará, specializing in child

health. As shown in Figures 1 and 2, its performance evaluated in terms of resource management or cost results is positively discrepant in relation to the average standard of the other hospitals.

The first scatter plot in Figure 1 emphasizes a positive, linear correlation between equipment use (EQP) and hospital size as measured by the number of beds (LTS). A similar pattern is also identified from the correlation between the working hours (HTH) of specialized professionals and the size of hospitals. The preliminary results also show that the management of hospitals managed by social health organizations does not present such a different pattern in relation to the average behavior of the group, even though these hospitals are employing a more diversified set of hospital equipment. In addition, most hospitals have 50 to 200 beds. Above that, there are three hospitals of direct administration that coordinated a group of professionals who required between 200 and 300 thousand hours worked. The discrepant point corresponds to the Santa Casa do Pará Foundation, managed by the Direct Administration, making 478 beds available in 2019.

Figure 1 – Dispersion of resource-related variables (*inputs*)



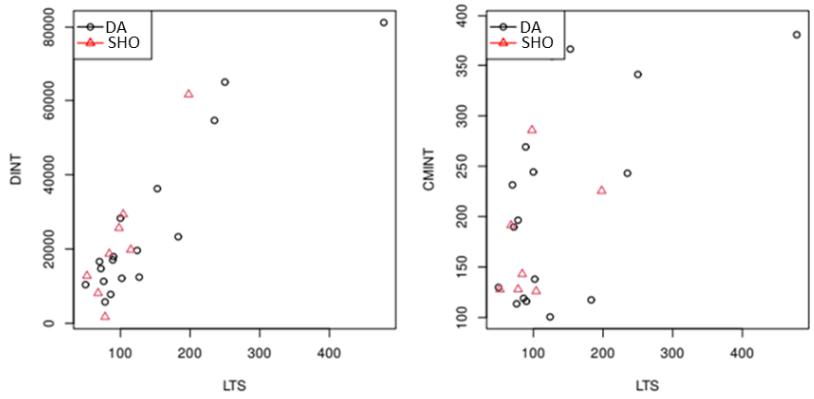
Source: research result and prepared by the authors.

Figure 2, where the *output variables* are represented, preliminarily identifies a nonlinear relationship between the variable days of hospitalization (DINT) and the number of beds (LTS). An apparent non-linearity is associated with the rate of change in the number of days of hospitalization (DINT), which increases at decreasing rates with the size of the hospital, which is consistent with the trajectory of a concave curve. Thus, preliminary results indicate that the larger and more complex the hospital, the shorter the number of days of hospitalization tends to be. This non-linearity indicates that the DEA model with variable returns (BCC) may offer a better fit than the model with constant returns (CCR).

When the analysis is directed to the graph that represents the average cost per day of hospitalization (CMINT), a greater discrepancy is observed in the non-linear relationship. This result is explained by the differential of monetary costs to which hospitals are subject about the contracting

of services. Apparently, some hospitals of the Direct Administration incurred costs slightly higher than those directed by the social health organizations.

Figure 2 – Dispersion of the representative variables of the outputs

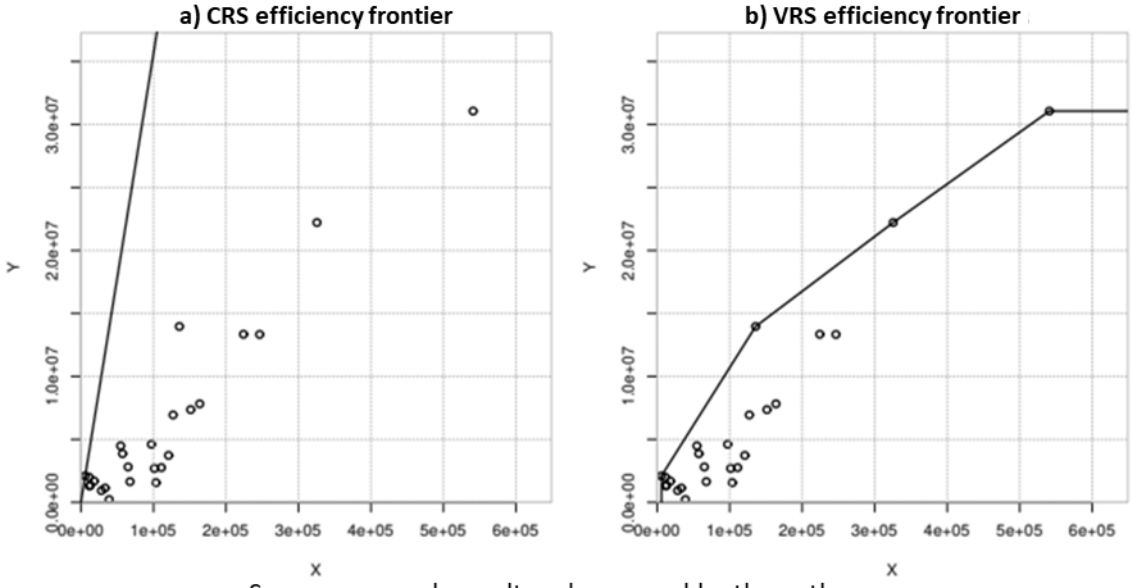


Source: research result and prepared by the authors.

4.2 RESULTS OF THE DEA MODEL

Technical efficiency is a distance relative to the efficiency frontier delineated by those units considered to be references, or following the language used in the DEA method, they are DMUs that offer the best practices and serve as *Benchmarking* for the others. As mentioned, this study is composed of 25 evaluation units represented by medium and large public hospitals operating in the State of Pará in 2019.

Figure 3 – Efficiency frontier of the DEA model with constant returns and scale variables



Source: research result and prepared by the authors.

Figure 3 shows two efficiency frontiers estimated based on the representative variables selected to characterize the public management of the 25 hospitals in 2019. Noticeably, the boundary with

Variable Returns to Scale (VRS) is better suited to the dispersion of the data, which in a way corroborates the hypothesis of non-linearity present in the input-output relationship mentioned above.

As shown in Table 2, this criterion was used to establish a ranking of the hospitals evaluated in 2019. For each DEA model, it offers a generalized view of the size of the inefficiency. Under the hypothesis of variable returns of scale (VRS), the results show that 12 hospitals reached maximum efficiency, with a score equivalent to 1. In this context, Santa Casa de Misericórdia do Pará and Hospital de Clínicas Gaspar Viana, both managed by the Direct Administration, make up the group with the best practices in 2019.

Table 2 – Efficiency scores of the DEA model with constant returns and scale variables

Hospital	Management	Beds	CRS	VRS	Ranking
Hospital Casa de Misericórdia do Pará	TO	478	1,000	1,000	First
Hospital de Clínicas Gaspar Viana	AD	250	1,000	1,000	2nd
Metropolitan Hospital for Urgency and Emergency	US	198	1,000	1,000	Third
Hospital Regional do Baixo Amazonas	TO	153	0,982	1,000	4th
Galileo State Public Hospital	US	104	1,000	1,000	5th
Araguaia Regional Public Hospital	TO	100	0,938	1,000	6th
Trans-Amazonian Regional Public Hospital	US	98	0,942	1,000	7th
Santo Antônio Maternity Hospital	TO	90	1,000	1,000	8th
Eastern Pará Regional Hospital	TO	70	0,795	1,000	9th
Thailand General Hospital	US	52	0,934	1,000	10th
Hospital Regional Olímpio Cardoso da Silveira	TO	50	0,925	1,000	11th
Hospital Ophir Loyola	TO	235	0,875	0,999	12th
Hospital Dr. Afonso Rodrigues	TO	76	0,718	0,961	13th
Hospital Julia Sefer	TO	124	0,775	0,957	14th
Regional Hospital of the Southeast of Pará	US	115	0,766	0,897	15th
Hospital Jean Bitar	TO	72	0,730	0,858	16th
Octávio Lobo Children's Oncology Hospital	TO	89	0,662	0,853	17th
St. Anthony's Hospital	TO	102	0,671	0,833	18th
Marajó Public Hospital	US	84	0,715	0,830	19th
Divine Providence Hospital	TO	127	0,781	0,800	20th

Regional Maternal and Child Hospital of Barcarena	US	68	0,384	0,756	21st
Hospital Abelardo Santos	TO	78	0,301	0,641	22nd
Abelardo Santos Public Hospital	US	78	0,081	0,641	23rd
Hospital de Conceição do Araguaia	TO	86	0,369	0,581	24th
Hospital Regional de Tucuruí	TO	183	0,513	0,516	25th

Source: Result of the research and prepared by the authors

Also observing the same table, with regard to the specification with constant or variable returns, it can be seen that the units occupying the positions of 1st, 2nd and 3rd in the ranking, as well as those occupying the 5th and 8th positions, exhibit an efficiency score equal to 1. It is also analyzed that of the 25 DMUs, only 5 (equivalent to 20%) reached maximum efficiency in the constant returns model, while 12 DMUs were efficient with the variable returns model, which is equivalent to 48% of the total sample.

Of the 12 units that exhibit maximum efficiency in the model with variable returns, only 4 are managed by social health organizations (OSS). In the model with constant returns, of the 5 units that exhibit maximum efficiency, only 2 are managed by OSS. In this sense, the Metropolitan Hospital for Urgency and Emergency and the Galileu State Public Hospital are among the units that reached maximum efficiency in 2019.

Analyzing Table 2, it can be seen that some units are located far below the degree of efficiency in both models used in this research, and thus can be considered inefficient, as in the case of the Regional Hospital of Conceição do Araguaia and the Regional Hospital of Tucuruí, which were analyzed from the perspective of the DEA BCC model and obtained scores of 0.581 and 0.516, respectively. It can be concluded that these units, along with others considered inefficient, did not make optimal use of the resources made available by the SUS.

It was also observed that more significant changes occurred from the middle class. For example, the Regional Public Hospital of Eastern Pará, managed by the Direct Administration, has a score of 1 and occupies the 9th position in the ranking *when analyzed from the perspective of the variable returns model and now occupies the 12th position in* the ranking *of the model with constant returns.*

Substantial changes also occurred in the results of the two models of the performance evaluation to which the Dr. Afonso Rodrigues Hospital, located in Igarapé-Miri, were submitted. While this unit resulted in a score of 0.961 using the DEA BCC model (a considerable score close to the maximum efficiency frontier), it reached a score of 0.718 when analyzed under the DEA model with constant returns. The same was observed in the Julia Sefer Hospital, a unit managed by the Direct

Administration, which went from a score of 0.957 in the model with variable returns to a score of 0.775 in the model with constant returns.

5 FINAL THOUGHTS

The present study aimed to evaluate the degree of efficiency of public services offered by medium and high complexity hospitals in the State of Pará in 2019. The quantitative analysis, based on the DEA method, allowed the generation of technical efficiency indicators based on the characteristics of the physical, financial and organizational structure of 25 hospitals with more than 50 beds available, whose management was subordinated to the Health Department of the State of Pará (SESPA).

Among the 25 hospitals analyzed, 8 units are coordinated by social health organizations and 17 are managed directly by the Public Administration. The main result of this trial indicated that of the 12 decision-making units considered efficient in the DEA BCC model, only 4 had their management carried out by OSS, while in the DEA CCR model of the 5 units that reached the maximum efficiency score, only 2 were subject to social health organizations. Therefore, it cannot be categorically stated that most hospitals managed by OSS can be considered efficient.

Another issue that can be deepened concerns the limits of the time interval applied in this essay. In specific cases, changes occurred in the relative classification of decision-making units (DMU). In the sample context, 4 hospitals that occupy a certain position in the efficiency ranking generated by the DEA CCR model showed a significant change in the efficiency ranking generated by the DEA BCC model. It is important to note that these changes occurred from the median of the distribution, therefore, they did not affect the classification of DMUs up to the 8th position in the efficiency ranking. Nevertheless, it is important to carry out a more consistent analysis, covering a wider period of time. Such considerations open the field for the investigation of new hypotheses, based on future trials.

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SEVEN publicações acadêmicas

Use of antimicrobial seal in central venous catheter in hemodialysis patients

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Douglas Nuernberg de Matos
MSc in Pharmaceutical Sciences, Hospital de Clínicas de Porto Alegre
E-mail: dmatos@hcpa.edu.br

Samantha Zamberlan Leyraud
Specialist in Pharmacology and Toxicology, Hospital de Clínicas de Porto Alegre
E-mail: szamberlan@hcpa.edu.br

ABSTRACT
Antibiotic lock therapy is an adjunctive therapy used in the treatment of bloodstream infections related to central venous catheters for hemodialysis and consists of the use of high concentrations of ATB to close the lumens between hemodialysis sessions.
The central venous catheter is the least desirable form of vascular access due to its 2- to 3-fold increased risk of morbidity and mortality. Procedures to maintain vascular access can result in inefficient treatments and recurrent hospital admissions, and are constantly a major problem for the healthcare system.
Contamination of the external and internal surface of the central venous catheter by the extraluminal and intraluminal routes, respectively, involves the transfer of microorganisms during manipulation of the central venous catheter, as well as during dressing changes or central venous catheter connection and disconnection.
The purpose of the antimicrobial seal is to prevent colonization and biofilm formation, for which an antimicrobial agent is required. An anticoagulant is needed to prevent catheter dysfunction. This intervention can also be an adjunct to systemic antibiotic therapy and consists of rescuing the catheter by instilling the solution into each lumen of the catheter at the end of each dialysis session for the same duration of systemic therapy, when there is an ongoing bloodstream infection (BSI).

Keywords: Pharmacy Service, Chronic Kidney Disease, Anti-Bacterial Agents, Catheter-Related Infections.

1 INTRODUCTION

Dialysis is defined as the diffusion of molecules in solution through a semipermeable membrane along an electrochemical concentration gradient. In addition to diffusion, solutes can pass through the pores of the membrane through a convective process driven by hydrostatic or osmotic pressure gradients – a process called ultrafiltration. During ultrafiltration, there is no change in solute concentrations, and its primary goal is to remove excess total body water (Himmelfarb & Ikizler, 2010). The dialysis patient population continues to grow. Extrapolation of prevalence data in low- and middle-income countries suggests that the incidence of dialysis initiation appears to be steadily increasing in this group of countries, with further increases expected in the coming decades. In high-income countries, the incidence peaked in the 2000s and has remained stable or slightly decreased since then (Himmelfarb, 2020).

Worldwide, a substantial number of people do not have access to renal replacement therapy (RRT) and millions of people die from kidney failure each year, often without supportive care. In 2010,

2.62 million people received dialysis worldwide and the demand for this therapy is projected to double by 2030. Vascular access-related complications are associated with high rates of hospitalization and infection (McKie, 2022; Lawson, 2020; Luyckx, 2018). According to data from the 2020 Brazilian Dialysis Census, there were 834 active chronic dialysis centers registered in July 2020 with the Brazilian Society of Nephrology (SBN), 3.6% higher than in 2019. The estimated total number of patients was 144,779, which is consistent with the upward trend in the number of dialysis patients (Nerbass, 2022).

The goal of chronic kidney therapy is to slow the progression of chronic kidney disease (CKD) before end-stage renal disease (ESRD) is achieved. CKD is a progressive condition caused by different factors. The solution to slowing the progression of CKD is treatment of all underlying conditions, however, other disorders that affect kidney health require much more extensive treatment (Flagg, 2018). When CKD progresses and kidney function declines to stage five, RRT needs to be considered. RRT includes peritoneal dialysis (PD), hemodialysis (HD), and kidney transplantation (RT). The choice of treatment may involve a shared decision-making model between the patient and health professionals, and is dependent on medical and surgical contraindications, as well as available resources (McKie, 2022; KDIGO, 2012).

Given the increasing prevalence of chronic renal failure and the expectation that hemodialysis will continue to be the mainstay of RRT, at least for the foreseeable future, there is a need to address the current limitations in vascular access for hemodialysis (Lawson, 2020). To start hemodialysis, the first vascular access can be through a central venous catheter (CVC), arteriovenous graft (VAS), or arteriovenous fistula (AVF). Arteriovenous accesses have been recommended by protocols when there is this possibility (Murea, 2019). AVF remains the preferred vascular access over VAS due to its lower infection rate, fewer thrombosis events, and higher long-term patency. CVC is the least desirable form of vascular access due to its 2- to 3-fold increased risk of morbidity and mortality. Procedures to maintain vascular access can result in inefficient treatments and recurrent hospital admissions, and are constantly a major problem for the healthcare system (Vachharajani, 2021).

The National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) vascular access guideline suggests that most HD patients starting CVC dialysis should switch to AVF or VAS if possible to reduce the risk of infection/bacteremia, infection-related hospitalizations, and adverse outcomes. Contamination of the outer and inner surface of the CVC by the extraluminal and intraluminal routes, respectively, involves the transfer of microorganisms during the manipulation of the CVC, as well as during dressing change or connection and disconnection of the CVC (KDIGO, 2020). Antimicrobial seal solutions are highly concentrated antiseptic/antibiotic agents or anticoagulants, which are used alone or in combination and are instilled into the tunneled catheters, while the catheter is not in use (Golestaneh, 2018).

The purpose of the antimicrobial seal is to prevent colonization and biofilm formation, for which an antimicrobial agent is required. An anticoagulant is needed to prevent catheter dysfunction. This intervention can also be an adjuvant to systemic antibiotic therapy and consists of rescuing the catheter by instilling the solution into each lumen of the catheter at the end of each dialysis session for the same duration of systemic therapy, when there is an ongoing bloodstream infection (BSI) (Almeida, 2022; Balikci, 2021; Golestaneh, 2018).

2 THEORETICAL FRAMEWORK

Kidney disease is a global public health problem that affects more than 750 million people worldwide. Data collected in recent decades have linked a range of genetic, environmental, sociodemographic, and clinical factors to the risk of kidney disease (Crews, 2019). Kidney failure is a consequence of the progression of acute kidney injury or chronic kidney disease (CKD) causing rapid deterioration of kidney function. CKD is defined by abnormalities in renal structure or function, present for more than 3 months, characterized by a glomerular filtration rate (GFR) below 60 mL/min/1.73 m2 or by the presence of markers of kidney injury, such as albuminuria, urine sediment abnormalities, or electrolyte abnormalities. In end-stage renal disease (ESRD), defined as GFR < 15 mL/min/1.73 m2, patients are at risk of potentially lethal complications without renal replacement therapy (RRT) (KDIGO, 2012). Among these patients, infections are some of the complications that draw the most attention, as they are the second most common cause of hospitalization after cardiovascular diseases (USRDS, 2021).

RRT is a treatment for people with end-stage kidney disease through dialysis or kidney transplantation. The use of dialysis to treat ESRD varies substantially across regions, likely due to differences in population demographics, prevalence of ESRD, and factors affecting access to and supply of RRT (Liyanage, 2015). Dialysis may be used as a temporary short-term measure if the cause of kidney damage is reversible, as a bridge to transplantation, or as definitive treatment in patients unable to undergo transplantation. Regardless of the treatment modality used, the management of kidney disease can have a significant impact on a patient's quality of life (Gupta, 2021).

With the onset of ESRD, about 88% of patients are treated with hemodialysis (HD), and their initial RRT is the first one. Over time, patients may switch to peritoneal dialysis (PD) or receive a transplant. The efficacy of HD is directly related to the quality and consistency of vascular access. More than 80% of patients start HD with central venous catheter (CVC), an unacceptably high rate due to the numerous complications associated with long-term CVC use, including catheter-related infection and death (Gupta, 2021). Arteriovenous fistula (AVF) is widely considered to be the preferred vascular access option for most HD patients, providing the best overall outcomes compared to arteriovenous grafts (VAS) or CVC (Thurlow, 2021).

The Brazilian reality regarding dialysis, according to the census conducted in 2020, in relation to vascular access, 25% of HD patients used CVC. There was a decrease in the use of short-term catheters and prostheses, while the use of long-term catheters increased (11%). HD continued to be the treatment for most patients (92.6%) and 7.4% were treated with PD. The treatment was financed by the public health system for 81.6% of the patients and by the private health plan for 18.4% of the patients in the participating units (Nerbass, 2022).

CVCs are used to provide vascular access for both short-term and long-term use. Non-tunneled CVCs are typically for short-term hospital use. Long-acting (tunneled) CVCs are placed under the skin and into the internal jugular vein (most commonly, due to its easy accessibility and path), from where they pass through the brachiocephalic vein and superior vena cava before terminating in the right atrium. Long-term catheter use is often a concern due to the numerous complications associated with this approach, the most common being infection, which can be located in the catheter or occur in the bloodstream (Agarwal, 2019; Lawson, 2020).

In addition, the use of CVC is associated with higher rates of all-cause mortality, fatal infection, and cardiovascular events than the use of fistulas or arteriovenous grafts (Lawson, 2020). Central vein stenosis or occlusion is often found in patients undergoing HD due to prolonged CVC use, multiple CVC insertions, thrombosis, and catheter-related bloodstream infection. Total occlusion of the central vein prevents the insertion of any form of vascular access into the upper extremity. Options are limited to a lower extremity CVC or arteriovenous access to maintain HD treatment (Vachharajani, 2021). Other CVC-related complications can be hemorrhage, pneumothorax, arterial puncture, and catheter dysfunctions such as low blood flow rates and inadequate flow (Balikci, 2021).

Catheters have constantly evolved to minimize complication rates, improve catheter patency, optimize blood flow, minimize intraluminal thrombosis, increase biocompatibility, and decrease the rate of catheter infection, twisting, collapse, or rupture (El Khudari, 2022). The management of CVC infections is complex and can be influenced by the type of device, microbial etiology, and clinical conditions of the patient. The 2009 Infectious Diseases Society of America (IDSA) guidelines recommend catheter removal in certain situations. However, catheter removal is not always feasible in children, especially younger children or those with genetic conditions, when alternative venous approaches may be difficult to establish in a short time to ensure continuity of intravenous infusions (Buonsenso, 2022). After insertion, the catheter often requires repeated interventions to maintain its usefulness. In fact, the rates of primary patency failure and catheter removal in the first year are estimated to be 91% and 52%, respectively (Lawson, 2020).

Infection is the most common long-term complication associated with hemodialysis catheter use. For most catheter patients, the question is when an infection will occur. As the number of catheter days increases, the likelihood of bacteremia increases. Risk factors include older age, diabetes,

malnutrition, frequent catheter manipulation, longer duration of catheter use, bacterial colonization, and contamination of the dialysis solution (El Khudari, 2022). Approximately three-quarters of the pathogenic microorganisms that cause infection are gram-positive and one-quarter are gram-negative bacteria. Systemic antibiotic therapy and the use of antimicrobial seals are the current treatment approaches and are not fully effective. When the infection originates from the extraluminal space of the catheter, blood from the catheter lumen does not indicate infection in the culture, and antimicrobial seal therapy will not be sufficient to terminate the catheter-related infection (CRF). CRF is basically the presence of a certain number of organisms in the catheter segment with clinically existing bacteremia or a local infection that may or may not be accompanied by bloodstream infection (Balikci, 2021).

The use of antibiotic solutions to fill the catheter lumen can be used as a complementary treatment to systemic antibiotic therapy when there is a catheter-related bloodstream infection. However, there are no robust randomized controlled trials proving the favorable effect of such solutions, but there are observational studies showing that the application of intraluminal antibiotic solutions together with a systemic antibiotic leads to the eradication of bacteria and reduces the need for replacement or removal of the tunneled catheter (Borisov & Linkova, 2020). A systematic review demonstrated that in the meta-analysis of a subgroup with an antibiotic + heparin seal (5 studies) or antibiotic + citrate (3 studies) compared with a heparin seal alone, there was a statistically significant reduction in catheter-related bloodstream infection in patients undergoing haemodialysis. However, the authors concluded that the included studies have some shortcomings and may have introduced biases. The results should be interpreted with caution due to the small number of studies (Snaterse, 2010).

The definition of the diagnostic criteria of infection for the epidemiological surveillance of healthcare-associated infections (HAIs) in health services allows the necessary congruence to identify the case, collect and interpret the information in a systematic manner by health system professionals and managers. In 2010, with the objective of standardizing the epidemiological criteria of HAI at the national level, Anvisa's Health Services Surveillance and Monitoring Management (GVIMS/GGTES/Anvisa) published the Manual for Diagnostic Criteria for Healthcare-Associated Infection. For the preparation of this manual, technical groups (WG) were formed with specialists from all over the country. The WGs were also responsible for the revisions of the manual in 2016, 2019 and 2021 (ANVISA, 2010; ANVISA, 2021).

One of the indicators that must be reported nationally is known as Primary Bloodstream Infection (IPCS). The diagnostic criteria for HAIs associated with invasive devices, of mandatory notification, can be checked in Annex I, according to Technical Note GVIMS/GGTES No. 07/2021,

which informs how the mandatory national notification for the year 2022 for the National Health Surveillance Agency (ANVISA) should be (ANVISA, 2021).

IPCS is the presence of one or more microorganisms in the bloodstream, whose origin is not related to any other focus of infection (primary focus), as defined in the national diagnostic criteria. In this sense, the primary focus is the bloodstream itself, which is why the infection is called IPCS (ANVISA, 2021). Laboratory-confirmed primary bloodstream infection (SLBI) is defined as infection in a patient using a central line for a period longer than two consecutive days (from D3 onwards, with the day of insertion being considered D1, regardless of the time of insertion) and that on the date of infection the patient was using the device or it had been removed on the previous day (ANVISA, 2021).

A central catheter is defined by the presence of an intravascular device used for infusion, blood sample collection, or hemodynamic monitoring, whose termination is positioned close to the heart or in a large vessel. The following are considered large vessels: aorta, pulmonary artery, vena cavae, brachycephalic veins, internal jugular veins, subclavian veins, external and common iliac veins, femoral veins, and in newborns all venous or arterial umbilical catheter (ANVISA, 2021). Among the types of central catheters for epidemiological surveillance purposes are tunneled permanent central catheters (which include tunneled hemodialysis catheters) and temporary non-tunneled central catheters (which include non-tunneled hemodialysis catheters) (ANVISA, 2021).

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ATTACHMENT

ANNEX I

TECHNICAL NOTE GVIMS/GGTES Nº 07/2021 Diagnostic criteria for Healthcare-Associated Infections (HAI): mandatory national notification for the year 2022

Diagnostic criteria for HAIs associated with invasive devices, which must be notified:

1. Diagnostic Criteria for Primary Central Line-Associated Bloodstream Infection

1.1 Diagnostic Criteria for Central Line-Associated Laboratory-Confirmed Primary Bloodstream Infection (IPCSL) in Adult and Pediatric Patients

Criterion 1: Central line-associated IPCSL caused by pathogenic microorganism in adults and children > 28 days
Patient > 28 days in use of a central catheter for a period longer than two consecutive days (D1 being the day of device installation) and that on the date of infection the patient was using the device or it was removed the day before. **And** It has a bacterial or fungal pathogenic microorganism, not included in the list of commensal microorganisms1, isolated in a blood sample2: 1. Identified from one or more blood samples obtained in blood culture **OR** 2. Identified genus and species, or at least genus, by validated methods of non-culture-based microbiological testing[3] **And** The microorganism identified is not related to another infectious focus4
Notes
1The complete list of skin contaminating microorganisms (commensals) can be consulted at the link: https://www.gov.br/anvisa/pt br/centralsofcontent/publications/health services/publications/list-of-common diners.xlsx 2The collection of blood samples should preferably be done by peripheral puncture, but it is accepted that the IPCSL caused by a pathogenic microorganism is defined using the results of blood culture or a microbiological test not based on culture of samples collected from a central line, in cases where it is not possible to perform peripheral collection. 3Non-culture-based microbiological tests are molecular, automated tests performed from blood samples. These tests can use, for example, multiplex PCR, miniaturized magnetic resonance imaging technology or DNA sequencing of microbial cells for microbiological diagnosis. It is worth emphasizing that if the blood culture was collected 2 days before or 1 day after the non-culture-based microbiological test, we should consider the result of the blood culture (gold standard) for the surveillance of IPCSL and disregard the result of the non-culture-based microbiological test. 4If the microorganism is related to another infectious source (as per Annex 1 of this document), this bloodstream infection will not be primary, and therefore should not be reported as IPCSL.
Criterion 2: Central line-associated IPCSL caused by skin-contaminating microorganism in adults and children > 1 year
Patient > 1 year in use of a central catheter for a period longer than two consecutive days (D1 being the day of device installation) and that on the date of infection the patient was using the device or it was removed on the previous day **And**

Have at least one of the following signs or symptoms:
o Fever (>38°C)
o Chills
o Hypotension (systolic pressure ≤ 90 mmHg in adults and children, see clinical parameters by age group in Annex l of the HAI Diagnostic Criteria manual)
And
It has skin-contaminating microorganisms (commensals1a,1b), for example: *Corynebacterium* spp. (excludes C. diphtheriae), *Bacillus* spp. *(*excludes *B. anthracis), Propionibacterium spp.,* coagulase-negative *Staphylococcus,* Viridans group Streptococcus, Aerococcus *spp.* and *Micrococcus* spp, identified in TWO or more blood cultures, collected at different times, on the same day or at most on the following day2,3.
And
The microorganism identified is not related to another infectious focus4
And
The signs/symptoms and the result of the blood culture occurred in the window period of infection.

Criterion 3: Central line-associated IPCSL caused by skin-contaminating microorganism in children > 28 days and ≤ 1 year

Patient > 28 days and 1 year ≤ using a central catheter for a period longer than two consecutive days (D1 being the day of device installation) and that on the date of infection the patient was using the device or it was removed on the previous day
And
Patient has at least one of the following signs or symptoms:
o Fever (>38°C)
o Hypothermia (<35°C)
o Apnea
o Bradycardia (see clinical parameters by age group in Appendix l of the HAI Diagnostic Criteria manual)
And
It has skin-contaminating microorganisms (commensals1a,1b), for example: *Corynebacterium* spp. (excludes C. diphtheriae), *Bacillus* spp. *(excludes B. anthracis), Propionibacterium spp.,* coagulase-negative Staphylococcus, Viridans group Streptococcus, Aerococcus *spp.* and *Micrococcus* spp, identified in TWO more blood cultures, collected at different times, on the same day or at most on the following day2,3.
And
The microorganism identified is not related to another infectious focus4
And
The signs/symptoms and the result of the blood culture occurred in the window period of infection.

Notes (criterion 2 and 3)

1aThe complete list of skin contaminating microorganisms (commensals) can be consulted at the link: https://www.gov.br/anvisa/pt br/centralisdeconteúdo/publications/servicosdesaude/publicacoes/llista-de-commensals comums.xlsx
1bThe two corresponding skin contaminant (commensal) samples represent a single element for fulfillment of criterion 2 or 3 and the date of collection of the first sample is used to determine the date of infection.
2The phrase "two or more blood cultures collected at different times" means that:
At least two separate blood sample collections were performed on the same day or on consecutive days, with individualized preparation (skin antisepsis or connector disinfection steps) from each collection site/site during collection.
The purpose of this is to ensure that preparation/antisepsis is carried out at the collection site/site for each collection carried out. In this way, the risk of contamination of the collection being considered IPCSL is reduced.
For example: Prepare individually, i.e., perform the antisepsis/disinfection steps separately in:
- two blood collections from different sites (different peripheral venipunctures, the combination of a venipuncture and collection of a lumen from the central line, or collection of two different lumens from the same central catheter {each lumen must be prepared individually before collection, remembering that this type of collection is allowed in case of exception when it is not possible to perform peripheral collection})

OR

- two blood collections from the same site (collected at different times)

3The collection of blood samples for blood cultures should preferably be done by peripheral vein puncture, because samples collected from the catheter have a high risk of contamination by commensal microorganisms and, therefore, a greater chance of false-positive results, so positive blood cultures collected only from the central line should be avoided. However, in exceptional situations, it is accepted that SLBI caused by a skin

contaminating agent is defined using two positive blood cultures collected from a central line, in cases where peripheral collection is not possible. The need for adequate preparation of the blood collection site/site is reinforced (see details of blood culture collection in the annex to the chapter on bloodstream infection of the Manual of Diagnostic Criteria for HAIs).

4If the microorganism is related to another infectious source (as per Annex 1 of this document), this bloodstream infection will not be primary, and therefore should not be reported as IPCSL.

The use of Libras as a means of facilitating nursing care for deaf patients

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Bruna Lucas Pissolato
Nursing student at Estácio de Sá University (UNESA)
E-mail: brunapissolato@outlook.com

Yohana Moreira
Nursing student at Estácio de Sá University (UNESA)
E-mail: yohana.moreira@gmail.com

Ana Claudia Moreira Monteiro
Graduated in Nursing UEL. Doctorate UERJ. Professor at FENF/UERJ
E-mail: ana.monteiro@uerj.br

ABSTRACT
The current article identifies the struggle of the deaf community facing the difficulty in nursing care, such as strategy that nurses and others healthcare professionals use to assist the deaf community, considering the unpreparation from the staff. The objective is to bring up the importance of Brazilian Sign Language (LIBRAS) use to healthcare professionals in order to exist a reliable communication between deaf people and those professionals. It is narrative bibliographic research with a qualitative descriptive and exploratory approach. The research was based in BDENF, LILACS and SciELO databases through the following keywords: deaf, nursing and LIBRAS. Six (6) articles were found within the above keywords. One (1) was excluded for not addressing the subject in question. Five (5) articles were available in full according to the inclusion and exclusion criteria. It is necessary to indicate the importance of knowing Brazilian Sign Language from healthcare professionals, even in a basic way to offer a proper caring to deaf community.

Keywords: Deaf, Libras, Nursing.

1 INTRODUCTION

The World Health Organization (WHO) estimates that there are currently more than 460 million people with hearing loss in the world and that approximately 630 million will have hearing loss in 2030.

According to the Brazilian Institute of Geography and Statistics – IBGE (2010), the total number of individuals with severe hearing loss1 was around 2 million, noting the need to learn Libras. The low spread of this importance makes the group of deaf people more distant from society, significantly increasing the number of what is called social exclusion.

Nursing comprises a holistic look at each individual who needs care and, for this, there is a need for good communication between the caregiver and the one being cared for – the so-called Interpersonal Communication, where the patient who needs help is heard and helped (ELIAS et al., 2016).

The choice of the theme was based on this relationship of individuals who want and need to be "heard" within a society that treats them as invisible beings, without being able to be helped efficiently and effectively. Therefore, learning in Libras for nursing can contribute to an improvement in the care

of these patients, aiming at good communication.

Some questions must be taken into account when it comes to deafness in order to have knowledge and understanding of deaf culture.

Topics that address the theme presented were selected in order to clarify any misconceptions about the subject.

1.1 DIFFERENCE BETWEEN HEARING IMPAIRMENT AND DEAFNESS

When there is some impairment in the individual's hearing, there is a distinction between two terms that many still confuse a lot: hearing impaired and deaf.

According to the World Health Organization (WHO), a person's hearing is considered normal when they perceive sounds around 20dB. When she can only hear sounds above this value, she is considered to have a hearing loss, which can be classified as mild, moderate, severe or profound, affecting only one or both ears. Those with mild, moderate or severe types have the ability to communicate through oral language, as well as make use of hearing aids, cochlear implants and other devices. Deafness, on the other hand, is identified as profound hearing loss, implying little or no hearing captured.

According to Klemp et al. (2016), there are many causes that can lead to deafness, such as: intense noises; bacterial and viral infections; some medications, especially antibiotics; lesions or fixation of small bones in the middle ear; one's own age (presbycusis); genetics; and, benign and malignant tumors.

The deaf person, according to Decree No. 5,626/2005, is identified by having hearing loss, as well as understanding and interacting with the world through visual experiences. The manifestation of its culture is through the use of Brazilian Sign Language – Libras.

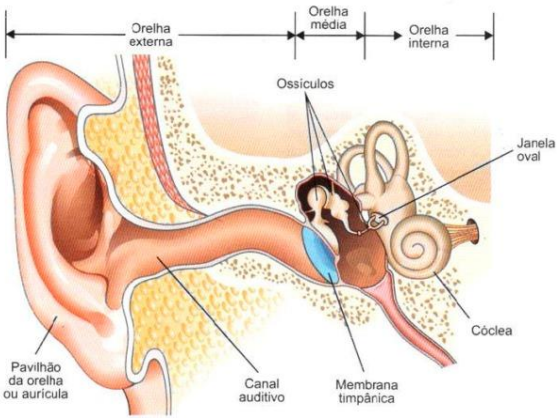
1.2 ANATOMY OF THE EAR

According to Gentil (2008 apud AREIAS, 2014), the human ear is divided into three parts: outer ear, middle ear and inner ear (Figure 1).

Areias (2014) also says that the external ear is made up of the pinna (or ear) and the external auditory canal and is responsible for receiving and transmitting sound to the middle ear. Its final portion is located in the tympanic membrane. From there, the middle ear begins, consisting of three ossicles: malleus, incus and stapes. Hammer in direct contact with the eardrum and stapes with the cochlea. The structure of the middle ear features an air-filled cavity, allowing the transformation of sounds into vibrations in the tympanic membrane, amplifying the sound all the way to the inner ear. In it, there is the presence of the cochlea, vestibular apparatus and auditory nerve. The cochlea is responsible for converting mechanical sound waves into electrical impulses through hair cells, while the vestibular

apparatus, which is composed of the semicircular canals (interconnected bone tubes) and has fluid inside capable of controlling balance. The auditory nerve, on the other hand, is responsible for sending the electrical impulses converted by the cochlea to the brain. Thus, the inner ear has two functions: balance, through the vestibular system, and hearing through the cochlea.

Figure 1: Anatomy of the human ear (CURI; PROCÓPIO, 2009)



Deafness can be classified in three ways: deafness due to conductive hearing loss, related to obstruction of the outer or middle ear, deafness due to sensorineural hearing loss, related to damage to the hair cells of the cochlea, and mixed deafness, caused by both the outer, middle and inner ears (SILMAN et al., 1997).

1.3 DEVICES USED TO LIVEN UP SURDEZ

Patients who have a profoundly damaged inner ear, resulting in severe or profound hearing loss, may manifest an inability to restore their hearing ability, making speech and language impossible (ILBERG et al., 2011 apud CRUZ et al., 2012 apud BARRAULT et al., 2013).

According to the WHO, hearing aids have the function of helping to amplify sound so that people who have hearing loss can hear better. These devices have behind-the-ear (behind the pinna) and in-canal (fitted in the ear canal) shapes.

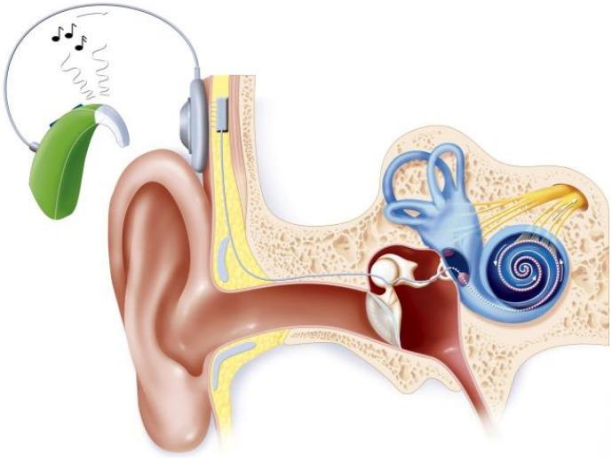
Milack (2015) presented six (6) models of hearing aids: microcanal, intracanal, intrauricular, conventional behind-the-ear, receiver-in-the-canal and open-fitting behind-the-ear, as illustrated in Figure 2 in A, B, C, D, E, and F, respectively.

Figure 2: Hearing aid models (MILACK, 2015)



The WHO points out that, in cases where the hearing aid does not show efficiency, especially for people who have bilateral sevara to profound hearing loss, another way for the auditory nerve to receive stimuli would be by applying an electric current through a device along the cochlea, called a cochlear implant and introduced by means of surgery. From it, the brain understands the transmitted sounds and the person is able to hear better (Figure 3).

Figure 3: Depiction of a cochlear implant in the ear, telling how sound is transmitted to the brain (MDS Manual, 2022).



1.4 ABOLITION OF THE TERM "DEAF-MUTE" AND "DISABLED"

During the period of oralism, in the nineteenth century, a period in which it was determined that deaf people should communicate through orality rather than by signs, the deaf was designated as deaf-mute, or mute. After several studies, it was concluded that the vocal apparatus of the deaf, as well as of the hearing people, was preserved. Thus, the term 'mute' is no longer used (BARBOSA, 2017, p. 33).

Sassaki (2003) points out that people who have disabilities have been manifesting themselves in relation to the term "disabled person", because they argue that the disability they have is not like objects that they can, or cannot, carry.

Thus, it is noted that the correct terms to be used when dealing with a deaf person are: deaf; deaf person; *hearing impaired and/or hearing impaired*[1].

1.5 POUNDS

The history of Brazilian Sign Language began at the time of Emperor Dom Pedro II, in mid-1855. One of his family members was deaf and was responsible for the interest of the emperor and the coming to the country of the French professor Eduard Huet, also deaf. He was responsible for the implementation of the manual alphabet and the French Sign Language and participated in the founding of the National Institute of Deaf-Mute Education in 1857. Currently, the institute is called the National Institute for the Education of the Deaf – INES (CARRARO et al., 2016).

According to Ramos (2004), Libras is an acronym used to designate the Brazilian Sign Language that was approved by *Feneis*[2] in 1993 and made official by Law No. 10,436/2002.

According to this Law:

> Art. 1 The Brazilian Sign Language (Libras) and other resources of expression associated with it are recognized as a legal means of communication and expression.
> Sole paragraph. Brazilian Sign Language (Libras) is understood as a form of communication and expression, in which the linguistic system of visual-motor nature, with its own grammatical structure, constitutes a linguistic system of transmission of ideas and facts, originating from communities of deaf people in Brazil.

Each country has its own sign language system and therefore cannot be considered as universal. This happens because each country has its own habits, characteristics, ideas and culture, which makes one place different from the other (ROSA, 2005 apud ANTUNES, 2011).

Considered a signural-visual language, Brazilian Sign Language has its own grammar, with its particularities and regional variations, which can be compared to the accents and slang of the Portuguese language. Therefore, it is noted that Libras is characteristic of each region of Brazil (KLEMP et al, 2016).

In an attempt to include deaf people in a society where they should be included, legislation was created to guarantee their right. Some of these will be highlighted for knowledge.

Law No. 10,436/2002 provides for the Brazilian Sign Language - Libras and provides other

[1] According to Sassaki (2003), there is a difference between partial hearing loss and deafness, where the former has some auditory residue, while the latter has total hearing loss. Therefore, it is interesting that the use of the term "hearing impaired" is avoided.
[2] According to FENEIS, the National Federation of Education and Integration of the Deaf is "a philanthropic, non-profit entity, whose purpose is the defense of language policies, education, culture, employment, health and social assistance, in favor of the Brazilian deaf community, as well as the defense of their rights."

provisions. From this Law, Libras was recognized as a legal means of communication and expression.

Decree No. 5,626/2005 regulates Law No. 10,436/2002, and provides for the Brazilian Sign Language - Libras, and article 18 of Law No. 10,098, of December 19, 2000. The aforementioned Decree includes Libras as a curricular subject, in addition to dealing with the training of teachers, instructors, translators and interpreters of Libras, guaranteeing the access and right of deaf people to education and health, and also ensuring effective service in the Public Power through the use and dissemination of Libras.

Law No. 13,146/2015 establishes the Brazilian Law for the Inclusion of Persons with Disabilities (Statute of Persons with Disabilities). Therefore, it ensures and promotes the rights and freedom of people with disabilities, seeking their social inclusion and citizenship.

Law No. 14.191/2021 alters theLaw No. 9,394/1996 (Law of Guidelines and Bases of National Education), to provide for the modality of bilingual education for the deaf. This Law guarantees that Libras be used as a first language in school education, and written Portuguese as a second language.

Therefore, the importance of addressing the rights of deaf people over the years is observed.

2 OBJECTIVES

The main objective of this study is to analyze how nurses can acquire knowledge in Libras. Thus, it is important to understand the need for this language in nursing care and also to contribute to this care and social inclusion, arousing the interest of the nursing team, in order to encourage them to study Libras.

3 MATERIALS AND METHODS

This is a narrative bibliographic research, with a qualitative, descriptive and exploratory approach, and was carried out through the VHL (Virtual Health Library), in the databases of BDENF (Nursing Database), LILACS (Latin American and Caribbean Literature in Health Sciences) and SciELO (Scientific Electronic Library Online), between the years 2014 and 2022 and in Brazilian articles, which contained the following keywords: Libras; nursing; and deaf.

A total of six (6) articles were found, one (1) of which was excluded because it did not address the same theme, and five (5) analyzed articles that were available in full and addressing the theme: Brito and Lavareda (2015); França et al. (2016); Marquete et al. (2019); Miranda et al. (2014).; and Soares et al. (2018).

4 RESULTS AND DISCUSSION

França et al (2016) use reports from health professionals from a primary health care unit in Campina Grandre – Paraíba. The inefficiency and ineffectiveness of language and communication with

deaf patients was observed due to the lack of training, mastery and knowledge of Sign Language, lack of audiovisual materials that could improve this communication and the fear of participating in care due to the presence of a companion and the message not being received accurately.

Brito and Lavareda (2015) reveal that deaf people face great difficulty in finding health services that have the resources to assist them in terms of communication. In addition, they highlight the idea of deaf patients being embarrassed in a nursing appointment because they are accompanied by a family member and end up hiding something important about their real health status because they are not at ease, which results in unqualified care due to the provision of care to the individual, in its entirety, be incomplete. They also add that the interpreter would not make this communication effective either, since he may be absent from the unit on the day of the consultation or even present, but without providing the patient's affective welcome, which may hinder the patient's relationship with the health professional for fear of his exposure.

Soares et al (2018) conducted an interview with twenty (20) nurses from Basic Health Units in the municipality of Arapiraca – Alagoas – and all interviewees stated that they had already assisted deaf patients and did not have the knowledge and/or mastery of Libras, also hindering the interaction between deaf users and health professionals. One of the interviewees revealed that he did not provide care to deaf patients who arrived at the unit without a companion or interpreter. The professionals interviewed used some practices to facilitate communication with the deaf, such as the presence of a companion during consultations, the use of writing and body language.

It was pointed out that the presence of a third individual in the care may not be safe, since there is a breach in trust between the professional and the patient. Writing was an instrument that helped the professionals a lot, since the deaf users knew how to read and write, as well as the use of body language, gestures and lip reading, which were also feasible for this communication.

In the research by Miranda et al (2014), the authors point to a study showing that 42% (forty-two percent) of health professionals use verbal communication to interact with deaf users, in the same way that writing is present in this interaction. However, communication can only be effective when these users are literate in both Portuguese and Libras (first language) and many did not have adequate access to the educational system. This type of communication also does not become effective when deaf patients try to write according to the rules used in Libras and are not understood due to the structure being different from the Portuguese language.

Regarding non-verbal communication, the authors highlight other studies demonstrating the relevance of this type of communication in care, both through Libras, gestures, mimes and/or lip reading. In one of the studies, the authors demonstrate that this type of communication is only understood if it is through short messages. Lip reading requires a lot of concentration, as it depends on the position of the head and lip gesticulation of the person who is reproducing. Another study by the

authors points out that all nurses and nursing technicians in a large hospital used mime to assist deaf patients, and a Colombian study addressed the use of graphics and demonstration with the instruments used in the procedure, before performing it to ensure the understanding and cooperation of these clients.

The same authors discuss communication via interpreter, which is effective, but must be with a TILS (Libras Interpreter Translator) professional, recognized in the deaf community and who is reliable, so that there is compatibility with the deaf and, thus, achieve success in the interaction of the client with the health and care professional.

A final means to enable communication between deaf users and health professionals pointed out by the authors is communication by devices, through computers, placed side by side, where the two can interact, in addition to the use of pictogram and icon programs demonstrating certain concepts, being effective in hospital environments where they are unable to use the hands to use the signs. In addition, programs and applications are also offered that can be used by the deaf, however, many of them are not available for free, causing a barrier to the access of these customers.

The relationship between the health professional and the deaf was addressed in one of the topics of the study and feelings of frustration, impotence and impatience were observed on the part of the professionals when interacting with this clientele, as well as fear, distrust and frustration on the part of the deaf when they need to take advantage of the health system and are not understood due to lack of preparation of the team. This lack of training of health professionals causes distancing and lack of personal interaction, excluding the deaf population from society. According to the authors, the communication between the health team and the deaf is complicated and clearly perceived when looking for care in the health units and, therefore, there is a need for a Libras interpreter in these establishments so that the deaf can be understood and assisted.

Marquete et al. (2019) demonstrate reports from family members of deaf users in the face of health services, highlighting the need for follow-up for these individuals, since the health team is not qualified to assist them. The family members who are fluent in Sign Language have verified the confidence in passing on the correct health information both to the deaf and to the professional who is providing care, without difficulties. On the other hand, there is the insecurity of family members who do not have such mastery, because there is no full understanding of the patient's health situation. Finally, there are reports from family members emphasizing that, due to the fact that the team is unable to communicate directly with the deaf person, there is a difficulty in relation to the important actions that will be assigned to this patient, such as, for example, prevention guidelines: what to do to prevent it, where to go or who to turn to.

5 CONCLUSION

Considering that communication is essential at any level of care, when there is no interaction or when it is weak between the health professional and the deaf patient, this communication becomes inefficient. Insufficient data collection and anamnesis lead to an erroneous diagnosis, posing a risk to the health of the deaf.

In the present study, the prevalence of the use of body language, gestures and even writing by the nursing team in the care of deaf patients is noted as a way of adapting care, when they should, in fact, have basic knowledge in Libras.

It is possible to observe the ineffectiveness in communication and the lack of preparation of health professionals to receive a deaf patient in the unit. Assumptions were raised in the articles studied regarding the autonomy of the deaf during the consultation, the difficulty in promoting the self-care of this patient, since the transmission of the message is not passed correctly, both by the patient and by the professional, and confidentiality and privacy that are not adequate in the care.

Therefore, it is notorious that health professionals need to have knowledge in Libras to offer personalized care, in accordance with the doctrinal principles of the Unified Health System (SUS). Feelings such as fear, lack of interest and/or impatience of the professional show the team's lack of preparation and exclusion towards the deaf patient, generating frustration, incapacity and invisibility of this patient, thus increasing exclusion by the hearing society, proven by the deaf community on a daily basis.

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Education and aesthetic treatment of acne-prone skin

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Vicente Alberto Lima Bessa
Lecturers at Centro Universitário Celso Lisboa.

Rita de Cássia Borges Lima
Lecturers at Centro Universitário Celso Lisboa.

Taciara Queiroz Gonçalves
Academics of the Aesthetics and Cosmetics Course at Centro Universitário Celso Lisboa.

Juliana Mendonça Farias de Sá
Academics of the Aesthetics and Cosmetics Course at Centro Universitário Celso Lisboa.

Fernanda Almeida da Silva

ABSTRACT
Objective: To investigate the benefits that cosmetic and educational practices provide to the skin of acne patients. Materials and Methods: the research was a case study composed of six volunteers divided into two groups: G1, who received treatment in the cabin, and G2, who received treatment in the cabin, in addition to a cosmetic acne treatment kit for use in homecare. Results: The study established a comparison between the treatments performed in the cabin and those administered in homecare, focusing on the analysis of their impact on the emotional and behavioral spheres of the participants. The results revealed a notable improvement in the volunteers' perception of acne, who reported less impact on their daily activities. The study emphasized the relevance of providing authoritative information and guidance on acne and proper skin hygiene, culminating in a significant increase in participants' knowledge of the condition. The survey found that beliefs related to makeup use and the influence of diet on acne remained relatively unchanged. The levels of satisfaction among the participants were considerable, especially in the group that adhered to the homecare treatment, corroborating the efficacy and acceptance of the cabin and homecare treatments. Conclusion: The treatment in the cabin and homecare was more satisfactory than that performed only in the cabin, although both had positive results. People who participated in the study are shown to be more educated in acne skin care.

Keywords: Acne vulgaris, Anti-acne cosmetics, Facial aesthetics.

1 INTRODUCTION

Acne vulgaris, a chronic inflammatory dermatosis of multifactorial origin, impacts the pilosebaceous follicles of the skin, manifesting itself by the presence of comedones, papules, pustules and nodules, which can present both openly and closedly. Although acne vulgaris is not associated with an imminent risk of mortality, its occurrence invariably triggers a considerable burden of morbidity, manifesting itself through physical sequelae as well as substantial psychological shocks. The latter manifest themselves through the inherent propensity to form permanent scars, the erosion of self-esteem, and can even trigger depression and anxiety (BALDWIN and TAN, 2021).

Acne is extremely common all over the world. A study conducted by the Brazilian Society of Dermatology in 2018 on the nosological profile of dermatological consultations confirmed that the main diagnosis of dermatological consultations was acne (MIOT et al, 2018).

Although the classification of acne is not universal, it is possible to classify it into degrees or types, and this classification guides treatment. Basically, there are 5 degrees of severity, and the closer to 1, the less severe, and the closer to 5, the more severe the acne. It is also possible to categorize them as comedonic, papulopustulous, nodular-cystic, conglobata, and fulminant acne (BESSA, BESSA, and MORAES, 2020). The beautician can act freely in grades 1 and 2, but in grade 3 there may be a need for medical intervention. Grades 4 and 5 are treated by doctors. Thus, educational and therapeutic aesthetic approaches can prevent progression to more severe degrees.

Based on the above, the following questions arise: What are the benefits that cosmetic and educational procedures provide for the skin and the quality of life of people with acne? Does the combination of in-cabin treatments and in-home care offer superior results compared to in-cabin treatment?

1.1 MAIN OBJECTIVE

To investigate the benefits that cosmetic and educational practices provide to the skin of acne sufferers.

1.2 SECONDARY OBJECTIVES

To compare the results of acne skin treatment in people who underwent cabin treatment and those who underwent cabin treatment and *homecare*.

Describe the guidelines on acne and facial care to prevent its appearance or worsening.

Analyze, through a questionnaire, the socio-emotional impact that acne causes in the person's life.

1.3 SOCIAL RELEVANCE

This project gained relevance by undertaking efforts to sensitize the community about the necessary care for acne-prone skin, aiming to prevent irreversible damage to the integrity of the skin and, consequently, minimize the resulting emotional and aesthetic impacts. In addition, it aimed to provide a proposal for a cosmetic treatment program that would prove to be efficient, effective and effective.

Thus, the main purpose of the project was to contribute to improving the quality of life of individuals, intervening positively in facial aesthetics and in the restoration of self-esteem.

2 PROPOSED METHODOLOGY

This research was classified as a case study, which constituted a scientific research strategy focused on the analysis of contemporary phenomena. In this sense, this study sought to analyze the

cosmetic conducts performed in the cabin and the *care in homecare*, focusing on the improvements observed in the skin and in the quality of life of people affected by acne.

The research project was submitted in compliance with the 2023 notice, for the research line "Scientific and technological development in health, aesthetics, beauty and well-being", and was approved by the evaluation committee in February 2023 in the Scientific Initiation Program of Celso Lisboa, in the senior category. It complied with the guidelines of the Research Ethics Committee, and all participants voluntarily signed the Free and Informed Consent Form.

The theoretical basis of this study was supported by articles in Portuguese and English, obtained from renowned virtual data sources, such as Wiley Online Library, PubMed and Google Scholar. The search for data was performed using single and/or combined keywords, including terms such as "acne vulgaris", "acne vulgaris and cosmetology" and "facial aesthetics".

After the selection of the volunteers, they were submitted to a comprehensive facial evaluation, which included a detailed anamnesis and the recording of photographs. In addition, the participants answered a questionnaire consisting of 10 questions, covering personal information and knowledge about acne.

The volunteers were divided into two groups: G1, who received treatment in the cabin, and G2, who received treatment in the cabin, as well as a cosmetic acne treatment kit for use in *homecare*.

The procedures performed in the cabin were identical for both groups. However, only G2 participants received the aforementioned kit for homecare application.

The treatment program for acne control was started with a total of 6 sessions, performed twice a week. After the completion of these 6 sessions, all participants underwent a reassessment and answered the questionnaire again.

During the sessions, the participants were properly guided on the specific care for acne-prone skin, and any doubts that arose were clarified. This included information on what acne is, appropriate care, recommended cosmetic products for use, and practices to avoid. It is important to mention that all cosmetic products used in treatments, both in cabins and in homecare, are *approved by ANVISA and are authorized for both professional and* homecare use.

The treatment program for acne control began with a total of 6 sessions, held twice a week at the Aesthetics and Cosmetics Laboratory, located at the Celso Lisboa University Center, in Rio de Janeiro.

After the completion of these 6 sessions, all participants underwent a reassessment and answered the questionnaire again. The collected data were subsequently analyzed qualitatively and through descriptive statistics.

During the sessions, the participants were properly guided on the specific care for acne-prone skin, and any doubts that arose were clarified. This included information on what acne is, appropriate

care, recommended cosmetic products for use, and practices to avoid. It is important to mention that all cosmetic products used in treatments, both in cabins and in homecare, are cosmetics for home use, have ANVISA approval and are authorized for both professional and homecare use.

The in-cabin protocol was conducted with the anti-acne cosmetic kit for professional use. Before starting the treatment, all volunteers underwent a patch test. If anyone manifested signs or symptoms that suggested an allergic reaction to the components of the cosmetic formulation, they were disqualified from the study. The patch test involved applying a small amount of the cosmetic to the region behind the ear. After a period of 24 hours, the area was washed. In the event of skin irritation, itching, or burning at or near the site, the use of the product was contraindicated.

The anti-acne cosmetic kit for professional use has been developed with triterpene extracts and a family of pre- and post-biotics containing essential active ingredients for acne control and the promotion of healthier-looking skin. The professional line consisted of six items: liquid gel soap - 100ml, anti-acne drying mask - 200g, tonic for acne skin - 100ml, drying fluid - 20ml, anti-acne fluid - 20ml and soothing sealing mask - 100g.

The stages of the treatment followed the criteria established by the company that produces the cosmetics and were strictly adopted, namely:

1. It started by applying the liquid gel soap, performing gentle massages for 2 minutes. Subsequently, it was removed with a cotton pad moistened with water.
2. Then, a layer of the drying mask was applied to the face with the help of a brush. He waited 15 minutes and then withdrew with a cotton pad moistened with water.
3. The toner was applied to the skin, without the need to remove it.
4. 10 drops of the anti-acne fluid were applied to the face, patting the region lightly until it was completely absorbed. It was not necessary to remove the product.
5. In the same way, 10 drops of the drying anti-acne fluid were applied to the injured areas, patting lightly until it was completely absorbed. The product has not been removed.
6. 4 pumps of the soothing sealing mask were applied all over the face and left on for 5 minutes, without removing the product.
7. The treatment was completed by applying the sunscreen that provides high protection against UVA and UVB rays.

The G2 group, which underwent the treatment in homecare and received an acne treatment kit for use in homecare, was provided with the following components: facial liquid soap (100 ml) and gel for skin with acne (60 ml).

The stages of the treatment followed the criteria established by the company that produced the cosmetics and were carefully guided and strictly followed by the volunteers, as described below:

1. They applied the facial liquid soap all over the face with circular motions and then rinsed thoroughly.
2. They applied a portion of anti-acne gel all over her face. Daily use. It can be used in the morning.

2.1 INCLUSION CRITERIA

Volunteers who presented acne in grades I to II and who strictly complied with the previously established inclusion criteria participated in this study. These criteria, fundamental for the selection of participants, were as follows:

- First, the volunteers had to be over 18 years of age, thus ensuring that they were of adult age and could fully understand the procedures and implications of the study. In addition, the survey was open to people of both sexes, ensuring a diverse sample for analysis.
- Another important point was the requirement that participants be properly immunized against the coronavirus (SARS-Cov2). This measure aimed to ensure the safety and health of everyone involved, minimizing the risk of infection during the study.
- Finally, the volunteers' adherence to the study required the signing of the Free and Informed Consent Form, in strict accordance with the regulations established by Resolutions No. 466/12 and 510/16 of the National Health Council. This term was an assurance that participants were aware of the objectives, procedures, and potential risks involved in the research, as well as ensuring that their participation was voluntary and based on an informed decision.

2.2 EXCLUSION CRITERIA

In the conduct of clinical trials and scientific research, the definition of exclusion criteria plays a key role for the appropriate selection of participants. These criteria, when applied judiciously, aim to ensure the validity and reliability of the results, as well as the safety of the participants.

In the context of this study, several exclusion criteria were established to ensure that the research is conducted in a rigorous manner and that the results are representative of the study population. One of these essential criteria concerns the presence of allergy to components of cosmetic products intended for the treatment of acne. This exclusion is imperative to avoid possible adverse allergic reactions that may arise during treatment and compromise the safety of participants.

Another important criterion was related to the previous use of topical acne products in the last three months, with the exception of cleansers, moisturizers, and sunscreens. The exclusion in this context was justified by the need to evaluate the performance of the cosmetic products tested without

interference from previous treatments, ensuring that the results were attributed to the products under study.

In addition, the exclusion of individuals who have used acne-specific oral antibiotics in the last three months is of paramount importance. Oral antibiotics, such as cyclins, can influence the skin's response to treatment, making their exclusion necessary for an accurate and unbiased analysis of the results.

Finally, the exclusion of participants who have used oral isotretinoin is justified due to the substantial effects of this drug on the skin. Isotretinoin is widely used in the treatment of severe acne and its characteristics may influence the efficacy and safety of the products under review.

In summary, the exclusion criteria established for this study were crucial to ensure the validity and accuracy of the results, as well as the safety of the participants. By excluding individuals with characteristics that could interfere with the results, the research became more reliable and able to provide valuable information about the products and their impact on acne treatment

2.3 RISKS

There is a likelihood of developing facial hyperchromia if the researchers' guidelines are not followed. The likelihood of developing facial hyperchromia is kept to a minimum when participants strictly follow the researchers' guidelines, which include the daily use of sunscreen with at least a sun protection factor (SPF) of 30 and a damage protection standard (PDD) of 10.

2.4 BENEFITS

Acne vulgaris is widely recognized as the most common dermatosis in the population, affecting individuals of all ages, with a prevalence ranging from 85% to 100% (SANTOS and SILVA, et al, 2020). In addition to its aesthetic manifestation, acne can have more serious implications, including significant emotional impact and the formation of scars (BESSA, BESSA, and MORAES, 2020).

Consequently, both the presence of acne and the possibility of scarring from it can result in social isolation and decreased self-esteem. This highlights the need for therapeutic and educational approaches aimed at preventing the appearance of acne or worsening of its manifestations.

3 DATA ANALYSIS METHODOLOGY

The results of this study were submitted to a qualitative and quantitative analysis. The qualitative analysis involved a comparison of the answers to the questionnaires before and after the cosmetic treatment. In addition, the data from the questionnaires were submitted to a descriptive statistical analysis. This combined approach allowed for a comprehensive and detailed evaluation of

the results, providing both qualitative and quantitative insights into the effects of cosmetic treatment in the context of the research.

4 LITERATURE REVIEW

Acne, a widely disseminated dermatological condition, impacts a significant portion of the population, especially in the age group that spans adolescence and early adulthood (BESSA, BESSA, and MORAES, 2020). Its prevalence reaches a remarkable 85% among people aged between 12 and 24 years (RIBEIRO et al., 2015).

The pathophysiology of acne vulgaris encompasses both ancient and current precepts, notably highlighting the predominant etiological agent, *Cutibacterium acnes* (*C. acnes*), and the underlying inflammatory process. Multiple factors interact synergistically in the unfolding of acne, with four fundamental elements: excess sebaceous secretion, hyperkeratinization of the pilosebaceous follicle, bacterial colonization and the consequent release of inflammatory mediators both inside the follicle and in the adjacent dermis (RIBEIRO et al., 2015).

The classification of acne involves five grades, and in general, grades I and II are treated by aesthetic professionals, while grade III requires medical treatment. Grades IV and V are treated by physicians and do not involve direct intervention by estheticians.

Grade I is known as comedonic acne, which is characterized by the presence of closed and open comedones. In grade II, called papulopustular acne, in addition to comedones, there are papules with or without erythema and pustules, as well as constant seborrhea. In grade III, identified as nodular-cystic acne, there is the presence of comedones, papules with or without erythema, pustules, seborrhea and nodules. Grade IV corresponds to acne conglobata, which includes comedones, papules with or without erythema, pustules, seborrhea, purulent nodules, abscesses, and fistulas, often resulting in substantial scarring. Finally, grade V refers to acne fulminans, being the most severe form, accompanied by systemic symptoms such as fatigue, malaise, myalgias, arthralgia, fever, inflammatory nodules, and hemorrhagic crusts (BESSA, 2022).

Its prevention and control require an attentive and comprehensive approach, reconciling hygiene measures and the alteration of certain aspects of lifestyle.

In line with this premise, some general guidelines can be outlined in order to mitigate the appearance or worsening of acne, as well as to favor skin health. The primacy of the skincare routine encompasses the practice of regular facial hygiene, through morning and night washing, using a delicate soap and lukewarm water. It is important to highlight that it is absolutely necessary to avoid rubbing hard, because this can cause irritation.

In the context of the careful choice of products for dermocosmetics, it is imperative to use non-comedogenic formulations that do not obstruct the cutaneous ostia. In the case of skin prone to dryness,

the application of a light moisturizer is relevant, in order to prevent the physiological response of sebum overproduction, caused by water scarcity.

Another aspect worth mentioning is adequate body hydration, through the consumption of an appropriate amount of water, a key element in promoting healthy skin.

It is important not to touch the face with your hands, especially when they are contaminated, as this helps to prevent the transfer of sebum and bacteria to the skin, preventing the obstruction of the follicles. Therefore, avoiding the manipulation of acne skin lesions is a crucial strategy, since this type of action can trigger inflammatory processes and possibly result in scarring, harming the health and appearance of the skin. It is important to emphasize the importance of skin care education, as the practice of "poking" or "squeezing", the use of home remedies, or the belief in miracle solutions can aggravate acne and increase the risk of sequelae (BESSA, 2022).

From a dietary point of view, diet has a considerable influence on the condition of the skin. Maintaining a balanced diet, abundantly composed of fruits, vegetables and fibre-rich foods, is one of the pillars of prevention. In addition, several other factors can exert a substantial influence on the development of acne, such as the use of medications, foods with a high glycemic index, exposure to iodine, dairy products (BAGATIN et al., 2019; RIBEIRO et al., 2015), amino acid supplementation (RIBEIRO et al., 2015) and smoking (BAGATIN et al., 2019; COAST; VELHO, 2018). Therefore, it is advisable to avoid these foods or take a moderate consumption approach.

Meticulous preservation against the harmful effects of solar radiation is an unavoidable imperative, mediated by the daily application of sunscreen, thus providing a significant attenuation of the harmful effects resulting from sun exposure. In addition, exposure to ultraviolet rays from artifices, such as artificial tanning practices, should be strictly avoided, as it tends to accentuate acne.

With regard to facial and capillary hairiness, appropriate asepsis takes on a relevant dimension. Keeping your hair clean and avoiding frequent contact with your face is a valuable precept, as well as careful treatment of your beard, if it is present.

Stress management, which can play a triggering or aggravating role in acne (BAGATIN et al., 2019; COAST; VELHO, 2018), deserves dedicated attention, with the implementation of relaxation techniques and the search for emotional balance.

Last but not least, the essential recommendation is to consult a dermatologist whenever acne persists or becomes severe. Specialists in this area of medicine will be able to prescribe specific topical or oral treatments, adapted to the particular characteristics of each acne condition, thus promoting a personalized approach.

Although the strategies outlined here constitute robust foundations for the prevention and management of acne, it is imperative to understand that the treatment and prevention of this skin condition may vary according to the type and severity of the condition, which is why it is recommended

to seek guidance from a qualified health professional, such as a doctor or esthetician. for the formulation of an appropriate care plan, especially in situations that require a more robust and personalized approach.

5 DISCUSSION

The treatment protocol applied by the researchers in both cohorts of volunteers, i.e., in groups G1 and G2, was uniform and included the use of an anti-acne cosmetic kit for professional use, consisting of a set of six cosmetic products.

The cosmetic products in the professional line have been made based on triterpene extracts and a family of pre- and post-biotics, which enable effective acne control and contribute to the promotion of skin health. The kit consists of a total of six products, including liquid gel soap, drying mask, toner, drying fluid, anti-acne fluid, and soothing sealant mask. These cosmetics have been developed to provide a comprehensive and efficient approach to treating acne and improving skin quality.

The *homecare* line, intended exclusively for the G2 group, consisted of two cosmetic products for home use, with direct guidance from the researchers. These products included a facial body wash and a specific gel for acne-prone skin.

Cosmetics used in the treatment of acne have been developed with a wide range of active ingredients, including Senegalese acacia, betulinic acid, boswellic extracts, salicylic acid, allantoin, rosemary, aloe vera, alpha glucan, alpha-bisabolol, white clay, green clay, oats, cassava carbohydrate, centella asiatica, tea tree cyclodextrins, collagen, calendula extract, witch hazel extract, yeast extract, fucocert, yeast, licorice, zinc PCA, propolis, ursolic acid, *blue light filter*, anti-acne complex, panthenol, arnica extract, and amino acid mix (BEL COL, 2023a; BEL COL, 2023b). Each of these ingredients plays a specific role in treating acne and promoting skin health and quality. They have been chosen based on their properties and benefits to address acne and skincare-related concerns.

The list includes a wide range of ingredients used in the formulation of skin care products. These ingredients perform distinct functions and are often combined in formulas to meet the specific needs of the skin. In this way, these ingredients play fundamental roles, such as antioxidants, moisturizers, anti-inflammatories, healing, cell regeneration promoters, skin barrier strengtheners, astringents, oiliness regulators, pore unblockers, soothing, nourishing, whitening, having antimicrobial properties, pH balance, cleaning agents, anti-aging, firming, wrinkle reducers, collagen production stimulants, protectors against environmental damage, exfoliating, circulation enhancers, providing a light, non-greasy texture, as well as sun protection.

The full list of ingredients can be found in Table 1 for a better understanding of the individual action of each active ingredient. Therefore, it can be seen that in addition to treating the skin with acne,

the cosmetics used in the study also prevent new acne and act by improving the quality of the skin, including aging.

Table 1: List and functions of active ingredients

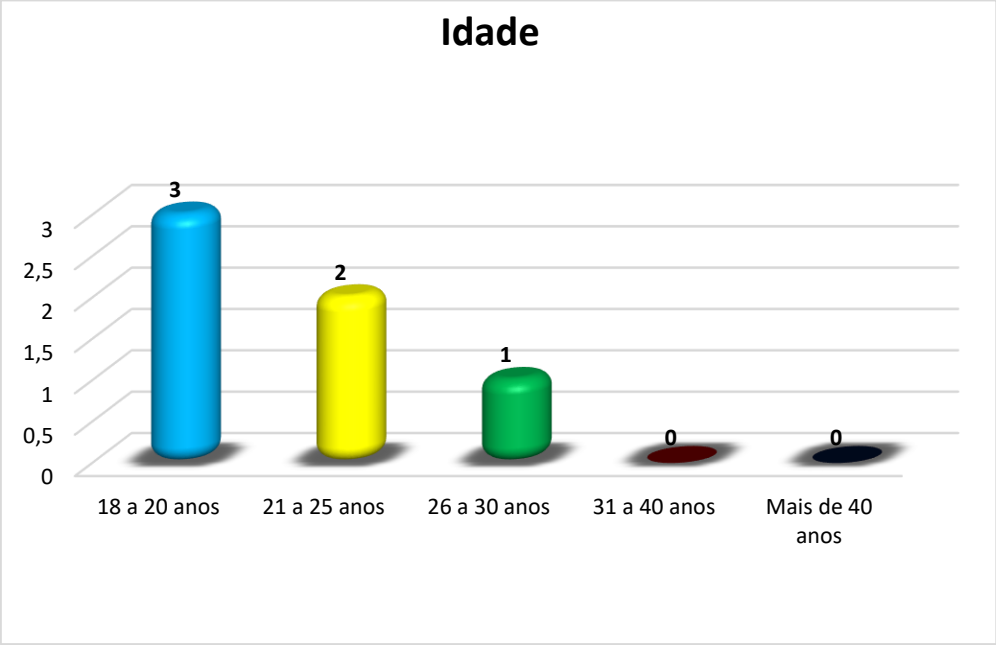
Active principles	Main Functions	Reference
Acacia to senegal	Antioxidant, moisturizing, strengthening the skin barrier, providing a light and non-greasy texture.	MICHALUN; DINARDO, 2016
Betulinic acid	Antioxidant, anti-inflammatory, whitening, anti-aging, healing	REDHEAD, 2012
Boswélic extracts (boswellic acid)	Antioxidant, anti-inflammatory, soothing, cell regeneration, oil control	MICHALUN; DINARDO, 2016
Salicylic acid	Oiliness control, breakout prevention	MICHALUN; DINARDO, 2016
Allantoin	Anti-inflammatory, healing, cell regeneration, soothing	MICHALUN; DINARDO, 2016
Rosemary	Antioxidant, anti-inflammatory, astringent, cleansing agent	AMARAL, 2015
Aloe vera	Antioxidant, hydration, healing, cell regeneration	MICHALUN; DINARDO, 2016
Alpha glucan	Hydration, skin protection, texture improvement, cell regeneration	MICHALUN; DINARDO, 2016
Alpha-bisabolol	Soothing, anti-irritant, healing, whitening, increases absorption	Ramadan et al., 2022
White clay (kaolin)	Anti-inflammatory, purifying, unclogging pores, brightening, soothing	ZENÓBIA BALDUINO, 2016
Green Clay	Astringent, purifying, exfoliating, healing, improving blood circulation	ZENÓBIA BALDUINO, 2016
Oats	Antioxidant, hydration, anti-inflammatory, soothing, gentle exfoliation	REDHEAD, 2012
Cassava carbohydrate	Antioxidant, hydration, nourishment, soothing, refreshing sensation	REDHEAD, 2012
Centella asiatica	Antioxidant, hydration, anti-inflammatory, healing, cell regeneration, improved blood circulation	REDHEAD, 2012
Melaleuca cyclodextrins	Anti-inflammatory, antimicrobial property, controlled release	ROCHA et al., 2018
Collagen	Hydration, firmness, wrinkle reduction, stimulation of collagen production, protection against environmental damage	MICHALUN; DINARDO, 2016
Calendula Extract	Antioxidant, hydration, anti-inflammatory, healing, antimicrobial property	MICHALUN; DINARDO, 2016
Witch hazel extrato	Antioxidant, anti-inflammatory, astringent, healing, oil control	MICHALUN; DINARDO, 2016
Yeast Extract	Antioxidant, hydration, cell regeneration, increased luminosity, soothing	MICHALUN; DINARDO, 2016
Fucocert	Antioxidant, intense hydration, soothing, reinforcement of the skin barrier, light and non-greasy texture.	MICHALUN; DINARDO, 2016
Yeast	Antioxidant, hydration, cell renewal stimulation, soothing, anti-irritant	MICHALUN; DINARDO, 2016
Licorice	Antioxidant, hydration, anti-inflammatory, brightening, sun protection	MICHALUN; DINARDO, 2016
Zinc PCA	Antioxidant, oil control, antimicrobial property, soothing, soothing, pH balancing	MICHALUN; DINARDO, 2016
Propolis	Antioxidant, hydration, anti-inflammatory, antimicrobial property, healing and cell regeneration, nutrition	MICHALUN; DINARDO, 2016
Ursolic acid	Antioxidant, anti-inflammatory, collagen stimulation, UV damage protection, antimicrobial property	MICHALUN; DINARDO, 2016
Blue light filter (capuchinha)	Powerful antioxidant	RONCHETI, 2018
Complexo antiacne	Acne Treatment and Prevention	MICHALUN; DINARDO, 2016
Pantenol	Hydration, cell regeneration, soothing	MICHALUN; DINARDO, 2016

Extrato de arnica	Antioxidant, anti-inflammatory, analgesic, improved blood circulation, healing	MICHALUN; DINARDO, 2016
Amino Acid Mix	Hydration, nourishment, skin repair, protection against environmental damage	REDHEAD, 2012

Source: The authors themselves, 2023.

A total of 6 volunteers participated in the study, 3 of whom were assigned to the G1 group and 3 to the G2 group. Graph 1 shows that 50% of the volunteers are between 18 and 20 years old, and no volunteer is older than 31 years old.

Graph 1: Participants' Seating Range

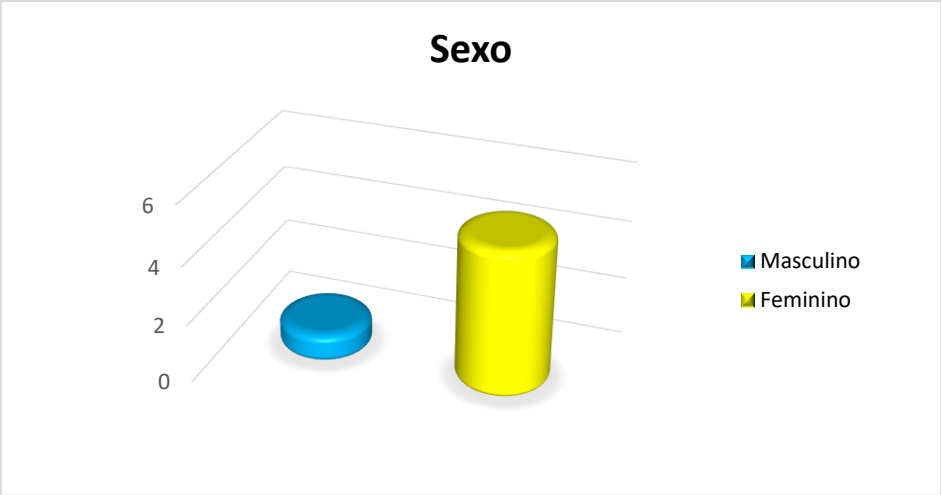


Source: The authors themselves, 2023.

The median age of people in this group is 22 years, with a standard deviation of ages of approximately 4.65 years. The standard deviation is a measure that indicates how far ages depart, on average, from the average of 22 years. The higher the standard deviation, the greater the dispersion of ages in relation to the mean. In this case, a standard deviation of 4.65 years suggests that the participants' ages have considerable variation from the mean age of 22 years.

As for the gender of the study volunteers, it was observed that approximately 83.33% were women, while 16.67% were men.

Graph 2: Gender of participants



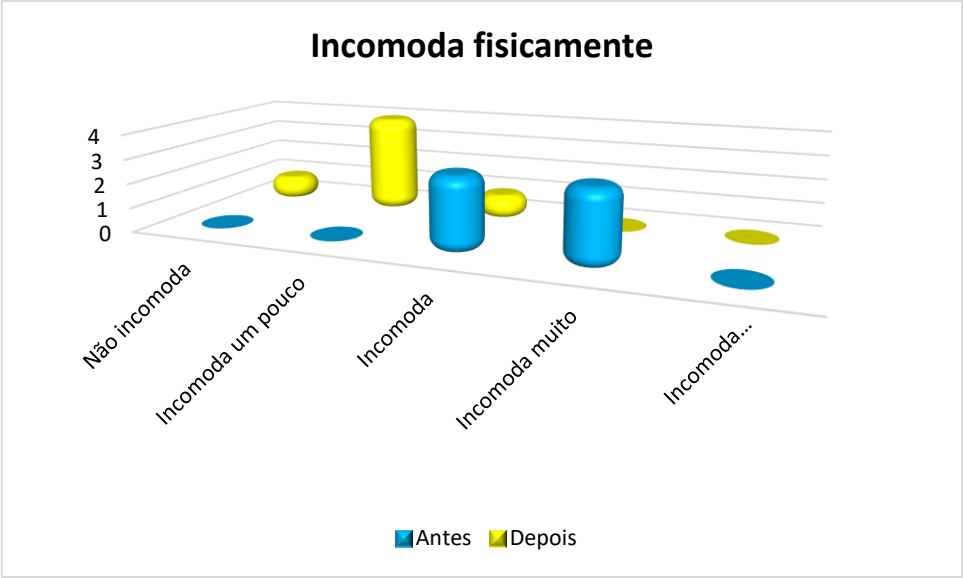
Source: The authors themselves, 2023.

To analyze the other questions of the study, descriptive statistics was used, an analytical tool that summarizes and describes a set of data in a concise way, facilitating the understanding of the central characteristics and variability in the data. This approach is particularly useful when comparing a study with data before and after an intervention, as it helps to assess changes in values and determine whether the intervention had a significant impact.

When participants were asked how much acne bothers them physically at this time, the following was observed: before the intervention, the mean was 2, the median was 3, and the standard deviation was 1.41; After the intervention, the results indicated a mean of 1.25, a median of 1 and a standard deviation of 1.5.

These statistics provide an overview of changes in responses before and after the intervention, as illustrated in Chart 3. They indicate that, on average, the level of physical discomfort decreased after the intervention, as reflected in the lower average after the intervention. However, the variability of responses after the intervention is greater, as indicated by the larger standard deviation, suggesting that some people experienced a significant decrease in discomfort, while others experienced a smaller change or even an increase.

Graph 3: Degree of physical discomfort

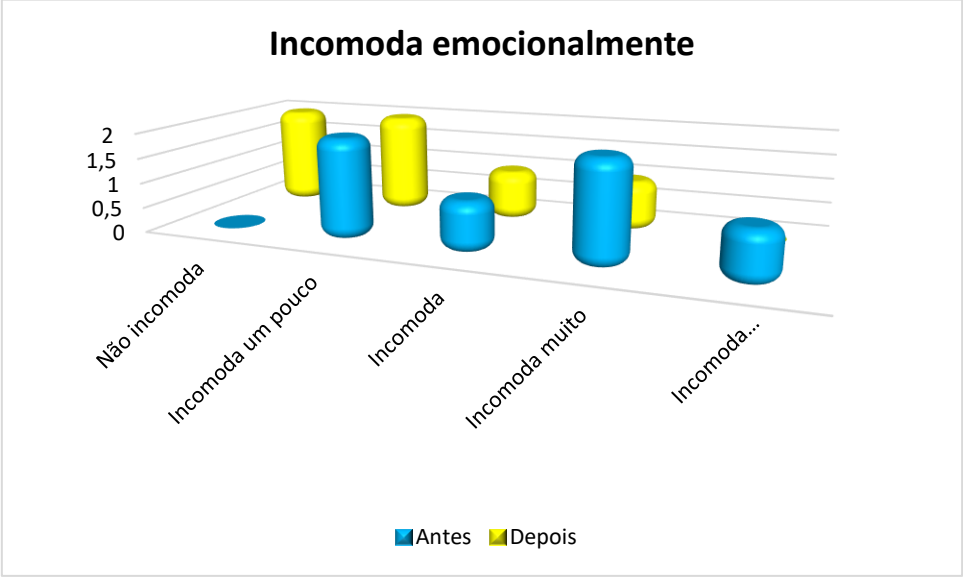


Source: The authors, 2023.

Regarding how much acne bothers you emotionally at this time, the results before were as follows: mean of 1.4, median of 2 and standard deviation of 0.875. After the intervention, the results were: mean of 0.9, median of 1 and standard deviation of 0.7.

The results suggest that the intervention had a positive impact on how people feel emotionally about acne, with a reduction in the mean and variability of responses indicating a lower level of emotional distress, as illustrated in Graph 4.

Graph 4: Degree of emotional distress

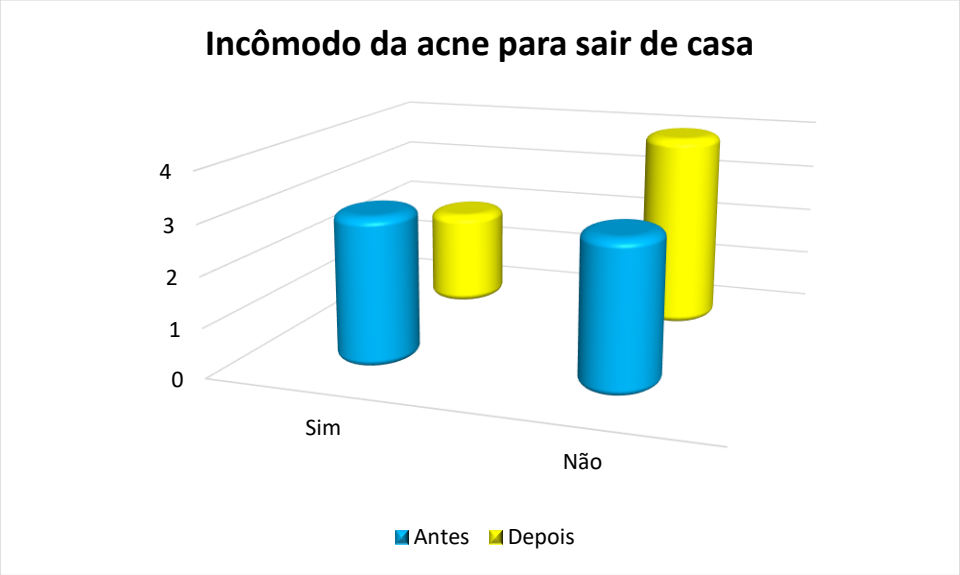


Source: The authors, 2023.

When asked if acne (blackheads and pimples) had ever influenced their decision to go out (whether to parties, school, mall, or another location), data analysis reveals that prior to the

intervention, an equal split occurred in the responses. Half of the people said they stopped going out because of acne, while the other half said it didn't stop them from going out, as shown in Graph 5.

Chart 5: Discomfort to leave

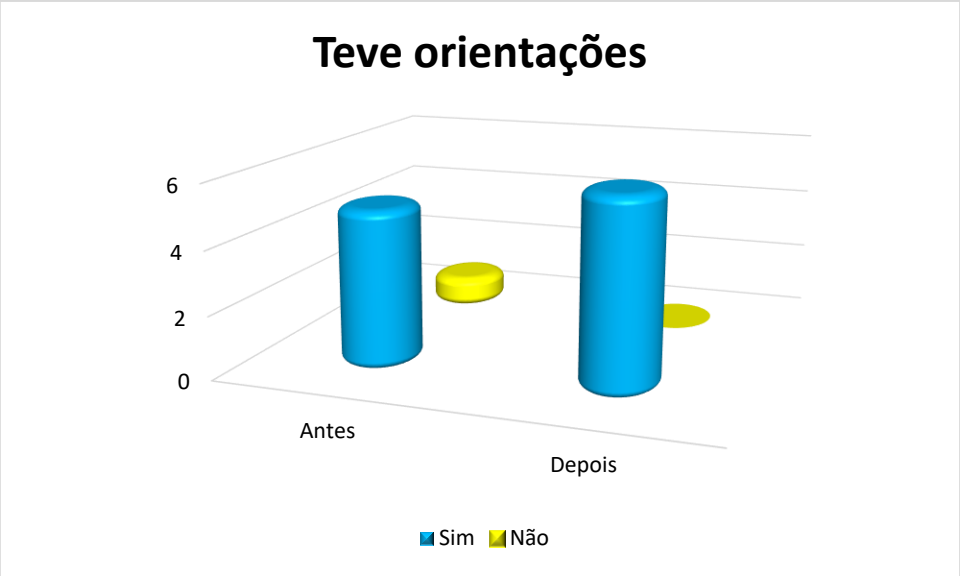


Source: The authors, 2023.

After the intervention, there was a significant change, with a decrease in the proportion of "Yes" responses (33%) and an increase in the proportion of "No" responses (66.7%). This change suggests that the intervention had a positive impact, leading to a reduction in the feeling of discomfort about leaving the house due to acne for most people. This can be considered a promising outcome of the intervention.

When asked if they had already received guidance on how to take care of acne skin (blackheads and pimples), the data indicate that before the intervention, most people had already received guidance (83.3%), while a minority (16.7%) had not received guidance, according to Graph 6.

Graph 6: Had acne guidance

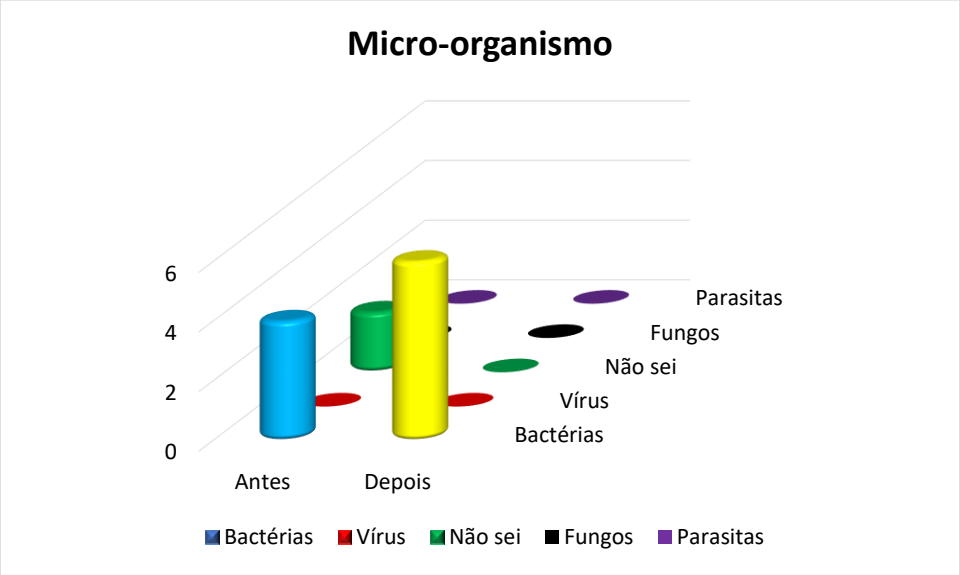


Source: T The authors, 2023.

After the intervention, all people reported receiving guidance for acne skin care, indicating that the intervention was effective in increasing access to these guidance.

As for the question whether the person knows which microorganism is involved in acne (blackheads and pimples), the answer before the intervention was that 67% said it was bacteria, while 33% did not know what the microorganism was. However, after the intervention, 100% correctly stated that they were bacteria, as shown in Graph 7.

Graph 7: Identification of the microorganism that causes acne



Source: The authors, 2023.

After the intervention, this knowledge was reinforced, with an increase in the number of responses that identified bacteria as the microorganism related to acne. The intervention appears to have been effective in improving participants' understanding of the cause of acne.

In the question "What do you do when you have acne (blackheads and pimples)?", the person was allowed to check more than one option among them: squeeze, do nothing, use anti-acne products without guidance, look for a solution on the internet and seek specialized help.

Before acne treatment, the average response was 0.875, meaning that, on average, people were more likely to "squeeze pimples" or "use anti-acne products without guidance." The median was 1, which indicates that most of the responses were concentrated in the option "squeezes" and "uses anti-acne products without guidance". The standard deviation was approximately 1.039, which is a measure of dispersion relative to the mean.

After acne treatment, the average response increased to 1.43, which indicates that, on average, people began to seek more specialized help after treatment. The median was 2, showing that most of the answers were concentrated in the option "seek specialized help". The standard deviation increased to approximately 1.53, indicating a greater dispersion relative to the mean after treatment.

Graph 8: Attitude towards acne

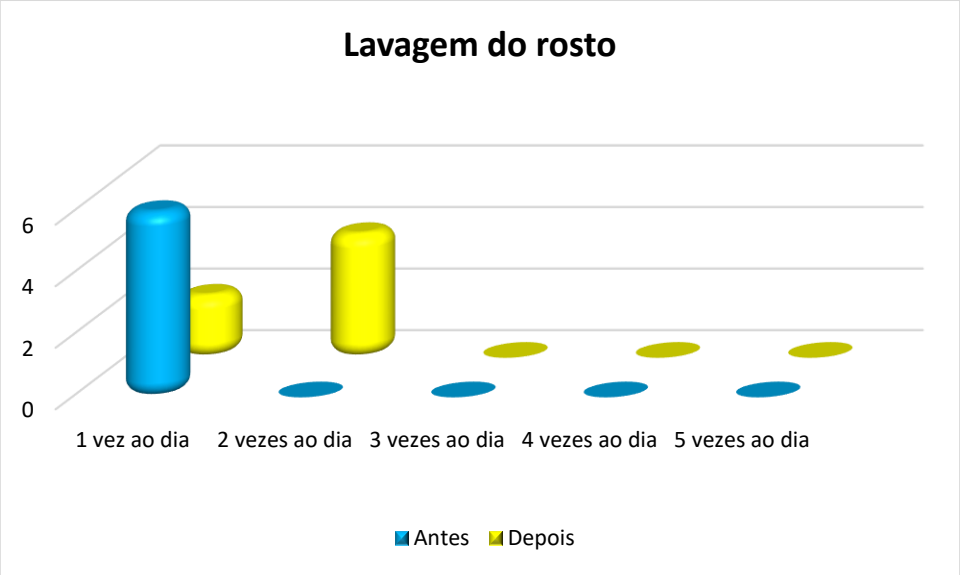


Source: The authors, 2023.

The results indicate that after acne treatment, there was a change in people's behavior, with more of them seeking expert help rather than "squeezing pimples," according to Graph 8. It increased variability in responses, suggesting a wider range of approaches after treatment. The higher standard deviation after treatment indicates that responses were more dispersed relative to the mean, which may be a reflection of people's different experiences after acne treatment.

Regarding the question about how many times the person who has acne should wash their face with anti-acne soap a day, before the intervention, all of them stated that it would be 1 time a day. After the intervention, there were 2 people stating that it would be 1 time a day and 4 that it would be 2 times a day, and none indicated 3, 4 or 5 times a day, according to Graph 9.

Graph 9: Amount of facial cleansing with anti-acne soap

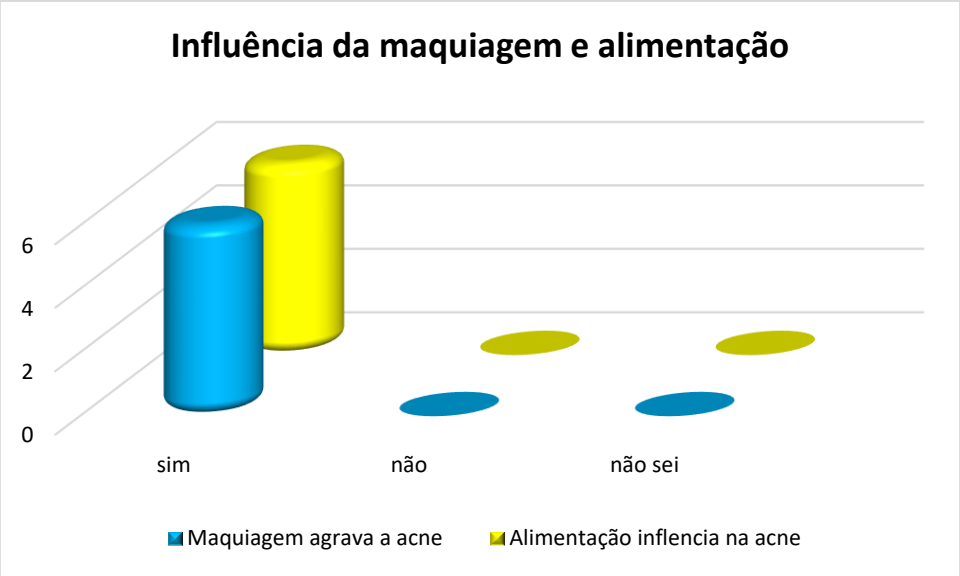


Source: The authors, 2023.

It is important to note that, generally, the frequency of cleaning the face with anti-acne soap can vary from person to person, depending on medical and aesthetic recommendations, the type of product used, and the individual skin's response to the treatment. However, in general, the guideline is to wash the face 1 or 2 times a day. Therefore, before and after the study intervention, the responses are coherent.

Regarding the questions "Do you believe that makeup for beautification can harm skin with acne (blackheads and pimples)?" and "Can diet influence the development of acne (blackheads and pimples)?", there was no variation in the answers before and after the intervention. This is because, in both questions, all people affirmed yes, as shown in Graph 10.

Graph 10: Influence of make-up and diet on the development of acne



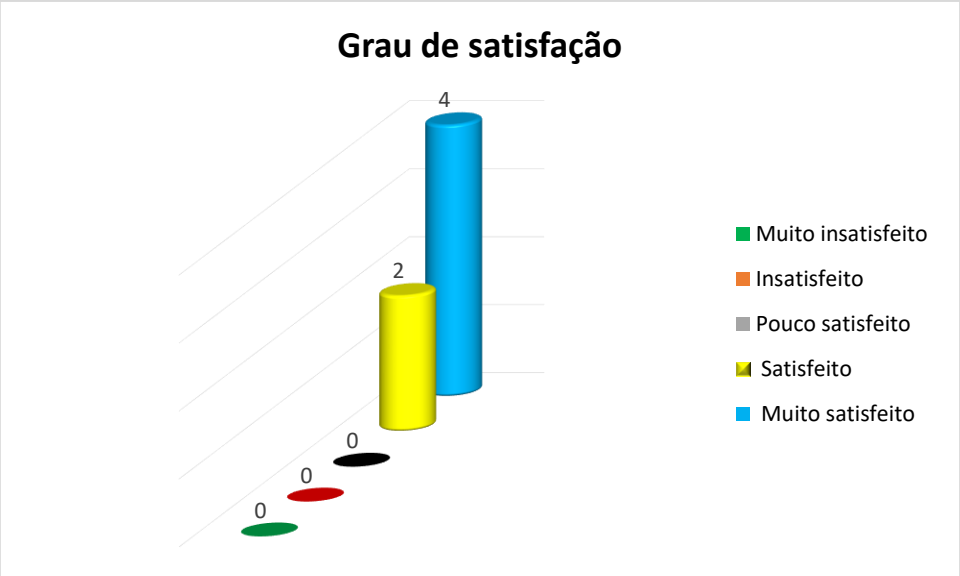
Source: The authors, 2023.

After the conclusion of the sessions, the degree of satisfaction of the people in relation to the procedures performed and the results obtained was evaluated. The results of this evaluation revealed a clear trend of satisfaction among the study participants.

In this case, the majority of people expressed a high degree of satisfaction, with 66.67% rating themselves as "very satisfied," while 33.33% indicated they were "satisfied." There was no one in the "very dissatisfied/dissatisfied/not very satisfied" category. This suggests that the procedures and results were generally well received by the participants, with considerable satisfaction.

These results are indicative that the intervention or treatment was perceived positively by the participants, reaching a high level of satisfaction and suggesting the effectiveness of the procedures performed. Importantly, participant satisfaction plays a crucial role in assessing the quality and effectiveness of any intervention or treatment.

Graph 11: Degree of satisfaction with anti-acne treatment Top of the form



Source: The authors, 2023.

Regarding the outcomes of acne treatment in volunteers submitted to cabin therapy, as opposed to those who not only benefited from the on-site treatment, but also incorporated home care products, there is indisputable evidence that the second group (G2) was more content. This discrepancy in satisfaction between the groups is latent and undeniable, as shown in Graph 12.

Graph 12: Comparison of the degree of satisfaction between G1 and G2



Source: The authors, 2023.

In Group G1, which received exclusively the treatment in the cabin, it was observed that 66.7% of the participants expressed satisfaction, while 33.3% showed a high degree of satisfaction. On the other hand, in Group G2, in which the individuals were submitted to the treatment in the cabin together with a cosmetic kit for *homecare* aimed at the treatment of acne, all participants reported a high degree

of satisfaction, thus reaching the fullness of 100% of great satisfaction. This suggests that the inclusion of a *homecare* regimen may be a more effective approach to treating acne.

6 FINAL THOUGHTS

The primary scope of this research was to investigate the benefits that cosmetic and educational practices provide to the skin of acne patients. To achieve this goal, secondary objectives were outlined, which included the comparison between in-cabin treatments and in-cabin treatments with *homecare*, the description of guidelines on acne and skin care, as well as the analysis of the socio-emotional impact caused by acne.

This study stands out for its inherent merit in raising community awareness about the essential measures for the management of acne-prone skin, aiming at the prevention of diseases and the attenuation of the related psychoemotional and aesthetic effects. In addition, it sought to bring together a therapeutic program that proves to be effective in improving the quality of life, self-esteem and facial aesthetics of individuals affected by this dermatosis.

This survey, carried out under the paradigm of a case study, took place in the facilities of the Aesthetics and Cosmetics Laboratory of a renowned higher education institution and was based on a comprehensive literature review, covering both Portuguese and English sources. The volunteers underwent assessments, including questionnaires, and were divided into two groups: one that received treatment in a cabin and another that also received a treatment kit for use in *homecare*.

The findings revealed that the treatment exerted a positive effect on the perception of the physical and emotional difficulties associated with acne. Prior to the intervention, acne was a deciding factor for half of the participants in their decision to leave the house, while the other half did not feel impacted in this regard. After the application of the treatment, a significant reduction was observed in the proportion of those who stopped going out due to acne, signaling a beneficial influence of the treatment.

The research also highlights the importance of education and guidance about acne and skincare. Before the intervention, most participants had already received guidance, and after treatment, all reported having received it. In addition, there has been a significant increase in knowledge about the microorganism involved in acne.

When it comes to people's behaviour towards acne, there was a shift after treatment, with more participants seeking specialist help rather than trying to tackle the problem on their own. The frequency of washing the face with anti-acne soap remained consistent, indicating that the guidelines provided were followed.

However, beliefs about the impact of makeup and diet on acne did not vary significantly before and after treatment, with the majority of participants agreeing that these factors can influence skin condition.

Finally, the satisfaction assessment revealed that 100% of the group that received treatment in the cabin *and homecare* was very satisfied with the procedures and treatment results. On the other hand, the group that had only treatment in the cabin was satisfied. This suggests that both approaches were effective in treating acne, with emphasis on in-cabin treatment and *homecare*.

Therefore, this study provides *valuable insights* into the effectiveness of acne treatments, contributing to improving the self-esteem of those affected by this dermatological condition.

Importantly, acne is a common condition that primarily affects teenagers and young adults. To effectively prevent acne, it is crucial to adopt a skincare routine, make use of appropriate products, and maintain a balanced diet. In this context, skincare education plays a key role.

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Belchior and the political criticism in the song "My Brazilian Cordial"

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Melissa Campos Oliveira Cavalcante Campos
Bachelor's degree in Social Communication – Journalism from the Federal University of Ceará (UFC)
Federal University of Ceará (UFC)
Fortaleza, Ceará, Brazil
E-mail: melissacco@gmail.com

ABSTRACT
This article analyzes the political criticism in the song "Meu cordial brasileiro", by the singer and composer from Ceará, Belchior. First, we address the relationship between music and the dictatorial context in Brazil. Then, we investigated Belchior's trajectory through studies about him - from his birth in Sobral, his experience in Fortaleza as part of the generation of artists and intellectuals known as Pessoal do Ceará, and in other places in Brazil - and found that the artist was censored and that he composed lyrics that contained criticism of the regime. To analyze the lyrics of the song "Meu cordial brasileiro", we based ourselves on the dialogue of the works of authors on discourse analysis and linguistics, among them, Garcia, Menezes, Fiorin, Maingueneau and Koch, using the terms "metaphor", "intertextuality" and "irony". In the analysis, we identified argumentative and textual elements that allow us to verify how this song contests the political regime. The study has broadened our knowledge of our artistic, cultural and political history.

Keywords: Belchior, Military Dictatorship, Songs, Politics.

1 INTRODUCTION

The military regime began with a coup d'état on April 1, 1964, overthrowing the government of then-President João Goulart, who had intentions of carrying out social and economic reform in Brazil. Humberto Alencar Castello Branco would be the first president of the dictatorial era. The defenders of the regime claimed that it arose to prevent communism from dominating the country, while the military exercised its domination through nationalism, repression, authoritarian and sometimes violent measures, in the form of censorship, imprisonment, torture, and political disappearances, according to Napoleon (2014), until the moment of opening, which would culminate in the redemocratization of the country in 1985.

In the present research, we will not go into the complex historical and political aspects of the military regime, which would require an in-depth study, but we will stick to the relations of conflict of Belchior's music, and, specifically, of the lyrics of the song "Meu cordial brasileiro", with the dictatorship.

The theme of our research arose from the interest in how the songs of various MPB artists manifested criticisms, libertarian and democratic ideals or desires that, according to the current regime, were seen as being against morals and good customs. According to Silva (2008, p.49) "popular music has been given the role of spokesperson for the anxieties and memories of a large part of the population,

a fact that is little known to other social formations." Some artists expressed their ideas against the dictatorship more explicitly, and others more implicitly, to circumvent and go unnoticed by censorship.

Regarding the censorship of music and artistic works, in order to approve the lyrics of a song, it had to be sent to the Division of Censorship of Public Entertainment (DCDP), which analyzed how good manners and political criticism against the military regime were treated. Other organs of repression were the Political and Social Order Police Stations (DOPS), military intelligence, and the Internal Defense Operations Center – Detachment of Operations and Information and Censorship (CODI/DOI) system.

> As for direct forms of cultural action, the regime combined a repressive cultural policy and, especially in the 1970s, a proactive cultural policy. The regime's repressive tripod was formed by the combination of information production, police surveillance-repression in charge of the Political and Social Order Police Stations (Dops), military intelligence and the CODI/DOI system (Internal Defense Operations Center – Operations and Information Detachment) and censorship, in charge of the Division and Services of Censorship of Public Entertainment of the Federal Police Department (DPF/DCDP) and the Office of the Ministry of Justice. specifically in the case of press control. The three prongs acted on the cultural area, producing suspicions and imposing silence on certain themes and approaches. (NAPOLITANO, 2014, p. 99 and 100)

We will go through some emblematic songs and cultural movements in Brazil, important to demarcate the historical context of the composition "Meu cordial brasileiro", which we will analyze from concepts of discourse analysis and linguistics. One of the most memorable songs at the time is "Para não dizer que não fallei de flores" (Not to say that I didn't talk about flowers), by Geraldo Vandré, which brought a blatant protest to the government. Geraldo Vandré presented the song to the public and the jury of the III International Song Festival, in 1968, and lost to the song "Sabiá", by Chico Buarque. According to Costa; Sergl (2007), Vandré's music became the anthem of resistance to the dictatorship.

> Vandré speaks explicitly of the government. He also mentions the armed struggle and the immobility of people who defend diplomacy, we can also note a criticism of the movements that preached "peace and love", showing that it is useless to "talk about flowers" to those who attack with weapons. (COSTA; SERGL, 2007, p.37)

"Cálice", by Chico Buarque and Gilberto Gil, is another song of historical importance, which has a strong criticism of the regime and already in the title of ambiguous meaning can mean, in addition to being a container, in the literal sense, "Cale-se", an expression that alludes to the repression exercised by the military. According to Zappa (2008, p. 114), the song "had devastating lyrics and evoked the torture suffered by the militant Stuart Angel, son of fashion designer Zuzu Angel, before he was killed in the army facilities". One of the verses that refers to this statement is (I want to smell diesel fumes/ Get drunk until someone forgets me). In an attempt to circumvent censorship, Chico Buarque created the pseudonym Julinho de Adelaide. Still, the song was censored.

> The Censorship forbade Chico Buarque and Gilberto Gil from presenting "Cálice", which they composed in partnership especially for Phono. The same happened with "Samba da Esperança", by Vinícius and Toquinho (which RGE "lent to Phonongram"). And there were policemen, disguised as hairy, parading ostentatiously among the artists [...] On Friday, for example, Chico Buarque's microphone suddenly went out of control when he tried to say: "They didn't let me sing my song. It's okay, I do others. (See 5/16/1973 *apud* SILVA, 2008, p. 127 and 128).

A prominent cultural movement was Tropicália, which emerged in the second half of the 1960s. The movement, according to Carli and Ramos (2008), was not intended to spread the political revolution, but to revolutionize language and behavior in everyday life. At the same time, she questioned the authoritarianism of the military dictatorship and also accused a left-wing aesthetic of belittling the artistic form.

Tropicalism was led by Caetano Veloso and Gilberto Gil, in addition to the participation of composer Tom Zé, lyricists Torquato Neto and Capinam, conductors and arrangers Rogério Duprat and Júlio Medaglia, the trio Mutantes and singers Gal Costa and Nara Leão. The movement would end in 1968 with the exile of Caetano Veloso and Gilberto Gil.

In the midst of this scenario that was seething in Brazil, we will draw a parallel with Belchior's trajectory and the artistic and political field in Ceará. Antônio Carlos Belchior was born on October 26, 1946, in Sobral, Ceará. Son of Otávio and Dolores, he had more than 20 siblings. According to Medeiros (2007), some of Belchior's influences were Cego Aderaldo, Romano da Mãe d'água, the music of the speaker of his hometown, with names ranging from Luiz Gonzaga to Ray Charles, the literature of João Cabral, Drummond, Verlaine and Rimbaud and, already at university, songs by The Beatles, Chico Buarque, Caetano, Gilberto Gil, Bob Dylan and others.

He went to live with his parents in Fortaleza in 1960, where he studied at the Liceu do Ceará State College and made some friendships that accompanied him throughout his life. He was a great connoisseur of the Bible and French novels. When he was in his first year of science, he went to study at a school of friars in Guaramiranga, where he spent three years, until he concluded that he had no vocation to religious life. Even when he was in the convent, he already showed a keen critical sense for social and political issues, and did not express satisfaction with the visit of the then president Castelo Branco, in 1965, to the monastery.

> Beards and hair were trimmed, habits were ironed. Despite his young age, Belchior already knew perfectly well what Castelo Branco represented and what kind of shadow hung over the country. In the future, his awareness of this democratic rupture would often make him a victim of censorship. That morning, in the photo of the Capuchins with the dictator, some novices appear laughing and making fun. Belchior is grim, on the left, apparently ruminating on the contradiction that this meant: a profession of faith that takes care of the poor, revering a government that takes away the right to kick, to vindicate, to citizenship. (MEDEIROS, 2017, p. 17 and 18)

In 1966, Belchior entered the medical course at the Federal University of Ceará (UFC), but did not complete it to follow the artistic path. During his career, he had songs recorded in the voices of important names in MPB, such as Roberto Carlos, Elis Regina, Jair Rodrigues, Oswaldo Montenegro and Zé Ramalho. He was part of a generation of artists and intellectuals that became known as the Pessoal do Ceará.

The choice to analyze the work of a fellow countryman artist came from the recognition of the importance of studying our culture to learn more about our characteristics as a society and as individuals in a time of conflicts and tensions between the imposed order and the expression of art and thought in our country. Belchior, in a statement captured by Castro (2008), revealed that politics influenced his compositions, providing us with a basis for finding relationships between his songs, at the time they were composed, and the dictatorial regime:

> We were formed within a political spirit, of knowledge of the world, of knowing that art can be a way of revealing this world, of clarifying things in the sense that the individual is interested in the common destiny of society, all of this translated in a more delicate, subtle and loving way. I do and say what many young people of my generation would like to put out. But everyone is suffocated. (CASTRO, 2008, p. 87).

2 THE PEOPLE OF CEARÁ, BELCHIOR AND THE DICTATORSHIP

In the 1970s, the "People of Ceará" encompassed a group of people from different areas, such as philosophers, physicists, chemists, architects, musicians, poets, singers and actors, who met to discuss the issues that plagued the country and produced art, with music being a prominent element. Some of the most well-known names in the group are: Fagner, Belchior, Ednardo, Jorge Mello, Wilson Cirino, Rodger Rogério, Téti, Amelinha, Augusto Pontes, Petrúcio Maia, Ricardo Bezerra, Fausto Nilo, among others. Although the work of each artist from Ceará was different, for Rogério (2006), there were some characteristics in common between them, such as the path, the environment they shared and the references.

There are still disagreements as to what this designation represents. For the singer and composer Rodger Rogério, the artists from Ceará did not have a similar musical project: "The people of São Paulo saw us as a group from Ceará. For them, this was a legitimate thing, but the proposals were not the same" (PIMENTEL, 1994, p.101). Belchior also did not see a unity in the group: "It was a cheerful and even ironic name. And the vulgar designation of 'group', which in reality encompassed a hundred people who generationally were involved with the music project here, did not correspond to the greater objective [...]." (PIMENTEL, 1994, p.101).

In the 1970s, composers and singers from Ceará left for Rio de Janeiro and São Paulo, either in search of giving greater visibility to their musical work, or for academic purposes. According to Castro (2008), Rodger, Teti, Ednardo and Belchior were invited to act as interviewers for a weekly

program produced by TV Educativa de Cultura called "Proposal". From there, the invitation to record an album with the entire group of composers from Ceará, produced by Walter Silva, would arise.

The album "Meu Corpo Minha Embalagem Todo Gasta na Viagem" would have as its subtitle "Pessoal do Ceará", a denomination that started to be widely used in the media. The artists who recorded the album were Ednardo, Rodger Rogério and Téti, in addition to having other people from Ceará in the composition of the songs. According to Castro (2008), the song "Cavalo Ferro", by Ricardo Bezerra and Fagner, made a subtle criticism of the military dictatorship, which is analyzed by Rogério (2006).

> A rock 67 that brings lyrics narrating the saga of a brave man riding an "iron horse" who does not fear death: "vivi, campos verdes me bureiro em terras tropicamericanas", emphasizing a Latin American feeling. The author launches a political criticism of the Brazilian government when he says: "in the Central Plateau, where good and evil are decided," which is a "place that is still mute, concrete, iron, deaf and blind" and the rider finds himself on a "right path, without fatal danger." (ROGÉRIO, 2006, p.80)

Because he was committed to the production of his own album, Belchior decided not to be part of the project of the artists from Ceará. He recorded the album "Mote e Glosa" in 1974, produced by Marcus Vinícius de Andrade. According to Medeiros (2017), while the Economic Miracle was publicized as a great achievement of the military dictatorship, at the time, political disappearances were increasing. In this context, Belchior showed indignation and a confrontational posture in his verses, as in the song "Senhor dono da Casa".

> The northeastern sound also permeates "Senhor dono da casa", the next song, with the flute sewing the frankly credible verses of João Cabral. "Oh, my lord, owner of the house/ wake up because the sun wants to tell you/ that death has done half the way/ Open that I'm your neighbor/ open to answer me." The cry for help against the recrudescence of the dictatorship is not a cry for refuge, it is in God, the only friendly shoulder of the backwoodsman. "What men are these, who go about at war night and day? Our Father, Hail Mary." (MEDEIROS, 2017, p. 59 and 60)

One of the defining settings for the development of the work of this group of artists and intellectuals was the university. The place brought together access to knowledge, political effervescence, the search for professionalization, a great willpower to choose a path and, at the same time, feed the dreams of achieving freedom, which at that time was curtailed by the military regime.

> Another important aspect is that the university was, at that time, a very new institution, a free space, with a certain autonomy and available for the agents to pioneer their ideas, their dreams, exercising and experimenting with political and artistic initiation. (ROGÉRIO, 2006, p.69)

The bars were also an important place for cultural and political meetings, with Bar do Anísio being the main one, as well as Estoril and Gerbaux. "At its peak, in 1971, Bar do Anísio would become

the largest artistic barn of the new music of Ceará, and those university students who elected it as host [...] have become the shining jewels of emerging musical culture." (MEDEIROS, 2017, p.35).

In the midst of the instabilities of 1968 (AI-5, the death of Che Guevara, French May '68, Prague Spring, war in Vietnam, among other impactful events), young people organized themselves to fight for improvements in the university, even against the military dictatorship. Thus, they held marches, in which they made parodies, many of them composed by Belchior and Jorge Melo, mixing resistance and good humor, according to Castro (2008). In addition, Belchior also participated in important moments that would be important for the redemocratization of the country.

> The artist, at his own expense, vigorously engaged in the Diretas Já campaign. He was on the historic stage of Praça da Sé, went to João Pessoa, São José do Rio Preto, Curitiba, Londrina, Maringá. At Candelaria, in the twilight of April 10, 1984, in front of a million people, he made the crowd cheer with emotion when he sang, a cappella, the beginning of the song "Commentary on John" ("Get out of my way, I'd rather walk alone"). (MEDEIROS, 2017, p. 128).

We can identify the relationship between several of Belchior's songs and the dictatorship, either through the censorship they suffered or through the critical content of their lyrics. According to Castro (2008), the song "Na Hora do Lunch", which had won the IV University Festival of Popular Music of Tupi, in 1971, where the artist launched himself as a performer and performed alongside Jorge Melo and Jorge Teles, came to suffer restrictions from the repressive organ of the government, but it was released. In addition, other compositions by the artist from Ceará were retained.

> "Don't Take Flowers" is one that at the time took a long time to be released, "Common Traffic Case" which, according to Belchior's own explanation, "talked about closed signals, the fact that it is difficult for you to speak, to sing in the middle of so many red lights". And Jorge Melo, when referring to censorship, said that his partnership with Belchior "Rock Romance de um Robot Goliardo" had been censored several times. (CASTRO, 2008, p.172)

According to the website "Censura musical", the song "Pequeno Mapa do Tempo" had been censored and the censors stated, in the opinion of March 29, 1977, that the song brings "messages of political protest against the socio-economic-political reality". The document informs that other songs by Belchior are also vetoed for presenting "content of dissatisfaction and criticism of the current regime". The song "Como nossos pais", composed by Belchior, is also full of references to the dictatorship, according to Medeiros (2017). It was recorded on the album "Falso Brilhante", by Elis Regina, and in "Alucinação", by Belchior, both in 1976.

> There is also reference to the disappeared politicians, in the figure of the friend who disappeared and no one heard of him again – something that was common to every young intellectual in the 1970s. "It's been a long time since I saw you on the street. Hair blowing in the wind, young people gathered / On the wall in memory this memory is the picture that hurts the most." Belchior exposed himself more than his colleagues of his generation. (MEDEIROS, 2017, p.89)

The album *Once Upon a Man and His Time,* released in 1979, is perhaps the most political of Belchior's entire career and the one with the most hits after "Alucinação", for Medeiros (2017). From *Once upon a time the man and his time,* we selected the song "Meu cordial brasileiro", composed by Belchior and Toquinho, aiming to understand elements that show the confrontation with the military dictatorship.

3 METHODOLOGY

We will use the terms "Metaphor", "Irony" and "Intertextuality" to analyze the song "Meu cordial brasileiro", by Belchior, from the dialogue of the works of classic and contemporary authors, scholars of discourse analysis and linguistics, such as Garcia, Menezes, Fiorin, Maingueneau, Koch and others, in order to make the analysis clear, coherent and efficient.

3.1 METAPHOR

Metaphor acts in the transmission of a message that can hardly be said in the literal sense. For Garcia (2010), contact with objects and beings of nature naturally leads us to create associations, so we are able to generate new meanings from a context.

> The existence of similarities in the objective world, the incapacity for abstraction, the relative poverty of the vocabulary available in contrast to the richness and numerosity of ideas to be transmitted, and the aesthetic pleasure of picturesque characterization constitute the motivations of metaphor. (GARCIA, 2010, P.55)

Menezes (2010) exemplifies a metaphor of similarity with the following sentence: "The prosecutor in this case looks like a peacock, he deserved to be scrutinized by the judge and now by the judge. Less chatter and more work." The peacock is characterized by liking to be admired for its extravagant plumage, while the aforementioned promoter likes to exhibit his oratorical skills but has few significant achievements. Therefore, the metaphor is given by sharing the "exhibitionism" present in the two subjects.

The conception of the metaphor of classical rhetoric, which sees it as a relation of similarity between the term of departure (substituted) and the term of arrival (substitute), for Fiorin (2008), is limited. The author states that metaphor, more than a substitution of words, is a resource that creates possible readings from a context. These are discursive procedures that can be found in literary texts and in everyday communication, and each linguistic community has its own semantic mechanisms of connotation. Therefore, metaphorical research must be done through a web of relationships that can take place at the level of a word, text or discourse.

3.2 IRONY

In irony, discourse X should be understood as not X, as it occurs when the opposite of what is intended to be said is affirmed, as stated by Fiorin (2008). As an example of irony, Maingueneau (2008) cites the phrase "What a kind man..." when it is said about someone who is rude.

Some elements of oral enunciation, such as intonation, mime, among others, can facilitate the identification of irony. In writing, these modes of identification "are indices that generate a distancing with ellipsis, emphatic words, quotation marks", according to Maingueneau (2008, p.176). The reader must be careful not to read the statement "literally", not understanding its true meaning.

Two different ways of using irony are presented by Maingueneau (2008). One of them is the extreme one, in which he subverts his own enunciation, generating a depreciation of the character represented. The other case is milder and makes what the author calls an ironic "coloring", because the enunciator distances himself, making it difficult for the co-enunciator to clearly identify the divergences of the points of view. Ducrot (1987) also addresses self-irony, when the enunciator mocks himself.

3.3 INTERTEXTUALITY

Based on the principle that every text is inserted in another, which has already been produced before, intertextuality, according to Kock and Elias (2006 apud Souza e Silva, 2018) is essential to generate meaning, as it is part of the collective and social memory of both the producer and receiver of the text.

> In its broad sense, intertextuality is present in each and every text, as a decisive component of its conditions of production. That is, it is the very condition of the existence of texts, since there is always an already-said, prior to all saying. According to J. Kristeva, creator of the term, every text is a mosaic of quotations, of other sayings that preceded it and gave rise to it. (KOCH and ELIAS, 2006, p. 86 *apud* SOUZA and SILVA, 2018, p.4).

The various textual productions establish dialogues about other people's texts, by presuming that the reader already has knowledge of them, developing certain effects of meaning that are widely used, for example, in humor, in popular song, in literature, in philosophy and even in advertising. As stated by Fiorin and Plato (2008, p.20) "The more one reads, the more one expands the competence to apprehend the dialogue that texts have with each other through references, quotations and allusions".

Koch (1991 *apud* MARCUSCHI, 2008, p. 131) classifies intertextuality into distinct modalities:

> a) intertextuality of form and content: when someone uses, for example, a certain textual genre such as the epic in another non-epic context just to obtain an effect of special meaning and thus develop the discourse;

> b) explicit intertextuality: when there is a citation of the source of the intertext, as in the reported discourses, in the quotations and references; in abstracts, reviews and translations; in the resumption of texts from partners to thread about it or question it in conversation.
> c) intertextuality with one's own, alien or generic texts: one can situate oneself in an affinity with oneself and refer to one's texts, as well as mention texts without specific authorship, such as proverbs, etc. (KOCH, 1991, p. 532).

The author analyzed in our research, Belchior, uses the resource of intertextuality to quote from literary phrases to other songs of Brazilian Popular Music. An example is in the song "Just a Latin American Boy" when he quotes the song "Divino Maravilhosa", by Caetano Veloso and Gilberto Gil. The track "Velha Roupa Colorida" refers to the lyrics of "Assum Preto", by Luiz Gonzaga and Humberto Teixeira, from 1950, and also "Blackbird", by The Beatles, recorded on the album "The Beatles", from 1968. Both of Belchior's songs are on the 1976 album "Alucinação". According to Medeiros (2010), Belchior does not aim to disregard the cited authors, but to reaffirm them.

> Belchior stated that his strategy of quotations, which arose from the first hour of his career, was not an attitude of disrespect to the composers he mentioned, but a reiteration and a complementary act. Something that 'recycles previous art, puts in check what is already done', a quote in another context. For Belchior, his intertextuality was "equally sincere." (MEDEIROS, 2010, p.127)

4 ANALYSIS: MY BRAZILIAN CORDIAL

My Brazilian Cordial

(Belchior/Toquinho)

My cordial Brazilian (a fellow)

tell me how happy and warm you are...

I smiled with my teeth out, in bed, South American.

Lord don't forgive me that I'm not in a good place

always lose the sport,

in the face of these indecent people, who eat, drome and consent;

That cala, logo is alive.

I'm alive too, I know,

but because I can bleed;...

And even though I see that it's dark,

Say the sun will shine

with/against those who hit me hard with their finger in the face,

Commanding me to soak up.

Girl, I've still got a cigarette,

but I can give it to you.

Girl, the grass is always green,

but I want to step on.

Girl, the North Star didn't even move out of place.

Girl, white wing, black assume,

The hinterland did not become the sea.

Girl, the show's already begun,

It's good not to be late.

Girl, it is forbidden to enter,

But I want to talk

with/against those who give me a hard time,

With my finger in my face, telling me to shut up

That the native sin is simply to be alive,

it's wanting to breathe.

The title of the song "Meu Cordial Brasileiro" contains two adjectives, one designates nationality, the other a quality of affection. According to Ferreira (1999) "cordial: 1. Adj. Relative or pertaining to the heart. 2. Affectionate, affable 3. Sincere, frank. 4. Medicine or drink that strengthens or comforts." The term "Cordial Brasileiro" generates an idea of closeness and affection with the subject. However, at the same time, the author is using an irony, as he criticizes the model of the amiable Brazilian, who is always cheerful and not indignant.

By using the expression "I smiled with my teeth out, in bed", the author criticizes the posture of the subject to whom he refers. Leito refers, metaphorically, to apathy, immobility, which is the state in which the "cordial Brazilian" finds himself. The word "content" is usually used in a positive way. According to Ferreira (1999), "to content: 1. To make happy; to give pleasure, satisfaction; please. 2. To appease, to settle; soothe. 3. To be satisfied, content; satisfy yourself." However, Belchior, in the song, is being ironic when using the word, because it is close to conformism and comfort, while, for him, people should have a posture of being active and fighting for change.

The expression "South Americanly" expands the criticism in the text, which is now directed not only to Brazilians, but also to South American countries in general, which are in a similar situation, in the author's view.

There is a simulation of a dialogue between the narrator and God (Lord), who questions whether he can be forgiven for his sin, which is not to take it with humor, nor to think it normal to be like people who live mechanically, who follow the routine without complaining. For him, the lack of questioning is not decent, because decency and honor lie in fighting for better living conditions. (Lord don't forgive me if I'm not in a good mood, I always lose my sport / in front of these indecent people, who eat, drink and consent; who are silent, therefore alive). There is a linguistic variation in the text, because instead of sleeping, in formal language, the author uses "drome", from informal language.

The song intertextually intertexts with the phrase of the philosopher René Descartes "I think, therefore I am", but he modifies and transforms it, saying: "People who are silent, therefore they are alive". The meaning of the statement is that people don't speak their minds, and that's why they're alive, so there's no problem, no conflict. Thus, the composer criticizes those who only say yes, who go on with life without contesting what is wrong, because he believes that human beings should think and have ideals.

The lyrical self of the song does not want to pay the price of a life in which to be well it is necessary to be silent and annul oneself. He'd rather be hurt than have this practice (I'm alive too, I know/ but because I can bleed). The dark represents, metaphorically, difficult, sad times. Despite this, the enunciator hopes to find happiness, a better time, represented by the metaphor of the "sunshine". (even seeing that it's dark, say that the sun will shine).

This dark time can be represented by the existence of repression and lack of freedom, but the lyrical self insists on not being afraid and on being free to express what it feels. At a certain point in the song, the author starts to simulate a dialogue. And it reveals the pleasure in transgressing orders, doing what is forbidden. (Girl, I still have a cigarette/ but I can give it to you. Girl, the grass is always green, but I want to step on it.).

The birds "Assum Preto" and "Asa Branca", which are part of the sertanejo universe, are brought to the song, in the form of intertextuality with the homonymous songs of Luiz Gonzaga. The expressions "The Sertão did not become the sea" and the "North Star did not move from the place" illustrate the stagnation and lack of change in the world.

The show to which the song refers is not a radio, theatre or television spectacle, but is a metaphor for the staging that takes place in real life. People are representing something they are not, and even if the speaker does not feel welcome, since he makes his position very clear, he makes a point of saying what he thinks about all those who try to coerce him. (Girl, it's forbidden to enter, but I want to talk).

The song addresses how invasive the instance that determines what is and is not allowed is. We can relate the repression presented in the musical work with the military dictatorship, which used mechanisms of censorship, coercion and violence against opponents of the regime. (against those who hit me hard with their finger in the face making me shut up).

From a brief context of national songs with protest content, knowledge of part of Belchior's trajectory, the artist's political engagement and his position in favor of democracy, the censorship of some of his lyrics by the DCDP and the study of other researchers on how Belchior's songs manifested criticism of the military regime, It becomes coherent to understand that the "Cordial Brasileiro" of the song is someone who does not react to the excesses committed by the rulers in the dictatorial period.

Acting passively, to avoid confrontation and unpleasant situations, the subject ignores the violence and repression that take place in the country.

Through our analysis, we understand that Belchior is opposed to this cordial Brazilian and prefers to suffer and take risks rather than have to remain silent and not give an opinion in the face of what he does not agree with and what he does not think is correct.

5 FINAL THOUGHTS

We hope with this work to have contributed a little to the studies of Ceará music and the military dictatorship. We analyzed a small part of Belchior's work and we believe that not only him, but also many artists in the state, have a great quality to originate academic research. The military dictatorship is the subject of countless works and can be studied in songs, newspapers, testimonies, books, academic articles, among others, but no study can make us feel what many suffered and lived during this period.

In view of a reflection on the present work, we conclude that, when we make a choice, we are naturally led to discard other possibilities that arise from the construction of the object of study presented. Even so, we point out possible developments for future research: to expand the analysis of aspects of the history of the military regime; analyze other Belchior songs, which also have the potential to be investigated; and we also envisage the possibility of deepening the methods of discourse analysis.

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Reflections on the abuse of screens by children in early childhood

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Carlos Alberto Fantin da Silva
Student of the Bachelor's Degree in Psychology at the Faculty of Vale do Rio Arinos – AJES, Juara, Mato Grosso.

Diógenes Alexandre da Costa Lopes
Professor of Nursing and Psychology at the Faculty of Vale do Rio Arinos – AJES, Juara Mato Grosso.
E-mail: diogenes@ajes.edu.br

ABSTRACT
The present work presents aspects about the evolution of electronic devices in our routine and, above all, in the routine of children. These electronics have become increasingly present in children's routine: either as an educational mechanism or as a means of entertainment (which has been happening ever earlier). This acquisition of "screens" has turned play (which was previously the only way to entertain children) into the background: today, everything is increasingly technological and digital, and play is a means of development of paramount importance in childhood: it sharpens imagination, growth, inclusion in groups, language and behavior.

Keywords: Electronics, Cognitive Development, Child, Use of screens.

1 INTRODUCTION

After years of technological evolution, electronic equipment was invented to facilitate our progress, among so many devices, televisions, cell phones, tablets, notebooks and video games are present in our daily lives, almost always in our pockets. Screens that were previously restricted to television have evolved and have been incorporated into the routine of people from different social backgrounds and age groups, due to their easy portability and usefulness, including in children's routines (NOBRE *et al,* 2021).

In recent years, there has been an increase in the consumption of electronic content and screen use by children. It is believed that this is a consequence of the progression of globalization and the increase in access to technology by the population, which increasingly offers it to its children (COSTA *et al, 2021* apud *DOMINGUES-MONTANARI, 2017).*

The emergence of the internet, in the 60s, is pointed out as a great milestone to make the use of cell phones something immensely interesting for people (OLIVEIRA *et al* 2021).

Electronic devices have become part of children's routines. Whether as an educational or entertainment method, including in the first months of life, which goes against the recommendation of the American Society of Pediatrics – AAP, (2020) and World Health Organization – WHO, (2019), as well as the Brazilian Society of Pediatrics – SBP, (2021), which highlights that babies under 1 (one)

year old should not be exposed to any type of screen and children from 2 (two) years old to 4 (four) years old on screen should not exceed one hour.

Playing, previously the only way to entertain children, loses space to this new technologies, however, thinking like the English psychoanalyst Donald Woods Winnicott, this absence or reduction of play should be widely studied and discussed, because he raises in his work that games are means of development in childhood and that playing is a basic way of living, universal and proper to health, which facilitates growth and leads to group relationships (WINNICOTT, 1975).

Pretend play demands much more cognitively, emotionally, and even physically from a child than the passivity found today in toys where smart technologies exist (BORBA, 2022). Imagination, creativity, attention, social interaction, cordiality, problem solving, body knowledge, motor skills, among many other skills, have their development strengthened during the process of playing.

Another very important characteristic that playing brings to child development is the interaction with parents and/or guardians, and this moment is a great strengthener of their bonds and the creation of strong emotional bonds (WINNICOTT, 1975). So if these playful moments are decreasing, most likely the contacts between parents and children are also decreasing.

In addition to the importance of playing, child development authors such as Papalia and Martorell (2021) state that it is in first and second childhood, from birth to around six years of age, that the child's psychomotor, cognitive, and social development takes place, through stimulation, experimentation, and interaction, which can be influenced by the excessive use of digital technologies, since, as previously stated and which will be discussed throughout this work, the children of the so-called generation Z are connecting earlier and earlier and for much longer.

The connection of children to electronic devices, which was already happening in a comprehensive way, took on new proportions after facing a pandemic in recent years. Access to screens by minors has increased due to online classes (PONTE and NEVES, 2020). This has made a situation that already existed take on even greater proportions today, leaving children increasingly exposed to technologies.

Thus, considering the relevance and contemporaneity of the theme, even more so after a pandemic period experienced by us, the present study aims to investigate what consequences the excessive use of screens can cause in children, especially with regard to their cognitive development.

Thus, considering the relevance and contemporaneity of the theme, even more so after a pandemic period experienced by us, the present study aims to investigate what consequences the excessive use of screens can cause in children, especially with regard to their cognitive development.

The present work aims to present information about the influence of screens in early childhood, and what impacts it has on children's cognitive formation. We know that nowadays access to screens is increasingly common and frequent (whether for entertainment, for study, for games, etc.) and this was

not far from children, who are increasingly having contact with digital (from that little movie to calm the crying to "educational" electronic games).

2 METHODOLOGY

The methodology used consisted of a systematic review of the literature, which uses data that have been published, allowing the author to delve deeper into the problems that are known as well as to explore new themes that are still on the theme that he will present in his work (MARCONI; LAKATOS, 2017).

Scientific articles, according to Marconi and Lakatos (2017), are priorities for researchers, because they are where more up-to-date scientific knowledge can be obtained. These were found in the Scielo, Bireme, PubMed, Google Scholar, and PePSIC databases. As a criterion for selecting material for research, a time frame was established from 2016 to 2022 and in Portuguese-language texts. The descriptors "Screens and children's cognitive development" and "electronics and children's cognitive development" were used. The electronic search was conducted from February 2022 to June 2022.

The following exclusion criteria were adopted: a) technologies developed for schools (such as specific games for development within the school environment); b) use of technologies with a population over seven years of age; c) article that deals with a specific disorder (such as language); d) articles that have restricted content (specifically focused on the areas of speech therapy, or game designer).

3 RESULT

Between 2016 and 2022, approximately 16,000 texts were found as results when conducting the bibliographic search with the descriptors "Screens and children's cognitive development" and "electronics and children's cognitive development".

When refining the search for the terms "screens" and children's "cognitive development", the result of articles falls around 1,900, whose areas of research are diverse. Research papers were found in the areas of Speech-Language Pathology and Audiology, Nutrition, Pediatrics, Physiotherapy, Pedagogy, Game Design, Information Technology, Computer Engineering and Psychology, the area of greatest interest for this research.

As the demand for articles found was vast, those that best matched the research subject of this study were selected. The eleven articles were listed, the most interesting and the most in accordance with the central idea of the research that was carried out here.

Table 1 - Articles selected by author/year, title, objective, methodology, and conclusion.

AUTHOR/YEAR	TITLE	OBJECTIVE	METHODOLOGY	CONCLUSION
Maria do Carmo Batista Arantes; Eduardo Alberto de Morais (2021)	**MEDIA DEVICE EXPOSURE AND USE IN EARLY CHILDHOOD**	To assess exposure and characterize the use of media devices by children from zero to six years of age	A descriptive and investigative study on the use of screens in children in early childhood, treated at the pediatric unit of the Regional Hospital of the State Health Department of the Federal District (SES-DF). Data collection was based on a questionnaire applied to the guardians (over 18 years of age) of the children treated at the health unit from August to November 2020.	Pattern of inappropriate use of media by the children in the study, characterized as the beginning of early, frequent and excessive use.
Nicolle Barassa Ventura Carvalho, Viviane Caroline de Paula da Silva, Maria Cristina Marcelino Bento (2016)	**CHILDREN'S USE OF MOBILE DEVICES — A CASE STUDY**	Check how excessive use of mobile devices can be detrimental to a child's development	A descriptive research through a case study, using a mapping carried out with the help of parents and/or guardians, where four children aged between four and eleven years were followed in their own homes. The research instrument for this case study was organized based on tables, with questions raised from dialogues between the authors. This mapping lasted forty-five days, starting in July and ending in August.	The excessive use of mobile devices is indeed harmful to the biopsychosocial development of the child.
Elise de Moraes, Tainara Paula Bavaresco, Tania Mara Bavaresco. (2021)	**YOUNG CHILDREN VS. SCREENS AND ELECTRONIC DEVICES: A DEBATE BASED ON ARTICLES FROM CRESCER MAGAZINE**	Understand and problematize the exposure of young children to electronic screens, based on the analysis of articles published by Crescer Magazine – published between 2014 and 2020	Qualitative research with analysis of articles published by Crescer Magazine in the period from 2014 to 2020.	The use of digital technologies awakens both positive and negative positions.
Thaís Aparecida Ferreira Costa,	**IMPACT OF TECHNOLOGY USE ON CHILD**	To address child development in the motor and	Exploratory systematic review, including articles,	The cyberculture experienced

Auxiliatrice Caneschi Badaró. (2021)	**DEVELOPMENT: A LITERATURE REVIEW**	cognitive aspects, based on Jean Piaget's developmental stages for children from zero to seven years of age	dissertations and theses, was used in the following databases: PubMed, Scielo, CAPES, Virtual Health Library (VHL-BIREME), Lilacs and Pepsic published in the last five years. Only the articles in Portuguese were filtered, based on the descriptors "child development", "technology", "childhood", "child cognition", "impact", "cognition" and "cognitive impact".	today has provided less and less social interaction and the development of skills necessary for full development
Priscilla Maria Faraco Rosa, Carlos Henrique Medeiros de Souza (2021)	**CYBERADDICTION AND CHILDHOOD: THE INFLUENCES OF DIGITAL TECHNOLOGIES IN THE DEVELOPMENT OF THE CHILD**	To highlight the insertion of the Technologies in their relationship with childhood today	Bibliographic and documentary research that was developed in the master's thesis, and has as its central theme to understand the insertion of digital technologies in childhood.	To think of measures and actions that promote access in a healthy way of technologies
Danielli Taques Colman, Sirlei de Proença (2020)	**SCREEN TIME AND EARLY CHILDHOOD**	Reflect on questions about children's early exposure to screens, as well as the harm they can cause to early childhood infants	For this work, exploratory research was used as a methodology, because "it aims to provide greater familiarity with the problem, with a view to making it more explicit or to constitute hypotheses" (GIL, 2002, p. 41). This research can be considered qualitative and bibliographic, having as its primary source the opinions and guidelines prepared by the World Health Organization (WHO), the Brazilian Pediatric Society, the studies of the theorists Wallon, Piaget and Ajuriaguerra, as well as articles and dissertations that	Prolonged use of screens can cause numerous health problems, such as: speech delay, learning difficulties, obesity, sleep problems, vision, among others. Too much exposure does not do any of the people any good, nor will it do children who are in the process of neurological, motor, psychic and social formation.

			contemplated the theme.	
Juliana Nogueira Pontes Nobre, Juliana Nunes Santos, Lívia Rodrigues Santos, Sabrina da Conceição Guedes, Leiziane Pereira, Josiane Martins Costa, Rosane Luzia de Souza Morais (2021)	**DETERMINANTS OF CHILDREN'S SCREEN TIME IN EARLY CHILDHOOD**	Investigate the determinants of screen time, understood as the total time for which the child remains exposed to all screens, including television and interactive media	A cross-sectional, descriptive and exploratory study investigating screen time included children aged between 24 and 42 months and 15 days, regularly enrolled in public and private daycare centers in the headquarters of a small Brazilian municipality with a high Human Development Index (HDI), from September 2016 to February 2017	The children in the present study had screen time above the recommended for their age. Television was also the main responsible for children's exposure to screens
Tawanna Pereira Passos, Larissa Seabra Toschi (2021)	**USE OF SCREENS IN CHILDHOOD: A LITERATURE REVIEW ON RISKS AND IMPAIRMENTS FOR COGNITIVE AND LINGUISTIC DEVELOPMENT**	Investigate the problems or consequences in cognitive and linguistic development linked to the digital age, more specifically to abusive exposure to screens.	Literature review in national and international literature in the following databases: SciELO, MEDLINE and CAPES. The following descriptors were used: 7 "digital media and language delay", "screens and cognitive delay", and "language delay and screens". As inclusion criteria, the articles should deal with the theme and be between the period 2005 and 2021.	It has been found that screens bring cognitive and linguistic risks and impairments if used during childhood
Maressa Ferreira de Alencar Rocha, Rebeka Ellen de Alencar Bezerra, Laura de Almeida Gomes, Alice Lins de Albuquerque Cavalcanti Mendes, Alinne Beserra de Lucena (2022)	**CONSEQUENCES OF EXCESSIVE USE OF SCREENS FOR CHILDREN'S HEALTH: A REVIEW INTEGRATIVE LITERATURE**	Understand the effect of screen use on childhood and its consequences	An exploratory research of the integrative review type regarding the consequences of early exposure to screens for neuropsychomotor development in childhood.	Existence of influence of the use of screens in the neuropsychomotor development, as well as the consequence of the use of screens in the daily habits of the childhood, with an indirect influence on children's development.
Gabriela Cristine de Oliveira Mota (2021)	**EXPOSURE TO SCREENS: THE DIGITAL AGE AND ITS EFFECTS ON**	To investigate and discuss the use of digital devices by children aged 0 to	Qualitative research, of the bibliographic type, which is based on studies and references related to	By investigating the digital and/or media effects that can affect

	THE DEVELOPMENT AND LEARNING OF CHILDREN AGED 0 TO 5 YEARS	5 years, related to exposure to screens and their potential to impair development and learning	the theme, as well as on theoretical sources such as articles, books and academic research.	development and learning, it was concluded that they can be harmful agents if used in an unbridled manner
Janice de Oliveira Borges, Mariane Silva Bueno Braga Àvila (2021)	**THE IMPACTS OF ELECTRONICS USE IN EARLY CHILDHOOD (0 TO 3 YEARS)**	Impacts of the use of electronics on the importance of lived experiences in the period from 0 to 3 years	Exploratory method, through literature review and analyzing the knowledge and statements of authors in the areas regarding each topic, it becomes possible to have a clearer understanding so that a better reflection on the question in question occurs.	Children thrive by doing, exploring, and interacting, and media use impairs this interaction.

Source: Authors (LOPES and SILVA, 2023)

4 DISCUSSION

The results obtained through the literature search bring important considerations regarding the use of electronic devices by children and how much this can influence the cognitive development of minors.

Arantes and Morais (2021), show through the data obtained in their research a high prevalence of media device use by children. According to the authors, 100% of their interviewees, i.e., 102 children, confirmed the use of some type of media device at least once a day.

This result corroborates the study by Nobre et al (2021), where the researchers showed that around 94.5% of children up to 03 years of age had access to the use of cell phones, *tablets*, televisions or computers.

In both studies, the minimum age of exposure was less than two years, as stated by Arantes and Morais (2021), where 83% started using it with less than one year of life. This result shows that parents or guardians are not taking into account the guidelines of the Brazilian Society of Pediatrics, together with the World Health Organization and the American Society of Pediatrics.

Colman and Proença (2020) also bring similar results in their work, where they present and certify that children who are months old already have access to the use of technological devices. The authors also bring up another important and worrying point, which is the amount of time that these children are using these devices.

Arantes and Morais (2021) state that regarding the time of exposure, the data obtained through work indicate that approximately 58% of children use media devices for more than 2 hours/day, corroborating the findings described by Nobre et al. and by Colman and Proença.

Nobre et al (2021) also conducted a study regarding the amount of time children use screens per day. According to the authors, 63.3% of children spend much more than two hours a day in front of screens, which again goes against what is recommended by experts. Also according to the study carried out by Nobre and collaborators, the devices most used by children are television, smartphones and tablets.

According to the study published by Colman and Proença (2020), neuroscience has been analyzing the impacts that excessive use of screens can have on children. The authors mention that, through volumetric tests, the more time the child spends using screens, the more their cerebral cortex is, that is, if it is linked to cognition, it is possible that this negatively affects children and their development.

Another fact that should be considered and discussed is how children are having access to these devices, since these are young children. In this regard, Arantes and Morais (2021) bring the worrying data that access to these devices is overwhelmingly encouraged by parents, mainly as a way of distraction and to calm and silence children and do not do it in a pedagogical way as it should be done. Unsupervised use also happens in large numbers of cases.

In his work, Mota (2021) brings the information that the use of screens before the age of two most likely does not bring significant contributions to child development. On the contrary, it states that unbridled use and without supervision by a guardian can block learning, psychomotor skills and sociability.

In line with the aforementioned studies, Carvalho *et al* (2016) also confirm that the excessive use of mobile devices is harmful to the biological, psychological and social development of children. It is also mentioned that the areas of memory, concentration, sleep impairment, agitation, obesity, are some of the negative consequences that can cause children.

Several authors mentioned these same areas as the main ones affected by the excessive use of cell phones, televisions and computers.

In addition to the problems related to cognition, it is very clear during the research that physically and emotionally children are also negatively influenced by the excessive use of technology. Information retention, sleep disturbances and aggressiveness are the first problems that arise, and consequently social interaction is impaired (CARVALHO et al, 2016).

Obesity and motor difficulties also appear in several studies as a consequence of the indiscriminate use of devices, with children's preference being to play and watch videos to the detriment of playing, practicing physical activities and interacting. Rosa and Sousa (2021) corroborate this idea by saying how much children are inserted in digital culture and how much this generation is dependent on devices.

As for the benefits of the insertion of children in the technological age, the authors do not present many positive indications. There is more concern about the problems caused by overuse than agreement about the benefits.

Arantes and Morais (2021) show that the use of tablets can be considered a useful technological resource for visual and tactile stimulation of children between two and three years of age, but this should be carried out in a supervised and controlled manner.

In the work of Moraes *et al* (2021), the fact that technological resources can serve as a pedagogical tool, innovating teaching methods and consequently learning, being possible through technology to get to know other cultures, have access to information faster and enable a new teaching method. Which can be seen widely in this pandemic period.

The studies were consonant in bringing up the many issues in which the excessive use of screens can be harmful to children, however they still bring the discourse that if carried out properly it is possible to find some benefits in the use of technological devices. The supervision of those responsible for the use, the amount of time and the age of the children form the essential triad to know whether or not it is convenient for children to use these devices.

5 CONCLUSION

It is a fact that technology is now part of children's routine, whether as a means of distraction, when it is necessary for children to be silent or sitting, or for parents to be able to carry out their daily activities, or as a means of studying, as seen in recent years due to a pandemic that has surrounded us.

The place that technology has taken in families is gigantic, and in many homes it is the manager of how things will work. Unfortunately, all this importance does not escape children.

It was seen throughout the present work how early children are being presented with screens and how much this amount of time is increasing, being too common for children under two years old to spend more than two hours a day taking turns between television, cell phones and tablets and to make matters worse, in the overwhelming majority these devices are presented by the parents themselves as a distraction strategy for the little ones.

In most of the articles, the researchers pointed out how much excessive use of screens has cognitively impaired children, leaving them more dispersed, irritable, with language problems and not very creative. In addition, it is clear the increase of children who have difficulty in interpersonal relationships due to the excessive use of screens, as well as the growing number of motor difficulties and obesity linked to technologies and a decrease in play by children.

Despite some benefits that the use of screens can bring to children, their harm when used in an unbridled and unsupervised way is much greater and more significant in children's cognitive development.

What we have seen are children who no longer play, who do not use their imagination, who no longer run, who do not practice physical activities, who have difficulty in reading because the automatic of cell phones no longer requires this challenge from them, they have difficulty in motor coordination and consequently in writing, since they type much more than they write.

And the most dangerous thing seen quite often is the virtual addiction that children have been suffering due to the excessive use of technologies. These children cannot cope with not using these devices, and exhibit irritable and aggressive behavior, which has significant effects on the brain.

In view of all the above, it is extremely clear that there is a need to measure the use of screens by children, in addition to avoiding as much as possible the early presentation of screens to children. Responsible adults should not outsource children's fun and entertainment to screens, as this has had negative impacts on the cognitive, social, and physical development of minors.

Finally, it is necessary that this theme be increasingly studied and explored by the various areas of human knowledge, because the influence of the new technology and its effects affect children in the most varied areas of their development and can cause even more damage than is already known by science.

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Financial analysis of small hospitals in the state of Pernambuco from 2009 to 2015

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Daize Kelly da Silva Feitosa
Education: Master's student in Public Health
Institution: Aggeu Magalhães Institute-Fiocruz, Recife-PE- BRAZIL
E-mail: kellydaize@hotmail.com
ORCID: https://orcid.org/0000-0001-9308-0430

Isadora Sabrina Ferreira dos Santos
Education: Master's student in Public Health
Institution: Aggeu Magalhães Institute-Fiocruz, Recife-PE- BRAZIL
E-mail: Isadora Sabrina18@gmail.com
ORCID: https://orcid.org/0000-0002-8853-2073

Kaio Flávio Freitas de Souza
Education: Master's student in Public Health
Institution: Aggeu Magalhães Institute-Fiocruz, Recife-PE- BRAZIL
E-mail: kaio.souza.res@ufpe.br
ORCID: https://orcid.org/0000-0001-9964-0064

Bárbara Letícia Silvestre Rodrigues
Education: Resident in Public Health
Institution: University of Pernambuco
E-mail: barbaralsrodrigues07@gmail.com
ORCID:https://orcid.org/0000-0001-7754-4282?lang=pt

Isabel de Jesus Brandão Barreto
Training: Resident in Interiorization of Health Care – PRMIAS
Institution: Federal University of Pernambuco
E-mail: isabelbrandao@outlook.com.br
ORCID: https://orcid.org/0000-0002-7965-0860

Erlene Roberta Ribeiro
Education: PhD in Neuropsychiatry and Behavioral Science
Institution: Federal University of Pernambuco (UFPE)
E-mail: erlene.santos@ufpe.br
ORCID: https://orcid.org/0000-0003-3334-3408

ABSTRACT
This article presents the results of a research that aimed to evaluate the economic and financial performance of the Hospital Units qualified in the National Policy of Small Portiers Hospitals (HPP) in the state of Pernambuco, from 2009 to 2015. In order to discuss the implications of the results for the financial sustainability of the units, indicating possible alternatives. The survey data were obtained from a sample of 59 small hospitals registered in the National Health Establishments Registration System (CNES), through the System Financial Limits of Control Medium and High Complexity (SISMAC) and Information Systems Hospital and ambulatory (SIA and SIH). These secondary data were analyzed by the Consumer Price Index (IPCA). Data analysis showed a significant loss of financial capacity of the studied hospitals and significant differences between the reported amounts of revenues and performance over the years. Showing the need to point out possible strategies redirection of resources or change the service profile of these units and analyze the feasibility of HPP policy.

Keywords: Hospital, Performance, Financial Management, Inflation.

1 INTRODUCTION

The amounts spent on hospital care activities in Brazil are significantly significant. In this sense, there is a need to reflect on the results and their beneficial cost to the health of the population. The evaluation of economic and financial performance plays an important role, in view of the scenario of working better on the management of resources related to the increase in costs in the health area, its operational activities, with regard to productivity, efficiency and quality of service, in addition to

monitoring decision-making processes (RIBEIRO, FOCHEZATTO, 2005; VEILLARD. J et al, 2005).

Small Hospitals (HPP) are strategic elements in the process of remodeling the Unified Health System (SUS). Due to their great expression in the Brazilian territory, they play an important role, especially after the consolidation of primary care as a health care strategy, they represent 62% of the hospital establishments in the Brazilian health system (UGÁ, 2007).

The HPP were the object of a specific policy, called the National Policy of Small Hospitals, instituted by Ordinance GM/MS No. 1,044 of 06/01/2004. According to this document, this type of hospital is encouraged to have a contracting process through qualitative and quantitative goals corresponding to a global budget, differing from the traditional payment for production through the Hospital Information System - SIH/SUS (BRASIL, 2005; UGÁ, 2007).

With regard to the process of adhesion of hospital units to this HPP policy, basic requirements were defined for this, namely: belonging to the public or private non-profit administrative sphere; be in municipalities or micro-regions with up to 30 thousand inhabitants, in which the same hospital institutions have between 05 and 30 beds registered in the National Registry of Health Establishments (CNES); and being located in municipalities that have Family Health Strategy coverage equal to or greater than 70% (BRASIL, 2005).

The Ordinance also ratifies that the quantitative supply of beds in Small Hospitals must be adjusted using as a parameter: the need for low and medium complexity hospitalizations, estimated at 5% of the population in the coverage area in the year; Occupancy rate of 80% with an average stay of 04 days. Thus, the policy proposes to guide, plan and adapt the profile of the PPHs according to the epidemiological profile and the needs of small hospital care in the municipalities, ensuring the continuity provided by primary and medium complexity care (BRASIL, 2004).

As for financing, the Ordinance also provides for the allocation of funding resources to health establishments, which must meet the criteria mentioned above and the overall budget corresponding to the cost of HPP hospitals. It refers to automatic transfers from the National Health Fund and the respective State and Municipal Funds, following the final rules of this type of transfer (BRASIL, 2004).

With regard to the financial resources applied, it designates that they must be in accordance with the Investment Master Plan of the States and be monitored through the Target Contract established by the Management Council to be established by the Health Council or by the Monitoring Committee of the Target Contract with indicators and parameters, for monitoring and evaluating the performance of health establishments, as a way to ensure the maintenance of the transfer of financial resources (BRASIL, 2004).

The incorporation of inflation rates is efficient in the analysis of costs in the health sector, emphasizing that the increases of these, in general in the sector, are higher than the indexes adopted

for inflation measures in the country. The Extended Consumer Price Index (IPCA) measures the variation in the cost of living of 90% of the families belonging to the urban areas covered by the National System of Consumer Price Indices - SNIPC and aims to measure the inflation of a set of products and services. Brazil is in the middle of the scale of growth of medical-hospital inflation, which has been higher than the variation in wholesale prices (FERREIRA E SILVEIRA, 2007; IBGE, 2015).

Considering the proposal of the National Policy for Small Hospitals, there is a need to evaluate the financial capacity of hospitals through the economic and financial performance, and the effects of inflation on the incentives established by the HPP Policy. From this perspective, the objective of this study is to evaluate the financial feasibility of the Units qualified in the National Policy of Small Hospitals in the state of Pernambuco between the years 2009 and 2015.

2 METHODOLOGY

This is a descriptive cross-sectional study of a quantitative nature. Descriptive research observes, records, analyzes, and correlates facts and phenomena without the interference of the researcher, seeking to interpret them. It was consolidated based on statistical tests and data measurement (MALHOTRA, 2001). It used secondary databases, which were collected for numerical measurement, seeking to identify patterns of behavior (SAMPIERI, COLLADO AND LUCIO, 2006; RAMPAZZO, 2005)

The universe of the study was composed of hospital establishments that are qualified in the Policy as HPP in the period from 2009 to 2015, totaling 59 municipal hospitals in Pernambuco. This universe corresponds to 876 beds, with an average of 14 beds per establishment, distributed in 12 Health Regions of the State **(Appendix A)**.

Information regarding the general description of hospitals was collected through the database of the National Registry of Health Establishments (CNES) in 2016. To survey the financial transfers, data from the information systems of the Ministry of Health and the Pernambuco State Department of Health were used.

Regarding the data referring to the financial resources coming from the Federal Government, they were obtained from the Medium and High Complexity Financial Limit Control System (SISMAC-MS-DATASUS) through the annual financial ceiling established for each federated entity, and the ordinance that establishes the qualification of the HPP policy and the value of the incentive was selected. Regarding the funds transferred by the State Health Department, these were obtained by State Ordinance No. 023 of January 17, 2014, published in the Official Gazette of the State of Pernambuco.

Data on the production of outpatient and hospital care were collected from the Hospital and Outpatient Information Systems (SIH and SIA) of the Department of Information and Informatics of

SUS (DATASUS), in which the amounts in reais approved for payment of each Hospital Unit were selected.

The values of productions and revenues from the Ministry of Health and the State Department of Health were deflated, i.e., the conversion of current (nominal) values into currency of constant purchasing power (real value), by means of the Extended Consumer Price Index (IPCA – **ANNEX A**), obtained from the website of the Brazilian Institute of Geography and Statistics (IBGE).

Table 01 - Formula for the calculation of deflation of values.

Formula: DEFLATED VALUE = ANO_X VALUE * (IPCA 2009/IPCA_X) Where: VALUE YEAR X = values transferred by the Ministry of Health and SES-PE (2009 to 2015) IPCA 2009 = base year index for the calculation IPCA_X= indices of the years analysed

Source: Brazilian Institute of Geography and Statistics (IBGE) – Prepared by the author, 2023.

Descriptive statistics were used to calculate measures that describe the data through the distribution of frequency and percentages. Finally, the collected data were transferred to a Microsoft Excel 2010 spreadsheet, where they were then tabulated and graphs generated.

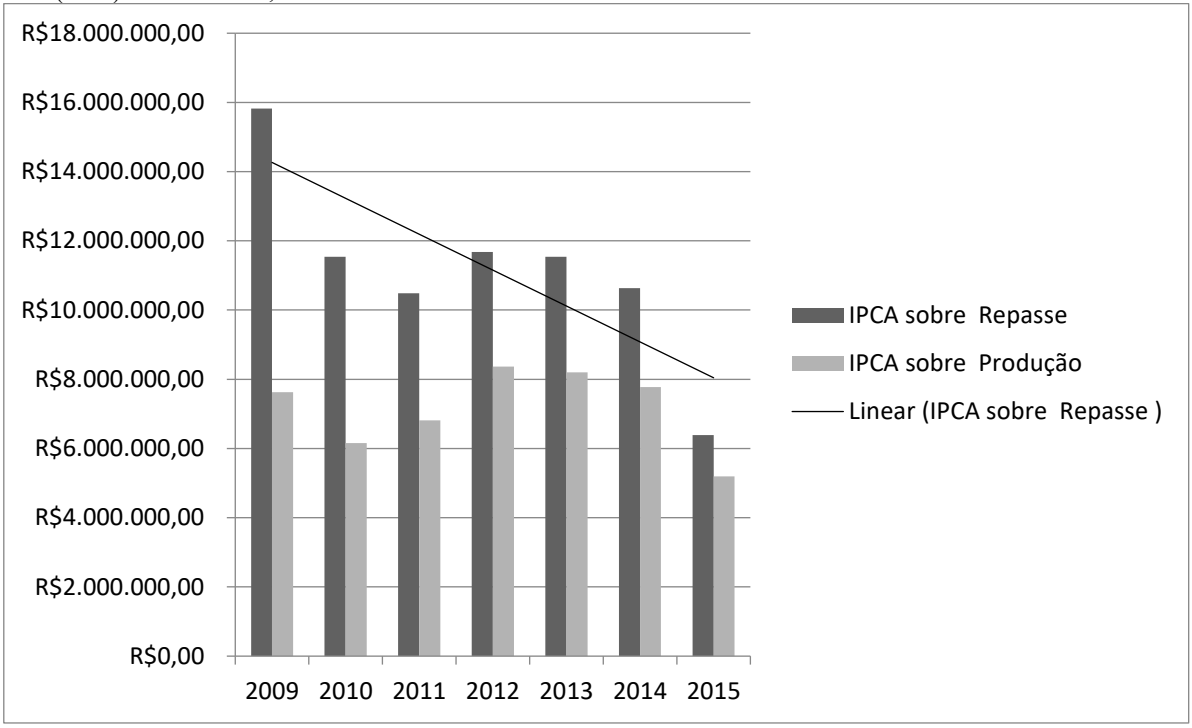
The data came from secondary databases in the public domain, the research does not require approval by the Ethics Committee on Research Involving Human Beings, considering Resolution No. 466 of December 12, 2012 of the National Health Council.

3 RESULTS AND DISCUSSION

The amount and the additional financial of the Hospital Units qualified in the National Policy of Small Hospitals (HPP) are divided equally between the Ministry of Health and the respective State Health Secretariat. In addition, unusually, it can present costing proposals providing for the participation of municipalities, agreed in the Tripartite and Bipartite Interagency Commissions.

The amount of the transfer of the total annual revenue was R$ 15,819,035.88, this amount remains fixed throughout the period from 2009 to 2015, indicating that there was no adjustment. In this way, it is possible to observe some trends over the years analyzed. The influence of inflation results in a decline in revenue values over time and a significant loss in the real value of fixed financial incentives (Chart 01).

Graph 01 - Impact of the IPCA on the financial resources of the Hospital Units qualified in the National Policy of Small Hospitals (HPP). Pernambuco, 2009 to 2015.



Source: SISMAC + Ordinance n. 023, SIA and SIH/DATASUS - Prepared by the author. Period: 2009 to 2015.

The total amount of the transfer in the period observed was R$ 110,733,251.16, however, considering inflation, it became R$ 78,082,106.61, totaling a difference of R$ 32,651,144.55, which represents 70.51% of the initial amount, that is, less capacity to acquire inputs and defray the expenses of the Hospital Units. The year 2015 stands out, in which there was the highest inflation in relation to the other years, with the IPCA of 10.61 showing a difference of R$ 9,429,153.53 over the total transfer of R$ 15,819,035.88, which corresponds to a real drop in revenue over the total value, with a drop of approximately 60% in purchasing power. showing a descending trendline.

Table 01 highlights the financial performance of the Hospital Units qualified in the HPP Policy, indicating differences between the revenue values and the performance over the years analyzed.

Table 01: Financial Performance of Hospital Units qualified in the National Policy for Small Hospitals (HPP). Pernambuco, 2009 to 2015.

Year	Total Value (Treasury + MS/SUS) *	Total Produced (SIA + SIH) *	Difference Between Total Revenue - Total Produced*	% Performance*
2009	R$ 15,819,035.88	R$ 7,627,026.49	R$ 8,192,009.39	48,21
2010	R$ 11,536,386.57	R$ 6,160,324.36	R$ 5,376,062.21	53,40
2011	R$ 10,489,237.64	R$ 6,816,023.81	R$ 3,673,213.83	64,98
2012	R$ 11,674,665.18	R$ 8,362,633.68	R$ 3,312,031.50	71,63
2013	R$ 11,536,386.57	R$ 8,197,836.81	R$ 3,338,549.76	71,06
2014	R$ 10,636,512.42	R$ 7,773,417.68	R$ 2,863,094.74	73,08
2015	/R$ 6,389,882.35	R$ 5,191,277.05	R$ 1,198,605.30	81,24

Total	R$ 78,082,106.61	R$ 50,128,539.87	R$ 27,953,566.74	64,20

Source: SISMAC + Ordinance No. 023, SIA and SIH/DATASUS – Prepared by the author. Period: 2009 to 2015.
*Deflated Values

The total average production rate of the establishments was 64.20%, in relation to the total amount transferred according to the deflated values. The result shows that the financial performance was influenced by inflation, because as revenues fell, financial production fell proportionally to the resources contributed. Despite this, the performance was between approximately 48% and 81% when the evaluation was carried out annually. In every period, there is a drop in performance of around 30%. The participation of municipal entities in the financing reflected a lower drop in productivity.

It can be seen that small hospitals tend to have a lower level of production, because even if they had their operational capacity fully utilized, they are still not self-sustaining units due to the small number of existing beds, which does not allow them to produce sufficient economic results to cover operating expenses, such as human resources and supplies. Linked to this issue, the existing underfunding further aggravates the structural problems of these units.

Ramos (2015) found that the performance of hospitals that provide care through the public system is recognized for its small size and capillarity to the interior of the country. These hospitals, although strategic for decentralization and regionalization, are not very efficient. It is important to emphasize that the results found reflect a smaller amount of care offered, since the financial volume contributed is directly related to the lower number of procedures performed. Thus, it is evident that the readjustment of resources should be reviewed, considering that inflation consumes and limits the ability to maintain productivity conditions.

According to Ferreira (2007), the increase in health expenditures tends to be higher in relation to other sectors, suffering the influence of medical technology on costs, the aging of the population that influences the growing consumption of health services, are factors traditionally pointed out to justify the disproportionate growth in expenditures, causing a real inflationary risk in the Health Sector. the inflation rate in Brazil has been above the targets set by the Government, being one of the great challenges in recent years.

According to La Forgia and Couttolenc (2008), the main focus of health care remains in hospitals, since the hospital sector performs practically all hospitalizations in the country. An issue that contributes to the low performance of these hospitals is the peculiarities of the health sector, which does not follow the flow of supply and demand in the market, impacting on higher inflation than that found in other sectors and, consequently, on the lag of the amounts transferred. Thus, the logic of SUS financing, which establishes physical and financial ceilings to produce hospitals according to the size and historical series of production, discourages the increase in the services provided and, consequently,

the increase in productivity.

The purpose of restructuring the care network in order to qualify and humanize care, management and strengthen decentralization, through financial incentives established in a Ministerial Ordinance, did not consider the real losses due to inflation, in which no strategy was established to replace these losses, since it froze the contribution of resources, making it impossible to improve and redefine the care role of small Hospital Units with a view to strengthening and improving the Unified Health System, Thus, further advances in the performance and maintenance of the operational capacity of the HPPS become unfeasible.

With regard to financial management, it is essential to understand the existing processes within these organizations in order to establish routines that promote the best use of existing resources and the expansion of users' access to the Unified Health System, strengthening the care network so that they can be effective (SPEDO, 2009). The results described here point to a lower than expected economic and financial performance and real inflationary effects on the financial capacity of the incentives provided for in the HPP policy, which refers to the need to point out possible strategies for redirecting resources or the change in the care profile of these Units and to analyze the feasibility of the HPP policy.

In this way, the importance of the evaluation of economic and financial performance in health services was demonstrated, in order to provide concise information regarding the financial capacity of small hospital care, The results found provoke the need for new research, with thematic and methodological approaches that make it possible to assimilate and understand the capacity of the set of measures and strategies adopted by the Ministry of Health to formulate hospital care policies, with the aim of improving and redefining the care role of hospital financing and management.

The purpose of evaluating the feasibility of the National Policy of Small Hospitals (HPP) through its economic and financial performance proved to be convenient and relevant, and becomes a tool for evaluating the proposal to strengthen the small hospital care network of the municipalities through the HPP Policy. in order to improve and redefine the care role of the financing and management process of hospitals. Thus, the study aimed to foster the debate on the organization of articulated and problem-solving networks of services, stimulating qualified access to health services and the relevance of inducing the decentralization process.

The study also encourages the importance of the debate on inflationary risk in the health sector, which is a fundamental issue in the financial management of the public sector to make possible investments and adjustments that ensure a minimum profitability, capable of overcoming the inflation of the necessary inputs and the creation and development of public policies that are compatible with the inflationary dynamics of the market for health products and services. reflected by the Extended Consumer Price Index (IPCA).

However, the use of economic and financial performance evaluation is considerable, in view of the scenario of working better on the management of resources related to the increase in costs in the health area, taking into account that hospital units are complex organizational structures that require managers to mobilize great efforts to ensure the maintenance of activities inherent to productivity, efficiency and quality of service, in addition to monitoring decision-making processes in hospital care.

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APPENDIX

Appendix A – General Description of Sample Hospitals (continued)

Health Region	City	Institution	CNES	Beds
I	Itapissuma	Hosp.e Mater. João Ribeiro Alburqueque	2432315	20
I	Pigeons	Virgínia C.Dias Hospital and Maternity	2432706	21
I	Glory of Goita	Maria Gaiao Guerra Mixed Unit	2499843	24
II	New Fair	Hospital Municipal Josefa E. da Rocha	2712024	17
II	João Alfredo	Joana Amelia Cavalcanti Mixed Unit	2715287	23
II	Car Pond	Simeão Ribeiro de Lemos Mixed Unit	2715392	12
II	Lagoa do itaenga	Casa de Saúde and Mat.Josefa C. de Petribu	2711389	19
II	Axes	Hospital Edson Alvares	2352575	09
II	Orobo	Hospital Severino Távora	2712067	20
II	Passira	Nossa Senhora da Conceição Mixed Unit	2715368	25
II	Tracunhaem	Maria da Gloria Nogeira Mixed Unit	2349728	11
III	Amaraji	Hospital Alice Batista Santos	2711877	19
III	Belem de maria	Our Lady of Sorrows Mixed Unit	2715376	09
III	Catende	Dr. João Mayrink Mixed Unit	2715260	27
III	Gameleira	Argemira S.R.Baros Mixed Unit	2435454	23
III	Joaquim Nabuco	Lídia Maria de França Mixed Unit	2433494	14
III	Tame	Dr. José Múcio Monteiro Mixed Unit	2715279	16
III	Xexeu	Santa Joana Mixed Unit	2429314	13
IV	Cachoeirinha	Nair Alves Raimundo Mixed Unit	2638908	16
IV	Camocim s. Felix	Mixed Unit N.S.do Good Birth	2703386	14
IV	Cupira	Hospital Municipal Jose Verísimo de Souza	2354845	20
IV	Friar Miguel	Hosp.e Mat. João Alexandre de Oliveira	2638916	11
IV	Ibirajuba	M.Prof.Jorge Oliveira Lobo Unit	2346850	07
IV	Jatauba	Ana Argemira Correia Mixed Unit	2433788	13
IV	Jurema	Santa Quitéria Mixed Unit	2346826	13
IV	Sanharo	M.Dr. Carlos Augusto S. Leão Unit	2638851	14
IV	Torhythma	Our Lady of Fatima Municipal Hospital	3631180	22
V	Angelim	Santa Terezinha Mixed Unit	2703033	08
V	Caetes	Luiza P. de Carvalho Mixed Unit	2703017	23
V	Left-hander	Antonia Alves de Melo Mixed Unit	2638924	22
V	Capoeira	Mixed Unit Quiteria Alves Vilela	2346869	17
V	Currents	Kyola Mixed Unit	2355841	16
V	Hiatis	N.Sra.da Conceição Mixed Unit	2702975	15
V	Jupi	Claudina Teixeira Municipal Unit	2638975	11
V	Gold Lagoon	Hospital and Mat.de Lagoa do Ouro	2638967	10
V	Saroh	Mixed Unity Josina Godoy	2638940	13
V	Theresa	Terezinha Mixed Unit	2715252	06
YOU	Ibimirim	Marcos Ferreira Davila Mixed Unit	2639092	19

YOU	It's coming	Santa Rita Mixed Unit	2703068	13
VII	Verdant	Adelaide Tavares de Sá Mixed Unit	2703106	08
VIII	Large Lagoon	José Henrique de Lima Municipal Hospital	2639211	19
IX	Bodoco	Eulina Silva L. de Alencar Mixed Unit	2345374	29
IX	Eshu	Hospiyal Jose Pinyo Saraiva	2431106	29
IX	Granite	M.Senhorinha de Souza Unit	2702835	06
IX	Santa cruz	Hospital Municipal João Rodrigues de Souza	2714485	10
X	Brejinho	Hospital Clotilde de Fonte Rangel	2711907	7
X	Carnaiba	Jose Dantas Filho Mixed Unit	2428881	15
X	Ingazeira	Benvinda de Brito Galvão Mixed Unit	2639327	04
X	Santa terezinha	Santa Terezinha Mixed Unit	2500000	10
X	Solidao	Maria Jesuino da Silva Mixed Unit	2639300	05
XI	Bethany	M.Prof.Alcides Ferreira Lima Unit	2703076	10
XI	Carnauba tree	Argemiro José Torres Mixed Unit	4018044	09
XI	Flowers	Genezio Francisco Xavier Mixed Unit	2432471	18
XI	Itacuruba	DR. Manoel Novaes Mixed Unit	2639114	04
XI	Triumph	Felinto Wanderley Mixed Unit	2702843	13
XII	Camutanga	Mivernia Guedes T. de Melo Mixed Unit	2715341	07
XII	County	João Pereira de Andrade Mixed Unit	2715295	20
XII	Itaquitinga	Adelina de Azevedo Mixed Unit	2499835	14

ATTACHMENT

Appendix A- Cumulative Extended Consumer Price Index: 2009 to 2015

YEAR	CUMULATIVE HICP
2009	4,31
2010	5,91
2011	6,5
2012	5,84
2013	5,91
2014	6,41
2015	10,67

Source: Brazilian Institute of Geography and Statistics – IBGE

SEVEN publicações acadêmicas

Infographics on the democratization of knowledge in the COVID-19 era

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Henrique Chiarini Batistella
Highest level of education: Incomplete higher education
Academic institution: Pontifical Catholic University of Campinas

Bruno Michelassi Bernardes de Oliveira
Highest level of education: Incomplete higher education
Academic institution: Pontifical Catholic University of Campinas

Bruna Granig Valente
Highest level of education: Complete university degree
Academic institution: Pontifical Catholic University of Campinas

Aline Cremasco Rocha
Highest level of education: Complete university degree
Academic institution: Pontifical Catholic University of Campinas

Cintia Kelly Bittar
Highest degree: Post-doctorate
Academic institution: Pontifical Catholic University of Campinas

ABSTRACT
Introduction: The search for information is essential to update professionals and provide the population with knowledge. In this context, infographics are resources capable of conveying complex information quickly, easily understandably, and attractively. Objectives: To analyze the interaction of the population with the infographics through social networks, to compare the access of the infographics on the Hospital PUC Campinas website in relation to the other pages of this website and to identify the reach of the infographics on the website and on Instagram. Methods: This is a descriptive, cross-sectional, retrospective, and comparative study on the impact of infographics that were published on the website of the PUC Campinas Hospital on a page for the population and another for health professionals, as well as they were also posted on an Instagram profile. Thus, the data from the website was collected by an IT professional and the data from Instagram would be collected from the platform itself. Results: The number of likes varied according to the specialties and topics covered and the number of views on the page of the PUC Campinas Hospital were significantly higher when it came to information in Infographics. Discussion: Infographics are excellent tools for the popularization of knowledge since they facilitate understanding and dissemination due to their format and short excerpts of texts. Conclusion: More research is needed to evaluate the capacity of infographics, given the low number of studies in the literature, although they seem to have a great capacity for disseminating information.

Keywords: Infographics, COVID-19, Democratization, Knowledge and information.

1 INTRODUCTION

In this pandemic period, the world is going through a moment of misinformation, caused by fake news, just when knowledge is so necessary for the prevention and fight against the coronavirus. In this way, we are constantly looking for a safe, fast and effective way to raise awareness among the population. Faced with this demand, infographics have become a method capable of meeting these requirements due to their ease and speed of understanding.

The infographic is a textual genre that mixes elements, such as the use of images and short texts in order to convey information as soon as possible and in a simplified way [1,2,3]. However, it is clear

that its aim is not to eliminate the use of more elaborate texts, but to include those who do not have the opportunity to read or understand them [4]. Thus, with the growth of preventive medicine and the use of the internet, there is a great potential for a wider use of them.

Thus, it is necessary to seek to recognize the scope of the information propagated so that the infographic is evaluated and used in the best possible way. Since, in proportion to so much technology, misinformation and false truth still prevail over knowledge.

The importance of this tool for popularizing information can be analyzed based on the data provided by the places advertised, most commonly, on web sites and social networks. Thus, better ways of publishing could be studied to achieve sufficient engagement to reach the target audience.

2 OBJECTIVES

The objective of this work is to collect the data obtained through interactions, such as the number of accesses, the average time spent per person in each publication, number of likes, number of shares, both on Instagram (@combatec0vid) and on the website of Hospital PUC Campinas, through popular interaction and professionals in these media. In this way, it would be possible to have a discussion about the results obtained from the use of infographics as a strategy to speed up and simplify information for many people.

3 METHODS

A retrospective study of the impact of infographics in relation to scientific articles was conducted. First, the COVID Project was a work carried out in pairs, which went through a selection process, however, to do them there was a training cycle carried out by IFMSA for the use of the Canva tool. Subsequently, each pair chose a specialty, together with a professor in the area, to make the infographics. They were published on the website of the PUC Campinas Hospital on a page for the general population and another for health professionals, in addition, they were posted on an Instagram profile (@combatec0vid). Thus, the site's data would be collected by an IT professional and Instagram's would be collected from the platform itself. From this moment on, the relevance of the analysis of this project is highlighted, in order to better understand the scope of the infographic.

Included: all people who accessed the site, people who have an Instagram account and, consequently, accepted the terms of conditions, offering some data to the applications.

4 RESULTS

From the analysis of Instagram and the website of Hospital PUC Campinas, some data were selected that demonstrate the interaction of the population with the infographics. As for Instagram

publications, the number of likes and shares was checked, while on the website the number of views of each post was analyzed.

Regarding Instagram likes, only those publications that had a higher number of 50 likes were selected, which totaled 26 publications out of 39. The 10 publications that obtained from 50 to 100 likes, added up to 631 likes out of 10638 total, which corresponds to 5.93%, the publication that obtained the highest number of likes within this group was related to Intensive Care Medicine, which received 88 likes and the lowest was Immunology, which obtained 50 likes. The posts with 100 or more likes *were all Immunology and related to the word "vaccine", the one with the highest number* of likes got 2084, the one with the lowest got only 114, the total sum of these data was 9570, which resulted in approximately 89.96% of likes.

The shares of the posts were also divided into two large groups: from 10 to 50 and those that reached more than 50 shares. Thus, of the 39 publications, 9 reached from 10 to 50 shares, among them the one with the lowest number obtained 10, related to Microbiology, the highest obtained reached 29, related to Endocrinology, the sum was 158, which means approximately 2%. In the second group, the one with the lowest number of shares reached 90 and with the highest 1964, which in the sum meant a total of 7572 shares, which represents approximately 97.11%, all also from Immunology and related to the word "vaccine".

As for the Hospital's website, only publications that had more than 500 views were chosen for analysis. Within this group, the lowest number was 531 accesses related to Intensive Care Medicine, and the highest reached 18973, related to Immunology. Within the website of Hospital PUC Campinas, of the 100 pages related to COVID-19, 18 of them got more than 500 hits and half of this total were posts that had infographics, which resulted in approximately 36.6%.

5 DISCUSSION

Regarding likes, it is evident that infographics with information that is closer to the population, such as vaccines, were more viewed. In this way, all those who had a good engagement on Instagram, that is, 100 likes or more were related to this topic. However, the use of infographics served as a way to leverage reach, due to the ease of understanding the information [2].

As for the shares, there was a disproportion between those with the highest number of likes and the smallest, since those with the lowest number of likes had a much lower number of shares, while those with a lot of likes had a very close number. This information reveals that there was really an understanding of the information, since for something to be liked it is enough to be seen, however, to be shared it also needs to be understood [3].

On the other hand, the numbers of views on the Hospital PUC Campinas website reveal a great gain of infographics over other pages, such as research summaries, since the site within the most

viewed about covid, half were about infographics, showing the potential for dissemination of knowledge through this tool, which will enable the arrival of information to a larger group of people [4].

6 CONCLUSION

Therefore, it is evident that more research and information are needed to have a greater scientific basis, given the low number of studies present in the literature. In addition, infographics are excellent tools for disseminating knowledge and a very effective way to democratize information that was previously restricted to a select group of people.

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Risks and vulnerabilities of injectable administration in health promotion settings with the impact of lack of biosafety

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Natália Figueiredo dos Santos
Graduated in Pharmacy
Institute of Health Sciences, Nova Ferlagos - Faculty of the Lakes Region, Brazil.
Postgraduate student in Hospital Pharmacy with Oncological Follow-up.
Institute of Science, Technology and Quality – ICTQ, Goiás, Brazil.

ABSTRACT

Biosafety is a set of measures aimed at preventing, minimizing or eliminating risks inherent to activities in occupational environments. Several problems have been reported regarding the lack of biosafety, especially in health care facilities that have sectors associated with the manipulation of injectables and other invasive procedures. Therefore, describing the performance of the pharmaceutical professional in relation to biosafety management directs a technical qualification seeking to identify, minimize and even eradicate risks and vulnerabilities associated with these invasive practices with the possible exposure of biological fluids to which they are exposed. Thus, the objectives of this study were to analyze and discuss the risks and vulnerabilities of injectable administration in health promotion environments, indicating the impact of the lack of biosafety. To this end, we conducted a small literature review, in addition to a field research among pharmacists in the Lakes Region, State of Rio de Janeiro, where an online questionnaire with 19 closed questions on the theme already explained above was applied. Our results found a wide variety of studies related to the theme, corresponding to the data found in the participation of 20 pharmacists who were technicians in charge, working in pharmacies with injectables or who had already worked in this practice. The results were impactful because they confirmed the fragility of many professionals who work with injectable injections. Lack of knowledge in current legislation, other disabled professionals performing these activities without proper preparation, among other difficulties. In view of the results obtained in the research, it is concluded that there is a need to broaden the discussion on occupational risks, work accidents and vulnerability in the practices of health professionals, with the objective of developing health policies for pharmaceutical professionals.

Keywords: Application of Injectables, Pharmacy, Biohazard and Biosafety.

1 INTRODUCTION

Biosafety is a set of measures aimed at preventing, minimizing or eliminating risks inherent to activities in occupational environments. The standards, in general, are for guidelines regarding care to keep both the patient and the professional free from contamination of microorganisms harmful to health, from hand washing, floor cleaning, choice of disinfectant for sterilization of materials and even how to dispose of chemical and biological waste (NUNES, 2018).

With the advent of RDC No. 44, of August 17, 2009, which established a series of standards and guidelines that authorized the characterization of injectable application rooms in health care environments such as drugstores and pharmacies, these criteria and guidelines were evidenced in order

to reduce possible accidental events against the health of the professional who works in these places. including pharmacists. (ANVISA, 2009).

Many risks and concerns came in line with this resolution, seeking a direct correlation with the sanitary difficulties and the economic and social precariousness of an underdeveloped country, that is, as well as in the maintenance that such standards are being complied with in health care environments, especially such as drugstores and pharmacies. (ANVISA, 2009).

Thus, this study brings a discussion about this specialized service based on an analysis of the professionals in these environments and the use of Personal Protective Equipment (PPE) and/or Collective Protective Equipment (CPE) indicated, as well as the acquisition of devices that guarantee the biosafety of these professionals as a result of exposure to waste generated and with the manipulation and/or exposure with biological fluids. (TOSMANN, 2019).

The biosafety of the pharmaceutical professional is extremely important, because it is not enough to be only the caregiver aiming only at the safety of the client. This professional also becomes the target of care and deserves to receive the proper support (PONTES, et al., 2018).

This study aims to discuss the problem of Biosafety issues of the pharmaceutical professional, either due to the unfavorable logistical conditions that do not meet the requirements already established by law, or due to the lack of dexterity or knowledge of the professional, due to the lack of training in a procedure that he is qualified and authorized to perform through a RDC that gives him autonomy.

Risks in professional environments, including health care environments, are present in the most varied environments, including health care environments, described as occupational safety hazards that affect the health and well-being of workers in various work activities. In the 1970s, Brazil was considered a world champion in occupational accidents, which led to the establishment of a policy aimed at the safety and health of workers in their work environment, aiming to reduce the incidence and prevalence of accidents and diseases at work (LIMA, et al., 2017).

The Ministry of Labor and Employment has been reinforcing actions to promote safety and prevent accidents and occupational diseases, especially in environments aimed at health promotion (BRASIL, 2005).

Biosafety comprises a set of actions aimed at preventing, controlling, mitigating or eliminating risks inherent to activities that may interfere with or compromise the quality of life, human health and the environment. Thus, biosafety is characterized as strategic and essential for research and sustainable development, being of fundamental importance to evaluate and prevent the possible adverse effects of new technologies on health (BRASIL, 2005).

Biosafety in health care environments begins with the adoption of Standard Precautions (PPs), such as: hand washing, use of personal protective equipment (PPE) and collective protection equipment (CPE), in addition to proper management of waste from health services and immunization,

always with the objective of protecting patients and health professionals, especially against exposure to biological fluids. Biosafety in Brazil is ensured by Regulatory Standard No. 32 (NR 32) directed and regulated by the Ministry of Health (Ministry of Health - Normative 32). It recommends, guides, among other regulations, preventive measures for each risk situation with the objective of promoting the safety of workers in health services, especially the use of PPE (CORRÊA, et al., 2017).

Another regulatory standard of extreme importance, with a view to ensuring the integrity and safety of health professionals, is regulatory standard 6 (NR6), which establishes standards, including the sizing and definition of PPE, as any device or product, for individual use used by the worker, intended to protect against risks that may threaten safety and health at work. such as: masks, goggles, gloves, disposable apron or gown, hat etc. In addition, this standard directs and establishes which professionals should use the specific PPE, always aiming at the prevention of diseases indicative of contact between professional and patient and the risks of other occupational accidents aiming at the preservation of their own health (BLEY, et al., 2005).

Personal Protective Equipment (PPE) and collective protective equipment (PPE) are essential in any industrial activity. It is no wonder that several Regulatory Standards (NR-4, NR-6, NR-10, NR-12 and NR-33) address its use and importance. Among the benefits is, first and foremost, the health and safety of the worker – through protection against the risks of accidents at work and/or occupational diseases. In addition, the correct use of equipment provides, as a consequence, a reduction in costs for the employer with personnel replacements, leaves of absence and indemnity processes (*TOSMANN, 2019).*

Many studies suggest that PPE has the function of reducing the incidence of accidents, protecting professionals against different diseases associated with the risks of each work environment and, consequently, promoting a reduction in the number of events caused to the health and especially to the physical integrity of professionals, including those that manifest themselves in the medium and long term (GONÇALVES, 2011; CISZ, 2015; SILVA 2014; SILVA, et al., 2018).

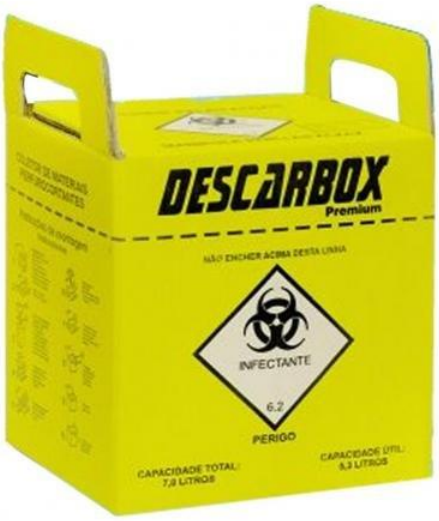
The document entitled "National Strategy for the Reduction of Occupational Accidents 2015-2016", published in 2015 by the Ministry of Labor and Employment, identified the occurrence of 2,797 fatal occupational accidents in Brazil, associated with a mortality rate of 6.53 individuals per 100,000 insured persons in the country. The report also suggests that the International Labor Organization (ILO) estimates that more than two million people die each year due to the occurrence of occupational accidents (BRASIL, 2015).

Many PPEs and EPCs are established in different instructional standards, always with the objective of reducing accidents in health care environments. Varying according to each professional specificity, they are important parts in the biosafety process.

Many places with manipulation of biological fluids have been worrying health teams, especially inspection and epidemiological support agencies. The need for essential devices and equipment to perform these services, combined with the reality of the population and the different economic and financial realities, varying from place to place, causes an alert in the surveillance teams with attention to non-compliance and lack of different devices indispensable for this type of specialized service.

A great example of essential devices for a site with handling biological fluids are sharps disposal boxes (**Figure 1**). In addition to these boxes, signage and material supports are extremely important in the development of this specialized service. There are many risks with the exposure of these residues (SILVA, et al., 2018).

Figure 1: Sharps puncture disposal box, a mandatory item in injectable rooms.



Source: Google.

Sanitary Surveillance is, by definition, "a set of actions capable of eliminating, reducing or preventing health risks and intervening in health problems arising from the environment, the production and circulation of goods and the provision of services of interest to health" – Organic Health Law – Law 8.080 of 09/19/1990, Art. 6, Item I. The objective of the development of Health Surveillance actions goes beyond ensuring that the products, as well as services provided, have a level of quality such as to eliminate or minimize the possibility of the occurrence of negative effects on health caused by the consumption of goods and the provision of improper services. It is necessary to understand Health Surveillance as an integral and primary part of the health area, being a set of specific actions to protect it, which ultimately contemplates the most diverse fields of action, from those specific to the health area to others, such as sanitation, education, security, among many others that contribute to the quality of life (BRASIL, 2010).

The actions developed by the Health Surveillance are educational (preventive), normative (regulatory), supervisory and, ultimately, punitive. They are developed at the federal, state and municipal levels and occur in a hierarchical manner in accordance with the provisions of the Organic Health Law – Law 8.080/90, in Ministerial Ordinance 1565/94 – GM/MS, which established the National Health Surveillance System, and in Federal Law 9.782, of January 26, 1999, which defines the National Health Surveillance System, creates the National Health Surveillance Agency, and makes other provisions (BRASIL, 2001).

Within the Brazilian history of pharmacy in Brazil, it is contemplated that from the beginning there was an environment of dispute between the pharmaceutical profession and other untrained professionals. This was due to the Healers, Healers where they had the trust of the population and even because it was a local culture of the colonies. Therefore, access for pharmacists was almost impossible, or we would say that it did not exist in these regions. In Brazilian cities, apothecaries began to have an important social contribution due to their determining commercial potential, directing the relationship of the professional who worked in the apothecary's shops, who provided a kind of link between pharmaceutical services and customers. With the beginning of the twenty-first century, apothecaries that made their medicines in an artisanal way began to lose their status when several therapeutic discoveries in the 1930s and 1940s boosted the scientific community for new methodologies, thus growing the drug industries (ANGONESI, SEVALHO, 2010).

From 1931 onwards, in Brazil, pharmacies played a form of establishment for the sale of medicines, and the pharmaceutical activity in pharmacies was regulated through Law No. 5,991, of December 17, 1973. Drugstores then became partners of the industries, making the distribution of their products generate a consumption of medicines, thus providing self-medication, since the pharmacy became a commerce aimed at financial profit (ANGONESI, SEVALHO, 2010).

The Consensus on Pharmaceutical Care in Brazil, after meetings of professional groups, proposed the insertion of the concept of Pharmaceutical Care as a model of practice directed to comprehensive Pharmaceutical Care, reaffirming its ethical values, behaviors and skills, in addition to involving commitment and responsibilities aimed at disease prevention, health promotion and recovery. Providing the interaction between the pharmacist and the user (BRAZILIAN CONSENSUS ON PHARMACEUTICAL CARE, 2002).

Pharmaceutical Care, nowadays, makes pharmacists encouraged to provide the client with their skills and knowledge as a trained health professional. A differentiated and essential professional to change reality, becoming an encouraging agent, promoting a new concept associated with care and assistance seeking the patient's recovery. Making Community Pharmacies an establishment for the recovery of health, leaving the paradigms of the past with the link of the pharmacist as a mere dispenser of medicines, which only praised the pharmaceutical industry and its profit motives.

With the advent of Law No. 13,021/2014, which provides for the exercise and supervision of pharmaceutical activities, different articles were described that determined the current concepts of pharmaceutical services, including the following:

> Art. 2. Pharmaceutical care is understood as the set of actions and services aimed at ensuring comprehensive therapeutic care, promotion, protection and recovery of health in public and private establishments that perform pharmaceutical activities, with medicine as an essential input and aiming at its access and rational use (BRASIL, 2014).

Inside the Law No. 13,021/14, published on August 11, 2014, denoted the concept of the word Pharmacy used in Brazil, emphasizing that Pharmacies and Drugstores cease to be mere commercial establishments to become a unit for the provision of pharmaceutical assistance, health care and individual and collective health guidance (BRASIL, 2014).

In the face of this new approach and the modified vision of the Community Pharmacy as an establishment that is made of health and not only aiming at the capitalist part of the pharmaceutical industry, there is a concern about the Biosafety of the pharmaceutical professional, as well as their training for such practice, which in this case is the procedure directed to the application of injectables. once it becomes exposed to biological hazards.

With regard to biological risk, it is known that the Regulatory Standard No. 32 of the Ministry of Labor and Employment aims to establish guidelines for the implementation of protective measures for the safety and health of workers, as well as the evaluation of the workplace, thus considering the organization and description of the sector in order to evaluate occupational exposure to biological agents (BRASIL, 2005).

Biosafety is an action aimed at preventing, minimizing or eliminating risks related to the work performed, as well as production, technological development activities, such as accident prevention in occupational environments, including, among many other measures: technical, educational, administrative, medical and psychological (PENNA, et al., 2010).

Therefore, it is understood that since this professional is exposed to biological risks, he needs all the support and adequate working conditions to carry out the practice; since there is a law that backs it up through pre-established regulations.

According to the Resolution of the Collegiate Board of Directors - RDC No. 44, of August 17, 2009, which provides for Good Pharmaceutical Practices for the sanitary control of the operation, dispensation and commercialization of products and the provision of pharmaceutical services in Pharmacies and Drugstores and provides other measures. It is addressed as follows:

> Art. 74. The administration of medicines in Pharmacies and Drugstores is allowed in the context of pharmacotherapeutic monitoring.
> Art. 75. Drugs for which a medical prescription is required must be administered upon presentation of a prescription and after its evaluation by the Pharmacist (ANVISA, 2009).

Considering that the reality in the injectable application rooms of these establishments is related to the most frequent routes, namely: Subcutaneous (CS), such as insulins and vaccines; intramuscular (IM), mostly focused on analgesics and contraceptives. Others, such as intravenous (IV) and intradermal (ID) are the least common, with the intravenous being more invasive and with more immediate risks of reaction because it reaches blood circulation more quickly. Many of them have characteristics of hospital exclusivity, according to Article 74, sole paragraph, of RDC 44, which says: "*The administration of medicines for exclusive hospital use is prohibited*" (ANVISA, 2009).

2 METHODOLOGY

2.1 FIRST EVALUATIVE TOOL - LITERATURE REVIEW

To support the discussion with the data obtained in the evaluative questionnaire, a literature review was carried out in the Google Academic, Pubmed and Scielo databases, in the period between 2010 and 2020. The keywords used were "injectable application" and "biosafety". Exclusion criteria were: articles published before 2010 and articles that did not have the essence of the theme.

2.2 SECOND EVALUATIVE TOOL - ONLINE EVALUATIVE QUESTIONNAIRE WITH PUBLIC OPINION WITHOUT IDENTIFICATION

The evaluative questionnaire is an important diagnostic tool that identifies and measures information and results on a subject/theme in order to collect data from different points of view (professionals) on a particular subject/demand or phenomenon in order to clarify and collect both quantitative and qualitative data.

The questionnaire was applied by the Google Forms platform due to social distancing, respecting all protocols and procedures universalized due to the Covid 19 Pandemic.

The questionnaire consisted of 19 closed questions, which were sent by messaging applications with the link to Google Forms, where information was analyzed that consolidated the hypotheses and results expected in this study in order to correlate through a broad discussion with the results obtained by a literature review and that pointed out real data to the research.

After the detection of the data, statistical analysis was performed and the results analyzed will be described and discussed.

3 RESULTS AND DISCUSSION

3.1 PROFILE OF THE PHARMACISTS INTERVIEWED

The results were obtained from the questionnaire answers. The questionnaire was answered by 20 people (n=20), predominantly female (65%) and (35%) male (Table 1). The average age of the participants was 34 years old, ranging from 31 to 35 years old (40%), with the participation of people

from 25 to 51 years old, constituting a young group of professionals working in the field of pharmacies and drugstores. Regarding academic background (25%), only have an undergraduate degree, demonstrating that a large part of the interviewees already have a postgraduate degree and most of them have a specialization in lato-sensu (70%). Another piece of information related to the profile was the parameter of the time since graduation, which was mostly between 5 and 10 years, totaling (40%). Regarding the time of practice and experience in the profession, it corresponds to the same time of training between 5 and 10 years (40%).

Table 1 - Sociodemographic characteristics of the informants according to age, gender, academic background, time of academic training and time working in the area

Sociodemographic Characteristics of the Informants						
Age:	**25 to 30 years**	**31 to 35 years old**	**36 to 40 years old**	**41 to 45 years old**	**46 or more**	**Total**
	25%	40%	10%	10%	15%	100%
Gender:	**Male**		**Female**			**Total**
	35%		65%			100%
Training:	**Graduation**	**Post-Graduation (Specialization)**		**Masters**		**Total**
	25%	70%		5%		100%
Training Time:	**Up to 1 year**	**1 to 3 years**	**3 to 5 years**	**5 to 10 years**	**10 or more**	**Total**
	0%	10%	20%	40%	30%	100%
How long have you been working in the field?	**Up to 1 year**	**1 to 3 years**	**3 to 5 years**	**5 to 10 years**	**10 or more**	**Total**
	5%	20%	5%	40%	30%	100%

Source: Author, 2021

By analyzing the data reported by the pharmacists, we have the first questions addressed in (**Figure 2 A, B, and C**). Initially, it was demonstrated in (**Figure 2 A**), the technical responsibility of the pharmacy or health promotion service. Obtaining the information that (70%) of the pharmacists participating in this research are the technicians responsible for pharmacies and health care environments, that is, most of them (30%) do not have this attribution.

The results indicated that (70%) of the pharmacists had already worked in an injectable application room and (30%) had not had this experience (**Figure 2 B**). In addition, the data showed that the majority of pharmacists have training and qualification in the area, totaling (80%), although some, even qualified, do not have the opportunity to work in the establishments where they work and

(20%) of pharmacists do not have training and technical skills for the development of the practice (**Figure 2 C**).

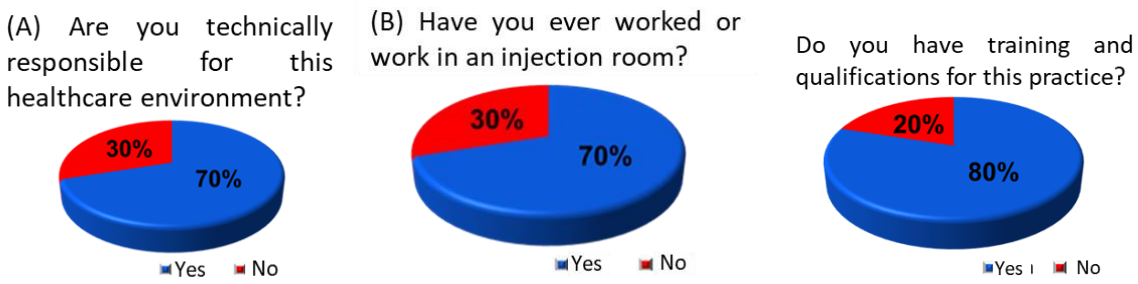
The results presented (**Figure 2 A**) corroborate the article by Oliveira, et al., (2017), which also presents a targeted context with an increase in the number of pharmacists working in drugstores in Brazil. In this study, 383 pharmacists (n=383) voluntarily participated, where (80%) of these pharmacists stated that they worked as technical managers (RT) in these commercial establishments. The authors reported that the responsibility for performing, supervising and coordinating all technical-scientific services of the company and establishment, such as pharmacy and health promotion environments, are the attributions of the pharmacist in charge of the technician (RT), who is responsible for the jurisdiction of the Federal Council of Pharmacy (CFF) and Health Surveillance bodies (OLIVEIRA, et al., 2017).

Similarly, Lucchetta and Mastroianni (2010) address in their study 85 health promotion units in a municipality in the central region of São Paulo with 200 thousand inhabitants, such as: public hospital, basic health unit, emergency care, private and public diagnostic center, in addition to 34 pharmacies and 52 drugstores. Among the 52 pharmaceutical RTs distributed among these AAS, 45 (86.5%) participated in the survey of the research in terms of knowledge. The RTs were questioned about their legal attributions, knowledge about the definitions of medications, such as the permission of injectable medications. (LUCCHETTA and MASTROIANNI, 2010).

Other current studies provide information that approximates the reasoning to the results we found and that were indicated in (**Figure 2 B and C**). Silva et al. (2015) demonstrate that 90 workers, including pharmacists and clerks, who worked in drugstores in a municipality in the interior of Minas Gerais and applied injectable medications, regardless of whether they had been trained and/or qualified for such a procedure, as it was verified that only the pharmacists in charge of the technicians were qualified for the activity of injecting drugs. This training is acquired through lectures and theoretical courses (SILVA, et al., 2015).

Indicating that there is a similar reality among the states, the percentage found in our studies did\ not show major differences, both in terms of technical accountability, which was also the majority, and in terms of the performance, training and qualification of pharmacists with regard to the practice of injecting drugs.

Figure 2



Legend: Representation of the questions applied in the evaluative questionnaire, being A- question 1, B- question 2, C- question 3.

Source: Author, 2021

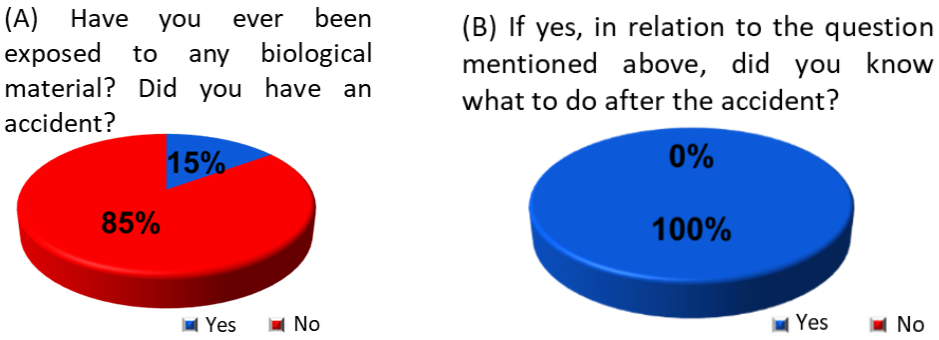
In the results that presented data associated with biological exposure accidentally through the acquired responses, they were illustrated in (**Figure 3 A and B**). It was demonstrated that most of the professionals had never been exposed to any biological risk (80%) and those who were exposed (15%) in their totality knew how to proceed in the face of the event, according to (**Figure 3 B**).

Similarly, Pontes et al. (2018) also presented data that indicated few reports regarding exposure to biological risks. Five students reported having suffered this accident, however only one notified the responsible sector and received outpatient follow-up, but they were aware of the risks, although they did not know how to proceed (PONTES, et al., 2018).

In 2015, another study showed that (100%) of the professionals who were exposed to biological risk sought immediate medical attention. Where (50%) sought care at the referral unit of a specialized service for acquired immunodeficiency syndrome (AIDS) and sexually transmitted infections (STIs), a unit indicated by the pharmacy and drugstore itself. Finally, (50%), on their own initiative, they turned to the private health care network (SILVA, et al., 2015).

Due to all the complexity of the subject, it was possible to discuss, through the research carried out, that most of the professionals are aware of the need to proceed after an accident with biological material for immediate care, in order to minimize the risks of contamination to which they were exposed, although there is still a need to improve the informative and educational means to further reduce these events.

Figure 3



Legend: Representation of the questions applied in the evaluative questionnaire, being A- question 4, B- question 5.
Source: Author, 2021

Many pharmaceutical professionals (95%) are aware of the biological risks to which they are exposed daily in the injectable room (**Figure 4 A**), however, (5%) claimed to be unaware of these risks.

The data shown in (**Figure 4 B**) indicated that (65%) of the investigated affirmed that the unit in which they work has protocols, such as: manuals of good practices and protocols displayed in the injectable drug application room. On the other hand, (35%) of those who responded stated that they did not have such informative documents on the use of sharps. The data presented warn of a worrying practice, given that studies published in 2015 indicated that sharps-related accidents are responsible for 80 to 90% of infectious disease transmissions among health workers (NOVACK, KARPIUC, et al., 2015).

Damasceno et al. also indicated, through a study with the participation of 382 health professionals in Goiânia, that many professionals do not have the necessary attention in relation to their own health care, ignoring or neglecting the risks related to accidents involving biological material with piercing and cutting agents (DAMASCENO, et al., 2006).

According to Santos et al. in 2012, their line of research showed that the rates of occupational accidents reported among physicians, pharmacists and nurses were lower in the literature analyzed, however, among the factors associated with the occurrence of occupational accidents, the inadequate use or resistance to use personal protective equipment (PPE) stands out, in addition to self-confidence, lack of continuous training, ineffective prevention measures and, finally, the inadequacy of disposal boxes for sharps (SANTOS, et al., 2012).

These studies demonstrate the existence of awareness among professionals about the exposed biological risk, but there is low adherence to protection measures. In other words, they are aware of the importance of the use of PPE, but due to the speed of care or even the lack of habit in using certain equipment, haste in performing a procedure, either due to work overload or the demand for care, safety is not properly prioritized (SANTOS, et al., 2012).

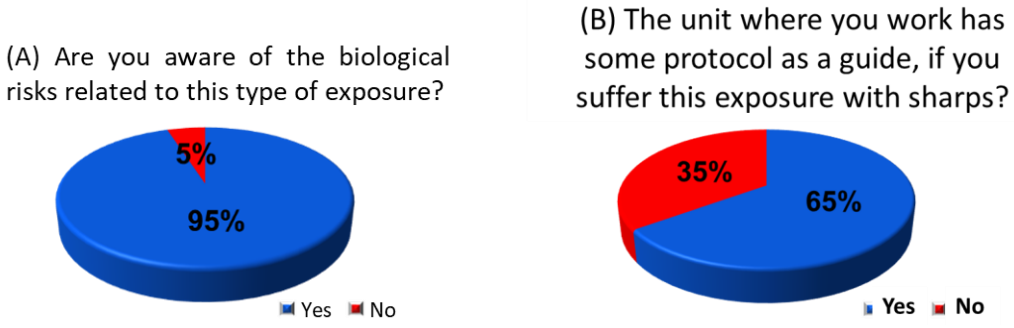
Finally, about RDC No. 44, of August 17, 2009, which provides for Good Pharmaceutical Practices for the sanitary control of the operation, dispensation and commercialization of products and the provision of pharmaceutical services in pharmacies and drugstores, and provides other measures, as already mentioned in the textual body of this research, it covers in its:

> Art. 27 – In training, employees must be instructed on procedures to be adopted in the event of accidents and episodes involving risks to the health of employees or users of pharmacies and drugstores (ANVISA, 2009).

In the current research, it is understood, correlating with the literature under analysis, that most pharmacists are aware of biological risks and their harmful consequences to health, as well as having knowledge of the protocols and all the existing apparatuses for their own safety. However, it is still perceived that (5%) are deprived of this information. This lack of education is directly related to the lack of continuing education. The lack of knowledge of the current legislation presents a small but worrying percentage regarding the prevention and exposure to biological risks, since, in view of the risks and vulnerability associated with this practice of injectable application, the pharmaceutical professional should have the primary commitment to know all these possible risk factors. Because he, in addition to being the possessor of scientific knowledge, has the technical support to carry out such practice and that no other professional, such as clerks and managers, even under his supervision, will not be able to perform them.

Another relevant finding for the research was the establishment in (**Figure 4 B).** More than one-third of respondents (35%) stated that they do not have standard operating procedures (SOPs) in AAS that have injectables, indicating the possibility of increased risks related to accidents.

Figure 4



Legend: Representation of the questions applied in the evaluative questionnaire, being A- question 6, B- question 7.
Source: Author, 2021

In the approach of (**Figure 5 A**) shows that (60%) of the pharmacists reported that no other professional working in the AAS practices the application of injectables, being a manager, owner or clerk. While (40%) answered yes, they know that other professionals work or have worked in this

practice. To the extent of this issue, the data presented to (**Figure 5 B)** point out that (35%) of these professionals have training and professional skills for this procedure, however, (15%) stated that these professionals do not have the training and qualification to perform this very important practice. In addition, (50%) of the interviewees did not know how to inform the other professionals who perform this function about this training.

All these data reinforce great concern, because, according to the Federal Council of Pharmacy, the administration of injectable drugs could only be administered by the pharmacist or by a qualified professional with the express authorization of the technical responsible in its Article 80. (CFF, 2001).

The National Council of Quality of the Order of Pharmacists defines specific rules on the administration of medicines, which, in the context of community pharmacy, is an activity to be carried out exclusively by pharmacists (ORDEM DOS FARMACÊUTICOS, 2009).

Following the above-mentioned publication regarding the administration of injectable drugs, which includes several requirements for administration of this drug. Subsequently, the National Authority for Medicines and Health Products, I.P. (indicated by Inframed) brings in its deliberation No. 139/CD/2010, of November 4, the establishment of the conditions that proceed to the administration of vaccines in pharmacies where they now have the following report:

> The administration of vaccines in pharmacies is the responsibility of the pharmacist, technical director of the pharmacy and must be carried out by pharmacists with appropriate training, recognized by the Order of Pharmacists, or by nurses specifically and exclusively hired for this purpose. (Resolution No. 145/CD/2010).

It is understood that although these deliberations refer to the administration of vaccines not included in the PNV (National Vaccine Program) or PNI (National Immunization Program), due to the links and similarities, it is to be considered that these procedures extend to the administration of injectables.

Focused on this context, the National Directorate of the Order of Pharmacists approved minimum requirements for the recognition of training in the administration of vaccines and injectable medicines, as well as the recognition of training and updating in this practice. According to these standards, pharmacists will need to obtain certification for registration and confirmation of their aptitude and competence. For the purposes of recertification, the technical director of the pharmacy must issue a statement in order to prove the practice of administering injectable medications, in which this pharmacist will perform this function later in the health care establishment that is the pharmacy (SANTOS, AZOIA, GUERREIRO, 2014).

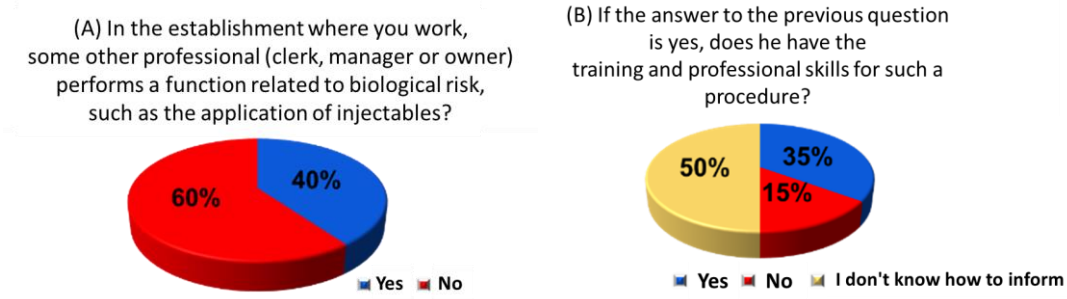
Within the context presented, studies in a city in the interior of São Paulo, thirty-four (n=34) pharmacy clerks who participated in the study, regarding their level of education, the predominance of high school was established. Therefore, the problem was presented, as it was confirmed that the clerks

did not have technical, scientific and legal knowledge to direct the use of medication, regardless of the route administered (GIR, et al, 2003).

Based on this literature, the present research reveals an aggravating factor to the detriment of illegal functions within health promotion establishments in the Lakes Region/RJ. Not only does this lead to a legal process due to all the documentary content mentioned in the body of the text above, but it also puts his own pharmaceutical activity at risk with regard to his professional registration, since he is the technical responsible for this health care unit and is aware of the exclusivity of his attributions. in addition to having a whole team under your care.

Professionals who work in pharmacies and drugstores and who perform procedures with biological risk should be periodically trained in the existing occupational prevention and post-exposure measures, considering that the vast majority of clerks have not taken specific technical or higher education courses in the health area. It is confirmed that these workers do not have scientific knowledge of the microbiological contaminants involved in the technique, that is, the procedure ends up being performed because it has become something habitual. It is up to the pharmacist to assume his posture as a qualified and trained professional to prevent possible errors and malpractice in the applied procedure.

Figure 5



Legend: Representation of the questions applied in the evaluative questionnaire, being A- question 9, B- question 10.
Source: Author, 2021

Information on the knowledge of the pharmaceutical professional in relation to NR 32 (Regulatory Standard), which aims to establish the basic guidelines for the implementation of measures to protect the safety and health of health service workers, as well as others who carry out health promotion and care activities in general, were presented in (**Figure 6 A, B, C, and D**). Such results establish safety parameters in all the logistics of an injectable drug delivery room **(Figure 6 A**). These results show that (75%) of the interviewees stated that they were aware of this regulation. In the same way, **(Figure 6 B),** it establishes the importance of the utensils in the injectable room, if these equipment are in compliance with the standards to favor the correct application procedure within the correct logistics. More than 2 thirds of the interviewees (85%) stated that they have appropriate

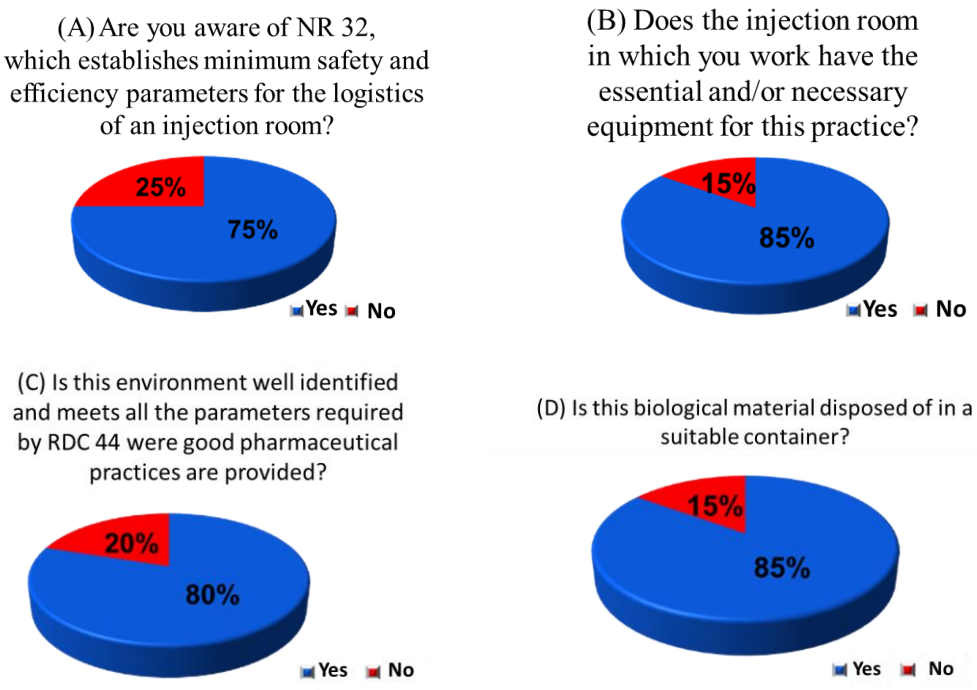
logistics for the performance of actions aimed at injectable applications. Even though those who responded that they did not have these essential materials expressed a small percentage of 15% compared to the statement of opposition, the data represent a very worrying statistic when looking at the degree of importance of this material. On the other hand, (**Figure C**) shows data inherent to the correct identification according to RDC 44, which governs good pharmaceutical practices. The vast majority (80%) say that the places where they work have signs in accordance with legal requirements. And finally, not most importantly, but presenting a considerable weight for this theme (**Figure 6 D)** are representative data on the correct disposal of biological material. Only 15% said they did not know and did not have the appropriate container. Reaffirming the importance of the provision of *Descarpack* recommended in the legislation in force in the AAS.

The results inherent to the information on knowledge about NR 32 and the safety parameters for the injectable room, as well as whether the room has elements for practice, and whether it complies with the parameters of RDC 44, correctly disposing of biological materials, were presented in (**Figure 6**). They indicate that most of the professionals participating in the research are aware of NR 32, as well as the presence and need for adequate disposal parameters to minimize the risk of accidents, being well identified by RDC 44.

The study by Silva and Campos in 2018 presented results where they described some pharmacies in Goiás, which had deficiencies in several stages in relation to the disposal of biological material. These studies confirm that establishments need to act correctly throughout the flow, from management to final disposal of waste. In contrast, in the study by Damasceno et al. in 2006, they demonstrated that many professionals are still resistant to adopting recommended preventive measures and the use of PPE (DAMASCENO, et al, 2006).

In the present research, it is observed that there is still a deficiency on the part of pharmacists, although in their minority, but becoming a relevant percentage in terms of safety and health knowledge of the professionals involved in the practice of injecting in the face of biological contaminants, as well as related to the standards and resolutions that guide all logistics and good practices. Since 15% of the patient received a negative answer regarding the correct disposal of sharps, it is understood that these professionals allow themselves to be exposed to this condition. With a negative response (25%) to the knowledge of NR32, it reaffirms that biosafety is a set of actions, equipment, methodologies, procedures and techniques appropriate to extinguish or minimize accidental, ergonomic, physical, chemical and biological risks related to work activities. Being devoid of this understanding, it is easy to fall into a wrong environment structurally and legally, as they will not be able to position themselves and have the autonomy to make the necessary changes due to the lack of this essential information.

Figure 6



Legend: Representation of the questions applied in the evaluative questionnaire, being A- question 11, B- question 12, C- question 13, D- question 14.

Source: Author, 2021

The results expressed in (**Figure 7)** present the relationship on the processing of contaminated waste generated. Where they were asked about the existence of a third-party company responsible for carrying out this collection and, consequently, the proper disposal (**Figure 7 A)**. The majority of professionals (85%) answered that the company they work for has a company responsible for the collection of biological waste, as well as in the studies by Silva and Campos, they highlighted that they temporarily stored the garbage with biological material in a cabinet in the injectable room and then delivered it to the company that performs the incineration service (SILVA and CAMPOS, 2018). In addition, in (**Figure 7 B)**, was referenced about the certification and authorization issued by the city hall, attesting to whether the injectable application room of the pharmacy or health promotion environment meets the sanitary standards established by the municipality for its operation, in this scenario the majority of professionals (90%) said that the companies they work for have the necessary documentation. Consonant, in (**Figure 7 C)**, data were related to the possible visit and inspection of injectable treatment rooms by inspection agencies. More than half of the professionals (60%) stated that they are inspected in their work environments and presenting a very expressive percentage portraying this absence, (40%) expressed that there is no regular inspection, since the author Oliveira, et al., (2020) described in their literature review that materials for disposal have become something very common not being found in different AAS, a management plan for these contaminated wastes, causing damage not only to human health but also to the environment, also pointed out that there is a deficit in relation to sanitary inspections for the control of this waste (OLIVEIRA, et al., 2020).

RDC No. 222 of March 28, 2018, addresses the RSS (Health Service Waste) of Group E in its Art. 86 describes that: "Sharps must be disposed of in labeled, rigid containers with lids, resistant to puncture, rupture and leakage."

> Art. 87 Group E RSS packaging containers must be replaced according to demand or when the filling level reaches 3/4 (three quarters) of the capacity or according to the manufacturer's instructions, and manual emptying and reuse are prohibited.

As far as the Health Surveillance is concerned, an investigation was carried out *On-site* in all community pharmacies (public, philanthropic and private) in a given municipality in the interior of Rio de Janeiro in order to see the adequacy of these places in relation to the legal frameworks along with their regulation. It was observed that both the work process and its physical structure did not meet the recommendations of the legislation, which points to failures for pharmaceutical and drug care due to the lack of legal and technical competence (VIEIRA, COSTA, SOLER, 2016).

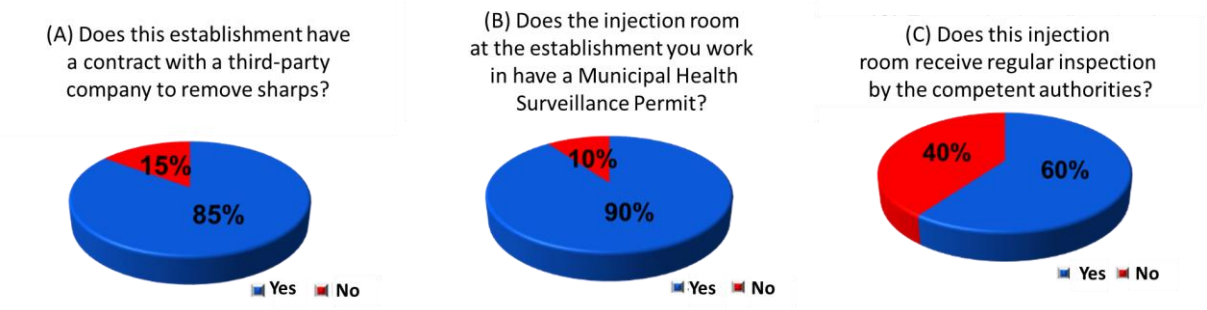
According to Silva and Vieira, based on 175 drugstores in the interior of São Paulo, 100 pharmacists Technical managers (RT) were interviewed to evaluate the legal aspects that govern the operation of drugstores and the profession, where they detected a deficit (50%) in the knowledge about the legal requirements of the permanence of pharmacists in the drugstores in the full-time operation of the establishment and about the regulation of the profession. An important fact that corroborates this current research is that only (15%) of the interviewees (99%) referred to an attribution of the pharmacist to the application of injectables (SILVA and VIEIRA, 2004).

The author verified the existence of a "myth" among them (pharmacists) regarding the prohibition for the procedure of injecting the application of injectables. (23%) made a mistake or did not know how to give an answer regarding "the pharmacist is prohibited by law from administering injectables", meaning the existence of a pharmaceutical professional who believes that he is prohibited by law from exercising such practice (SILVA and VIEIRA, 2004).

In view of all the subject explained above, it is understood through the current theme that pharmaceutical professionals with their institution located in the Lakes Region/RJ have the science and concern with the proper disposal of contaminating materials, such as biological and even chemical waste in the case of medicines, having outsourced companies to dispose of them in appropriate places, such as landfill or incineration process.

However, there are still few policies aimed at promoting the correct disposal of medicines and microbiological materials, in addition to the lack of supervision by competent health entities, as shown by the percentage of this survey where (40%) answers that there is no regular inspection, which contributes to an often inadequate disposal of waste from health services. as well as the maintenance of incorrect logistics to carry out the procedures that require care regarding exposure to biological risks.

Figure 7



Legend: Representation of the questions applied in the evaluation questionnaire, being A- question 15, B- question 16, C- question 17.

Source: Author, 2021

Finally, (**Figure 8 A)** presented data on the continuing education of pharmaceutical professionals regarding training for the application of injectables, interestingly, only 55% answered that they have been updated and only 15% of the professionals stated that they are not up to date with their vaccination schedule against Hepatitis B and Tetanus vaccines. This result provides further concern regarding the study carried out, since these professionals may be exposed to biological risks (**Figure 8 B).**

Regarding vaccines, the study by Pontes et al. 2018 observed that only 50% of students reported being up to date with their vaccination, of these, 56% against hepatitis B and 78% against tetanus. This study also points out that if it is necessary to continue training future professionals in biosafety training and monitoring vaccination coverage, it needs to be effective, since safe and conscious practice minimizes the risks of contamination in the environments where this future professional will work.

In the study addressed by Lucchetta and Mastroianni (2010), it was observed in their results that the level of conduct was more satisfactory than the level of knowledge on the part of RT pharmacists in their attributions, which can be explained by their time of training favoring greater practice. As for knowledge, the level has become low due to the lack of updating rather than the training itself. The study points out that these evidences are due to the lack of habit in seeking continuing education and participation in congresses, where often these congresses are attended mostly by academics and not pharmaceutical professionals already active, so the study suggests strategies to encourage the habit of updating. (LUCCHETA and MASTROIANNI, 2010).

In relation to the authors' study, it is necessary to identify the causes of accidents and for this, continuing education can be used as a strategy to minimize risks and, thus, investment in continuing education is necessary, and for any educational program to be successful, it must be linked to the participation and recognition by the workers and support of the institution (NOVACK, KARPIUCK, 2015).

The current study brings a relevant point when it comes to continuing education, it is noticed that (45%) of the professionals do not update themselves, it is not known if it is due to the lack of

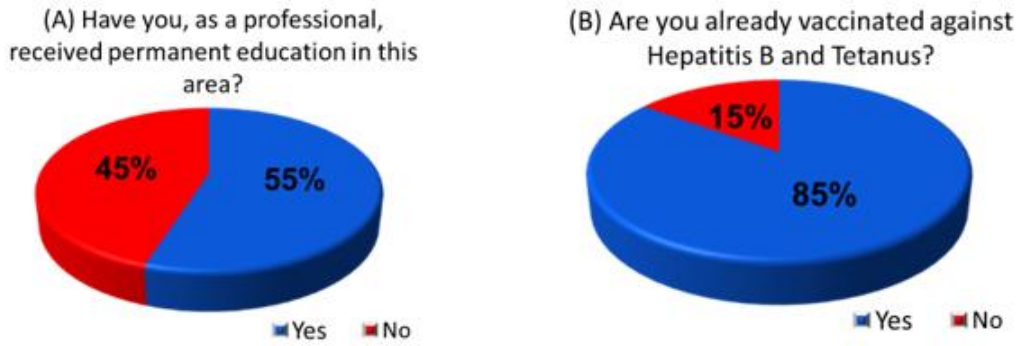
seeking to be trained, due to the lack of time since the workload is overloaded or even by the institution that does not provide the incentive, but according to the National Council of Quality of the Order of Pharmacists it says that it is the competence of the Pharmacist to continue training where it should include the attendance of scientific and technical training courses, such as participation in symposia, congresses and other scientific initiation projects, as well as reading publications with the aim of professional updating and strengthening of their skills.

RDC 44, of August 17, 2009, in its section III, speaks of the training of employees in its Articles 24, 26 and 27:

> Art. 24. All employees must be trained in complying with current health legislation applicable to pharmacies and drugstores, as well as the establishment's Standard Operating Procedures (SOPs).
> Art. 26. Initial and continuous training on the use and disposal of PPE should be provided, in accordance with the Health Services Waste Management Plan - PGRSS, according to specific legislation.
> Art. 27. During training, employees should be instructed on procedures to be adopted in the event of accidents and episodes involving health risks to employees or users of pharmacies and drugstores.

This is the legal support that the professional has regarding continuing education. On the other hand, the relevant point, even if in a total of 15%, refers to the concern about the vaccination schedule of these working professionals, because in view of the practice developed, which is the application of injectable drugs, it becomes extremely important to require vaccination coverage for all professionals involved.

Figure 8



Legend: Representation of the questions applied in the evaluative questionnaire, being A- question 18, B- question 19.
Source: Author, 2021

Concerning **Question 8 (eight)** From this evaluative questionnaire, which is described in text form, (65%) of the participating pharmaceutical professionals believe that they will be welcomed by the institution in the event of an accident with biological material and the others (35%) believe that they will not be supported.

The author Azevedo, et al., used a quantitative, descriptive, and retrospective method in the database of a given hospital pharmacy. A total of 529 cases of accidents involving exposure to biological material were reported, 496 (93.8%) required post-accident prophylaxis and (43.3%) did not obtain information from the source. The author points out in his study that exposure to biological material causes not only physical but also emotional damage and extends to the victim's social and family environment (AZEVEDO, et al., 2019).

It is understood that all professionals who suffer this type of exposure deserve all the support, both from the health team and from the institution through which they provide their services and care. In the present study, a percentage of (65%) of confirmation by the professionals regarding this embracement was observed. This becomes important for the professional in terms of trust and credibility. This also leads us to review some positions and conducts on the part of the institutions when a percentage of (35%) who do not believe that they will be welcomed is verified. An issue to be analyzed, because it brings to light some indications, do you not accept because you neglect the fact or because you do not know how to conduct? That is a question to be evaluated.

4 CONCLUSION

In view of the above, it is concluded that most of the pharmaceutical professionals involved in the practice of injecting drugs in health promotion services such as pharmacies and drugstores, among other AAS, are the technicians responsible for the establishment. They demonstrated to have scientific knowledge, training and qualification to perform the procedure, as well as the understanding of health safety protocols, regulatory standards of good practices and biological risks inherent to the practice, but within this group there is still a portion devoid of this understanding, which becomes worrying since he is the main responsible for carrying out this attribution supported by law.

The fact that this small portion is unaware of these standards, which guide all part of the structural logistics of an injectable application room, makes these professionals much more susceptible to risks with microbiological contaminating materials. Another aggravating point, that within this study, the lack of knowledge on the part of pharmacists regarding the training of clerks to practice the application of injectables was presented, it is understood that once they are not able to practice, they are more vulnerable to errors, malpractice and consequently exposed to risks. In view of this result obtained in the research, the need to broaden the discussion on occupational risks, occupational accidents and reinforce the need to have permanent education, as well as the elaboration of health policies for the pharmaceutical professional, is emphasized.

It also reinforces the need for regular sanitary inspection, which will also help to minimize accidents, since they will detect non-conformities, whether of physical structure, and even of actions developed such as the improper disposal of sharps and biological waste. Now when the pharmacy

becomes a health promotion establishment and develops activities of exposure of the professional himself, the role of the pharmacist is not limited only to facilitating the patient's access to the proposed treatment, he also becomes the target of care and due support when his health is exposed to both operational and biological risks.

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SEVEN
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The technological transformation of higher education in the context of the COVID-19 pandemic – Knowledge and challenges

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Ana Beatriz Carvalho de Souza
Nursing students from the Faculty of Education and Health Sciences. Brazil, Sao Paulo.

Augusto Minelli Amaral
Nursing students from the Faculty of Education and Health Sciences. Brazil, Sao Paulo.

Bianca Andriguetto Oliveira
Nursing students from the Faculty of Education and Health Sciences. Brazil, Sao Paulo.

Eduarda Tsuneme Hayashi Salomão
Nursing students from the Faculty of Education and Health Sciences. Brazil, Sao Paulo.

Barbara Barbosa
Professor of the Nursing course at the Faculty of Education and Health Sciences. Brazil, Sao Paulo.

ABSTRACT
In 2020 the first cases of COVID-19 were diagnosed in Brazil. A worldwide virus that caused a pandemic and a quarantine was established in much of the world, a way to avoid personal contact in order to control the spread. It has the objective of showing the adaptations, methods and feelings of the students and teachers adopted in this pandemic, with an integrative study methodology and virtual research, based on the last 5 years. Twenty-four articles were discussed, resulting in the adaptation of the new routine with digital platforms and interactions through video-classes, animations, among others. It was reported that the lack of a stable connection and modern devices hindered the interaction in these online classes proposed by the universities. It is possible to conclude that despite the difficulty with the adaptations, creating an educational and practical way to present the classes, with the application of assessments and interactions by various means, made that education did not suspend.

Keywords: COVID-19, Nursing, Higher education, Pandemic, Technology.

1 INTRODUCTION

Throughout our history, humanity has experienced the most diverse pandemics that have marked humanity. However, in December 2019, the first case of an infectious disease originating from the new Coronavirus (SARS-COV-2) was discovered, which would later be officially considered a pandemic in March 2020 by the World Health Organization (WHO) and would lead humanity to change the modern lifestyle.[1]

In a short time, concerts, trips to the mall and even visits to parents' homes became restrained or at least mitigated to give way to quarantine. All this meant that we all had to adapt to a new reality in which many companies had to send their employees home to work from home. All these changes also had to occur in the educational field, therefore, the Ministry of Education through ordinance No. 343 of March 17, 2020 allowed the replacement of face-to-face classes with those in digital media, thus, a race began to adapt an entire education network that was mostly integrated with face-to-face

teaching to remote teaching. [1]

From another perspective, teachers also had to enter this race, but they not only had to adapt to the new teaching platforms that would be introduced to them and to the students, but also to adapt all that material that they were used to working with for years to a new reality, where they would no longer have direct contact with the student. [2] The greatest challenge was to transform the culture of education, which, although based on new distance learning formats, blurred its traditional characteristics.[2]

All these adversities were even greater for the areas of study that involve practical activities, since with the persistence of the pandemic, many of them also had to be adapted.[3] Thus, teachers also had the challenge of creating didactic strategies that, combined with the use of technology, brought a new way of educating, a way that even with social distancing brings students to the theme and keeps teaching pleasurable.[4]

Based on our view as undergraduates, experiencing from the 3rd to the 6th semester of higher education, we were able to witness and observe several divergences during this period considering that everything happened quickly, in a matter of months and in some cases, days, everyone had to adapt their residence to a study environment closer to the appropriate one and it is known that in all residences we have different realities, So, the students constantly experienced these events in the virtual classroom, such as: students who could not attend classes due to unfavorable socioeconomic conditions, the clear effort of teachers to maintain students' interest, the lack of spaces for study, and even mothers who had to explain to their children why even she was there at home could not give attention as he was used to.[5]

Through experiences, both her own and those of her classmates and their respective teachers, she felt the need to report the various adaptations suffered by the teaching method during these 2 years of the pandemic, as well as the different opinions that emerged in the face of these changes, such as positively and negatively, in addition to the fact that these adaptations have been observed and experienced since the beginning of the pandemic, as well as the comparison between the quality of teaching before and after the pandemic. In this context, this work will enunciate the technological adaptations and teaching methods during this period, in addition to the feeling of teachers and students in the face of all the challenges imposed by distance learning during the covid-19 period.

2 OBJECTIVE

Enunciate what adaptations and teaching methods have been established by higher education institutions to meet the academic needs of teachers and students during the COVID-19 pandemic. In addition, to highlight the feelings and challenges of educators and academics in relation to adaptations and methods during the period.

3 METHOD

The study method consists of an integrative study, with a qualitative approach in a descriptive format, carried out through a literature review, where the study was conducted.

The search period was conducted between March and April 2022. The methods used for inclusion were scientific articles published in the 5-year interval period, from 2018 to 2022, in Spanish, English and Portuguese, available in full and which allows to determine the topics related to the objective of the work. Respecting the exclusion guidelines, the criteria used were articles outside the established period, editorials with only one author, articles that did not fit the theme criterion related to the theme, articles that did not refer to undergraduate nursing students, and duplicate articles.

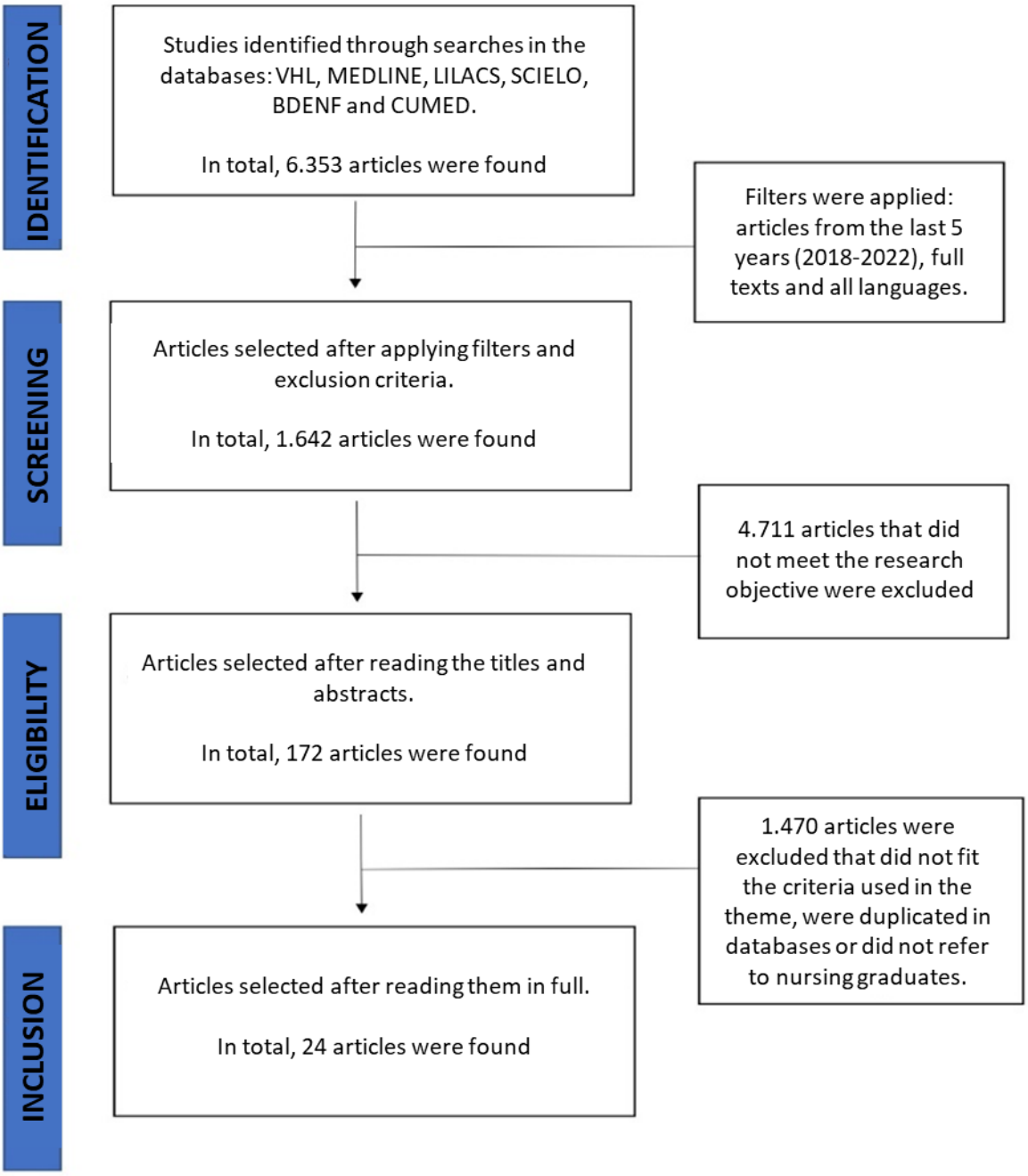
The descriptors used for this research were: distance learning, pandemic, covid-19, students, teachers, technology, nursing, and higher education in the pandemic, in order to discuss the subject addressed.

The analysis and data collection were carried out by the 4 researchers, Ana Beatriz Carvalho de Souza, Augusto Minelli Amaral, Bianca Andriguetto Oliveira and Eduarda Tsuneme Hayashi Salomão, independently and compared consecutively. Data collection was performed with a previously defined protocol, with the purpose of capturing, analyzing, organizing and compendium of information.

The resolution of the data was studied in an expository way and grouped in descriptive tables containing the summary information of the studies and quality research.

Flow chart

Figure 1 - Summary of the selection process of articles for integrative literature review. Brazil, 2022.



4 RESULTS

From the searches in the established databases, 6,353 articles were obtained. After application of the designated filters, 1,642 articles remained. Applying the exclusion and inclusion criteria defined, 172 articles were obtained. After reading them in full, 24 articles were arranged in order from the most recent to the most decrepit for the year of publication (Table 1).

Table 1 – Papers selected for analysis

Title	Authors	Year of Publication	Main Results
Perspectives of a school teacher and teacher educators teaching during the COVID-19 situation: between insiders	Kucera, Charles; Ovens, Alan; Gomes, Anne Lisa of the Vale; Bennett, Blake.	2022	The rapid migration to a virtual environment profoundly challenges educators' pedagogical praxis, technical proficiency, ability to be consistent with their beliefs, values, theoretical and practical approaches.
Professional practice environment in nursing from the perspective of students in COVID-19	Dorneles Nery, Victoria; de Oliveira Linares, Matheus; Martins, Bruna; Barros Reis, Maycon; Mayumi Yoshimura de Campos, Michelle; Taminato, Monica; Pazetto Balsanelli; Alexander.	2022	Subscale 3 "adequacy of the team and resources" was the only one with an unfavorable mean (53.49%). The variable "having worked and/or performed an extracurricular internship" was statistically significant in Subscale 2 "ability, leadership and support from nursing coordinators/supervisors to nurses/nursing staff" (p=0.003). In the general average, the students evaluated the environment as favorable (p<0.001).
Experience in remote classes in the context of the COVID-19 pandemic	Silva, Fernanda de Oliveira; Santos, Bruna Marques de Lima; Jesus, Ana Carolina dos Santos de; Silva, Joise Magarão Queiroz; Lefundes, Talita Batista; Anjos, Karla Ferraz dos.	2021	The emergency need for the use of digital technologies had implications for students, teachers and managers, even in the face of the benefits in the teaching and learning process, such as the (re)adaptation to the remote format and the incipience of training for the use of information and communication technologies.
Transition from face-to-face to remote teaching in times of COVID-19: teacher perspective	Santos, Loiane Letícia dos; Nery, Nathalia de Moraes Lebeis; Carvalho, Enderson Rodrigues de; Cecilio-Fernandes, Dario.	2021	Such reflections address the advances and challenges related to teacher development, adaptations in theoretical, theoretical-practical classes, supervised mandatory internships and student assessment in remote emergency teaching.
COVID-19: emergency remote teaching and mental health of university faculty	Maria Ricardo Félix dos Santos, Georgia; Elaine da Silva, Maria; Belmonte, Bernardo.	2021	Teachers were faced with new demands that had repercussions on their social and work routine, due to the increase in workload, rhythm and diversity of work. These

			professionals were affected in financial, affective and motivational aspects.
Developing critical thinking in nursing education: a challenge in times of the Covid-19 pandemic	Riegel, Fernando; Martini, Jussara Gue; Bresolin, Paula; Mohallem, Andrea Gomes C; Nes, Andréa Aparecida Gonçalves.	2021	This discussion categorized two reflective theoretical points: The importance of critical thinking in nursing education and innovation to stimulate critical thinking. The current moment of calamity assumes a pedagogical character because it teaches about the need for changes in the ways of providing care, management and research, as well as signaling to the field of health education the need to adapt the teaching and learning processes to the reality of the students' living conditions.
The Use of Emergency Remote Teaching During the Covid19 Pandemic: Experience of Faculty in Higher Education in Nursing	Fernandes, Sâmara Fontes; Nunes, Rafael Jeremias de Aquino; Almeida Neta, Antonia Gomes de; Menezes, Harlon França de; Melo, Kísia Cristina de Oliveira and; Freitas, Rodrigo Jácob Moreira de; Soares, hemis Cristina Mesquita; Silva, Richardson Augusto Rosendo da.	2021	Digital distance learning platforms have a range of diverse resources, are organized by defined spaces where it is possible to make video classes, teaching materials, extra activities, doubt forums, notices, schedules and follow-up notes available, in addition to the fact that some study references, activities and practical challenges are already offered to students, being a high quality material. However, they need computers and/or cell phones that support the programs and quality internet to process them.
Innovating in Times of Pandemic: Technology-Enriched Teaching Strategies for Health Sciences Students on Social Media	Rodriguez Enriquez, Carolina; Doninalli, Marián.	2021	91% of students were satisfied with the new method; 95.5% agree that the contents studied will be applied in practice; 91% agreed that the course was organized and 59% strongly agreed with all the evaluative topics.
Problem-based learning in remote teaching: nursing students' experiences in the covid-19 pandemic	Rodrigues, Paula Sales; Marin, Maria José Sanches; Souza, Aline Pereira; Grandin, Gabriela Martins; Almeida, Karina Roberta Vieira de; Oliveira,	2021	Four themes were identified in the analysis of these students' perception of the remote tutorial process: the dynamics of the remote tutorial process; the

	Carolina Saab Rocha de.		limitations imposed on activities at home; the discomforts of the pandemic and the lack of institutional resources and moments of coexistence.
The remote work of teaching nurses in times of pandemic	Araújo, Anna Raquel Lima; Sousa, Larisse Marques Costa; Carvalho, Rita Beatriz de Sousa; Oliveira, Adélia Dalva da Silva; Amorim, Fernanda Cláudia Miranda; Sousa, Kayo Henrique Jardel Feitosa; Zeitoune, Regina Célia Gollner; Damasceno, Carolinne Kilcia Carvalho Sena.	2021	Remote teaching has generated changes in routine, with the need to adapt classes to the virtual environment and home rearrangements. These aspects have been maximized by the lack of mastery over digital tools, which has increased job demands. Sometimes they felt distressed, sad, guilty, and alone because of the obstacles to establishing relationships with the students. Work overload contributed to the physical and emotional illness of the nurse professors.
Remote Emergency Teaching: A Neurophysiology Perspective	Coutinho, André Almo de Moraes; Kubrusly, Regina Célia Cussa; Borges-Martins, Vladimir Pedro Peralva.	2021	The impacts of social distancing on higher education through a neurophysiological approach, connecting stress, empathy and the historical context of emergency teaching, in addition to the tools at our disposal and the complexities of the virtual environment.
Being a nursing student in times of COVID-19	Baixinho, Cristina Lavareda; Ferreira, Óscar Ramos.	2021	5 categories emerged: difficulties experienced in integration; difficulties in the implementation of clinical teaching; influence of the pandemic on students' expectations regarding clinical teaching for integration into professional life; fears related to COVID 19 and suggestions for the training of nursing graduates, with a view to empowering them to manage pandemic situations.
Repercussions of COVID-19 and possibilities for promoting health: thinking with nursing students / Repercusiones del COVID-19 y las posibilidades de promoção la salud:	Souza, Jeane Barros de; Madureira, Valéria Faganello; Friestino, Jane Kelly Oliveira; Tombini, Larissa Hermes Thomas; Tomasi, Yana Tamara; Konrad, Angélica Zanettini.	2021	It is urgent to promote the health of students from the perspective of uncovering feelings and announcing strategies to overcome difficulties, with emphasis on the awakening of coping skills and resilience.

reflexiones junto a estudantes de nursing			
Daily life of university students in the health area during the beginning of the Covid-19 pandemic in Brazil	Ferreira da Mata, Luciana Regina; Dias Reis Pessalacia, Juliana; Prette Kuznier, Tatiane; da Silva Neto, Priscila Kelly; de Castro Moura, Caroline; Ribeiro dos Santos, Fernando.	2021	The main changes that have occurred in the daily lives of health students are related to lower productivity; difficulty concentrating; increased hours of sleep, weight, use of electrical and electronic equipment; poorer food quality; increased consumption of food, licit and illicit substances, and medications (especially analgesics, anxiolytics, and antidepressants); less interest in personal appearance and greater contact with family members.
Experiencias docentes del uso de la tecnología educativa en el marco de la pandemia por COVID-19 / Teaching experiences with the use of educative technology in the context of the pandemic by COVID-19 / Experiências de ensino do uso de tecnologia educacional no contexto da pandemia COVID-19	Garcia-Leal, Mariel; Medrano-Rodriguez, Hernandez; Vazquez-Acevedo, Joseph Anthony; Romero-Rojas, Jose Carlos; Berrún-Castañón, Luz Natalia.	2021	The challenges identified from the teacher's perspective were categorized according to their own role, based on what they glimpsed in their students, ranging from socio-affective, technological, communication, pedagogical and academic problems.
Psychological well-being and coping in nursing students during COVID-19 quarantine	Silva, Mafalda Sofia da; Marques, Goreti Filipa; Reis, Ana Catarina; Lourenço, Tânia; Abreu-Figueiredo, Rita; Gonçalves, Maria Luísa; Santos, Maria Luisa.	2021	Students in the last years of the course more frequently use instrumental ($p = 0.015$) and emotional ($p = 0.009$) coping strategies, and also have higher levels of psychological well-being ($p = 0.012$). Changes in family income are associated with psychological well-being ($p = 0.024$), as well as coping strategies for religion ($r = 0.36$; $p \leq 0.01$), positive reinterpretation ($r = 0.47$; $p \leq 0.01$) and mood ($r = 0.37$; $p \leq 0.01$).
Emergency remote teaching in undergraduate nursing: experience report	Bastos, Milena de Carvalho; Canavarro, Danielle de Andrade;	2020	Supported by the dialogic education model, the process of emergency

on covid-19	Campos, Luana Moura; Schulz, Renata da Silva; Santos, Josely Bruce dos; Santos, Claudenice Ferreira dos.		remote teaching of classes demanded the approximation of teachers and students to virtual reality, in addition to the restructuring of the teaching strategies adopted by the faculty.
Adaptation to Higher Education, Learning Strategies and Motivation of Distance Learning Students.	Bacan, Aline Ribeiro; Martins, Gustavo Henrique; Santos, Acácia Aparecida Angeli dos.	2020	Indicators show that students have adaptive behaviors favorable to distance learning, but with nuances, such as social, age, and gender levels, showing that they impact in some way on the student's life.
Challenges of remote learning by university students in the context of Covid-19	Lima, Alisson Cunha; Freitas, Jacqueline Oliveira; Pereira, Lucas de Almeida Santos Rocha; Silva, Vanessa Gomes da; Coelho, Maíra Moreira Peixoto; Peixoto, Thais Moreira; Andrade, Juliana Nascimento; Musse, Jamilly de Oliveira.	2020	Carrying out an innovative work, focused on the initial and continuing education of students, teachers and health professionals. Changes in the flow of patients, production of booklets and articles were also developed.
The impact of the new coronavirus pandemic on the quality of life of nursing students	Ramos, Tangriane Hainiski; Pedrolo, Edivane; Santana, Leni de Lima; Ziesemer, Nadine de Biagi Souza; Haeffner, Raphael; Carvalho, Telma Pelaes de.	2020	63.6% rated their quality of life as good and 47.3% were satisfied with their health. The "Physical" item had the highest score, 67.9%, while the "Psychological" item had the lowest score, 58.2%. The "Psychological" domain was significantly affected by marital status, work, and household support.
Coping with COVID-19: what cannot be relativized in higher education in nursing	Angélica de Almeida Peres, Maria; Antônio Gomes Brandão, Marcos ; Geovana Gama de Sousa Aperibense, Pacita; Cabral de Lacerda, Alessandra; Paim, Lygia; by Assunção Ferreira, Márcia.	2020	Recently graduated nurses, in the process of accelerated training, will have few resources available for the empirical standard of knowledge, both because of the reduced framework of evidence of knowledge and because of the difficulty in dealing with mechanisms that are often unknown.
Strategies and challenges of remote teaching in Nursing	Silveira, Andressa da; Santos, Naiana Oliveira dos; Wilhelm, Laís Antunes; Soccol, Keity Laís Siepmann; Tisott, Zaira Letícia; Prates, Lisie Alende.	2020	Main challenges: difficulty in accessing the internet by students, which can lead to dropout and interfere with learning. Strategies such as the use of interactive technologies have been

			shown to facilitate remote teaching.
Strategies for the resumption of higher education in health in the face of COVID-19	Oliveira, Zulmerinda Meira; Freitas, Lívia Maria Andrade de; Santos, Nilton Cesar Nogueira dos; Dias, Joana Angélica Andrade; Freitas, Maria da Conceição Andrade de; Oliveira, Tiago Meira.	2020	The first axis highlights the adoption of virtual strategies to avoid agglomerations and the risk of contamination by COVID-19; the second, the use of biosafety measures to carry out face-to-face academic activities and the third, the actions to cope with the emotional stress experienced by teachers and students in this same context.
COVID-19 pandemic and the possibilities of reframing management activities in higher education: experience report	Ferreira, Glaucirene Siebra Moura; Vasconcelos, Lourdes Claudenia Aguiar; Ferreira, Francisco Ivanildo Sales; Oliveira, Paciolo Montini Costa; Paula, Paulo Henrique Alexandre de.	2020	Stages: 1 - Scenario analysis: the understanding of the new reality was abruptly established that affected the normal development of academic activities; 2 - Planning: virtual technological resource for the definition of the necessary points that should be contemplated in the planning; 3 - Action: Adaptations of face-to-face teaching to digital platforms are promoted, we (re)build ourselves for a new way of working.

According to the year of publication, the following distribution was obtained: 2022 (2), 2021 (14) and 2020 (8). Regarding the type of publication, the following composition was acquired: Experience Report (7), Cross-Sectional Study (6), Qualitative Study (5), Theoretical-Reflective Study (3), Narrative Review (1), Bibliographic Review (1) and Self-Study (1).

In order to analyze and discuss the information obtained, the studies were grouped into categories by thematic adherence, which are: "Adaptations and Teaching Methods", "Feelings and Challenges of Teachers" and "Feelings and Challenges of Academics".

5 ADAPTATIONS AND TEACHING METHODS

On March 30, 2020, synchronous classes were started and the ability to resignify teachers, students and administrative staff gained notoriety. As the development of remote activities progressed, new demands emerged, such as carrying out assessments, internet access, weak connection, emotional aspects, among others, which generated the need to revisit the previous steps to readjust the steps.[6] The

use of social networks in an appropriate way was a way that the course sought to promote interaction and use of more content, such as Facebook, Instagram and Twitter [7],

Although the access of technologies, mainly through mobile devices, for the population is becoming more accessible in general.[6]

Remote classes were the way universities adapted to transmit knowledge, despite the COVID-19 outbreak. Therefore, it was necessary to use the internet, a practical way that transmits information quickly to several people, in different places and at the same time. Remote classes take place through digital platforms, simplifying communication and dialogue between teachers and students and making the demand for face-to-face teaching sometimes dominate, whether in public or private universities.[8] It was noticeable that during the transition from face-to-face teaching to emergency remote teaching, there were differences between public and private institutions, where the latter was more concerned with the transfer of curricular content and the public with the socioeconomic conditions of students and their families, due to access to technology. [2]

Currently, there is a huge diversification of digital resources, such as software that ensures greater interaction with students through games, animations, platforms for video lessons, e-books and other ways to increase knowledge and reduce the lack of a face-to-face classroom.[9] Commitments are needed to provide quality education services, reduce suffering, exclusion and marginalization, avoid strengthening situations of vulnerability, sustain democratic processes, promote social liberation and the realization of the rights of students and teachers.[10]

It is noteworthy that the adoption of online strategies by HEIs goes beyond focusing on those merely related to theory. These are strategies that will also permeate other academic spaces, such as practical laboratory classes, which can be taught through video classes; conducting and prioritizing research with online data collection; virtual/online meetings of departments, areas, collegiates, extension and research projects, university higher councils and committees. [11]

6 TEACHERS' FEELINGS AND CHALLENGES

The "new" remote teaching had a somewhat frightening austerity in the view of the teachers, where the elaboration of the disciplines and the planning had to be idealized and planned from another context and scenario. Thus, it was necessary to organize the teaching plans and lesson programs, applying the use of technology in higher education education, which required and requires educators to use current and new resources where specific knowledge for activities was essential in the virtual environment. [12]

In the context of the pandemic, the reality has greatly affected educators, increasing the possibility of stress, with the feeling of vulnerability and fear of contagion.[13]

In this context, the skillful handling of digital teaching platforms by master educators was a necessary procedure to reduce the consequences of the emergency remote teaching process, due to its application, several possibilities of interpersonal sociability, collaborative activities, development of evaluation and self-assessment practices, scope of the information chaining process, interrelating, managing and administering educationally with students shaped by the to the detriment of severe cultural and educational actions. [14th]

The routine of these remote classes was divided into synchronous and asynchronous pedagogical moments. Synchronous moments are video conferences through apps, which allow for real-time digital interaction. On the other hand, the asynchronous moments are the Virtual Learning Environments (VLE), which use a series of resources, such as teaching materials, extra activities, doubt forums, warnings, schedules, follow-up notes and enable spaces for sharing video classes. With the insecurity of remote classes due to Covid-19, combined with inexperience with this pedagogical strategy and the hope of resuming classes, they have generated, throughout the academic community, situations of stress, only for the theoretical moments being scheduled, since the practices have been postponed until the health situation is better controlled. [15]

In the face of all these changes in routine during the Covid-19 pandemic, emotional changes have been triggered, such as anguish, anxiety, sadness, fear, loneliness, guilt, stress and loss of life, consequent to such a fatigued and continuous work process, feeling of vulnerability, fear of contagion, tiredness, difficulty sleeping, problems with blood circulation, eating and visual damage. The illness related to this damage is the work overload and the brightness of electronic devices, which are necessary for remote activities to take place. However, they have also had negative experiences and effects from remote learning, not only in itself insipidity in the use of technological tools, but also the overload at work, change of routine, lack of feedback from students, the use of the camera to capture images, insufficient devices for communication and low internet access to continue learning. [3]

During the pandemic, teachers sought to improve education in this period, there were undoubtedly difficulties for both sides, but the experiences of using educational technology during the pandemic had some challenges, including: planning the teaching process, the use of media and technological resources, evaluation of the learning process, tolerance and understanding of students' needs, computer use, communication with students, and communication with parents and/or guardians. Faced with the challenges detected in the reflection on their performance, the teachers mentioned: the use of computer programs, socio-emotional development, teaching didactics, healthy living, study plans and programs, educational management and environmental education. And the challenges related to socio-affective problems were: boredom, stress, anxiety, sadness, difficulty in performing tasks, inadequate space to work at home, lack of motivation, low comprehension of the content, frustration, fatigue and loneliness. In view of the pedagogical problems, it was identified notable difficulty in the

evaluation of activities, having inadequate space to work at home and difficulty in planning activities. [16]

6.1 FEELINGS AND CHALLENGES OF SCHOLARS

In the current period of the COVID-19 pandemic, face-to-face classes in the undergraduate nursing modality were impacted by changes in their model in order to ensure compliance with social isolation and the needs of undergraduate students and professors regarding teaching. However, there was incapacitation on the use of the digital teaching platforms available, both for teachers and students, for the monitoring and development of distance classes, affecting the adaptation and quality of teaching during the transition, wasting precious time in the organization and implementation of classes. [8]

With classes being broadcast live they have had a tremendous significance in the development of learning, being both positive and negative. Some of these positive aspects are the monitoring of classes anywhere, whether at home or at work, and it is even possible to watch the recordings later; use of technological means for education and learning, active participation of the student8 and increased interactivity with the family.[17] The negative points are the impediment of practical classes necessary for the course; Student Commitment; patience with the remote modality and their skill with the use of technology; difficulty accessing technological devices such as computers, poor internet connection; difficult creation of independent study routine; domestic routines that hinder the reconciliation of remote classes positively; decreased socialization that the face-to-face classroom provided, [8] The lack of customs and sudden changes in quarantine and remote classes, many students had difficulties complying with social distancing, lower productivity, increased sleep time, greater use of technological tools, greater consumption of unhealthy foods, less care with appearance, greater consumption of alcohol and medications. [17]

The students exposed the difficulty or total lack of access to the library, the removal of teaching materials and the exchange of knowledge that took place in these places. At first, it was difficult to adapt to the process of remote classes, resulting in anxiety and excessive worry. However, with the passage of time, they were able to carry out the adaptation process. The distance activities allowed them to be more comfortable to communicate among the group, the circumstance that they did not need to travel from their homes to the educational institution brought a gain of precious time. Still, they justify being a disadvantage, as it is an exhausting and low-yield process.[18]

The adhesion of distance learning has intensified issues such as social and economic inequality in the country. The population that hardly has access to quality internet, computers, smartphones and a quiet and conducive environment for their studies, income instability, precarious housing and basic sanitation. Approximately 51.6% of Brazilians have access to the internet. The South and Southeast of Brazil have 51% of the households that have access to the internet, the Midwest 44%, the North 30%

and the Northeast 26%, proving the inequality to digital media and only a minority have full access to the internet.[13]

The students who show a favorable behavior to adapt to the distance learning modality are men, from 32 to 60 years old. It is worth noting that women show greater losses in their academic productivity and employability compared to men, due to taking care of the house and working, suffering impacts on adaptation during distance learning. It is necessary to create measures so that this specific audience can achieve their academic goals and achieve the desired training with distance learning.[19]

A voluntary evaluative survey was carried out at the end of the course, of teaching and work methods during the pandemic, 52% of students reported 93.2% satisfaction with the course; 95.5% of the students agreed that the method used allowed them to obtain new skills and 91% of the students expressed that the course was well headed. [7] From the point of view of students, during the COVID-19 pandemic period, made it possible to identify favorable and unfavorable conditions for learning and teaching. [13]

Other alternatives for promoting and maintaining individual health during social isolation are self-knowledge, acts that promote relaxation, admiration of the small and simple things that life provides and that were previously unnoticed, self-confidence, closeness to the family, establishing bonds with nature and animals. During the pandemic period, university students suffered a significant increase in anxiety, stress, and depression. As a way to combat the pandemic and stimulate health for this public, physical exercises are recommended, as they benefit mental and physical health, the creation of routines, development of skills and existing practices, are healthy ways to face stress and enable physical and mental health. [20] Participating in social practices, performing leisure-oriented activities, and discussing tribulations, anxieties, and habitual routine with family and friends are preceptors for a better quality of life. [21]

7 DISCUSSION

Second **(Fernandes & Frison, 2015),** "Social adaptation is linked to the social integration of the student in the establishment of relationships, and the existence of a positive correlation with such social learning strategies is expected. This is due to the fact that establishing relationships with those involved (students, teachers and educational institutions) facilitates the process of learning how to learn, which implies having autonomy and responsibility with the act of studying and also regulating and planning their tasks." [19]

It can be seen that remote teaching has reverberated in challenges for teachers, where the problem overloads adaptations and flexibilities to the new way of teaching, which go beyond the activities and working hours of teachers, without a break for rest and availability at any time to meet

the demands of students and the institution, in addition to affective-emotional support to students, that are slowed down and full of uncertainties, which generates insecurities and doubts. Teachers maximized the need for self-care due to the pandemic, where all these situations contributed to increase complaints of symptoms, both physical and psychological.[3] Previous studies suggest that awareness-raising should be an effective part of teacher qualification and an ongoing theme of educators' professional development. [22]

When analyzed in detail, there is a relationship between different coping strategies and mental health. It was noticed that students who gave up easily or did not work to achieve their goals (behavioral disinvestment) were less likely to be happy. Making fun of a stressor (in this case, an epidemic) (mood) is a strategy used to build relationships with others (social competence) and increase self-esteem by promoting mental health. Planning and working hard to overcome difficulties (positive coping) are coping strategies that have been shown to be fundamental to improve students' perception of control and, consequently, their mental health. Increased participation in religious activities (religion) seems to help increase students' motivation, create goals and aspirations.[23]

Teaching students to think critically, regardless of complex interprofessional practice, is one of the greatest challenges of nursing education. Growing up requires them to use professional practices, where they are without fear of evaluations and judgments. However, it is also valid to encourage them to be able to practice innovative methods and strategies, having the critical thinking of a nursing student, [24] where educators are critically important for the development and professional identity of students to work in different and complex health environments that are constantly changing. [25]

A mutual collaboration of the students during the remote classes was a challenge, to research responsibly, to reach an agreement when they disagree, to plan and execute without being gathered in the same environment, common situations among nursing professionals, who need to work in interprofessional and multidisciplinary teams, in which it is impossible to choose who to work with, create care strategies, problem-solving and develop plans to achieve objectives related to the care of citizens. Health professionals need to evolve and develop their adaptation skills, creativity to solve problems, curiosity, interest, social discernment and effective communication. [7]

It is important to be aware that the best way to learn is to have direct contact with the patient and the student must always be empathetic and flexible. However, during the pandemic, the process was adapted, which It is not favorable for the intervention of the large number of students who are in the process of developing nursing practices, of which this skill is necessary for their growth and professional training. [26] However, it is valuable to emphasize that the true value is not only in the content, but in what is done with it. [7]

8 CONCLUSION

COVID-19 has taken a large proportion and it has been more than 2 years with the virus circulating in the country. As a result, technology has become the largest means of study and with all the adaptations that have been made, it is increasingly easier and more practical to interact through online classes. However, students and teachers miss teaching in a joint environment, within universities, in classrooms and laboratories, because despite the adaptations, the routine of attending classes at home in the long term has become boring. It can be concluded that in the face of a pandemic, adaptations occur every day and the sudden change gradually becomes the new routine of each person. In the field of health, especially nursing from the perspective of teachers and students in the context of the COVID-19 pandemic, we identified factors that were favorable and unfavorable, such as technological captures, the emotions of students and professors, the ease of improving with online courses and acquiring international knowledge, but triggered, at the same time, negative feelings such as insecurity, Fear and anxiety, in relation to practical classes, brought a certain return due to social distancing and the difficulty in maintaining focus during classes, reflecting in the return to face-to-face and in the exercise of the profession. In addition, it was necessary to have an action, an organization and strategies for the practice of the new teaching, in order to have an eminent teaching. However, this emergency scenario served to increase to the academic content of undergraduate nursing relevant themes/subjects, directed to the pandemic, but which were not studied or passed on to students, such as mechanical ventilation, team management with large embezzlements, extremely critical patient care, the importance of monitoring vital signs and, crucially, the empathy and humanization of understanding that the patient is not just a patient, He is the love of someone's life.

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SEVEN
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The Robson Classification as an evaluation of the cesarean section rate in the regions of Brazil and the relationship with the infant mortality rate

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Nicolle Albuquerque Miott
Medical student
Cesumar University – UNICESUMAR

Lívia Dalla Vechia
Medical student
Cesumar University- UNICESUMAR

Adriana Cunha Vargas
Doctor
Cesumar University- UNICESUMAR

ABSTRACT
INTRODUCTION: Most childhood deaths are concentrated in the first year of life, above all in the first month. There is a high participation of perinatal causes such as prematurity, by which highlights the importance of factors related to pregnancy, childbirth, and postpartum, generally preventable with quality assistment healthcare. OBJECTIVE: To analyze the prevalence of cesarean section rates according to Robson's classification in each region of Brazil and relate it with infant mortality rate. METHODOLOGY: This is a quantitative, observational, cross-sectional, and descriptive study. The study involved 7,194,258 Brazilian women aged 20 to 24 years from 2012 to 2021. The study was conducted in Brazil, covering all five regions of the country: North, Northeast, Southeast, South, and Midwest. Data were electronically obtained from the Health Department (DATASUS) of the Brazilian Unified Health System (SUS) using the TABNET application. RESULTS: Our findings suggest that patients aged 20 to 24 years old who fall into group 3 of Robson's classification are the most prevalent in Brazil then the others and They are who have a highest chance of vaginal delivery). Therefore, it can be inferred that there was an option for cesarean section and not a medical indication. Regarding newborns, it is also necessary to note that in the first and second minute of life, the Apgar score with the highest occurrence was 8-10, indicating that most babies were born with good vitality. Furthermore, the most prevalent birth weight was between 3000 and 3999 grams, which, according to the Ministry of Health, indicates the ideal weight for a healthy newborn. Moreover, it is worth noting that despite the highest infant mortality rates occurring onto 0-6 days period, we can infer that something during childbirth may have contributed to this statistic, such as an incorrect indication for cesarean section. CONCLUSION: It is common knowledge that vaginal delivery offers numerous (a several) benefits to the newborn, as in terms of immunity such as for the mother during the postpartum period.

Keywords: Robson classification, Cesarean, Infant Mortality, Indicators of Morbidity and Mortality.

1 INTRODUCTION

"Most childhood deaths are concentrated in the first year of life, especially in the first month. There is a high participation of perinatal causes such as prematurity, which highlights the importance of factors related to pregnancy, childbirth and postpartum, which are generally preventable through quality health care" (LANSKY S, 2014).

It is known that the choice of natural childbirth is extremely important for the health of the newborn, due to factors related to the physiological process from birth to the immunological development provided, among many other benefits (RAYMAN M, 2019). Thus, the percentage of

cesarean sections indicated by the World Health Organization (WHO) is 15%. However, in Brazil, this number grows to 56%, being the world leader in cesarean sections, becoming an "epidemic". In the private network, this margin is increased, reaching the mark of 89% (FIOCRUZ, 2021).

In 20 years, there has been an increase worldwide in cesarean deliveries, on average, in Europe the rate is 20% to 22%, in the United States it rises to 32.8%, but still below the rate in Brazil (UNA-SUS, 2015).

Data from the information system on live births (Sinasc) referring to births in 2016 indicate the Brazilian states with the highest rates of cesarean delivery: Goiás (67%), Espírito Santo (67%), Rondônia (66%), Paraná (63%) and Rio Grande do Sul (63%) (GUEDES, 2018).

This procedure indicates that there is a higher risk of infant mortality in 25% of children up to 5 years of age compared to those born vaginally. However, when cesarean section is recommended by the physician due to risk factors, the death rate decreases (LARANJEIRA, 2021).

The infant mortality rate, or coefficient, is an estimate of the risk of death to which a population of live births is exposed in a given area and period before completing the first year of life (PEREIRA, 1995). Infant mortality can be divided into early neonatal (0-6 days of life), late neonatal (7-27 days) and post-neonatal (28 days or more) (PALHANO, 2017).

The epidemic of cesarean deliveries, largely without indication for medical reasons (therapeutic cesarean section), helps to increase the infant mortality rate, pointing to the need to reassess the cesarean section rate, through the implementation of a standard instrument, proposed by the World Health Organization (WHO), the Robson Classification (LINS, 2021).

The Robson Classification was created by the Irish physician Michael Robson in 2001 with the aim of prospectively identifying clinically relevant groups of women in which there are differences in cesarean section rates and thus allowing comparisons within the same institution over time or between different institutions (WORLD HEALTH ORGANIZATION, 2015).

The Robson Classification uses 10 groups and 6 obstetric concepts, namely: parity, previous cesarean section, onset of labor, gestational age, fetal presentation, and number of fetuses. The classification is totally inclusive and mutually exclusive, i.e., all pregnant women are included in only 1 of the 10 groups (NAKAMURA- PEREIRA M, 2016).

It is essential to portray the usefulness of the Robson Classification: in addition to being simple, robust and reproducible, it is clinically relevant and prospective. The World Health Organization in 2011 concluded, in a systematic review, that it is the most appropriate classification for local and international needs. (FIOCRUZ, 2018)

To the best of our knowledge, there are no articles relating the cesarean section rate based on Robson's classification to neonatal mortality. It is inferred, therefore, that there are several variables that justify the increase of this practice without correct indications in Brazil. Therefore, the objective

of this study is to analyze the prevalence of cesarean section rates according to Robson's classification in each region of Brazil and to relate it to the infant mortality rate.

2 METHODOLOGY

This is a quantitative, observational, cross-sectional and descriptive study. The study involved 7,194,258 Brazilian women aged between 20 and 24 years, since this age group is associated with lower risk during pregnancy. In order to analyze the causes of the incidence of cesarean deliveries in the period from 2012 to 2021, to understand the possible reasons behind the growing preference for the cesarean section method, and to identify the infant mortality rate taking into account the most recent data available, the study was conducted in Brazil, covering the five regions of the country: North, Northeast, Southeast, South and Midwest.

The infant mortality rate was calculated based on the equation: number of deaths of children under 1 year of age in the period divided by the number of live births in the period multiplied by 1,000. This calculation is used internationally to define the indicator of quality of life and development of a given population, it is a very sensitive indicator of social, economic and health inequity (UFSC, 2017).

Data related to variables related to the mother and newborn were obtained electronically from the Health Department (DATASUS) of the Unified Health System (SUS) in Brazil, using the TABNET application, a generic tabulator in the public domain that allows data to be organized according to the requested query to obtain various information within the SUS.

Initially, data collection was carried out on women aged between 20 and 24 years, from the five different regions of Brazil, totaling 7,194,258 participants. Thus, several aspects were evaluated, including schooling, race, Robson classification and the analysis of their respective newborns, including information such as weight, sex, Apgar score in the first and second minute, birth weight and type of delivery.

The second period was used for comparison purposes, in order to verify the characteristics of pregnant women in relation to the characteristics of newborns. The choice of this target audience is due to the intention of analyzing the trend in the behavior of opting for cesarean sections without medical indication and its impact on live births and infant mortality rates in different regions of Brazil.

The data were consolidated in an Excel spreadsheet and, subsequently, were discussed in a descriptive way, analyzing the collected numbers and comparing those with higher and lower prevalence, in order to generate a conclusion about the proposed theme. The present study followed the ethical procedures according to Resolution No. 466/2012 CNS, however, it used public databases (http://datasus.saude.gov.br/).

3 RESULTS

During the study period, 7,194,258 women participated in the Robson classification. The most prevalent education in Brazil was from 8 to 11 years old (69.7%), with the highest rate in the Southeast region being 39.7%. The least prevalent were those with no schooling (0.3%), with a predominance in the North region (42.1%).

Regarding race, the highest percentage of mothers who had children was brown, in the Northeast region 39.1%. On the other hand, those who had fewer children were considered yellow, with the lowest rate in the southern region: 6.7%.

Finally, with regard to Robson's classification, the highest rate of deliveries occurred in nulliparous women, singleton pregnancies, cephalic pregnancies, <37 weeks, and spontaneous labor, totaling 35.2% in the Northeast region. While the lowest percentage was of women who had all abnormal presentations (including previous cesarean section), with the Midwest region having the lowest rate (6.7%).

Table 1 - Identification data of mothers who presented Robson classification in the period from 2012 to 2021. Brazil, 2023.

		North		Northeast		Southeast		South		Midwest		Brazil	
VARIABLE		N	%	n	%	n	%	n	%	n	%	N	
	Mother's Instruction												
No		8708	42,1	7613	37	2198	10,6	814	3,9	1340	6,5	20673	0,3
1 to 3 years		31764	6,6	62763	47,6	21529	16,3	8859	6,7	7027	5,3	131942	1,8
4 to 7 years		199465	16,1	471746	38,0	335680	27,1	150490	12,1	83302	6,7	1240683	17,2
8 to 11 years		576859	11,5	1382816	27,6	1988815	39,7	640593	12,8	425059	8,5	5014142	69,7
12 years and older		71534	10,7	148933	22,2	252641	37,7	109068	16,3	88381	13,2	670557	9,3
Ignored		18205	15,7	57885	49,8	30286	26,1	3938	3,4	5947	5,1	116261	1,6
Total		906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100,0
	Race												
White		63732	3,0	209717	9,7	1049277	48,6	699597	32,4	135422	6,3	2157745	30,0
Black		20811	5,0	107214	25,8	216947	52,3	43775	10,6	26061	6,3	414808	5,8
Yellow		2180	8,6	6901	27,2	10772	42,5	1701	6,7	3778	14,9	25332	0,4
Curtain		769818	18,0	1673920	39,1	1295387	30,3	152964	3,6	388825	9,1	4280914	59,5
Indigenous		35633	53,9	10735	16,2	5114	7,7	4010	6,1	10671	16,1	66163	0,9
Ignored		14361	5,8	123269	49,4	53652	21,5	11715	4,7	46299	18,6	249296	3,5
Total		906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100
	Robson's Classification												
01	Increased chance of vaginal delivery	158361	12,9	433870	35,2	402189	32,7	127051	10,3	109870	8,9	1231341	17,1
02	Increased chance of vaginal delivery	49601	5,3	178192	19,2	456586	49,1	178506	19,2	67149	7,0	930034	12,9

03	Increased chance of vaginal delivery	210365	17,9	411795	35,0	348790	29,6	109411	9,3	96584	8,2	1176945	16,4
04	Increased chance of vaginal delivery	35485	7,8	97115	21,4	212466	46,8	76942	16,9	32097	7,1	454105	6,3
05	Some chance of vaginal delivery	122936	12,7	256008	26,5	353799	36,7	132158	13,7	99996	10,4	964897	13,4
06	Lower chance of vaginal delivery	7749	9,9	21692	27,6	29106	37,0	12484	15,9	7595	9,7	78626	1,1
07	Lower chance of vaginal delivery	11852	15,4	23826	30,9	23703	30,7	9646	12,5	8120	10,5	77147	1,1
08	Lower chance of vaginal delivery	9869	10,9	25624	28,4	35126	38,9	11894	13,2	7771	8,6	90284	1,3
09	Lower chance of vaginal delivery	1721	17,1	3152	31,4	2995	29,8	1511	15,0	675	6,7	10054	0,1
10	Lower chance of vaginal delivery	68112	14,2	143340	29,9	170561	35,6	57348	12,0	39731	8,3	479092	6,7
11		46541	22,6	89112	43,3	41700	20,3	10321	5,0	18128	8,8	205802	2,9
Not informed		183943	12,3	448030	29,9	554128	37,0	186490	12,5	123340	8,2	1495931	20,8
Total		906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100

Source: own authorship

		North		Northeast		Southeast		South		Midwest		Brazil	
VARIABLE		**N**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**N**	
	Mother's Instruction												
No		8708	42,1	7613	37	2198	10,6	814	3,9	1340	6,5	20673	0,3
1 to 3 years		31764	6,6	62763	47,6	21529	16,3	8859	6,7	7027	5,3	131942	1,8
4 to 7 years		199465	16,1	471746	38,0	335680	27,1	150490	12,1	83302	6,7	1240683	17,2
8 to 11 years		576859	11,5	1382816	27,6	1988815	39,7	640593	12,8	425059	8,5	5014142	69,7
12 years and older		71534	10,7	148933	22,2	252641	37,7	109068	16,3	88381	13,2	670557	9,3
Ignored		18205	15,7	57885	49,8	30286	26,1	3938	3,4	5947	5,1	116261	1,6
Total		906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100,0
	Race												
White		63732	3,0	209717	9,7	1049277	48,6	699597	32,4	135422	6,3	2157745	30,0
Black		20811	5,0	107214	25,8	216947	52,3	43775	10,6	26061	6,3	414808	5,8
Yellow		2180	8,6	6901	27,2	10772	42,5	1701	6,7	3778	14,9	25332	0,4
Curtain		769818	18,0	1673920	39,1	1295387	30,3	152964	3,6	388825	9,1	4280914	59,5
Indigenous		35633	53,9	10735	16,2	5114	7,7	4010	6,1	10671	16,1	66163	0,9
Ignored		14361	5,8	123269	49,4	53652	21,5	11715	4,7	46299	18,6	249296	3,5

Total		906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100
	Robson's Classification												
01	Increased chance of vaginal delivery	158361	12,9	433870	35,2	402189	32,7	127051	10,3	109870	8,9	1231341	17,1
02	Increased chance of vaginal delivery	49601	5,3	178192	19,2	456586	49,1	178506	19,2	67149	7,0	930034	12,9
03	Increased chance of vaginal delivery	210365	17,9	411795	35,0	348790	29,6	109411	9,3	96584	8,2	1176945	16,4
04	Increased chance of vaginal delivery	35485	7,8	97115	21,4	212466	46,8	76942	16,9	32097	7,1	454105	6,3
05	Some chance of vaginal delivery	122936	12,7	256008	26,5	353799	36,7	132158	13,7	99996	10,4	964897	13,4
06	Lower chance of vaginal delivery	7749	9,9	21692	27,6	29106	37,0	12484	15,9	7595	9,7	78626	1,1
07	Lower chance of vaginal delivery	11852	15,4	23826	30,9	23703	30,7	9646	12,5	8120	10,5	77147	1,1
08	Lower chance of vaginal delivery	9869	10,9	25624	28,4	35126	38,9	11894	13,2	7771	8,6	90284	1,3
09	Lower chance of vaginal delivery	1721	17,1	3152	31,4	2995	29,8	1511	15,0	675	6,7	10054	0,1
10	Lower chance of vaginal delivery	68112	14,2	143340	29,9	170561	35,6	57348	12,0	39731	8,3	479092	6,7
11		46541	22,6	89112	43,3	41700	20,3	10321	5,0	18128	8,8	205802	2,9
Not informed		183943	12,3	448030	29,9	554128	37,0	186490	12,5	123340	8,2	1495931	20,8
Total		906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100

Source: author

Legend:

1. Nulliparous, singleton pregnancy, cephalic, >37 weeks, spontaneous labor
2. Nulliparous, single pregnancy, cephalic, >37 weeks, with indication of cesarean section before labor
3. Multiparous, (no previous cesarean section) singleton pregnancy, cephalic, >37 weeks, spontaneous
4. Multiparous, (no previous cesarean section) single pregnancy, cephalic, >37 weeks, indicated cesarean section before labor
5. With previous cesarean section, single pregnancy, cephalic, >37 weeks
6. All breech births in nulliparous women
7. All breech births in multiparous women (including previous cesarean section)
8. All multiple pregnancies (including previous cesarean section)
9. All abnormal presentations (including previous cesarean section)
10. All singleton pregnancies, cephalic, <36 weeks, including previous cesarean section
11. Births not classified due to lack of response to the necessary items

Regarding the identification of newborns in the different regions of Brazil, males accounted for 51.2%, with the highest rate in the Northeast region, corresponding to 29.6%. While the female gender was 48.7%, with a predominance also in the Northeast region, 29.6%.

The Apgar score at 1st minute in Brazil obtained the highest score from 8 to 10 (85.6%), with the most prevalent region being the southeast, with 37.1%. The lowest score was between 0 and 2, with 0.7%, and the Central-West region was the least prevalent, with 7.1%. In the 2nd minute, the Apgar score in Brazil was (95.3%), with a score between 8 and 10, and the highest rate was 37.1% in the Southeast region. The region with the lowest percentage was the Midwest, with 7.5%, and scores between 3 and 5.

Regarding the weight of the newborn, (64.7%) were born weighing between 3,000g and 3,999g, with 35.7% being more prevalent in the Southeast region. While the lowest percentage was less than 500g, in the Midwest region 6.8%.

Regarding the type of delivery in Brazil, (50.8%) were vaginal deliveries, with the highest incidence in the Southeast region (35.6%) and (49.1%) were cesarean sections, also with a predominance in the Southeast region (37.6%). The region with the Regarding the type of delivery in Brazil, (50.8%) were vaginal deliveries, with the highest incidence in the Southeast region (35.6%) and (49.1%) were cesarean sections, also with a predominance in the Southeast region (37.6%). The region with the lowest rate of cesarean section was the Midwest, 9.1%, and the lowest rate of vaginal deliveries was also in the Central-West region, 7.2%.

Table 2. RN identification data from 2012 to 2021. Brazil, 2023.

VARIABLE	North		Northeast		Southeast		On		Midwest		Brazil	
	n	%	n	%	n	%	n	%	n	%	N	%
sex												
Mask	464869	12,6	1092909	29,6	1347356	36,5	468649	12,7	312726	8,4	3686509	51,2
Five	441538	12,6	1038346	29,6	1283381	36,6	445013	12,7	298170	8,5	3506448	48,7
Ign	128	9,8	501	38,5	412	31,7	100	7,7	160	12,2	1301	0,02
Total	906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,4	7194258	100
Apgar 1st minute												
0 a 2	5203	10,0	14712	28,4	20396	39,3	7856	15,2	3679	7,1	51846	0,7
3 a 5	16526	8,9	57350	31,0	72617	39,3	25255	13,7	13118	7,1	184866	2,6
6 a 7	77315	12,5	198420	32,1	211452	34,2	78389	12,7	52936	8,6	618512	8,6
8 a 10	771239	12,5	1766188	28,7	2286402	37,1	797137	12,9	534603	8,6	6155569	85,6
Ignored	36252	19,8	95086	51,8	40282	22,0	5125	2,8	6720	13,0	183465	2,6
Total	906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,4	7194258	100
Apgar 2nd minute												
0 a 2	2654	13,6	6507	33,3	6816	34,9	2080	10,6	1479	7,6	19536	0,3
3 a 5	3034	10,9	9049	32,6	9962	35,9	3624	13,1	2087	7,5	27756	0,4
6 a 7	11570	10,9	34996	33,0	36756	34,7	14206	13,4	8470	7,9	105998	1,5
8 a 10	852113	12,4	1985036	28,9	2539853	37,0	888885	13,0	592336	8,6	6858223	95,3
Ignored	37164	20,3	96168	52,6	37762	20,7	4967	2,7	6684	3,6	182745	2,5
Total	906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100
Weight												
Less than 500g	1123	11,7	3939	41,0	3009	31,4	876	9,1	651	6,8	9598	0,1

500 to 999g	2934	9,4	8642	27,7	13109	42,0	4045	13,0	2487	7,9	31217	0,4
1000 a 1499 g	4886	10,6	12601	27,4	18777	40,8	6018	13,1	3732	8,1	46014	0,6
1500 a 2499 g	53002	11,3	129137	27,6	186038	39,8	60178	12,9	39600	8,4	467955	6,5
2500 a 2999 g	195016	11,9	452112	27,5	642654	39,1	207039	12,6	145324	8,8	1642145	22,8
3000 a 3999 g	598703	12,9	1403305	30,2	1662348	35,7	592748	12,7	394021	8,4	4651125	64,7
4000g and more	48792	14,2	121242	35,3	105097	30,6	42816	12,5	25040	7,3	342987	4,8
Ignored	2079	64,6	778	24,2	117	3,6	42	1,3	201	6,2	3217	0,0
Total	906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100
Type of delivery												
Vaginal	508597	13,9	1158304	31,7	1302144	35,6	421897	11,5	264686	7,2	3655628	50,8
Cesario	396826	11,2	969364	27,5	1326673	37,6	491411	13,9	345763	9,7	3530037	49,1
Ignored	1112	12,9	4088	47,6	2332	27,1	454	5,3	607	7,1	8593	0,1
Total	906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100

Source: own authorship

Among the live births in Brazil, data were collected from 361,047 who died in the year 2012 to 2021. It is possible to see that the region with the highest number of live births is the southeast (36.6%). In relation to mortality, the Northeast continues to have infant mortality leading among the regions (53.7%). On the other hand, the Midwest continues to have the lowest rates of live births (8.5%) and infant mortality, the South has the lowest number when compared to the others (43.3%)

The year with the highest rates of live births was 2012 (10.5%) compared to 2021 (9.2%). In relation to mortality, it is possible to associate the time from o to 6 days (26.5%) as the highest index when compared to the other age groups, on the other hand, the age of less than 1 year (ign) is the lowest rate (0.01%).

Table 3. Relationship of live births with infant mortality from 2012 to 2021. Brazil

VARIABLE	**North**		**Northeast**		**Southeast**		**On**		**C.West**		**Total**		
	n	%	n	%	n	%	n	%	n	%	N	%	
Live births													
2012	91813	12,1	229054	30,3	281147	37,1	93457	12,35	61525	8,1	756996	10,5	
2013	92130	12,5	218976	29,6	272981	36,9	93033	12,59	61815	8,4	738935	10,3	
2014	93913	12,6	217620	29,2	275989	37,0	94240	12,65	63245	8,5	745007	10,4	
2015	93044	12,4	219572	29,2	278542	37,1	96873	12,89	63638	8,5	751669	10,4	
2016	89869	12,5	212364	29,4	265309	36,8	92244	12,79	61515	8,5	721301	10,0	
2017	90303	12,4	215697	29,5	267857	36,7	93314	12,78	62947	8,6	730118	10,1	
2018	92089	12,7	216271	29,9	261565	36,2	91392	12,63	62035	8,6	723352	10,1	
2019	89599	12,8	206544	29,6	252526	36,2	88670	12,71	60139	8,6	697478	9,7	
2020	86021	12,8	198088	29,5	242318	36,1	86550	12,91	57412	8,6	670389	9,3	
2021	87754	13,3	197570	30,0	232915	35,3	83989	12,74	56785	8,6	659013	9,2	
Total	906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100	
Infant mortality													
0 to 6 days	25115	27,7	63979	30,0	65414	24,9	20617	22,6	15584	25	190709	26,5	
7 to 27 days	7193	7,9	17769	8,3	24251	9,2	7549	8,3	5032	8,2	61794	8,6	
28 to 364 days	16160	17,8	32820	0,0	39403	15,0	11353	12,4	8768	14	108504	15,1	

Younger 1 year (ign)	4	0,0	7	0,0	13	0,0	4	0,0	12	0,0	40	0,0	
Total	48472	53,5	114575	53,7	129081	49,1	39523	43,3	29396	48	361047	50,2	

Source: own authorship

Table 4 shows a relationship between 7,194,258 women, most of whom fit into one of Robson's 10 groups, with infant mortality. Thus, it is possible to observe that the North (22.6%) and the Northeast (43.3%) had higher rates of women in whom childbirth could not be classified due to lack of response to the items necessary to enter any of the groups. It is also noteworthy that in the Southeast (49.1%) and South (19.2) the most prevalent Robson group was group 2, while in the Midwest (10.5%) it was group 7.

In addition, with regard to infant mortality, the region with the highest infant mortality rates was the Northeast (53.7%) and the one with the lowest rates is the South (43.3%). It should also be noted that the age group with the highest mortality rates was from 0 to 6 days (26.5%), as opposed to the age group of children under 1 year (ign) with extremely low rates (0.01%).

Table 4. Relationship of women who fit into the Robson Classification with infant mortality in the period from 2012 to 2021. Brazil

VARIABLE	North		Northeast		Southeast		On		C. West		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Robson's Groups												
01 Increased chance of vaginal delivery	158361	12,9	433870	35,2	402189	32,7	127051	10,3	109870	8,9	1231341	17,1
02 Increased chance of vaginal delivery	49601	5,3	178192	19,2	456586	49,1	178506	19,2	67149	7,2	930034	12,9
03 Increased Chance of Vaginal Delivery	210365	17,9	411795	35	348790	29,6	109411	9,3	96584	8,2	1176945	16,4
04 Increased Chance of Vaginal Delivery	35485	7,8	97115	21,4	212466	46,8	76942	16,9	32097	7,1	454105	6,31
05 Some Chance of Vaginal Delivery	122936	12,7	256008	26,5	353799	36,7	132158	13,7	99996	10,4	964897	13,4
06 Lower chance of vaginal delivery	7749	9,9	21692	27,6	29106	37	12484	15,9	7595	9,7	78626	1,09
07 Lower Chance of Vaginal Delivery	11852	15,4	23826	30,9	23703	30,7	9646	12,5	8120	10,5	77147	21,4
08 Lower Chance of Vaginal Delivery	9869	10,9	25624	28,4	35126	38,9	11894	13,2	7771	8,6	90284	1,25
09 Lower Chance of Vaginal Delivery	1721	17,1	3152	31,4	2995	29,8	1511	15	675	6,7	10054	0,14
10 Lower chance of vaginal delivery	68112	14,2	143340	29,9	170561	35,6	57348	12	39731	8,3	479092	6,66
11	46541	22,6	89112	43,3	41700	20,3	10321	5,0	18128	8,8	205802	2,86
Not informed	183943	12,3	448030	29,9	554128	37	186490	12,5	123340	8,2	1495931	20,8
Total	906535	12,6	2131756	29,6	2631149	36,6	913762	12,7	611056	8,5	7194258	100
Infant mortality												
0 to 6 days	25115	27,7	63979	30,0	65414	24,9	20617	22,6	15584	25,5	190709	26,5
7 to 27 days	7193	7,9	17769	8,3	24251	9,2	7549	8,3	5032	8,2	61794	8,6
28 to 364 days	16160	17,8	32820	0,0	39403	15,0	11353	12,4	8768	14,3	108504	15,1
Younger 1 year (ign)	4	0,0	7	0,0	13	0,0	4	0,0	12	0,0	40	0,0
Total	48472	53,5	114575	53,7	129081	49,1	39523	43,3	29396	48,1	361047	50,2

Source: own authorship
Caption:

1. Nulliparous, singleton pregnancy, cephalic, >37 weeks, spontaneous labor
2. Nulliparous, single pregnancy, cephalic, >37 weeks, with indication of cesarean section before labor
3. Multiparous, (no previous cesarean section) singleton pregnancy, cephalic, >37 weeks, spontaneous
4. Multiparous, (no previous cesarean section) single pregnancy, cephalic, >37 weeks, indicated cesarean section before labor
5. With previous cesarean section, single pregnancy, cephalic, >37 weeks
6. All breech births in nulliparous women
7. All breech births in multiparous women (including previous cesarean section)
8. All multiple pregnancies (including previous cesarean section)
9. All abnormal presentations (including previous cesarean section)
10. All singleton pregnancies, cephalic, <36 weeks, including previous cesarean section
11. Births not classified due to lack of response to the necessary items

4 DISCUSSION

Studies relating the cesarean section rate based on Robson's classification to neonatal mortality are still scarce, although they are essential for understanding the infant mortality rate. This type of analysis contributes to the orientation of research and intervention programs on determinants of infant mortality, reinforcing the potential of the public health system for prevention and health promotion in the different regions of a country of continental dimensions such as Brazil, which can be extrapolated to similar countries.

Our findings suggest that patients aged 20 to 24 years who fall into group 3 of Robson's classification are the most prevalent in Brazil among the others and are the ones with the highest chance of vaginal delivery. Therefore, it can be inferred that there was an option for cesarean section and not a necessity. It is also possible to observe that the place where Robson's group 3 prevailed was in the Northeast, where the most prevalent level of maternal education was from 1 to 3 years old (47.6%) and the race with the highest numbers was Brown (39.1%), whether it is associated with the choice of the woman or the obstetric indication is not known. Something similar occurred in a study carried out in Honduras regarding the Robson Classification, which related the rates with the importance of induced labor and showed that the group that most prevailed was also 1, 3 and 5, as well as in Brazil, and showed that if these data were analyzed, an alternative could be found that would reduce cesarean deliveries without need. (BANEGAS, 2022)

It is also possible to observe in relation to the NB that the rates of cesarean section and vaginal delivery are very similar, with the latter being slightly higher, with males having the highest numbers in relation to females. Regarding this NB, it is also necessary to relate that in the first and second minute of life of the individuals the APGAR score that had the highest rates of occurrence was that of 8-10, which indicates that most were born with good vitality. And, to top it off, the weight that most prevailed was 3000 to 3999 grams, which, according to the Ministry of Health, shows that it is ideal for a healthy newborn. (MINISTRY OF HEALTH, 2012)

In addition, it is noteworthy that, despite what has been shown, the highest infant mortality rates are found in the period of 0-6 days, we can infer that something that occurred during childbirth may have caused such a statistic, such as, for example, an indication of incorrect cesarean section. As

an example, we have the North region, which, despite having the second lowest rate of live births, has the second highest rate of infant mortality, with emphasis on the period already mentioned. Analyzing the Northeast, it is possible to see that it has the highest infant mortality rates among the regions, and the Robson Group that most prevailed was group 1, which had the highest chances of a successful vaginal delivery and even so, the Apgar score that had the highest numbers was 6-7 in the first minute and 0-2 in the second minute. and weighing less than 500g.

However, despite the above, given the impossibility of going to the field to collect all the information necessary for this article because it is a national study with several indicators, it is necessary to mention that the research has limitations in relation to the database, which, as it is a resource with information from all regions of the country, requires constant updating. Thus, in addition to finding several indicators with the highest rates being in uncollected data, it was necessary to collect a long period to be able to work with larger values and acquire a more complete result.

Thus, it is vital that the subject addressed in the following work serves as a basis for further research so that the content of the theme remains updated, an example of how this can be done is by investigating more deeply within each region the reason for deaths in the first days of the newborn's life and even the cause of cesarean sections being performed in women who are part of Robson groups that have chances vaginal delivery. In this way, knowledge about this topic that is so relevant today will be expanded.

5 CONCLUSION

It is common sense that vaginal delivery has numerous benefits for the newborn, both in terms of immunity and for the mother in the postpartum period. The increase in the mortality rate is due to the inadequate choice of cesarean sections and the reduction in vaginal deliveries. This research demonstrated from Robson's classification that the frequency of mortality is still growing and children's health problems are increasing. Therefore, it is necessary to develop viable strategies to reverse this growing trend in infant mortality, caused by the inadequate choice of the type of delivery, starting with increased investments in information, so that infant mortality rates decrease.

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Effects of aging on vocal function: A systematic review

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Victor Hugo Tetilla Moreira
Highest academic degree: Higher education completed – Medicine
E-mail: victortetilla@gmail.com

Mario Pinheiro Esposito

Tarcisio Redes Xavier

Rayna Gonçalves Ferrer

Izabela Pinheiro Esposito

Thales Victor Fernandes Ferreira

Karina Alencastro dos Santos

ABSTRACT
Introduction: Aging is a natural and inevitable process that affects all areas of the body, including vocal function. The voice plays an important role in communicating and expressing emotions. A variety of physiological and biomechanical changes can impair vocal function with aging. In view of the above, this study is justified by its academic, scientific, and social relevance, with the aim of exploring in detail the effects of aging on vocal function, including associated structural and physiological changes and their social and emotional implications. Objective: To demonstrate, through the scientific literature, the effects of aging on vocal function. Methodology: This is a systematic review research, carried out according to the indications of the PRISMA method. Data collection took place in the scientific bases: LILACS, SCIELO and MEDLINE. Results and Discussion: The discussion about the effects of aging on vocal function is crucial for us to understand how the natural aging process affects such a fundamental aspect of human communication. It was evidenced through the analysis of the selected sample, the main aspects for the present discussion. The natural aging of the voice occurs progressively in parallel with other bodily functions and is influenced not only by the anatomy and physiology of the body, but also by the lifestyles that individuals lead throughout their lives. Conclusion: Understanding the effects of aging on speech function has advanced significantly, but knowledge gaps still need to be filled. More research is needed to validate the effectiveness of different therapeutic interventions and to develop innovative approaches to facilitate voice quality improvement in older adults.

Keywords: Aging, Voice, Vocal chords.

1 INTRODUCTION

Aging is a natural and inevitable process that affects all areas of the body, including vocal function. The voice plays an important role in communicating and expressing emotions. A variety of physiological and biomechanical changes can impair vocal function with aging. As life expectancy increases in many parts of the world, understanding the impact of aging on speech function is becoming increasingly important (Fernandes *et al.,* 2023).

The voice is produced through a complex interaction of multiple organs and structures, including the vocal cords, larynx, lungs, nervous and muscular systems. In the aging process, there may be changes in speech-related structures, such as thinning and atrophy of the vocal cords, and it can lead to loss of muscle mass and resistance to vocalization (Madeiro *et al.,* 2021).

Additionally, the elasticity of the vocal cords decreases with age, resulting in a decreased ability to regulate frequencies, making it difficult to reproduce higher pitches. This can lead to hoarseness, tremors, and reduced intelligibility, which can affect the clarity and comprehension of speech (Seixas; Chamber, 2022).

In addition to these structural changes, the aging process can also affect the coordination of the muscles involved in vocalization, making it difficult to produce certain sounds and articulate words. These changes can make the voice weaker, less expressive, and affect the ability to convey emotional nuances in communication (Fernandes *et al.,* 2023).

Another relevant aspect is the psychosocial effects of aging on speech function. Voice is an important part of an individual's identity and age-related vocal changes can lead to self-esteem issues, social isolation, and difficulty interacting with others (Fernandes *et al.,* 2023).

With the increase in life expectancy in many parts of the world, the understanding of the effects of aging on vocal function becomes of great relevance, both for the early identification of possible vocal dysfunctions in the elderly, and for the development of therapeutic and preventive strategies that promote a healthy and functional voice in old age (Leão *et al.,* 2022).

In view of the above, this study is justified by its academic, scientific and social relevance, with the aim of exploring in detail the effects of aging on vocal function, including associated structural and physiological changes and their social and emotional implications. A deeper understanding of this process will allow us to devise more effective strategies to prevent and treat age-related vocal disorders and improve the quality of life of the elderly.

2 OBJECTIVE

To show, through the scientific literature, the effects of aging on vocal function.

3 METHODOLOGY

This study was carried out through a systematic review carried out between June and July 2023, with the aim of investigating updates regarding the aging process and its impacts on vocal function. All the steps developed in this review were independently developed by the authors of the research. For this, the recommendations based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method were followed.

The systematic review of the literature is a type of study that aims to answer a specific question, in an objective, complete and impartial way about the topic in question. To this end, this type of study uses systematic methods for identification, selection, data extraction, analysis and discussion of results.

As this was a systematic review and meta-analysis, there was no need to submit the project to the Ethics Committee (CEP) for consideration.

3.1 ELIGIBILITY CRITERIA

To ensure the eligibility of the results presented, the selected articles followed the following inclusion criteria: Free papers, available in full, in the Portuguese language, published in the last 3 years and that met the proposed objective. The exclusion criteria were: Incomplete articles, duplicates in more than one database, monographs, abstracts and theses.

3.2 BIBLIOGRAPHIC SEARCH STRATEGY

The bibliographic survey was carried out through searches in the following scientific databases: Latin American and Caribbean Health Sciences Literature (LILACS*), Scientific Electronic Library Online (SCIELO) and* Medical Literature Analysis and Retrievel System Online *(MEDLINE), through the applicability of the Health Sciences Descriptors (DEcS) and (MeSh):* Aging; Voice and Vocal Cords/ *Aging; Voice; Vocal Strings* mediated by the *Boolean operator AND.*

3.3 SELECTION OF STUDIES

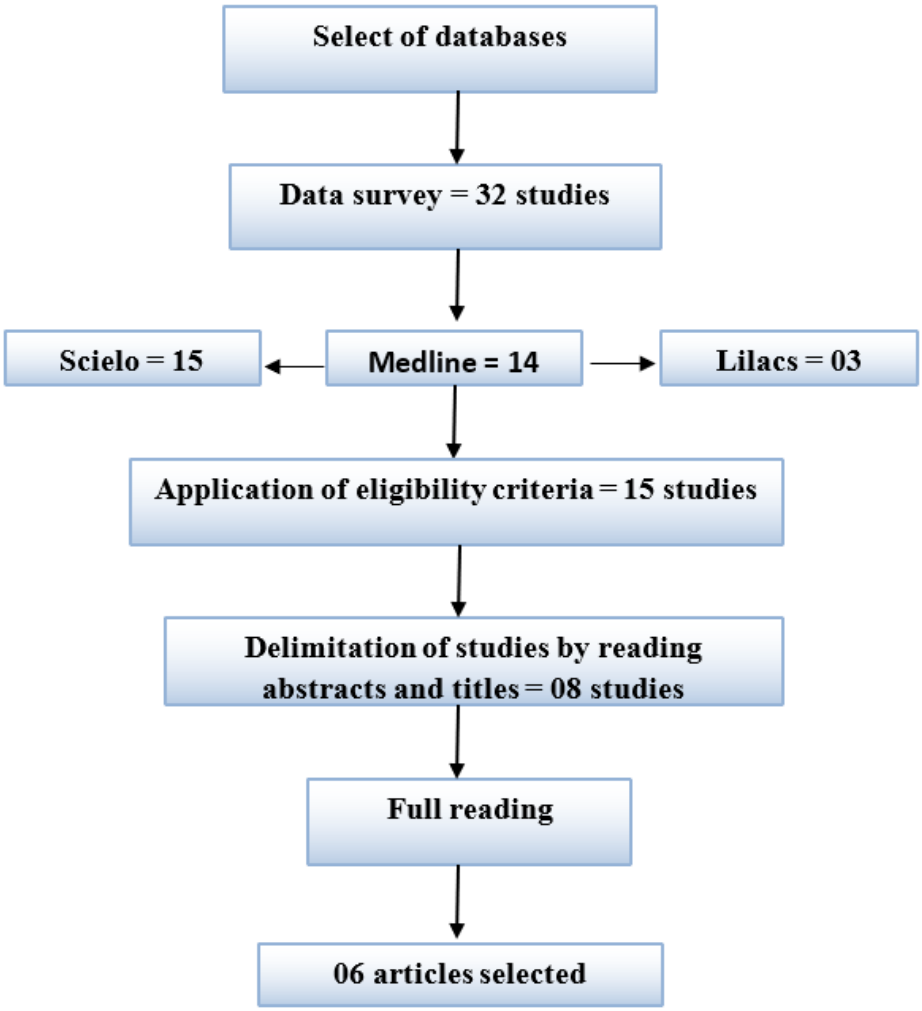
To ensure the eligibility of the selected studies, in the first instance, through analysis of the titles, articles that were not related to the theme were manually excluded. Therefore, by reading the abstracts, studies that did not meet the defined eligibility criteria were excluded. After reading it in full, new exclusions were made, selecting only those studies with relevant results that answered the research problem.

3.4 ASSESSMENT OF THE QUALITY OF STUDIES

In the final analysis, it can be seen that the quality of the studies was similar, and for this finding, validated instruments from the scientific literature were used. The instrument, taken as a reference by the Joanna Briggs Institute, evaluates the specific characteristics of each methodological design, evaluates the eligibility criteria, sampling, population, as well as analysis of variables.

Based on this, the studies that presented information related to the study may have limitations in relation to the objective that this research intends to achieve. However, with regard to the quality of the research, there was no exclusion of studies, although the limitations highlighted in the discussion of the results were presented. The description of the selected sample is described in figure 1:

Figure 1: Flowchart for the selection of studies selected for the sample.



Source: Prepared by the authors, 2023.

4 RESULTS AND DISCUSSIONS

With the data collection, 06 articles were selected for final analysis. For a better understanding, the studies were organized in Charts 1 and 2, subdivided into the main information of: Title, author, year of publication, study objective, journal in which the work was published, and country of origin referring to the publication. On the other hand, the results organized in Chart 2 were subdivided between the specialty of the work and the main outcomes found.

Table 1: Description of the selected sample.

N°	TITLE	AUTHOR/YEAR	OBJECTIVE	NEWSPAPER	COUNTRY OF ORIGIN
1	Voice disorders associated with aging.	Rosendo *et al.,* 2022	Present the possible vocal disorders associated with aging.	Neurosciences Journal	Brazil
2	Effect of aging on vocal muscle atrophy.	Peres, 2022	To evaluate the effect of aging on thyroarytenoid muscle.	Cefac Magazine	Brazil
3	Lifelong vocal changes: cepstral analysis.	Spazzapan, 2022	OBJECTIVE: To investigate the characteristics of voice production in elderly individuals.	Cefac Magazine	Brazil
4	Voice of the elderly: does advancing age generate different impacts?	Gomes *et al.,* 2021	To verify whether there are differences in vocal aspects among elderly people with presbyphonia, divided into three age groups.	Brazilian Society of Speech-Language Pathology and Audiology	Brazil
5	Vocal therapy with respiratory approach in the elderly: practice of Brazilian speech-language pathologists.	Leo, 2021	Evidence of changes that may compromise voice and breathing.	UFP	Brazil
6	Comparison of the immediate impact of the techniques of sonorized high-frequency oral oscillation and sonorized blowing with a resonance tube in elderly women.	Piragibe *et al.,* 2020	To verify and compare the vocal quality of elderly women.	Brazilian Society of Speech-Language Pathology and Audiology	Brazil

Source: Authors, 2023.

Of the studies selected for the sample and detailed in Table 1, regarding methodological aspects, 17% (n=1) were quantitative studies, 34% (n=2) were exploratory studies, and 51% (n=3) were qualitative studies.

Chart 2: Description of the main points highlighted in the research.

N°	SPECIALTY	MAIN OUTCOMES
1	Speech therapy	In this study, it was observed that among the speech disorders associated with aging, the classifications identified include spastic and flaccid dysarthria, followed by shortness of breath, excessive vocal tension, instability of vowel emission, and slowness of speed.
2	Medicine	In this study, it was evidenced that sarcopenia consists of an age-related muscle alteration with progressive loss of mass and function that is common in the elderly and also occurs in the larynx. In the anterior larynx, atrophy of the vocal folds, prominence of the vocal folds, glottic cleft and pseudosulcus are observed.
3	Speech therapy	According to the effects of aging, vocal changes that affect the individual from childhood to old age can be perceived and can be detected in acoustic analysis.
4	Speech therapy	Some auditory-perceptual aspects have a significant deviation in the elderly, which is an important consideration both in the evaluation of the effects of aging on the voice and in the development of interventions to minimize voice loss. The need to consider these peculiarities is reinforced.
5	Medicine	In this study, some specific exercises were used to maintain and improve voice quality in elderly people who suffered impairment in phonation. The results obtained from the research were positive.
6	Speech therapy	In this research, it was found that vocal quality in the elderly is relatively compromised due to the aging process. However, it has also been observed in research that sounding blowing exercises with a resonance tube can be indicated to improve vocal quality.

Source: Authors, 2023.

The discussion of the effects of aging on vocal function is crucial to understanding how the natural aging process affects such a fundamental aspect of human communication. In this section, we will analyze the main findings of the research and how they relate to vocal changes resulting from aging.

Through the analysis of the selected sample, the main aspects for the present discussion were evidenced. Thus, 17% (n=1) studies in the scientific literature showed that natural voice aging occurs progressively in parallel with other bodily functions and is influenced not only by the anatomy and physiology of the body, but also by the lifestyles that individuals lead throughout their lives (Piragibe *et al.,* 2020).

Thus, it was also found from 51% (n=3) of the studies that, with the impairment of vocal function according to aging, it can result in calcification and ossification of the laryngeal cartilage and may be associated with reduced mobility, with possible atrophy and changes in the covering of

the vocal folds, leading to the appearance of fusiform fissures. In this population, supraglottic narrowing may also occur to compensate for changes in the Gothic level. Age-related changes in the voice and larynx impair physical function, can lead to social avoidance, and negatively impact quality of life in older adults (Spazzapan, 2022; Rosendo *et al.,* 2022; Leo, 2021;).

In addition, 32% (n=2) of research studies show that aging results in changes in the vocal folds, such as thinning and atrophy of tissues. The reduced elasticity of the vocal folds in old age also affects the capacity for vocal modulation, making it difficult to vary the frequency and produce higher tones. This loss of control can lead to a monotonous and less expressive voice, making it difficult to communicate emotionally and convey nuances in speech (Peres, 2022; Gomes *et al.,* 2021).

These structural changes directly impact vocal production, reducing the ability to generate adequate tension and control crease vibration. This can lead to a weaker voice, less projection, and even the occurrence of vocal disorders such as senile dysphonia (Piragibe *et al.,* 2020).

Voice is an essential part of personal identity, and age-related vocal changes can cause self-esteem issues, social anxiety, and isolation. Older adults may avoid situations of social interaction or have difficulties in expressing themselves adequately, which affects their quality of life and emotional well-being. Thus, it is essential that society as a whole is aware of the challenges faced by older adults in relation to vocal function and communication (Rosendo *et al.,* 2022).

Education about the effects of aging on the voice should be disseminated among health professionals, family members, and even among the elderly themselves, so that they feel encouraged to seek help and adopt preventive measures. With a multidisciplinary approach that is sensitive to individual needs, it can be ensured that older adults continue to enjoy clear, expressive, and meaningful communication, providing them with a better quality of life as they age (Peres, 2022).

Based on this, vocal therapy is characterized as an important tool in reducing the negative effects of aging on speech function. Targeted vocal exercises strengthen the speech muscles and improve the coordination of the vocal organs. For older people who want to improve voice quality and function, it may make sense to seek treatment from a speech pathologist who specializes in gerontology (Piragibe *et al.,* 2020).

5 CONCLUSION

In summary, the effects of aging on vocal function are multifaceted and can significantly affect communication and quality of life in older adults. Awareness of these changes and the search for preventive and therapeutic measures are essential to preserve vocal health and ensure effective communication at all stages of life. Interdisciplinarity between speech-language pathologists, physicians, and technology professionals is critical to developing comprehensive approaches that address the specific vocal needs of the elderly population.

Understanding the effects of aging on speech function has advanced significantly, but knowledge gaps still need to be filled. More research is needed to validate the efficacy of different therapeutic interventions and to develop innovative approaches to facilitate improved voice quality in older adults.

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Central themes of the relationship between pesticides and cancer: A systematic review of the literature

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João Carlos Belarmino Aguiar
Master's student in the Professional Graduate Program in Public Administration in National Network (PROFIAP)/UFAL, Campus A.C. Simões, Maceió – AL.
ORCID: 0009-0005-2697-3999
E-mail: joao.aguiar@feac.ufal.br

Luciana Santos Costa Vieira da Silva
Professor at the Faculty of Economics, Administration and Accounting of the Federal University of Alagoas (FEAC/UFAL), Campus A.C. Simões, Maceió – AL.
ORCID: 0000-0002-9538-7150
E-mail: luciana.vieira@feac.ufal.br

Wesley Vieira da Silva
Professor at the Faculty of Economics, Administration and Accounting of the Federal University of Alagoas (FEAC/UFAL), Campus A.C. Simões, Maceió – AL.
ORCID: 0000-0001-5354-8676
E-mail: wesley.silva@feac.ufal.br

Fernando Fleury Curado
Researcher at the Brazilian Agricultural Research Corporation – Embrapa Food and Territories. Rua Cincinato Pinto, nº 348, Centro, Maceió – AL.
ORCID: 0000-0002-0498-7944
E-mail: fernando.curado@embrapa.br

Paola Hernandez Cortez Lima
Researcher at the Brazilian Agricultural Research Corporation – Embrapa Food and Territories. Rua Cincinato Pinto, nº 348, Centro, Maceió – AL.
ORCID: 0000-0001-6676-831X
E-mail: paola.cortez@embrapa.br

Lidiane de Almeida Pereira
Master's student in the Professional Graduate Program in Public Administration in National Network (PROFIAP)/UFAL, Campus A.C. Simões, Maceió – AL.
ORCID: 0009-0007-5841-4539
E-mail: lidiane.pereira@feac.ufal.br

Bianca Lima Silva
Master's student in the Professional Graduate Program in Public Administration in National Network (PROFIAP)/UFAL, Campus A.C. Simões, Maceió – AL.
ORCID: 0009-0004-0039-7236
E-mail: bianca.silva@prograd.ufal.br

Luciana Peixoto Santa Rita
Professor at the Faculty of Economics, Administration and Accounting of the Federal University of Alagoas (FEAC/UFAL), Campus A.C. Simões, Maceió – AL.
ORCID: 0000-0002-6868-9014
E-mail: luciana.santarita@feac.ufal.br

Ibsen Mateus Bittencourt Santana Pinto
Professor at the Faculty of Economics, Administration and Accounting of the Federal University of Alagoas (FEAC/UFAL), Campus A.C. Simões, Maceió – AL.
ORCID: 0000-0002-6543-143X
E-mail: ibsen@feac.ufal.br

ABSTRACT

Objective – to identify central themes in the relationship between pesticides and cancer associated with rural areas, agriculture or agribusiness, through a Systematic Literature Review. Methodology – The research is exploratory, with a quantitative approach for bibliometric analysis and qualitative for the supervision of articles in the final corpus and the discussion of central themes. Results - The analysis of corpus indicators demonstrated that the topic can be considered recent and with a tendency to grow. The coupling bibliographic of the corpus, using the VOSviewer software, showed low quantitative and intensity connections. The thematic map highlights emerging central themes about "breast cancer", "childhood cancer" and "nervous system", niche themes such as "DNA damage", basic themes about "environmental protection" and motors, "health study", "risk of cancer" and "exposure to pesticides". Methodological contributions – Identification of themes with reduced bias by centrality and density statistics, which may represent advances in knowledge. Social and environmental contributions – The discussion of the central themes points to the approach of research techniques such as biomarkers and evidence mapping, exposure to pesticides associated with other areas, such as gardens, parks, urban areas, which can cause damage to health beyond the cancer, such as lung and coronary diseases, DNA damage, reporting strategies to reduce these risks

through the use of PPE, distance from homes to places that use pesticides, training of farmers. However, these measures seem insufficient, as State regulation allows the use of pesticides within certain limits, generally exceeded, which contributes to damage to health and the environment.

Keywords: Pesticides, Cancer, Systematic Literature Review, Bibliographic Coupling, Central themes.

1 INTRODUCTION

According to the World Health Organization, twenty thousand deaths per year are recorded due to the consumption of pesticides (INCA, 2023). Approximately 2.5 million tons of pesticides are used worldwide. The national consumption is over 300 thousand tons (SPADOTTO; GOMES, 2021), and in 2021, the total sale of these products was 720.87 thousand tons, an increase of 5.03% compared to the previous year (IBAMA, 2023).

According to Brazilian legislation, pesticides and related products are products and agents, whether of physical, chemical or biological processes, to be used in the production sectors, in the storage and processing of agricultural products, in pastures, in the protection of forests, native or implanted, and other ecosystems, including urban, water and industrial environments. which aim to alter the composition of flora or fauna in order to preserve the harmful action of living beings that are considered harmful, as well as substances and products used as defoliants, desiccants, growth stimulators and inhibitors (BRASIL, 1989).

However, according to the National Cancer Institute, these synthetic chemicals are used as a justification for the control of diseases of various vectors – insects, larvae, fungi, ticks – and to regulate the growth of vegetation in urban and rural environments (INCA, 2023).

Scientific research around the world reports studies on the association between the use or exposure to pesticides in agricultural activities and cancer, such as in Pakistan (PARVEEN *et al., 2023), Nigeria (ABUGU et al., 2023), the United States (VIKRAM et al., 2023), China (YOU* et al., *2022),* suggesting sustainable agricultural practices and the role of regulatory agencies in the inspection of prohibited pesticides.

Therefore, to better understand the relationship between pesticides and cancer associated with rural areas, agriculture, or agribusiness, a search was conducted in the *Scopus* journal database in September 2023, where 937 documents were found. The application of the inclusion and exclusion criteria and an analysis of adherence to the theme consolidated the *final corpus* in 46 articles and reviews. It was found that the studies did not present a systematic review of the literature in the area of environmental sciences that sought to identify the central themes addressed here, which motivated the development of this research.

Thus, the research question arose: What central themes can be evidenced from the relationship between pesticides and cancer associated with rural areas, agriculture or agribusiness? The objective of this systematic literature review (RSL) is to identify the central themes of the relationship between pesticides and cancer associated with rural areas, agriculture or agribusiness.

To achieve the objective, systematic mapping was developed according to Tranfield *et al.* (2003), with rigid stages of planning, conduction and dissemination of knowledge. In the last stage, in addition to the analysis of indicators of scientific and temporal production, it was based on the premise that the articles and reviews could be bibliographically coupled by analyzing the references with the VOSviewer software and that the abstracts, after being processed in *the* Bibliometrix® software, could reveal central themes of the research, based on calculations of centrality and density. which reduces research bias.

It is intended to contribute to studies in the area of environmental sciences, interrelating pesticides and cancer with rural areas, agriculture or agribusiness, which can foster academic debates and influence government decision-making, as well as identify advances in knowledge of the subject.

This article, in addition to this first section, is organized as follows: the second section is dedicated to methodological procedures; the third section includes the analysis and discussion of the results; and the fourth presents the conclusions and limitations of this study.

2 METHODOLOGICAL PROCEDURES

The methodological procedures were carried out in three stages, namely: planning, conducting the systematic literature review (RSL) and disseminating knowledge (TRANFIELD *et al*., 2003). In the planning stage, the *Scopus database was chosen and the search* string *was defined*, using the booleans "AND" and "OR" between words that cover the objective of analysis of this study, with research in the titles, abstracts and keywords, as shown in Chart 1. The choice of the *Scopus journal database* stems from the information that its content comes from more than seven thousand publishers, with more than 1.8 billion cited references and the source's list of titles includes 43,034 results (ELSEVIER, 2023).

Chart 1 – Search string and general result of identified works

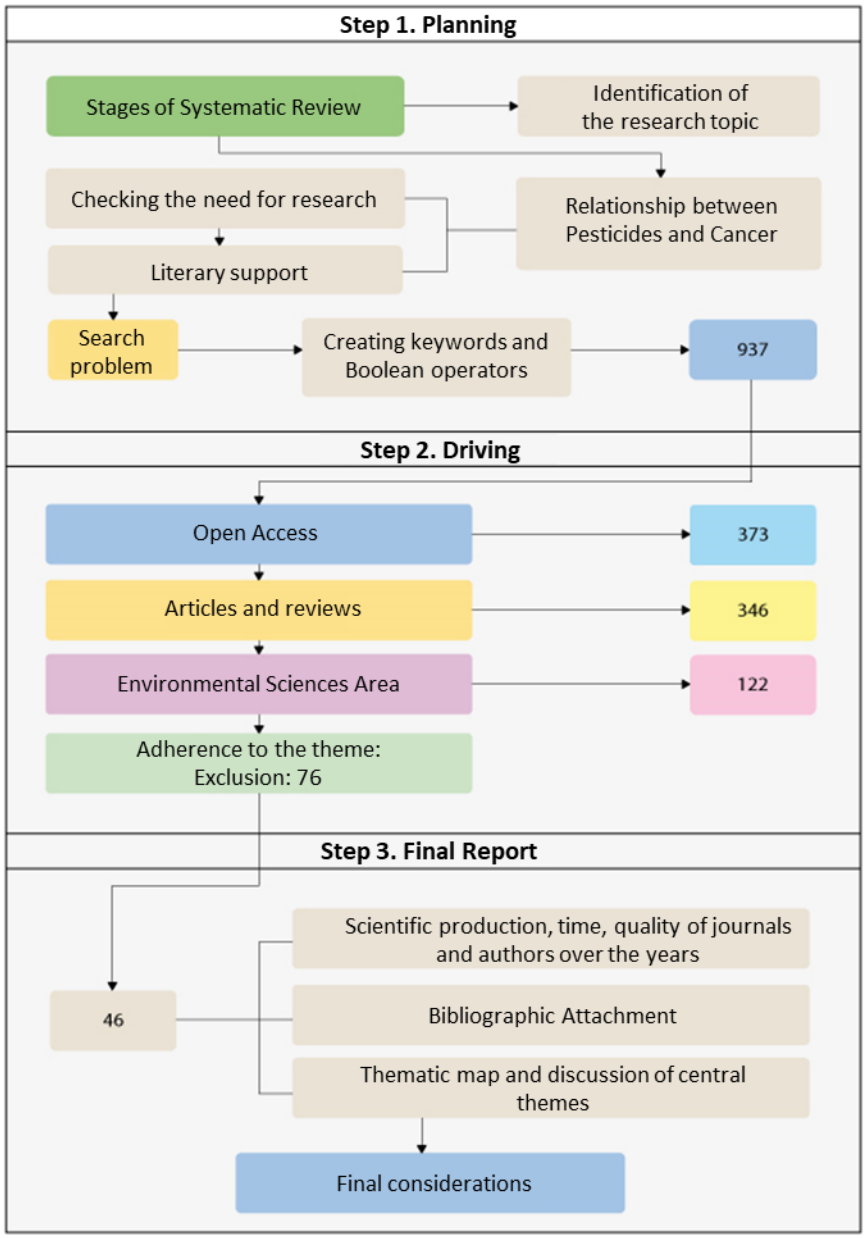
String* searched in *TITLE-ABS-KEY	**Result**
"pesticide" AND "cancer" AND ("rural" OR "agriculture" OR "agribusiness")*	937

Source: The Authors (2023). Data from the Scopus journal database

The systematic literature review was conducted according to the previously defined inclusion and exclusion criteria. Thus, the inclusion criteria used were open access papers, articles, and reviews in the area of environmental sciences, reducing the *corpus*, respectively, to 373, 346, and 122 papers.

Subsequently, detailed and in-depth readings were performed for adherence analysis, which was used as an exclusion criterion for other articles that did not meet the requirement. This criterion refers to the concomitant existence of the constructs "*pesticide**", "*cancer*" and at least one of the others, "*rural" or "*agriculture*" or "agribusiness" in the abstracts of the studies, which led to the exclusion of 76 articles, bringing the* final corpus *to 46 studies, as shown in Figure 1.*

Figure 1 - Summarized flowchart of the RSL steps.



Source: The Authors (2023). Adapted from Tranfield *et al.* (2003)

The flowchart presented in Figure 1 covers all the stages relevant to this research and can be replicated by any researcher or interested party, which is why we move on to the dissemination of knowledge, through the results and discussion, with the analysis of indicators of scientific and temporal

production, bibliographic coupling by the use of the VOSviewer® software and thematic map organized by centrality and density. through the *Bibliometrix*® software.

Finally, it is appropriate to make considerations about the thematic map:

i) the data processed were the abstracts of the 46 papers of the *final corpus*;

ii) the bigrams parameter was used to include at least two words in the cluster name;

iii) 1 label was defined to keep only the two indicator words of each cluster in evidence;

iv) a minimum frequency of five words was also chosen to form each cluster;

v) words that prevented the formation of clusters relevant to this research were excluded, such as "*authors licensee", "north carolina", "basel switzerland"* and *"data gaps*", as well as "*comet assay*", related to a technique for detecting DNA damage, which was presented as an emerging theme, but was excluded to enable the discussion of other themes, in addition to "*agriculture home*", considering that the search for the words together in the abstracts did not identify any works;

vi) synonymized the words "pesticide exposure" and *"*pesticide exposures*", which were forming 2 distinct clusters despite having the same meaning, and;*

vii) once the map was plotted, the words of each cluster were jointly identified in the abstracts of the papers, reporting the central themes categorized by Bibliometrix® based on centrality and density, which allowed the answer to the central research question.

3 RESULTS AND DISCUSSION

This section is composed of three subsections: the first is the analysis of the indicators of scientific and temporal production of the textual *corpus*, the quality of the journals in which the articles were published and the production by the authors over the years; the second is dedicated to the study of bibliographic coupling and the third is dedicated to the analysis of the thematic map based on the values of centrality and density of words contained in the abstracts of these Work. This stage allowed the identification of the central themes, which were divided into emerging, basic, niche and drivers of the relationship between pesticides and cancer associated with rural areas, agriculture or agribusiness.

3.1 ANALYSIS OF SCIENTIFIC AND TEMPORAL PRODUCTION INDICATORS

The objectives of this analysis are: i) to present the indicators of scientific and temporal production, contextualized by the descriptive statistics data from the textual *corpus*, ii) to evaluate the quality of the journals from which the articles came and, iii) to contextualize the annual production over the years in order to bibliometrically analyze the articles published on the theme studied.

Figure 2 - Indicators of scientific production of the *corpus*.



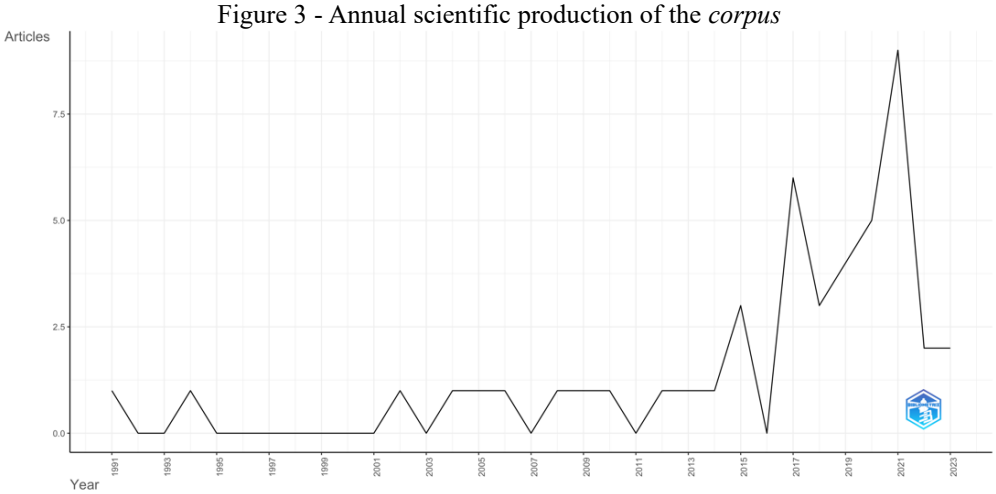
Source: The Authors (2023). *Bibliometrix*® Software

Figure 2 shows that the articles in the *corpus* cover the period from 1991 to 2023, from 26 journals, totaling 46 documents, with an annual growth rate of 2.19%, with an average of 7.26 documents per year and an average of citations per document of 44.28, including 2,998 references.

The documents present 200 keywords defined by 328 authors. The co-authorship rate per document is 7.39, with an international co-authorship rate of 23.91%. Only 1 author produced a study in a singular way, which demonstrates a tendency that the studied theme is usually developed through collaboration between authors and co-authors.

Although the annual growth rate was 2.19%, the analysis of the temporal distribution shown in Figure 3 shows that, from 1991 to 2016, the publications reached a cumulative of 15 papers, equivalent to approximately 33% of the *corpus*.

Figure 3 - Annual scientific production of the *corpus*



Source: The Authors (2023). Bibliometrix®.

From 2017 to 2023, 31 papers were published, which corresponds to approximately 67% of the *corpus*. In this context, although the average age of the documents was 7.26 years, the temporal distribution of the publications is concentrated in the last six years, which is why it is possible to

identify that research on the subject is recent, with an upward trend. However, before proceeding, it is important to evaluate the quality of the journals in which the work of this study was published.

Table 1 – Journals, number of articles published and SCImago quartile in 2022

Newspaper	Articles	SCImago
International Journal of Environmental Research and Public Health	8	Q2
Environmental Health Perspectives	6	Q1
Environmental Health: A Global Access Science Source	3	Q1
Environmental Research	3	Q1
Air, Soil and Water Research	2	Q2
Ecotoxicology and Environmental Safety	2	Q1
Environment International	2	Q1
Environmental Sciences Europe	2	Q1
Annals of Agricultural and Environmental Medicine	1	Q3
Case Studies in Chemical and Environmental Engineering	1	Q1
TOTAL	30	

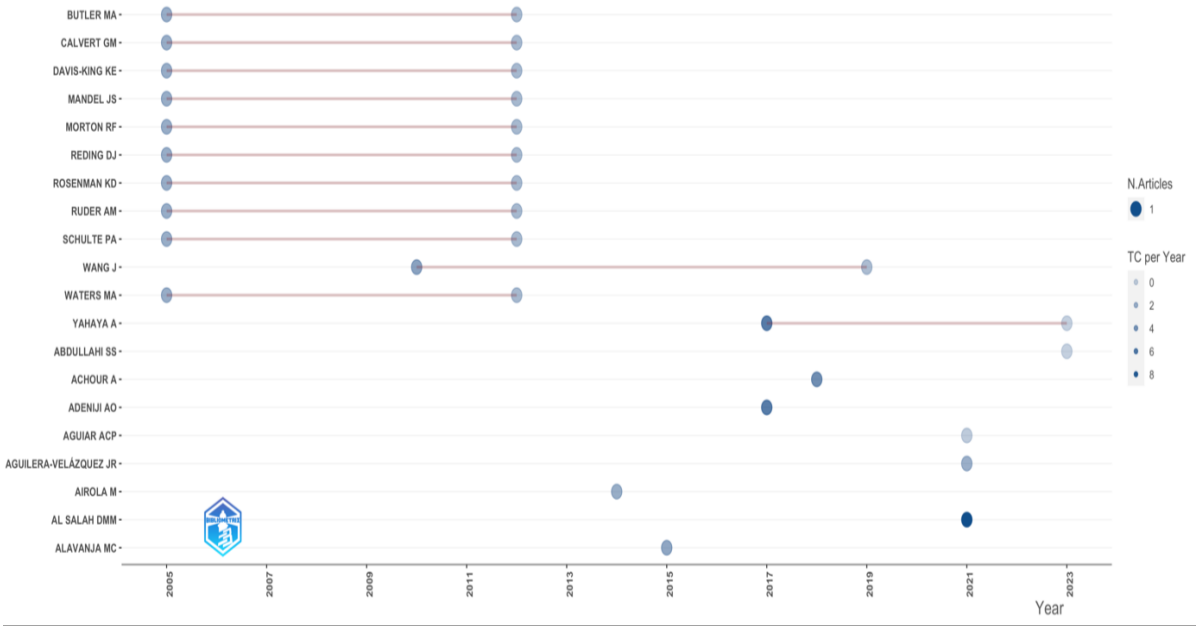
Source: The Authors (2023). Adapted from *Bibliometrix*® software

Table 1 shows the top ten most relevant journals, organized by Bibliometrix® according to the number of publications of the articles selected to compose the final *corpus* of this study. Considering that the articles were obtained from the search in the *Scopus* journal database and that the SCImago Journal & Country Rank *is a portal that makes publicly available a* ranking of the journals in the aforementioned database, based on citations that are extracted from more than 34,100 titles from more than 5,000 international publishers and performance metrics from 239 countries (SCImago, 2023), it was decided to verify the quality of the journals in which the articles involved in this research were published.

Thus, from the analysis of the ten journals made available by Bibliometrix®, it can be seen that, of the 30 articles, approximately 63% were published in journals classified in the first quartile (Q1) of the SCImago, 33% in the second quartile (Q2) and 3% in the third quartile (Q3). It is noteworthy that this classification helps to compare a given journal with others in the same category, and that the Q1 classification indicates that the performance of the journal is better than 75% of the others in the category analyzed, as well as Q 2 is between 50% and 75%, Q3 is between 25% and 50%, and Q4 is up to 25% (MATTHEWS, 2016). For this reason, it can be inferred that *the corpus* selected for the analysis is of high quality in terms of classification of the journals in which they were published.

The authors' production over time (ARIA; CUCCURULLO, 2017), in terms of number of publications and total citations per year, was plotted in Figure 4.

Figure 4 – Authors' production over time



Source: The Authors (2023). Bibliometrix®

In this type of figure, the size of the spheres is closely linked to the number of published papers, while the shading of the spheres, from light blue to darker, refers to the increase in the total number of citations of articles per year.

Among the twenty main authors, Bibliometrix® highlights the author Al Salah (2021), who despite having published only one article in relation to the topic under study, in 2021, reached an index of 8.67 citations per year, surpassing all other authors who came from the *software*' s output. In second place, tied, are Yahaya (2017) and Adeniji (2017), both with one publication and, despite being four years older compared to the highlight, they have a 5.86 citation index per year.

In terms of production over the years, it is identified that Wang (2010; 2019) continued to publish for a longer period, approximately nine years, compared to the others. However, this analysis was carried out using the timeline between two articles, one in 2010 and the other in 2019, with 3.29 and 1.4 citation rates per year, respectively.

All the other authors shown in Figure 4 presented citation rates below the values mentioned or published only one work related to the topic under study or, when they published two, no constancy was identified over the years in the development of the subject.

These findings justify a detailed analysis of the bibliographic coupling of the articles of the entire *corpus, in* order to verify the sharing of theories and/or methodologies, which is presumed to be low due to the low citation rates of the authors in the analysis of this subsection.

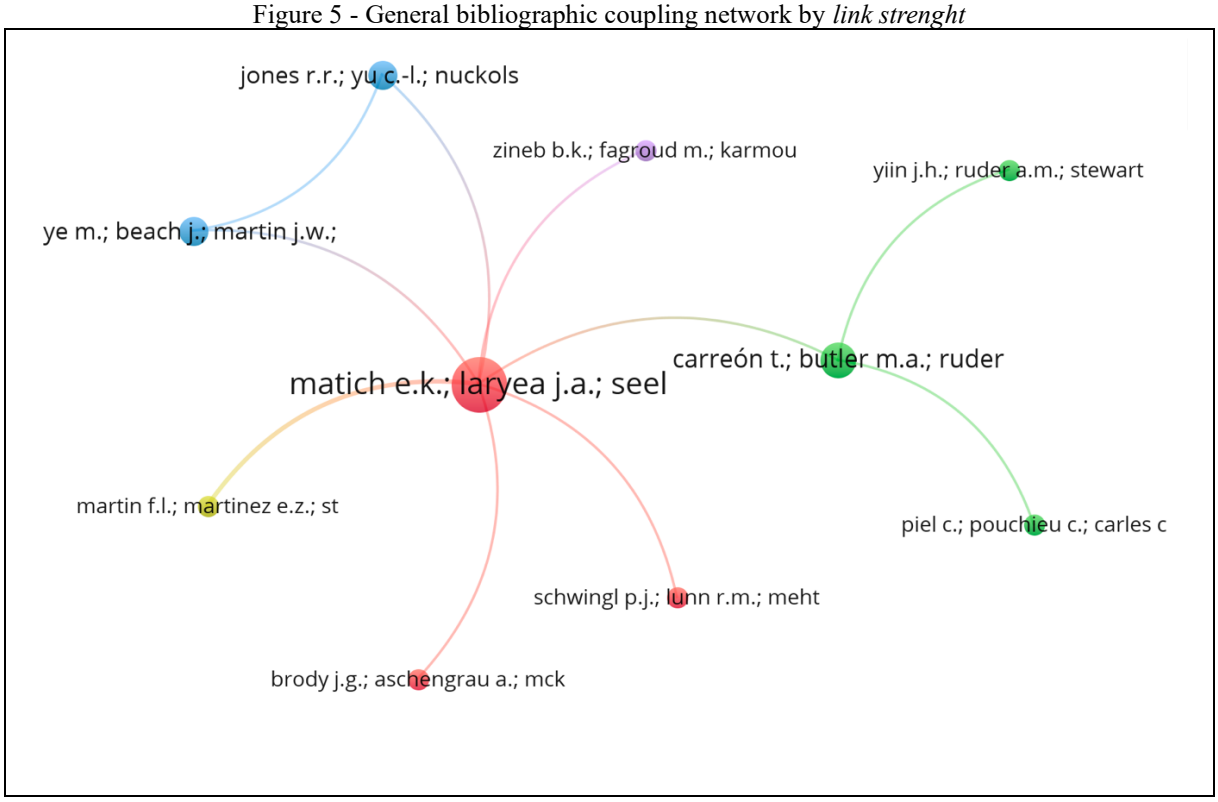
3.2 BIBLIOGRAPHIC COUPLING

The objective of this subsection is to analyze the bibliographic coupling between the works of the textual corpus, which, according to Kessler (1963), allows measuring the degree of similarity between the pairs of references. Thus, the number of references shared between two works admits the assumption that the content of these works is related and, in this way, it is possible to map the *research portfolio* and measure the strength of the connection between the works based on the overlapping of references, i.e., the more identical references shared, the greater the intensity of the coupling (EGGHE; ROUSSEAU, 2002; ZHAO; STROTMANN, 2008).

Coupling analysis involves connections, called *links*, that establish the relationships between two or more jobs. The thicker the *links*, the greater the strength, measured numerically by the *total link strength*, meaning that the articles have a greater intensity of methodological and/or theoretical cooperation in terms of coupling. The nodes represent each work and are calculated based on the density and degree of correlation between the other articles, whose intensity is also measured by the total strength of connections, which shows the works with greater intensity in the respective clusters. Thus, the larger the nodes, the greater the intensity of cooperation of the scientific article (VAN ECK; WALTMAN, 2020).

The VOSviewer was used for the intended analysis, whose chosen unit was the document, with the total count method and the minimum of 5 citations per document, reaching the limit of 38 documents. The analysis option was based on the connections established between the articles, with the method of association by force, as well as for the scale of the nodes. This option allowed the plotting of Figure 5, which presents 10 connections and *total link strength* of 12, forming 5 clusters, identified by the colors red, green, blue, yellow and lilac, with attraction parameters of 7 and repulsion -5 to improve the image *layout*.

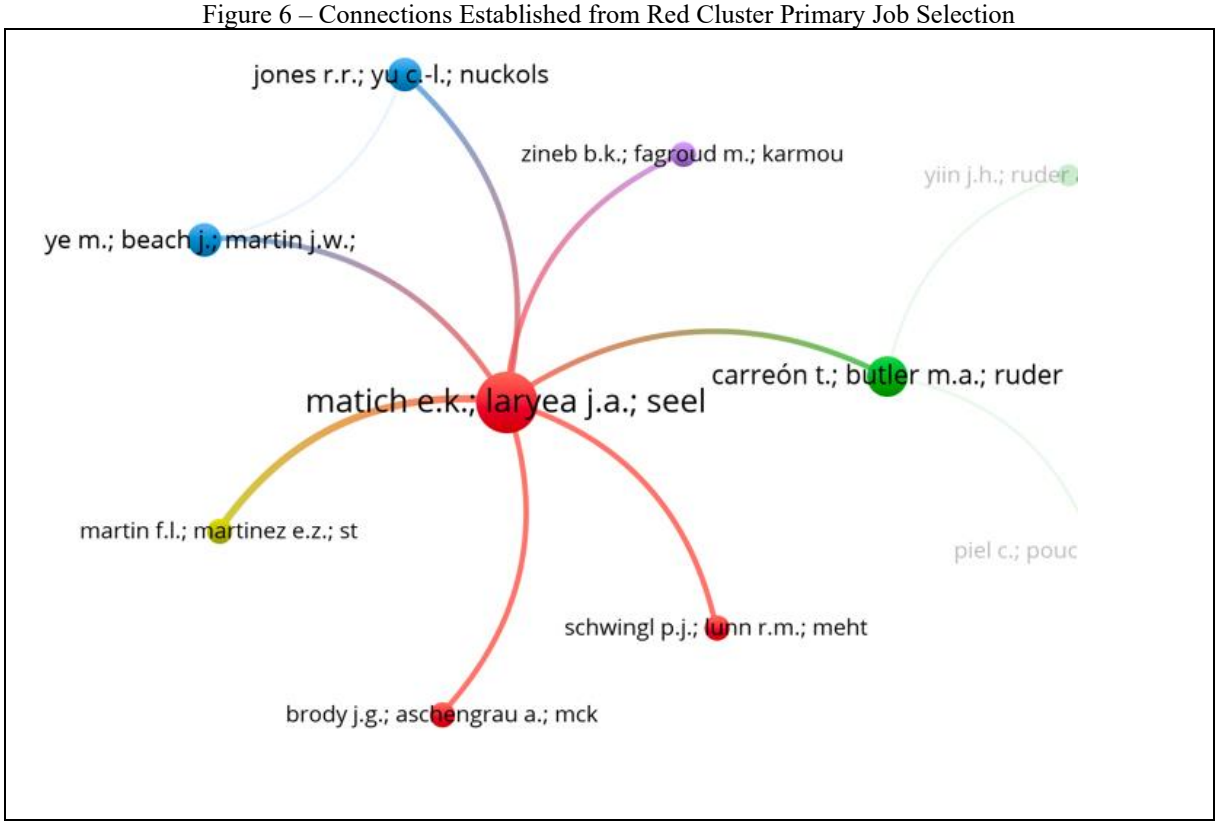
Figure 5 - General bibliographic coupling network by *link strenght*



Source: The Authors (2023). *VOSviewer* Software

Following the logic for obtaining a *layout* to facilitate understanding, the procedure carried out by Aguiar was adopted *et al.* (2023), in which the selection of the main works of each cluster makes it possible to highlight the connections established between the selected article and the other documents of the entire network. In this analysis, this procedure does not form a new cluster, but visually highlights these connections to compare the quantity (*link*) and intensity (*total link strenght*) of the relationships established with the main work of each cluster, thus considered the one that has the largest node among the others in the cluster.

Figure 6 – Connections Established from Red Cluster Primary Job Selection



Source: The Authors (2023). *VOSviewer* Software

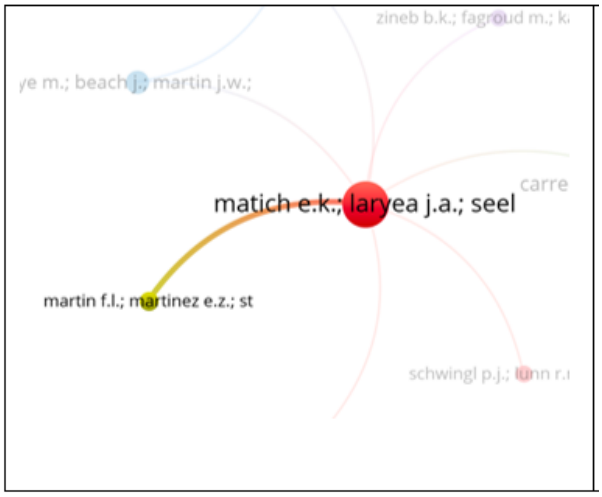
The red cluster (Figure 5) has three studies, with emphasis on Matich *et al.* (2021), the article with the highest *intensity (link strength* 9) in the network, in addition to establishing connections, totaling 7 *links*, with all other clusters, at least one work (Figure 6). This phenomenon can be explained by the nature of the study, since it is a systematic review of the literature, which usually establishes a broad theoretical and/or methodological relationship with other studies on a given subject studied.

Entitled "*Association between pesticide exposure and colorectal cancer risk and incidence: A systematic review*" and with the aim of investigating this association, the results of the article, in general, were not conclusive in such a way that it could be stated that exposure to pesticides causes colorectal cancer (CRC). However, the authors reported concern about some types of pesticides and highlighted that pesticide exposure by farmers, industrial workers, and those living in rural communities, among others, may occur due to the possibility of these pesticides remaining in the environment, for example, in soil, water, and air for weeks or years, warning that, in the United States, 60 million people live in rural areas and that all *CRC mortality hotspots* are within rural communities (MATICH *et al.* 2021).

This research is more closely related (*link strength* 3) to the work of Martin *et al*. (2018), which composes the yellow cluster in isolation (Figure 7), with the article entitled "*Increased exposure to pesticides and colon cancer: Early evidence in Brazil*", whose objective was to investigate the association between pesticide exposure and colon cancer (CHD). However, differently from the study by Matich *et al*. (2021), Martin *et al*. (2018) identified a correlation between the increase in CHD

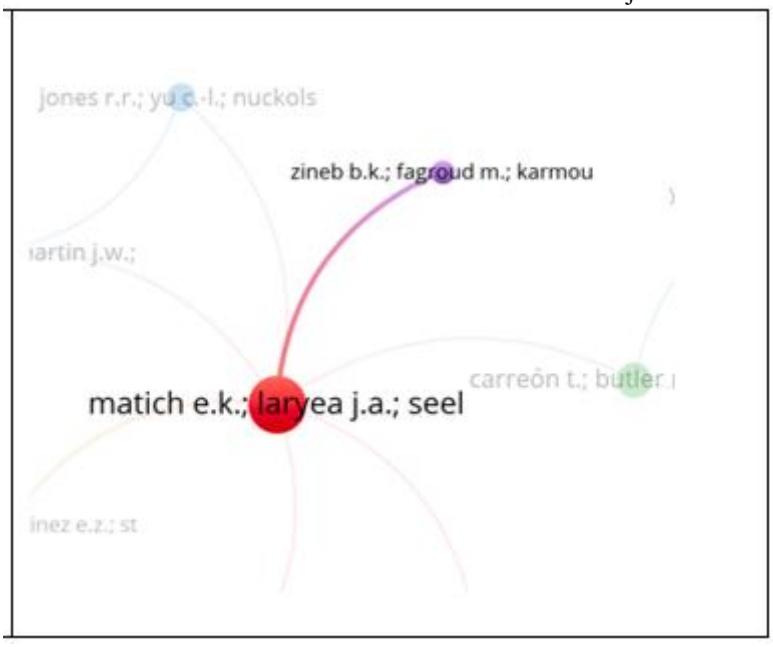
mortality over a decade and the amount of pesticides sold in Brazil, with higher concentrations in the South and Southeast regions. In this context of divergence, it is important to emphasize that the studies adopted different methodologies, which is why, in terms of bibliographic coupling, it is possible to infer that they share theories.

Figure 7 – Connections Established from the Selection of the Yellow Cluster Main Job



Source: The Authors (2023). *VOSviewer* Software

Figure 8 – Connections established from the selection of the main job of the lilac cluster



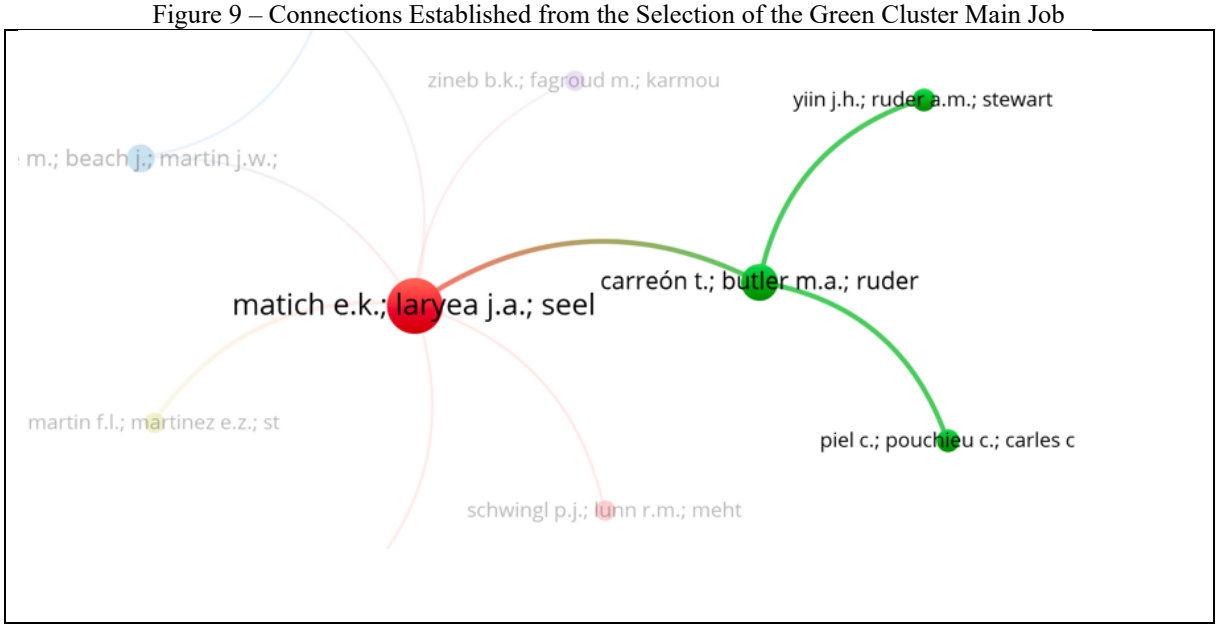
Source: The Authors (2023). *VOSviewer* Software

The single work of the lilac cluster (Figure 5) follows practically the same path as the previous analysis, with the difference that the article has a quantity and intensity of connections in the value of 1 and is linked only to the main work of the red cluster (Figure 8). In the paper, Zineb Ben Khadda *et al*. (2021), entitled "*Farmers' knowledge, attitudes, and perceptions regarding carcinogenic pesticides in fez meknes region (Morocco)*", sought farmers' perceptions and the results showed that, in addition

to the lack of information on pesticide application for most respondents, 40% of the farmers did not properly store pesticides or dispose of them in an environmentally appropriate manner, systematizing, through descriptive statistics, the possible consequences of exposure to these substances by the interviewees: visual impairment (46%); dizziness (44.3%); headache (39.4%); excessive sweating (34.4%); and 30.2% had respiratory problems.

Similarly to the previous analysis, it is noted that this study adopted a different methodology compared to the article that is attached, by Matich *et al*. (2021), that this is a systematic review, while the work analyzed above is a qualitative research, with primary data collection, which is why it can be inferred that the articles, in terms of bibliographic coupling, share theories.

Figure 9 – Connections Established from the Selection of the Green Cluster Main Job



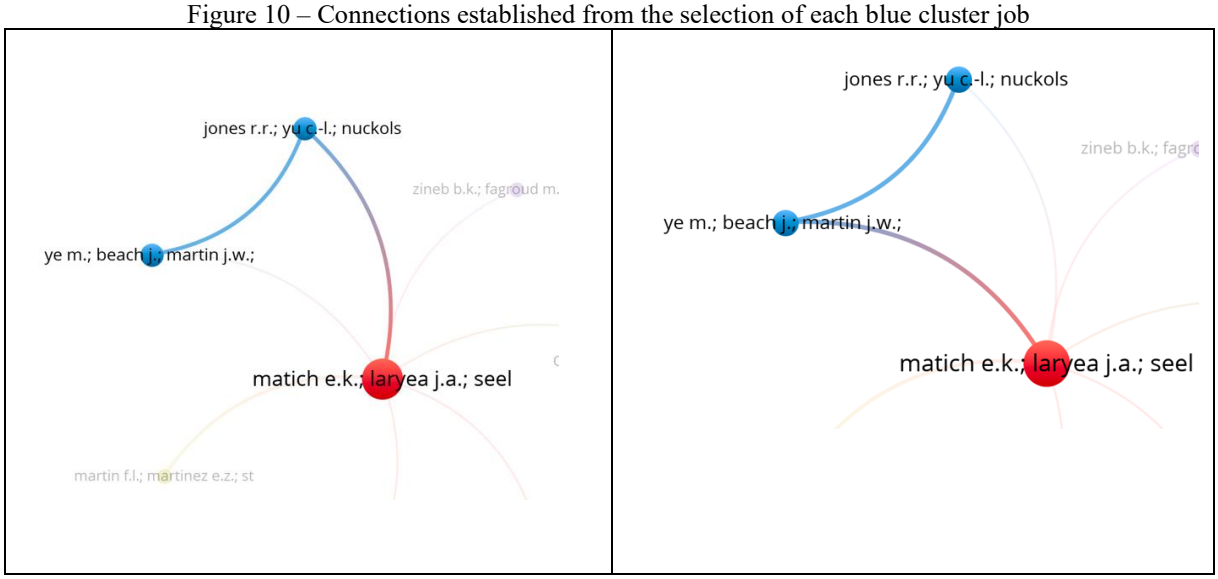
Source: The Authors (2023). *VOSviewer* Software

The green cluster is composed of three studies (Figure 5), in which the study by Carreón *et al*. stands out. (2005), with the number and intensity of 3 connections, one of which occurs with the main work of the red cluster (Figure 9). The article is entitled "*Gliomas and farm pesticide exposure in women: The Upper Midwest Health Study*", and aimed to investigate gliomas in women due to the fact that there were, at the time, several studies that made this association in relation to men. However, the results showed, statistically, that there was no association between exposure to pesticides and increased risk of intracranial gliomas in women, however, they highlighted an increased risk due to carbamate herbicides.

The article by Yiin *et al.* (2012), a member of the Green Cluster, seems to be theoretically and methodologically coupled to the previously analyzed work, having concluded that there is a lack of evidence on positive associations between glioma and pesticides. On the other hand, Piel *et al.* (2019), another component of the green cluster, also developed studies on the association between gliomas,

among others, and exposure to pesticides, however, they reported an increased risk of development in relation to exposure to pesticides called carbamates and a significant association for fungicides and herbicides.

Figure 10 – Connections established from the selection of each blue cluster job



Source: The Authors (2023). *VOSviewer* Software

The blue cluster is formed by two studies (Figure 5), which have identical values for the number and intensity of connections (2). Both establish a connection with each other and with the main work of the red cluster (Figure 10). The work of Ye *et al.* (2013) and Jones *et al.* (2014) will be reported later among the central themes, however, it should be noted that they are not methodologically coupled. The first is a review and the second followed up on previous research, documented records on the subject studied, and investigated the distance between homes and places exposed to pesticides. This allows us to infer that the articles share theories in terms of bibliographic coupling.

As can be seen, the bibliographic coupling was shown to have a low quantity and intensity, to the extent that only 10 studies, out of a total of 46, formed five clusters, and the main work of the red cluster (Figure 5) became a highlight due to the methodology adopted, a systematic review that, by its very nature, conducts broader studies.

After analyzing the descriptive information associated with *the corpus* and the bibliographic coupling, it is of interest to this work to identify and discuss the central themes, composed of emerging or declining, basic, niche and motors, based on the analysis of the thematic map.

3.3 THEMATIC MAP BY CENTRALITY AND DENSITY VALUES

The thematic map is based on the variables centrality (horizontal axis) and density (vertical axis), measured, respectively, by the degree of relevance and development of the theme investigated. The division of the map into four quadrants allows us to evaluate the relationship between the variables

studied and the situation of the central themes under discussion in the literature over the period analyzed.

Each cluster represents a network of words derived from the abstracts, related to each other through connections, forming nodes, where these words are located. The formation and positioning of the clusters in the quadrants are calculated by Bibliometrix® and, in this study, organized by the centrality and density values themselves, as shown in Table 2.

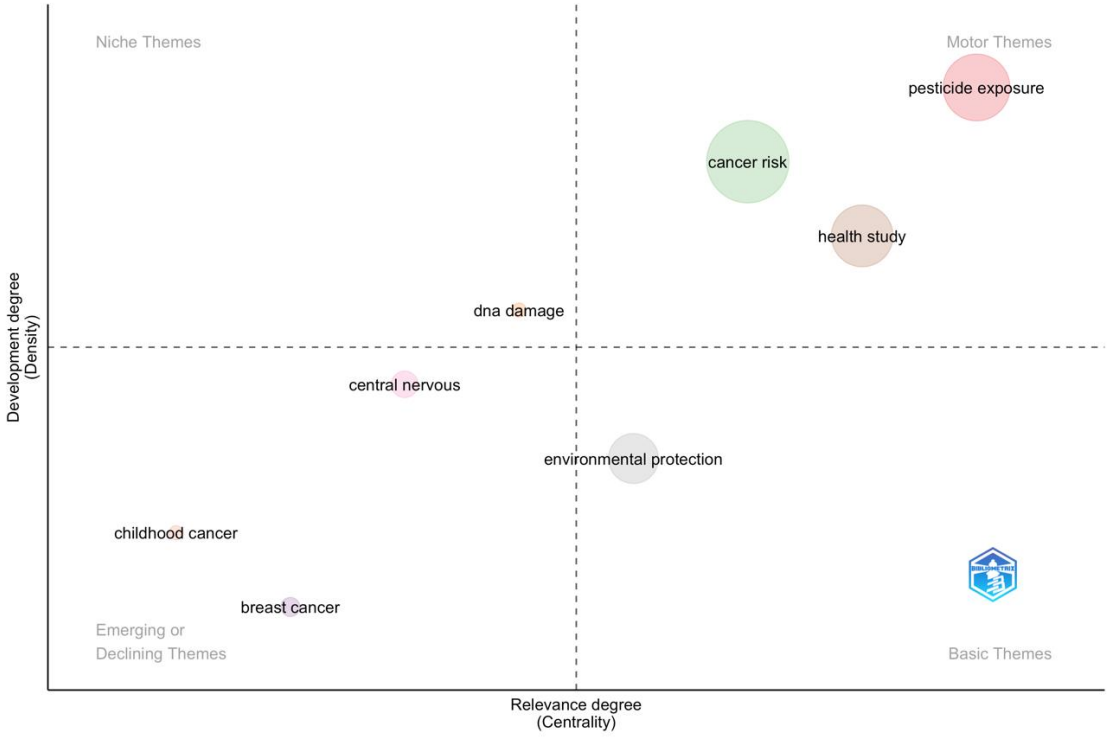
Table 2 – Clusters and centrality and density statistics

Cluster	Centrality	Density
pesticide exposure	18,33	294,29
cancer risk	12,16	191,67
breast cancer	3,03	36,00
dna damage	8,25	115,00
health study	15,38	181,76
central nervous	5,50	93,75
environmental protection	11,15	91,23
childhood cancer	1,75	85,00

Source: The Authors (2023). Bibliometrix® data

The values of centrality and density associated with the main word forming the cluster determine the quadrants of positioning of these clusters in Figure 11, classifying them into basic themes, *motor* themes, niche themes, *and emerging or* declining *themes*.

Figure 11 – Thematic Map



Source: The Authors (2023). *Bibliometrix*® software.

Emerging or declining themes are considered marginal and have little impact on the final *corpus*, as they are marked by low centrality and density. It should be noted that, in this study, the themes were considered emerging, since most of the articles identified are recent, formed by the clusters breast *cancer*, childhood cancer, and central nervous nerve.

The basic themes have high centrality and low density, they are considered relevant for the development of a research theme, however, they are not sufficiently developed (MARTÍNEZ *et al.* 2015). In this quadrant, the environmental protection cluster stands out.

In niche themes, the DNA damage cluster appears, characterized by research that is developed, however, in an isolated way, given its low centrality and high density.

The clusters with high centrality and density form the motor themes, which are sufficiently developed and relevant to the theme studied. In the case of the *corpus* under analysis, the clusters of *health study*, *cancer risk* and *pesticide exposure* are the driving themes.

In view of this, we present some identified studies and a brief discussion, excluding quantitative information as much as possible, which can be accessed in the studies reported and referenced in this article. This choice is justified in order to construct an intelligible narrative centered on the importance of research associated with the basic, niche, emerging and motor themes identified, using 23 works, which corresponds to 50% of the final *corpus*.

3.3.1 Basic, niche and emerging themes

As **basic** themes, there are studies on the pesticides carbaryl, dichloropropene, dimethoate, mancozeb, metolachlor, pendimethalin, permethrin and trifluralin, used in large volumes in various sectors (agriculture, home and garden, industry, commercial and/or government) and classified with carcinogenic potential by the U.S. Environmental Protection Agency (USEPA). These substances were related to human cancer, based on a systematic literature review, in at least three primary peer-reviewed studies, concluding that the mapping of evidence carried out in the research can guide decision-making in order to update the cancer risk assessment (SCHWINGL *et al*., 2021).

Organochlorines (OCP) are widely used in agriculture, industry and even in domestic use, but they are resistant to biodegradation. A recent primary study, conducted along the Okura River in the Eastern Senatorial District of Kogi State, Nigeria, concluded that there was no health risk when measuring the hazard quotient (HQ), average daily dose (ADD), and cancer risk (CR) based on the methods and limits set by the USEPA. However, the research identified that the concentrations of the OCPs were slightly above the maximum limit allowed by the USEPA (MUHAMMED *et al*., 2023).

Another primary study identified, in the surface waters of the Buffalo River in the Eastern Cape, South Africa, that the concentrations of seventeen organochlorine types (OCP) were above the limits established by the USEPA and that the cancer risk assessment was below the permissible limit, despite

having found that the average daily dose over the lifetime was at a level higher than that established by that agency. suggesting that both regulation and the use and elimination of agrochemicals are necessary in the studied region and in other locations in South Africa, given that PCOs impact human health and biota if found in concentrations higher than permitted (YAHAYA *et al*., 2017).

In emerging themes, a study on the relationship between exposure to pesticides as an environmental risk factor and **breast cancer concluded that, when living in the vicinity of agricultural areas that use pesticides, women over 50 years of age who menstruated early had a higher risk of developing breast cancer compared to the control group (SILVA** *et al*., 2019). In the context of breast cancer, research has been carried out with pesticides that can affect humans and animals, used in agriculture and livestock, such as flumethrin, classified as a pyrethroid for insect control (KARA-ERTEKIN et al., *2021) and chlorpyrifos, one of the most used in extensive agriculture, that is, characterized by using rudimentary or traditional techniques in production (LASAGNA* et al., 2020).

Related to childhood cancer, in the **Cerrado biome, Brazil, a study on the advance of agribusiness and the use of pesticides highlights, in addition to the environmental impacts (reduction of native vegetation, migration of springs, among others.), that the region consumed 73.5% of the country's pesticides in 2018, resulting in higher rates of childhood cancer compared to the national average (EGGER** *et al*., 2021). A review of French scientific studies on the effects of pesticides on children's health indicates that there is an increased risk of otitis at 2 years of age, as well as an increased risk of developing several types of childhood cancer, although it did not identify other effects on the neurological development of 6-year-old children who were exposed to pesticides in the prenatal period (CHEVRIER; BÉRANGER, 2018).

The increased risk of **central nervous** system tumors in children under 6 years of age was inferred through research that focused on mothers living in rural areas during pregnancy, whose distance was 4,000 meters between homes and areas of application of certain pesticides (LOMBARDI *et al*., 2021). Studies on the occurrence of central nervous system tumors in people involved in agriculture indicate that there is an increased risk of development in relation to exposure to pesticides called carbamates, having reported a significant association for fungicides and herbicides, the latter at a lower level, and highlighted the need for further studies for confirmation (PIEL *et al*., 2019).

As a **niche** theme, we can highlight a community-based research carried out with ten Latino children of rural workers, in North Carolina, United States, in which silicone bracelets (samplers) were used, which allowed the identification of pesticides and other substances harmful to health, such as organophosphates, organochlorines and pyrethroids. The results of the research showed a significant association between the number of pesticide detections and **DNA damage to** hair follicles,

highlighting the high acceptability of the collection method among children, as it is non-invasive and the possibility of monitoring pesticides (VIDI *et al*., 2017).

3.3.2 Driving themes

In **health studies**, it is noteworthy that agricultural health research in North Carolina, USA, indicates that a study on the use of Biomarkers of Exposure and Effect in Agriculture (BEEA) can provide *insights* into how exposure to pesticides influences disease risk through the investigation of molecules. The study is relevant because it collected samples of blood, urine and house dust from people who had been exposed to contact with pesticides in the last twelve months, especially because, of the 1,233 participants, 70% of farmers reported that they had been exposed to herbicides, such as glyphosate, and insecticides such as malathion, cyfluthrin and permethrin, which enables diagnosis and subsequent research (HOFMANN *et al*., 2015).

A study in Iowa, USA, suggested the need to investigate specific exposures of women who lived in agricultural or rural areas, considering that a higher risk of developing acute myeloid leukemia (AML) was identified just by living in these areas. In addition, it was identified that living close (750 meters) to pastures or row crops possibly conferred an increased risk of chronic lymphocytic leukemia (CLL) and small lymphocytic lymphoma (SLL), regardless of whether the place of residence was in a rural area or not (JONES *et al*., 2014).

The other health studies were closely related to pesticide exposure and cancer risk. In this context, the protection of children from **exposure to pesticides** requires improvement in health practices and policies, because it can occur during prenatal care and until childhood, with possible exposures in various scenarios, for example, domestic environments through insecticides, whose exploitative behavior of children increases this risk, in parks and gardens, contact with domestic animals treated with pesticides, as well as in rural environments, whether by the application of pesticides, contaminated equipment and work clothes of the parents, ingestion of contaminated fruits, water, milk, eggs, among others, and the dose, duration and life span of exposure to pesticides are considered determinant of the toxic effects, and may be associated, although at low levels, to cancer, among other diseases (PASCALE; LABORDE, 2020).

An ecological study in Brazil indicates that exposure to pesticides may be associated with colon cancer (CHD) by correlating data on deaths from the type of cancer mentioned, obtained from data from the Ministry of Health, with the use of pesticides extracted from the Brazilian Institute of the Environment and Renewable Natural Resources, emphasizing that, for another decade, mortality was concentrated in the South and Southeast regions of the country (MARTIN *et al*., 2018).

On the other hand, the relationship between the colorectal cancer (CRC) mortality rate and pesticide exposure in rural areas did not obtain a conclusive result in a systematic literature review,

however, pesticides such as terbufos and dicamba were reported as a concern in the association studied, as well as aldicarb and dieldrin, which were banned in the USA, highlighting the relevance of this exposure and its permanence in the environment for long periods (MATICH *et al*., 2021).

Lung diseases, such as asthma and chronic bronchitis, have been associated with work-related occupational exposure, although there have been inconclusive results for lung cancer, suggesting that the use of personal protective equipment and training on the proper use of PPE are measures that can control this type of exposure in agriculture. fisheries, forestry, and the food industry (YE *et al*., 2013).

Respiratory problems, excessive sweating, headache, dizziness and visual impairment were categorized as possible consequences of agricultural exposure to pesticides based on a study conducted in Fez-Meknes, Morocco, which investigated attitudes, knowledge and practices about the use of pesticides in fifteen rural communities, in which most farmers reported not having received training on the use of pesticides. and almost half of them used glyphosate and malathion, classified as human carcinogens by the International Agency for Research on Cancer, highlighting the risk to the environment and human health (BEN KHADDA *et al*., 2021).

The use of biomarkers is suggested to confirm the results of research that demonstrate that the intake of fruits and vegetables, although recommended to prevent coronary heart disease, if exposed to pesticides, can compromise the benefits of consuming these foods (CHIU *et al*., 2019).

Regarding **cancer** risk, in Bizerte, Tunisia, a study reported that organochlorines and hydrocarbons in aerosols were in high concentrations in dry disposition, that is, in the air, being considered a carcinogenic risk in winter (BARHOUMI *et al*., 2018).

In the province of Lecce, southern Italy, exposure to smoking, environmental conditions (use of pesticides in agriculture without PPE), occupational conditions and lifestyle itself need to be further explored as they contribute to the increased risk of cancer, especially due to the identification of a higher incidence of adenocarcinoma, considered a malignant tumor. in men and women from the studied region (MINICHILLI *et al*., 2022).

The probability of exposure to cancer was not considered low in soils of Kapsabet, Voi and Nyeri, Kenya, proposing control measures based on a study that demonstrated the distribution, concentrations and threat that organochlorines (OCP) pose to human health and the environment, highlighting that OCP pollution was derived from the use of hexachlorocyclohexane (HCH) and dichlorodiphenyltrichloroethane (DDT), the first as a control of diseases transmitted by insects and the second, for its use in agriculture (MUNGAI; WANG, 2019).

A literature review indicates that molecular biology and genetics can contribute to studies related to bioremediation, i.e., the degradation of the insecticide called Dichlorvos (O,O-dimethyl O-(2,2-dichlorovinyl)phosphate, DDVP), considered a toxic product, to transform it into non-toxic products, considering that DDVP has been used for more than four decades, and it is still sought after

in developing countries, reporting that microbial degradation is more environmentally friendly compared to physicochemical methods (ZHANG *et al*., 2021).

4 FINAL CONSIDERATIONS

This article aimed to identify the central themes of the relationship between pesticides and cancer associated with rural areas, agriculture or agribusiness. The analysis of the indicators of scientific and temporal production showed that the theme can be considered recent, with a growing trend in the area of environmental sciences.

The investigation of the quality of the journals found that most of the articles in the sample came from journals classified in the first quartile (Q1) of the SCImago and the analysis of the authors' production over the years was dispersed, with low citation rates and little production over the period in relation to the theme studied.

In this sense, the analysis of bibliographic coupling was presented, which evidenced low sharing of theories and/or methodologies, based on the study of the quantity and intensity of the connections established between the works, which suggests a probable need to foster the intersection between the researches developed in the area of environmental sciences, considering that the *corpus* has shown a trend of growth of studies in recent years.

The central themes were obtained from the abstracts *of the final corpus*, through bibliometric calculations of centrality and density, from which emerged, basic, niche and motor themes, identified and contextualized, qualitatively, with the exclusion of quantitative data and research techniques used as a means to obtain research results.

Despite the attempt not to approach techniques as means to achieve results, the *corpus* presented the relevance of biomarker studies and evidence mapping in investigations on the subject in the area of environmental sciences, which was made possible by reducing the bias provided by the methodology adopted in this article.

In this sense, although this study achieved the objective of identifying central themes on the relationship between pesticides and cancer associated with rural areas, agriculture or agribusiness, it was verified that the *corpus* went beyond the adopted cut, to the extent that it reported the risk of exposure to pesticides associated with cancer in areas such as gardens, parks, urban areas near crops that use pesticides, domestic use, clothing or work tools taken home, contaminated food, lifestyle factors such as smoking, among others.

In addition, the risk of exposure to these substances beyond cancer was demonstrated, given that the results indicated risks of developing other diseases, such as pulmonary diseases (asthma and chronic bronchitis) in occupational exposure, coronary diseases in the ingestion of contaminated food, DNA damage and farmers' perception of respiratory problems, excessive sweating, headaches,

dizziness and visual impairment, proving that it is a public health problem that affects the environment through the contamination of soil, water, air, fauna and flora, reaching the contamination of people.

Strategies that aim to reduce these impacts can be inferred from the *corpus*, such as the use of personal protective equipment, the establishment of residence far from places that use pesticides, the control of children's behavior in relation to the risk of exposure, training of farmers on the use of pesticides, among others. However, these measures seem to be insufficient, since the widespread use of pesticides is widespread, even with the consent of the States, which regulate maximum limits for the presence of pesticides in water, soil, air and even in the human body, with mathematical or statistical calculations that allow, at least in theory, to infer the absence of cancer risk.

Despite the State's regulation, studies show that the allowed limits are exceeded in most cases, causing the problems and diseases reported. In this context in Brazil, in the field of environmental law, the precautionary principle is in force, that is, even if it is not scientifically proven, the risks inherent to exposure must be avoided, which is why there is a need for a social pact for health and the environment in the search for alternatives to the production model adopted in the world. Among the models with low environmental impact and high socioeconomic impact, the valorization of agroecology and organic food production and the need for public policies that foster this transition process with the public of family farming, traditional peoples and communities, as well as incentives for urban and peri-urban agriculture, along these lines, stand out. In addition to these, the development of bioremediation techniques for already contaminated areas, such as the microbial degradation of insecticides demonstrated by the *corpus* in studies related to cell biology and genetics, in attention to the principle of prevention.

The limitations of this study include the in-depth analysis of quantitative data, description of laboratory techniques, formulations of these substances and the chemical and biological interactions inherent to several areas of knowledge, which is why it is suggested that, in future research, the multidisciplinary nature of the studied theme should be considered, with an expansion of the *corpus* without being limited to rural areas, agriculture or agribusiness, such as meta-analysis, which allows the mapping of scientific evidence through statistical methods, in addition to the development of studies that associate these analyses with qualitative perspectives, such as the perception of the actors involved and intervention through action research.

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Evaluation of physicochemical, microbiological and cutaneous permeation properties of *Calendula officinalis L.* In different concentrations and dosage forms

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Karina Valandro
Pharmacy graduate
University of Vale do Taquari – UNIVATES
E-mail: karina.valandro@universo.univates.br

Liana Johann
PhD in Zoology
University of Vale do Taquari – UNIVATES
E-mail: liana@univates.br

Luisa Scheer Ely
Doctorate
University of Vale do Taquari – UNIVATES
E-mail: luisa.ely@univates.br

Jane Herber
Doctorate
University of Vale do Taquari – UNIVATES
E-mail: jane.herber@univates.br

Marines Persigo Morais Rigo
Master's Degree
University of Vale do Taquari – UNIVATES
E-mail: mpmr@univates.br

ABSTRACT
C. officinalis is a herbaceous plant that has anti-ulcerative, healing, restorative, anti-edematous and refreshing properties. In this article, the permeation of the glycolic extract of *C. officinalis* in cream and gel at different concentrations was evaluated. Accelerated stability tests were also carried out, as well as organoleptic, physical-chemical and microbiological tests.

Keywords: *Calendula officinalis L.*, Physical-chemical, Microbiological, Skin permeation.

1 INTRODUCTION

The incidence of malignant neoplasms has increased in recent years, with a prevalence of diagnoses of head and neck tumors, with radiotherapy being the main form of treatment. Radiotherapy uses ionizing radiation, promoting the death of malignant cells, in addition to causing lesions that are most often irreversible. Tissue damage induced by radiation emitted by radiation therapy is called radiodermatitis.[1]

In an analysis of publications, the most commonly used allopathic drugs in the prevention and treatment of radiodermatitis are topical corticosteroids, Tetra-Cream® and Bepantol®. However, these drugs have numerous adverse reactions, such as contact dermatitis (due to the preservatives used), skin infections, perioral dermatitis, skin atrophy, and systemic adverse effects (they can also occur due to topical corticosteroid therapy).[2]

The use of plants is an ancient practice that stands out as one of the oldest forms of medicinal practice in humanity. The use of medicinal plants has increased in recent years due to the absence of more economically viable therapies. *C. officinalis*, also known as mal-me-quer, 23 golden daisy and

wonder-of-the-gardens, stands out for its numerous indications, used for pruritus, solar erythema, burns, dry dermatoses, wounds, ulcers, acne, skin toner, skin fungi, jaundice, eye inflammation and prevention of radiodermatitis, among others. Its use is recommended topically for anti-inflammatory and healing therapeutic actions, stimulating tissue regeneration by increasing the metabolism of glycoproteins, nucleoproteins and collagen proteins.[3]

C. officinalis is a plant that has already been used in semi-solid formulations for the treatment of patients who develop radiodermatitis. In a randomized, double-blind clinical study in patients with head and neck cancer, *C. officinalis* cream was effective in the prevention and treatment of radiodermatitis.[4]

The permeation of active ingredients through the skin occurs in two ways: transepidermal (intercellular and intracellular) and transadnexal (transfollicular and transudoridoparous). In vitro skin permeation tests are used using the Franz method. The cells are made up of two compartments: the donor and the recipient, and the skin sample is placed between the two compartments. Due to the physiological similarities with human skin, pigskin is the most suitable animal model for performing this method.[5]

The physicochemical evaluation of formulations consists of a set of tests performed in the laboratory, aiming to evaluate the physical and chemical properties and characteristics of the product. Among the types of tests are pH, density, spreadability and centrifugation.[6] Microbiological tests, on the other hand, identify microbial contamination of a product, analyzing changes with physical and chemical properties, seeking to find signs of risk of infection for the user.[7]

2 OBJECTIVE

To analyze the physicochemical, microbiological and cutaneous permeation properties of two semi-solid dosage forms at different concentrations of the glycolic extract of the *C. officinalis.*

3 MATERIAL AND METHODS

For the development of the formulations, a literature search was carried out, which supported the main active ingredients to be used in cream (Table 1) and gel (Table 2), such as emulsifiers (cream), neutralizing and gelling agents (gel), surfactants, humectants, antioxidants and preservatives.

Table 1. Formulation of anionic cream used to incorporate the glycolic extract of *C. officinalis* at concentrations 7% and 10%

Input	**Usage Percentage**
Oil Phase (Phase B)	
Lanette N	16%
Octyl Stearate	16%
Glycerol	6,35%
Aqueous Phase (Phase A)	
Parabens Solution	3,3%
Water	qsp 800mL
Phase C	
Imide preservative solution	0,6%

Source: From the author (2023).

Table 2. Formulation of carbopol gel used to incorporate C. *officinalis glycolic* extract at 7% and 10% concentrations

Input	**Usage Percentage**
Carbopol 940	1%
Disodium EDTA	0,05%
Propylene Glycol	5,2%
Imide preservative solution	0,5%
AMP-95 Solution 50%	2%
Purified water	qsp 800mL

Source: From the author (2023).

During the production of the formulations, some aspects were analyzed to verify the compatibility of the extract in the vehicles, such as the solubility of *C. officinalis* in the cream and gel, pre-stability, homogeneity and organoleptic characteristics.

3.1 STUDY SAMPLE

For comparative analysis of the cutaneous permeation *of C. officinalis*, the glycolic extract was used at concentrations of 7% and 10% in two vehicles: cream and gel produced in the laboratories of the Pharmacy-School of the University of Vale do Taquari - Univates. The concentrations mentioned were previously taken from the report of the glycolic extract of *C. officinalis,* which recommends a

concentration between 5-10% of the active ingredient in lotions, creams, aftershave and post-waxing products, shampoos, conditioners and soaps. The determination of permeability was analyzed in porcine skin. The skin in question was obtained soon after the slaughter of the pig and there was no scalding process, so that there was no loss of favorable conditions for permeability. After performing the skin permeation tests by the Franz cell method, physicochemical and microbiological tests were performed on the formulations that permeated.

3.2 SKIN PREPARATION

The pig's skin was removed from the cartilage with a scalpel and sanitized with 70% alcohol and water, being intact and with minimal blood vessels and fats. After the skin was removed, it was cut into circles and measured with a caliper to obtain similar sizes. The skin was stored in aluminum foil and kept at -4 °C until the moment of use, so that it did not exceed 30 days, so that there would be no loss of any permeability condition. To perform the test, the skin was thawed and heated in an ultrathermostatic bath at 32 °C, simulating body temperature.

3.3 FRANZ CELLS

The method used to analyze permeability is Franz's, as it is the most widely used method to determine skin permeation in medicines and cosmetics. Franz cells are known to be static, finite-dose diffusion cells where the skin is arranged in a Vertical Diffusion Cell (VDC). Being the best method of quality control in topical formulations.[8]

Franz's method is the most widely used method for verifying the *in vitro* absorption of topical formulations such as gels, creams, ointments, lotions, and transdermal patches. Franz diffusion cells study the cutaneous permeation of semi-solid dosage forms in the skin.

In this method, a vertical diffusion cell is used, containing a donor compartment and a recipient compartment, separated by the membrane sample. The formula was applied to pig skin, which had the epidermis and dermis. The method is characterized by the use of diffusion cells, where the active ingredient passes through the membrane by diffusion, to the recipient solution, in which the analytical delimitation of the content of the permeated active ingredient was performed through time.[9]

The analyses were carried out in triplicate at the Chemistry laboratories of the University of Vale do Taquari - Univates. The recipient solution was made with a 1:1 ratio of water and alcohol: 250ml of purified water + 250ml of alcohol. The receptor solution used in the study had a maximum of 17 mL inside the Franz cell. In the donor's compartment, 0.2g of the vehicle containing the glycolic extract was applied. During the experiment in the laboratories, the luminosity was also controlled so that there was no interference. The standardized time was 15 minutes and 30 minutes.

3.4 IN VITRO SKIN PERMEATION

After removing the recipient solution at 15 minutes and 30 minutes, it was placed in an amber bottle so that the light would not interfere with the result. The samples were analyzed in triplicates in a UV spectrophotometer, at a wavelength of 517 nm.[10]

3.5 ORGANOLEPTIC TESTS

Organoleptic assays were the methods used to verify the characteristics of formulations through the sense organs, such as appearance, color, odor and touch. This method analyzes the state of the product in a quick and easy-to-perceive way in cases of alterations such as phase separation, precipitation and turbidity.[6]

3.6 PHYSICOCHEMICAL TESTS

3.6.1 Centrifuge Test

The centrifuge test caused stress on the product, reproducing an increase in the force of gravity, increasing the mobility of the particles and accelerating probable instabilities. The changes were analyzed in the form of precipitation, phase separation, caking and coalescence.[6]

The test was performed with 30g of the analyzed sample, where the sample was submitted to the centrifuge at 3,000 rpm for 30 minutes. The centrifuge test analyzes changes in formulations before stability tests are performed.[11]

3.6.2 Accelerated Stability Tests

Accelerated stability testing is an important quality control to evaluate the efficacy, safety, and quality of the product. This test indicates the degree of stability of the formulation under different environmental conditions that affect the product from its manufacture to its shelf life. According to RDC No. 318 of 2019, this parameter analyzes the chemical, physical and microbiological changes of formulations in a forced state of storage, helping to determine the shelf life of the product. This test looks at the shelf life and compatibility of the product with its storage material. The formulations were stored at different temperatures, to evaluate their characteristics in different environments that may be exposed. The stability assessment period varies according to the specifications of the formula, the active ingredients and preservatives used.[12th]

Due to the time available for the tests, the stability test lasted 60 days, due to the time available after the preparation of the formulations and the development of the skin permeation test. To carry out this research, the samples were stored at room temperature/bench (20 °C - 25 °C), greenhouse temperature (40 °C) and refrigerator temperature (5 °C). The times used in this stability study will initially be at time zero, days seven, 15, 30 and 60. The parameters analyzed were the organoleptic

characteristics, the physicochemical tests (pH, density, spreadability and centrifugation) and the microbiological test performed at time zero, right after production, all physicochemical and microbiological tests were performed in triplicate.[13]

3.6.3 ph

pH determination is by potentiometry, where the electrode is immersed in the sample to determine the activity of hydrogen ions. The scale of values 1 to 14 determines the acidity or alkalinity of a formulation, in which the closer to 1 the more acidic and the closer to 14 the more alkaline, and the value 7 is considered neutral pH. To determine the pH, a device called pH meter was used. Before using the equipment, it is essential to clean and check the sensitivity of the electrode using reference buffer solutions.[6]

In semi-solid formulations, the measurement is not carried out directly on the product, a 10% aqueous solution (1:10) has been prepared. Values should not vary by more than 0.05 pH units in three consecutive readings. The three consecutive readings with a difference of 0.05 were added and divided by three to obtain the average.[14th]

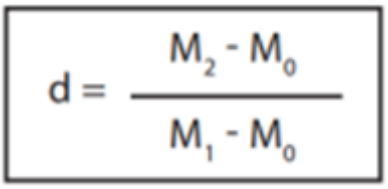
3.7 DENSITY

Density is the ratio of the mass to the volume of the product to be analyzed. The density of the formulations was measured using a metal pycnometer, which is the most suitable for use in semi-solid and viscous formulations.[6]

In this method, the empty pycnometer was weighed and its value (M0) was recorded. Soon after, Milli-Q water was poured until it overflowed and the lid was placed, causing the water to leak through the hole located in the lid, taking care not to generate bubbles. After that, it was dried and weighed again and its value (M1) was noted. Then, the pycnometer was emptied and dried carefully, and then the sample was placed, causing it to leak when the lid was placed. It was dried, weighed and the value (M2) was noted.[6]

Finally, the following formula was applied with the values obtained as shown in Figure 1.

Figure 1. Density Calculation



Source: Brazil (2008, p. 36).

Where: d = density

M0 = mass in grams of empty pycnometer

M1 = mass in grams of the pycnometer with Milli-Q water

M2 = mass in grams of the pycnometer with the sample

Density analysis temperature = 20 °C

3.8 SPREADABILITY

Spreadability is the empirical measure, described by KNORST in 1991, where it determines the ability of the formulation to spread by means of a force that is applied. Aiming to reduce the tangential effort made when applying the formulation to the skin.[15th]

To perform the test, a circular glass mold plate was used, with a hole in the center of the plate containing 1.20 cm in diameter. This circular plate was placed on top of a glass support plate (20 cm x 20 cm). On the top of the square plate there is a sheet of graph paper, with a light source. The sample to be analyzed was placed in the hole of the circular plate and leveled with the aid of a spatula. Then the mold plate was carefully removed and a glass plate was placed on the specimen with the predetermined weight. For each plate added, the measurement of the diameter in two opposite positions and the weight of the plate were recorded. The glass plates were added until it reached a constant value. The interval for the addition of each plate is at least 1 minute.[6]

Spreadability was calculated using the following equation:

Ei= (d2 x π) /4

E = spreadability of weight specimen i

d = average diameter (mm)

3.9 MICROBIOLOGICAL TESTING

The microbiological test identifies microbial contamination of a product, analyzing changes with physical and chemical properties, seeking to find indications of risk of infection for the user. This test is performed in oral and topical formulations, not sterile. For the analysis of microbiological contamination, the acceptable microbial limits for each active ingredient or formulation should be considered.[16]

The microbiological evaluation was performed by the method of counting the total number of mesophilic microorganisms, through the determination of fungi and bacteria, the following culture media was used: casein-soybean conducive to bacterial growth (Table 3) and sabouraud-dextrose agar conducive to fungal growth (Table 4).

Table 3. Formulation of casein-soybean culture medium

Casein-soybean culture medium		
Tryptic soja agar		40g
Purified water		1000 mL

Source: Brazilian Pharmacopoeia (2010, digital text).

Table 4. Formulation of sabouraud-dextrose agar culture medium

Sabouraud-dextrose agar culture medium	
Sabouraud dextrose agar	65g
Purified water	1000mL

Source: Brazilian Pharmacopoeia (2010, digital text).

To dilute the sample, a buffer solution of sodium chloride-peptone with a pH of 7.0 was prepared (Table 5).

Table 5. Formulation of Sodium Chloride-Peptone Buffer Solution

Sodium chloride-peptone buffer solution, pH 7.0	
Monobasic potassium phosphate	3.6g
Disodium phosphate dihydrate	7.2g
Sodium chloride	4.3g
Peptona (meat or casein)	1.0g

Purified water	1000mL

Source: Brazilian Pharmacopoeia (2010, digital text).

The microbiological test was performed in a fume hood in triplicate for each dilution. To dilute the 2g of the sample, 20 mL of the buffer solution was used at around 45 °C. The dilutions performed were 1:10, 1:100, 1:1000. The petri dishes were properly identified, where three white dishes were prepared for each sample, one for each culture medium. The buffer and media were sterilized in an autoclave using a validated cycle. In each plate, 1 mL of the diluted sample was transferred and culture medium was placed until the surface was covered (about 20 mL). The temperature of the culture medium was around 45 °C.[16]

The plates were capped when the medium was solidified and then sent to their respective oven:

- Greenhouse at 35 °C - casein-soybean culture medium plates;
- Greenhouse at 25 °C - plates of sabouraud culture medium;

The test shows a visible count of microorganisms within 5 days, in casein-soybean agar at 32.5 °C ± 2.5 °C, and in up to 7 days, in Sabouraud-dextrose agar at 22.5 °C ± 2.5 °C.

3.10 DATA ANALYSIS

To compare skin permeation, the t-test was used for paired samples, for analysis between times at the same concentrations. Between different concentrations, ANOVA followed by Tukey was used.

Organoleptic characteristics were expressed by tables and descriptive analysis was performed. In the centrifugation test, a descriptive analysis of the results was performed.

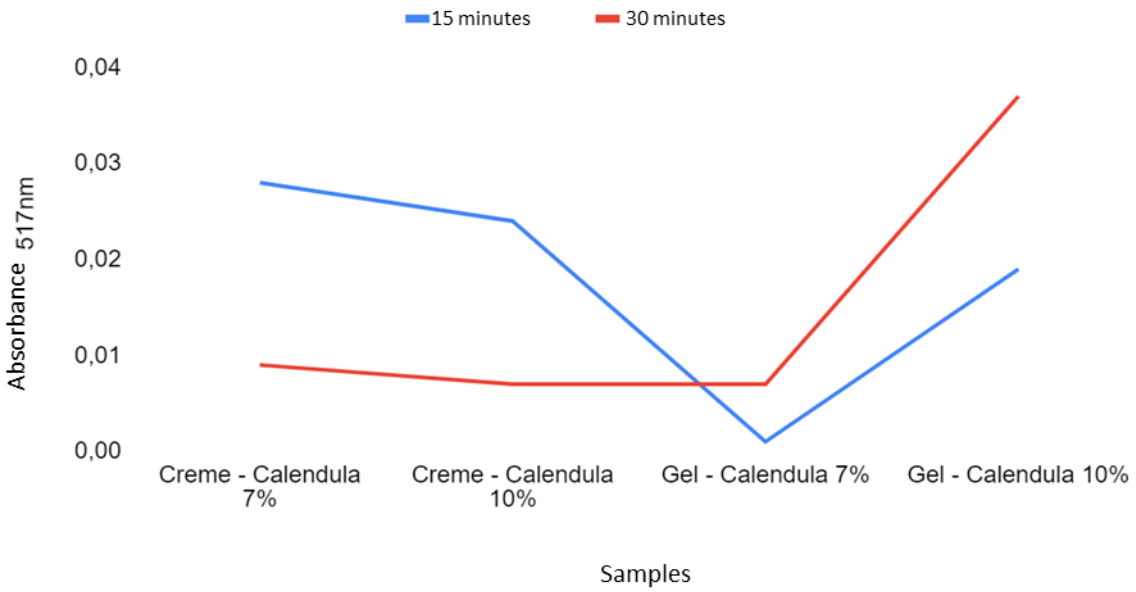
To compare pH and density at different times and concentrations, ANOVA was used, followed by Tukey using the JAMOVI software.[17] Descriptive statistics were used for spreadability. And the microbiological tests were expressed by tables and descriptive analysis was performed.

4 RESULTS AND DISCUSSIONS

4.1 PERMEATION TESTS

With the skin permeation tests performed, it was observed that the 10% *C. officinalis gel sample in 30 minutes has better permeation compared to* the 7% C. officinalis gel and the 7 % and 10% C. *officinalis* cream, *as shown in Graph 1.*

Graph 1. Variation of the absorbance value in the skin permeation test



Source: From the author (2023).

The absorbance results indicate that there was permeability in all concentrations and formulations tested.

The stratum corneum is considered the greatest barrier in the absorption of active ingredients, as it is composed of lipids, which form layers, thus hindering the diffusion of substances and because of this there is little skin permeability. When the active ingredient passes through the stratum corneum, the active ingredient can penetrate layer by layer, the lipophilic to a greater degree and the hydrophilic to a lesser degree.[18th]

With the statistical analysis, it was possible to observe that all samples showed statistically significant difference ($p<0.05$) in the permeation test, considering the times, concentrations and formulations. In gel samples of *C. officinalis*. At 7% and 10% the permeability of the samples was higher in 30 minutes. On the other hand, the cream samples of *C. officinalis* at 7% and 10% had higher permeability in 15 minutes.

The use of topical products has better patient adherence, being a non-invasive and painless method most of the time, in addition, the product will not be subjected to first-pass metabolism and there are fewer side effects compared to other routes of administration. However, a small amount of active ingredient will reach the target tissue, most of which is wasted due to the partial impermeability of the skin.[19] Thus, the product must have a hydrophilic-lipophilic balance for efficient permeation through the cutaneous route.[20th]

The transdermal route is a route that has been widely used due to the development of drugs and cosmetics with systemic action, where the active ingredient is absorbed into the bloodstream. To achieve this permeation, some allies have been used in the formulations, such as surfactants, ionic pairs

and liposomes, or even alcohol and fatty acids. The physicochemical characteristics of formulations and active ingredients are determining factors for cutaneous absorption.[21]

Zampieri, in his studies with genistein, using gel and emulsion as a vehicle, observed significant greater cutaneous permeation of the gel in relation to the emulsion. The method used in the study was also Franz cells, using porcine skin, but the standardized time for collection of the recipient solution and analysis was 24 hours.[22]

With the result obtained in the analyses, it is possible to observe that the vehicle used in the formulations can alter the characteristics of the stratum corneum, thus influencing the permeation of the active ingredients in the skin. In a study, it is possible to observe that the vehicle used in the formulations alters the permeation of the active ingredients in the skin, altering the skin hydration and the permeability profile.[23rd]

At the end of the study, it was found that there was greater permeation of the gel if associated with the other manipulated bases, due to its formulation being more aqueous. Thus, it is observed that pharmaceutical bases directly influence the permeation of active ingredients in the skin.

4.2 ORGANOLEPTIC TESTS

The samples were placed in a stability study, which presented the organoleptic characteristics contained in Charts 1, 2, 3 and 4.

Table 1. Cream - *C. officinalis* 7%

Condition	**Time (days)**	**Characteristics Organoleptic**
Standard Sample	0	Homogeneous cream smooth and shiny, with light brown coloration and characteristic odor
Environment	7	Remained the same as the standard sample
Environment	15	Remained the same as the standard sample
Environment	30	Remained the same as the standard sample
Environment	60	Remained the same as the standard sample
Refrigerator	7	Remained the same as the standard sample
Refrigerator	15	Remained the same as the standard sample
Refrigerator	30	Remained the same as the standard sample
Refrigerator	60	Homogeneous cream smooth and slightly opaque, with light brown coloration and characteristic odor

Greenhouse	7	Remained the same as the standard sample
Greenhouse	15	Cream with a darker color on the surface and the rest with a lighter color and characteristic odor
Greenhouse	30	Cream containing air bubbles, water droplets, lighter surface than the rest of the cream, and slightly altered odor
Greenhouse	60	Cream containing air bubbles, water droplets, lighter surface than the rest of the cream, and slightly altered odor

Source: From the author (2023).

Table 2. Cream - *C. officinalis* 10%

Condition	**Time (days)**	**Characteristics Organoleptic**
Standard Sample	0	Homogeneous cream smooth and shiny, with light brown coloration and characteristic odor
Environment	7	Remained the same as the standard sample
Environment	15	Remained the same as the standard sample
Environment	30	Remained the same as the standard sample
Environment	60	Remained the same as the standard sample
Refrigerator	7	Remained the same as the standard sample
Refrigerator	15	Remained the same as the standard sample
Refrigerator	30	Remained the same as the standard sample
Refrigerator	60	Homogeneous cream smooth and slightly opaque, with light brown coloration and characteristic odor
Greenhouse	7	Remained the same as the standard sample
Greenhouse	15	Cream with a darker color on the surface and the rest with a lighter color and characteristic odor
Greenhouse	30	Cream containing air bubbles, water droplets, lighter surface than the rest of the cream, and slightly altered odor
Greenhouse	60	Cream containing air bubbles, water droplets, lighter surface than the rest of the cream, and slightly altered odor

Source: From the author (2023).

In both formulations of creams, it was possible to observe that the organoleptic characteristics remained stable at room temperature (20 °C - 25 °C) throughout the study. The samples submitted to the refrigerator cycle remained stable on day 7, 15 and 30, but on day 60 they were slightly opaque.

The cream samples submitted to the oven (40 °C) began to show changes from day 15 onwards, with a darker color on the surface and the rest with a lighter color and characteristic odor. On day 30,

the samples showed air bubbles, water droplets, a lighter surface than the rest of the cream and a slightly altered odor, maintaining these same characteristics on day 60.

Panel 3. Gel - *C. officinalis* 7%

Condition	Time (days)	Characteristics Organoleptic
Standard Sample	0	Homogeneous and shiny gel, with brown coloration and characteristic odor
Environment	7	Remained the same as the standard sample
Environment	15	Remained the same as the standard sample
Environment	30	Remained the same as the standard sample
Environment	60	Remained the same as the standard sample
Refrigerator	7	Remained the same as the standard sample
Refrigerator	15	Remained the same as the standard sample
Refrigerator	30	Remained the same as the standard sample
Refrigerator	60	Remained the same as the standard sample
Greenhouse	7	Remained the same as the standard sample
Greenhouse	15	Gel containing water droplets on the surface, brown coloration, and slightly altered odor
Greenhouse	30	Gel containing air bubbles, with water droplets on the surface, brown coloration, and slightly altered odor
Greenhouse	60	Gel containing air bubbles, with water droplets on the surface, brown coloration, and slightly altered odor

Source: From the author (2023).

Panel 4. Gel - *C. officinalis* 10%

Condition	Time (days)	Characteristics Organoleptic
Standard Sample	0	Homogeneous and shiny gel, with brown coloration and characteristic odor
Environment	7	Remained the same as the standard sample
Environment	15	Remained the same as the standard sample
Environment	30	Remained the same as the standard sample
Environment	60	Remained the same as the standard sample
Refrigerator	7	Remained the same as the standard sample
Refrigerator	15	Remained the same as the standard sample
Refrigerator	30	Remained the same as the standard sample

Refrigerator	60	Remained the same as the standard sample
Greenhouse	7	Remained the same as the standard sample
Greenhouse	15	Gel containing water droplets on the surface, brown coloration, and slightly altered odor
Greenhouse	30	Gel containing air bubbles, with water droplets on the surface, brown coloration, and slightly altered odor
Greenhouse	60	Gel containing air bubbles, with water droplets on the surface, brown coloration, and slightly altered odor

Source: From the author (2023).

In both gel formulations, it was possible to observe that the organoleptic characteristics remained stable at room temperature (20 °C - 25 °C) and in the refrigerator (5 °C) throughout the study period.

The gel samples submitted to the oven (40 °C) began to show changes from day 15, containing water droplets on the surface, brown color and slightly altered odor. On day 30, the samples showed air bubbles, with water droplets on the surface, brown color and slightly altered odor, maintaining these same characteristics on day 60.

The odor changes of the formulations of creams and gels, slightly altered, may be the result of the packaging where the samples were stored, since they were made of plastic.

When products are subjected to extreme temperatures, it is acceptable to have small changes in the appearance of the product, but extreme changes, such as the cream changing its appearance to liquid, are not acceptable. For color and odor variation, it is recommended that they remain in accordance with the standard sample. The sensory of the product is a determining factor in semi-solid formulations, determining whether the product will be accepted or not by the consumer, being analyzed through the organoleptic characteristics.[24th]

The organoleptic characteristics of the product may change depending on where it is stored, such as plastic or glass containers. The plastic container can undergo alterations, due to heat fixation, thermal resistance and oxygen permeation. When this incompatibility between the product and the packaging occurs, phase separation and precipitation of the product can occur, even leading to a change in pH.[25th]

It is possible to observe that both creams and both gels, regardless of the concentration of the glycolic extract of *C. officinalis*, presented the same organoleptic characteristics.

In a study carried out with creams and gels containing grape seed extract, for 60 days, changes in the organoleptic characteristics were also observed from day 15 of analysis in the greenhouse sample, intensifying on day 30 and remaining stable until day 60. The study subjected the product to

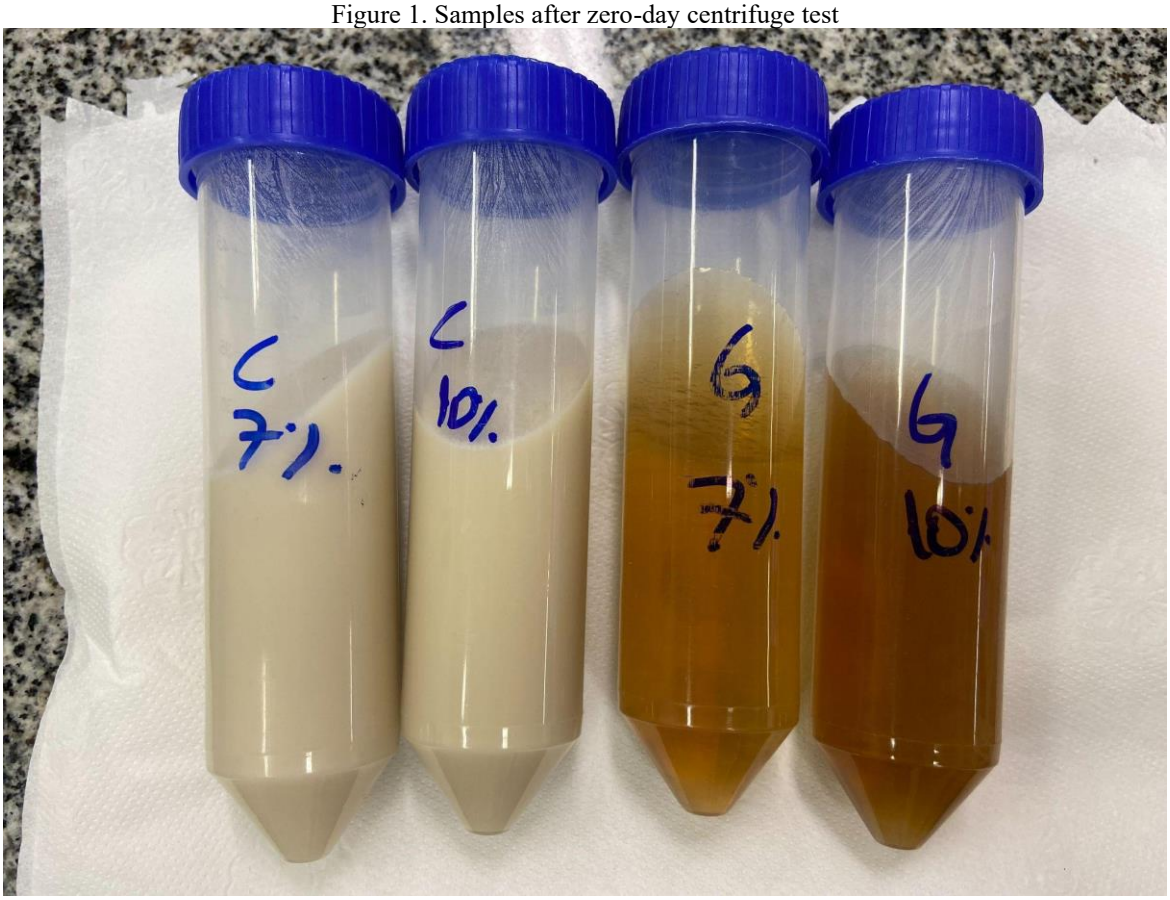
instability tests at room temperature, refrigerator and oven. The study was also carried out with four different formulations, two cream and two gel, in two different concentrations of the extract.[26th]

4.3 PHYSICOCHEMICAL TESTS

4.3.1 Centrifuge Test

After centrifugation test, the products remained stable and without phase separation (Image 1).

Figure 1. Samples after zero-day centrifuge test



Source: From the author (2023).

According to Anvisa's Guide for Quality Control of Cosmetic Products, the centrifugation test is responsible for causing stress in the sample, increasing the circulation of particles, thus anticipating some instabilities, consisting of the force of gravity on the formulation. Changes can be observed through precipitation, coalescence, phase separation, and caking, among others.[6]

The spin test is responsible for identifying possible chemical and physical instabilities that could harm the products. In a study carried out with gel and cream with a product of natural origin, both were stable, and were subsequently submitted to stability studies.[27]

4.3.2 ph

The reference samples/day 0 of the creams presented pH values within the variations allowed according to the Manual of Magistral Pharmacotechnical Management, while the reference samples of the gels did not present values within the standard allowed according to the Manual of Magistral Pharmacotechnical Management, requiring adjustment in the pH, according to the values contained in Table 6, 7 and 8.[28]

The sample that showed the lowest statistical variation of pH values under different storage conditions was the 7% gel. At room temperature and in the oven, the 7% gel showed greater stability, however, when stored in the refrigerator, all formulations showed statistically significant variations.

Table 6. Mean and standard deviation values of pH at room temperature of C. *officinalis* cream and gel samples at 7% and 10% on days zero, 7, 15, 30 and 60

Samples - ENVIRONMENT	**pH day 0**	**pH day 7**	**pH day 15**	**pH day 30**	**pH day 60**
Creams - Calendula 7%	6.99± 0.03a	6.88± 0.03b	7.04± 0.01c	7.13± 0.02d	6.84± 0.03e
Creams - Calendula 10%	6.66± 0.01a	6.74± 0.02b	6.95± 0.02c	7.04± 0.01d	6.66± 0.02e
Ice - Calendula 7%	7.62± 0.02A	8.00± 0.01B	7.99± 0.03B	7.97± 0.02b	7.59± 0.02C
Ice - Kalendula 10%	7.71± 0.02a	7.53± 0.02b	7.97± 0.02C	7.64± 0.00D	7.34± 0.02e

Source: From the author (2023).

*Different lowercase letters on the same line indicate a statistical difference ($p<0.05$) between the sample means.

Table 7. Mean and standard deviation pH values in refrigerator of C. *officinalis* cream and gel samples at 7% and 10% on days zero, 7, 15, 30 and 60

Samples - REFRIGERATOR	**P.S. is 0.**	**P.S. is 7.**	**P.S. is 15.**	**P.S. is 30.**	**P.S. is 60.**
Creams - Calendula 7%	6.99± 0.03A	7.11± 0.03B	7.26± 0.02C	7.11± 0.02d	6.94± 0.00e
Creams - Calendula 10%	6.66± 0.01a	6.83± 0.03B	6.92± 0.00C	6.93± 0.03D	6.80± 0.00E
Ice - Calendula 7%	7.62± 0.02A	7.87± 0.03B	7.99± 0.03C	8.25± 0.01d	7.50± 0.03E
Ice - Kalendula 10%	7.71± 0.02a	7.58± 0.00b	7.71± 0.02C	7.96± 0.01d	7.33± 0.02e

Source: From the author (2023).

*Different lowercase letters on the same line indicate a statistical difference ($p<0.05$) between the sample means.

Table 8. Values of the mean and standard deviation of pH in an oven of *C. officinalis* cream and gel samples at 7% and 10% on days zero, 7, 15, 30 and 60

Samples - GREENHOUSE	**P.S. is 0.**	**P.S. is 7.**	**P.S. is 15.**	**P.S. is 30.**	**P.S. is 60.**
Creams - Calendula 7%	6.99± 0.03A	7.15± 0.02B	6.56± 0.03C	6.78± 0.03d	6.78± 0.02d
Creams - Calendula 10%	6.66± 0.01a	6.56± 0.00b	6.35± 0.01c	6.61± 0.02d	6.51± 0.03e
Ice - Calendula 7%	7.62± 0.02a	7.91± 0.02b	7.93± 0.01b	7.80± 0.03c	7.84± 0.02c
Ice - Kalendula 10%	7.71± 0.02a	7.55± 0.02b	7.51± 0.01b	7.66± 0.02c	7.46± 0.02d

Source: From the author (2023).
*Different lowercase letters on the same line indicate a statistical difference ($p<0.05$) between the sample means.

According to the Manual of Pharmacotechnical Management of Magistral Creams, the pH range indicated is from 6.0 to 7.0. For formulations using carbopol gel-based, the recommendation is a pH range between 6.0 to 7.0. [28]

The samples stored at room temperature showed a statistically significant variation in most formulations and times, with the exception of the 7% C. *officinalis* gel, which did not change significantly between day 7 and day 30. On the other hand, all samples stored in the refrigerator showed statistically significant variation. The samples stored in the oven varied in the statistical results, with the 7% cream showing stability only from day 30 to day 60, the 10% cream showed statistical variation at all times, and the 7% gel showed stability between day 7 to day 15 and between day 30 to day 60. and the 10% gel showed stability between day 7 and day 15.

Physiological skin has a slightly acidic pH (4.0 - 6.5), which changes according to gender, location, and age. The pH of a semi-solid formulation is an essential factor for its efficacy and safety, contributing to bactericidal and fungicidal protection on the surface of the skin, and formulations with acidic pH have better skin permeation, as they are less ionized, causing less irritation to the skin. Formulations with a pH between 4.0 and 8.0 are less harmless to the skin.[29th]

The Practical Guide of Farmácia Magistral recommends that semi-solid formulations with pH values outside the expected standard should be corrected with a pH correcting agent when necessary.[30] In the case of the formulations developed in the present study, their correction with a citric acid solution would be recommended to adjust the pH and favor skin permeation.

When high pH changes occur in formulations, the indication is of degradation of compounds in the product, thus compromising its efficacy and safety over time. Therefore, stability tests in semi-solid formulations are indispensable to analyze physicochemical parameters and stability of active ingredients in different vehicles. For a product to remain stable, the pH changes must be small in the

storage time, not fluctuating too much from the pH at time 0, because the stability of products is related to high pH variations.[31]

In a stability study, carried out with glycolic extract of *C. officinalis* for 60 days, using an emulsion developed with non-ionic self-emulsifying wax (Polawax), it showed instability, not supporting large temperature variations, presenting pH changes. The use of wax in the development of emulsions is difficult, because during all the tests the pH temperature varied, not supporting temperature changes, so the way of storage and transport influence the stability and physicochemical tests of the products containing glycolic extract of *C. officinalis* in non-ionic emulsions.[32th]

The cream samples showed statistically significant variation in practically all storage conditions, but the variation of these values is not significant when referring to the established pattern that delays changes in the parameters of the product. On the other hand, the gels showed less statistically significant variation when compared to the cream samples, not altering the stability of the product, but requiring correction of pH values, thus favoring even more the permeation of the product.[13]

4.4 DENSITY

The reference formulations/day 0 of the creams and gels presented density analysis values within the standard allowed according to the Cosmetic Products Quality Control Guide, according to the values contained in Tables 9, 10 and 11.[6]

The analyzed samples did not show statistically significant changes in most formulations and times in the density analyses. Since the 10% gel formulation of *C. officinalis* is the only formulation with no statistical change when stored at room temperature and in the refrigerator, showing alteration only between days 7 and 15 in the oven.

Table 9. Mean and standard deviation values of density at room temperature of *C. officinalis* cream and gel samples at 7% and 10% on days zero, 7, 15, 30 and 60

Samples - ENVIRONMENT	Day 0 Density	Density Day 7	Density Day 15	Density Day 30	Density Day 60
Creams - Calendula 7%	0.876± 0.00A	0.861± 0.00A	0.862± 0.00A	0.912± 0.00b	0.901± 0.01b
Creams - Calendula 10%	0.903± 0.00A	0.853± 0.00b	0.860± 0.01b	0.908± 0.01c	0.915± 0.00c
Ice - Calendula 7%	0.998± 0.00A	0.972± 0.00b	0.996± 0.01c	0.979± 0.02c	0.980± 0.00c
Ice - Kalendula 10%	0.975± 0.00A	0.970± 0.00A	0.976± 0.00A	0.975± 0.01a	0.984± 0.01a

Source: From the author (2023).

*Different lowercase letters on the same line indicate a statistical difference ($p<0.05$) between the sample means.

Table 10. Values of the mean and standard deviation of the refrigerator density of C. *officinalis* cream and gel samples at 7% and 10% on days zero, 7, 15, 30 and 60

Samples - REFRIGERATOR	Day 0 Density	Density Day 7	Density Day 15	Density Day 30	Density Day 60
Creams - Calendula 7%	0.876± 0.00A	0.865± 0.01a	0.853± 0.00A	0.879± 0.00b	0.920± 0.05B
Creams - Calendula 10%	0.903± 0.00A	0.940± 0.01B	0.894± 0.01c	0.926± 0.01d	0.843± 0.01e
Ice - Calendula 7%	0.998± 0.00A	1.02± 0.03A	0.970± 0.01b	0.986± 0.01c	0.957± 0.01c
Ice - Kalendula 10%	0.975± 0.00A	0.977± 0.00A	0.977± 0.00A	0.991± 0.01a	0.993± 0.01a

Source: From the author (2023).

*Different lowercase letters on the same line indicate a statistical difference ($p<0.05$) between the sample means.

Table 11. Values of the mean and standard deviation of the greenhouse density of *C. officinalis* cream and gel samples at 7% and 10% on days zero, 7, 15, 30 and 60

Samples - GREENHOUSE	Day 0 Density	Density Day 7	Density Day 15	Density Day 30	Density Day 60
Creams - Calendula 7%	0.876± 0.00A	0.876± 0.00A	0.871± 0.00A	0.878± 0.01a	0.917± 0.00b
Creams - Calendula 10%	0.903± 0.00A	0.903± 0.00A	0.883± 0.00b	0.938± 0.01c	0.916± 0.01c
Ice - Calendula 7%	0.998± 0.00A	0.998± 0.00A	0.983± 0.01b	0.990± 0.00b	0.986± 0.00b
Ice - Kalendula	0.975± 0.00A	0.975± 0.00A	0.959± 0.00b	0.975± 0.01b	0.969± 0.01b

10%					

Source: From the author (2023).
*Different lowercase letters on the same line indicate a statistical difference ($p<0.05$) between the sample means.

At room temperature, the 7% cream showed statistical changes only between days 15 and 30, remaining unchanged at the other times, while the 10% cream showed changes between days 0 and 7 and days 15 and 30. The 7% gel showed changes between days 0 and 7, 7 and 15, stabilizing in the rest of the other times, while the 10% gel remained without statistical changes in all times.

When stored in the refrigerator, the 7% cream sample showed statistically significant changes between days 15 and 30, remaining stable in the other times, and the 10% cream showed statistical variation in all times. The 7% gel showed statistical variation between days 7 and 15 and between days 15 and 30, and the 10% gel did not show statistically significant variation at any of the times.

In the greenhouse, the 7% cream showed statistically significant variation only between days 30 and 60, while the 10% cream showed changes between days 7 and 15 and days 15 and 30. The 7% and 10% gels showed statistical variation only between days 7 and 15, remaining stable in the rest of the times.

According to the Quality Control Guide for Cosmetic Products, formulations based on anionic cream, the density value range is 0.85-0.95 g/mL. For formulations based on carbopol gel, the permissible range is 0.9-1.0 g/mL.[6]

In a study carried out with a vegan O/A emulsion, containing oily extract of *C. officinalis* and glycolic extract of *Chamomilla recutita*, the formulation was submitted to organoleptic and physicochemical characterization tests. The density tests in the study were performed only on day 0, presenting density values within the standard established by the Cosmetic Products Quality Control Guide, density of 0.933± 0.00.[33rd]

Density is a quality control that indicates whether there has been air incorporation or loss of volatile inputs. The samples, in most storage times and conditions, did not show statistically significant variation, however, the few changes they presented It is not significant when referring to the established standard that delays changes in product parameters.

4.5 SPREADABILITY

In all samples of creams and gels, it was possible to observe statistically significant changes in the results of the spreadability tests when compared to the different times. If we compare all times, temperatures and samples, it was observed that the *C. officinalis* at 10% in the greenhouse showed greater spreadability. However, due to changes that the product presented when stored in an oven, this form of storage is not considered adequate, therefore, the sample that had the greatest spreadability at room temperature and in the refrigerator was the formulation of gel of *C. officinalis* at 7%.

The samples showed satisfactory results in relation to spreadability, as the values increased as the weights/glass plates were added.

Each formulation showed different spreadability results in each storage condition. The 7% cream showed greater spreadability when stored in the refrigerator on day 60. On the other hand, the 10% cream showed greater spreadability in the oven on day 7. The 7% gel showed greater spreadability when stored at room temperature and in the refrigerator on day 30. On the other hand, the 10% gel showed greater spreadability when stored at room temperature on day 30.

In the different storage conditions, the samples showed different spreadability values when compared in the oven, refrigerator and room temperature. At room temperature and in the refrigerator, the 7% gel showed greater spreadability, whereas when the samples are stored in the oven, the 10% cream showed greater spreadability.

It is observed that all formulations did not show continuity in relation to spreadability in their storage conditions and times, because at some times the values increased and others decreased, this is due to the temperature variation of the central air of the laboratory that was stored and also to the temperature variation of the minibar that was made available, no matter how much the temperatures are controlled and programmed.

Spreadability is an essential quality control in semi-solid formulations, indicating the relationship between the formulation and the site of action on the skin. This test indicates whether the formulation should be applied to the skin in greater or lesser amounts, taking into account the presence or expansion of the lesion. Cold-brewed formulations have better spreadability compared to hot-brewed formulations.[34th]

In a study carried out with cream and gel formulations containing hydroethanolic extract of calendula, spreadability was evaluated according to the area obtained in relation to the weight applied, and the gel samples showed greater spreadability in relation to the cream. During the period of analysis, the samples remained stable and the physicochemical characteristics were preserved. In the study, it was observed that the samples kept in the refrigerator preserved their initial characteristics better.[31]

The spreadability of a product is a determining factor, as it is related to the level of user acceptance and adherence to treatment. Spreadability is the ability of the product to spread over the place where it will be applied and the action is expected. A product with low spreadability presents a change in the application dose and a change in the permeation of the active ingredient in the skin, leading to a low level of adherence by users.[35th]

4.6 MICROBIOLOGICAL TESTING

Considering that in this study, four semi-solid formulations were analyzed in triplicate, verifying the microbial contamination soon after the manipulation of the formulations, at time 0.

Table 5 shows the results of microbial contamination of bacteria and fungi in samples of creams and gels containing *Calendula officinalis L* in different concentrations. It was observed that all samples showed contamination by bacteria and fungi in the Casein culture medium, however, in the Sabouraud culture medium, only the formulations of the creams showed fungal growth, with no bacterial growth.

Table 5. Results of bacterial and fungal contamination analyses in casein-soybean and sabouraud-dextrose agar culture medium.

SAMPLE (time 0)	CASEIN	SABOURAUD
CREAM 7% Bacteria	3.2 x 10^2 CFU/mL	< 1 X 10^1 CFU/mL (Est.)
CREAM 7% Fungi	9.0 x10^1 CFU/mL	1.0 x10^1 CFU/mL
CREAM 10% Bacteria	2.1 x 10^2 CFU/mL	< 1 X 10^1 CFU/mL (Est.)
CREAM 10% Fungi	4.0 x10^1 CFU/mL	1.0 x10^1 CFU/mL
GEL 7% Bacteria	9.0 x10^1 CFU/mL	< 1 X 10^1 CFU/mL (Est.)
GEL 7% Fungi	3.0 x10^1 CFU/mL	< 1 X 10^1 CFU/mL (Est.)
GEL 10% Bacteria	3.8 x 10^2 CFU/mL	< 1 X 10^1 CFU/mL (Est.)
GEL 10% Fungi	5.0 x10^1 CFU/mL	< 1 X 10^1 CFU/mL (Est.)

Source: From the author (2023).

The samples had a bacterial count within the limits allowed by the Brazilian Pharmacopoeia for non-sterile products of a maximum of 1.0 x 10^3 CFU of bacteria/g.[14]

The samples also showed fungal counts within the microbial limits acceptable by the Brazilian Pharmacopoeia, which establishes a maximum of 1.0 x 10^2 CFU of fungi/g for non-sterile products.[14]

In light of this, According to the results of the microbiological tests, both specific plates for the growth of bacteria and fungi, respectively, containing the formulation, analyzed at time 0, after production, did not show growth of microorganisms outside the specified standards.

Microbiological testing of non-sterile formulations determines the limited microbial presence due to the use of the product. To minimize the risks of microbial contamination, it would be recommended that the product be accompanied by a spatula for minimal contact of the product with the hands, thus preserving the original characteristics of the product for longer, since contamination by microorganisms is identified in most cosmetic products.[36th]

According to the Brazilian Pharmacopoeia, quality control and microbial control of non-sterile products must be within pre-established safe limits for the consumer. The limits within the acceptable standard are 1.0 x 10^3 CFU of bacteria/g and 1.0 x 10^2 CFU of fungi/g.[14]

In the study by Soares and his collaborators, the presence of bacteria in cosmetic samples was verified, in which six cosmetic products were analyzed, with bacterial and fungal growth in 75% of the manipulated formulations, while the industrialized ones did not show such microbial growth.

Proper quality control is essential to ensure that the product is used by the consumer effectively and safely. [37]

In the study carried out by Borella, with carbopol gel and anionic emulsifier base, containing an input of natural origin, microbial growth occurred in both formulations, however, within the limits established by the legislation, ensuring the microbiological safety of the formulations. In the study, two different bases were standardized, carbopol gel and anionic cream, containing papain in different concentrations, used for wound healing and debridement. The following analyses were performed: pH, organoleptic analysis, spreadability, microbiological analysis, centrifugation test and enzymatic activity, to evaluate stability, contamination by microorganisms and proteolytic action.[38]

As the main raw material used for the production of galenic bases was water, which is the main contributor to microbial growth. Thus, as the formulations were manipulated following Good Manufacturing Practices, Rosa and his collaborators believe that formulations that use water as their main raw material, thus contributing to microbial growth in semi-solid formulations. Another factor that contributes to microbial growth is the use of glycolic extract, which is of natural origin, conducive to the growth of microorganisms.[39]

5 CONCLUSION

With the study it was possible to verify the dosage form and the concentration of the glycolic extract of calendula that permeate more efficiently in the skin, identifying that the gel of calendula *C. officinalis* 10% obtained superior permeation performance in 30 minutes compared to other formulations and times.

Regarding the organoleptic characteristics, the gel samples remained stable when stored at room temperature and in the refrigerator, only those stored in the oven showed alterations.

In the pH test, the sample that showed the least statistically significant variation was the 7% gel sample of *C. officinalis.* In the density test, the sample that did not show statistically significant changes when stored at room temperature and in the refrigerator was the 10% C. *officinalis* gel , showing changes only between days 7 and 15 in the oven.

In the spreadability test, statistical changes were observed in all times, storage conditions and formulations analyzed, however, the results are satisfactory, because the spreadability increased as the glass weights/plates were added to the samples. The 10% cream sample showed greater spreadability when stored in the oven, but when stored at room temperature and in the refrigerator, the 7% gel showed greater spreadability.

All samples had bacteria and fungi counts within the microbial limits established by the Brazilian Pharmacopoeia.

In view of the results, it can be concluded that the gel sample of *C. officinalis* 10% is the most adequate, as it presented better skin permeation and density, organoleptic characteristics and adequate microbiological count and good spreadability, however, the only alteration presented was related to pH values, requiring correction to further favor the permeability of the product, since more acidic products have better skin permeation.

Stability studies are considered an important safety standard for the manufacturer and consumer who use these products, but studies on semi-solid formulations containing active ingredients of natural origin are still scarce. Thus, the need for further studies on permeation, physicochemical and microbiological tests of topical formulations containing active ingredients of natural origin is ratified.

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Culture – Health relationships in a quilombola community in Northeastern Brazil: Perceptions of the duality of traditional medicine / conventional medicine

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Mariana Sahade Nink
Master's Degree in Human Ecology and Socio-Environmental Development. Municipal Health Department – Barreiras - BA, Brazil.
ORCID: 0009-0009-9685-2657

Érika dos Santos Nunes
Doctor in Biological Sciences. Department of Education, State University of Bahia – UNEB Campus VIII.
ORCID: 0000-0002-9519-1473

Ricardo Augusto Nink
Doctor in Biological Sciences. Department of Higher Education, Federal Institute of Education, Science and Technology of Bahia – IFBA, Barreiras Campus.
ORCID: 0009-0000-5178-3568
E-mail: ricardo.nink@ifba.edu.br

ABSTRACT
The Quilombolas constitute ethnic-racial groups with African ancestry, with their own historical trajectory, and endowed with specific territorial relations. The Quilombolas have been neglected in public health policies, despite being among the vulnerable populations in Brazil. This study sought to understand the relationships between culture and health within the context of valuing Quilombola traditions as a tool for promoting health in a remaining Quilombola community in the state of Alagoas. Through conducting interviews and employing a thematic content analysis, it was found that the population of the Village of Cruz uses non-conventional methods for restoring health, especially the use of medicinal plants, but seeks to adopt conventional medicine when their economic conditions allow. The majority of Quilombolas consider that traditional wisdom regarding health is not valorized by health professionals. This finding highlights the need for a rescue of the users' historicity by health services, with a focus on respecting and understanding Quilombola cultural traditions, as an important tool for better adherence of this population to treatments developed based on the conventional biomedical model.

Keywords: Quilombo, Health, Traditional Medicine, Alternative Therapies.

1 INTRODUCTION

The values and conceptions we have about health are always a cultural trait. Throughout history, man and his culture have invented institutions: the priest, the guru, the shaman, the doctor, the sanitarian, the Unified Health System, etc., that is, specialized apparatuses and/or knowledge in charge of taking care of health, of producing health, of interfering in traditional cultural values in the name of defending life - generally from a more quantitative perspective - translated into more years of life.[1]

In parallel to the biomedical model, medicine based on popular knowledge is kept alive in the daily lives of the population. Prophylactic and at-home therapeutic measures are carried out to seek or maintain a state of well-being close to what is conceived as ideal. These practices are generally worked on in the family or community environment and are almost always passed on between different generations, mainly by traditional communities.[2]

Quilombola communities are considered traditional populations made up of descendants of slaves who live in hard-to-reach places and develop traditional productive practices such as subsistence farming and the collection of forest products. After the abolition of slavery, these groups, distributed throughout the country, began to seek their identity and citizenship, having as a reference the struggle for their rights and the guarantee of their territory3. The Ministry of Health defines ethnic-racial groups as quilombolas, according to criteria of self-attribution, with their own historical trajectory, endowed with specific territorial relations, with a presumption of black ancestry related to resistance to the historical oppression suffered4.

Despite being among Brazil's vulnerable populations and having historically suffered ethnic and social inequities, quilombolas have been neglected in public health policies. Despite the advances, the remaining quilombo populations still suffer from a variety of problems, from agrarian disputes over occupied areas, to the lack of infrastructure and public investments. The absence of education, the still precarious presence of health services, the physical and social isolation of these communities, prejudice and lack of information, among other elements, have perpetuated a series of distortions about knowledge about health and about the scope of promotion and prevention policies5.

In view of this scenario, this study sought to understand the relations between culture and health in the context of the valuation of ethnic, religious and family traditions as a tool for promoting the health of the remaining traditional quilombo peoples in public health services and to establish a relationship between the impressions of traditional peoples about classical biomedical practices and the causes of adherence/refusal to hospital and outpatient procedures commonly employed by the health professionals.

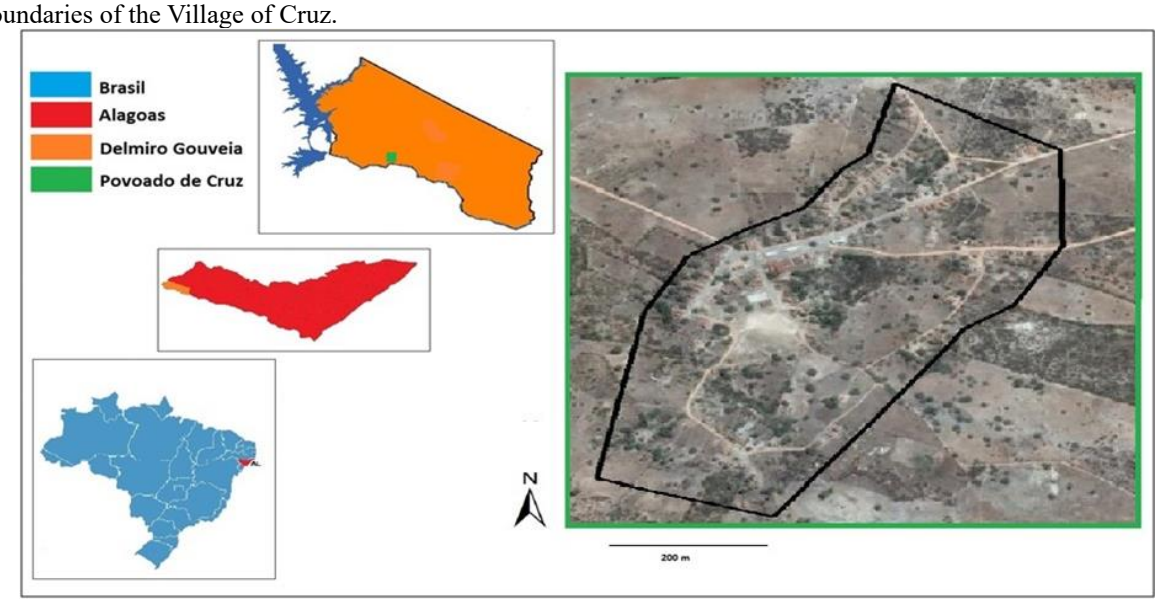
2 METHODOLOGY

2.1 POPULATION AND STUDY AREA

The research was carried out in the village of Cruz, a district of the municipality of Delmiro Gouveia, State of Alagoas - Brazil (Figure 1), located about 1 km north of the left bank of the São Francisco River and 16 km south of the city center (geographic coordinates: 9°25'33.2"S; 38°05'26.7"W). The urbanized sector of the district occupies an area of approximately 670.47 m2. The community had its certificate of quilombola remnant issued on April 19, 2005, based on FCP Ordinance No. 98/2007 and Presidential Decree No. 4887/20036,7.

The community of Povoado de Cruz is duly recognized as a quilombo remnant8, being composed of 72 families, in addition to encompassing non-quilombola migrant residents and residents born in the place who do not self-recognize as descendants of quilombolas. Subsistence farming, fishing, small businesses and social income transfer programs are the basis of the local economy.

Figure 1. Map of the study area, showing the State of Alagoas, the location of the municipality of Delmiro Gouveia, and the boundaries of the Village of Cruz.



2.2 TYPE OF STUDY

This was a descriptive-exploratory study, with a qualitative approach. Information was collected through interviews guided by a semi-structured script (Appendix 1). During the interviews, the focus was on the family entity, and one individual per family unit was interviewed. The interviews were recorded, in order to ensure the fidelity of the record. These interviews were conducted during visits from November 15 to 29, 2014. Along with conducting the interviews, a socioeconomic questionnaire was carried out with the purpose of surveying these aspects of the residents for a better characterization of the population. Of the 72 families living in the village, a total of 70 interviews were obtained, i.e., a coverage of more than 97%.

The data were analyzed according to the Content Analysis technique, Thematic Modality type through categories9. According to this modality of qualitative analysis, the theme is the unit of meaning that is naturally freed from a text analyzed according to criteria related to the theory that serves as a guide to reading10.

The results were divided into two categories: **1.** The perception of community residents about the position of health professionals in relation to practices based on traditional knowledge to treat or prevent some disease; and **2.** The residents' perception of the therapeutic treatments used by the Unified Health System (SUS) to the detriment of treatments based on traditional knowledge.

2.3 ETHICAL ASPECTS

Regarding the ethical aspects of research involving human beings and because it is a study conducted with the quilombola community, the study was previously submitted to the appreciation and approval of the National Institute of Historical and Artistic Heritage – IPHAN (Process No.

01450.012314/2014-23) and the Research Ethics Committee of the State University of Bahia – CEP/UNEB (Opinion No. 1.289.196), in accordance with the recommendations of Resolution 196/1996 of the National Health Council. A Free and Informed Consent Form was addressed to all participants, who authorized, in addition to the recording of the interviews, the dissemination of the results obtained from the data collected, guaranteeing the anonymity of the research informants.

3 RESULTS AND DISCUSSION

3.1 SOCIOECONOMIC CHARACTERIZATION OF THE POPULATION

The socioeconomic study showed the following aspects: Regarding the sociodemographic profile, of the 70 subjects participating in this study, 54 were female and 16 were male. Regarding the age group, the interval between 46 and 56 years (34%) was predominant. Most of them considered themselves to be of mixed race (53%) and were married or lived with a partner (54%). As for religion, Catholicism (54%) and Protestantism (34%) were predominant; The rest of the residents (12%) said they had no religion.

The vast majority of the residences are owned (97%), being built in masonry almost entirely (96%). None of the residences has sewage collection and treatment, so septic tank is used (91%) or sewage is disposed of in the open (9%). Regarding the professional occupation, just over half of the interviewees reported not having an employment relationship (54%), with 17% reporting working with a formal contract and 28% working autonomously. The predominant level of education among the interviewees was incomplete elementary school (48%).

The socioeconomic characterization of the residents of Povoado de Cruz is similar to that described for most of the recognized quilombola communities in Brazil, with 90.9% of the families belonging to social classes D and E living in conditions of social exclusion that have a negative impact on the health-disease process11.

3.2 CONTENT ANALYSIS

In order to better address the different perceptions of quilombola families about the valorization of traditional knowledge in health care, both thematic categories were divided into subcategories. The subcategories were defined based on the selection of excerpts from the interviewees' reports, thus allowing the evidence of different aspects within the previously delimited macrocategories.

3.2.1 Category 1. Perception of community residents about the position of health professionals in relation to practices based on traditional knowledge to treat or prevent a disease.

In this category, the perceptions of the residents of the Povoado de Cruz about the relationship between the professionals who care for them and the practices of so-called traditional medicine are demonstrated. The following subcategories could be observed:

3.2.1.1 Residents who agree that health professionals respect traditional knowledge associated with curing and preventing disease

About 26% of respondents said they agreed that health professionals value community knowledge. We can observe in the dialogues that there are many health professionals who not only respect but also encourage the use of traditional treatments as a way to combat some dysfunction:

> - "I think they respect it. The doctors here don't say anything complaining, no." EC7
> - "Yes, they do. The doctor who treated me in Aracaju even asked me about what I used for fibroids and thought it was good." EC12
> - "I think they do. They are very polite and have never complained to me from time to time to make my teas, no." EC18
> - "Respect. They don't recommend it, but they don't complain either." EC26

3.2.1.2 Residents who do not feel comfortable reporting to the health professional about the use of traditional knowledge to prevent or treat a disease

In the reports of 18% of the interviewees, there is an embarrassment when mentioning the use of alternative therapies. This was evident in the speeches of the residents below:

> - "I don't know. Because I've never talked to the doctors about the use of plants. I'm embarrassed to talk about it with them. I don't think you're going to think it's going to be a good conversation." EC4
> "I don't know if they respect it, because I've never dealt with any doctor or nurse about these matters. I use it at home, but I never talk about it." EC22
> - "What I think is right is to ask God. I've never talked to doctors that I use tea, no. I don't know what they think." EC3

3.2.1.3 Residents who agree that health professionals do not respect traditional knowledge associated with the cure and prevention of diseases.

Whether because they do not know the types of unconventional treatments that the community uses, because they do not believe in the healing potential of these practices or simply because they believe only in a vertical relationship with the individual, some health professionals do not agree with the use of alternative methods of preventing and curing diseases. This is evident in the statements of 56% of the residents interviewed.

> - "... There are many who criticize and think that only pharmacy medicines can cure." EC1
> - They say it's wrong. That it can have microbes and cause infection..."EC2

- "I don't think so... They complain when we say that we use the medicine from the bush..."EC11
- "They don't respect it. Usually they treat it with disdain. They don't like us to use the medicine from the bush. There was a doctor right here, before the one who is now, who said that he would no longer see me if he knew that I used the plum zest (Ximenia americana) and not the medicine he gave me." EC20

3.2.2 Category 2. Residents' perception of the therapeutic treatments used by the Unified Health System (SUS) to the detriment of treatments based on traditional knowledge.

In this category, the residents' perceptions in relation to the treatments currently used by the SUS are demonstrated, usually done through pills, or even with more invasive methods, such as injections, to the detriment of the treatments carried out by the community itself through traditional knowledge. We can observe the following subcategories:

3.2.2.1 Residents who trust the therapeutic treatments used by the Unified Health System and do not stop using conventional medicines to the detriment of alternative/traditional medicines.

Even though they belong to a quilombola community, where traditional knowledge to prevent or treat diseases is widely used, 20% of the residents interviewed reported that they do not make use of any type of treatment based on tradition to the detriment of conventional treatments. We can see this in the following accounts:

- "I've never stopped using the medicine that the doctor gives me to use medicine from the bush. I don't do that, no. I trust medicine." EC1
- "I trust the doctors and follow the right treatment." EC71
- "It has happened that the doctor has made a mistake in what I had. I'm worried about that. But even so, I trust and follow to the letter what the doctor tells me. If he passes the medicine I use it right. I don't stop using the medicine he gave me to use the bush medicine, no. They're right." EC20
- "Medicine from the pharmacy, which the doctor prescribes, I take it properly. I have gastritis. I have to take it. When there's no gas station, I have to buy it." EC23
- "... I trust the doctor's treatment... We now go more after pharmacy medicines." EC9

3.2.2.2 Residents who trust the therapeutic treatments used by the Unified Health System, but also use alternative/traditional treatments.

About 48% of the interviewees reported seeking health services in the face of a problem and following the treatment recommended by the professionals. However, they also assumed to make use of non-conventional treatments as a complement to drug treatment, as evidenced in the following reports:

- "... I use the doctor's medicine, but I use the plants too." EC12
- "... Today I have high blood pressure and have already had a stroke. I need to go to the doctor all the time. I've gotten used to it and I get along well with the medicines at the pharmacy. I don't stop taking my meds. But I use my teas from time to time." EC70
- "We try a bush remedy first, but I go to the doctor too and follow it to the letter. I trust it a lot." EC26

- "I trust medicine. But it has happened that some medicines don't work and I use the one from the bush and do it." EC67

3.2.2.3 Residents who do not trust the therapeutic treatments used by the Unified Health System and prefer to use alternative/traditional treatment

A portion represented by 30% of the interviewees mentioned preferring the use of non-conventional methods as a way to treat some dysfunction. The lack of financial resources to purchase medicines and the ease of access to medicinal plants were some of the factors reported:

- "I make an effort to take the medication that the doctor prescribes, but sometimes I don't follow it, no. I drink my tea at home and if I get better I don't drink the one from the pharmacy, no. It has already happened to get worse with the medicine from the pharmacy. Apart from the fact that they are so expensive." EC69
- "I don't take medicine, no. It's hard to go to the doctor. If the doctor goes to take it for 30 days, I only take two. I use it's the medicine of the bush. Am I going to spend money on medicine? I only get along with medicine from the bush." EC10
- "I always prefer to use the medicine from the bush because the one from the pharmacy is always expensive..." EC15
- "I have my doubts. People say that in the past, a lot of healing was done with the medicine from the bush. I believe, for we find the older people healthier than the young. But I believe that the medicine of the bush is good. Improvement. When my son had diarrhea, I took him to the hospital and they asked him to take an injection. And I didn't want to. I came home and had a cup of tea. And he got better." EC4

About 55% of the residents believe that there is no appreciation of traditional knowledge by professionals. Whether because they do not know the types of unconventional treatments that the community uses, because they do not believe in the healing potential of these practices or simply because they believe only in a vertical relationship with the individual, some health professionals do not agree with the use of alternative methods of preventing and curing diseases. This attitude demonstrates a vertical view of these servers, where the patients' beliefs are not representative, thus hindering effective adherence to treatment.

It is necessary to investigate whether this perception of cultural devaluation does not permeate situations of structural racism in health services, a reality already recognized by the Ministry of Health12, and the fight against racism in health care, including in the remaining quilombolas, is one of the premises of the National Policy for Comprehensive Health of the Black Population13.

The overlapping of scientific knowledge is identified when professionals do not understand how suggestive sociocultural representations are for the population. Thus, they end up not understanding the reason for the resistance to adapt to a conventional treatment and the 'exchange' of this for another of greater meaning for the user14.

A portion of 25% of the informants say they agree that health professionals respect traditional knowledge. Alternative and/or complementary therapies, also considered as traditional medicine by the WHO, are techniques aimed at providing health care to the individual, whether in prevention, treatment or cure, considering him or her as a mind/body/spirit and not a set of isolated parts15. Such

popular practices are developed within a social context that is not isolated from cultural values. Therefore, in order to better understand these practices, it is important to consider the cultural aspects of the population16.

Due to these factors, it is extremely important for health professionals to view the service user as a holistic being, endowed with experiences and knowledge that directly interfere in their practices of prevention and treatment of diseases, especially when it comes to a traditional community, where these cultural traits are more present17.

It should be noted that, although there is a dominant culture, there are a number of other cultures that have their own values and beliefs. And this cultural diversity has demanded from health professionals, particularly those who work in primary care, a deeper understanding of the sociocultural universe of the individuals with whom they work18.

A smaller (18%) - but considerable - portion of respondents reported not being able to answer whether there is appreciation on the part of professionals. They justify their answers by the embarrassment they feel in reporting the use of these methods for fear of reprisal from health professionals. Such attitudes reinforce the importance of the co-participation of health users in their treatment. It is believed that it is possible to work together with people and not as it is normally done, which is to work for people without respecting them in their differences19.

Health care has traditionally been characterized by the biomedical model, focusing on disease and cure, interpreted with biological parameters, and based on the vertical relationship between physician and patient, for which psychosocial and cultural determinants are of little interest for diagnosis and therapy20.

In this way, many users of health services, seeking the knowledge acquired through their ancestors and their experiences, end up using non-conventional methods to treat some disease, but they omit this fact from the professionals, knowing that many of them would not agree on a horizontal and exchange relationship. The omission of users, in the face of the use of traditional ways to combat diseases, entails not only a risk for this patient, who may be using some non-recommended or improper substance, but also in the absence of a greater bond of trust between the individual and the professionals.

More than half of the interviewees (56%) reported using both types of treatment: the conventional one, based on the biomedical model, and the traditional one, based on popular knowledge. Every therapeutic system is an indissoluble part of a society's cultural repertoire, that is, they are integral parts of culture, being influenced by it and vice versa. Thus, medicine based on popular knowledge, parallel to the biomedical model, remains alive in the daily lives of the population. Prophylactic and at-home therapeutic measures are carried out in order to seek or maintain a state of

well-being close to what is conceived as ideal. These practices are generally worked on within the family and are almost always passed on to different generations21.

The above-mentioned data demonstrate how this knowledge is rooted in individuals who inherit customs and, even though they are influenced by current medicine, maintain the habit of treating themselves through some procedure resulting from traditional knowledge. Some report that they first use the traditional medicine and, if it does not have an effect, they use the conventional medicine. Others, on the other hand, report initially trying to use the medication prescribed by the doctor and, if they do not effectively treat the symptoms, they then go to therapy based on popular knowledge.

A portion of 30% of the residents answered that they strictly follow the prescribed medical treatment and do not use any unconventional method. Even though it is a traditional community, it is evident how the current biomedical model and the treatment system based on medicalization interfere with the customs and modify the habits of the population. Even though there is no easy access to these drugs by the community, they report finding the use of pharmaceutical drugs more practical and more reliable.

With the advances in the field of health sciences, new ways of treating and curing diseases have emerged, such as the use of industrialized medicines, which were gradually introduced into people's daily lives, not only through health professionals but also through advertising campaigns by the laboratories that produced such medicines, which promised to cure the most diverse diseases22.

The interference of external factors in the social dynamics of the group and the influence of the positivist and hegemonic character in the provision of care by health services has exerted an influence on this aspect of changing the habits of traditional communities. An example is a greater exposure of communities to modern society and, consequently, to external economic and cultural pressures, resulting in greater ease of access to contemporary medicine services and the displacement of people from their natural environments to urban regions This induces the loss of the utilitarian character of popular knowledge accumulated for several generations; It hinders autonomy for protection, health promotion and disease prevention, and can lead to the disappearance of traditional knowledge23,24.

The socioeconomic conditions of these individuals, as well as the geographical issue and, consequently, the difficult access of these users to the prescribed medications, have a strong influence on the choice of traditional treatment. These were some of the arguments of the villagers who mentioned the factors "high price" and "distance from pharmacies" as justifications for opting for home methods. However, the belief in the ancestors and especially the successful experiences with such ways of fighting diseases are still the main aspects that are related to this choice.

It can be said that the change of health-related habits among users of popular practices is a difficult process, because they are rooted in sociocultural aspects, transmitted between different

generations within the family or in the community. The empirical proof of these resources, based on previous experiences, contributes to their acceptance and usefulness2.

Respect on the part of health professionals is also significant for the perpetuation over the generations, since, with the appreciation and encouragement of such cultural practices, users will feel more comfortable to perpetuate their acquired knowledge and, perhaps, a greater interest of the new generations in the theme17. The improvement in the health care of quilombola communities and the coping with the difficulties identified is a co-responsibility of all the actors involved in these processes: managers, health workers and users of health services25.

4 CONCLUSIONS

In the present study, it was observed that many users of health services experience a vertical relationship with professionals who imprint their knowledge as the only effective form of treatment. This attitude, on the part of the professionals, causes a distancing in their relationship with the users, who most of the time do not feel comfortable exposing their knowledge and consequently their practices to treat their ailments.

The recovery of the historicity of users based on respectful relationships, distancing themselves from practices that consider their view as obsolete, can represent an important tool for better treatment adherence. With cultural appreciation and respect, professionals will not only be adding knowledge and inserting the individual as a participant in the health-disease process, but also gaining the trust of the individual and thus favoring a more effective treatment.

Therefore, there is a need to respect the various forms of treatment used by traditional communities, and it is essential that health professionals have knowledge about such practices and how each individual behaves in relation to their health. Another aspect that should be highlighted is the importance of the user's co-participation in the choice of their treatment, making their knowledge an inseparable part of the healing process.

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SEVEN
publicações acadêmicas

Systematic review of literature, RED and art teaching

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Lilian Isana
Inês Toneli Napoli Meleiro Municipal School of Basic Education – SC – Brazil
E-mail: isanaoenning@gmail.com

Ivanir Antunes
Inês Toneli Napoli Meleiro Municipal Basic Education School – SC – Brazil
E-mail: ivantunes.08@hotmail.com

Patrícia Jantsch Fiuza
Federal University of Santa Catarina (UFSC) Florianópolis – SC – Brazil
E-mail: pjfiuza@yahoo.com

Rita de Cassia Martins Biz
Dário Crepaldi Municipal School of Basic Education – Morro Grande - SC – Brazil
E-mail: ritabiz@hotmail.com

ABSTRACT
This article refers to the systematic review of literature presented in the master's dissertation entitled "Digital Educational Resources and the teaching of Art in Municipal and State Basic Education in the region of the Association of Municipalities of the Extreme South of Santa Catarina AMESC", with the objective of analyzing the educational practices with the use of Digital Educational Resources in the teaching of Arts in Municipal and State Basic Education in the region of the Association of Municipalities of the Extreme South Catarinense – AMESC. Initially, the search resulted in 1,111 studies in the ten-year period, the search was refined for the last five years, resulting in 390 studies, and after a thorough review, based on the selection and exclusion criteria, resulted in the identification of (22) studies that relate the variables defined in the Systematic Literature Review protocol.

Keywords: Digital Educational Resources, Art Teaching, Municipal and State Basic Education, AMESC.

1 INTRODUCTION

Currently, the generation that attends schools is known as Generation "Z"[1], of children born in the early 2000s, during the advent of the internet and the growth of new digital technologies (*smartphones*, video games, mobile applications, among others). They are also known as *Gen Z*, *iGeneration Plurals or Centennials* described by Toledo (2012), as: "Z" from two definitions that can come from the English "*zap*", An expression that denotes "do something quickly, with a lot of enthusiasm" or "change channels quickly with the remote control". The National Common Curriculum Base (BNCC) highlights that digital culture has promoted significant social changes in contemporary society. All this context imposes challenges on the school in fulfilling its role in relation to the formation of the new generations, which involves: "instituting new ways of promoting learning,

[1] Generation Z (also known as *Gen Z*, *iGeneration*, *Plural* or *Centennial*) is a generation of people born between the beginning of the 90s and the end of the first decade of the 21st century. Available at: https://www.significados.com.br› genacao-z.

interaction and the sharing of meanings between teachers and students" (BRASIL, 2017, p. 61). From this perspective, from the RSL, the teaching of Art and technologies is highlighted: perspectives for digital educational resources; technology applied to education; the definition of Digital Educational Resources, their use within the school environment and the similarities and differences between the concepts of Digital Educational Resources and Digital Resources, based on authors such as Souza (2020); Harmandjian (2020); Faraco (2020); Lopes (2020); Zamperretti and Souza (2019/2020); Defendants (2019); Pereira (2019); Santos (2019); Magalhães (2019); Del Câmara (2019); Freitas and Vilela (2019); Quatter (2019); Douglass (2019), Barbosa (2019); Bittencourt (2018); Peixoto (2018); Venturini (2018); Santos (2018); Silva (2018); Machado (2018) among others who emphasize the teaching of Art and technologies.

The works related to the systematic review of literature aim to minimize systematic and random errors seeking to clearly define the procedure to be adopted in conducting the survey of the state of the art of a research topic, as argued by Kitchenham and Charters (2007), which should be presented in a fair manner and that appears to be fair to other researchers. Conducting a systematic literature review goes beyond the usual activity of doing a literature review as part of an academic research work, with specific protocols that seek to give some logic to a large documentary corpus (2019). In view of the procedure and methods used, it was possible to verify the lack of studies regarding the use of digital educational resources in the teaching of art for elementary school I and II, requiring improvement and technological and educational investments for this area of knowledge.

2 METHODOLOGY

To carry out the RSL, it is necessary to use methodological procedures, which aim to identify studies on the theme in question, that is: "Digital educational resources and the teaching of Arts" and how these theories communicate. Therefore, the exploratory search was adopted through a Systematic Review of the Literature (RSL), this method was chosen so that it can identify a synthesis of the knowledge already acquired on the subject (VELLUZZI, 1998 *apud* FREIRE, 2013, p. 31) and thus enable ways to identify possible advances by comparing and statistically relating the results of different studies that lead to new results (FREIRE, 2013, p. 28).

In this search, strategies are defined for the development of the research, including the definition of a guiding question, which requires a bibliographic research to explain a problem. Rampazzo (2013, p. 53) presupposes "that any kind of research, in any area, it presupposes and requires prior bibliographic research." In this way, it will be possible to understand the question that is intended to be answered. Galvão and Pereira (2014, p.183) define that a "systematic review of the literature is a type of investigation focused on a well-defined issue, which aims to identify, select, evaluate and synthesize the relevant evidence available". Thus, initially it is necessary to formulate the question

about the problem to which it is intended to answer, Gomes and Caminha (2014, p. 402) advise that the "first step to be taken at the beginning of any study is to establish what if you want to search. Poorly worded questions can lead to obscure decisions about what to include in the review later."

It was defined that the themes to be studied are Digital Educational Resources and the teaching of Art with a specific focus on State and Municipal Basic Education in the region of the Association of Municipalities of the Extreme South of Santa Catarina/AMESC. And the research question defined was: **What are the educational practices with the use of Digital Educational Resources in the teaching of Art of teachers who work in Municipal and State Basic Education (Elementary School I and II) in the AMESC region?**

2.1 SYSTEMATIC LITERATURE REVIEW PROTOCOL

After defining the theme, the problem and the objectives, the variables and their variants in Portuguese and English were defined in the search databases and search engine. The first Variable is Art Teaching, the second is Elementary School and the third Variable: Digital Educational Resources. The key words, and their variants in Portuguese and English, were also defined, to help frame the documents to be researched: Art Teaching, Elementary School, Elementary School I and II and Digital Educational Resource - RED. The selection of the databases for the research considered the availability of platforms such as the CAPES Journal Portal through the IP of the Federal University of Santa Catarina (UFSC). The search was carried out in Portuguese and English in databases such as: **Databases/search engines** (Scopus Elsevier (English), Proquest (English), Proquest (English), Google Schoolar (Portuguese and English); **Search parameters:** *Open educational resources, Arts teaching, Elementy school, Art Teaching, Elementary Education, Digital Educational Resources* in the period of 03/03/21. For the search, the following inclusion and exclusion criteria were considered, first the selection and identification of the studies were performed, then the inclusion criteria were used: Full articles, dissertations and theses, Open access database, Peer review, Publications in Portuguese/English, Descriptors in titles, abstracts or keywords and ***exclusion*** criteria: Paid Papers, Conference Papers, Undergraduate Papers, Papers in languages other than Portuguese and English Old documents (more than 10 years old), Do not include descriptors or derivations in titles, abstracts or keywords, After reading, identify if the subject is not related to the research and put an end to data extraction. At the end of the searches in the databases and in the search engine, the researchers felt it necessary to catalog the bibliography, analyze the abstracts to obtain greater clarity of the variables researched. Initially, the search resulted in 1,111 studies in the ten-year period, the search was refined for the last five years, resulting in 390 studies, and after a thorough review, based on the selection and exclusion criteria, resulted in the identification of (22) studies that relate the variables defined in the Systematic Literature Review protocol. In other words, 1,089 articles, dissertations and theses with

abstracts, titles and keywords that discussed or superficially dealt with the themes under study were rejected. In this way, 22 works that best fit the descriptors remained: Arts Teaching, Elementary Education, Digital Educational Resources.

2.1.1 Data Extraction

The data pointed to a diversity of knowledge about artistic languages, which demonstrates the importance of access, study and research in this area. Different tools are available to assist in the systematic review of the literature, i.e., software (whether free or proprietary), using in this review the Parsifal Software (www.parsifal.al) which is an online tool developed to support researchers in conducting reviews systematic studies of the literature in the context of *Software* Engineering). Subsequently, they were defined *in the data extraction software* in order to create a quantitative ***score*** to classify the studies, this classification should answer the following questions: ***Are the studies related to the use of digital educational resources in the teaching of Arts for Elementary School? - Are the studies related to the use of digital educational resources in the teaching of Arts for Elementary School? - Are the studies related to the use of digital educational resources in the teaching of Arts for Elementary School?*** The documents were classified by scores, databases, types of documents, years of publication and authors, and their relevance considered the classification of the ***score***, *when presenting the artistic languages of Art used, the* new terminologies for the theories studied, the theories of learning, the methods and types of studies that the authors used to relate the use of digital educational resources in the teaching of Arts, which resulted in a predominance of the Language of the Visual Arts.

3 RESULTS AND DISCUSSIONS

It is observed that in relation to the areas of knowledge, (10) ten studies report: media, ICT's, Cyberculture, Designer Trinking' and STEM, terms related to new digital technologies: Zamperetti and Souza in (2019/2020) and Rodrigues (2018) in RS/BR published studies related to the area of Arts, technologies and cyberculture; Vazquez, Medeiros, Possi and Souza (2016) have published studies related to Art and technology; Quatter, Barbosa published in DF/BR in 2019 a study whose area of knowledge was Arts and ICT's,.; previously Silva(2018) a study whose area of knowledge was cyberculture and participatory culture for the school levels of Elementary I, II and High School; Douglas published in the USA, in 2019, a study whose area of knowledge was artistic integration in the curriculum; Santos published in Goiás, in 2018, a study whose area of knowledge was new media and cyberculture; Oliveira published in Portugal in 2017 a study whose area of knowledge was Art and designer: 'designer trinking' communication. Four other selected studies mention Art and Curriculum as an area of knowledge: Freitas and Vilela (2019) published in MG/BR; Pillotto and Voigt (2016)

published in SC/BR, Rodrigues, Subtil (2016) published in SP/BR a study for the school level of Elementary School. Eight selected studies also listed different areas of knowledge: Souza (2020) ES/BR published a study whose area of knowledge was education and culture, Harmandjian (2020) published in the USA a study whose area of knowledge was Art and mathematics for the school level of Elementary School I and Del Câmara (2019) a study whose area of knowledge was Visual Arts; Faraco (2020) published in S P/BR a study whose area of knowledge was Art and education for the school level of Elementary School II, Lopes (2020) published in MG/BR a study whose area of knowledge was Art and history for the school level of Elementary School II, Magalhães (2019) published a study whose area of knowledge was didactic material, Machado (2018) published a study whose area of knowledge was didactic material and Orofino (2017) published in SC/BR a study whose area of knowledge was Contemporary Art for the school level of Elementary School I.

4 CONCLUSION

The studies demonstrated documents related to the teaching of Art and technologies: perspectives for digital educational resources; technology applied to education; the definition of Digital Educational Resources, their use within the school environment and the similarities and differences between the concepts of Digital Educational Resources and Digital Resources. The research pointed out new categories such as the feeling of belonging to the teaching of Art; the feeling of belonging to educational practices and methods and the feeling of belonging in relation to technologies Subsequently, the study revealed the insertion of experiences and propositions of teachers and students for the use of technologies, the "Visual Arts" stood out as the predominant visual language, in which the contact with visual languages has been mediated for the development of skills and competencies / art as a practical and methodological interdisciplinary resource, Art as expression, Art as access to aesthetic standards and Art as knowledge.

In view of the above, RSL found that the use of Digital Educational Resources in the teaching of Art by teachers who work in Municipal and State Basic Education (Elementary School I and II) in the AMESC region, proposed an updated action for the new educational paradigms for this century, contributing to the social and intellectual development of students and teachers. The use of digital educational resources is configured as a new educational stratagem by popularizing the use of technologies in education, among the different curricular components, considering the experiences of teachers and students, where both are mediators of their knowledge in activities that improve the use of technology between students and teachers, strengthening educational and social bonds.

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Strategies for the prevention and management of obesity in the pediatric population: A literature review

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Pedro Henrique Mendonça Mariano
IMEPAC Araguari University Center; Medical Student

Isabella Martins Motta
IMEPAC Araguari University Center; Medical Student

Diego Fernando de Avila
IMEPAC Araguari University Center; Medical Student

Aline Rocha Martins
IMEPAC Araguari University Center; Medical Student

Laura Elisa Ávila Jacó
University of Uberaba UNIUBE; Medical Student

Gabriel Francisco Ferrari Peres
Federal University of Mato Grosso do Sul; Medical Student

Ana Cecília de Queiroz Santos
IMEPAC Araguari University Center; Medical Student

Leonardo Carrijo Naves
IMEPAC Araguari University Center; Medical Student

Maria Tereza Pasquini França da Fonseca
IMEPAC Araguari University Center; Medical Student

Pedro Henrique Buso
IMEPAC Araguari University Center; Medical Student

ABSTRACT

Introduction: Overweight and obesity are conditions that have been increasing considerably in the pediatric population. Overweight and obesity are known to be associated with the development of systemic arterial hypertension (SAH), heart disease, osteoarthritis, type 2 diabetes, and some cancers in adulthood. In addition to the expected clinical problems, it is known that obese people, and especially children, often have problems with low self-esteem, affecting school performance and relationships Objective: To analyze and synthesize the most recent research on obesity prevention and management strategies in the pediatric population, in order to identify the consequences of non-treatment and the most effective approaches. Methodology: The searches were carried out in the PUBMED and LILACS databases, using the search process through vocabulary controlled through descriptors and Boolean operators "and" and "or". Conclusion: Addressing childhood obesity requires comprehensive measures, including improvements in quality of life, promotion of healthy eating, encouragement of physical activity, family support, consideration of bariatric surgery in severe cases, and, occasionally, use of medication measures. By adopting an integrated strategy, it is possible to effectively address this health challenge, promoting healthy habits from childhood for a more balanced future.

Keywords: Pediatric Obesity, Prevention, Intervention.

1 INTRODUCTION

According to the description of the World Health Organization, obesity refers to the presence of an excessive accumulation of body fat at levels that result in adverse health impacts, and the body mass index (BMI) is one of the most effective measures to delineate the degree of obesity of individuals.

Body mass index (BMI) is a classification method that seeks to facilitate the comparison of weights in different populations, regardless of height. Its formula consists of dividing body weight (in kilograms) by height (in meters, squared).

Weight gain is the result of a balance between energy intake and energy expenditure. Weight gain occurs when energy consumption is greater than energy expenditure. Weight loss occurs with restricted energy intake, increased energy output, or both. However, this simple model fails to incorporate what are now known as complex homeostatic systems, which counterbalance voluntary energy disturbances, whether they are forced overfeeding, caloric restriction or increased activity. (RANKINEN, 2006)

A homeostatic model of weight regulation is theoretically identical to other tightly regulated systems in the body, such as systems for maintaining glucose levels and blood pressure. Each system involves perceiving and responding to environmental changes, including lifestyle changes related to activity and diet. For example, glucose levels are maintained within a narrow normal range, even in the face of the wide daily fluctuations in calorie intake that occur during meal intake, overnight fasting, and exercise, due to the action of complex and integrated responses, which include insulin, glucagon, catecholamines, cortisol, growth hormone and central nervous system. (MORTON, 2006)

Like glucose, body weight is regulated at multiple levels in order to maintain a normal range (or set) through the interaction between the systems that control meal-by-meal intake (satiety) and those that control relative adipose mass (adiposity). (MORTON, 2006)

Overweight and obesity are conditions that have been increasing considerably. Overweight and obesity are known to be associated with the development of systemic arterial hypertension (SAH), heart disease, osteoarthritis, type 2 diabetes, and some cancers in adulthood. About 50% of obese children at 6 months of age, and 80% of obese children at 5 years, will remain obese. (TROIANO, 1995) (GORTMAKER, 1987)

The fact that obese children tend to remain with the same condition in adulthood is one more reason for family physicians to be aware of this epidemiological change and include the prevention of overweight/obesity in their care routine.

In addition, high blood pressure is a pathological process that can start in childhood. In addition to the expected clinical problems, it is known that obese people, and especially children, often have problems with low self-esteem, affecting school performance and relationships. (KLEIGMANL, 2004)

There are several factors that are related to the state of overweight and obesity, ranging from genetic issues that can induce greater or lesser energy gain/expenditure, to lifestyle habits that favor weight gain. Individual issues, such as specific diseases and the use of medications, can favor the onset of the disease. However, only 5% of childhood obesity is associated with diseases such as Cushing's, Turner's, muscular dystrophy, among others. (MONTE, 2006)

Other authors mention that obesity of organic causes in childhood corresponds to 1% of cases, and 99% are of exogenous origin, mainly due to an increase in the intake/expenditure ratio. (SUCUPIRA, 2010).

2 OBJECTIVE

The objective of this literature review is to analyze and synthesize the most recent research on obesity prevention and management strategies in the pediatric population, in order to identify the consequences of non-treatment and the most effective approaches, as well as to provide a solid theoretical basis for future interventions and development of measures to prevent childhood obesity.

3 MATERIALS AND METHODS

3.1 DATABASES

The searches were carried out in two bibliographic databases — PubMed and LILACS. At the end of the searches in each database, the duplicate references were excluded.

3.2 TIME LIMIT

Articles published between 2015 and 2023 (including those available online in 2023 that could be published in 2024) were selected

3.3 LANGUAGES

Articles written in English and Portuguese were selected.

3.4 DESCRIPTORS

The search process was used through vocabulary controlled through descriptors and Boolean operators "and" and "or". With this strategy, there was a recovery of specific references, ensuring the detection of most of the published works within the pre-established criteria.

The descriptors used were "Pediatric*" and "Obesity",* were combined with the "and" operator and the descriptors *"Management" and* "Primary Prevention" *were combined with the descriptor "*or". As the objective of the present review was not to assess obesity in other age groups, the term was specific in "Pediatric" in the search.

3.5 INCLUSION AND EXCLUSION CRITERIA

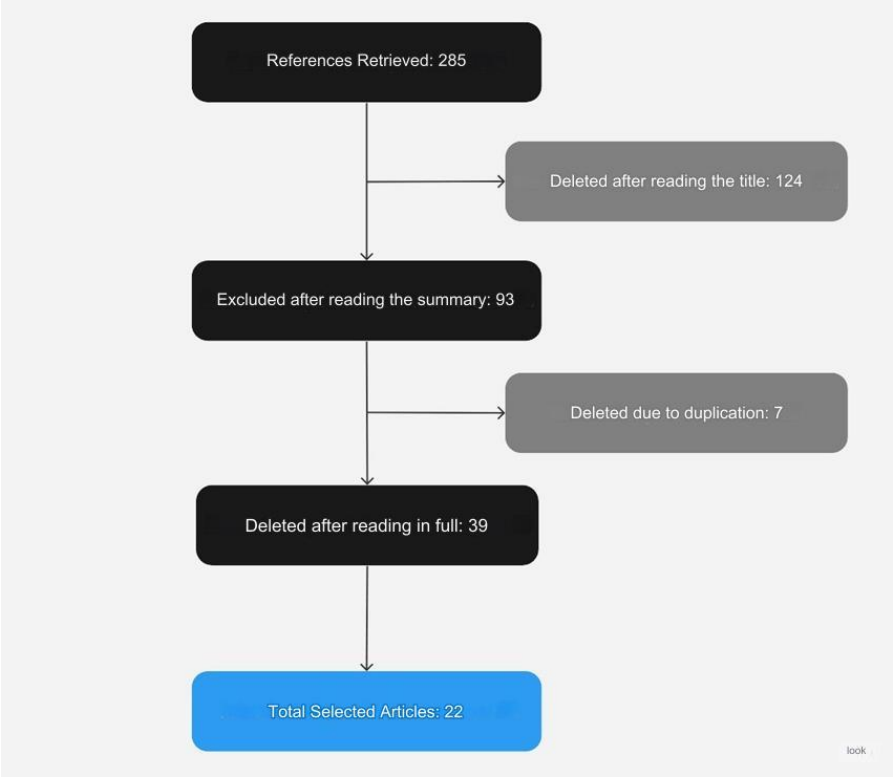
All original articles indexed in the period between January 1, 2015 and November 10, 2023, with experimental design (clinical trials, randomized or not) or observational design (case-control studies, cohort studies, and before and after studies) were included. Articles that analyzed observational

studies with cross-sectional analysis, phase I or II studies, and studies conducted in pregnant patients were excluded.

3.6 ARTICLE SELECTION AND ANALYSIS PROCESS

Figure 1 shows the process of selecting articles in its different stages and the respective number of articles retrieved in each one. The captured references were included in a unique library in the Zotero program. Two medical students were responsible for selecting and reading the selected articles in full; After the selection, a library was created in which all the selected references and the respective complete articles in PDF format were listed. A total of 22 original articles were included in this review (Figure 1).

Figure 1 - Flowchart of the selection process of the researched articles. The number of items in each stage is indicated.



Source: The Authors.

4 DISCUSSION AND RESULTS

4.1 EPIDEMIOLOGY

Childhood obesity affects 13.2% of children between 5 and 9 years of age monitored by the Unified Health System (SUS) of the Ministry of Health, and can have worrying consequences throughout life. In this age group, 28% of children are overweight, a warning sign of the risk of obesity in childhood or in the future. Among children under 5 years of age, the overweight rate is 14.8, and 7% are already obese. The data are from 2019, based on the Body Mass Index (BMI) of children who are cared for in Primary Health Care (SAPS). (BRAZIL, 2021)

Obesity in children and adolescents is multifactorial. Genetic, individual, behavioral, and environmental conditions can influence nutritional status. The public report of the National Food and Nutrition Surveillance System, with data from people monitored in Primary Health Care, points out that, by mid-September 2022, more than 340 thousand children aged 5 to 10 years had been diagnosed with obesity. In 2021, PHC diagnosed obesity in 356 thousand children of the same age. (BRAZIL, 2022)

Currently, the South region has 11.52% of obese children in this age group, the highest rate in the country. It was followed by the Southeast, with 10.41%; Northeast, with 9.67%; Midwest, with 9.43%; and North, with 6.93% of children monitored by the Unified Health System (SUS) in the region. (BRAZIL, 2022)

4.2 CLASSIFICATION OF CHILDHOOD OBESITY

Body Mass Index (BMI) is a widely used tool for assessing overweight and obesity in children, employing a specific approach that takes into account the age of the individual. When calculating BMI for age, standard growth charts are used, which take into account normal variations in children's development. The result is compared with specific percentiles to determine the relative position of the child in relation to the general population.

Interpretation of children's BMI often involves the use of percentiles or z-scores, which indicate how far a child's BMI is from the mean for their age. Higher percentiles may suggest that you are possibly overweight. In addition, converting BMI to z-scores allows adjusting for natural variability in child growth. Positive z-score values indicate an above-average BMI, while negative values indicate a below-average BMI for the child's age. (ALMEIDA, 2018)

It is crucial to recognize that BMI-for-age also takes into account differences between the sexes, since boys and girls may have distinct growth patterns. Sex-specific growth charts make it possible to assess the child's development more accurately, taking into account the biological particularities of each gender. Thus, the use of BMI for age, percentiles/z-score and differentiation by sex offers a comprehensive approach to the assessment of children's nutritional status, providing valuable information for prevention and intervention in cases of overweight and obesity. (ALMEIDA, 2018)

4.3 PHYSIOPATHOLOGY

The pathophysiology of obesity is intrinsically linked to the endocrine role of adipose tissue, transcending its nature merely as a reservoir of energy to manifest itself as a dynamic secretory organ. This adipose organ expresses receptors responsive to both the hormonal systems and the central nervous system (CNS).

Concisely, several mechanisms associated with obesity are closely related to insulin resistance and metabolic syndrome, intertwining in a significant portion of obese patients. The accumulation of fat in the intra-abdominal organs favors insulin resistance and dyslipidemia, while the accumulation of visceral fat, assessed by measuring abdominal circumference, emerges as a robust marker of predisposition to metabolic syndrome in adulthood. This phenomenon not only affects metabolic disorders, but also plays a crucial role in arterial thickening, predisposing to atherosclerosis. (GUYTON, 2021)

Additionally, increased visceral fat correlates with other pathological conditions, such as sleep apnea, hepatic steatosis, polycystic ovary syndrome, and hyperandrogenism. (GUYTON, 2021)

4.4 LIFESTYLE HABITS

Several elements have an impact on children's eating habits, being understood both by external factors, which include family dynamics and their particularities, attitudes manifested by parents and friends, values rooted in the social and cultural sphere, the influence of the media, the presence of fast-food consumption, nutritional knowledge and established eating patterns, as well as by internal factors, which include psychological needs and characteristics, body image perception, intrinsic values and personal experiences, self-esteem, food preferences, health and ongoing psychological development.

There are well-studied aspects in relation to eating habits that are more related to obesity. Breastfeeding is touted to be an important protective factor against obesity. However, habits such as not eating breakfast, eating dinner consuming a large amount of calories, eating a limited variety of foods and preparations and in large portions, consuming too much light but caloric liquids and having an inadequate practice of early eating are harmful and inducing obesity. (MELLO, 2004)

Exercise is considered a category of planned, structured, and repetitive physical activity. Physical fitness, in turn, is a characteristic of the individual that encompasses aerobic power, strength, and flexibility. The study of these components can help in the identification of children and adolescents at risk of obesity. Children and adolescents tend to become obese when they are sedentary, and obesity itself can make them even more sedentary (YANOVSKI, 2002).

Physical activity, even if spontaneous, is important in body composition, as it increases bone mass and prevents osteoporosis and obesity. Sedentary habits, such as watching television and playing video games, contribute to a decrease in daily caloric expenditure. (MATSUDO, 2003). In a study, they observed a significant decrease in the rate of resting metabolism while children watched a certain television program, being even smaller in obese women. So, in addition to the metabolic expenditure of daily activities, resting metabolism can also influence the occurrence of obesity. Increasing physical activity, therefore, is a goal to be followed, accompanied by a decrease in food intake. With physical activity, the individual tends to choose less caloric foods. (KLEGES. 1993)

4.5 STRATEGIES AND MANAGEMENT FOR THE PREVENTION OF CHILDHOOD OBESITY

Today, there are several ways of presenting both numerical and linguistic data. Therefore, the use of tables brings several benefits such as conserving and restricting data loss, greater specificity and, in addition, provides a better analysis of the data since they are grouped in order, allowing comparisons and conclusions to be made.

Table 1 presents this article to demonstrate the strategies and management methods for the prevention of childhood obesity. Thus, Table 1 summarizes the results and discussions that the authors of their respective articles carried out during their research.

Table 1: Analysis of the results of the articles

Pediatric Obesity-Assessment, Treatment, and Prevention: An Endocrine Society Clinical Practice Guideline	The use of weight loss drugs during childhood and adolescence should be restricted to clinical trials. Growing evidence demonstrates the efficacy of bariatric surgery in the most severely affected mature adolescents who have not been able to modify their lifestyle, but the use of the surgery requires experienced teams with resources for long-term follow-up.
Pediatric obesity: prevention is better than care	A multi-component intervention, addressing different targets and contexts, may be desirable, but further studies are needed to confirm long-term efficacy and to guide policy interventions.
Obesity in children and adolescents: epidemiology, causes, assessment, and management	Evidence is emerging of intensive dietary approaches, pharmacotherapy, and metabolic and bariatric surgery as supplemental therapies; However, access to these therapies is scarce in most jurisdictions.
Addressing Childhood Obesity: Opportunities for Prevention	Public policies and environmental interventions aim to make it easier for children to choose a healthy diet and physical activity. Interventions focusing on family habits and parenting strategies have also been successful in preventing or treating childhood obesity.
Overweight and obesity in children and adolescents	Currently, pharmacotherapy options for the treatment of pediatric obesity are very limited. Therefore, it is crucial to establish a comprehensive management program that emphasizes proper nutrition, exercise, and behavioral modification.
Prevention and Management of Childhood Obesity and Its Psychological and Health Comorbidities	Clinical health psychologists are ideally suited to conduct research on this complex problem, but transdisciplinary teams will be needed to increasingly change control.
Pediatric Obesity: Primary Care Perspective and Prevention	Pediatricians and primary care providers are instrumental in treating overweight and obesity. They have the advantage of observing children over a long period of time, having a family-centred perspective and often being seen as a reliable source of information.
Progress in pediatric obesity: new and advanced therapies	Promising new medical and surgical therapies and screening tests for rare genetic causes of obesity are available. These new diagnostic and therapeutic options bring renewed enthusiasm to the treatment of children and adolescents with obesity and increase the recognition that obesity is a chronic disease that begins in childhood and deserves intervention to prevent consequences.

Dietary Interventions to Prevent Childhood Obesity: A Literature Review	Overall, most intervention studies have shown consistent effects on changing children's body mass index; They reported weight reductions, which were clinically relevant to the obesity reduction outcome.
Childhood obesity: causes, consequences and solutions	The identification of the main causal factors will facilitate, from primary, specialized and population-level care, a more adequate and concrete response to childhood and adolescent obesity.
Obesity and Children	Pediatric nurses are respected and positioned to present evidence-based obesity education, correct common myths about obesity, sensitively address obesity-related biases and discrimination, and model person-first language and actions.
Risk Factors and Implications of Childhood Obesity	Restructuring anti-obesity interventions towards community-based/environmentally-oriented measures to counteract an obesogenic environment is mandatory for sustainable success and to halt the obesity epidemic
Child and adolescent obesity	A respectful, stigma-free, family-based approach involving multiple components and addressing eating, physical activity, sedentary and sleep behaviors. Especially in adolescents, adjunctive therapies can be valuable, such as more intensive dietary therapies, pharmacotherapy, and bariatric surgery.
Childhood obesity: increased risk for cardiometabolic disease and cancer in adulthood	Normalization of body weight before the onset of puberty is crucial for several reasons. Obese children and adolescents often remain obese until adulthood, requiring adequate diet and physical exercise.
Childhood obesity: an ecological perspective	Environmental aspects should be taken into account in the prevention and treatment of childhood obesity, both from an individual and population point of view, with adequate and comprehensive public health policies.
The adolescent with obesity: what perspectives for treatment?	The risks of bariatric surgery include the need for additional abdominal surgical procedures and specific micronutrient deficiencies. Hopefully, new pharmacological treatments, in addition to lifestyle interventions, will offer more chances of success.
Childhood Obesity	Medications and bariatric surgery can play a role in certain severe cases. Community and policy changes regarding diet and physical activity can facilitate practical strategies against the growing obesity epidemic.
Childhood obesity: Aetiology, comorbidities, and treatment	Pharmacological and non-pharmacological management through lifestyle changes and relevant aspects of bariatric surgery in the pediatric population are effective measures in the management of children with obesity.
Pediatric Obesity-A Looming Problem for the Pediatric Population	Primary care physicians are the agents of change, as promoters of healthy habits, challenged to involve families and communities in health and in the movement of good nutrition and adaptation of good habits, and not in overabundance and stagnation.
Obesity in Childhood and Adolescence, Genetic Factors	An increasing number of genes and genetic mechanisms in children continue to be discovered. This sheds new light on the molecular mechanisms of obesity and potentially provides a target for new forms of treatment.
The association between adverse childhood experiences and childhood obesity: A systematic review	Taken collectively, the results suggest the need for greater attention to adverse childhood experiences in the prevention and treatment of childhood obesity.

Obesity in Children	It is important to review optimal care in both primary care and multidisciplinary weight management settings. This allows for timely evaluation and appropriate referrals, with the pediatrician playing a key role in advocating for the most at-risk patients.

Source: Own Authorship

5 CONCLUSION

Childhood obesity is a growing concern globally, with significant public health implications. In this literature review, we address the points associated with changes in quality of life in children facing this health challenge. Addressing childhood obesity goes beyond aesthetics, involving the promotion of healthy eating habits and the incorporation of regular physical activity. Taking a holistic approach to improving the quality of life of obese children is crucial.

Improved diet is a key aspect in the management of childhood obesity. Interventions that promote nutrition education, encourage healthy food choices, and restrict access to ultra-processed foods have been shown to be effective in preventing and treating obesity. In addition, strategies that involve raising awareness about adequate portions and the importance of a balanced diet contribute to a positive change in children's eating patterns.

Encouraging early initiation of physical activity is another key element in addressing childhood obesity. Programs that promote regular physical activity not only aid in weight loss but also have positive impacts on children's cardiovascular health, muscle development, and mental health. It is imperative to engage children in physical activities that are age-appropriate, fun, and encourage the formation of long-term active habits.

The support of family members plays a crucial role in tackling childhood obesity. Effective strategies often involve family changes, such as creating healthy home environments, establishing eating routines, and actively participating in physical activity together with children. Fostering a health-centered family culture contributes to long-term success in managing childhood obesity.

For more severe cases of childhood obesity, bariatric surgery appears as an effective option. This approach is considered when other measures fail to achieve sustainable results. However, it is essential that the decision for surgical interventions is based on a comprehensive assessment, considering factors such as the child's overall health, development, and ongoing family support.

Drug measures may also be considered in certain scenarios, under strict medical guidance. However, it is crucial to highlight that the use of medications should be an integral part of a multifaceted approach, which includes lifestyle changes and psychosocial support.

In conclusion, addressing childhood obesity requires a comprehensive response, incorporating changes in quality of life, improved diet, initiation of physical exercise, support from family members, surgical interventions for severe cases and, in certain contexts, medication measures. By taking an

integrated approach, we can work to reverse the trend of childhood obesity and provide a healthier future for generations to come.

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SEVEN
publicações acadêmicas

Sickle Cell Anemia: Medicines of choice for treatment in Brazil

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Josyany Melo Lopes
St. Augustine University Center
E-mail: Josyanelopes1@gmail.com
ORCID: http://orcid.org/0000-0002-1121-9089

Ana Patrícia Matos Barbosa
St. Augustine University Center
E-mail: anaapatriciamatos@hotmail.com
ORCID: https://orcid.org/0009-0006-1689-3714

Alessandra Camillo da Silveira Castelo Branco
St. Augustine University Center
E-mail: Profa.alessandracamillo@gmail.com
ORCID: http://orcid.org/0000-0003-3359-8654

ABSTRACT
Sickle cell anemia is a hematological disease with prevalence in Africa, the Middle East, India, and Central America. It happens when there is a defect in the red blood cell, due to the abnormal presence of a hemoglobin S. This condition is caused by a genetic mutation that affects the structure of hemoglobin, the protein responsible for transporting oxygen in red blood cells. The present study aimed to analyze the drugs currently used in Brazil for sickle cell anemia with the hypothesis that there are new therapeutic alternatives under development. Searches were carried out in databases such as Science direct, Pubmed, Scielo and 52 articles involving the theme of sickle cell anemia were found, and after applying the inclusion criteria, 10 articles remained for complete reading, where 4 were used in this integrative review. The new studies include the substances crizanlizumab, hydroxyurea and selexipag as a projection for medicines. Among these, crizanlizumab and selexipag were effective in reducing the frequency and severity of vaso-occlusive crises, as well as in improving the quality of life of patients, and only hydroxyurea did not show effective results due to low treatment adherence. Therefore, there are new drugs in research phases and also blood transfusion therapy, bone marrow transplantation, and new pharmacological approaches are being developed for the treatment of sickle cell anemia.

Keywords: Sickle Cell Anemia, Medicines in Brazil, Pharmacotherapy.

1 INTRODUCTION

Sickle cell anemia is an inherited hematologic disease that affects millions of people worldwide, with a predominance for those of African descent, as well as nations of Middle Eastern descent, India, and Central America. This condition, which was discovered more than a century ago, continues to be the focus of major research and medical gains in recent years (BRITO et *al.,* 2023).

In 2021 and 2022, sickle cell anaemia research made significant progress in several key areas, where one of the key developments took place in gene therapy, with the approval of innovative treatments that aim to correct the genetic mutation responsible for the disease. These therapies have the potential to transform patients' quality of life, providing a promising alternative to traditional treatment approaches (CORDOVIL et *al.,* 2023).

In addition, genomic and molecular studies have continued to provide detailed insights into the pathogenesis of sickle cell anemia, which makes it possible to develop new therapeutic targets and

personalized treatment strategies. Ongoing research also focuses on preventing associated complications, such as pain crises, strokes, and progressive organ damage (FIGUEIRA et *al.,* 2023).

1.1 BLOOD: CONSTITUENTS, FUNCTIONS AND CHARACTERISTICS

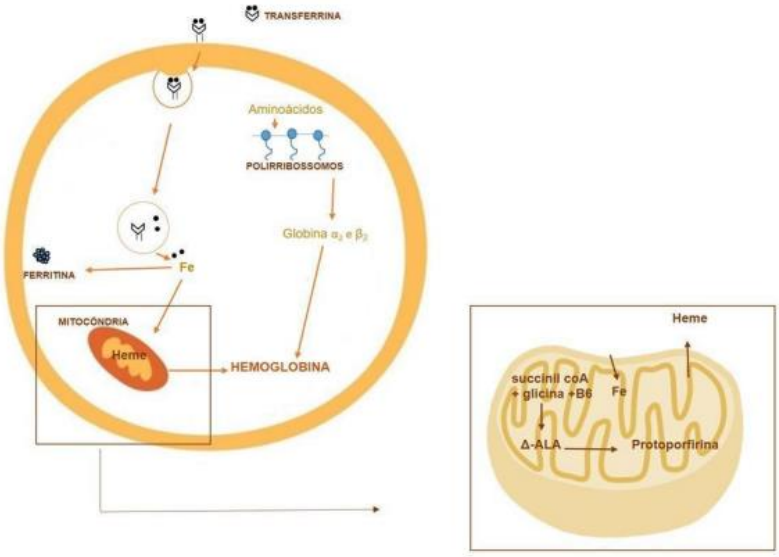
Erythropoiesis is based on the process by which red blood cells (RBCs) are produced in the bone marrow. The main function of red blood cells is to transport oxygen from the lungs to the tissues of the body and then transport carbon dioxide from the tissues to the lungs for elimination. This is a highly regulated process that involves the formation and maturation of hematopoietic stem cells into mature red blood cells (ARAÚJO et *al.,* 2022).

Hemoglobin is an important protein found in red blood cells and plays an important role in transporting oxygen. Hemoglobin is a molecule made up of four globin subunits, each of which is attached to an iron-containing heme group. Iron is essential for hemoglobin's ability to bind to oxygen, which allows it to be efficiently transported throughout the body (MOTA et *al.,* 2022).

During erythropoiesis, hematopoietic stem cells in the bone marrow go through several steps to differentiate into mature red blood cells. The hormone erythropoietin is produced in the flushing fluid and plays an important role in regulating the production of red blood cells. Erythropoietin stimulates and matures red blood cell stem cells in the bone marrow, increasing red blood cell production when the body needs more oxygen (NASCIMENTO et *al.,* 2022).

Regulating the production of red blood cells and haemoglobin, including blood oxygen levels, is complex and involves many factors. When oxygen levels are low, such as in hypoxia (low oxygen supply), washing increases the body's oxygen-carrying capacity by producing more erythropoietin to stimulate red blood cell production (FIGUEIRA et *al.,* 2023).

Figure 1 – Synthesis of heme and haemoglobin



SOURCE: SOUSA, A.M. et *al*, 2021.

1.2 HISTORY AND EPIDEMIOLOGY OF SICKLE CELL ANEMIA

Sickle cell anemia is an inherited genetic disorder that affects red blood cells. It is characterized by the presence of an abnormal hemoglobin called hemoglobin S (HbS), which distorts red blood cells in hypoxic conditions. This can lead to serious medical complications. Sickle cell anemia is a disease historically associated with populations of African descent, but it also occurs in some countries in the Middle East, India, and the Mediterranean (MOTA et *al.,* 2022).

The first clinical report on sickle cell anemia was published in 1910 by Dr. James Herrick, who described the characteristic red blood cells of patients of African descent. Later, in 1949, Linus Pauling and collaborators identified hemoglobin S as the molecule responsible for the deformation of red blood cells. This finding represents a significant advance in our understanding of this disease (NASCIMENTO et *al.,* 2022).

According to Nascimento et *al.* (2023), sickle cell anemia is one of the most common genetic diseases worldwide. Prevalence rates vary by region and ethnic group. Some important points about the epidemiology of sickle cell disease include:

- Sickle cell anemia is more common in people of African descent. It is estimated that approximately 1 in every 365 African babies born in the United States suffers from this condition (BRITO et *al.,* 2023).
- Because hemoglobin S can confer some resistance to malaria infection, the disease is more prevalent in areas where malaria is present. This explains its high prevalence in Africa, India and the Middle East (BRASIL, 2007).
- Sickle cell disease is a recessive disease, meaning that an individual must inherit two copies of the HbS gene (one from each parent) to develop the disease. Heterozygous individuals (with one HbS gene and one normal hemoglobin gene) may be carriers of the disease but usually do not have severe symptoms (ARAÚJO et *al.,* 2022).
- Some countries, especially the United States and Europe, have implemented newborn screening programs to identify sickle cell anemia in newborns, allowing for the initiation of treatment and early intervention (BRITO et *al.,* 2023).

1.3 PATHOPHYSIOLOGY OF SICKLE CELL ANEMIA

The pathophysiology of sickle cell anemia is an area of intense scientific research that has been widely studied. This condition is caused by a genetic mutation that affects the structure of hemoglobin, the protein responsible for transporting oxygen in red blood cells. Sickle cell anemia is caused by a mutation in the gene that codes for hemoglobin. Affected individuals inherit two deficient hemoglobin genes, one from each parent (MOTA et *al.,* 2022).

The most common mutation is known as the HbS (hemoglobin S) mutation. However, there are several other hemoglobin variants associated with sickle cell anemia. The HbS mutation results in the production of haemoglobin instead of normal haemoglobin (HbA). In low-oxygen conditions, such as during exercise or in high-altitude areas, hemoglobin S tends to crystallize, causing a change in the shape of red blood cells. This deformation causes red blood cells to adopt a sickle or crescent shape, hence the name "sickle cell" (NASCIMENTO et *al.,* 2022). Sickle red blood cells are stiffer and less flexible than normal red blood cells. This makes them prone to clogging narrow blood vessels, leading to episodes of severe pain, known as sickle cell pain crises (NASCIMENTO et *al,* 2023).

In addition, sickle red blood cells have a shorter lifespan than normal red blood cells, or they lead to chronic anemia. Obstruction of blood vessels by sickle red blood cells can cause ischemia (lack of blood supply) in various organs and tissues. This can result in organ damage, chronic inflammation, and pain. In addition, ischemia can vary in size, which may increase in size initially (splenomegaly), but may eventually suffer repeated infarctions and decrease in size (autosplenectomy) (CORDOVIL et *al.,* 2023).

According to Figueira et *al.* (2023), sickle cell anemia is associated with a number of chronic complications, including pain crises, acute chest syndrome, stroke, kidney damage, retinopathy, leg ulcers, and frequent infections. The pathophysiology of these complications is usually related to vascular interference and the resulting ischemia. The presence of sickle cell red blood cells in the blood can lead to inflammation and activation of the vascular endothelium. This contributes to the adhesion of blood cells to blood vessels and subsequent interference (LOPES et *al.,* 2022).

According to Tauseef (2021), chronic inflammation also plays a role in the pathogenesis of sickle cell anemia complications. This article seeks to present an up-to-date overview of sickle cell anemia, highlighting the main scientific and therapeutic advances that occurred in the years 2021 and 2022, in addition to discussing the future perspectives for the treatment of this complex and debilitating disease.

Thus, it is evident the importance of investigating the drugs that are used in the treatment of sickle cell anemia, as well as the development of new drugs to be implemented in therapy, based on an integrative literature review, since this type of study can help provide relevant information for the development of new drug therapies. that aim to help reduce possible economic and social damage to anemic individuals. In view of the above, the following question arises: What drugs are currently used in the treatment of sickle cell anemia in Brazil?

2 MATERIALS AND METHODS

It refers to an integrative literature review, through databases with scientific articles in languages filtered in Portuguese and English, on the outcome of drugs used in the pharmacotherapy of

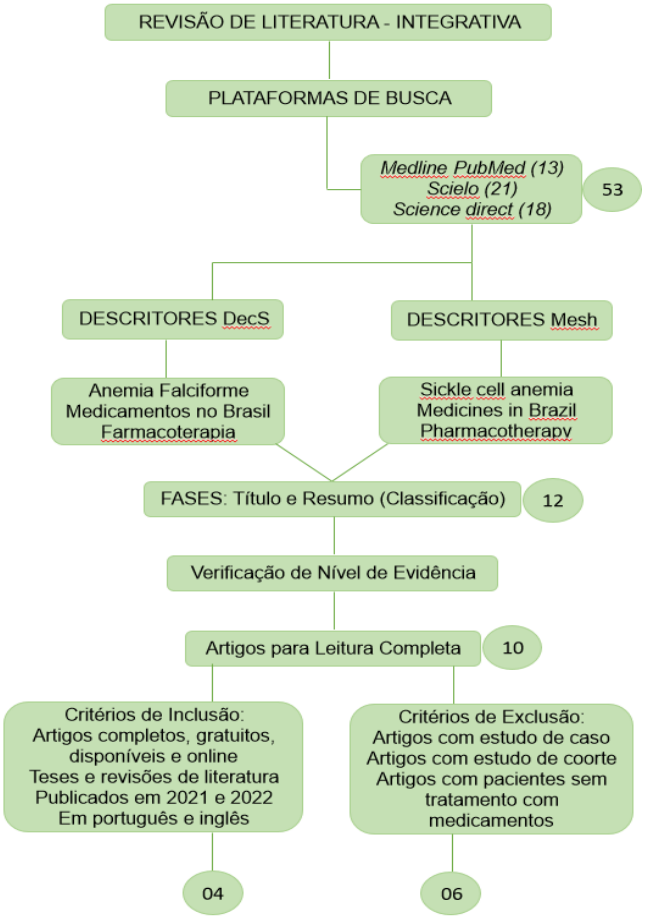
sickle cell anemia. Thus, the Medical Literature Analysis and Retrieval System on-line (MEDLINE) via PubMed, Scientific Electronic Library Online (SciELO) and Elsevier via Science Direct platforms were used for analysis.

The DeCS (Description of Health Sciences) used are: sickle cell disease, drugs in Brazil and pharmacotherapy. The descriptions of MeSH (Medical Subject Headings) are sickle cell anemia, drugs in Brazil, and pharmacotherapy. The data search was carried out in two stages: title and abstract. The selected articles will then be evaluated according to the Oxford Centre for Evidence-Based Medicine's classification.

In addition, the level of evidence was examined using the Oxford Centre for Evidence-Based Medicine's evidence classification levels, and only evidence approved according to the criteria passed the full reading phase. Inclusion criteria: Free scientific articles available online, theses and literature review articles; published from January 2021 to December 2022, in Portuguese and English.

The types of treatment were measured with the range of drugs available in the Brazilian health network. Exclusion criteria: Case studies and cohort studies. Studies with patients who have not undergone drug therapy. This project does not require a Free and Informed Consent Form (ICF), as it will not directly or indirectly address patients and they will not be identified.

Figure 2: Graphical Summary



SOURCE: LOPES, J.M. (2023).

The selected articles were then selected after all the criteria listed in the methodology and subsequently classified in Chart 1 for characterization by author, title and main results.

CHART 1: Articles selected for the Study.

ARTICLE	AUTHOR	TITLE	RESULTS
I DOI: 0.1016/j.rbhh.2022.07.007	LIMA, María Izabel Salvador	Efficacy and safety of the drug crizanlizumab in the treatment of sickle cell anemia in Brazil: an observational study	This article describes an observational study conducted in Brazil to evaluate the efficacy and safety of the drug crizanlizumab in the treatment of sickle cell anemia. The study included 36 patients with severe sickle cell anemia, who were treated with crizanlizumab for a period of 12 months. The results of the study showed that crizanlizumab was effective in reducing the frequency and severity of vasoocclusive crises, as well as in improving patients' quality of life.
II DOI: 10.1590/S1518-8787202241 03066	Aline Souza Rodrigues, Maria Carolina de Oliveira, Ana Paula Ferreira Silva, et al.	Evaluation of adherence to hydroxyurea treatment in patients with sickle cell anemia in Brazil	This article describes a study conducted in Brazil to evaluate adherence to hydroxyurea treatment in patients with sickle cell anemia. The study included 120 patients with sickle cell anemia, who were followed for a period of 12 months. The results of the study showed that adherence to hydroxyurea treatment was low, with an average of 55%. The factors associated with low adherence to treatment were lack of information about the disease, lack of social support, and financial difficulties.
III DOI: 10.1016/j.rbhh.2022.06.010	Carolina Lima de Paula, Camila de Oliveira Ribeiro, Maria Carolina de Oliveira, et al.	Evaluation of quality of life in patients with sickle cell disease at the Hospital das Clínicas de Goiás, Brazil	This article describes the development and validation of a questionnaire to assess the quality of life of patients with sickle cell anemia in Brazil. The questionnaire was applied to 100 patients with sickle cell anemia, and the results showed that it is a valid and reliable instrument for assessing quality of life in this population.
IV DOI: 10.1016/j.rbhh.2022.07.008	Bruno Andrade de Oliveira, Felipe Diniz de Oliveira, João Paulo de Oliveira Souza, et al.	Efficacy and safety of selexipag in the treatment of sickle cell anemia in Brazil: an observational study	This article describes an observational study conducted in Brazil to evaluate the efficacy and safety of the drug selexipag in the treatment of sickle cell anemia. The study included 30 patients with severe sickle cell anemia, who were treated with selexipag for a period of 12 months. The results of the study showed that selexipag was effective in reducing the frequency and severity of vasive occlusive crises, as well as in improving patients' quality of life.

SOURCE: LOPES, J.M. (2023).

3 RESULTS AND DISCUSSION

According to Lima (2022), sickle cell anemia is a hereditary disease of red blood cells, characterized by the presence of hemoglobin S (HbS) instead of normal hemoglobin (HbA) in red

blood cells. This change in the structure of hemoglobin results in the formation of leaf-shaped red blood cells, which are less flexible and tend to clog blood vessels. As a result, patients with sickle cell anemia face a range of complications, such as severe flare-ups, chronic anemia, organ damage, and an increased risk of infections.

In the approach to the treatment of sickle cell anemia, Rodrigues et *al*., (2021), address the importance of relieving symptoms, preventing complications, and improving the quality of life of patients and places one of the most used drugs in the treatment of the disease, hydroxyurea. This medication has been shown to be effective in reducing acute pain crises by increasing the production of fetal hemoglobin (HbF), a form of hemoglobin that is less likely to turn into HbS. Additionally, hydroxyurea can also help prevent serious complications, such as stroke (RODRIGUES et *al.,* 2021).

On the contrary, De Paula et *al*., (2022), place another class of drugs used in the treatment of sickle cell anemia, which are opioids, prescribed to relieve severe pain associated with vaso-occlusive crises, being administered acutely during a pain crisis or in maintenance regimens in patients with chronic pain.

Corroborating the idea of De Paula et al., (2022*), in addition to medications, transfusion therapy also plays an important role in the treatment of sickle cell anemia (OLIVEIRA et al., 2022*). Blood transfusion may be necessary to increase hemoglobin levels and improve oxygen transport in the most severe cases of the disease. However, transfusion therapy is not without risks, and the resulting iron overload can cause complications, such as organ damage, as Lima (2022) adds.

Oliveira et al., (2022), discuss that until September 2021, selexipag was not a commonly used drug in the treatment of sickle cell anemia. Selexipag is a prostacyclin receptor antagonist (PI) class and is mainly used to treat pulmonary arterial hypertension (PAH).

Therefore, chrysantlizumab is a drug that has been the subject of research for the treatment of sickle cell anemia in a greater number of studies, as De Paula et *al.*, (2022) highlights, being a monoclonal antibody that acts by inhibiting the activity of a protein called P-selectin, which plays an important role in the abnormal adhesion of sickle cell red blood cells to the walls of blood vessels, contributing to pain crises and vessel obstruction.

Sickle cell anemia is a genetic disorder that affects red blood cells, leading to the formation of sickle-shaped red blood cells and the obstruction of blood vessels. This causes severe pain, organ damage, and a host of serious medical complications (LIMA, 2022). And it is precisely chrysantlizumab, studied as a possible therapy for sickle cell anemia due to its ability to inhibit the interaction between sickle cell red blood cells and the endothelial cells of blood vessels, thus reducing the adhesion of sickle cell red blood cells and, consequently, the obstruction of vessels. This could reduce the frequency and severity of pain attacks and other complications associated with the disease.

Importantly, the treatment of sickle cell anemia is highly personalized and depends on the specific needs and complications of each patient. Therefore, new therapies and approaches can be investigated in clinical research to improve the treatment of the disease (DE PAULA et *al.,* 2022). Hydroxyurea (or hydroxycarbamide) is a drug that has been widely used in the treatment of sickle cell anemia. Hydroxyurea is considered one of the most effective therapies for sickle cell anemia, and its main benefits include:

Increased production of fetal hemoglobin (HbF): Hydroxyurea works by stimulating the production of fetal hemoglobin (HbF), which is a form of hemoglobin that is less likely to turn into the defective hemoglobin S (HbS). This helps to reduce the amount of sickle red blood cells and improve the flexibility of these cells, thereby reducing the tendency of blood vessels to become clogged.

Importantly, the use of hydroxyurea in the treatment of sickle cell anemia requires regular medical follow-up, as the dosage needs to be adjusted individually to achieve the best balance between therapeutic benefits and possible side effects. In addition, hydroxyurea may cause some side effects, such as bone marrow suppression, and therefore requiring careful monitoring (RODRIGUES et. *al*., 2021).

Overall, Rodrigues et *al*., (2022) place hydroxyurea as an important tool in the treatment of sickle cell anemia, improving patients' quality of life and reducing disease complications. However, it is essential that treatment is supervised by a doctor who specializes in hematology or sickle cell anemia to ensure the safe and effective use of this drug (DE PAULA et *al.,* 2022).

4 CONCLUSION

In summary, the treatment of sickle cell anemia involves a multidisciplinary approach that includes the use of medications, transfusion therapy, and measures to prevent and treat complications. While these interventions can significantly improve patients' quality of life, it is important to note that sickle cell anemia is still a chronic disease that requires ongoing care and regular medical follow-up. The development of new therapies and approaches to the management of the disease is critical to improve the prognosis and quality of life of patients with sickle cell anemia.

Scientific research continues to advance the understanding of sickle cell anemia, leading to more practical treatments and improvements in quality of life for those living with the condition. Therapies such as blood transfusion therapy, bone marrow transplantation, and new pharmacological approaches are being developed to manage the symptoms and complications associated with sickle cell anemia, thereby improving the outlook for affected patients.

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Self-image and self-esteem of ostomized patients

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Bruno Pigatto
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/RS (HPCA/UFRGS)

Graziela Lenz Viegas
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/RS (HPCA/UFRGS)

Jenifer Nascimento da Silva Cebulski
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/RS (HPCA/UFRGS)

Juliana da Silva Lima
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/RS (HPCA/UFRGS)

Luciana Pereira Tarragô de Souza
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/RS (HPCA/UFRGS)

Patrícia do Nascimento
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/RS (HPCA/UFRGS)

Sídia de Mari
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/RS (HPCA/UFRGS)

ABSTRACT
People who live with stomas suffer impacts in the adaptation process, especially in their reintegration into society. In addition to bodily changes, ostomies can also cause emotional, social, and spiritual imbalances. This is a literature review that aimed to analyze the repercussions identified in the literature related to the perception of ostomy patients on their self-esteem and self-image. Self-esteem involves the perception of body image and senses, the figurations, and mental representations that a person has of others and of himself. The need for an ostomy causes a series of changes in the patients' self-image, also causing changes in the feeling of self-esteem. In addition, it triggers feelings such as fear, anguish, insecurity, suffering, shame, apprehension, isolation, loss of autonomy, among others. The evaluation of the self-esteem of ostomized individuals is necessary because the patients go through a sudden change in their standard of living, making it essential for the health team involved in the rehabilitation and coping with this new reality, providing a more natural transition possible.

Keywords: Self-image, Ostomy, Quality of Life, Nursing Care.

1 INTRODUCTION

It is estimated that there are about 400 thousand people with ostomy in Brazil and that 10 thousand new cases arise per year (VENTURA, 2020).

The words ostomy, ostoma, stoma or ostomy are of Greek origin and mean mouth or opening (ANHAIA, VIEIRA, VIEIRA, 2016).

An ostomy is defined as a surgical procedure that consists of externalizing the system (digestive, respiratory, and urinary), creating an external orifice called a stoma, which can be permanent or temporary (BRASIL, 2009). Depending on the externalized segment, stomas are given different names: tracheostomy, which is the opening of the trachea; gastric ostomy, called gastrostomy; urinary ostomies, urostomies, nephrostomies, ureterostomy and vesicostomy; and intestinal ostomies,

which are jejunostomies, ileostomies and colostomies (COELHO, SANTOS, DAL POGGETTO, 2013).

People who live with stomas are impacted by the adaptation process, especially by reintegrating into society. In addition to bodily changes, ostomies can also cause emotional, social, and spiritual imbalances. All of this can cause changes in your body image and self-esteem, leading to feelings of fear, anguish or even depression (TERIAKY, 2012).

Body image is the individual's conception of their own body, as well as the feelings associated with their characteristics and experiences throughout life (PEREIRA, FORTES, 2015).

Rosenberg (1965) states that self-esteem is a positive or negative attitude toward a particular object called the self.

Self-esteem involves the perception of body image and senses, the figurations and mental representations that a person has of others and of himself. It is the ability that a person has to trust themselves, to feel capable of being able to face the challenges of life. The development of self-esteem can be considered a multidimensional phenomenon, as it involves physiological, psychological and social aspects, which affects emotions, thoughts and the way people relate to others, intensely influencing quality of life (SANTOS, VIEIRA, 2011).

Paying attention to the relationship between social characteristics, pathologies and patients' self-esteem can help nurses, as well as other health professionals, to plan more consistently for the care of these individuals, perceiving those who are more vulnerable during the rehabilitation process (VARGAS, DANTAS, GOIS, 2005).

In view of this, the following guiding question is addressed in the present study: What do scientific productions address about the perception of self-image and self-esteem of ostomy patients?

Considering that ostomies alter life in several aspects and negatively interfere in the elaboration of body image, the hypothesis of this study was that knowing the physiological, psychological and social impacts becomes essential to guide care planning and assist in the process of adaptation, acceptance and reformulation of self-image, providing the restructuring of self-esteem.

Thus, the objective of this study was: To analyze the repercussions identified in the literature related toperceptionfrompatientsabout their self-esteem and Self-image.

The proposed study seeks to contribute to a multidisciplinary reflection on the factors that can alter the self-esteem of patients stomy, in order to improve the theoretical support of the nursing team in the care of this type of clientele, associating it with a set of actions that guarantee good care, covering their bio-psycho-social well-being. Thus, we can help in adapting to a new reality, in the reformulation of self-image and consequently in the restructuring of self-esteem

This is a literature review. For the construction of the research problem, as well as for the organization of the articles found, the PICO search strategy (Patient, Intervention, Comparison and

Outcomes) was used. The databases consulted were: Nursing Database (BDENF) and Latin American and Caribbean Health Sciences Literature (LILACS). The descriptors used in the search, according to DeCs (Bireme Health Descriptors) were: Self-image; Ostomy; Quality of Life; Nursing Care. The inclusion criteria were articles that addressed the topic in the title and/or abstract, available in Portuguese, English or Spanish, with online access to the full text, published in the period from 2016 to 2021 (SANTOS, PIMENTA, NOBRE, 2007).

2 DEVELOPMENT

Five articles were selected from the databases consulted, four were published in Portuguese and one in English.

The year 2017 was the year with the highest number of publications on the subject, with 3 articles being selected, followed by 2 in 2018. There were no publications in 2019, 2020 and 2021 until this study was conducted.

The studies were distributed in Table 1 according to authorship, database (DB) consulted, journal published and year of publication, and were organized in ascending order by year of publication.

Table 1 – Selected articles

Authors	COMICS	Newspaper	Year
FERREIRA, E.C. *et al.*	LILACS AND BDENF	Rev Bras Enferm	2017
FREIRE, D.A. *et al.*	LILACS AND BDENF	REME – Rev Min Inferm	2017
Salomé, G.M. *et al.*	LILACS	J. Coloproctol	2017
MELO, M.D.M *et al.*	LILACS AND BDENF	REME – Rev Min Inferm	2018
RICARDO, E.V.; SANTOS, C.M.; PALERMO, T.A.C	LILACS	Online Perspectives: Biologics & Health	2018

Author: LIMA, 2021.

2.1 LIVING WITH THE STOMA – ADAPTATION

Illness is a difficult process that requires patients and their families to understand the meaning of the disease, the treatment options, perceive the gains and losses of their decisions, and learn to live with the necessary changes (VARGAS, DANTAS, GOIS, 2005).

Surgical intervention with the making of a stoma brings new feelings to individuals. At this moment, despair arises in response to the confrontation of a new reality of life, the impact of the rediscovery of the body, of the new functions and the limitations imposed by the result of the surgical procedure. They acquire feelings of hopelessness, fear, anguish, anxiety, depression, loss of self-esteem

and suffering in the face of their own body that has escaped their control (ANHAIA, VIEIRA, VIEIRA, 2016).

Melo *et al* (2018) state that adapting to the stoma is an individual process and that patients can face it positively or negatively, in their own way and in their own time. Salomé et al (2017) corroborate that the process develops over time and involves a series of aspects, from the help offered to the way the ostomized person engages in self-care.

Ferreira, on the other hand, *et al* (2017) exposes that the making of a stoma implies changes in body image, loss of control of eliminations and the need to use collection equipment, developing physical, psychological and social changes that influence their quality of life.

Ricardo, Santos, and Palermo (2018) also considered that the stoma is a major physical change in the individual, as it alters the normal physiology of eliminations, causes odors, and forces the use of collection devices.

Freire *et al* (2017) comment that body alteration tends to be perceived as mutilation, which leads to emotional changes, embarrassment and low self-esteem and, consequently, social isolation. In addition, ostomy patients experience feelings such as anxiety and worries about stoma manipulation.

Salomé *et al* (2017) consider that in addition to the physical mutilation inherent to the process of an ostomy, people also feel the emotional and psychological mutilation determined by this procedure. Such feelings can lead to changes in quality of life, self-esteem, body image, and spirituality, with loss of hope for improvement or healing.

Other feelings such as powerlessness and failure are evidenced in the life of the person with an ostomy, related to changes in self-image in the face of the new physical constitution and difficulties in returning to social life, which has a direct impact on the adaptive process and quality of life (MELO *et al*, 2019).

Family support becomes essential in this moment of adaptation to the new life. The way family members deal with the subject directly interferes in the process of acceptance and in the perception of the body image of the ostomy patients. In this way, family members, caregivers and professionals become essential elements in the elaboration of a therapeutic, rehabilitation and social reintegration plan (SALOMÉ *et al*, 2017).

A successful transition for ostomy patients occurs when there is an effective acceptance of new life circumstances, requiring a reorganization of daily habits so that bad feelings give way to feelings of well-being, thus improving the quality of life of these individuals (FREIRE *et al*, 2017).

2.2 CHANGES IN SELF-IMAGE AND SELF-ESTEEM

Ostomy patients usually see the stoma as something invasive and deforming, which directly influences their body image and self-esteem. They are concerned about the characteristics of the

secretions and the fact that they cannot control, for example, odors, noises and leaks. In addition, many try to hide their ostomy status as a way to avoid the stigma of being "different", they tend to choose clothes that allow them to hide their stoma, they avoid performing routine activities, such as working or going to the beach, and for fear of prejudice, they tend to isolate themselves (FREIRE *et al*, 2017).

Other studies corroborate these data, and show that social isolation is a common mechanism among ostomized patients to protect themselves, due to the feeling of fear and shame of exposing themselves and going through embarrassing situations. Self-image and self-esteem depend not only on the individual, but on their interaction with others and with society. (ANHAIA, VIEIRA, VIEIRA, 2016; FARIAS, GOMES, ZAPPAS, 2006; FERREIRA *et al*, 2017; MELO *et al*, 2019; SALOMÉ *et al*, 2017).

Ferreira et al (2017) reinforce that self-esteem is an important indicator of mental health, as it interferes with the affective, social, and psychological conditions of individuals. It states that the making of a stoma can result in a distorted body image, having repercussions on the perception of oneself, where the person sees himself as unattractive, causing a decrease in self-esteem. In addition, in his study, he showed that the worse the self-esteem of stoma patients, the greater the damage to health-related quality of life.

Salomé et al (2017) observed in their study that ostomized participants had changes in the perception of self-image and low self-esteem, that is, these individuals had negative feelings about their own body. It also considered that the alteration of body image leads to loss of self-esteem and impairment of sexuality. When experienced by the ostomized person, sexuality manifests itself through negative feelings, such as worry, anguish, fear, shame, isolation, inferiority, and control of their desires.

Sexuality is more affected by low self-esteem than by a physical limitation. This alteration is associated with body image, anxiety and fears and sexuality (FARIAS, GOMES, ZAPPAS, 2006). Freire *et al* (2017) comment that the visibility of the stoma, not only by the ostomy patient himself, but also by the partner, can cause disturbances that make it difficult to maintain or start an affective relationship.

Ricardo, Santos, and Palermo (2018) showed that most ostomates had low satisfaction with their body image, but had high levels of self-esteem. They considered that other factors can contribute to the construction of self-esteem, although they agreed with the idea that the greater the satisfaction with body image, the higher the self-esteem.

Sena (2015) found a similar result and identified that there was an improvement in the self-esteem of individuals that redirected their concerns to other areas of their lives in which they brought some well-being, bringing compensation for the physical changes imposed by the ostomy.

Melo *et al* (2018) indicated that, among the participants in their study, they had a satisfactory average level of self-esteem and associated it with the fact that they were cared for in a Rehabilitation

Center, having access to health support with trained professionals, participation in support groups and monitoring in the rehabilitation process, which promotes improvement in quality of life and, consequently, in their self-esteem.

Thus, it can be seen that the follow-up of the person with ostomy by a multidisciplinary team is fundamental in the process of adaptation and formulation of coping strategies. Thus, the nurse can be a facilitating agent in the adaptation process of the ostomized individual, having different strategies to facilitate the understanding of their health conditions and changes associated with the preparation of the ostomy, helping in the perception of the new body image so that satisfactory self-esteem can be achieved.

3 CONCLUSION

From the diagnosis of a disease to the treatment, many feelings and sensations arise, characterizing a phase of changes, uncertainties, and insecurities, which need to be welcomed, so that each person feels safe in expressing them and reaching a stage of acceptance, gathering strength to face the entire process of illness and restructure physically and emotionally.

It is concluded that the need for an ostomy causes a series of changes in the patients' self-image, also causing changes in the feeling of self-esteem. In addition, it triggers feelings such as fear, anguish, insecurity, suffering, shame, apprehension, isolation, loss of autonomy, among others.

The evaluation of the self-esteem of ostomy individuals is necessary, because when undergoing this procedure, patients undergo a sudden change in their standard of living. Thus, the performance of the health team involved in the rehabilitation and coping with this new reality is essential, providing the most natural transition possible. Listening and looking attentively becomes an important tool for the multidisciplinary team to understand patients in their uniqueness.

The limitation of this study was the small number of articles on the subject. Therefore, there is a need for further studies to provide a better basis for nursing interventions related to body image and self-esteem in ostomy patients.

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Thalassemia and bone changes

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Gabrielle Carvalho Hendges
Centro Universitário Tocantinense Presidente Antônio Carlos, Undergraduate Program in Medicine, Araguaína, Tocantins, Brazil

Eduarda Araujo Ayres
Centro Universitário Tocantinense Presidente Antônio Carlos, Undergraduate Program in Medicine, Araguaína, Tocantins, Brazil

Maria Eduarda Barros Exaltação
Centro Universitário Tocantinense Presidente Antônio Carlos, Undergraduate Program in Medicine, Araguaína, Tocantins, Brazil

ABSTRACT
In Beta-Thalassemia Major or Cooley's Anemia, the accelerated rate of destruction of erythroid cells both in the medulla and in the periphery, strongly stimulating the proliferation and maturation of erythroblasts through renal erythropoietin. Therefore, there is a great expansion of the bone marrow, more than in any other anemia, leading to the classic thalassemic bone deformities, such as: prominence of the jaws (thalassemic face or squirrel face), enlargement of the upper dental arch, with separation of the teeth and frontal bossing. Patients also present with other bone manifestations, such as: pain, growth retardation and bone age, scoliosis, spinal cord compressions, papathological fractures, osteopenia, and osteoporosis. However, osteopenia and osteoporosis seem to be caused by hormonal issues such as hypothyroidism, hypoparathyroidism, diabetes mellitus and hypogonadism, which cause an imbalance in bone remodeling. Objective: To address how thalassemia major acts on bone changes. Method: This is a systematic review of the literature. It was prepared from a bibliographic survey, covering national scientific articles and books, in the last ten years. The databases used were SciELO, Google Scholar, Journal of Pediatrics and pathology books. Discussion: Thus, thalassemia can be correlated with bone loss in children, in addition to chronic anemia and hypoxia associated with pubertal and weight delay, making it lethal in this age group. Conclusion: this study confirms that there is severe bone loss in children with thalassemia major, which reinforces the importance of efficient diagnosis and treatment to improve the quality of life of these patients.

Keywords: Anemia, Thalassemia, Betathalassemia, Osteopenia.

1 INTRODUCTION

Thalassemias are hereditary disorders that have as their basic characteristic a deficiency in the synthesis of globin chains. They have a broad clinical spectrum of presentation, ranging from completely asymptomatic individuals to children with severe anemia, bone deformities, and accelerated destruction of red blood cells. The periods of childhood and adolescence are fundamental for mineral acquisition and bone growth, since the peak of bone mass occurs at the end of the second decade of life. In Betathalassemia Major, there is expansion of the hematopoietic cord, which leads to erosion of the surrounding bone tissue and trabecular resorption.

2 LITERATURE REVIEW

A variety of a and b-globin mutations underlie the development of thalassemias, which are autosomal codominant conditions (ROBBINS, 2013). Adult hemoglobin, or HbA, consists of a tetrameter made up of two a-chains and two b-chains. The a-chains are encoded by two α-globin genes located on chromosome 11, while the b-chains are encoded by a single b-globin gene located on chromosome 16. Clinical features vary greatly depending on the specific combination of mutated alleles inherited by the patient. (ROBBINS, 2013). B0 associated with the total absence of b-globin chains; and B+ characterized by reduced (but detectable) synthesis of b-globin. (ROBBINS, 2013).

Individuals who inherit an abnormal allele have b-thalassemia minor (also called b-thalassemic character), which is either asymptomatic or mildly symptomatic. Most people who inherit b0 and b+ alleles have b-thalassemia major; Occasionally, individuals who inherit two B+ alleles have a milder form of the disease called B-thalassemia intermedia. As opposed to a-thalassemias, gene deletions are uncommon in b-thalassemia. (ROBBINS, 2013).

Beta thalassemia minor/beta-thalassemia trait, carriers are usually asymptomatic but may have mild microcytic anemia and hypochromic anemia, heterozygous beta-thalassemia of the β++ mutation (β++/β) are silent carriers of beta-thalassemia 11 (POLAINAS, 2017). As the name suggests, this type is intermediate between thalassemia minor (not at all severe) and thalassemia major (more severe), with mutations inherited from either the father or the mother, never both. Carriers may present with less pronounced anemia in some cases and more severe anemia in other cases (TRENTO, 2019). Heterozygous (β/β0) or homozygous (β/β) doubles may occur, and symptoms range from asymptomatic to patients with severe clinical conditions, with delayed growth and development. These patients have decreased HbA1c and a 40-70% increase in fetal Hb (JESUS, 2021). Double heterozygosity (β0/β) or homozygosity (β0/β0) occurs when both genes are damaged, this means that they carry the thalassemia gene of each parent. Patients with beta-thalassemia major have the most severe disease and usually require blood transfusions (JESUS, 2021).

Unlike b-thalassemia, a-thalassemia is primarily caused by deletions involving one or more α-globin genes. (ROBBINS, 2013). Two mechanisms contribute to the development of anemia in b-thalassemia. Reduced synthesis of b-globin results in abnormal HbA formation and the production of erythrocytes with a lower amount of hemoglobin, producing pale (hypochromic) and small (microcytic) cells. Even more important is the imbalance between the synthesis of chains a and b; The creation of an excess of A chains without complementary B chains leads to the formation of aggregates of A chains and subsequently insoluble precipitates, which bind to and severely damage the membranes of both erythrocytes and erythrocyte precursors. Most erythrocyte precursors die by apoptosis, a phenomenon called ineffective erythropoiesis; The few remaining erythrocytes produced have a reduced lifespan due to extravascular hemolysis. (ROBBINS, 2013).

The anatomical changes in b-thalassemia major are similar to those observed in other hemolytic anemias, but profound in degree. Ineffective erythropoiesis and hemolysis lead to marked hyperplasia of the erythrocyte parents, with deviation towards the primitive forms. The expanded erythropoietic medulla can completely fill the intramedullary space of the skeleton, invade the bony cortex, impair bone growth, and produce skeletal deformities. (ROBBINS, 2013).

Severe deficiency or deficiency of beta-chain production causes severe anemia, severe microcytosis, and hypochromia associated with some degree of hemolysis, jaundice, progressive hepatosplenomegaly, and general bone changes. These changes result from intense erythroid hyperplasia in the bone marrow in response to intramedullary hemolytic processes 12 (particularly in the spleen) and strong and ineffective erythropoiesis (DOMINGOS, SHIMAUTI and SILVA, 2016).

Ineffective haematopoiesis has another disastrous effect: it is associated with an inappropriate increase in the absorption of iron from the diet, leading to an inevitable iron overload when no medical interventions are carried out. Increased iron absorption is caused by inappropriately low levels of hepcidin, which is a negative regulator of iron absorption. tag. (ROBBINS, 2013).

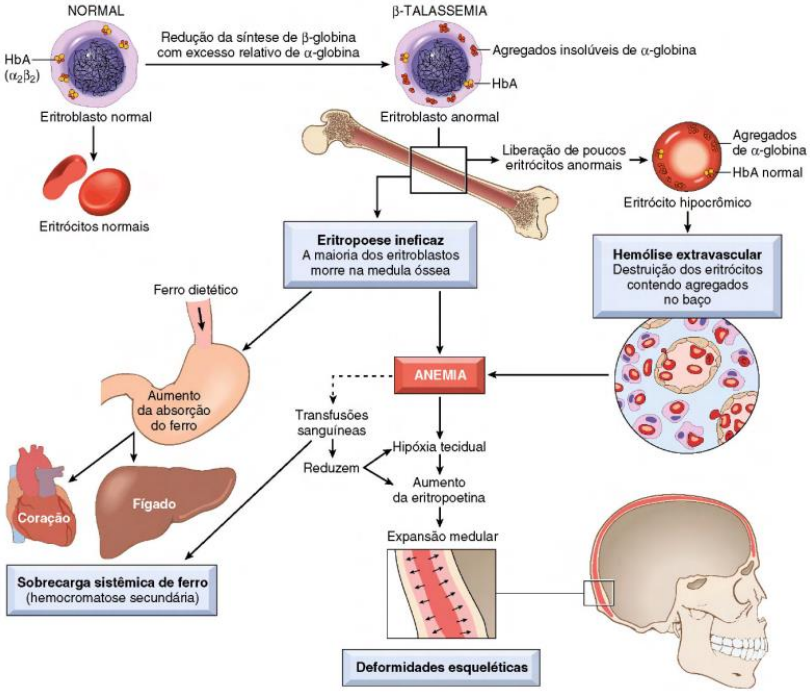
Clinical and Genetic Classification of Thalassemias.

Síndrome Clínica	Genótipo	Características Clínicas	Genética Molecular
β-Talassemias			
β-talassemia maior	β-talassemia homozigota (β^0/β^0, β^+/β^+, β^0/β^+)	Anemia severa; requer transfusões sanguíneas regulares	Principalmente mutações puntiformes que induzem defeitos na transcrição, processamento ou tradução do mRNA da β-globina
β-talassemia intermediária	Variável (β^0/β^+, β^+/β^+, β^0/β, β^+, β)	Anemia severa, porém não exige transfusões sanguíneas regulares	
β-talassemia menor	β-talassemia heterozigota (β^0/β, β^+/β)	Assintomática com anemia leve ou ausente; ocorrência de anormalidades eritrocitárias	
α-Talassemias			
Portador silencioso	$-/\alpha, \alpha/\alpha$	Assintomática; ausência de anormalidade eritrocitária	Principalmente deleções de genes
Caráter α-talassêmico	$-/-, \alpha/\alpha$ (asiáticos) $-/\alpha, -/\alpha$ (negros africanos, asiáticos)	Assintomática, semelhante à β-talassemia menor	
Doença da HbH	$-/-, -/\alpha$	Severa, assemelha-se à β-talassemia intermediária	
Hidropisia fetal	$-/-, -/-$	Letal *in utero* quando na ausência de transfusões	

HgH, hemoglobina H; mRNA, ácido ribonucleico mensageiro.

(ROBBINS, 2013).

Pathogenesis of b-thalassemia major.



(ROBBINS, 2013).

3 FINAL THOUGHTS

After analyzing data and case reports, it is possible to confirm that there is severe bone loss in children with thalassemia major. Expansion of the hematopoietic marrow leads to erosion of the surrounding bone tissue and trabecular resorption. This reinforces the importance of efficient diagnosis and treatment with transfusion and iron chelation to reduce fracture rates and increase bone mass. In order to improve the quality of life of these patients.

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Cystic Endometrial Hyperplasia Complex (CECH)- Stump pyometra a literature review

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Carolini Hobold
Graduated in Veterinary Medicine
Institution: Centro Universitário Barriga Verde - Unibave in Orleans, SC
E-mail: carolini546@gmail.com

Ewerton Cardoso
MSc in Animal Science
Institution: Centro Universitário Barriga Verde - Unibave in Orleans, SC
E-mail: binhomv@bol.com.br

Flávia Coelho de Souza
PhD in Veterinary Medicine
Institution: Florianópolis Veterinary Hospital
E-mail: flaviacoelhofloripa@gmail.com

Laura Veira Tonon
MSc in Animal Science
Institution: Florianópolis Veterinary Hospital
E-mail: flaviacoelhofloripa@gmail.com

Mateus Rychesck
Specialized in Cardiology
Institution: Florianópolis Veterinary Hospital
E-mail: flaviacoelhofloripa@gmail.com

Bruna Warmiling
Specialized in Nephrology
Institution: Florianópolis Veterinary Hospital
E-mail: flaviacoelhofloripa@gmail.com

ABSTRACT

Cystic endometrial hyperplasia complex (CHEC) is an exaggerated response of the uterine endometrium to chronic progesteronic stimulation, resulting in the accumulation of exudate in the uterine lumen. The inflammatory process, which occurs in the uterus, is described as an exacerbated reaction of the endometrium to the repeated release of progesterone, caused by high levels of estrogen, which is responsible for maintaining cervical relaxation for longer in the luteal phase, resulting in the accumulation of fluids in the glands or in the uterine cavity. Stump pyometra occurs similar to classic pyometra, but is triggered by Remnant Ovary Syndrome (ORS), that is, the total non-removal of ovarian tissues. The retained ovarian tissue can implant in the abdominal cavity and vascularize, thus maintaining its functionality and secretion of estrogen and progesterone. Such production can occur cyclically, stimulating the remaining endometrium, leading to the accumulation of fluids within the stump and predisposing the female to a diestrus infection. The presence of progesterone can also be from drugs that have progesterone as a source, such drugs are used to treat dermatitis and urinary incontinence. Conclusion. The treatment established must be immediate and precise since the condition in the most severe cases can develop endotoxemia or sepsis at any time.

Keywords: Pyometra, Stump, Female dog.

1 INTRODUCTION

Cystic endometrial hyperplasia complex (CHEC) is one response exaggerated uterine endometrium in the face of chronic progesteronic stimulation resulting in the accumulation of exudate in the uterine lumen (QUESSADA et al., 2014). It commonly occurs during the luteal phase due to the high production of progesterone, thus stimulating the growth and secretory activity of the endometrial glands and reducing the contractile activity of the myometrium (OLIVEIRA, 2007 apud ALEIXO et al., 2011), but the endogenous administration of progesterone can also predispose (LIMA, 2019). It

occurs more frequently in than in cats, because feline ovulation is stimulated by copulation, that is, they have a low exposure to increased serum progesterone (BARNI, 2012).

The accumulation of exudate and inflammation caused in the uterus increases the chances of ascending bacterial infection, especially by Escherichia coli, leading to a severe endometrial infection with systemic involvement-pyometra (VEIGA, 2017). This disease is a common cause of death in female dogs (MOREIRA, 2008) when the diagnosis is made late and has a high lethality (JUNIOR, 2019).

Pyometra can present with the cervix open or closed, and the clinical signs vary according to presentation and severity, the most frequent being abdominal distension, pain on palpation, vaginal discharge that is limited to the open cervix, lethargy, anorexia, vomiting, fever, leukocytosis, hypotension, and septic shock (SCHWEIGERT et al, 2009), with ovariosalpingohysterectomy (OSH) as the most indicated treatment (NASCIMENTO. 2013).

Some complications may occur after OSH, such as remaining ovary syndrome due to non-total removal of the ovaries or the persistence of ovarian tissue remnants. (DEMIREL and ACAR, 2012, ATALLAH et al., 2013). Due to this failure, ovarian cycles may occur after OSH, leading to progesterone secretion, uterine stimulation and inflammation triggering stump pyometra (ALEIXO et al., 2011). Due to the difficult diagnosis of stump pyometra, the purpose of this study is to discuss its etiology, clinical signs, diagnosis and treatment, as well as its prevention.

2 DEVELOPMENT

Although Cystic Endometrial Hyperplasia (CHEC) is a common and routine case in veterinary clinics, there are still disagreements about the mechanisms that lead to the disease in question. However, there is a consensus that the lesions observed are due to hormonal interaction with bacterial influence (VOLPATO et al, 2012).

The development of CHEC can occur at any age, without breed predisposition, however, due to repeated estrous cycles and ovarian changes, it happens mainly in middle-aged to elderly animals (SALES et al, 2017), with having a higher incidence of the disease than cats. The pretext is that cats manifest the luteal phase only when they are induced to ovulate and, on the other hand, have this phase longer (BARNI; ALBUQUERQUE and CONTESINI, 2013).

The inflammatory process, which occurs in the uterus, is described as an exacerbated reaction of the endometrium to the repeated release of progesterone, caused by high levels of estrogen (FERRARI, 2008), which is responsible for maintaining cervical relaxation for longer in the luteal phase (OLIVEIRA et al, 2008), resulting in the accumulation of fluids in the glands or in the uterine cavity (LIMA, 2009).

Progesterone has several functions in the homeostasis of animals, as well as the stimulation of

the growth of endometrial glands, cervical closure and suppression of myometrial activity (MARTINS and LOPES, 2015), which can result in the accumulation of secretion, becoming a favorable culture medium for bacteria (SUGIURA et al., 2004).

The role of estrogen in CHEC is to maintain cervical relaxation for a prolonged period, as well as to intensify the functions of progesterone in the uterus (SILVA, 2013).

Due to the excess secretion, pus is formed in the uterine lumen, initiating the inflammatory process. The predominant bacterium involved is the uropathogenic *Escherichia colli*, in which its prevalence can reach up to 80% of cases (KREKELER et al., 2012).

In addition to *Escherichia colli,* there are other microorganisms isolated in the uterus in case of pyometra, which, like the predominant bacterium, are part of the vaginal flora, they are: *Staphylococcus aureus, Streptococcus spp., Pseudomonas spp. and Proteus spp.* (ETTINGER and FELDMAN, 2005).

There are two classifications of this pathology. In the first, the Sick women are divided into young people, when under six years of age, and old women, when they are over seven years old. For young females, the most credible explanation for the development of CHEC is the therapeutic method of exogenous administration of estrogen and progesterone. For the elderly, it may refer to the long and repeated stimulation of progesterone during the diestrous phases throughout the animal's life (SILVA, 2010).

Silva (2010) also describes the second classification based on the presentation of the cervix, which can be open or closed. In the open cervix, there is vaginal discharge without exaggerated dilation of the uterine horns, the wall of the uterus It is thickened with hypertrophy and fibrosis and myometrium. On the other hand, in the closed cervix, the female presents with abdominal distension due to the extensive dilation of the uterus, with the uterine walls being thin and without vaginal discharge. Concomitantly, the endometrium will be atrophied and infiltrated by lymphocytes and plasma cells (SILVA, 2010; SMITH, 2006). Stump pyometra occurs similar to classic pyometra (described above), but is triggered by Remnant Ovarian Syndrome (ORS), i.e., the non-total removal of ovarian tissues (VIJAYAKUMAR et al., 2018). This failure can occur for several reasons, inadequate placement of hemostatic forceps, erroneous ligation, poor visualization, dropping some portion of ovarian tissue into the cavity, atypical location of residual ovarian tissue (COPAT et al., 2015). Unbiased removal may also be a surgeon's choice to prevent the possible side effects of ovariohysterectomy, such as excess appetite and obesity, thus leaving one of the ovaries intact (TSS and TUNA, 2005).

The retained ovarian tissue can implant in the abdominal cavity and vascularize, thus maintaining its functionality and secretion of estrogen and progesterone (SONTAS et al., 2009). Such production can occur cyclically, stimulating the remaining endometrium, leading to the accumulation of fluids within the stump and predisposing the female to a diestrus infection (MAGEE, 2016).

Vasconcelos (2014) states that the presence of progesterone can also be from drugs that have progesterone as a source, such drugs are used to treat dermatitis and urinary incontinence.

The clinical signs of stump pyometra are similar to classic pyometra and may be related to ORS. Among the clinical signs associated with pyometra, vaginal discharge, hyperthermia, lethargy, hyporexia or anorexia, weight loss, emesis, polyuria, polydipsia, and abdominal enlargement are the main ones (COUTO, 2019). On the other hand, the signs related to ORS result from the production of ovarian hormone, characteristic signs of proestrus and estrus, vulvar edema, bloody vaginal discharge and behavioral changes, cystic endometrial hyperplasia, endometritis, vaginitis, and vaginal neoplasia (PEREIRA et al., 2018; NIMWEGEN et al., 2018). Sontas (2009) also shows signs of pseudocyesis and mating without fertility. The appearance of signs can occur up to 11 years after the procedure (NIMWEGEN et al., 2018).

The diagnosis of this pathology is made through a compilation of information obtained through anamnesis, clinical signs, complete blood count, abdominal ultrasound, vaginal cytology, hormonal dosage and exploratory laparotomy with biopsy (SONTAS, 2009), the last three being specific for the diagnosis of remnant ovary. It is recommended that laparotomy be performed during estrus, as the presence of ovarian follicles facilitates the identification of the ovary, and histological evaluation of the excised tissue is performed for the definitive diagnosis of ORS (PEREIRA et al., 2018).

Luteal phase progesterone (P4) levels above 3.36 nmol/I confirm the suspicion of ORS, but if the result is negative and the suspicion continues, the Gonadotropin-Releasing Hormone (GnRH) stimulation test can be performed to confirm (NIMWEGEN et al., 2018).

The ultrasound image of stump pyometra does not have a pattern in relation to its shape, size or echotexture, and smaller lesions are more difficult to diagnose and a great challenge without this aid (KUMAR et al., 2008), but this evaluation is not always reliable depending on the location of the remaining tissue and its amount and size. The measurement of Anti-Mullerian Hormone (AMH) for the diagnosis of ORS is a new test, but it can be used in these cases due to its good sensitivity in this detection (MAGEE, 2016).

AMH is a glycoprotein hormone produced by the cells of the ovarian granulosa that after castration its production ceases and its serum concentration drops to an almost zero level, not interfering with the ovarian cycle or hormones gonadotropins (YILMAZ, 2015) thus showing that this can be an alternative and reliable method for the diagnosis of ORS since many alternatives can be unreliable, expensive, technically demanding or time-consuming.

The treatment established must be immediate and precise, since the condition in the most severe cases can develop endotoxemia or sepsis at any time (SANTOS, 2019).

In order to ensure the best prognosis, there are two paths to follow, which consists of the therapeutic drug resource or surgical intervention, in which Ovariectomy is performed (CABRAL et

al., 2016). However, these two pathways should be associated with antibiotic therapy, with the aim of reducing the infectious load present (TRAUTWEIN et al., 2017), with amoxicillin being the most used in these cases and, when associated with potassium clavulanate, increases its spectrum of action against bacteria (PEREIRA, 2011).

In hydroelectrolyte disorders and acid-base imbalance, fluid therapy should be performed continuously during the clinical or surgical treatment of the patient, in order to improve renal perfusion (SANTOS, 2019).

The prognosis is favorable after surgery, Conrado (2009) describes that only 5% to 8% of patients die intraoperatively or soon after the procedure is performed.

Prevention consists of the surgical removal of the female reproductive organ, i.e., OSH, since it brings, in addition to the prevention of CHEC, other favorable factors for the animal. Sousa and Florencio (2019) cite as benefits of early OSH the control of endocrine diseases, elimination of persistent estrus, dystocia, estrogen-dependent diseases, abortions, prevention of breast, ovarian, and uterine tumors, hyperplastics, and unwanted behaviors due to pseudocyesis, in addition to the issue of public health and population control of a certain species.

3 CONCLUSION

After the elaboration of this work, it can be concluded that the Cystic Endometrial Hyperplasia Complex is a routinely common pathology to be found in veterinary clinics, and it is of great relevance to know about this disease, because, as already clarified, when not If identified and treated urgently, it can lead to the animal's death.

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Endometrial cancer, Lynch syndrome and screening: Literature review

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Bárbara Barbosa dos Santos Teixeira
Specialist in Gynecology and Obstetrics, Federal University of Rio de Janeiro Institution: Clementino Fraga Filho University Hospital Address:R. Prof. Rodolpho Paulo Rocco, 255, Cidade Universitária da Universidade Federal do Rio de Janeiro, Rio de Janeiro - RJ, CEP: 21941-617
E-mail: barbarabstmeduerj@gmail.com

Luiza Marques Monteiro de Oliveira
Graduated in Medicine Institution: Federal University of the State of Rio de Janeiro (UNIRIO) Address: Av. Pasteur, 296, Urca, Rio de Janeiro -RJ, CEP: 22290-250
E-mail: luiza.mmo@icloud.com

Fábio Marchon Leão
Specialist in Gynecology and Obstetrics Institution: Hospital Federal de Ipanema Address: R. Antônio Parreiras, 67, Ipanema, Rio de Janeiro -RJ, CEP: 22411-020
E-mail: fabiomarchonleao@hotmail.com

ABSTRACT

TEIXEIRA, B.B.S. Endometrial cancer, Lynch Syndrome and Screening: Literature review. 2002. Course Completion Paper (Medical Residency) - Faculty of Medicine, Federal University of Rio de Janeiro, Rio de Janeiro, 2022.

The incidence of Endometrium cancer (EC) has increased in recent years. Hereditary predisposition is the risk factor responsible for 5% of cases and Lynch Syndrome (LS) and the most frequent. Conversely, the cumulative risk in developing EC related to LS carriers is around 71%, behind colorectal cancer (RCC), which represents 80%. In addition, women with LS have 40 to 60% chance to develop EC, as the first clinical manifestation of this disease, behaving as a sentinel tumor. Such information serves as a timely tool for early screening in patients with family history, compatible with LS suggesting the importance of early screening for early diagnosis. In LS occurs mutations in genes germ inheritance responsible for encoding DNA incompatibility repair proteins, i.e.: hMLH1, hMSH2, hMSH6, hPMS2 and EPCAM. The understanding and change of attitude towards this finding are challenging, due to, a compreensive part of professionals in charge with this area, do not have a solid basis of the clinical-pathological characteristics of the EC related to LS. The methodology used, was a literature review, conducted through the search and collection of data in pubmed, VHL and Scielo databases ALL in English and Portuguese, published in national and international journals in the last 10 years. The selection of articles was made through a diacritical analysis, in which we relate the information and then the solutions. EC research in LS is still in the initial phase, that reduces the number of consistent studies and the level of evidence of recommendations regarding optimal screening and, therefore, conclusive early detection and treatment. The high risk of developing EC in women with LS, as well, as the parallel development of primary tumors throughout life, indicates the great value, in understanding this condition, as it directly implies the attendant attention of professionals assisting these patients. This reflects, in addition to attention, surveillance and screening through family history and screening exams.

Keywords: Cancer, Endometrial cancer, Nonpolypoid colorectal cancer, Lynch Syndrome, Tracking.

1 INTRODUCTION

It is estimated that 5% of EC cases can be attributed to a specific hereditary predisposition. LS, also known as hereditary nonpolypoid colorectal cancer syndrome (HNPCC), is responsible for most inherited endometrial cancers. Mutations in Mismatch Repair (MMR) genes, MLH1, MSH2, MSH6,

PMS2, and EPCAM, have been identified in patients with LS (RYAN et al., 2019).

LS is the most common presentation of CCRHNP when compared to Familial Adenomatous Polyposis (FAP) and accounts for 2-5% of all colorectal cancer (CRC) cases. Studies have shown significant progress in understanding LS-related CRC in terms of molecular pathogenesis, risks, genetic basis, and prevention of cancer per se.

In addition, similar studies have demonstrated, through algorithms developed for universal screening for LS in individuals affected by CRC, a significant reason for performing it. The main justification is the analysis of survival, cost-effectiveness, and efficiency in screening (WANG et al., 2013). The NSC related to LS was extensively studied in order to understand its association with the CCRHNP. Women with LS have a 40-60% chance of presenting with CS as the first clinical manifestation of the condition. From a clinical point of view, the confirmation that a CS is related to LS has the potential to indicate and influence the screening, prevention, and early detection of other cancers associated with LS (AHADOVA et al., 2018).

The objectives of this study were:

1 - Describe LS and its relevance in the care of patients with FB;

2 - To conduct a brief literature review, observing the clinical-pathological characteristics of FB associated with LS.

3 - Analyze the genetic characteristics linked to LS;

4 - Present clinical recommendations for the diagnosis of individuals with LS and, subsequently, the screening and prevention of secondary cancers.

A concise bibliographic research was carried out, intending to update this knowledge. The articles searched were separated and qualified by:

1 - Be analytical with a relevant "n";

2 - Come from recognized research centers in the academic sphere;

3 - Published in English and Portuguese;

4 - Published in national and international journals in the last 10 years;

5 - The search was performed in the Pubmed, BvS and Scielo databases.

The research was carried out in two stages. Initially, the search for bibliographies in the above-mentioned form, selection of articles through a diacritical analysis, where we relate the information and then the solutions. Finally, a text was prepared with the interpretation of the data obtained.

2 HISTORICAL

In 1895, Aldred Scott Warthin of the University of Michigan Medical School observed that his German seamstress was depressed imagining that, like members of her family, she would also develop gastric, colonic, or uterine cancer. In fact, he died of CE at an early age.

In analyzing the case of the seamstress, Warthin published in 1913 the pedigree of 10 affected family members, describing the generations affected with colon, stomach, and uterine cancer. Auditing 3,600 cancer cases diagnosed in his laboratory between 1895 and 1912, he found that approximately 15 percent of them had a positive family history of carcinoma. Hence, he concluded that there was some influence of heredity on cancer.

A similar study by the same author on another family (G) in 1925 showed a higher familial preponderance for cancers of the gastrointestinal tract and uterus. These cancers affected family members at a mean age of 37.9 years with a tendency to develop CRC (BOLAND; LYNCH, 2013).

In 1966, Henry Lynch described two families, one from Nebraska (N) and one from Michigan (M) that had similar cancer patterns involving several generations similar to the aforementioned G family. By analyzing more than 650 members of Family G, he published the article "Cancer Family 'G' Revisited" (1971) which evidenced the syndromic characteristics of this condition with an autosomal dominant inheritance pattern and an early onset age (mean onset <45 years), with CRC, FB and stomach cancer. Other similar studies describing CCRHNP were published in the mid-1980s with clinical classification schemes developed for research (SEHGAL et al., 2014).

In 1989, the International Collaborative Group on HNPCC (ICG-HNPCC) was created, which formulated a set of criteria known as the "Amsterdam Criteria" for the diagnosis of CCRHNP, to facilitate the identification of causative genes. Expanded in 1999, it incorporated extra-colonic tumors and from then on came to be known as the "Amsterdam II Criteria".

With the identification of several mutations within the MMR genes,[1] the National Cancer Institute held an international workshop on LS in Bethesda (1997), when it was created a standardized diagnostic panel of microsatellite analysis[2] (MSI)[3] in conjunction with the Bethesda Guidelines for selecting patients with CRC.

These guidelines were reviewed and published (2004) including family history and specific pathological features of CRC, such as signet ring cell features, Crohn's disease-like reaction, mucinous features, and tumor location in the right colon. There are limitations to these guidelines, as many families with LS do not meet the "Amsterdam Criteria" or the "Bethesda Guidelines". On the other hand, despite meeting such criteria or guidelines, some families do not have germline alterations in any of the MMR genes in the DNA.

In 2008, Hampel et al. enabled large-scale immunohistochemistry (IHC) to aid genetic testing.

[1] The mismatch repair (MMR) system is involved in the repair of point mutations, ensuring the fidelity of replication. It recognizes and corrects random DNA polymerase errors during the replication process, significantly increasing the accuracy of this process.
[2] Microsatellites (MS) are short, repeated sequences of DNA that have 1 to 6 base pairs. These regions are randomly distributed and most are close to coding regions.
[3] Microsatellite Instability (MSI). The absence or deficiency of the DNA repair function, more precisely the inactivation of proteins by alterations in MMR genes, results in contractions or expansions of microsatellites. When there are failures in this repair system, the errors are not corrected, resulting in the instability of microsatellites.

In 2009, the Jerusalem Workshop recommended routine MSI testing or histochemistry for all immunodiagnosed RCCs in patients under the age of 70. These recommendations were incorporated into the Assessment of Genomic Application in Practice and Prevention (EGAPP) evidence report (BOLAND; LYNCH, 2013).

3 EC EPIDEMIOLOGY

Studies on the prevalence of cancer of the uterine body ranks sixth worldwide, with the most common type being endometrial cancer. In 2018, there were 370,000 new cases, with an estimated risk of 9.9/100,000 women. About 2/3 of these cases occur in countries with a high human development index (HDI), such as North America and Central and Eastern Europe (INCA, 2019).

Obesity and a sedentary lifestyle account for 70% of EC cases (American Cancer Society, 2019) Other risk factors include: genetic predisposition, diabetes mellitus, endometrial hyperplasia, chronic anovulation, previous pelvic radiotherapy, hormone replacement, early menarche, late menopause, nulliparity, and LS.

In Brazil, uterine cancer is expected to increase the number of new cases by 6,540 for each year of the 2020-2022 triennium. This corresponds to an estimated risk of 6.07 new cases per 100,000 women. Excluding non-melanoma skin tumors, cancer of the body of the uterus ranks eighth.

Figure 1 – Proportional distribution of the ten most incident types of cancer estimated for 2020 by sex, excluding non-melanoma skin

Localização Primária	Casos	%
Próstata	65.840	29,2%
Cólon e reto	20.520	9,1%
Traqueia, brônquio e pulmão	17.760	7,9%
Estômago	13.360	5,9%
Cavidade oral	11.180	5,0%
Esôfago	8.690	3,9%
Bexiga	7.590	3,4%
Linfoma não Hodgkin	6.580	2,9%
Laringe	6.470	2,9%
Leucemias	5.920	2,6%

Homens



Mulheres



Localização Primária	Casos	%
Mama feminina	66.280	29,7%
Cólon e reto	20.470	9,2%
Colo do útero	16.590	7,4%
Traqueia, brônquio e pulmão	12.440	5,6%
Glândula tireoide	11.950	5,4%
Estômago	7.870	3,5%
Ovário	6.650	3,0%
Corpo do útero	6.540	2,9%
Linfoma não Hodgkin	5.450	2,4%
Sistema nervoso central	5.220	2,3%

*Números arredondados para múltiplos de 10.

Source: INCA (2019).

As for the distribution by geographic regions, in the Southeast Region (7.45/100 thousand), it occupies the sixth position; Midwest (5.27/100 thousand), seventh; Northeast (5.10/100 thousand), eighth; North (2.41/100,000), tenth and South (6.53/100,000), eleventh position. In 2017, there were 1,827 deaths and the crude mortality rate from uterine cancer in Brazil was 1.77/100,000.

Graph 1 – Geographical distribution of EC in Brazil



Source: INCA (2019).

A systematic review selected 53 studies and included 12,633 patients with CS. The global proportion of endometrial tumors through microsatellite instability (IMS) or immunohistochemistry (IHC) detected the deficiency in Mismatch Repair (MMR), one of the mechanisms of DNA repair, which alters susceptibility to cancer. Of women with abnormal tests, germline analyses to evaluate pathogenic variants associated with LS; The study suggested that the prevalence of LS in patients with CE is approximately 3%, similar to that of CRC (RYAN et al., 2019).

In 2020, the first report on the prevalence of LS in SC in Brazil was published. This was a study with 242 patients diagnosed with FB, with screening by IHC and IMS to detect DNA incompatibility repair deficiency or MMR, in addition to MLH1 methylation to identify sporadic cases. Ten patients (10/37, 27%) were detected with pathogenic, or probably pathogenic, germline variants, most of them in the MSH6 gene (4/10, 40%). Thus, the prevalence of LS in this cohort was at least 4.1% (ROSA et al. 2020).

In order to detect and prevent CRC early, some countries have begun screening patients with CS to identify cases of LS. As a result, they detected and treated CRC early. (DILLON et al., 2017). It is estimated that 50% of patients with LS have FB as their first manifestation. Thus, the diagnosis of LS at the time of diagnosis of FB, although not proven, may be a cost-effective approach in clinical management. Notably, because the mortality of CRC is much higher than that of CE (AHADOVA et al. 2018).

3.1 ENDOMETRIAL CANCER (EC)

FB has become a disease of increasing interest in recent decades, for different reasons. The incidence is increasing, especially in developing countries. With the increase in life expectancy of the female population, the prevalence of overweight, obesity and morbid obesity has also increased.

Therefore, it also greatly increased the risk for these patients, which are therefore the main risk factors for CS. Staging surgery is the basis of treatment and, therefore, of the staging of the disease itself.

FB has two distinct classifications: Type I and Type II, with very distinct epidemiological, demographic, and pathological characteristics. Type I, which is more frequent, results from intrinsic or extrinsic estrogenic hyperstimulation, is preceded by endometrial hyperplasia, and affects obese women in the peri- and postmenopausal periods. The most frequent histological type is endometrioid carcinoma, with less aggressive behavior. Type II occurs in older women, is not related to obesity and hyperestrogenism, does not have endometrial hyperplasia as a precursor lesion and consists of the histological types serous carcinoma and clear cell carcinoma, which have a worse prognosis.

The prognostic factors of CS are: histological type; histological grade; depth of myometrial invasion; lymph node involvement; peritoneal cytology and presence of extrauterine secondary cancer. The histological types are: endometrioid adenocarcinoma (80%), the most frequent; serous papillary and clear cell carcinoma, the most aggressive, mucinous, squamous, undifferentiated and mixed.

The histological grade represents the amount of cancer cells similar to glandular cells, i.e., cells similar to those of the endometrium (undifferentiated). The higher the grade, the fewer glandular cells are present and therefore the more differentiated cancer cells, thus being more aggressive. In grade 1 more than 95% of the tumor forms glands, in grade 2, 50 to 94% and in grade 3, the most aggressive, also called high grade, less than 50% form glands. Regarding the degree of myometrial involvement, when it affects more than 50% of the endometrium, the prognosis will be worse (NCCN, 2017).

Table 1 – Staging of the EC of the International Federation of Gynecology and Obstetrics (FIGO)

Stadium	Description
I	Tumor limited to the uterine body
WOULD	Tumor limited to the endometrium or < 50% myometrial invasion
IB	≥ 50% myometrial invasion
II	Tumor invades the cervical stroma but does not extend beyond the uterus
III	Tumor with local and/or regional extension
IIIA	Tumor involves uterine serosa and/or adnexa(s)
IIIB	Parametrial or vaginal involvement
IIIC	Metastases to pelvic and/or para-aortic lymph nodes
IIIC1	Metastases to pelvic lymph nodes
IIIC2	Metastases to para-aortic lymph nodes with or without metastases to pelvic lymph nodes
IV	Intra- or extra-abdominal metastases
VAT	Invasion of the bladder or intestinal mucosa
IVB	Distant metastases (including intra-abdominal and/or inguinal lymph node metastasis)

Source: YOSHIDA et al (2020).

Table 2 – Classification of risk groups to guide adjuvant treatment of FB

Groups of risk	Characteristics
Low	Stage I endometrioid EC, grade 1 or 2, < 50% myometrial invasion, invasion Linfovascular (-)
Intermediary	Endometrioid FB, grade 1 or 2, > 50% myometrial invasion, lymphovascular invasion (-)
High Intermediate	Stage I endometrioid FB, grade 3, < 50% myometrial invasion, regardless of the lymphovascular invasion status; Endometrioid FB, grade 1 or 2, lymphovascular (+) invasion, regardless of the degree of Myometrial invasion
High	Stage I endometrioid FB, grade 3, ≥ 50% myometrial invasion, independent lymphovascular invasion status; CE stage II; stage III endometrioid FB, without residual disease; CE serous or clear cells, or undifferentiated or carcinosarcoma
Advanced	Stage III CE with residual disease and stage IVa CE
Metastatic	CE stage IVb

Source: YOSHIDA et al (2020).

Treatment for the low-risk group is total hysterectomy with SOB. Lymphadenectomy (pelvic only or pelvic and paraaortic) may be considered for surgical staging, however, a Cochrane review (2017) showed that there is no evidence of better survival in stage I FB. Studies show increased detection of lymph node metastasis, with low false negatives, on sentinel lymph node mapping in women with disease restricted to the uterus. In more advanced stages, there is a need for a combination of surgical enlargement (lymphadenectomy, omentectomy and/or radical hysterectomy) with radio/chemotherapy and even hormone therapy.

In 2005, CE was identified as the most frequent sentinel cancer among women with LS. In 2013, based on the studies of the TCGA (The Cancer Genome Atlas), whose objective was to catalog and discover the genomic alterations that cause EC — until then classified from a purely morphological point of view (type I and type II) — it could be defined as four molecular subgroups of behaviors and natural history that were very different from each other. This opened the possibility for the molecular characterization of ECs, which enabled therapies based on the molecular profile: POLE (better prognosis), microsatellite instability, wild-type p53 and mutated p53 (worse prognosis).

The TransPORTEC[4] study team and another group called the Vancouver Project translated the molecular information into immunohistochemical profiles, with results that are very close to the molecular information and can now be incorporated into clinical practice.

In the face of so many changes in the epidemiological knowledge of FB, risk factors, diagnostic methods, surgical and radiotherapeutic treatment, and systemic treatment of FB - as well as the new

[4] International consortium that was established for translational research in high-risk ECs.

demands for knowledge that this disease is beginning to awaken in the field of human reproduction, oncogenetics, immunotherapy, among others - it requires a more intense and robust review of the acquisition of new concepts that better define the current ones.

4 THE SL

LS, or CCRHNP (Hereditary Nonpolypoid Colorectal Cancer, HNPCC), is an inherited disease with autosomal dominant transmission of genes responsible for encoding DNA mismatch repair proteins with mutations. It is characterized by an increased risk of CRC and SC, as well as other primary cancers such as renal pelvis, ovarian, ureter, and small bowel. The estimated risk of developing CRC in women is 40 to 60%, and in men it is as high as 80%. SC is the second most frequent cancer in LS, second only to CRC. However, several studies show that the risk of CE outweighs the risk of CRC. In addition, about 50% of the time it precedes CRC, behaving like a sentinel tumor (LYNCH et al. 2017).

4.1 GENETICALLY BASED

LS results from mutations in the MMR genes of DNA (hMLH1, hMSH2, hMSH6, hPMS2 and EPCAM), inherited in the autosomal dominant form. Individuals with LS inherit a non-functional allele. When subsequent loss of the corresponding allele occurs, DNA repair becomes defective in the target tissue. Germline mutations in hMLH1 and hMSH2 are responsible for more than 90% of diagnosed cases of LS (BOLAND; LYNCH, 2013).

Prior to the discovery of the genetic mutations responsible, the diagnosis of LS was based on clinical criteria. These criteria were initially named the "Amsterdam Criteria". The first criterion, or "Criterion I", was based on the aspects, clinical presentations, and epidemiological behavior of CRC. Criteria include (1) three or more relatives with LS-associated cancer, (2) two affected relatives in successive generations, or (3) one or more relatives with LS-associated cancer diagnosed before age 50 (LYNCH et al., 2017).

4.2 IDENTIFICATION OF PATIENTS WITH LS

According to Moreira et al. (2012), general guidelines aid in the suspicion of a hereditary cancer syndrome that includes early age of onset, presence of multiple and/or bilateral primary cancers, and multiple affected family members.

To assist in the specific and most efficient identification of patients at risk for LS, the Education Committee of the Society of Gynecologic Oncologists has recently published guidelines to determine which patients may have a 20% to 25% chance of being carriers of LS, for whom genetic risk assessment is recommended, and even in patients with a slightly lower risk (5 to 10%) this same genetic risk assessment may be useful (Table 3).

Chart 3 – Society of Gynecologic Oncologists: Guidelines for Genetic Risk Assessment for LS

20 to 25% chance of hereditary predisposition	5 to 10% chance of predisposition
Genetic risk assessment is RECOMMENDED	Genetic Risk Assessment Is HELPFUL
Patients with EC or CCR than Meet To revised Amsterdam criteria: ✓ At least 3 relatives with Lynch/HNPCC-associated cancer (CCR, EC, small intestine, ureter or renal pelvis) in a lineage. Patients with CE or CRC ✓ An affected individual must be a relative of diagnosed < age 50 of the other two. ✓ At least 2 successive generations must be affected. ✓ At least 1 cancer associated with HNPCC It must be diagnosed < age 50.	Patients with CE or CRC diagnosed < age 50

Source: Adapted from MOREIRA et al. (2012).

In a population-based prevalence study, Bartley et al. (2012) identified a 1.8% prevalence of germline mutations in hMLH1, hMSH2 or hMSH6 among unselected patients with FB. Landon et al. (2015) stated that two studies evaluating patients with FB under 50 years of age indicated a 9% prevalence of germline mutations in hMLH1, hMSH2 or hMSH6. One study noted that 18% of individuals with CRC and synchronous or metachronic SC had LS. However, the finding of SC and synchronous ovarian cancer does not indicate the same risk.

Lim et al. (2012) found that only 7% of a cohort of women with SC and synchronous OC met clinical or molecular criteria for LS. Each of these patients also had a previous history of a tumor associated with LS or a first-degree relative with a history of a tumor associated with LS. It was then concluded that limiting genetic evaluation to women with FB and synchronous OC who also have a family history suggestive of LS may be more appropriate than testing all women with FB and synchronous OC.

5 THE SCREENING

LS has come to be understood as the representation of various molecular entities, and even with the introduction of the revised Bethesda guidelines, up to 28% of carriers of MMR gene mutations are lost. The Amsterdam and Bethesda guidelines have been criticized for lack of specificity and sensitivity, making them difficult to implement in clinical practice (VASEN et al., 2013). Other studies have indicated that these Bethesda guidelines lose 6 to 25 percent in diagnosis in mutation carriers. It is necessary to properly document the family history through study and genetic mapping, identifying the families affected by LS. (COHEN, 2014).

Screening programs for LS tumors are available. However, protocols vary widely. The current algorithm for diagnosing LS must meet the criteria established in the Bethesda guidelines. If not met, there is no advantage in performing other genetic tests (LYNCH et al., 2017).

Some authors indicate routine screening of CRC tissue samples for MSI and MMR immunohistochemical expression (IMQ). This approach indicated better identification of mutation carriers when compared to Bethesda guidelines. The Working Group on the Evaluation of Genomic

Applications in Practice and Prevention (EGAPP) advocates screening for LS in all patients newly diagnosed with CRC to identify at-risk relatives (MOREIRA et al., 2012).

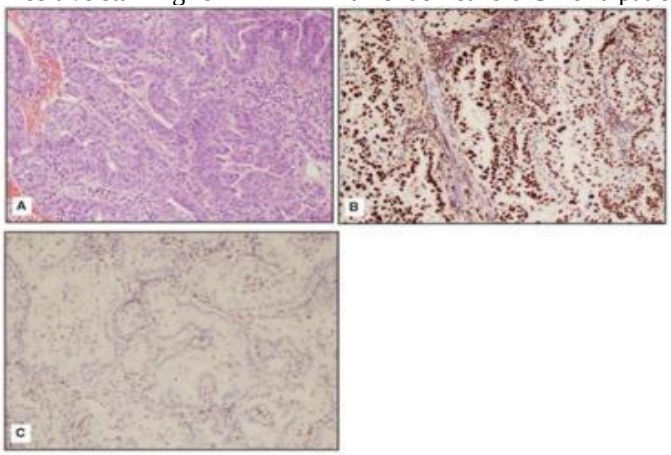
Recently, revised guidelines for the clinical management of LS recommended that all CRCs (<70 years) and all ECs (<70 years) should be tested for IHC or MSI to identify patients potentially with LS. These recommendations have been incorporated into the updated NCCN guidelines for genetic/familial risk assessment: colorectal version I.2014 (LYNCH et al., 2017).

5.1 TISSUE TEST TO IDENTIFY SL

Although family history information is important in identifying individuals who may benefit from genetic testing and genetic counseling, the presence of MSI in tumors of LS patients is a useful adjunct to screening for DNA repair germline mutations. Tissue testing (IHC or MSI analysis) has emerged as a practical first step in the assessment of women at risk for LS. This test is especially useful in cases where, due to family or personal history of cancer, individuals fall into the lower risk category of 5 to 10% risk of LS, such as individuals diagnosed with CE before the age of 50 years (STRAFFORD, 2012).

Broaddus et al. (2006) state that it is possible to analyze IHC for hMLH1, hMSH2, hMSH6 and hPMS2 and IMS in tissues. Antibodies are commercially available and there is no need for special handling of tissues or samples. For IHC tests, it is important to select non-tumor cells, as they behave as comparative controls. The images in Figure 2 show positive staining for hMLH1 in an endometrioid-type FB of a patient with LS. This tumor did not stain to hMSH2.

Figure 2 – Positive staining for hMLH1 in an endometrioid CE of a patient with LS



Source: BROADDUS et al. (2006).
Caption:
(A) Hematoxylin-eosin (HE) staining of endometrioid-type FB from a patient with SL/CCRHNP (power 10 ×);
(B) Endometrioid-like CE of a patient with SL/HNPCC with positive staining for hMLH1;
(C) EC endometrioid type of a patient with SL/HNPCC staining negative for hMSH2.

Broaddus et al. (2006) also performed MSI analyses in parallel with IHC. For MSI analysis,

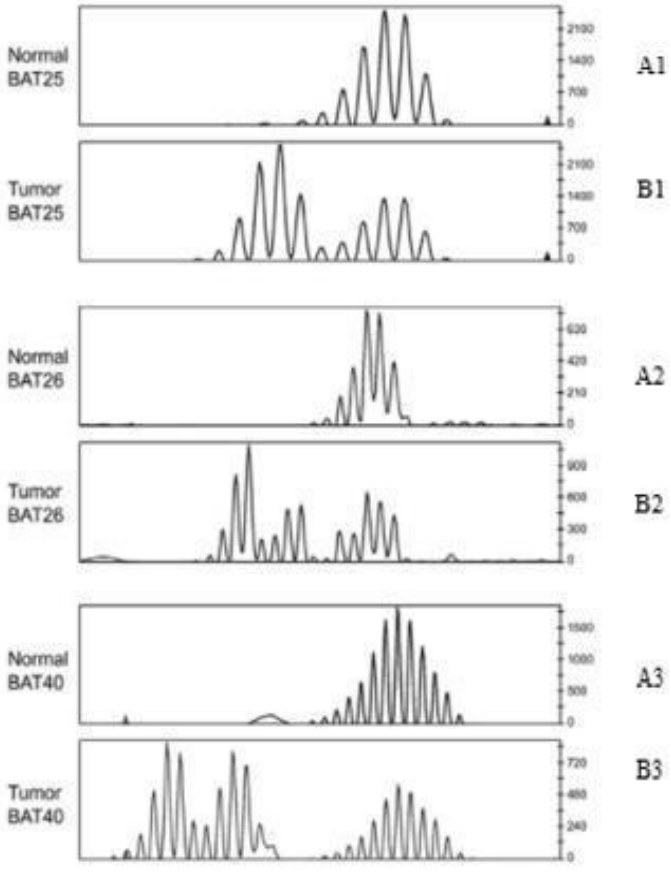
non-tumor tissues are also required, and any normal tissue from the hysterectomy specimen can be used, including the cervix, fallopian tube, or benign lymph nodes. The slides of both tissues are stained with hematoxylin-eosin (H&E). Approximately 5 to 10 slides with normal and tumor tissue are required to provide enough DNA to perform polymerase chain reaction (PCR)-based MSI analysis.

A panel of 7 markers recommended by the National Cancer Institute - NCI (BAT25, BAT26, BAT40, D2S123, D5S346, D173250 and TGF-R2) is used to detect changes in the number of microsatellite repeats in the tumor compared to normal tissue. The amplified DNA is analyzed in the ABI (Applied Biosystems) Genetic Analyzer by capillary electrophoresis.

Tumors with allelic deviation in 2 or more microsatellites in the panel are considered MSI-high. Tumors without allelic deviation in all 7 microsatellites are considered stable microsatellites. Tumors with allelic deviation in only 1 microsatellite are considered MSI-low. The significance of MSI-low in endometrial and ovarian tumors is not known.

A representative MSI chromatogram for the BAT25, BAT26, and BAT40 microsatellites is shown in Figure 3. Tumor DNA (represented by the bottom trace for each microsatellite) demonstrates an increased number of spikes compared to DNA extracted from non-neoplastic tissue from the same patient (top trace for each microsatellite). Therefore, allelic displacement is present for these 3 microsatellites, so the tumor is considered high MSI.

Figure 3 – Representative MSI chromatogram for BAT25, BAT26 and BAT40 microsatellites



Source: BROADDUS et al. (2006)

Tumor DNA (B1, B2, and B3 for each microsatellite) has a higher number of spikes compared to DNA from normal tissue from the same patient (A1, A2, and A3 for each microsatellite). Therefore, allelic displacement is present for these 3 microsatellites. If a tumor exhibits such allelic deviation in 2 or more of the 7-microsatellite panel, the tumor is considered MSI-high.

Broaddus et al. (2006) performed specific PCR in the proximal promoter region, in relation to the transcription initiation site of the MLH1 gene, -248 to -178 to detect possible methylation of this region.[5] Methylation of this region correlates with loss of expression of MLH1.Se methylation is present, the patient is likely to have a sporadic carcinoma rather than a tumor associated with LS. The MLH1 methylation assay can be performed using the same DNA extracted for the MSI analysis.

5.1.1 Genetic testing of at-risk individuals

If a hereditary cancer is identified based on family history, personal history, studies of the tumor, or a combination of both, genetic testing is important. Referral to genetic counseling may be useful for pre-test counseling and to gain insight into the implications of genetic testing (STRAFFORD, 2012).

Genetic testing categorically diagnoses individuals with LS. However, there are families that meet the clinical criteria for LS, but certain specific mutations cannot be identified (WEISSMAN et al., 2012). Genetic testing for LS is only available for mutations in hMLH1, hMSH2, or hMSH6 and is costly. Since the prevalence of LS does not exceed 5%, it may not be economically reasonable to test all patients with CS.

After tissue testing, a targeted approach to genetic testing can be performed. For example, a patient with a high MSI tumor and loss of hMSH2 by IHC analysis may have tests focused only on the hMSH2 gene. If a specific germline mutation in one of the DNA MMR genes is identified, at-risk family members can also be evaluated for the same mutation, which reduces the cost (STRAFFORD, 2012).

Several guidelines related to surveillance and screening of familial CRC have been proposed, such as the National Comprehensive Cancer Network (NCCN) guidelines. Gene mutations germline lesions are detected in up to 80% of LS cases, despite meeting the Amsterdam criteria and showing high MSI/loss of MMR protein expression (COHEN, 2014).

6 THE CE IN SL

6.1 IDENTIFICATION OF LS IN PATIENTS WITH EC

Diagnosing individuals with LS is very important, as cancer patients with a germline mutation in one of the genes in the MMR system associated with LS are at risk of developing a second primary

[5] Fixed location of the gene along the chromosome.

malignancy. In addition, once a specific mutation has been identified, family members of affected individuals can be tested. Thus, identifying a specific genetic mutation in a patient with CE would allow family members to undergo predictive genetic testing targeting the same mutation (WOLF et al., 2013).

In a series of 117 women from families with LS and a history of CRC and CE or CO, 16 had a synchronous diagnosis of CRC with SC or with CO and 49% were first diagnosed with CRC. This underscores the need for gynecologic gynecologists and oncologists to take an active role in identifying LS among their patients (WOLF et al. 2013).

Because proctologists, oncologists, and gastroenterologists have historically identified individuals with LS, the previous emphasis on establishing guidelines to assist specialists in identifying patients with LS has focused on patients with CRC. The Bethesda criteria define criteria to aid in the identification of patients with LS (KAYA et al., 2017). As more evidence accumulates, it is becoming increasingly clear that professionals dealing with patients with SC need to understand the importance of LS.

6.1.1 Clinical and Pathological Outcomes in LS-Associated FB

There are no concrete data comparing the prognosis among women with associated FB SL with Sporadic Cancer (CESP). Banno et al. (2013) reported a series of 125 women with CE who met the Amsterdam I or II criteria. The mean age at diagnosis of FB was 48 years, ranging from 27 to 72 years, and 57% of the cases occurred in women under 50 years of age, and 98% in women under 65 years of age. The overall survival rate was high, with only 12% of patients dying as a result of their FB. However, 61% developed a second primary cancer, and the majority (54 out of 75) were carriers of CRC. In 15% of these women, more than two primary cancers were also diagnosed.

Another survival analysis performed in a case-control study of 50 women with LS-associated CE (based on mutation analysis or meeting criteria Amsterdam II) matched to sporadic cases by age at diagnosis and FIGO6 stage showed no significant difference in tumor histology. Most tumors were endometrioid adenocarcinoma (92% for the study group and 88% for the control group). The overall cumulative 5-year survival rate was 88% for patients with LS-associated FB and 82% for patients with sporadic FB ($p = 0.59$) (TANGJITGAMOL; KITTISIAM; TANVANICH, 2017).

Although there is consensus that CRCs with high MSI are associated with a more favorable prognosis, the clinicopathologic impact of MSI in CE is unclear. The implication for tumors with high MSI resulting from LS is even less clear, as most studies are conducted in patients with sporadic tumors with high MSI (POWELL, 2017).

A retrospective study in 473 patients with CE classified 93 (20%) of the tumors as MSI-high. Disease-free survival was better compared to MSI-negative tumors (hazard ratio [HR] = 0.3; 95%

confidence interval [CI] = 0.2–0.7) (CUI et al., 2020). Li et al. (2020), in a small series of 65 cases of stage I and II sporadic endometrioid-type FB, found 11 of the 65 cases with high MSI.

There are conflicting reports on the association of SC with high MSI in relation to grade, stage, and clinical outcome. While some studies do not associate disease-free survival, MSI status, or negative prognosis for women with tumors with high MSI, 19 studies nevertheless showed better survival (KANOPIENE et al., 2014)

When compared with microsatellite-stable (MS) cases, tumors with high MSI were significantly more likely to be poorly differentiated (50% vs 9%; p = 0.003). The 5-year disease-free survival rate of high MSI cases was 63% compared to 96% for MS controls (p = 0.0004). Arabi et al. (2019) analyzed 446 cases of CE prospectively collected and found no association between endometrioid-like CE with high MSI and disease-free survival (HR = 0.951; 95% CI = 0.554–1.635) or overall survival (HR = 1.011; 95% CI = 0.688–1.48).

For individuals with documented hMLH1 and hMSH2 germline mutations, the lifetime risk of EC is estimated to be between 40 to 60%. One study specifically evaluated the risk of cancer in women with hMSH[6] mutations. Cumulative risk of endometrial cancer was 71% at 70 years of age. The risks of other cancers in LS are lower and include cancers of the renal pelvis, ovarian, stomach, small intestine, and ureter (VASEN et al., 2013).

6.2 COMPARING THE CESP WITH THE CE OF THE SL

6.2.1 Clinical and Histological Comparison of LS of high MSI versus CESP

Most research on CE with high MSI has focused on sporadic tumors, so the relevance to LS has not been well established. Broaddus et al. (2006) compared 3 groups with different pathological characteristics: (A) 26 cases of CESP with high MSI; (B) 42 cases of CESP diagnosed under the age of 50 years and (C) 50 cases of associated CE à SL and with high MSI. In the series (C) with LS, 78% were diagnosed as stage I, 10% as stage II, and 12% with stage III or IV disease.

Compared to CESP with high MSI and CESP cases under 50 years of age, groups (A) and (B) there was no significant difference in myometrial invasion, presence of lymphovascular space invasion and staging.

The histological subtype of the tumors proved to be the most striking difference between these three groups. Two groups—(B) the sporadic group of women under 50 years of age and (A) the group of sporadic MLH1 methylation—were almost entirely composed of tumors with endometrioid histology (41/42, 97.6%, and 25/26, 96.2%, respectively). However, the endometrioid type in CS associated with LS (C) accounted for only 43/50 (86%), with the remainder distributed in serous

[6] International Federation of Gynecology and Obstetrics (FIGO): surgical staging of FB that includes study of the extent of disease in the uterus, depth of myometrial invasion, cytology of peritoneal fluid and pelvic and para-aortic lymph nodes.

papillary carcinoma, clear cell carcinoma, and malignant mixed Müllerian tumors.

Although in the general population, non-endometrioid FB is typically diagnosed in older women, with a mean age of 65 to 68 years, the mean age of diagnosis of non-endometrioid tumors in patients with LS in this study was 46.4 years, similar à mean age at diagnosis of all FBs in LS (46.8 years). Interestingly, all of the non-endometrioid tumors in this study occurred in patients with hMSH2 mutations. Together, almost 25% of patients with LS had pathological findings for which radiotherapy or adjuvant chemotherapy would be indicated (BROADDUS et al., 2006).

7 SCREENING AND PREVENTION FOR INDIVIDUALS WITH LS

The diagnosis of LS in cancer patients and their relatives who have not yet developed a malignancy is important so that screening and individual prevention can be performed. Lindor et al. (2016) compiled a review of recommendations for the care of individuals with LS (Chart 4).

Table 4 – Recommended screening and prevention options for women with LS

INTERVENTION	RECOMMENDATION	*FOLLOW-UP*
Colonoscopy	From 20–25 years or 10 years earlier the age of the youngest individual with Diagnosis of cancer in the family. For MSH6 families, start at 30 Years	Every 1–2 years
Endometrial sample	From 30–35 years old	Annual
Transvaginal Ultrasonography (UTV)	From 30–35 years old	Annual
Urinalysis with cytology	From 25–35 years old	Every 1–2 years
History and examination	From the age of 21	Annual
Hysterectomy with Salpingoophorectomy bilateral (SOB)	Discuss as a prophylactic option after Full offspring	*

Source: LINDOR et al. (2016).

* Author's note: In this case, patients undergoing hysterectomy and prophylactic SOB should be followed up according to the needs linked to the remaining organs and that follow-up is already indicated.

Patients with LS-associated cancer are at high lifetime risk for a second malignancy and should be counseled as to available screening and preventive measures. For example, survivors of LS-associated CE should undergo CRC screening. Similarly, women with LS who present with CRC as a

sentinel tumor should be guided by FB screening.

UTV, endometrial biopsy, or hysterectomy with prophylactic SOB may be offered if fertility is no longer desirable. Family members who have not yet been diagnosed with cancer should undergo screening for CE and CRC, and may also benefit from hysterectomy with prophylactic SOB (LINDOR et al., 2016).

7.1 CE SCREENING

The data for FB screening are not as convincing for several reasons: low prevalence of the disease in the general population; presence of early symptoms, such as vaginal bleeding; and high survival rates for early disease. There are no CE screening programs for the general population, so basic data on sensitivity and specificity for screening in the general population are not available (MEYER; BROADDUS; LU, 2009). As an example, Cornou et al. (2016) evaluated UTV and endometrial thickness measurement in high-risk populations and reported that screening had a high rate of false-positives.

Meyer et al. (2019) looked at 41 women (35 premenopausal and 6 postmenopausal) diagnosed with LS by genetic mutation or meeting the Amsterdam criteria. The study analyzed annual UTVs and serum CA-125 level for screening for gynecologic malignancies. After a mean follow-up of 5 years, 17 out of 179 UTVs (9.5%) suggested further evaluation by endometrial sampling. From this, only 3 premalignant lesions were discovered (17.6%). An incidental FB was detected after the manifestation of clinical symptoms (MEYER; BROADDUS, LU, 2009).

Similarly, Helder-Woolderink et al. (2013) conducted a UTV screening study in women with LS or descendants of families with criteria for LS. The study period included 825.7 years of risk. Only two cases of EC have been reported; both with symptoms, as opposed to that identified in the triage UTV. We did not find a study evaluating the efficacy of prospective endometrial biopsy as an isolated screening tool for women with LS.

However, Lu & Daniels (2013) conducted a study on the combination of endometrial and ultrasound sampling in 175 women with germline mutations in MLH1, MSH2 or MSH6. Although there was no significant difference in long-term outcomes – in the 11 patients with CE detected by screening compared to 83 women from the same families who were diagnosed with CS detected by symptoms – the study revealed a reduction in stage at diagnosis, with 7% of women in the surveillance group having stage III/IV disease vs 17% of women who had symptoms.

In summary, despite the lack of evidence from current screening methods for CS, women with LS have an increased risk of CS and usually develop it at a younger age, at which stage it may be more difficult to recognize bleeding as a warning sign.

In addition, UTV can be useful in identifying ovarian abnormalities since these women also

have a lifetime risk of CO of 6 to 12%.

As such, tracking is a reasonable option. For these reasons, UTV and endometrial biopsy are currently offered for women with LS and recommended annually for women aged 30 to 35 years. This recommendation is based on expert consensus, but given the scarcity of data, further studies evaluating ultrasound, endometrial biopsy, or studies evaluating the possibility of including new screening techniques for CE are needed (HELDER-WOOLDERINK et al., 2013).

7.2 CRC SCREENING

Colonoscopy is the best screening method for CRC. Perrod, Rahmi, & Cellier (2021) reported that individuals from families with LS who underwent prospective screening (colonoscopy or barium enema) had a 62% reduction in the incidence of invasive CRC compared to individuals from the same families who did not receive routine screening. Subsequent follow-up showed that the group with prospective CRC screening also reduced mortality by approximately 65%.

Current recommendations for screening for CRC in individuals with known or suspected mutations is colonoscopy every 1 to 2 years, starting at the age of 20 to 25 years (or 30 years in families with known hMSH6 mutations) (WELLS; WISE, 2017). The age to start screening is higher for families with hMSH6 mutations. Evidence suggests that the age of onset of such individuals is, on average, 10 years later than with mutations in the other genes associated with LS (PERROD; RAHMI; CELLIER, 2021). In addition, most of the data on the incidence of CRC and the reduction in mortality after screening in this high-risk population are collected using colonoscopy for screening, which justifies the consolidation of this test (WELLS; WISE, 2017).

8 PROPHYLACTIC SURGERY

Schmeler et al. (2006) confirmed the efficacy of prophylactic hysterectomy in reducing the incidence of CE in a cohort of women with documented germline mutation in one of the DNA mismatch repair genes associated with LS. In this study, 61 women who underwent prophylactic hysterectomy were matched with 210 women who did not undergo risk-reduction surgery. None of those who underwent prophylactic hysterectomy developed FB compared with 33% of the women in the comparison group. Thus, women with LS should undergo hysterectomy and prophylactic SOB as a reasonable prevention strategy.

The mean age of CE diagnosis in patients with LS is 50 years. Because individuals with LS are at higher risk of CE at a younger age than the general population, it is recommended that prophylactic surgery be performed after the woman no longer desires fertility (ETCHEGAY et al., 2015). After the pregnancy is complete, women can have a traditional laparotomy (abdominal hysterectomy) or a laparoscopic one. (SCHMELER et al., 2006). In addition, LS-positive women with CRC may choose

to have this procedure in combination with colon surgery (KALAMO et al., 2020).

Because of the risk of occult malignancy in the endometrium or ovaries, at the time of prophylactic surgery, preoperative endometrial biopsy should be performed and, if necessary, staging, surgical support with an oncological surgeon should be arranged. In addition, intraoperative pathological analysis of the endometrium and ovaries is considered advantageous (Schmeler et al., 2006).

9 DISCUSSION

Although FB is less prevalent in our country, unlike countries with a high HDI, there is a trend towards an increase in new cases on a global scale, largely due to the increasing increase in obesity and sedentary lifestyle in the population, which are marked risk factors that have been proven to be important and linked to the disease. However, these factors have a greater association with CESP, whose pathophysiology is associated, in most cases, with hyperestrogenism, resulting from the peripheral conversion of androstenedione into estrone, which in obese women comes, on a large scale, from adipose tissue.

Contrary to the prevalence of CESP, LS CS corresponds to 3% of all EC cases. Its pathogenesis results from the mutation of germline genes, inherited in an autosomal dominant manner, whose function is to encode enzymes responsible for the error repair system of genetic sequencing. As a result, the function of correcting the modified DNA is lost, not eliminating the formation of atypical cells, which multiply with errors and generate several primary tumors. The most common are SCC and CRC and, in turn, the least prevalent are OC, renal pelvis, and stomach.

Women with LS are at high risk for SC in addition to other primary tumors throughout their lives. Thus, it is essential that in patients with FB there is reasonable suspicion when obtaining information from personal and family history when evaluating, so that an adequate and timely diagnosis can be made. The opposite should also be considered, women in usual gynecological follow-up should undergo a detailed anamnesis to evaluate suspicions worthy of investigation.

Although the prevalence of LS in patients with SC is small, 6 out of 10 patients with LS will have SC. This highlights the importance of the need for active surveillance in patients with a diagnosis or family history of tumors that meet the criteria for LS. The relative prevalence of CRC is higher than that of CE. On the other hand, CS, as it is a pathology exclusively related to the female sex, its absolute proportion is slightly lower. However, some studies have already shown that this proportion exceeds that of CRC in LS in female patients.

In addition, unlike CESP, LS FB is more frequent in women at an earlier age. Lynch's SCC often behaves like a sentinel tumor in individuals under 50 years of age, in more than half of the cases, a phase in which the woman may be still in the menacme. Therefore, abnormal uterine bleeding, one

of the main signaling symptoms of FB, may not be noticed or even confused with other causes more frequent in this age group, unlike the postmenopausal woman, in which the appearance of vaginal bleeding leads her to seek medical attention. This disturbs the diagnosis, as it makes it more difficult or delayed, increasing the chance of disease progression, leading to a late staging at the time of diagnosis, which aggravates the condition and prognosis.

It should be noted that although endometrioid FB, or type 1, is the most prevalent in ESCs, in LS it greatly reduces in proportion, to the detriment of more aggressive subtypes, such as serous and clear cell subtypes, which increase slightly in prevalence in this population, especially in those with hMSH2 mutations. The increase in the more aggressive histological subtypes and the difficulty of diagnosis in the face of confounding factors, due to the precocity of the age (mean of 46 years) at the onset of LS in relation to other types of LS cancers, leads to and corroborates the need to implement consistent protocols regarding screening, screening and the implementation of prophylactic measures of FB in patients with LS.

Some prophylaxis and screening measures evaluated in the literature and determined in some protocols based on expert consensus (level D) consider surgical prophylaxis after complete offspring (HTA and SOB); in the screening, there are UTVs alone or associated with endometrial biopsy. Studies have shown that screening with UTV plus endometrial biopsy, although there is no significant long-term difference, reduces the stage of FB at the time of diagnosis. Thus, comparatively, UTV with additional biopsy may be useful means for early diagnosis, which would allow, in addition to increasing life expectancy, less invasive and aggressive treatments. This data contributes to the reduction of severity and consequent surgical complications. In addition, it reduces the need for adjuvant therapy (chemotherapy and radiotherapy) - a treatment that is current in the most advanced endometrioid stages and in type 2 subtypes (serous and clear cell) - therefore, with harmful effects that are known to add physical sequelae and reduce quality of life, including sexual quality. UTV alone was not efficient for the early screening of asymptomatic FB, although it showed acceptable detection of premalignant lesions. Endometrial biopsy alone has not been shown to be effective in screening.

In spite of this, studies related to SC in LS are scarce, limited, and often have a small "n" compared to the number of studies and evidence in the literature regarding CRC in LS, especially with regard to screening, prevalence, and histopathological characteristics in LS SC. Regarding CRC screening, colonoscopy is consolidated, first because it has been shown to be effective and because most studies have focused on this screening method. Similar to CRC screening, the prospective analysis of CE screening can be a useful tool. However, studies that indicate the best form of evaluation need to be carried out looking for a considerable 'n' in spite of the other current studies.

The diagnosis of LS is well established in the literature and has well-established guidelines to aid the diagnosis of suspicion. The most recent are the Amsterdam II and Bethesda criteria, which

consist of the evaluation of the familial pedigree, the latter considering the histological study of the tumor. These tests provide an intermediate step before performing germline mutation analysis in the evaluation of individuals with LS-related malignancies. They can rule out LS in these patients, simplify and reduce the costs of genetic testing by targeting specific genes in individuals with positive results. Identifying a specific genetic mutation in the index case would allow your family members to undergo predictive genetic testing targeting the same mutation, which makes the process less costly.

In addition, because it behaves like a sentinel tumor in more than 50% of LS cases, confirmation of LS at the time of FB diagnosis may be a cost-effective approach in clinical management. Notably, because the mortality of CRC is much higher than that of CE.

The diagnosis of LS offers the opportunity to use screening and prevention strategies that can decrease the incidence and mortality of associated cancers. Further research is needed to indicate prevention strategies and to evaluate, as mentioned above, the effect of prophylactic surgery on survival. In the meantime, we should recommend that individuals diagnosed with LS be advised to follow current screening recommendations, based on expert consensus, and have the option of prophylactic surgery.

Although studies by several international groups are focusing on LS-related ECs, research on this entity continues to seek the necessary knowledge in order to obtain the greatest efficiency in the screening, treatment, and follow-up of these patients. There is a real lag, with prejudice in the clinical-pathological diagnosis of CS in LS due to the information, apprehension of renewed and current genetic concepts, as well as the clinical-pathological characteristics of FB related to LS.

It is very likely that gynecological cancer will predominate in the near future. Therefore, this disease can no longer be seen as it has been until then.

10 CONCLUSION

Although LS and CRC in LS remain historically and permanently studied and well-evidenced diseases, their presence in the literature and the focus on CS research in LS is still in the embryonic phase. This is due to the small number of consistent studies and the low level of evidence of recommendations regarding optimal screening, and therefore conclusive early detection and treatment.

Studies should be encouraged for a better understanding of this entity. The discrepancy in the quality and quantity of information between CRC and CE in SL shows how far research in the field of gynecology oncology is. Consensuses already show a prognostic association of MSI in CRC, on the other hand, this information is not clear in the SC, which corroborates the need for more equitable studies.

Considering the high incidence rate, early age of presentation, in relation to other primary cancers in LS — which enables the early diagnosis of both SC itself and other cancers in LS as a

familial index case — identifying a specific genetic mutation in a patient with SC would allow family members to undergo predictive genetic tests directed to the same mutation.

Despite the lack of evidence in the literature, until a more consistent protocol is established, showing efficiency and cost-effectiveness, patients with LS need to be informed about the possible forms of screening and their limitations, as well as to be well informed about the role of prophylactic surgery. Although studies have described a high rate of false-positives in the isolated screening of endometrial thickness measurement in high-risk populations, UTV and endometrial biopsy associated with it showed a reduction in the stage of FB at the time of diagnosis. Although they are methods based on expert consensus, they are currently offered to women with LS and recommended annually in those aged 30 to 35 years.

In addition, so far, the synchronicity of CO and EC are not sufficient to justify genetic testing of LS, unless there is a positive family history.

Given the scarcity of data, further studies evaluating ultrasound, endometrial biopsy, or studies evaluating the possibility of including new screening techniques for CE are needed. The construction of these measures aims, above all, at the consolidation of public policies, in order to offer society a model capable of improving diagnosis by screening, treatment, and consequently, survival and quality of life for individuals affected by this condition.

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SEVEN
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Risk factors associated with falls in adult patients

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Bruno Pigatto
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/ RS (HPCA/UFRGS)

Graziela Lenz Viegas
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/ RS (HPCA/UFRGS)

Jenifer Nascimento da Silva Cebulski
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/ RS (HPCA/UFRGS)

Juliana da Silva Lima
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/ RS (HPCA/UFRGS)

Luciana Pereira Tarragô de Souza
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/ RS (HPCA/UFRGS)

Patrícia do Nascimento
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/ RS (HPCA/UFRGS)

Sídia de Mari
Nurses from the Surgical Nursing Service of the Hospital de Clinicas de Porto Alegre/ RS (HPCA/UFRGS)

ABSTRACT
Accidents caused by falls can have various consequences for patients and identifying the risk factors that contribute to the occurrence of this event is essential for its prevention. Falls are a multifactorial event and it is essential for nurses to assess the risk factors for falls during hospitalization in order to provide individual, qualified care, seeking a safe environment and preventing the occurrence of this adverse event. This study is the result of a literature review on the subject, the aim of which was to analyze the risk factors identified in the literature related to the occurrence of falls in adult patients admitted to clinical-surgical units. Ten articles were found which showed that the main factors identified in the literature were advanced age, changes in physical mobility, post-surgery and the use of potentially dangerous medication.

Keywords: Fall accidents, Patient safety, Hospitalization, Nursing.

1 INTRODUCTION

Patient safety has remained an issue of great concern to healthcare institutions and professionals all over the world in recent decades. In Brazil, the National Patient Safety Program (PNSP) was established in 2013, through Ministerial Order 529 of the Ministry of Health, with the aim of preventing and reducing the incidence of adverse events (AE) related to care in health services and encouraging institutions to develop and implement protocols that guarantee safer care (BRASIL, 2013a; BRASIL, 2013b).

In this perspective, many strategies have been undertaken to guide good practices for reducing risks and adverse events in health services, such as the adoption of the International Patient Safety Goals, established in 2006 by the Joint Commission International (JCI), in partnership with the World

Health Organization (WHO), in which reducing the risk of injury to patients from falls is one of these goals (JOINT COMMISSION INTERNATIONAL, 2014).

A fall is defined as the unintentional displacement of the body to a lower level than the initial position, caused by multifactorial circumstances, resulting or not in damage. Accidents caused by falls can have various physical or psychological consequences for patients, lead to serious injuries, impair their physical mobility and prolong their hospital stay, as well as negatively affecting the health institution involved, increasing care costs and generating ethical and legal implications (BRASIL, 2013c).

In this context, it is essential to identify the risk factors that contribute to falls. These factors can be directly related to the patient, known as intrinsic factors, or they can be associated with the environment, known as extrinsic factors. In view of this, this study's guiding question is: What scientific productions identify as factors associated with falls in adult patients hospitalized in clinical-surgical units?

Considering that falls are a public health problem worldwide and a frequent adverse event in the hospital environment, the hypothesis of this study was that knowing the prevalent risk factors associated with falls is essential to guide care planning and the implementation of preventive measures, thus contributing to reducing the occurrence of the event and to patient safety.

The aim of this study was to analyze the risk factors identified in the literature related to the occurrence of falls in adult patients admitted to clinical-surgical units.

The proposed study aims to help nursing staff reflect on the importance of identifying the risk factors associated with falls and implementing care to prevent them, in order to improve patient care, reduce harm, length of stay and the cost of hospitalization.

This is a literature review. The PICO (Patient, Intervention, Comparison and *Outcomes*) search strategy was used to construct the research problem and organize the articles found. The databases consulted were: Nursing Database (BDENF), Scientific Electronic Library Online (SciELO) and Latin American and Caribbean Literature on Health Sciences (LILACS). The descriptors used in the search, according to DeCs (Bireme Health Descriptors) were: Fall Accidents, Patient Safety, Hospitalization and Nursing. The inclusion criteria were articles that addressed in the title and abstract factors associated with the occurrence of falls in adult patients admitted to clinical and surgical units, available in Portuguese, English or Spanish, with online access to the full text, published between 2015 and 2020 (SANTOS, PIMENTA, NOBRE, 2007).

2 DEVELOPMENT

2.1 CHARACTERIZATION OF THE SAMPLE

Ten articles were selected from the databases consulted, all published in Portuguese, with SciELO having the highest number of published articles (6).

2019 was the year with the highest number of publications on the subject, with 4 articles selected, followed by 3 in 2017 and only one in 2015, 2016 and 2018. There were no publications in 2020 as of the time of this study.

The studies were distributed in Table 1 according to authorship, database consulted, journal published, year of publication and the risk factors for falls identified in the article, organized in ascending order by year of publication.

Table 1 - Selected articles on factors associated with falls in adult patients hospitalized in clinical-surgical units

Authors	COMICS	Journal	Year	Risk Factors
VITOR, A.F. *et al.*	BDENF	Revista Cogitare Enfermagem	2015	> Age over 65 > History of falls > Post-surgery > Use of multiple devices > Impaired physical mobility > Decreased visual acuity > Anemia, dizziness, impaired balance > Vascular diseases > Insomnia > Use of narcotics, opiates, antihypertensives
SILVA, C.F. *et al.*	LILACS	Revista Cogitare Enfermagem	2016	> Age over 65 > History of falls > Change in gait > Decreased visual acuity > Postural hypotension, dizziness, anemia, hypoglycemia > Insomnia > Use of diuretics and psychotropic drugs > Depression and anxiety > Urinary incontinence and urgency
MATA, L.R.F. *et al.*	SCIELO	Latin American Journal of Nursing	2017	> Age over 60 > SAH (use of antihypertensives) > DM (use of hypoglycemic agents) Heart disease > Hypothyroidism
BITTENCOURT, V.L.L. *et al.*	SCIELO	Journal of the USP School of Nursing	2017	> Age over 60 > Post-surgery (orthopedic surgeries) > Decreased visual acuity > Comorbidities (SAH, DM, Parkinson's) > Use of sedative drugs and pain control

VICTOR, M.A.G. *et al.*	BDENF	*UFPE Nursing Journal*	2017	> Age over 65 > Post-surgery > Use of multiple devices > Use of antihypertensives and sedatives > Limitation in walking > Absence of caregiver > Comorbidities (SAH, DM) > Wet / slippery floor
SEVERO, I.M. *et al.*	SCIELO	Latin American Journal of Nursing	2018	> Post-surgery > Limitation in walking > Disorientation and confusion > Number of medications in the last 72 hours > Frequent urination > Absence of caregiver > Prolonged hospitalization
LUZIA, M.F. *et al.*	SCIELO	Gaúcha Journal of Nursing	2019	> Age over 65 > Altered gait, impaired physical mobility > Altered state of consciousness > Use of at least 3 risk medications > Absence of caregiver
XIMENES, M.A.M. *et al.*	LILACS	Brazilian Journal of Health Promotion	2019	> Age over 65 > History of falls > Post-surgery > Use of multiple devices > Difficulty walking, altered gait, reduced strength > Decreased visual acuity > Anemia, Hypotension, Impaired balance > Insomnia > Medicines > Unfamiliarity with the environment > Lack of non-slip material in the bathroom
BARBOSA, A.S. *et al.*	SCIELO	Gaúcha Journal of Nursing	2019	> Age over 60 > History of falls > Post-surgery > Use of multiple devices > Limitation in walking, gait alterations, use of canes and prostheses, reduced strength > Hypotension and dizziness > Disorientation, agitation, insomnia > Use of sedatives/drowsiness > Hypoglycemia > Absence of caregiver > Equipment failure
AGUIAR, J.R. *et al.*	SCIELO	Acta Paulista Enfermagem	2019	> History of falls > Post-surgery > Use of multiple devices > Difficulty walking / impaired physical mobility / Decreased strength > Impaired balance > Little known scenario

				> Lack of non-slip material in the bathroom

Author: LIMA, 2020.

2.2 MAIN FACTORS ASSOCIATED WITH FALLS

Falls in hospitalized patients are a multifactorial adverse event and represent one of the main incidents related to patient safety. The literature review identified various risk factors for the occurrence of falls in clinical-surgical patients, providing some categories of analysis, as described below:

2.2.1 Advanced age

Eight articles (80%) found that advanced age (over 60) is one of the main risk factors for falls (VITOR *et al*, 2015; SILVA et *al*, 2016, MATA et *al,* 2017; BITTENCOURT *et al*, 2017; VICTOR et al, 2017; LUZIA *et al*, 2019; XIMENES *et al*, 2019, BARBOSA et *al*, 2019).

Luzia *et al* (2019) states that fall rates increase with age due to changes related to aging, which is a natural process in which there is a general decline in the physical capacities of individuals. The association of the presence of chronic degenerative diseases, cognitive decline, visual and physical mobility changes and the use of multiple medications makes the elderly more fragile and vulnerable to falls (SILVA, BRASILEIRO, SOUZA, 2018).

2.2.2 Changes in physical mobility

Changes in physical mobility such as difficulty walking, changes in gait, reduced strength or the use of walking aids such as canes were found in 70% of the articles selected (VITOR *et al*, 2015; SILVA et *al*, 2016; VICTOR *et al,* 2017; SEVERO *et al,* 2018; LUZIA, *et al* 2019, XIMENES, et al, 2019, BARBOSA *et* al, 2019).

Barbosa *et al* (2019) found that limitation in walking was present in 54.3% of falls reported at a university hospital in the south of the country. In addition, Ximenes *et al* (2019) found that, among patients diagnosed as being at risk of falls, 51% had impaired physical mobility and 56.7% had difficulty walking. A study carried out in an American hospital corroborates this data, which found that 47% of patients with falls had gait alterations, and 34% used some kind of device to help them walk (GUILLAUME, CRAWFORD, QUIGLEY, 2016).

2.2.3 Post-operative state and use of multiple auxiliary devices

According to NANDA I (2013) one of the physiological factors for the risk of falls is the conditions following the surgical intervention. The postoperative period was classified as one of the predictive factors for a high risk of falls, cited in 7 of the 10 articles selected, since the patient may

still be under the effects of anesthetics and other medications, with difficulties in mobilizing, the presence of pain, in addition to the use of drains, venous accesses and probes, leading to greater vulnerability due to the surgery performed (VITOR *et al*, 2015; BITTENCOURT *et al*, 2017; VICTOR et *al*, 2017; SEVERO et *al,* 2018; XIMENES *et al,* 2019; BARBOSA *et al,* 2019; AGUIAR *et al, 2019*).

Vitor *et al* (2015) found that 83.8% of postoperative patients had a diagnosis of risk of falls and Bittencourt *et al* (2017) stated that the surgical procedure increases the risk of falls because it affects the patient's mobility and memory due to the use of sedative and pain-control medications.

In addition, the use of multiple hospital devices, often found in postoperative patients, was listed in 50% of the articles in this study (VITOR *et al*, 2015; VICTOR et *al*, 2017; XIMENES *et al,* 2019; BARBOSA et *al*, 2019; AGUIAR *et al, 2019*). Victor *et al* (2017) reports that the presence of probes and drains in surgical patients can hinder their mobility, not only because they have to carry them during locomotion, but also because of the restriction of movement they can cause.

2.2.4 Use of potentially dangerous medicines

The use of some potentially dangerous drugs for the fall event or the combination of multiple drugs were identified in 90% of the articles in this review (VITOR *et al*, 2015; SILVA et *al*, 2016; MATA et *al,* 2017; BITTENCOURT et *al, 2017;* VICTOR et al, 2017; SEVERO *et al,* 2018; LUZIA et al, 2019; XIMENES *et al,* 2019; BARBOSA et *al, 2019*).

Severo *et al* (2018) considered polypharmacy and the relationship with multiple comorbidities a relevant factor for the risk of falls, highlighting the number of drugs administered from certain classes in the last 72 hours, namely: benzodiazepines, opioids, barbiturates, antipsychotics, antidepressants, antihypertensives, laxatives, diuretics, antihistamines, anticonvulsants and sedatives. He pointed out that the combination of different medications can produce or potentiate clinical conditions such as hypotension, confusion, dizziness, attention deficits, drowsiness and others.

Mata *et al* (2017), Bittencourt *et al (2017)* and Victor *et al* (2017) highlighted systemic arterial hypertension (SAH) as the main comorbidity associated with the risk of falls in their studies. In addition, Barbosa *et al* (2019) reported that the use of antihypertensive drugs and postural hypotension can cause dizziness and loss of consciousness, resulting in falls.

The use of diuretics and laxatives is related to urinary and intestinal urgency/incontinence. Silva *et al* (2016) stated that urinary urgency increases the risk of patients falling due to the greater chance of trying to get out of bed. Severo *et al* (2018) corroborates this by stating that altered urinary and/or intestinal elimination leads to a more frequent need to go to the bathroom, exposing patients to a greater risk of falls.

The results of the study by Vitor *et al* (2015) showed that more than 50% of post-operative patients were taking narcotics and/or opioids. Opioids, often used to control pain, can increase the risk of falls due to their potential to depress the central nervous system (Severo at all, 2014).

Benzodiazepines can promote side effects such as: sleep disorders, seizures, drowsiness, sedation and lethargy, and can cause distorted vision, transient postural hypotension, in addition to their rebound effect of insomnia when used for a long time, conditions that favor the risk of falls (MARQUES, NICOLA, OLIVEIRA, 2016).

2.2.5 Decreased visual acuity

Decreased visual acuity was found to be a risk factor for falls in 40% of the articles in this review (VITOR *et al*, 2015; SILVA et *al*, 2016; BITTENCOURT *et al*, 2017; XIMENES *et al,* 2019).

Bittencourt *et al* (2017) showed in their study that visual impairment had significant relevance as a predictive factor for falls and Silva *et al* (2016) reported that 100% of patients with a fall outcome had impaired vision.

Another study that aimed to analyze the risk factors for falls in the first 48 hours of hospitalization and associate them with the occurrence of falls reported that 88.6% of patients who fell had visual impairment (REMOR, CRUZ, URBANETTO, 2014).

2.2.6 History of falls

A history of previous falls is a relevant factor in assessing the risk of the event occurring and was highlighted in 5 of the 10 articles selected (VITOR *et al,* 2015; SILVA et *al*, 2016; XIMENES *et al,* 2019; BARBOSA *et al*, 2019; AGUIAR *et al, 2019*).

An American study pointed out that patients with a history of falls are 2.98 times more likely to suffer a new event (MOE at all, 2015).

Silva *et al* (2016) found that 60% of patients who fell had a previous history of falls, while Ximenes *et al* (2019) found that almost 28% of patients with a nursing diagnosis of risk of falls had a history of falls.

2.2.7 Absence of a companion

The absence of a companion is one of the extrinsic factors that contributes to the occurrence of falls, reported in 40% of the studies that make up this review (VICTOR *et al,* 2017; SEVERO *et al,* 2018; LUZIA *et al,* 2019; BARBOSA et *al, 2019*).

Barbosa *et al* (2019) found that in 65.9% of the reports of falls, patients were without companions at the time of the event. Prates *et al* (2014) corroborates this with their study in which they found that only 29.2% of falls were reported with a companion present.

Patients often hesitate to ask for help from the nursing staff to get out of bed, overestimating their physical capacity and/or out of embarrassment, especially at night. In addition, the nursing team is not always present due to the number of patients assigned to it, so the companion is an important element in helping the patient with their mobility, and thus in preventing falls (PRATES at all, 2014).

2.2.8 Unfavorable environment

Another extrinsic factor that can increase the risk of falls is the environment, mentioned in 30% of the articles (VICTOR *et al*, 2017; XIMENES *et al*, 2019; AGUIAR *et al,* 2019).

Aguiar *et al* (2019) and Ximenes *et al* (2019) reported that the unfamiliar setting and insufficient non-slip material in the bathroom are among the main environmental risk factors related to the risk of falls.

A study carried out in a medical and surgical inpatient unit at a university hospital in the interior of Paraná found that none of the rooms had non-slip floors. In addition, the water drainage in the bathroom/box was inadequate, keeping these environments constantly wet and, to minimize this problem, they used cloths and rugs on the floor, which further increases the risk of falls (MARQUES, NICOLA, OLIVEIRA, 2016).

In this context, nurses must act to prevent falls in hospitalized patients, identifying intrinsic risk factors related to the patient, together with extrinsic factors related to the environment and the work process, implementing preventive interventions to prevent the adverse event from occurring, reassessing the risk when there is any change in the patient's clinical condition and adjusting the measures if necessary (SEVERO *et al*, 2014; BRASIL, 2013c).

In addition, applying visual signage for patients at risk of falls and providing guidance to healthcare professionals, as well as patients and their companions, are important measures recommended by the PNSP. The education of patients and the professionals who will assist them should be carried out as soon as the risk is identified and reinforced throughout hospitalization (BRASIL, 2013c; LUZIA *et al*, 2018).

3 CONCLUSION

The results of this study showed that falls are a multifactorial adverse event, which mainly affect patients of advanced age, with altered physical mobility, in the post-operative period, using multiple assistive devices and potentially dangerous medication, with reduced visual acuity, a history of falls and altered mental state, as well as environmental factors that influence the occurrence of the event.

It is important to consider that hospitalization itself increases patients' risk of falls due to the change in their familiar environment, especially for those with sensory alterations, such as low visual

acuity, or impaired physical mobility, which can aggravate injuries resulting from falls, should they occur, and the patient's clinical condition.

In view of this, it is essential for nurses to assess the risk factors for falls during hospitalization, in order to support individual, qualified care, seeking a safe environment and preventing the occurrence of this adverse event.

The limitation of this study was the small number of articles on the subject focusing on the adult population, since there are several publications focusing only on the relationship between falls and the elderly.

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SEVEN
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Evaluation of the efficacy of the in *vitro micronucleus method* using a commercial kit and comparison with the microscopy method

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Karine Renata Dias Silveira
Bioinnova Biotechnology Solutions, Brasília, DF, Brazil.
Graduate Program in Genomic Sciences and Biotechnology, UCB, Brasília, DF, Brazil.

Hilana dos Santos Brunel
Bioinnova Biotechnology Solutions, Brasília, DF, Brazil.

Rosângela Vieira de Andrade
Graduate Program in Genomic Sciences and Biotechnology, UCB, Brasília, DF, Brazil.

ABSTRACT
In vitro *micronucleus testing* is an important tool in the investigation of the genotoxic potential of products. Performing the test by the optical microscopy method requires training and attention from the technician reading the slides and can be an extremely slow process. The technique of micronucleus analysis by flow cytometry emerges as a highly complex assay that makes it possible to increase the number of analyses and reduce the time spent on experiments. Some commercial kits are sold to perform this test, however, in some cases, they can be very costly for the laboratory. This work demonstrated that the technique of micronuclei in vitro by microscopy and cytometry are equivalent and that it is also possible to optimize the use of commercial reagents to reduce costs.

Keywords: Micronucleus, In vitro test, Cytometry.

1 INTRODUCTION

Product safety analysis is essential for the overall evaluation of medicines, cosmetics, food additives, insecticides and other consumer agents to ensure that they will not harm human health or that of those who have contact with them. An important test routinely performed and recommended by the OECD to analyze the safety of products is the investigation of their genotoxic potential (Türkez et al., 2017).

Products considered genotoxic are those that, when in contact with a cell, interact with genetic material, producing changes in its structure or function. When these alterations occur and are transmitted to daughter cells, they are called mutations. Mutations are hereditary and these changes in the structural content of DNA, whether in a somatic cell or a germ cell, can cause a variety of diseases to the affected individual, including cancer (Buick et al., 2020; Türkez et al., 2017).

One of the tests routinely used to evaluate genotoxic potential is the in *vitro* micronucleus assay (MNvit), which detects the presence of micronuclei (MN) in the cytoplasm of interphase cells. Micronuclei can originate from fragmented acentric chromosomes, or entire chromosomes that have been unable to migrate to the poles during one of the phases of cell division, anaphase. MNvit is an *in vitro* method that provides a comprehensive basis for investigating the potential for chromosomal

damage. It is able to detect both clastogenic (which break chromosomes) and aneugenic (which induce aneuploidy or abnormal chromosomal segregation) effects in cells that have undergone cell division during or after exposure to the test chemical (Buick et al., 2020).

The presence of micronuclei in human cells is an indicator of damage to genetic material and may be related to the development of reproductive problems and diseases such as cancer. Bhatia & Kumar, 2013 demonstrated that the presence of micronuclei in cells from people exposed to mutagens is associated with an increased risk of developing lung, head and neck, and bladder cancers. In addition, it reported that the presence of micronuclei can affect the reproductive capacity and overall health of individuals. Fenech, 2011

In mammalian cells it is particularly relevant to evaluate the potential of chemical and physical agents to affect human health. Studies show that these *in vitro* tests are useful for identifying genotoxic and carcinogenic agents or proving the biocompatibility of materials. One of the studies already carried out analyzed the genotoxicity of dental implant extracts of (Bryce et al., 2008; Witt et al., 2008) *Porous NiTi* (pNiTi) produced by *Metal Injection Molding* (MIM). Using the *in vitro* micronucleus test, the researchers demonstrated cellular compatibility of the product with the cell lines L-929 (fibroblast) and V79-4 Another study analyzed (N W N A et al., 2023). *black cohosh* extract (ECB), a dietary supplement widely used to relieve symptoms of gynecological diseases in women, which has not yet had its toxicity well characterized. Tests have shown that ECB induces chromosomal damage, causing micronuclei in blood cells when grown at normal levels of folic acid, raising concerns about its safety (Smith- Roe et al., 2018).

In vitro *micronucleus testing* (MNVit) can be performed by both conventional microscopy and flow cytometry. The conventional microscopy technique is the most widely used for the detection of micronuclei, but it requires technical skills and careful analysis of the results. Flow cytometry, on the other hand, is an automated and objective technique that allows the detection and analysis of a large number of cells in a short period of time (Lenzi et al., 2017, 2018; Witt et al., 2008; Zhou et al., 2013).

In this context, the main objective of this study was to compare the results obtained between the techniques of analysis of MNVit by microscopy and by flow cytometry. By providing a comparative analysis of techniques, this study provides valuable information for informed decision-making on the choice of the most appropriate methodologies to evaluate the genotoxic potential of products.

2 MATERIALS AND METHODS

2.1 V79 CELL CULTURE ESTABLISHMENT

Aliquots containing 3x105 V79 cells were cultured with DMEM medium (Dulbecco's modified Eagle's medium) supplemented with 10% fetal bovine serum in 75cm2 culture bottles. At the moment when the cells reached 80% confluency, they were trypsinized and plated in 6-well plates (1.5x10; ^{5} cells per well) for the microscopy assay and in 96-well plates (1x104 cells per well) for the flow cytometry assay. The plates were then incubated for 24h ± 0.5h in a CO2 greenhouse with an atmosphere of 5% ± 0.5% CO2, humidity of 90% ± 10% and temperature of 37oC ± 1oC.

2.2 CELL TREATMENT

The cell treatment protocol was the same for both forms of evaluation (by microscopy and cytometry), differing only in the amount of reagents, which was calculated proportionally to the area of the wells.

After 24 hours of incubation, the culture medium was replaced by the treatments, namely positive control, negative control and vehicle control. The positive control consisted of a 0.75µg/mL colchicine solution in DMEM medium + 10% Fetal Bovine Serum (FBS), the negative control only half DMEM + 10% FBS, and the vehicle control by 0.5% DMSO diluted in DMEM medium + 10% SFB. In each well of the plate, the respective treatments were added in triplicates, being 100uL for the 96-well plates and 2mL for the 6-well plates.

After the addition of the treatments, the plates were incubated for 3 h in a CO2 greenhouse with an atmosphere of 5% ± 0.5% CO2, humidity of 90% ± 10% and temperature of 37oC ± 1oC.

3 MICROSCOPY ANALYSIS PROTOCOL

3.1 EXPOSURE OF CELLS TO CYTOCHALASIN B

After the time of exposure to the treatments, the plates were removed from the greenhouse and analyzed under an inverted microscope to evaluate the appearance of the cultures for the presence of precipitation, morphology and cell death.

After the evaluation, they were treated with cytochalasin B (Sigma, code C6762), a mycotoxin that acts by blocking the formation of the contractile ring of actin and myosin, necessary for the division of the cytoplasm and the formation of daughter cells, causing the cells to stop dividing in the cytokinesis phase, remaining with two or more nuclei in the same cytoplasm Click or tap here to enter the text. (Wessells et al., 1971).

For this, the culture medium was removed and all wells with cells were washed with phosphate buffer (PBS) for 2 times. Then, the DMEM culture medium containing cytochalasin B at the final

concentration of 3 µg/mL prewarmed to a temperature of 37 °C was added. The plate was homogenized gently with circular motions to avoid air bubbles.

The cultures were incubated at 37 °C and 5 % CO2 for 21 hours, which corresponds to approximately 1.5 times the cell cycle time of the V79 cells, and then submitted to fixation treatment.

3.2 CELL FIXATION

The culture medium from each well was aspirated and transferred to 15mL tubes. Then, the cells were trypsinized and added to the corresponding tube. The cultures were then centrifuged for 5 minutes at 1000 rpm. The supernatant was discarded and the cells were resuspended in 3 mL of sterile 0.075 M potassium chloride (KCl) previously cooled. After 3 minutes in KCl, 500 µL of the cell fixative (methanol + acetic acid, in a 3:1 ratio) were added. Subsequently, the cultures were centrifuged again for 5 minutes at 800 rpm. The supernatant was carefully removed and the pellet resuspended in 5 mL of fixative. They were centrifuged once again and resuspended again in 5 mL of fixative.

3.3 ASSEMBLING THE BLADES

The fixed cells were homogenized and 3 drops were added to the central areas of the previously identified slides. After this process, they were placed at an angle in an exhaust hood for 12 hours at room temperature for complete drying. After this period they were stained with panopticon dye.

3.4 SLIDE READING

The slides were analyzed under a Nikon optical microscope with a 10x eyepiece and a 40x objective. Whenever necessary, a 100x objective (with immersion oil) was used to confirm the presence of micronuclei. The multiplication rate was performed by reading the slides to evaluate the Replication Index. We counted 500 cells per slide and recorded the number of mononucleated, binucleated and multinucleated cells. Approximately 500 binucleate cells were analyzed for the presence of micronuclei in each slide.

3.5 STATISTICAL ANALYSIS

The analyses were performed using the GraphPad Prism software.

Initially, the percentages of micronuclei found in each group were tabulated and analyzed by T-test, and the analysis was unpaired and with Gaussian distribution. Subsequently, all groups were analyzed by One-way ANOVA, without matching and with multiple comparisons of the means of each group.

3.6 MICROFLOW KIT PROTOCOL – CYTOMETRY ANALYSIS

After 3 h of incubation, the treatments were removed and each well was added DMEM medium with 10% SFB, 100µL in 96-well plates and 2mL in 6-well plates. The plates were then incubated for 21 h in the greenhouse of CO2 until they are removed from the greenhouse and submitted to the Microflow kit protocol (Commercial kit *In Vitro MicroFlow*® (BD, Cod 562354). For the 96-well plates, the reagents were reduced to 1/5 of the manufacturer's recommendation, which indicates the use of 12-well plates.

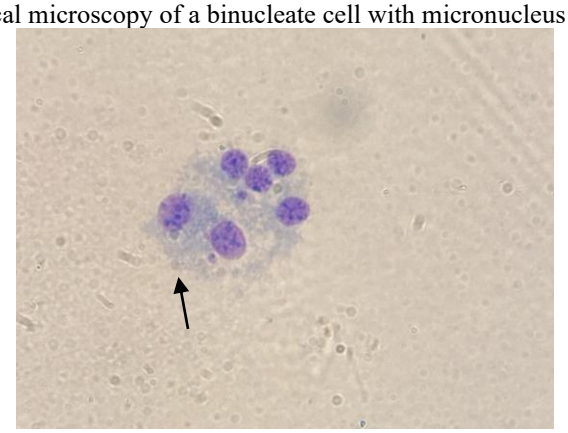
According to the specifications of the manufacturer of the kit used the reagent *Nucleic Acid Dye A* (ethidium monoazide or EMA), crosses the compromised exterior of the membrane of apoptotic and necrotic cells. After that, the cells are washed and the cytoplasmic membranes are digested with detergent to release nuclei and micronuclei. During the lysis step, the reagent *Nucleic Acid Dye B* (SYTOX Green) is introduced and marks all chromatin. In this way, it is possible to achieve differential staining of healthy chromatin versus that of dead or apoptotic cells.

After the completion of the protocol steps, the samples were acquired using the Beckson Dickson (BD) flow cytometer model FACSVia.

4 RESULTS

In order to prove the efficacy of the in vitro *micronucleus technique* performed in cytometry, this study compared the results of flow cytometry assays with light microscopy analyses (Figure 1). For this, treatments were performed with positive controls (colchicine), vehicle control (DMSO) and negative control (culture medium only). The treatments were performed in the same way in the experiments for analysis by microscopy and cytometry, differing only in the amount of reagents, which was proportional to the size of the culture plates and the number of cells used per well.

Figure 1: Image obtained by optical microscopy of a binucleate cell with micronucleus formation indicated by the arrow.



Fonte: Carla Lujan

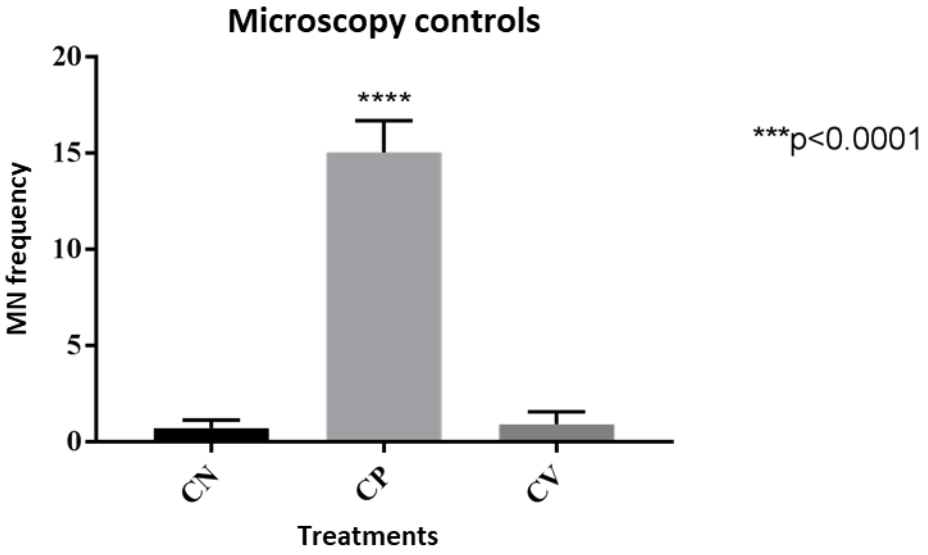
Data from 3 different experiments were obtained for the analysis of each type of micronucleus evaluation (microscopy and cytometry) and the percentage of micronuclei found in the negative, positive and vehicle control samples evaluated by optical microscopy are shown in Table 1.

Table 1: Percentage of micronuclei by control groups in each microscopy experiment.

	Negative Control	**Vehicle Control**	**Positive Control**
Experiment 1	0,36%	0,33%	16,60%
Experiment 2	0,6%	0,8%	15,2%
Experiment 3	1,16%	1,6%	13,3%

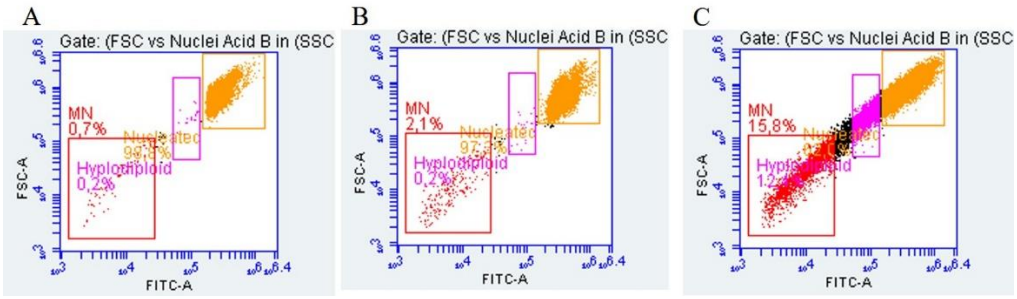
When analyzing the data from the vehicle controls and negative control, the differences in the means were not statistically significant. The opposite is observed when comparing the first two with the Positive Control, which presented statistically significant differences, with a p-value lower than 0.0001 (Figure 2).

Figure 2: Statistical analysis of the micronucleus frequency of the Negative Control (NC), Positive Control (CP) and Vehicle Control (NC) groups in the NM experiments by microscopy. The mean of the positive control showed a significant difference (P<0.001) in relation to the other groups.



For the micronucleus experiments *In fashion* In vitro cytometry, data from 3 different experiments obtained from the acquisition of samples treated with the MicroFlow kit were also used in the cytometer (BD FACSVia). EMA-staining and SYTOX-positive cells are analyzed for micronucleus quantification. The gates were designed according to the recommendations of the kit, and the micronuclei consist of the group of events that present fluorescence in the SYTOX channel with values between 1 and 10% of those found in the gate of the nucleated cells. The graphs obtained in the analyses are shown in Figure 3.

Figure 3: Graphs obtained in the BD Research software. By analyzing the SYTOX signal (FITC-A) by size (FSC-A) it is possible to quantify the Micronuclei (MN – in red), the hypodiploid cells (in purple) and the nucleated cells (in orange). Chart A shows the negative control samples; B the vehicle control and C the positive control.



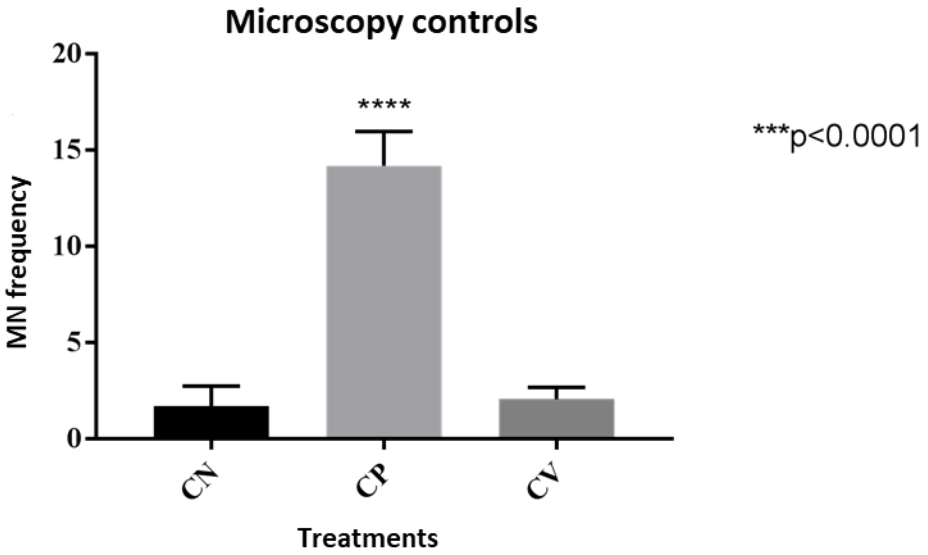
The percentage of micronuclei found in the negative, positive and vehicle control samples are shown in Table 2.

Table 2: Percentage of Micronuclei by Control Groups in Each Cytometry Experiment

	Negative Control	**Vehicle Control**	**Positive Control**
Experiment 1	1,34%	2,51%	16,22%
Experiment 2	0,89%	1,33%	12,87%
Experiment 3	2,87%	2,31%	13,49%

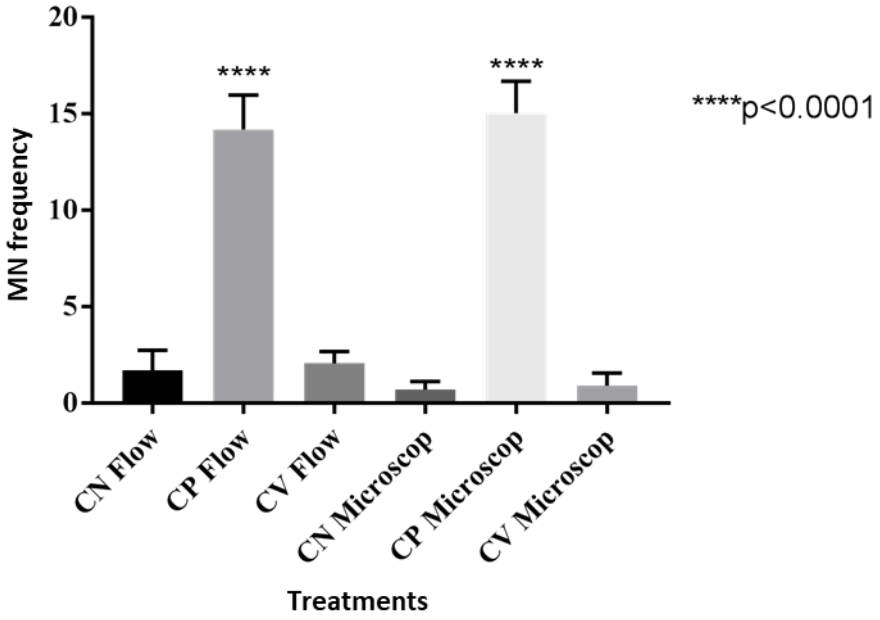
In the cytometry tests, as well as in the microscopy experiments, the statistical analyses of the data from the vehicle and negative controls showed no statistical difference. The opposite is observed when comparing the first two with the Positive Control (Figure 4).

Figure 4: Statistical analyses of the micronucleus frequency of the Negative Control (NC), Positive Control (CP) and Vehicle Control (NC) groups in the NM experiments by cytometry. The mean of the positive control showed a significant difference (P<0.001) in relation to the other groups.



When we performed the comparative statistical analyses of the cytometry and microscopy approaches, we found a consistency in the observed patterns. The analysis of the negative controls in both techniques did not show significant differences, as well as in relation to the vehicle controls. However, significant differences were observed when comparing the positive controls with the negative controls and the vehicle controls. It is worth noting that no significant differences were identified between the positive controls obtained through microscopy and cytometry analyses. Even with the different approaches used for the analysis of the micronuclei, the results indicate no statistically significant difference between the negative controls and the vehicle controls ($p>0.001$). Relevant differences appeared exclusively between the positive controls and the other groups ($p<0.001$), and such differences were not evidenced between the positive controls of the different groups ($p>0.001$).

Figure 5: Statistical analyses of the micronucleus frequency of the Negative Control (NC), Positive Control (CP) and Vehicle Control (NC) groups in the NM experiments by cytometry (Flow) and microscopy (Microscop). The means of the positive controls showed a significant difference ($P<0.001$) in relation to the other groups.



4.1 MICROFLOW® IN VITRO *COMMERCIAL KIT OPTIMIZATION* (BD, COD 562354)

The amount of reagents used for the treatment of the cells that were analyzed by cytometry was reduced by 1/5 compared to the value recommended by the manufacturer for 12-well plates. This ratio was chosen to maintain a minimum volume of reagents per well and to maximize the number of analyses with the same kit. The results showed that this reduction did not interfere with the labeling and identification of micronuclei.

5 DISCUSSION

One of the main advantages of micronucleus testing *in vitro* It is the possibility of performing accurate and detailed evaluations using cells grown in the laboratory. This allows for standardization of the test, minimizing variability between assays. In addition, the use of *in vitro* It allows the selection of different cell types, representing specific tissues and organs, which increases the correspondence with the human organism Added to this is the use of (Lenzi et al., 2017, 2018). *in vitro* It reduces the number of experimental animals by aligning with ethical principles and regulatory guidelines aimed at reducing the use of animals in scientific research. (Jennings, 2015)

The main objective of this study was to provide data to support the use of the micronucleus detection technique *in vitro* by cytometry in V79 cells of known genotoxic and non-genotoxic agents.

Our study demonstrated the equivalence of the MNVit method when analyzed by microscopy and cytometry. Even reducing the number of reagents and cells indicated by the kit manufacturer, we can prove that by performing the test in cytometry it is possible to analyze a larger number of cells (10 thousand events in cytometry versus 500 cells in microscopy), in a few minutes, while the complete test performed by a technician in microscopy can take weeks. depending on the skill of the reader.

Several studies corroborate our data by demonstrating that the efficacy of the in vitro micronucleus test is similar when performed by microscopy or cytometry. Zhou et al., 2013, demonstrated that primary murine bone marrow and blood cells exposed to genotoxic and non-genotoxic chemicals were able to generate a good match between the two methods of analysis. The authors also emphasized that cytometry is a faster and more objective method than manual microscopy. This conclusion has been reached in other studies using different mammalian cells associated with different compounds: human lymphocytes treated with compounds known to be clastogenic and aneugenic; in hamster epithelial cells (CHO-K1) treated with 21 chemical compounds; in peripheral blood of mice. (Lenzi et al., 2018) (Shi et al., 2010) (Witt et al., 2008)

Recent studies have created and validated in some laboratory's software capable of automating analyses. This program can quantify the micronuclei of cells previously labeled with antibodies and specific probes submitted to analysis in a specific flow cytometer, capable of recording images of the cells. Such analyses are based on photographs, just like in the microscopy method, but with the automation of the process, the need for a trained operator in the analyses is eliminated and the difference in readings between operators is zeroed. Another study compared the MicroFlow technique with another semi-automated evaluation technique, Metafer, to evaluate the formation of micronuclei (MN) in human lymphoblastoid cells exposed to different chemical compounds. MicroFlow has been shown to be comparable to the Metafer approach in terms of sensitivity, but with some non-significant differences in micronucleus quantification. (Rodrigues et al., 2021; Wills et al., 2021) (Verma et al., 2017)

The development of automated cytometry-based methods to calculate micronucleus frequencies in cells is a major technological advance when compared to manual slide-based methods. Unlike microscopy, the cytometry method sorts cells in suspension. Individually, the cells flow through a focused laser beam, and the signals of scattering and fluorescence of the light are detected by the cytometer. This automation provides very large numbers of micronucleated cells, improving the power of the assay. (Lenzi et al., 2018; Ueoka et al., 2023; Zhou et al., 2013)

Another important aspect is the speed and efficiency of micronucleus testing *in vitro*. Compared to tests *in vivo*, the essay *in vitro* It requires significantly less time to deliver results, increases production capacity, and can save resources by eliminating labor time spent on manual reading, making it a valuable tool in screening studies (Lenzi et al., 2018; Ueoka et al., 2023; Zhou et al., 2013)

6 FINAL THOUGHTS

Performing the micronucleus test *in vitro* The flow cytometry technique demonstrated equivalence of the data found in the microscopy. Allied to this technique, the use of the Commercial Kit *In Vitro MicroFlow*® (BD, Cod 562354) with the reduction of the amount of reagents proved to be effective, thus allowing the analysis of more samples in less time and with cost optimization for the laboratory.

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Colorectal surgery: Surgical approaches and postoperative rehabilitation strategies

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Bruna Vergani Canali

Laís Tinoco Silveira

Gabriele de Lima Gazani Brito

Nathalia Rodrigues Ribeiro

Guilherme Badawi Urio Mujahed

Ana Carolina Shinkawa Fernandes

Isaac Badawi Urio Mujahed

Denilson Fiore

Ademar Bretas Júnior

ABSTRACT

Colorectal surgery is a multifaceted medical discipline that encompasses the treatment of various conditions, including colorectal cancer, inflammatory bowel diseases, and diverticulitis. This review article examines surgical approaches and post-operative rehabilitation strategies in this field of medicine. Concerning surgical approaches, we highlight laparoscopy and robotic surgery as alternatives to open surgery. Laparoscopy offers benefits such as shorter hospital stays and faster recovery, but the choice of surgical technique should be personalized, taking into account the complexity of the case and the surgeon's experience. Robotic surgery, while promising, faces challenges related to costs and the learning curve. Regarding post-operative rehabilitation strategies, we emphasize the importance of a multimodal approach, which integrates physical therapy, pain management, psychosocial support, proper nutrition, and early mobilization. Personalizing care based on the individual needs of the patient is crucial for a successful recovery. In conclusion, colorectal surgery requires carefully considered decisions and holistic care to achieve effective outcomes and improve patients' quality of life. Ongoing research and the evolution of techniques are essential for enhancing clinical practice in this field. Individualized care and interdisciplinary collaboration are key to ensuring the success of colorectal procedures.

Keywords: Colorectal surgery, Laparoscopy, Robotic surgery, Post-operative rehabilitation, Surgical approaches.

1 INTRODUCTION

Colorectal surgery is an area of medicine that addresses a diverse spectrum of pathologies, ranging from the treatment of colorectal cancer to the management of inflammatory bowel diseases, diverticulitis, and other conditions that affect the colon and rectum. The field of colorectal surgery is characterized by a constant evolution of surgical techniques and postoperative rehabilitation approaches, aiming not only at the effectiveness of treatment but also at improving the quality of life of patients.

The importance of colorectal surgery cannot be underestimated, since colorectal cancer is one of the leading causes of morbidity and mortality worldwide. In addition, conditions such as Crohn's disease and ulcerative colitis affect millions of people, resulting in considerable impact on public health

and the quality of life of those affected. It is in this context that ongoing research and development of surgical approaches and postoperative rehabilitation strategies play a crucial role.

The choice of surgical approach is a complex decision that depends on a number of factors, including the nature of the condition, the location of the problem, and the individual characteristics of the patient. Traditional open surgery options, minimally invasive laparoscopy, and robotic surgery have been the subject of extensive research and debate. Each of these approaches offers specific advantages and challenges, and the appropriate selection should be based on a careful assessment of risks and benefits.

In addition, postoperative rehabilitation plays a crucial role in the recovery of patients undergoing colorectal surgery. Strategies that include physical therapy, pain management, psychological support, proper nutrition, and early mobilization have the potential to speed recovery and minimize complications. These personalized approaches target not only physical recovery but also the emotional well-being of patients, recognizing the psychological challenges that often accompany these surgeries.

Therefore, this comprehensive review aims to explore and synthesize key studies and findings related to surgical approaches in colorectal surgery, as well as postoperative rehabilitation strategies. By doing so, we hope to provide valuable insights that will assist surgeons, healthcare professionals, and researchers in making informed decisions and improving patient care in this vital area of medicine.

2 METHOD

2.1 SEARCH STRATEGY

To identify relevant studies, we conducted a comprehensive search of electronic databases, including PubMed, Scopus, and Web of Science, up to September 2021. Search terms included "colorectal surgery," "surgical approaches," "postoperative rehabilitation," "surgical complications," and "clinical outcomes." Inclusion criteria were established that prioritized high-quality studies, randomized controlled trials, systematic reviews, and meta-analyses. Exclusion criteria included studies with weak methodology and home reports.

3 RESULTS

The analysis of the studies was grouped into three main topics: laparoscopy, robotic surgery, and endoscopy. The effectiveness of different approaches was discussed based on surgical outcomes, complication rate, recovery time, and patient satisfaction.

3.1 SURGICAL APPROACHES IN COLORECTAL SURGERY

Colorectal surgery is a medical discipline that involves a wide range of conditions, including the treatment of colorectal cancer, the management of inflammatory bowel disease, the resolution of diverticulitis, and the management of other pathologies of the colon and rectum. The choice of surgical approach plays a key role in determining the success of the procedure and improving the patient's quality of life. In this context, the comparison between surgical approaches, including open surgery, laparoscopy, and robotic surgery, has been a topic of great interest and research.

Traditional open surgery, for many years, was considered the gold standard in colorectal surgery. However, technological advancements have brought laparoscopy into the spotlight. Clinical studies and systematic reviews have consistently shown that laparoscopy offers significant advantages, such as shorter hospital stays, reduced postoperative pain, and faster recovery (Smith et al., 2017). The laparoscopic approach is also associated with smaller incisions, resulting in less trauma to the patient and more discreet scarring. However, the choice between open surgery and laparoscopy is not universal, and the decision must be individualized, taking into account the complexity of the case, the patient's conditions, and the surgeon's experience (Brown & Jones, 2019).

In addition to laparoscopy, robotic minimally invasive surgery has emerged as a viable option in colorectal surgery. Robotic surgical systems offer a magnified three-dimensional view and the ability to perform precise movements. This translates into benefits, such as improved cosmetic results and a lower conversion rate for open surgery (Davis & Wilson, 2020). However, it is important to recognize that robotic surgery may involve significantly higher costs compared to laparoscopy, and the learning curve for surgeons adopting this approach may be a challenge to overcome (Jones et al., 2018).

Another critical aspect in colorectal surgery is the choice between segmental resection and total resection, especially in the treatment of colorectal cancer. Segmental resection involves removing only the affected part of the colon or rectum while preserving a functional part of the organ. Research and meta-analyses suggest that in selected cases, segmental resection may be as effective as total resection, resulting in better preservation of anorectal function and improved postoperative quality of life (Johnson & White, 2019). However, this decision should be carefully weighed based on the location, extent of the tumor, and individual patient characteristics, such as functional capacity (Clark et al., 2020).

It is essential to emphasize that the choice of surgical approach in colorectal surgery is not a one-time decision, but rather a carefully evaluated process that takes into account multiple factors. Additionally, ongoing research is key to improving surgical techniques and identifying best practices for each clinical setting, thereby ensuring more effective surgical outcomes and a better quality of life for patients.

3.2 POSTOPERATIVE REHABILITATION STRATEGIES

Postoperative rehabilitation plays a crucial role in optimizing recovery and improving the quality of life of patients undergoing colorectal surgery. These strategies aim to reduce the length of hospital stay, minimize postoperative complications, and promote the restoration of normal function of the gastrointestinal tract. In this context, the implementation of multimodal rehabilitation programs has gained prominence as a comprehensive and effective approach (Brown et al., 2018).

An essential component of postoperative rehabilitation is the multimodal approach, which integrates a range of measures. These include physical therapy to improve mobility, breathing exercises to prevent lung complications, proper pain management, and optimized nutrition (Jones & Smith, 2019). This holistic approach has been shown to be effective in speeding up recovery and reducing length of hospital stay (Taylor et al., 2020).

In addition, personalizing post-operative care based on individual patient needs is critical. This includes assessing the patient's functional capacity prior to surgery in order to develop a tailored rehabilitation plan (Clark & Davis, 2021). Patients with better fitness often recover more quickly after surgery.

Proper pain control also plays a critical role in postoperative rehabilitation. Uncontrolled pain can lead to immobility, making recovery difficult. Multimodal analgesia strategies, including medications, regional anesthesia, and non-pharmacological techniques, are used to ensure effective pain relief (Patel & White, 2017).

In addition, the prevention of complications, such as deep vein thrombosis, is an important concern in postoperative rehabilitation. Early mobilization, intermittent pneumatic compression therapy, and prophylactic anticoagulation are common measures to minimize these risks (Williams et al., 2018).

Psychological and social support is often underestimated, but it plays a significant role in patients' recovery. Colorectal surgery can be emotionally challenging, and psychosocial support can help patients navigate these challenges (Martin et al., 2019). This can include counseling, support groups, and stress management interventions.

In addition, proper nutrition plays a key role in postoperative rehabilitation. Early enteral feeding is a common strategy to accelerate the recovery of the gastrointestinal tract and prevent malnutrition (Garcia et al., 2020). Personalized nutrition based on the patient's individual needs is preferable.

Early mobilization is a key practice in postoperative rehabilitation. It helps prevent complications such as muscle atrophy and deep vein thrombosis. Physical therapy is often incorporated into the care plan to ensure that patients are active as early as possible after surgery (Clark et al., 2020).

Finally, continuous monitoring of patients after surgery is essential to detect early complications and ensure that recovery is progressing as expected. This involves regular follow-up appointments with medical staff and open communication between the patient and healthcare providers (Davis & Patel, 2019).

In summary, postoperative rehabilitation strategies play a critical role in colorectal surgery, aiming to optimize recovery and improve patients' quality of life. Multimodal approach, personalization of care, pain management, prevention of complications, psychosocial support, adequate nutrition, early mobilization, and continuous monitoring are key components of this integrated approach.

4 DISCUSSION

The discussion about minimally invasive cardiac surgery covers a number of crucial aspects that impact its efficacy, safety, and clinical applicability. Based on the studies and information presented throughout this article, it is evident that this approach has the potential to revolutionize the way we treat complex heart disease, but it also faces significant challenges that need to be addressed in order to maximize its benefits.

One of the main points of discussion is the careful selection of patients for minimally invasive procedures. While these approaches offer notable advantages in terms of faster recovery and less surgical trauma, not all patients are ideal candidates. As mentioned earlier, age, comorbidities, and individual characteristics play a crucial role in determining a patient's suitability for minimally invasive surgery (Falk et al., 2017; Umakanthan et al., 2018). Therefore, it is imperative that the preoperative evaluation takes into account all of these factors to make informed decisions about the best course of treatment.

Additionally, the learning curve associated with minimally invasive heart surgery is an important topic of discussion. Acquiring skills in less invasive techniques requires specialized training and extensive practice (Umakanthan et al., 2018). Surgeons who want to adopt these approaches need to undergo rigorous training programs to ensure the safety and effectiveness of the procedures. Therefore, the development of robust educational programs and the dissemination of knowledge are key to further boosting this area.

Another highlight is the ongoing need for long-term research and evaluation of the outcomes of minimally invasive cardiac surgery. Follow-up studies are essential to determine the durability of outcomes, identify late complications, and compare the long-term efficacy of these techniques compared to open-heart surgery (Bougioukakis et al., 2019; Smith et al., 2020). Research also plays a key role in identifying technological innovations and enhancements to minimally invasive approaches.

In addition, personalized medicine emerges as an important consideration in the discussion about minimally invasive heart surgery. As we move towards a more personalized approach to patient care, it is essential to consider individual factors, such as genetics and clinical characteristics, when determining the best surgical strategy for each patient (Harskamp et al., 2019).

In summary, minimally invasive cardiac surgery represents a promising approach in interventional cardiology, offering substantial benefits to patients. However, it is an area that requires careful patient selection, specialized training, ongoing research, and consideration of personalized medicine to reach its full potential. As new discoveries are made and technological innovations emerge, minimally invasive cardiac surgery continues to evolve and shape the future of clinical practice in cardiology.

5 CONCLUSION

Colorectal surgery is an area of medicine that constantly challenges healthcare professionals to provide the best possible treatment to patients. In this review, we explore surgical approaches and postoperative rehabilitation strategies, highlighting the importance of personalized decisions and holistic care to achieve effective outcomes and improve patients' quality of life.

Regarding surgical approaches, laparoscopy and robotic surgery have emerged as viable alternatives to traditional open surgery. Although laparoscopy is often associated with faster recovery and lower postoperative pain, the choice of surgical technique should be carefully evaluated based on the complexity of the case and the surgeon's experience. Robotic surgery offers precision and three-dimensional vision, but it faces challenges related to costs and the learning curve. The decision between these approaches should be made considering a comprehensive assessment of the patient and clinical conditions.

With regard to postoperative rehabilitation, multimodal strategies have been shown to be highly effective in promoting patients' recovery after colorectal surgery. Personalization of care based on individual patient needs is critical. This includes physical therapy, pain management, proper nutrition, psychosocial support, and early mobilization. Not only do these measures speed up physical recovery, but they also address the emotional needs of patients by recognizing the psychological challenges often associated with colorectal surgery.

As we continue to advance colorectal surgery research and clinical practice, it is critical to maintain a commitment to ongoing research and evolving techniques. The personalized approach and consideration of each patient's individual characteristics should be the central focus of any treatment plan. Additionally, interdisciplinary collaboration between surgeons, physiotherapists, psychologists, and other healthcare professionals is essential to ensure the best possible approach.

Ultimately, this review seeks to provide a comprehensive overview of surgical approaches and postoperative rehabilitation strategies in colorectal surgery. Understanding the complexity of this medical discipline and recognizing the importance of individualized care are key steps to improve surgical outcomes and quality of life for patients undergoing colorectal procedures.

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SEVEN
publicações acadêmicas

Vibrational aesthetics and education of consciousness in the process of integral health

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Valquiria Pezzi Parode
Adjunct Professor at UERGS - Doctorate (PUCRS) and Master's Degree in Education (UFRGS). Specialization in Youth and Adult Education (EJA) from the perspective of Popular Education (UFRGS); Bachelor's degree in Fine Arts (UFRGS) and in Human and Social Sciences (Emphasis in Sociology/UFRGS); Transpersonal Psycho-Pedagogue and Multidimensional Vibrational Therapist. Researcher in the area of Science of Consciousness.
E-mail: valquíria-parode@uergs.edu.br

ABSTRACT

This article highlights the research on Vibrational Aesthetics (PARODE, 2004), its relationship with health and education, based on what I call, Consciousness Education for Integral Health. From an interdisciplinary and transdisciplinary qualitative approach, it brings as its foundation the holistic and integral perspective of human development, having as background references studies on Quantum Physics, Neuroscience, Transpersonal Psychology and other areas of knowledge and knowledge, in addition to theory Complexity (MORIN,2001), Multidimensionality (PARODE,2004) and Transdisciplinarity (NICOLESCU,2002). The challenge of this study is to problematize the relationship between body and consciousness, based on Vibrational Aesthetics in its applied bias. The study aims to understand the complex and empirical relationship of energy fields (emotional, mental, spiritual bodies), which are articulated with the biological physical body in the human body, in its vibrational perspective in relation to an existential projection of the being in time and space, in multi dimensions. The study also aims to highlight, through education from a perspective of Consciousness Education and Multidimensional Vibrational Therapy, the importance of processes related to the Wholeness of the Being (PARODE, 2007) for Integral Health (PARODE, 2010). Aesthetics here, beyond a theory, expands its approach to the field of pragmatic action in relation to Integral Health, enhancing a unity between body, mind, emotion and consciousness. Vibrational Aesthetics, so to speak, is the Aesthetics of Consciousness, which makes it possible, from Consciousness Education and Multidimensional Vibrational Therapy, to fully encompass body-nature-culture and cosmos as a Unit that can generate Integral Health and the fluidity of the Being in the world. In this approach to aesthetics, education and health, we identify Vibrational Aesthetics as an area of knowledge capable of generating awareness of disease prevention, for integral health, that is, of the physical and vibrational body (PARODE,2019). Through not only education for nutrition and food intake, but also for the qualification of human vibrational fields (mental, emotional and energetic). It is in this relationship between Aesthetics, Health and Education, that we perceive the vibrational field as an articulator of the different layers between the individual and their terrain, an existential locus capable of a projectual and at the same time cosmic consciousness. Hence the importance of Vibrational Aesthetics for configuring another philosophical approach regarding the issue of Health, which is multidimensional and which can certainly contribute to Integral Health and the human development of the Being in the world.

Keywords: Vibrational Aesthetics, Consciousness Education, Integral Health.

1 INTRODUCTION

To understand the processes that involve Vibrational Aesthetics and Health, this qualitative and transdisciplinary research is based on a literature review carried out from 2021 to 2022. Vibrational Aesthetics (PARODE, 2004) is a theory that moves in the field of Art theories, being built by the

principle of *reconnection of knowledge* (MORIN, 2001), involving different areas of knowledge to account for the complexity of human life. Theory that is based on Quantum Physics, Neuroscience, Psychology of Consciousness, Biology, Ecopedagogy, Hermeneutic Phenomenology, Multidimensional Philosophy and other areas of knowledge and knowledge. Vibrational Aesthetics is a theory arising from experiments in the field of Arts, Health and Education, articulating thought and practice between the sensible and the intelligible, which is based on the concepts of Consciousness, Continuous and Discontinuous, Aesthetic Experience and Symbolic Imagination, Language and Communication, which is constituted as a whole, from the understanding of the relationship between the Human Vibrational Fields, of Nature and Cosmos, postulating as a principle the fruition between the different dimensions of the human and its *existential locus*. This perspective creates its own cosmology between the internal and external aspects of the body, seeking to establish balances through aesthetic assemblages, homeostasis between the vibrational layers of the bodies.

It is through the notion of unity between bodies and nature, a single, multiform substance with different intensities, power and vibrations, that we identify an approximation between Spinoza's Ethical and Political Thought and Vibrational Aesthetics. It would be in the relationship between the One and the Multiple and the possible interactions, being able to generate what Spinoza defines, in the theory of affects, as joyful passion or sad passion. A body, in this perspective, can compose with another body and thus expand its potency, a joyful passion, or it can annihilate another body, generating a sad passion. By referring to Vibrational Aesthetics, we understand the importance of these compositions and interactions of the physical and vibrational bodies, which are constituted in different frequencies and vibrations.

The approach of Vibrational Aesthetics has as its reference the energy that is produced and emanates from the bodies; élan vital as Bergson (2005) would say. It starts, therefore, from a thought about the aura, élan vital, or even, as Parode (2004) calls it, the Vibrational Body. Quantum medicine, unlike the traditional model of medicine, considers and highlights the importance of the vibrational body and the interrelationship of the physical-biological body with the vibrational body. It shows how much we need to be attentive to the balance of both, especially when it comes to health processes, otherwise, the imbalance is established and the disease is established (PARODE, 2007). All fields are determinant in this sense, physical, mental, emotional, energetic, spiritual field, so that there is a balance of the *Being*. The imbalance of one field affects the others. This perspective refers to the *Theory of Affections* in Spinoza (2017). In addition to the food ingested and its nutrients, the mental and emotional field in imbalance also make a total difference in the health and quality of life of the subjects, which can generate many diseases in the human being. In this sense, illness can settle in the physical body, when the energy body is out of balance,

The theme of this study with its approach validated by the theory of Vibrational Aesthetics, based on the relationship between health and education, by an inter and transdisciplinary approach called by Parode (2010) Consciousness Education, aims to provide opportunities for reflection and understanding about the need for a paradigm shift to expand the multidimensional approach. under vibrational aspects and its practical and effective application. This is because it highlights a specific issue regarding the notion of the body, how much we need to expand our consciousness, advance in this direction, that is, that we need to understand that the human body is not only physical-biological, but also vibrational, energetic. This certainly validates the importance of this research, which relates the issue of the physical and vibrational bodies, evidencing the relationship of the vibrational fields (emotional, physical and energetic) with health, thus contributing to expand knowledge in the area of Health and others, helping to raise awareness of the way the human being perceives not only his food, but also his food. that it is certainly important and can generate health, but also that health is linked to emotion, thoughts, vibrational energy. In this sense, education in daily life is important, we need to look beyond basic needs and realize that the issue of health and disease goes beyond the dimension of the physical and biological body (PARODE, 2019), but is also related to other issues, such as the Vibrational Body (PARODE, 2004) and the multidimensional and referential field. Therefore, the purpose of this study is to expand the knowledge about vibrational energy, as well as to instigate new studies in this area, emphasizing the Education of Consciousness in the process of Integral Health.

2 VIBRATIONAL AESTHETICS

Vibrational Aesthetics, a multidimensional process of expansion of consciousness, is also a process that articulates energy healing systems through the interaction of cosmic and human vibrational fields (PARODE, 2004). It is a multidimensional process that includes multiple systems, including art, therapy, education, meditation, nutrition, multiple languages and interrelated intelligences, and conversation. The composition of these systems in an integrated perspective with qualitative objectives from the point of view of physical, mental and organizational health, were conceived and co-created by the researcher in the field of Vibrational Aesthetics, Valkyrie Parode. Throughout her career, Valkyrie experimented with art therapy, and from aesthetic experiences with groups organized around experimental projects, she obtained practical results, which allowed her to build research methodologies and aesthetic-vibrational approaches, involving the body and consciousness of the individuals who are members of the groups. Initially, it used performance, meditation, group interaction, sensory and emotional exploration between individuals and with nature and with projected artistic symbologies, graphics, symbols, visual language and others. This research provided him, over the course of twenty years, with the possibility of observing the results in his groups.

The theory of Vibrational Aesthetics is constituted as Aesthetics and Science of Consciousness, seeking the connection between the field of the sensible and the intelligible, the Education of the Sensible prioritizing a holistic approach that interconnects, or as Morin would say, *re-connects*, the multiple knowledges (MORIN, 2006), areas of knowledge and enables the field of art, education and Health. performance and organizational management of human practices, stimulating, from their interrelated systems, alignment and energetic balance with the entire living system, for healing and the integrality of the *Being.* This perspective of Vibrational Aesthetics works with the idea of awakening the consciousness of the *Being, of the* search for the Wholeness of Being, *of the* various levels and fields of consciousness, according to Pagode (2010) for the alignment of the REC (Cosmic Balancing Network). The structuring principle of Vibrational Aesthetics is the perception of a cosmic consciousness, an expanding consciousness, consisting of several levels, composed of subtle energy fields, stimulating the cognitive, sensitive and aesthetic dimension in relation to the molecular arrangement of the physical body as a complex system weakened by vital energy, whose flow is intertwined and interconnected to a larger network of cosmic energy. that is, body, mind, emotion and spirit are connected to the cosmic universe and articulated to the Biocosmic Principle (PARODE, 2010).

3 INTEGRAL HEALTH, ENERGY SYSTEMS, VIBRATIONAL BODY

Science has brought the basis that the outer physical world is vibrational and composed of varying spectrums of energies, perceptible or not. This *quantum* of energy that emanates from each body moves in waves with its ranges of amplitudes and frequencies, giving them unique behaviors and characteristics (PEIRCE, 2011). Realizing that we are vibrational beings, in practice, means realizing that we are beings composed of matter and energy, vital extension in time and space, *duration (*BERGSON, 1999), at the same time that we are multireferential beings, we are also multidimensional beings (PARODE, 2019). Thus, Integral Health, which means the health of the physical, mental, emotional and spiritual body of the Being, is not only related to the physical-biological body, but is directly related to this multimonthly approach, to what I call the Vibrational Body (PARODE, 2004), to the electromagnetic, energetic field that surrounds the human being.

4 ENERGY FIELDS AND INTEGRAL HEALTH

Living systems are surrounded by energy fields, the realization of the existence of energy fields occurred from scientific research that advanced due to the discovery and use of Kirlian photographs that record energy fields (PARODE, 2004, COUSENS, 2011). Scientifically, from Bioelectrography it has already been possible to prove and measure the energy field of living systems, as well as the vibratory characteristic of emotions, of emotional energy. Emotions, whether positive or negative, are

manifestations of the vital energy that favors absorption by human consciousness. Emotions are disturbed by physical illness and physical illness can generate psychological disturbances, in turn, psychological imbalances cause physical consequences generated by tensions in the heart and nerves weakening the physical body (FRAWLEY, 1996). A real perception and discernment of emotions maintained by focusing on the present moment is capable of mitigating the emotional or physical effects (CÔRTES, 2008).

According to Cousens, the first level of manifestation of vital energies is the living colloidal field, and being healthy, it is essential for the homeostasis of the coagulation system and for the construction of cellular, blood, lymphatic and intracellular structures (COUSENS, 2011). This theory and material approach of the energy field allows us to consider as possible in the field of application, the interaction and affection of bodies by the energetic bias, which in turn is influenced by emotional states. From this perspective, the emotional state can influence the energetic frequency of environments and objects, including food.

The organism psychosaps density, whether it is generated by the vibrational field of the person who manipulates and prepares the meal, that is, from the oscillation of more densified emotions (low frequency measured in Hertz – Scale of Emotions, Dr. David Hawkins). Children, the elderly, and sensitive people are more susceptible to dense and condensed energies in food through food preparation. The mind is also matter and has vibratory characteristics. Life manifests itself in several more subtle planes that must be considered, this more refined matter has vibratory movements in its atomic structure, generating peculiar sounds according to the generating source (CÔRTES, 2008). Being sensitive, the mind is influenced by all things and grounds the senses, and can erect a barrier around itself to dull its sensibility. For this reason it is important that we are open to observing paradigms other than materialism, we need to transcend the mechanistic view to understand all these processes. Therefore, in order to improve and enhance energy for health, we need Consciousness and its expansion, that is, to understand the interconnection between us and the Cosmic Universe as approached by Vibrational Aesthetics (PARODE, 2004). According to Cousens (2011), what is absorbed by our body-mind-spirit complex, at different levels of matter density and precipitated from the cosmic force is considered nutrition, what nourishes us as living beings, this is a holistic paradigm approach.

From the point of view of biologists, the cell has a structured water matrix containing enzyme systems and macromolecules, complemented with sodium and potassium ions, in a polarized water structure. The greater the amount of water structured within the cells, the greater the balance of balanced and concentrated intracellular ions, increasing the energy of the subtle field and benefiting health (COUSENS, 2011). Therefore, water, because it is highly energetic, because of the large amount of ions it has, is altered in its composition and charged with the vibrant energetic impression to which

it is exposed. The subtle energy fields vibrate in tune with the cosmic energy transferring energy to us and as our body-mind system expands and transforms at the level of consciousness of its *spiritual energy*, the greater ease occurs for this energetic transfer (COUSENS, 2008). This approach is close to the Bergsonian approach to *Creative Evolution* (BERGSON, 2007).

5 AWARENESS EDUCATION IN THE INTEGRAL HEALTH PROCESS

Vibrational Aesthetics – a multidimensional process of expansion of consciousness presupposes the Education of Consciousness as one of the possibilities for human evolution, for Integral Health, as this is constituted from a multidimensional and multi-referential approach. This means that the human being needs to evolve, to experience each level of consciousness in order to evolve from the material world to the multidimensional world and vice versa. When we refer to "Integral" we can refer to a more comprehensive, holistic vision, where all things are intertwined and at the same time we cannot suppress differences. Integral Health, which involves the health of the physical and vibrational body, is urgent and necessary for the evolution of humanity in contemporaneity. The process of Consciousness Education can certainly make a difference, as it highlights the complexity of the human being and the world in a time of chaos and disorder, it also points to a new paradigm of science, for health and quality of life, based on the understanding of the multidimensionality of the Being and the Cosmos. The transdisciplinary approach in education, which starts from interdisciplinarity, from the "reconnection of knowledge" (MORIN, 2001) to solve problems, not only in health, but in all the areas in which it is contained, can generate a Creative Evolution, as mentioned by Bergson (2007).

6 METHODOLOGICAL PROCESS

The research consists of a qualitative, bibliographic, inter and transdisciplinary approach and was carried out from 2021 to 2022. For the survey of studies related to the chosen theme - Vibrational Aesthetics – Consciousness Education, Multidimensional Vibrational Therapy (TVM) and Integral Health. Books, articles, websites, scientific journals, dissertations and theses related to the main theme of the study were used. To this end, the following databases were also selected, Google and Google Scholar.

7 DATA ANALYSIS AND RESEARCH RESULTS

After bibliographic research related to the theme in question - Vibrational Aesthetics - Consciousness Education, Multidimensional Vibrational Therapy and Integral Health, in order to disseminate knowledge about Vibrational Aesthetics contemplating a process of paradigm change and expansion of consciousness for a greater understanding of connections of access to the Cosmic

Vibrational Field (PARODE, 2004), dynamics of balance and energetic exchanges between people, The environment, nature and the cosmos We can point out some axes of analysis to understand the process that constitute the results of the research.

Vibrational Aesthetics : the theory of Vibrational Aesthetics is constituted as a multidimensional process of expansion of the consciousness of the Being, articulated to practice, presupposes the change of paradigm, from the Cartesian and linear model to the multidimensional model. The multidimensional approach presupposes the complexity of Being, Nature, Culture, and Cosmos. When it comes to the Human Being, it means to say that our body is not only physical and biological, that we are not only matter, but that we are also energy, we have a *vibrational* body, an electromagnetic field around the physical body and interconnected to it, vibrating at different frequencies and energy waves, which is also interconnected to other energy fields, of other bodies, such as the cosmic, universal field. Thus, in order to understand health from the energy field, we need to expand our consciousness, which can stimulate processes of healing and renewal of the consciousness of the *Being*, and consequently, of the quality of life in all instances. This process, in its pragmatic approach, can be articulated with specific methods and dynamics according to the particularities of each individual, thus projecting an existential planning qualified by the holistic integration of the body with its universe, a process recognized by Morin (2006), from the perspective of complexity, as *re-ligare*.

Integral Health - we perceive the urgency to develop research based on the new paradigm, with a multidimensional approach, which evidences the conception of an *Integral Human Being,* which presupposes that one works on the Being in its totality (body, mind, emotion and spirit), according to (PARODE, 2010), in the Wholeness of the Being, because the body is not only physical - biological, but Multidimensional, which presupposes, then, that vibrational energy can impact health and well-being. We find that health and education are directly related, what we ingest, feel, think and absorb is vitally important for the health of the physical-biological body, but it is also for the Vibrational Body (PARODE, 2004), so we have to be careful with what we ingest, absorb, feel, think. What can be seen is that the interaction of the physical and vibrational bodies in their internal and articulated process with their environment and cosmos is directly related to possible states of health and disease. In this sense, we need to show that our body is not only physical-biological, but also vibrational. The emotional, mental and energetic field is constituted as a vibratory field of this Vibrational Body, therefore, it can generate many impacts on the human being, determining his health or disease (PARODE, 2007).

Education of Consciousness and Human Vibrational Fields - With regard to the Emotional, Mental and Energetic Fields, it is important to address the problem of oscillations of emotions and negative mental and energetic patterns, how much this can affect the health of individuals, as well as

the oscillations of emotions and their vibrational frequencies that can change, in addition to the vibrational field of the bodies, the vibrational field of the environment, psychosomatization and materialization of diseases in people. The general conception is that everything we ingest, capture by the sensation and perception of the body that we feel or absorb has energy, food, emotions, thoughts produced, perceptions, and can determine health and/or disease. In this sense, it is essential to emphasize the importance of Consciousness Education, to highlight the relationship of vibrational fields for aesthetic and vibrational management of health and quality of life of the being. In addition, it is important to highlight the issue of paradigm transition, seeking alternatives to the traditional and reductive model of education and health, mechanistic, Cartesian and linear, and to adopt a multidimensional logic of complexity to understand the processes that involve Integral Health.

8 FINAL THOUGHTS

When we begin to understand the importance of the electromagnetic field, called the Vibrational Body (Parode, 2004) that is articulated to the physical and biological body and its interaction with the environment, we will begin to cultivate a better awareness of ourselves, as well as how to take care of our health in the Wholeness of our Being (Parode, 2004)

A rescue of Consciousness and multidimensionality, a sensitive look at our integration and action in the environment, are some approaches of Vibrational Aesthetics, which evokes the interconnection of knowledge, uniting the good, the good and the beautiful, together with Science and Consciousness, Education of Consciousness, providing an opportunity for a perception of spirituality and the vibratory energy of bodies in their interconnection and material and temporal processuality. Understanding that the human being is also the result of this interaction between the dense and the subtle, and that the construction of the new paradigm of science to understand education and health in the twenty-first century is constituted in the relationship between the sensible and the intelligible. The vibrational perspective, at its limit, seeks to rescue the soul condition of the relationship between bodies and nature, an approach to the sacred as an ethical, aesthetic, political condition of the existential, having aesthetics as a reference as an articulating intersectional field of knowledge.

Finally, the present study leads us to consider Vibrational Aesthetics - Consciousness Education and Multidimensional Vibrational Therapy as processes that involve several areas of knowledge and knowledge that can generate Integral Health. In this sense, the time has come to choose to know, learn and teach, disseminating knowledge to improve the quality of life and well-being of all of us, after all, the interconnection between beings is known, as well as that we are affected by the environment. We need to understand the paradigm of transdisciplinarity, which involves the complexity and multidimensionality of the *Being*, in order to be able to perceive the interconnected flows between bodies and evidence the Unity in the Whole.

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Hospital waste- Recycling for hospital energy feedback

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Eliete de Pinho Araujo

Ingrid Christine da Silva Bastos Lopes

Priscilla Benevides Segarra Domenech

ABSTRACT

Considering the view of hospital waste as dangerous and potentially infectious, the treatment given may be diffuse and inadequate. In this context, this work aimed to investigate the possibility of adapting recycling methods to various hospital waste, to generate energy to feed back the hospital building. Solid waste, especially health waste, is today a major pollutant of the environment and the legislation exempts the State from responsibility for its illegal disposal in common landfills. Hospital administrators may package and store in a way that does not consider the type of collection, transportation, treatment, and destination system. The current legislation lacks more in-depth research in the area to work in a more functional way and consider the possibility of recycling to generate products that can be used again, with minimal dumping and damage to the environment. Currently, hospital buildings do not have processes that enable total efficiency of their structure and ways to feed back into the building itself. It is still necessary, in most cases, to use extra power generators and dispose of water, garbage and other materials that can be reused. It was only in 2010 that the law establishing the National Solid Waste Policy was approved, after twenty years of discussions in the National Congress. This law establishes that environmental education is a fundamental instrument for success in this purpose of changing a culture in relation to waste disposal. In fact, garbage is a word that has already been proscribed by law, and today we speak of waste and rejects, because everyone should take advantage of this material. There is also a concern with improving the quality of life of human beings, the maintenance of life on the planet and the survival of the ecosystem. Doubts arise about what to do with the production and with what has already been produced of waste so that it does not cause further irreversible damage to the environment. It is these doubts that arose for the research theme. To support the answers to the questions raised in this study, the buildings of the Regional Hospital of Taguatinga (HRT - DF) and the Regional Hospital of Santa Maria (HRSM - DF) were studied, as references. Also the ENSP-FIOCRUZ Thesis, 2008 – Araujo, E. P. quality of life, clean energy production, necessary changes in legislation and their applications in architectural design. In the end, a booklet was prepared for the user campaign and an architectural project with the appropriate space in the hospital for the storage of the waste until the destination, thus being able, in various ways, to feed back into the building.

Keywords: Hospital waste, Clean energy, Feedback.

LIST OF ABBREVIATIONS:

ABNT - Brazilian Association of Technical Standards
AIDS - Acquired Immunodeficiency Syndrome (Síndrome da Imunodeficiência Adquirida)
ANTT - National Land Transport Agency ANVISA - National Health Surveillance Agency IDB - Inter-American Development Bank
IBRD - International Bank for Reconstruction and Development (World Bank)
CEBES - Brazilian Center for Health Studies CME - Sterile Material Center
CNEN - Norm of the National Nuclear Energy Commission CONAMA - National Council for the Environment
CONTRAN - National Traffic Council
CTNBio - National Technical Commission on Biosafety ECP - Pollution Control Equipment
EPA - Environment Protection Agency - USA EPC - Collective Protective Equipment
ENSP-FIOCRUZ - National School of Public Health EPI - Personal Protective Equipment

MSDS - GMC Chemical Safety Data Sheet - Common Market Group
HIV - Human Immunodeficiency Virus (Vírus da Imunodeficiência Humana) HRT - Hospital Regional de Taguatinga
HRSM - Hospital Regional de Santa Maria
IPANEMA - Outsourced Hygiene, Cleaning and Segregation Company of the Department of Health
MMA - Ministry of the Environment MS - Ministry of Health
NBR - Brazilian Registered Standard
ILO - International Labour Organization
UN - United Nations OS - Polystyrene
PB - Paraíba
PC - Sharps
PEAD - PEBD High Density Polyethylene - Low Density PET Polyethylene - Polyethylene Terephthalate
PCMSO - Occupational Health Medical Control Program PGRSS - Health Services Waste Management Plan
PP - Polypropylene
PPRA - Environmental Risk Prevention Program PNRS - National Solid Waste Policy
PVC - Polyvinyl Chlorite
RDC - Collegiate Board Resolution
REFORSUS - Reinforcement of the Reorganization of the Unified Health System RSS - Health Services Waste
MSW - Urban Solid Waste SUS - Unified Health System
SVS - Health Surveillance Secretariat

1 INTRODUCTION

Health Service Waste (HCW) is all that waste generated in any human or animal medical care service, or similar establishments as defined by ANVISA RDC Resolutions No. 306/2004 and CONAMA No. 358/2005.

Based on the theme Hospital Waste – Recycling for hospital energy feedback, the initiative was taken to carry out research, campaign and proposal of architectural project, with the objective of studying concepts, legislation and existing works on the subject, and identifying what is possible to do so that by recycling waste, it is possible to elaborate an architectural project that is not only sustainable, but also sustainable. but self-sustaining.

As a proposal, the advantages of the correct classification and typological separation of medical waste will be presented; the benefits for the administrator in terms of energy gains by feeding back to the hospital with what it produces; theoretical data that help in architectural design, the gains in terms of environmental health and quality of life of the population and data to complement the existing waste manual (2010) and open the discussion on legislation on the subject.

Hospitals have the function of treating their patients, so it is necessary to be careful with the environment, so that it is healthy and does not generate diseases for its environment.

It must be able to manage its inputs, recycle them, make them productive. Reduce the impact caused by soil, water and air pollution that damages people's health. It should never be a focus of unhealthiness or a commercial institution with the sole purpose of treating patients and making financial gain from them, but rather to improve the conditions and quality of life in order to increase the number of healthy people.

Therefore, this work began with the intention of improving the quality of life for future generations, reducing the impact caused by excessive production and improper disposal of medical waste. In an attempt to make people and the environment suffer less and that the hospital can sustainably sustain itself. The idea for the research was born out of the difficulty in finding hospital building projects that can also "cure" their own "disease", because garbage is becoming a "cancer" for the planet. There is a growing concern of society and the authorities involved in relation to environmental issues and sustainable development. By considering this question, this work brings to light what is gained from recycling waste of particular concern.

Every day tons of garbage are generated, sometimes they are brought (imported) clandestinely, thrown into common landfills, reused inappropriately, which is a crime against human beings and the environment.

Today, architects, biologists, urban planners and several other professionals from various areas defend the idea of humanized, sustainable, functional architectural projects that satisfy the user, among other characteristics that a building must have. The project must foresee the possibility of a construction that minimizes the damage caused to the environment, but it must not stop only at the choice of materials that meet the requirements, but at the research of how they were produced and will be used, it must extend and verify the possibility of this building continuing to generate minimal damage or no damage to the environment, Therefore, it must be researched what to do with what will be produced in this building. If what is produced is sick, it must be treated so that it can be reinserted into its environment in a healthy way and can have the maximum use in this reinsertion process.

Architecture must be designed in such a way that it sustains and maintains the sustainability of life on the planet. If the production of waste is excessive and without any means to guarantee its elimination, the problem will be not only for the owner, but for everyone. With recycling, it is possible to have energy gains by reducing expenses and damage.

2 LEGAL GUIDELINES

In Brazil, Law No. 12,305/2010, Anvisa's RDC No. 306/2004 and Conama Resolution No. 358/2005 are the main legal norms related to the management of health service waste.

Law No. 12,305/2010 establishes the National Solid Waste Policy (PNRS), providing for its principles, objectives and instruments, as well as guidelines related to the integrated management and management of solid waste, including hazardous waste, the responsibilities of generators and public authorities and the applicable economic instruments. It was regulated by Decree 7,404, of December 23, 2010, which, among other measures, establishes the Interministerial Committee of the National Solid Waste Policy, hereinafter referred to as the Committee. The purpose of this Committee is to support the structuring and implementation of the National Solid Waste Policy, through the articulation

of government agencies and entities, in order to enable the fulfillment of the determinations and goals set forth in Law No. 12,305 and in the Decree itself.

It is incumbent upon the Committee, which is coordinated by the Ministry of the Environment (MMA), to prepare and evaluate the implementation of the National Solid Waste Plan, and the preparation of the version of the Plan must be based on studies that support it.

The National Solid Waste Plan (PNRS) is valid for an indefinite period and has a horizon of 20 (twenty) years, with updating every 04 (four) years and the content as described in items I to XI of Article 15 of Law 12,305/2010. In Article 19, Item X of the PNRS, which states the importance of, in this order of priorities, the following:

1. Reduce Waste Generation - in line with the perception that waste and, especially, excess waste mean process inefficiency, which is typical of today's consumer society. This concept involves not only behavioral changes, but also new positions of the business sector, such as investment in eco-design and eco-efficiency projects, among others.
2. Reuse – increasing the useful life of materials and products and combating planned obsolescence, among other medium and long-range actions. It is important to expand the relevance of the concept, which is often confused and limited to the implementation of small actions to reuse materials that result in objects or products with low added value, disposable and/or no real economic or environmental value. These practices have been commonly disseminated as a solution to the serious problem of excessive generation and inadequate disposal of waste and often make up a large part of what is considered environmental education in schools and communities.
3. Recycle – valuing the segregation of materials and the proper disposal of dry and wet waste, thus supporting selective collection projects and reducing the amount of waste to be disposed of in line with the guidelines of the National Solid Waste Policy.

Anvisa's RDC No. 306/2004 provides the rules for the elaboration of a waste management plan, highlighting the guidelines for waste management. It is primarily concerned with the prevention of accidents and the preservation of public health. It also defines recycling as "the process of transforming waste that uses processing techniques for reprocessing or obtaining raw materials for the manufacture of new products."

To prove the fundamental concepts contained in this work, the main federal legislations will be presented, as well as technical standards of ABNT. In addition to these, any existing state and municipal legislation must be observed and complied with.

The main general legislations are:

- Constitution of the Federative Republic of Brazil – Title III (On the Organization of the State), Chapter II (On the Union) – Articles 23 and 24.

- Constitution of the Federative Republic of Brazil – Title IV (Municipalities) – Article 30.
- Constitution of the Federative Republic of Brazil – Title VIII (Social Order), Chapter VI (Environment) – Article 225.
- Law No. 6,938, dated 08.31.1981, provides for the National Environmental Policy, its purposes and mechanisms for formulation and application, and provides other provisions.
- Law No. 9,605, dated 02.12.1998 (Environmental Crimes Law), provides for criminal and administrative sanctions derived from conducts and activities harmful to the environment, and provides other provisions.
- Law No. 9,605, dated 02.12.1998 (Environmental Crimes Law), provides for criminal and administrative sanctions derived from conducts and activities harmful to the environment, and provides other provisions.
- Decree No. 3,179, dated 09.21.1999, provides for the specification of sanctions applicable to conducts and activities harmful to the environment, and provides other provisions.
- RDC ANVISA No. 50, dated 02.21.2002, provides for the technical regulation for planning, programming, elaboration and evaluation of physical projects of health care establishments.
- RDC ANVISA nº 305, of 14.11.2002: "The entry and commercialization of raw material and finished products, semi-elaborated or in bulk for use in human beings, whose starting material is obtained from tissues/fluids of ruminant animals, related to the classes of medicines, are prohibited throughout the national territory, while conditions that constitute a risk to health persist. cosmetics and health products, as itemized."
- Normative Instruction of the National Technical Commission on Biosafety/Ministry of Science and Technology CTNBio nº 7, of 06.06.1997.
- Ordinance of the Secretariat of Health Surveillance/Ministry of Health SVS/MS 344, of 05.12.1998, approves the technical regulation on substances and medicines subject to special control.
- Decree-Law No. 2,657, of 07.03.1998, promulgates Convention No. 170 of the International Labor Organization – ILO, on safety in the use of chemical products at work, signed in Geneva, on 06.25.1990.
- General guidelines for containment work with biological material – Ministry of Health, 2004.

In accordance with the solid waste legislation specified by theme:

- Civil Construction – CONAMA Resolution No. 307, of 07.05.2002, establishes guidelines, criteria and procedures for the management of construction waste, disciplining the necessary actions in order to minimize environmental impacts.

- Chemicals – Legislative Decree No. 67, of 04.05.1995, approves the text of Convention No. 170, of the International Labor Organization, on the safety of the use of chemical products at work, adopted by the 77th Meeting of the International Labour Conference, in Geneva, in 1990. CONAMA Resolution No. 23, of 12.12.1996, regulates, in the Brazilian territory, the application of the provisions of the Basel Convention, defining the wastes whose import and/or export are allowed or prohibited, as well as the conditions for them to be carried out. CONAMA Resolution No. 316, of 10.29.2002, regulates the processes of thermal treatment of waste and corpses, establishing operational procedures, emission limits and criteria for performance, control, treatment and final disposal of effluents, in order to minimize the impacts on the environment and public health resulting from these activities.
- Radioactive Materials – Standard of the National Nuclear Energy Commission – Nuclear Standard CNEN-NE-06.05 defines general criteria and basic requirements related to the management of radioactive waste in radioactive facilities. CNEN-NE-3.05 defines the radiation protection and safety requirements for nuclear medicine services. Standard CNEN-NE-6.01 provides for the requirements for the registration of professionals for the preparation, use and handling of radioactive sources. Standard CNEN-NE-6.02 defines the process related to the licensing of radioactive facilities, according to the competence assigned by Law No. 6,189, of December 16, 1974. Standard CNEN-NE-3.03 defines the basic requirements for the certification of the qualification of radiation protection supervisors. Law No. 10,308, dated 11.20.2001, provides for site selection, construction, licensing, operation, inspection, costs, indemnity, civil liability and guarantees related to deposits of radioactive waste of low and medium levels of radiation. CNEN-NE- Standard 3.01 Defines the basic guidelines for the radiological protection of people in relation to exposure to ionizing radiation.
- Transportation of dangerous goods – Decree-Law No. 2,063, dated 10.06.1983, provides for fines to be applied for violations of the regulations for the execution of the road transport service of dangerous goods or cargo, and provides other provisions. Resolution of the Common Market Group GMC 82.02 - Mercosur - which approves the Instructions for the Supervision of the Rail Transport of Dangerous Products in Mercosur. Decree No. 96.044, of 05.18.1988, approves the Regulation for the Road Transport of Dangerous Products, and provides other provisions. Decree No. 98.973 of 02.21.1990, which approves the Regulation of the Railway Transport of Dangerous Products. Decree No. 875, of 19.07.1993, promulgates the text of the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Decree No. 1,797, dated January 25,

1996, provides for the Partial Scope Agreement for the Facilitation of the Transport of Dangerous Products in Mercosur. CONAMA Resolution No. 23, of 12.12.1996, provides for the transboundary movement of hazardous waste. Decree No. 2,866, dated 12.07.1998, approves the Regime of Infractions and Sanctions Applicable to the Land Transport of Dangerous Products in Mercosur. Resolution of the National Traffic Council/Ministry of Justice Contran/MJ 91, of 04.05.1999, provides for Specific and Complementary Training courses for Drivers of Road Vehicles Transporting Dangerous Products. Decree No. 4,097, dated January 23, 2002, amends articles 7 and 19 of the regulations for road (Decree No. 96,044/88) and rail (Decree No. 98,973/02) transportation of dangerous products. MT Ordinance No. 349, of 06.10.2002, approves the Instructions for the Inspection of Road Transport of Dangerous Products at the National Level. Resolution of the National Land Transport Agency ANTT-MT No. 420, of 02.12.2004, approves the Complementary Instructions for the Inspection of Road Transport of Dangerous Products at the National Level.

- Occupational health – NR 7 – Occupational Health Medical Control Program – PCMSO – Ministry of Labor. Establishes the obligation to prepare and implement the Medical Health Control Program Occupational – PCMSO. NR 9 – Environmental Risk Prevention Program PPRA – Ministry of Labor. Establishes the obligation to prepare and implement the Environmental Risk Prevention Program – PPRA. NR 32 – Occupational Safety and Health in Health Services – Ministry of Labor. Establishes basic guidelines for the implementation of measures to protect the safety and health of workers in health services.
- Waste batteries and light bulbs – CONAMA Resolution No. 257, of 06.30.1999, provides for the use of batteries that contain lead, cadm, mercury and their compounds in their compositions, necessary for the operation of any type of appliances, vehicles or systems, mobile or fixed, as well as electrical and electronic products that contain them integrated into their structure in a non-replaceable form. and makes other arrangements.
- Waste from health establishments and sanitary barriers – CONAMA Resolution No. 6, of 19.09.1991, exempts the incineration or any other burning treatment of solid waste from health establishments, ports and airports, except in the cases provided for by law and international agreements. ANVISA RDC No. 342, dated 12.13.2002, establishes and approves the term of reference for the preparation of the Solid Waste Management Plans for Ports, Airports and Borders to be submitted to ANVISA for analysis and approval. RDC ANVISA No. 306, dated 11.25.2004, provides for the technical regulation for the management of waste from health services.
- Recyclable waste – CONAMA Resolution No. 275, of 04.25.2001, establishes color codes

for different types of waste in selective collection.

- Treatment system – CONAMA Resolution No. 316, of 10.29.2002, provides for procedures and criteria for the operation of waste thermal treatment systems.
- Technical Standards – Symbology – NBR 7500 – Risk and handling symbols for the transport and storage of material.
- Packaging – NBR 9191 – Specification. Plastic bags for packaging. NBR 9195 – Test methods. Plastic bags for packaging. NBR 9196 – Determination of resistance to air pressure. NBR 9197 – Determination of ball impact strength. Plastic bag for garbage packaging – determination of ball impact strength. NBR 13055 – Determination of volumetric capacity. Plastic bag for packaging – determination of volumetric capacity. NBR 13056 – Transparency verification. Plastic films for packaging bags – transparency check. NBR 13853 – Requirements and test methods for collectors for sharps or sharps waste.
- Collection and transportation – NBR 12980 – Defines terms used in the collection, sweeping and packaging of urban solid waste. NBR 13221 – Specifies the requirements for the land transport of waste, in order to avoid damage to the environment and protect public health. NBR 13332 – Defines the terms related to the solid waste collector-compactor, coupled to the chassis of a road vehicle, and its main components. NBR 13463 – Classifies the collection of urban solid waste from the equipment intended for this collection, the types of work system, the packaging of this waste and the transshipment stations. NBR 14619 Establishes the chemical incompatibility criteria to be considered in the inland transport of dangerous goods. NBR 12810 – Establishes the procedures required for the internal and external collection of health service waste, under conditions of hygiene and safety. NBR 14652 – Establishes the minimum requirements for the construction and inspection of group A road collectors-transporters of health service waste.
- Storage – NBR 12235 – Establishes the conditions required for the storage of hazardous solid waste in order to protect public health and the environment.
- Waste sampling – NBR 10007 – Establishes the requirements for solid waste sampling.
- Management – NBR 15051 – Establishes the specifications for the management of waste generated in clinical laboratories. Its content covers the generation, segregation, packaging, preliminary treatment, treatment, transport and presentation to the public collection of waste generated in the clinical laboratory, as well as guidance on the procedures to be adopted by laboratory personnel. NBR 14725 - Chemical Product Safety Data Sheet – MSDS.

3 MANAGEMENT PLANNING

The planning of the management of the HCW should have as its starting point the reality of the municipalities, with regard to the management of solid waste produced in the community. Punctual solutions, which observe only the internal environment of health facilities, should be avoided, considering the form of final disposal to be adopted.

Solid waste management in Brazil is still flawed, with major deficiencies in treatment and final disposal. This has entailed considerable environmental and health risks. Due to the size of the problem, it can be predicted that the solutions should be gradual. Thus, it is important that any HCW management solution seeks to present proposals that improve the situation in the municipality in an integrated way.

Changes in habits, in order to reduce or minimize the generation of waste, have a very positive impact on management. Thus, it is necessary to adapt products, equipment and procedures, aiming at the non-generation and minimization of the production of HCW.

The proper management of HCW may be costly at first, but in the long run it becomes economically viable, as it reduces the rates of occupational accidents and illnesses. In addition, correct management converges in the defense of three fundamental rights:

- Everyone can enjoy health facilities without running the risk of contracting infections;
- Workers in health facilities must be safe to perform their tasks;
- The entire community should live in a healthy environment.

Based on these considerations, the following alternatives should be evaluated:

- Pre-treatment in the generating unit itself for later final disposal; or
- Differentiated collection with centralized treatment and final disposal.

The pre-treatment in the generating unit itself, including the appropriate segregation, allows the final disposal to be made together with the other municipal solid waste. This alternative is possible when segregation and pretreatment result in a final waste classified in Group D.

When the HCW has not undergone pre-treatment, in order to be classified as Group D, the collection should be differentiated from that of urban solid waste. This alternative implies the subsequent treatment and appropriate final disposal of the RSS of Groups A, B, and C.

4 FUNDAMENTAL CONCEPTS

Solid waste and garbage are terms used interchangeably by authors of publications, but in everyday language the term waste is rarely used.

Garbage is used to designate everything that is no longer useful and waste is mostly used to designate surplus (refuse) from the processing of industrialized products.

Health Service Waste (HCW) is waste generated in health establishments during the provision of care and diagnostic services, and can become a risk to public health and the environment due to its

characteristics. It consists mostly of syringes, needles, gloves, probes, catheters and other disposable materials. These wastes pose a major health hazard as they can be contaminated with disease-causing microorganisms. Therefore, the creation of a waste management plan was essential to mitigate such risks.

The health services waste management plan (PGRSS) is a set of procedures that must be adopted by hospital medical establishments in order to reduce or eliminate the production of waste and provide the waste generated with a safe and efficient route, aiming at the protection of workers and the preservation of public health and the environment. As stipulated in ANVISA RDC No. 306/04 and CONAMA Resolution No. 358/05, every generator must prepare and implement the Health Service Management Plan – PGRSS.

HSW management is all the actions carried out to manage waste inside and outside hospital medical establishments, from the moment it is generated until its final disposal. Therefore, all public servants and employees who carry out actions related to waste management are responsible for such actions. The steps in the management of HCW are:

- Segregation;
- Packaging;
- Identification;
- Intermediate treatment;
- Internal transportation;
- Temporary storage;
- External storage;
- Final treatment;
- Final disposition.

Both the minimization of waste and the segregation of recyclable materials are directly related to the change in habits of the people involved in the generation of waste. In this sense, environmental education can be an important tool in the adoption of standards of conduct that are more appropriate to the new models of waste management and, therefore, should receive special attention in the continuing education program aimed at employees. The implementation of this program provides the conditions for professionals to clearly know their responsibilities in relation to the environment, inside and outside the health unit, and their roles as citizens.

Minimization consists of the reduction of common, hazardous or special waste in the generation stage, before the treatment and storage phases or disposition. The first way is to reduce the amount of waste generated, looking for ways to combat waste, that is, to generate the minimum. This procedure applies to all materials used - food scraps and leftovers, chemicals, etc. Another way is to reuse the discarded material for the same purpose as the previous one, for example, jars and containers, after a

disinfection and cleaning process. The third way to minimize is to recycle waste, which consists of forwarding recyclable materials for reuse.

All processes involving reduction, reuse and recycling must be carefully planned and operated, considering the precautionary principle, to avoid endangering the health of the workers involved, as well as that of the patients, or even preventing contamination of the environment.

Segregation is one of the fundamental operations to allow the fulfillment of the objectives of an efficient waste handling system and consists of the separation of waste at the time and place of its generation, according to its chemical and biological characteristics, its physical state and the risks involved.

In each specialized service, there is one or more types of waste generated. In order to carry out the management based on the principle of minimizing the additional risks of the MW, the manager must adopt segregation procedures according to the type of waste, at the generation site itself. The advantages of practicing segregation at source are:

- Reduction of risks to health and the environment by preventing potentially infectious or special waste, which is usually small fractions, from contaminating other waste generated in the hospital;
- Reduction of expenses, since only a fraction will have special treatment and not all;
- Increased recycling efficiency.

Packaging consists of the act of packing the segregated waste in bags or containers that prevent leakage and resist puncture and rupture actions.

According to RDC ANVISA 306/04, identification consists of a set of measures that allow the recognition of the residues contained in bags and containers, providing information on the correct handling of HSW.

The identification must be affixed to the packaging bags, to the internal and external collection containers, to the internal and external transport containers, and to the storage places, in an easily visible place, in an indelible way, using symbols, colors and phrases, meeting the parameters referenced in the NBR 7.500 standard of ABNT, in addition to other requirements related to the identification of content and the specific risk of each group of waste. The identification of storage bags and transport containers may be made by adhesives, provided that their resistance to the normal handling processes of bags and containers is guaranteed. (Table 1)

TABLE 1 - IDENTIFICATION SYMBOLS OF WASTE GROUPS

Identification symbols for waste groups	
Group A wastes are identified by the infecting substance symbol, with a white background label, black design and outlines.	
Group B waste is identified by the associated risk symbol and with chemical substance breakdown and risk phrases.	
Group C is represented by the international symbol of the presence of ionizing radiation (magenta trefoil) on labels with a yellow background and black outlines, plus the expression RADIOACTIVE MATERIAL.	
Group D waste can be recycled or reused. When recycling is adopted, its identification must be made on the containers and container storage shelters and container storage shelters, using color coding and their corresponding names, based on CONAMA Resolution No. 275/01, and recyclable material type symbols. For the other waste in group D, the color gray or black should be used in the containers. It can be followed by a color determined by the City Hall. If there is no segregation process for recycling, there is no requirement for color standardization containers.	 **GLASS, PLASTIC, PAPER, METAL, ORGANIC**
Group E products are identified by the infective substance symbol, with white background labels, black design and outlines, plus the inscription SHARPS WASTE, indicating the risk posed by the waste.	

Intermediate treatments are processes carried out in medical and hospital facilities that modify the physical, chemical or biological characteristics of waste, reducing or eliminating the risk of

contamination, work accidents or damage to the environment. Some wastes require intermediate treatment, according to their classification.

Example: Bacterial cultures, before the final treatment, are subjected to autoclaving (Figure 1), which is a treatment process, carried out in the laboratory, for the destruction of bacteria at a temperature of 121º C. Attention: In the bacteriology sector of the laboratory there is a white trash can on top of the bench where materials containing bacteria or fungi are placed. This trash can not be collected by the cleaning staff, as this material has not yet passed through the autoclave. Only the material from the white bins that are on the floor should be collected by the cleaning staff.

Figure 1 - RSS Autoclave



Source: Healthcare Waste Management

The collection and internal transportation of the RSS consist of the transfer of waste from the generation points to the place destined for external storage, with the purpose of making it available for collection. The collection must be done separately, according to the group of waste and in specific containers for each group of waste. The collection and transportation must comply with the previously defined itinerary and must be done at times, not coinciding with the distribution of clothing, food and medicines, periods of visit or greater flow of people or activities. The internal transport of containers must be carried out without excessive effort or risk of accident for the employee. Before and after collection, the employee must wash their gloved hands, remove them and place them in their proper place.

For the correct transport of the RSS, properly packaged, it is necessary to have wheeled trolleys, resistant, rigid or semi-rigid, with lid, chamfered, smooth, waterproof, without recess or edges and easy to store, clean and disinfect, with an anti-theft system. The main function is to reduce the risk of spills of the RSS during transport or storage.

It is important to take the following precautions:

- Carts carrying waste should not carry clothing or other utensils;

- Transport the RSS containers of groups A, B, C, and D separately in specific carts;
- Establish shifts, schedules and frequency of collection;
- Consider the chemical compatibility of the waste and do not carry together substances that could cause a violent chemical reaction;
- Do not drag containers or plastic bags on the ground;
- Move the collection trolley as close as possible to the place from which the containers are to be collected;
- Packaged HSW should not be transferred from one container to another;
- When collecting the bags, the cleaning staff must lift them and keep them away from the body, in order to avoid cuts and possible accidents with improperly packed sharps.

The personnel in charge of the management of HCW must be vaccinated against hepatitis B and tetanus, as well as use personal protective equipment (PPE) (Figure 02) that prevents direct contact with the HSW and protects against possible occupational accidents. It is recommended to:

- Wear a uniform appropriate to the function;
- Wear a waterproof apron over the uniform;
- Fully secure the hair;
- Wear only closed shoes;
- Avoid the use of props such as costume jewelry and jewelry;
- Keep them short;
- Wear goggles;
- Wear nitrile gloves with reinforcement in order to avoid punctures;
- Wear flexible boots, made of PVC or rubber, with long shafts;
- Wear a respirator mask.

The collection carts must be washed five times a week, and the professionals who perform this washing must wear PPE: boots, waterproof apron, gloves, goggles and mask. (Figure 2)

Figure 02 - PPE's



Source:http://reidasplacas.com.br/site/Produtos.asp?Act2=&Pagina=41&Categoria=33&SubCategoria=&TextSearch=&Act=Next

The temporary storage of the MW consists of the temporary storage of the containers containing the waste already packed, in a place close to the generation points, in order to speed up the collection within the establishment until the external collection. Depending on the distance between the waste generation points and the external storage, temporary storage may be dispensed with, and the shipment is directly to the storage for external collection.

Temporary storage cannot be made with direct disposal of the bags on the floor or on the floor, and it is mandatory to store the bags in packaging containers. When temporary storage is carried out in an exclusive location, it must be identified as a waste room, which can be a compartment adapted for this, if it was not designed in the construction, as long as it meets the legal requirements for this type of environment. Room with a minimum of eight square meters, signposted, ventilated and easily accessible to cleaning and conservation personnel, not being allowed the entry of unauthorized people, as well as the use of this area for other purposes.

In temporary storage, it is not allowed to remove waste bags from inside the collection containers parked there.

Easily drilled waste that may be collected for a period of more than 24 hours after its storage must be kept refrigerated. As for chemical waste, the temporary storage place must be made of masonry, closed, equipped with screened openings for ventilation, with a device that prevents direct sunlight, floors and walls made of washable materials with a liquid retention system.

External storage consists of packing the waste in a shelter, in appropriate collection containers, in an exclusive environment and with easy access for the collection vehicles, while waiting for the external collection stage to be carried out.

Final treatment of solid waste is understood as any manual, mechanical, physical, chemical or

biological processes that alter the characteristics of the waste, aiming at minimizing the risk to health, preserving the quality of the environment, and the safety and health of the worker. According to ANVISA Resolution 306/04, treatment consists of the application of a method, technique or process that modifies the characteristics of the risks inherent to the waste, reducing or eliminating the risk of contamination, occupational accidents or damage to the environment.

The treatment can be carried out in the generating establishment or in another location, observing, in these cases, the safety conditions for transport between the generating establishment and the place of treatment. The systems for the treatment of HSW must be subject to environmental licensing, in accordance with CONAMA Resolution No. 237/97 and are subject to inspection and control by health and environmental surveillance agencies.

There are several ways to carry out the treatment: chemical or thermal disinfection (autoclaving, microwave, incineration), detailed below.

Disinfection for the treatment of group A waste – The most well-known disinfection technologies are autoclaving, microwave and incineration. These alternative technologies for the treatment of waste from health services allow the treated waste to be sent to the normal circuit of municipal solid waste (MSW), without any risk to public health.

According to the EPA, USA, Technical Assistance Manual: State Regulatory Oversight of Medical Waste Treatment Technology (Chart 1), there are several levels of microbial inactivation. For healthcare waste treatment technologies, it is necessary to achieve at least level 3.

TABLE 1 - Microbial inactivation level according to EPA, USA

Microbial inactivation level according to Evironment Protection Agency – EPA, EUA	
Inactivation level	Description
Level 1	Inactivation of vegetative bacteria, fungi and lipophilic viruses with a reduction greater than or equal to 6 Log10
Level 2	Inactivation of vegetative bacteria, lipophilic and hydrophilic fungi and viruses, parasites and microbacteria with a reduction greater than or equal to 6 log10 and inactivation of B. staerotermophilus or B spores. subtilis with a reduction greater than or equal to 4 Log10.
Level 3	Inactivation of vegetative bacteria, lipophilic and hydrophilic fungi and viruses, parasites and microbacteria with a reduction greater than or equal to 6 log10 and inactivation of B. staerotermophilus or B spores. subtilis with a reduction greater than 4 Log10.
Level 4	Inactivation of vegetative bacteria, lipophilic and hydrophilic fungi and viruses, parasites and microbacteria and inactivation of B. staerotermophilus spores or B. subtilis with a reduction greater than or equal to 6 Log10.

Source: Technical Assistance Manual: State Regulatory Oversight of Medical Waste Treatment Technologies – State and Territorial Association on Alternate Treatment Techonologies – abril1994.

Decontamination with the use of steam at high temperatures (autoclaving) – It is a treatment that consists of keeping the contaminated material in contact with water vapor, at a high temperature, for a period of time sufficient to destroy potential pathogens or reduce them to a level that does not constitute a risk. The autoclaving process includes compression and decompression cycles in order to facilitate contact between the steam and the waste. The usual pressure values are in the order of 3 to 3.5 bar and the temperature reaches 135ºC. This process has the advantage of being familiar to health technicians, who use it to process various types of hospital materials.

The normal autoclaving process basically involves the following operations:

- Initial pre-vacuum: negative pressure conditions are created so that in the next phase the steam comes into contact with the residues;
- Steam intake: introduction of steam into the autoclave and gradual increase in pressure in order to create conditions for contact between steam and waste and for the destruction of enclosures that limit steam access to all surfaces;
- Exposure: maintaining high temperatures and pressure for a certain period of time until the decontamination process is completed.
- According to the load to be treated, the operator sets the time and temperature of each cycle;
- Slow exhaust: gradual release of steam passing through a porous filter with a mesh fine enough to prevent the passage of microorganisms to the outside of the autoclave. Gradual decrease in pressure up to the pressure of 1 atmosphere;
- Charge cooling: reducing the load to a temperature that allows the removal of waste from the autoclave.

To verify the operating conditions of these units, a test can be carried out in order to reach inactivation level 3, as defined by the EPA. This treatment system must be licensed by the competent environmental agency.

After being processed, these treated solid wastes must be sent for final disposal licensed by the competent environmental agency.

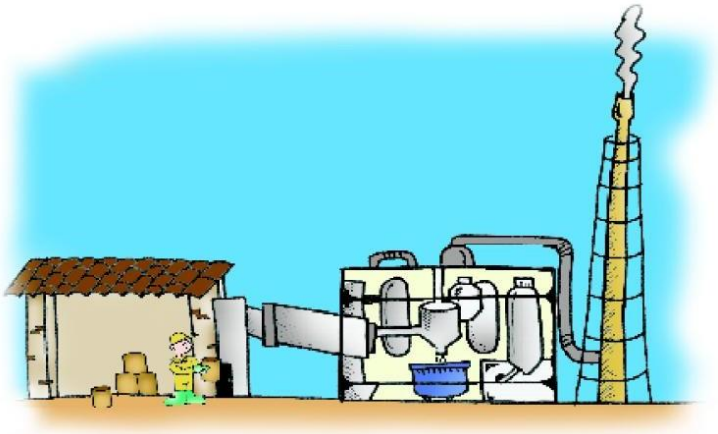
After being processed, this solid waste is treated, if necessary, and meets the emission limits of pollutants established in the current environmental legislation, before its release into a body of water or sewage system. Treatment with the use of low or high frequency microwaves – It is a relatively recent technology for the treatment of waste from health services and consists of the decontamination of waste with the emission of high or low frequency waves, at a high temperature (between 95 and 105ºC). The waste must be subjected to a shredding process beforehand and humidification. To verify the operating conditions of these units, a test can be carried out in order to reach level 3, as defined by the EPA. This treatment system must be licensed by the competent environmental agency. After being

processed, this treated waste must be sent to a sanitary landfill licensed by the environmental agency.

Heat treatment by incineration – It is a solid waste treatment process that is defined as the chemical reaction in which combustible organic materials are gasified, in a predetermined period of time. The process is oxidized by the waste with the help of the oxygen contained in the air.

Waste incineration is a physicochemical process of oxidation at high temperatures that results in the transformation of materials with a reduction in the volume of waste, destruction of organic matter, especially pathogenic organisms (Figure 3).

Figure 3 - RSS Incineration System



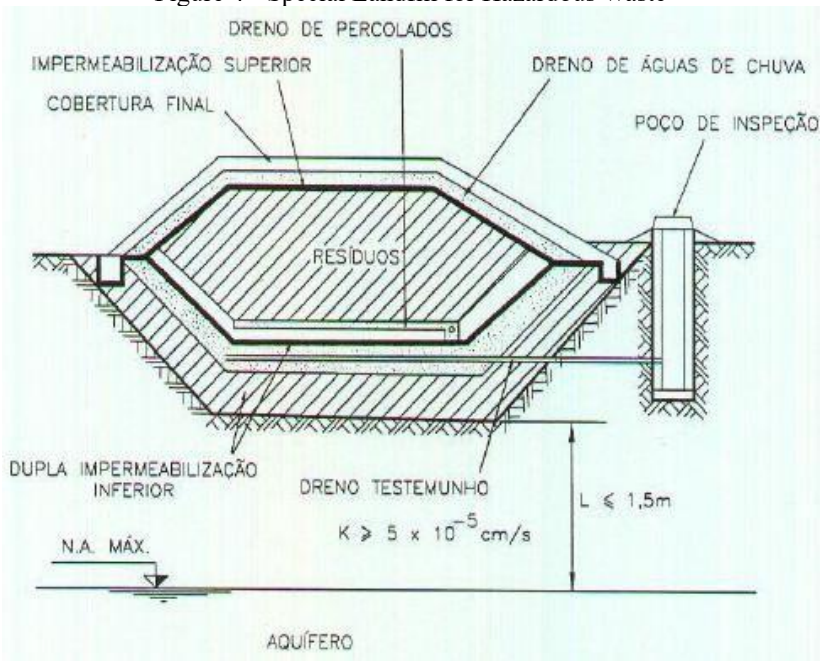
Source: Healthcare Waste Management

The design of two-stage incineration follows the following principles: temperature, resistance time and turbulence. In the first stage, the waste in the waste incineration chamber is subjected to a minimum temperature of 800ºC, resulting in the formation of gases that are processed in the combustion chamber. In the second stage, temperatures reach 1000ºC- 1200ºC.

After incineration of the MSW, the gaseous pollutants generated must be processed in pollution control equipment (ECP) before being released into the atmosphere, meeting the emission limits established by the environmental agency. Among the pollutants produced are hydrochloric acid, hydrofluoric acid, sulfur oxides, nitrogen oxides, heavy metals, particulates, dioxins and furans.

In addition to the gaseous effluents generated in the incineration systems, ash and slag from the incineration chamber generate waste and other solid pollutants from the ECP, as well as liquid effluents generated from the activity of this treatment system. Ashes and slags, in general, contain heavy metals in high concentrations and therefore cannot go to landfills, requiring a special landfill for hazardous waste (Figure 4). The liquid effluents generated by the incineration system must comply with the pollutant emission limits established in the current environmental legislation (Table 2).

Figure 4 - Special Landfill for Hazardous Waste



Source: Mercury Waste Management in Health Services

TABLE 2 - Recommended Treatment Methods and Final Disposal

METHODS OF TREATMENT	RSS GROUP		
	BIOHAZARD GROUP	GROUP B CHEMICAL RISK	GROUP C RADIOACTIVE WASTE
Incineration	X	X	
Autoclave	X		
Chemical Treatment	X		
Microwaves	X		
Irradiation	X		
Decay			X

Fonte: Training Guide – Management and Management of Hospital Solid Waste (1996).

Incineration consists of destroying waste (biological and chemical) through a combustion process in which it is reduced to ashes (id., 1996).

Incinerators can burn most hazardous solid waste, including pharmaceuticals and organic chemicals, except for radioactive waste and pressurized containers.

Modern incinerators are equipped with two combustion chambers (primary and secondary) equipped with burners capable of achieving complete combustion of waste and extensive destruction of harmful and toxic chemicals (dioxins, furans, etc.). In the secondary combustion chamber, temperatures of around 1,100ºC are reached and operating with a residence time of at least two seconds. To treat the flow of gases and the entrained particles, before they are released into the atmosphere,

chemical washing towers, cyclones, filters, etc., are added.

The advantages of incineration are:

- Destroys any material than Contains carbon organic including pathogens;
- It produces a significant reduction in the volume of waste (80% to 95%);
- Leftovers are unrecognizable and definitely not recyclable;
- Under certain conditions, it allows the treatment of chemical and pharmaceutical waste;
- It allows the treatment of anatomical and pathological waste.

Autoclave consists of subjecting biological waste to heat treatment, under certain pressure conditions in a sealed chamber (autoclave), for a certain time and with prior extraction of the present air (GUÍA..., 1996).

All types of microorganisms can be killed by heat (dry or wet) if they are exposed to a temperature adapted to a temperature adapted to their level of resistance. For bacterial spores, these are temperatures above 100ºC (SWITZERLAND, 1994).

Steam autoclave is an appropriate method of treating microbiology laboratory waste, blood waste, human organic liquids, sharps and animal waste, which cannot be shredded. On the other hand, this method is not suitable for treating human and animal anatomical waste.

The efficiency of the waste decontamination operation depends on the temperature to which they are subjected and also on the duration of contact with the steam. Considering that the waste is heated by steam penetration and thermal conduction, it is necessary that all the air is extracted and that the containers containing the waste can easily let the steam penetrate. Usual operating conditions consist of a temperature of at least 121ºC for more than 60 minutes (id., 1994). In checks in Brasilia hospitals, the usual methods of treating RSS are autoclave and incineration.

The final disposal of the RSS consists of the definitive disposal of waste in the soil or in places previously prepared to receive it. According to Brazilian law, the disposal must comply with technical criteria for construction and operation, for which environmental licensing is required in accordance with CONAMA Resolution No. 237/97. The project must follow ABNT standards.

The forms of final disposal currently are landfills and ditches Septic. Unfortunately, in Brazil, what predominates are uncontrolled landfills, better known as dumps, in which waste is disposed of on the ground without any criteria, exposing the population to the risk of diseases and harming the environment.

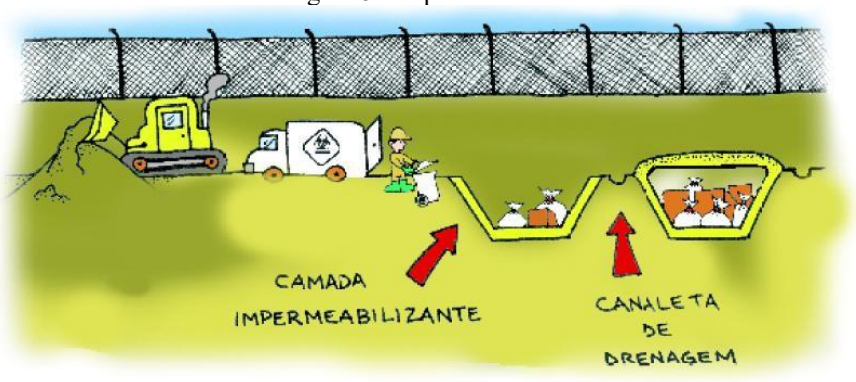
Once the RSS have undergone prior segregation and treatment, the final destination of the resulting product is a landfill. This method of final disposal consists of confining the waste in the smallest possible volume (by means of compaction carried out by narrow treaters or compactors) and isolating the waste from the open air, by covering it daily with a layer of soil, preferably clay. This method consists of compacting the waste in a layer on the properly sealed soil (using, for example, a

bulldozer) and controlling liquid effluents and gaseous emissions. It is covered daily with a layer of soil, compacted with a thickness of 20 cm, to prevent the proliferation of flies; appearance of rodents, flies and cockroaches; scattering of papers, garbage, in the surroundings; pollution of surface and groundwater. The main objective of the landfill is to dispose of waste in the soil in a safe and controlled manner, ensuring environmental preservation and health.

The controlled landfill is an improved landfill. In this system, the waste is discharged into the soil, covering a layer of inert material, daily. This form does not avoid pollution problems, as it lacks drainage systems, treatment of liquids, gases, waterproofing and etc.

Septic ditching is the technique with soil waterproofing according to the ABNT standard, it is called Special Cell of RSS and is used in small municipalities. It consists of the procedure of waterproofed excavated trenches, with width and depth proportional to the amount of garbage to be filled (Figure 5). The earth is removed with a backhoe or tractor that must be close to the ditches and later be used in the daily coverage of the waste. The collection vehicles deposit the waste without compaction directly inside the ditch and, at the end of the day, it is covered with earth, which can be done manually or by machine.

Figure 5 - Septic Trenches



Source: Healthcare Waste Management

5 MANAGEMENT PLANE

The correct management of HCW involves the reduction or minimization of the waste generated, the prevention of the health of the workers involved in the process and the guarantee of the maintenance of environmental quality. To this end, it is necessary to implement the Health Services Waste Management Plan.

The PGRSS shall contemplate the quantities and characteristics of the waste generated, classification, segregation conditions, packaging, temporary storage, transportation, treatment technologies, forms of final disposal and source control programs (3R - Reduction, Reuse and Recycling), aiming at the elimination of practices and procedures incompatible with the relevant legislation and technical standards.

Article 1 of CONAMA Resolution No. 5/93 defines a Solid Waste Management Plan as: a document that is part of the environmental licensing process, which points out and describes the actions related to the management of solid waste, within the scope of the establishments, contemplating aspects related to generation, segregation, packaging, collection, storage, transportation, treatment and final disposal. as well as the protection of public health.

Reducing the waste generated to a minimum is the goal that the PGRSS must necessarily pursue. It is possible that, at the beginning of its implementation, the results may be far from the expected target and reach proportions of 55% common waste and 45% deserving waste special treatment. But, certainly, with a good system of personnel training, control and progressive corrections, it will be possible to achieve the expected results.

The main objectives of the segregation of RSS are:

- Reduce risks: as long as RSS (common and hazardous) are managed together, the entire mass of waste produced is potentially hazardous.
- Lower management costs: minimizing the mass of waste that needs specialized treatment due to its hazardousness.
- Allowing recycling: the separation between RSS in Groups A, B and C and common waste (Group D) allows the latter to be handled without any special precautions and eventually recycled.

5.1 STEPS FOR THE IMPLEMENTATION OF A PGRSS

The elaboration of a Health Services Waste Management Plan presupposes the following steps:

1st – Identification of the problem;

2nd - Constitute the work team; 3rd – Mobilization of the organization;

4th – Diagnosis of the situation of the RSS;

5th – Definition of goals, objectives, implementation period and actions basic;

6th – Preparation of the PGRSS.

(Suggestions for recording the information required for the PGRSS – Annex I)

6 SOLID WASTE CLASSIFICATION

The classification of HCW has undergone a continuous process of evolution, as new types of waste are introduced in health units and as a result of the knowledge of their behavior in relation to the environment and health, as a way to establish a safe management based on the principles of risk assessment and management involved in its manipulation. The benefit of the correct classification of health service waste (HSW) lies in enabling the correct handling by generators, without posing risks to workers, public health and the environment. RSS are classified according to their characteristics and

consequent risks they may pose to the environment and health.

ANVISA RDC No. 306/04 and CONAMA Resolution No. 358/05 classify HCW according to distinct risk groups that require specific forms of management.

The groups are:

- Group A – Residues with the possible presence of biological agents that, due to their characteristics, may present a risk of infection (Chart 3);
- Group B – Chemical Waste (Table 4);
- Group C – Radioactive Waste (Table 5);
- Group D – Common Waste (Table 6);
- Group E – Sharps (Table 7).

6.1 HEALTH SERVICE WASTE GROUPS

TABLE 3 - GROUP A - POTENTIALLY INFECTIOUS WASTE

Group A – Potentially infectious waste
Residues with the possible presence of biological agents that, due to their characteristics, can present a risk of infection.
A1 – milky white bag • Cultures and stock of microorganisms, residues from the manufacture of biological products, except blood products, disposal of live or attenuated microorganism vaccines, culture media and instruments used for transfer, inoculation or mixing of cultures, residues from genetic manipulation laboratories. • Residues resulting from the health care of individuals, or animals, with suspicion or certainty of biological contamination by agents of risk class 4, microorganisms with epidemiologically important relevance or whose transmission mechanism is unknown. • Transfusion bags containing blood or blood components rejected due to contamination or poor conservation, or with an expired expiration date, and those resulting from incomplete collection. • Leftover laboratory specimens containing blood or body fluids, containers, and materials resulting from the health care process, containing blood or fluids Corporeal in free form.
A2 – milky white bag • Carcasses, anatomical parts, viscera and other residues from animals subjected to an experimentation process with inoculation of microorganisms, as well as their linings, and the carcasses of animals suspected of being carriers of microorganisms of epidemiological relevance and with risk of dissemination that have or have not been subjected to anatomopathological study or diagnostic confirmation.
A3 – red bag • Anatomical parts (limbs) of the human being, product of fertilization without vital signs, weighing less than 500 grams or stature less than 25 centimeters or gestational age less than 20 weeks, which have scientific or legal value and there has been no requisition by the patient or family members.
A4 – milky white bag • Arterial and intravenous line kits and dialyzers, when discarded. • Air filter and gas contaminated area aspirators; filter membrane for medical, hospital and research equipment, among other similar products. • Leftover laboratory samples and their containers containing feces, urine, and secretions, from patients that do not contain and are not suspected of containing risk agents 4, and do not present epidemiological relevance and risk of dissemination, or microorganisms that cause an emerging disease that becomes epidemiologically important or whose transmission mechanism is unknown or suspected of being contaminated with prions. • Waste of adipose tissue from liposuction, liposculpture or other plastic surgery procedure that generates this type of waste. • Containers and materials resulting from the health care process, which do not contain blood or bodily fluids in free form. • Anatomical specimens (organs and tissues) and other residues from surgical procedures or anatomopathological

studies or diagnostic confirmation. • Carcasses, anatomical parts, viscera and other residues from animals not subjected to experimentation processes with inoculation of microorganisms, as well as their linings. Empty transfusion bags or those with residual volume after transfusion.
A5 – red bag • Organs, tissues, organic fluids, sharps or scarifiers and other materials resulting from the health care of individuals or animals, with suspicion or certainty of prion contamination.

Group A wastes that require treatment must initially be packaged in a manner compatible with the treatment process to be used. Waste from groups A1, A2 and A5 should be packed after treatment as follows (Figure 9):

- If there is physical decharacterization of the structures, they can be packaged as group D waste;
- If there is no physical decharacterization of the structures, they must be packed in a milky white bag.

  Group A1 and A2 wastes should be treated in equipment that reduces or eliminates the microbial load.

  Group A3 waste that has no scientific or legal value and that has not been handled by the patient or his/her family should be sent for burial or treatment. If they are referred to the treatment system, they must be packed in red bags with the inscription "anatomical parts". The competent environmental agency in the States, Municipalities and the Federal District may approve other alternative disposal processes.

  Group A4 waste does not require treatment.

  Group A5 waste must be incinerated.

Biological waste (group A) should be placed in a milky white bag (Figure 6) and separated into white collectors (Figure 8) and/or a red bag (Figure 7) with the infectious substance symbol;

Figure 6 - Milky White Bag



Source: http://catalogohospitalar.com.br/saco-plixo-hospitalar-100-lt-c100-1.html

Figure 7 - Red Bag

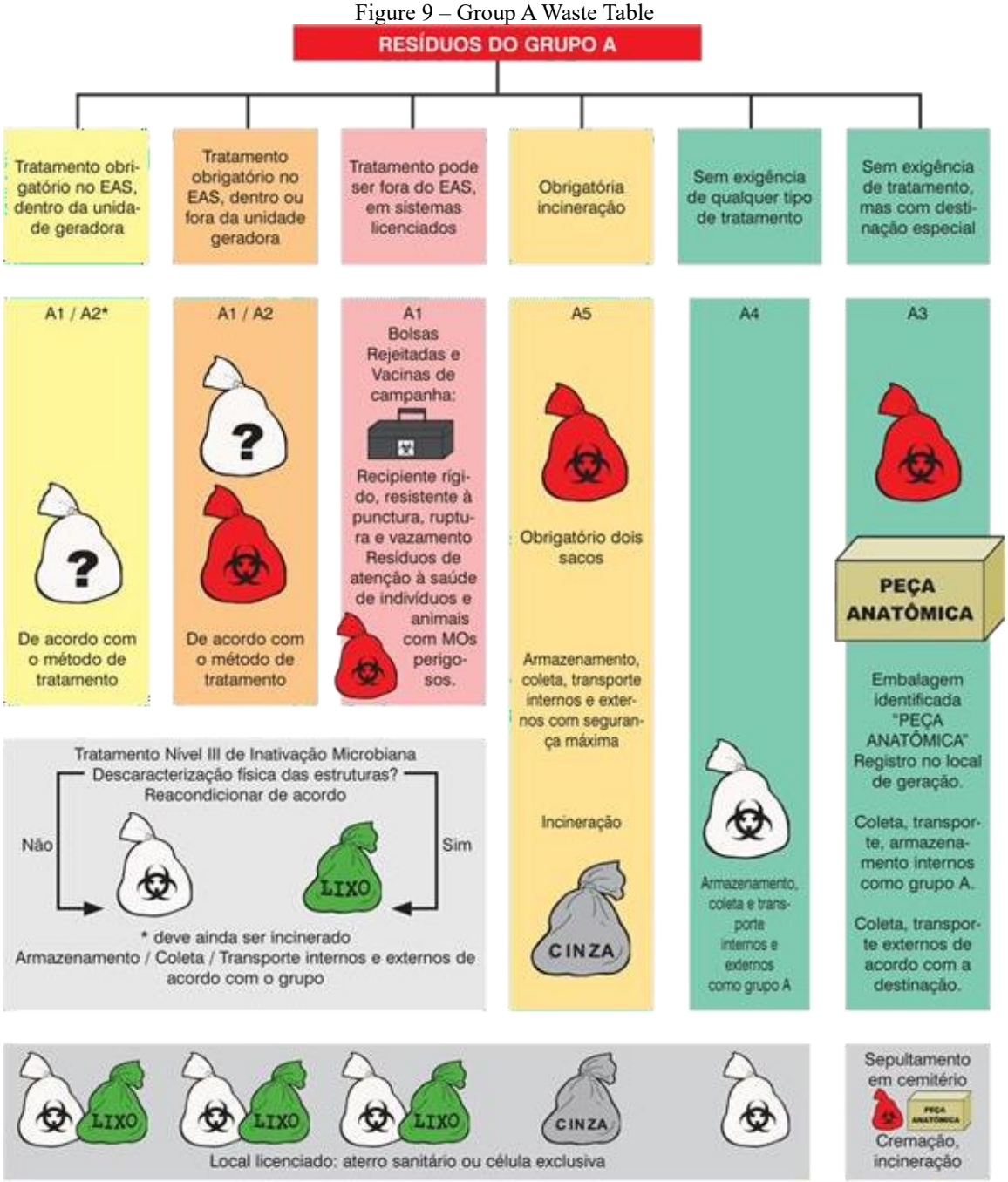


Source: http://www.fiocruz.br/biosseguranca/Bis/lab_virtual/descarte-residuos-grupo-a.htm

Figure 8 - White Trash Can (Group A) Source: Personal Collection



Figure 9 – Group A Waste Table



Source: http://www.resol.com.br/cartilha11/gerenciamento_etapas.php

The bags for packaging group A waste must be contained in a container made of washable material, resistant to puncture, rupture and leakage, impermeable, with a lid equipped with a non-manual contact opening system, with rounded corners, as shown in (Figure 8). They must be tip-over resistant and the weight limits of each must be respected shell. The bags must be identified with the symbology of the infecting substance. It is forbidden to empty the bags or reuse them.

TABLE 4 - GROUP B - CHEMICAL WASTE

Group B – Chemical waste
Waste containing chemicals that may present a risk to public health or the environment, depending on its characteristics of flammability, corrosiveness, reactivity and toxicity.
• Hormonal products and antimicrobial products; cytostatic; antineoplastics; Immunosuppressants; Digitalis; immunomodulators; antiretrovirals, when discarded by health services, pharmacies, drugstores and drug distributors or seized, and the residues and pharmaceutical inputs of drugs controlled by Ordinance MS 344/98 and your updates.
• Waste from sanitizers, disinfectants, disinfectants; waste containing heavy metals, laboratory reagents, including containers contaminated by them.
• Effluents from image processors (developers and fixers).
• Effluents from automated equipment used in clinical analysis.
• Other products considered dangerous, according to the classification of NBR 10004 of ABNT (toxic, corrosive, flammable and reactive).

Hazardous substances (corrosive, reactive, toxic, explosive and flammable) must be packaged based on the manufacturer's specific recommendations for packaging and disposing of them. They can be found on the labels of each product (Figure 10).

Figure 10 – Chemical Example – Caustic Soda



Source:http://www.prevencaonline.net/2010/07/cuidados-para-manipulacao-da- war.html

Laboratories, which are the main generators of this group of wastes, are the ones that can best establish specific precautions regarding its management, since they have knowledge about its hazardous characteristics.

Sharps contaminated with chemical residues must be packed in rigid containers, filled up to

two-thirds of their volume. The container must be placed in a milky white plastic bag, with the inscription "Sharps" and the universal symbol of toxic substances. The inscription "Chemical Hazard" is suggested (See page 22).

Solid waste must be packed in containers of rigid material, suitable for each type of chemical substance, respecting its physicochemical characteristics and its physical state, and must be identified according to its specifications.

Liquid waste should be stored in containers made of material compatible with the stored liquid, resistant, rigid and watertight, with a screw-on lid and seal (Figure 11). They must be identified according to their specifications.

Figure 11 - Chemical Waste Container (Group B)



Source: http://www.bio-brasil.com/familiaclean/produtos.html

According to ANVISA RDC No. 306/04, they must be packed in rigid material containers, suitable for each type of chemical substance, respecting their physicochemical characteristics and physical state, and identified in accordance with item 1.3.4 of the RDC in order to avoid chemical reaction between them, as well as the weakening or deterioration of such packaging, or the possibility that its material is permeable to the components of the waste. When the packaging containers are made of high-density polyethylene (HDPE), the compatibility between the substances must be observed.

Secondary packaging, which has not come into contact with the product, must be physically decharacterized and packaged as group D waste. Primary and secondary packaging and chemically contaminated materials must be treated in the same way as the chemicals that contaminated them.

Waste containing mercury (Hg) (Figure 12/13) should be stored in water-sealed containers and sent for recovery.

Figure 12 – Example of chemical material containing Mercury (Hg)



Source: Mercury Waste Management in Health Services

Figure 13 – Summary of suitable alternatives for Mercury-containing Waste Management

RESÍDUOS	ESTRATÉGIAS DE GERENCIAMENTO
Termômetros, Esfigmomanômetros	Embale-os cuidadosamente, para que não se quebrem no transporte. Se já estiver quebrado, o termômetro bem como as gotículas de mercúrio derramado deve ser guardado em um recipiente com tampa de vedação eficaz (um pote plástico, por exemplo). Evitar potes de vidro que se quebram facilmente.
	Tratamento: Recuperação do Hg
Amálgamas dentários	Segregação na fonte
	Coletar os resíduos em recipiente dotado de boca larga e de material inquebrável. Deixar um lâmina de água sobre o resíduo. Manter o recipiente hermeticamente fechado e em local de baixa temperatura, isento de luz solar direta
	Tratamento: Recuperação do Hg
Lâmpadas	Segregação na fonte
	É recomendável que as lâmpadas a descartar sejam armazenadas em local seco, nas próprias caixas de embalagem original, protegidas contra eventuais choques que possam provocar sua ruptura.
	Tratamento: Recuperação do Hg
Químicos	Segregação na fonte
	Acondicionamento em embalagem identificada
	Armazenagem temporária em local fechado
	Disposição final: aterro para resíduos perigosos
Eletroeletrônicos	Segregação na fonte
	Acondicionamento em embalagem identificada
	Armazenagem temporária em local fechado
	Tratamento: Reciclagem

Source: Mercury Waste Management in Health Services

Diskettes that are no longer used should be packaged as recyclable, in order to recycle the plastic and metal in them. For print cartridges, whenever possible, you should look for companies that provide refill services. If it is not possible to recharge, it must be packaged as group D waste.

Fluorescent lamps (Figure 14) should be stored separately from the rest of the waste, since they contain mercury (a highly toxic and polluting substance). If they are not disposed of correctly, they will be thrown in the common garbage, ending up in the landfill and contaminating the soil, thus reaching the water table.

Figure 14 - Packaging of fluorescent lamps



Source:http://meioambiente.culturamix.com/blog/wp-content/gallery/1-274/como-reciclar-uma- fluorescent-lamp-2.jpg

General Precautions:

- Packaging solid waste and liquids separated;
- Do not discharge them into the wastewater or wastewater collection system;
- Do not mix incompatible materials in the same container or in the same plastic;
- Do not put corrosive or reactive chemicals in metal cans;
- Fill containers only to 90% of their capacity;
- Ensure that the lids are securely closed before packing them into containers or bags to be collected.

Chemically hazardous waste, due to its possible commercial value, must be sent to a safe final destination, which prevents its recovery by garbage collectors or other unqualified persons.

TABLE 5 - GROUP C - RADIOACTIVE WASTE

Group C – Radioactive waste
Any materials resulting from human activities that contain radionuclides in quantities above the exemption limits specified in the CNEM rules and for which re-use is improper or unforeseen.
• This group includes radioactive waste or waste contaminated with radionuclides, from clinical analysis laboratories, nuclear medicine and radiotherapy services, according to CNEM-6.05 Resolution.

Radioactive waste must be stored in lead containers (Figure 15), with shielding appropriate to the type and level of radiation emitted, and must be labeled radioactive. Solid radioactive substances must be packed in rigid material containers, lined internally with a resistant plastic bag and identified according to item 12.2 of RDC ANVISA 306/04.

Figure 15 - Lead Container for Radioactive Waste



Source: www.cearensizando.com.br

Liquid waste must be packed in bottles of up to two liters or in drums of material compatible with the stored liquid, whenever possible made of plastic, resistant, rigid and watertight, with a screw-on lid and seal. They must be accommodated in trays of unbreakable material and deep enough to contain, with the appropriate safety margin, the total volume of the tailings, and be identified with specific symbols.

Unlike other hazardous materials, group C wastes are not vulnerable to degradation by external chemical and physical processes. Disposal in landfills or discharge into water bodies poses a risk to health and the environment. The only system capable of eliminating the characteristics of hazard is the decay of its radioactivity, and the time required for this varies according to the half-life of each radioactive element. After the radionuclide decays, they become waste and will be classified according to the material to which the radionuclide is associated.

TABLE 2 - DECAY TIME OF THE MOST COMMON RADIOISOTOPES

CHARACTERISTICS	ISOTOPE	HALF-LIFE	TIME OF SAFETY
Isotopes most commonly used in establishments Health	TC99 Ga67 I130 I125 Cr51	6 hours 3.26 days 8 days 60.20 days 27.80 days	60 hours 32.60 days 80 days 602 Days 278 Days
Other isotopes	Ti201 Fe59 In198 Co57 Ni63 Si90 C14 Cs137 Lr192 Am241	3.08 days 45.60 days 2.69 days 270 days 92 years old 27.70 years 5.73 years 30 years 5 years 458 years	30.80 days 456 Days 26.90 days 2,700 days 920 years 277 years 57.30 years 300 years 50 years 4,580 years

Fonte: Training Guide – Management and Management of Hospital Solid Waste, (1996)

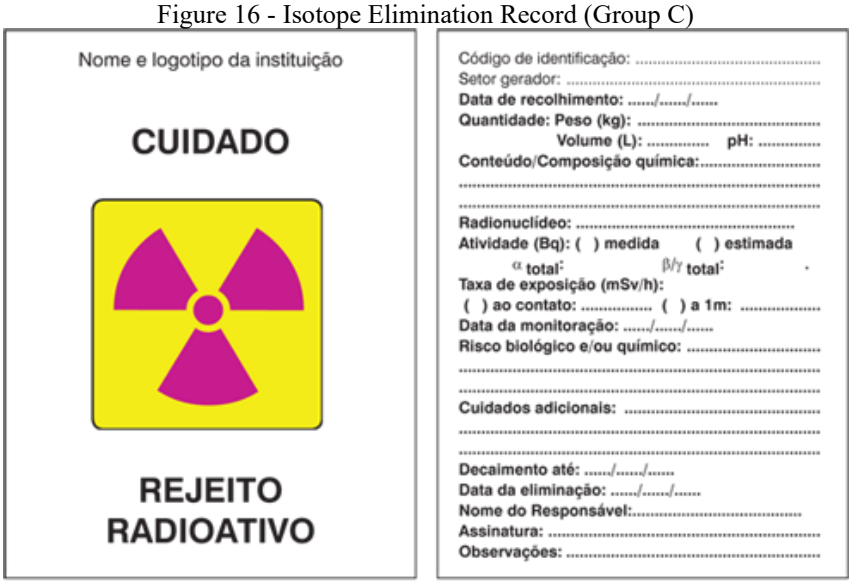
Every radioisotope endangers people and the environment according to its own characteristics. Radioactive waste is considered to have lost its hazardous characteristics when it has been stored or stored for decay for a time 10 times longer than its half-life.

A record of isotope elimination (Figure 16) should be kept near the decay area, or the suitable

decay container, on which the following information should be noted:

- Username;
- Area or service of origin;
- Storage date;
- Tipo de isótopo;
- Activity;
- Method/Form from elimination (decay, dilution fuel and non-combustible); Date of decay.

Figure 16 - Isotope Elimination Record (Group C)



Source: SILVA, E.M.P., CUSSIOL, N.A.M Management of radioactive waste from health services in Belo Horizonte: Center for the Development of Nuclear Technology, 1999 (CDTN - 857/99)

TABLE 6 - GROUP D - WASTE EQUIVALENT TO HOUSEHOLD WASTE

Group D – Waste equivalent to household waste
Waste that does not present a biological, chemical, or radiological risk to health or the environment environment, and can be equated with household waste.
• Sanitary paper and diapers, sanitary napkins, disposable garments, patient food remains, material used in antisepsis and hemostasis of venoclysis, serum and other similar equipment not classified A1.
• Leftovers from food and food preparation.
• Food remnants from the cafeteria.
• Waste from administrative areas.
• Residue from sweeping, flowers, pruning and gardens.
• Gypsum residue from health care.

Common waste should be packed in black (Figure 17) or transparent waterproof plastic bags and handled in accordance with the standards of the local urban cleaning services. To facilitate possible

recycling operations (paper, plastic, metal and glass) it is advisable to install special containers for segregation in the same place where they are (Figure 18). This practice facilitates recycling because the materials will be cleaner and, consequently, have greater potential for reuse.

Figure 17 - Black Plastic Bag



Source: http://dpsa.com.br/sacos-plasticos/saco-plastico-lixo-preto-200-litros-reforcado-90x110/

Figure 18 - Collectors of Recyclable Materials (Group D)



Source: http://ambientalistasemrede.org/como-e-porque-separar-o-lixo/

Paper (group D recyclable) must be separated in a blue collector identified with the inscription "paper"; plastics (recyclable group D) must be separated in a red collector identified with the inscription "plastic"; metals (recyclable group D) must be separated in a yellow collector identified with the inscription "metals"; glass (recyclable group D) must be separated in a green collector identified with the inscription "glass" and other waste (non-recyclable group D), such as paper towels, food scraps, etc., must be separated in a gray collector identified with the inscription "common garbage" (Figure 19).

Figure 19 - Gray Trash Bin (Group D - Non-Recyclable)



Source: Personal Collection

GLASS – Recyclable glass waste must be deposited in suitable green containers, exclusively for this type of waste. (Figure 18)

Glass containers that have been used to store chemicals can only be disposed of as recyclable glass if they have undergone a decontamination process. Otherwise, they should be considered as hazardous chemical waste and placed in containers intended for Group B waste.

PLASTIC – Recyclable plastic waste must be deposited in a suitable red container. (Figure 18)

Today there are about 40 different families of plastics, classified into two groups: thermoplastics and thermosets. Only thermosets are recyclable. The main resins are:

- High Density Polyethylene (HDPE);
- Low Density Polyethylene (LDPE);
- Polystyrene (OS);
- Polyvinyl Chlorite (PVC);
- Polypropylene (PP);
- Polyethylene Terephthalate (PET).

METALS – Recyclable metals must be deposited in a yellow container. (Figure 18)

Cans, both tinplate and aluminum, are the main scrap metal today and can be recovered in large quantities by segregation at source. Just to give an example, each ton of steel recycled represents a saving of 1,140 kg of iron ore, 154 kg of coal and 18 kg of lime. In aluminum recycling, on the other hand, the energy savings are 95% compared to the primary process, replacing the extraction of 5 tons of bauxite per ton recycled, not to mention all the non-generation of mining waste.

PAPER – Recyclable paper must be deposited in its own blue container. (Figure 18)

ORGANIC – Organic waste (food leftovers, fruits, vegetables, flowers, gardening pruning, etc.) must be separated at the generating sources and stored in their own brown containers (Figure 20). They can be used to generate energy, organic fertilizer gas, through the composting or biodigestion process.

Figure 20 - Proper Container for Organic Waste



Source: http://ambientalistasemrede.org/como-e-porque-separar-o-lixo/

TABLE 7 - GROUP E - SHARPS WASTE

Group E – Sharps residue
• Sharps or scarifying materials, such as: razors, needles, scalps, glass ampoules, drills, endodontic files, diamond tips, scalpel blades, lancets; capillary tubes; micropipettes; laminae and coverslips; Spatulas; and all broken glass utensils in the laboratory (pipettes, blood collection tubes, and Petri) and the like.

The pre-packaging of the RSS of group E must be in a rigid, watertight container, resistant to puncture, rupture and leakage, waterproof, with lid (Figure 21), containing the symbology of the substance (See page 22). Sharps (sharps) must be stored separately, at the place where they are generated, immediately after use.

Figure 21 - Sharps Collectors (Group E)



Source: http://www.bio-brasil.com/familiaclean/produtos.html

It is strictly forbidden to empty these containers for reuse. It is forbidden to re-engrave or manually remove the deferrable needles. The containers that are used in the CP must be discarded when the filling reaches 2/3 of its capacity or the filling level is 5 cm away from the mouth of the container, and its emptying or reuse is prohibited.

Group E waste, generated by home care services, must be packaged and collected by the care agents themselves or by a person trained for the activity, collected by the home care service, responsible for managing this waste.

Sharps contaminated with biohazard residues should be packed in rigid containers, which should not be filled to more than two-thirds of their volume. The containers must be placed in white plastic bags and labelled with the universal symbol of infectious substance and with the inscriptions "Biohazard" and "Sharps".

If specific sharps containers are not available, they can be placed in cans with lids or sturdy plastic bottles reused, then placed in white plastic bags and labelled with the inscriptions specified above.

Sharps, once placed in their containers, should not be removed for any reason.

7 IMPACTS ON HEALTH, SAFETY AND THE ENVIRONMENT

Health Service Waste (HSW), commonly associated with the name "Hospital Waste" is a strong risk to health and the environment. Generated and managed inappropriately in the environment, solid waste, in general, can contribute to biological, physical and chemical pollution of soil, water and air, subjecting people to various forms of environmental exposure, in addition to direct or indirect contact with biological and mechanical vectors. The HCW, despite representing a small portion of solid waste, is composed of different fractions generated in health facilities, ranging from sharps contaminated with biological agents, anatomical parts, toxic chemicals and hazardous materials (solvents, chemotherapy, photographic chemicals, formaldehyde, radionuclides, mercury, etc.), to empty glass, cardboard boxes, office paper, etc., single-use plastics and food waste which, if not managed properly, represent potential sources of negative impact on the environment and the spread of disease, and can pose a danger to healthcare workers, as well as patients and the wider community.

According to research carried out by the "Regional Program for Solid Hospital Outcomes" in Central America, the main deficiencies identified in HCW management practices are:

- The lack of segregation of biological waste, or its inadequate execution, increases the amount of contaminated waste. Common waste, when in contact with contaminated waste, is infected, increasing the risk to the personnel who handle it and to the population in general;
- The lack of adequate segregation of sharps waste is a direct cause of the highest number of accidents;
- The practice of dumping HSW in dumps along with municipal waste creates a serious risk to the health of waste pickers, to public health in general, and to the environment.

The main problems generated by inadequate management of HCW healthy:

- Infectious lesions caused by sharp objects;
- Risks of infection outside hospitals;
- Nosocomial infections due to inadequate waste management.

It is important to remember that any carelessness in the management of HCW puts the workers and operators of this system at risk.

Epidemiological evidence in Canada, Japan and the United States has established that biological waste from hospitals is a direct cause of the transmission of the HIV agent that produces AIDS and, even more frequently, of the virus that transmits Hepatitis B or C, through injuries caused by needles and other sharps (COAD, 1992).

Those responsible for the management of HCW must be vaccinated against hepatitis B and tetanus, as well as use personal protective equipment (PPE) that prevents direct contact with HCW and protects against possible occupational accidents. It is recommended to:

- Wear a uniform appropriate to the function;
- Wear a waterproof apron over the uniform;
- Fully secure the hair;
- Wear only closed shoes;
- Avoid the use of props such as costume jewelry and jewelry;
- Keep them short;
- Wear goggles;
- Wear nitrile gloves with reinforcement in order to avoid punctures;
- Wear flexible boots, made of PVC or rubber, with long shafts;
- Wear a respirator mask.

8 RECYCLING WASTE TO FEED BACK INTO THE BUILDING WITH ENERGY

Fortunately for nature and for man, waste can generally be recycled and partially used, which brings great benefits to the community, such as the protection of public health and the saving of foreign exchange and natural resources.

The benefits of recycling are:

- Reduction of the amount of waste to be disposed of in the soil;
- Energy saving;
- Preservation of natural resources;
- Financial resources generated by recycling to feed back into the hospital in various ways.

8.1 RECYCLING OF WASTE GROUPS

Waste that is often used in recycling is: organic matter; paper; plastic; metal; glass; and rubble. The following is a summary of each.

Recycling of organic matter – composting – Composting is the decomposition of organic matter from animal or plant waste, through microbial biological processes. The final product is called compost and is applied to the soil with the aim of improving its characteristics, without compromising the environment. The characteristics of the compost must follow the specific legislation of the Ministry of Agriculture. In a health care facility, organic matter for composting can be found in food scraps from the kitchen, tree pruning, gardens, etc.

Paper recycling – It is the technique that uses used paper to manufacture new paper. Most papers are recyclable. In a health care establishment, the raw material is in packaging, office paper, including letters, notepads, copiers, printers, magazines and brochures.

Glass recycling – Glass is a non-porous material that resists high temperatures, without losing its physical and chemical properties. Glass packaging can be reused several times. Glass is 100% recyclable. Thus, all glass containers, which do not present biological, radiological and chemical risks, found in a health service establishment, can be recyclable.

Metal recycling – Encompasses both ferrous and non-ferrous metals. The one with the greatest interest and commercial value is the non-ferrous metal, as it is in great demand by the largest industries. Some packaging, however, cannot be used for recycling, such as cans for canned food, oil, water-based paint, beverages, etc.

Recycling of construction waste – It is the reuse of fragments or remains of brick, concrete, mortar, steel, wood, etc., from waste in the construction, renovation and/or demolition of building structures, found in health establishments under construction or under renovation.

Other waste – Waste such as batteries, fluorescent lamps and toxic waste, contained in packaging (paint cans, etc.), x-ray plates are also subject to recycling and have specific regulations.

8.2 FEEDBACK

As previously explained, recycling can and does bring many benefits and as proposed by this research, from recycling we can feed back the building in order to generate energy gains with what it itself produces.

On a visit to the HRSM, we found that before the waste committee took over the work, the hospital generated approximately 80% of infectious waste and the rest of the common waste. This means that, in addition to not having the correct segregation, generating all this infected waste, the hospital spent a lot in terms of cost to collect all this waste, considered potentially dangerous. After the entry of the commission, with a work of environmental awareness and education, with the people who

worked and dispose of this waste, the HRSM hospital managed to reduce the infectious waste by 80% and with this reduction, The recycling of common waste was cost-effective, feeding back to the hospital itself.

Most of the garbage generated in Brazil is organic matter, mainly food scraps. In health establishments, the ideal is that, through correct segregation, the waste with the largest amount generated is common. The decomposition of this waste causes the appearance of leachate, the juice of the garbage, a dark, toxic liquid that can contaminate groundwater. In most landfills in the country, there is no proper treatment for leachate. One of the proposals found and researched is that through the technology of protection and recovery of the environment, we can transform leachate, that liquid resulting from the decomposition of garbage, into pure water. This technology has shown positive and revolutionary results in Brazil, and in the future it can supply industries and various establishments that provide services, such as health care.

The Cariacica landfill, in Espírito Santo, is an exception, with a totally Brazilian technology that transforms 130,000 liters of leachate per day into treated water and fertilizer. "95% of the leachate turns into water and the other 5% is transformed into waste, in the form of solid sludge, and this waste can be used in composting processes so that they can be transformed into organic fertilizer," says engineer Walter Plácido.

Another landfill in São Gonçalo, in the Metropolitan Region of Rio, the treatment of leachate is more sophisticated. It has been proven that it is cheaper to treat leachate by this German technology than to take the material for treatment in a sewage plant.

The leachate collected from the landfill is pumped into a mini-treatment plant that fits in a container. State-of-the-art equipment filters the leachate. Micro membranes only let water molecules through. The result of the process is astonishing. Pure, distilled water. What used to be a problem became a solution. A saving of R$ 300 thousand in just two months.

"The noblest uses of this water should be industrial uses. Industries that need water with a high standard of demineralization, a high standard of distillation", points out engineer Walter Plácido.

For now, the distilled water is used to lower the dust in the landfill itself, until new businesses can transform this water source into revenue for those who take care of the garbage and consequently feed back energy to industries, health establishments, etc.

Composting is a technique that transforms waste into fertilizer, which is essential in agriculture. As a proposal, the transformation of this waste into fertilizer meets the need of the administrator of the care facility, who intends to reduce the volume of the material to be managed, in addition to stabilizing a polluting material.

Another proposal already used in some hospitals is the recycling of papers. Bond paper, drafts, photocopies, and magazines, common in most hospital environments, can be recycled, as well as other

materials classified in group D, previously described. The recycling of paper generates financial resources and feeds back to the hospital energetically. This money is used in various ways to meet the needs of hospitals.

9 HRT ANALYSIS

Based on the norms, already mentioned in the previous texts, the Regional Hospital of Taguatinga - HRT has been working so that the Hospital establishes that waste is handled correctly from generation to final disposal, meeting the requirements of the Health Service Waste Management Plan: segregation, packaging, identification, internal transport, storage, treatment, collection, external transport and final disposal.

During the visit, we found that the HRT still has difficulty in following the Health Service Waste Management Plan, due to several factors. Initially, the lack of information is crucial for everyone to separate correctly in the offices, before the garbage goes to the shelter. Then, the structure for the packaging of this waste does not correctly accommodate the amount generated. According to the General Directorate of the Hospital, the HRT concentrates efforts for the correct management of waste from health services.

Waste from groups A, B, D and E is generated in the HRT, and does not have group C (radioactive). The weight in 2008, according to data collected by the General Activities Center, is 1300 kg, of which 1119 kg are infectious risk and 168 kg are common waste.

The waste is stored in white and green bags, there is no separation at the time of generation.

The internal collection is unique for the two types of waste, and different internal transport carts are not used for each color of bag.

The waste with chemical risk produced in general in all hospitalization areas, and in the sectors where there is handling of chemical products and use of cleaning products, there is no weight, packaging, or specific transport for this type of waste, with the exception of sharps that are stored in cardboard boxes and collected separately by employees of IPANEMA (Third-Party Hygiene Company, Cleanliness and Segregation of the Department of Health).

Common hazardous waste is generated in the administrative area, bathrooms, pantries and service stations, etc., and stored in green plastic bags.

The sharps are discarded in places close to their generations and are collected and separated from other waste. The final destination is incineration or, in some cases, autoclaving.

The treatment used autoclaving is for materials with chemical hazards-group B and/or associated biological hazards, which cannot be removed from the place of generation without the inactivation of the chemical elements and reduction of the biological agents, Group A1 and A4 of the CONAMA classification, as they cause major impacts to nature.

Autoclaving consists of the action of saturated water vapour at high pressures that lasts an average of 1 hour 30 minutes, done at a temperature of 160° C for 45 minutes.

The process of transforming group A waste into common waste that, in a way, is already proposed to generate energy, is absolutely clean, the cycle control is automatic. The Epidemiological Surveillance forwards to the Central Sterile Material (MSC) from the hospital, sharps with chemical risk to be autoclaved.

In observation and field analysis at the Regional Hospital of Taguatinga - HRT, the external shelter (Figures 22, 23 and 24) is in precarious conditions and needs to be adjusted to meet the norms and specifications of CONAMA and Anvisa Resolution, RDC No. 306, of December 7, 2004.

Figure 22 – Exterior photo of the current HRT shelter.



Source: Personal collection

Figure 23 – Blue container for recycling paper generated in the HRT.



Source: Personal collection.

Figure 24 - HRT's external shelter



Source: Personal Collection.

It has enough drums for the amount of garbage produced (Figure 25), however, the way in which the separation is done and the place where they are placed is not adequate. It has enough containers, but it does not have cleaning of the place and the types of waste are mixed.

Figure 25 - Thermoplastic drums.



Source: Personal Collection.

The bags are identified by each sector in the hospital, so it is possible to easily identify which sector is collecting the incorrectly.

The collection of medical waste is done in the external shelter itself, a place that should be free of insects, made of masonry and closed. It is located outside the hospital. In this unit, the waste is separated correctly and in the following way, form:

The green bag is intended for non-contamination-free type waste such as: papers in general,

adhesive tape, disposable cups, saline solution bottles, expired materials, wrappers and others.

The white bag is used to dispose of materials with biological waste, cotton, transfusion bag, bag segments, hemodialysis tubes with samples, gloves, gases, lab coats, contaminated equipment, syringes and others.

The descartex is a box made with two layers of cardboard, a place to dispose of sharps such as needles, ampoules, scalps. The garbage truck (Figure 26) to collect the waste does not collect according to the need and quantity. According to nurse Edna, who is also responsible for the HRT's Waste Commission, it is necessary to schedule a day and time with the company to make the collection. There are days when there is a lot of garbage and days when there is not. Stericycle is a service company specialized in protecting people and reducing risks through the management of waste generated by the customer and it is the one who collects it. However, this was not what we found during the visit. The person responsible for the collection, on the day of the visit, was not properly dressed for the risk, with gloves, mask and rubber boots and an identified company uniform. The collection is done as follows: the waste from the health system is packed in thermoplastic drums (Figure 25) with the appropriate reinforcements for handling and transport, previously sent to the generators. Preparation and packaging are carried out by the generator itself, ensuring minimal contact of the collectors and no exposure of RSS.

Figure 26 - Waste collection truck from groups A, D and E.



Source: Personal Collection.

The drums have the capacity to store volumes of 20, 50 and 200 liters, according to the amount

of waste generated. In some locations, 20-liter cardboard boxes are also provided.

After use and removal of their contents, the drums are sanitized with chlorine-based bactericidal products and sent back to health units for reuse, another way that supports the research's recycling proposal.

The collection of waste in the health units, properly packed in drums and containers (Figure 25/27), is carried out in a mechanized and "door-to-door" manner, meeting the pre-defined schedule and the frequencies established between the Stericycle and the generator, adequate and safe ways for its handling.

The hospital unit adopts measures to reuse administrative papers and uses this money for local needs.

The final disposal of biological waste is incinerated at the P. Sul Sanitary Landfill, the ashes and slag are taken to septic ditches at the Jockey Club.

Common waste is taken to Estrutural's landfill.

Figure 27 - Containers.



Source: Personal Collection.

10 PROPOSAL FOR EXTERNAL SHELTER FOR WASTE STORAGE

The shelter must be sized according to the volume of waste generated, with storage capacity compatible with the collection periodicity of the local urban cleaning system. It should be built in an exclusive environment, with at least one separate environment to serve the storage of waste containers from group A together with group E and an environment for group D (Figure 28).

The location of this external RSS storage must have the following characteristics:

Accessibility: the environment must be located and constructed in such a way as to allow easy

access for transport containers and collection vehicles;

- Exclusivity: the environment must be used only for the storage of waste;
- Safety: the environment must have adequate structural physical conditions, preventing the action of the sun, rain, winds, etc., and that unauthorized people or animals have access to the site;
- Hygiene and sanitation: there must be a place to sanitize carts and containers; The environment must have good lighting and ventilation and have floors and walls covered with materials resistant to cleaning processes.

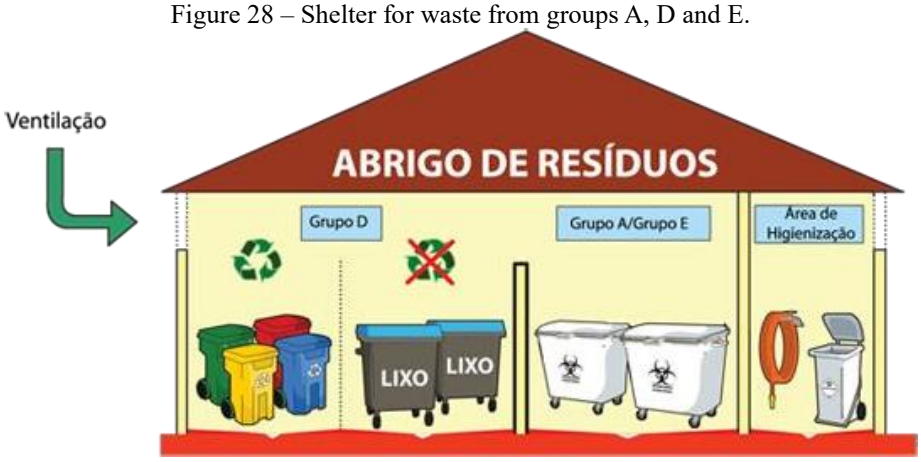
We should also follow some specific recommendations: The group A waste shelter must meet the following

Requirements:

- Be built in masonry, closed, equipped only with openings for ventilation, screens, which allow a minimum ventilation area of 1/20 of the floor area and not less than 0.20 m²;
- Be covered internally (floor and walls) with smooth, washable, waterproof, traffic and impact resistant material;
- Have a door equipped with a screen to protect against rodents and vectors, with a width compatible with the dimensions of the external collection containers;
- Have identification symbols, in an easily visible place, according to the nature of the waste. (See table on pages 23 to 24);

Have a specific sanitation area for simultaneous cleaning and disinfection of collection containers and other equipment used in the management of RSS. The area must have a roof, dimensions compatible with the equipment that will be subjected to cleaning and sanitization, smooth, waterproof, washable floors and walls, be provided with lighting points and electrical outlets, a water point, wastewater drainage pipes directed to the establishment's sewage network and a siphon drain provided with a cover that allows its sealing.

Figure 28 – Shelter for waste from groups A, D and E.



Source: http://www.resol.com.br/cartilha11/gerenciamento_etapas.php

The establishment that generates health service waste, whose weekly production does not exceed 700 litres and whose daily production does not exceed 150 litres, may opt for the installation of a reduced shelter. It must have the following characteristics, contained in RDC No. 306/2004:

- Be exclusively for the temporary storage of RSS, properly packed in containers;
- Have floors, walls, doors and ceilings made of smooth, waterproof, washable, impact-resistant material;
- Have minimum ventilation of two openings of 10 cm x 20 cm each (located one 20 cm from the floor and the other 20 cm from the ceiling), opening to the external area. At the discretion of the health authority, these openings may lead to internal areas of the establishment;
- Have a floor with a minimum trim of 2% to the opposite side of the entrance, and it is recommended to install a siphon drain connected to the sanitary sewer network;
- Have identification on the door with a symbol according to the type of waste stored;
- Have such a location that it does not open directly to areas where people stay, giving preference to places with easy access to external collection.

The group B waste shelter (Figure 29) shall be designed, constructed and operated in such a way that:

- Be made of masonry, closed, equipped only with screened openings that allow an adequate ventilation area;
- Be covered internally (floor and wall) with smooth finish material, resistant to traffic and impact, washable and waterproof;
- Have a door equipped with lower protection, preventing the access of vectors and rodents;
- Have a floor with a drape in the direction of the gutters or drains;
- Be identified, in an easily visible place, with safety signs – with the words CHEMICAL WASTE – with a symbol (see page 23 to 24);
- Provide for the shielding of internal electrical energy points, when flammable waste is stored;
- Have a device in order to avoid direct sunlight;
- Have a fire suppression system by means of CO2 extinguishers and PQS (dry chemical powder);
- Have an emergency kit in case of spillage or leakage, including absorbent products;
- Store the Waste Constituted from goods corrosive and flammable hazards near the floor;
- Observe the recommended safety measures for chemicals that can form peroxides;
- Do not receive or store unidentified waste;

- Organize or storage from agreement with Criteria compatibility, segregating waste into trays;
- Keep a record of the waste received;
- Keep the place locked, preventing access by unauthorized persons.

Figure 29 – Group B waste shelter.



Source: http://www.resol.com.br/cartilha11/gerenciamento_etapas.php

As a shelter proposal for the HRT, the waste storage site was dimensioned according to the amount generated by the hospital, respecting the standards of constructive aspects contained in ANVISA RDC No. 306/2004, ANVISA RDC No. 50/2002, RDC No. 307/2002 and ANVISA RDC 189/2003.

(Annex III – Plan of the external area of the HRT)

(Annex IV – Proposal for a basic project for the HRT shelter)

11 CAMPAIGN PROPOSAL

Due to the various cases mentioned above related to the incorrect separation of organic waste and recyclables, and the inadequate disposal for the RSS. We suggest a health and environmental awareness campaign to alert and make everyone aware of the need to dispose of garbage correctly.

An illustrative and explanatory folder was produced with the following information: what is RSS? legal guidelines, classification of HCWs, how to separate the waste produced in health facilities? segregation, packaging and PPE's.

(Appendix I)

12 THEORETICAL REFRENCIAL

In Brazil, half of the world's population currently lives in urban regions. According to data from the United Nations (UN), this rate will be 60% in 2030 and will reach close to 70% in 2050. In Brazil, 85% of the population lives in cities. As cities grow in size and population, so do the difficulties in maintaining the spatial, social and environmental balance in their territories. Consequently, the generation of waste from human action has been growing at a faster pace than nature's absorption capacity. However, the technological advancement of the last decades has enabled achievements in the field of science, but on the other hand, it has contributed to produce a significant increase in the diversity of products with components and materials that are difficult to degrade and have greater toxicity. Among them, medical waste.

Solid waste management in Brazil is still flawed, with major deficiencies in treatment and final disposal. This has entailed considerable risks to the environment and health. Silva (2004) considers that the concern with waste from health services goes beyond health services, leading to discussions about the environment, suggesting mechanisms for proper management, minimizing pollution of the planet.

The main idea of HSW management is to promote their follow-up, from their generation to their final disposal, going through stages and distinguishing them, aiming at minimizing or blocking the effects caused by HSW in the sanitary, environmental and occupational spheres. Confortin (2001) consolidates this statement when he states that the purpose of management is to establish all stages of the system, from the generation to the final disposal of the RSS.

Management refers to the articulated set of normative, operational, financial and planning actions based on sanitary, environmental, social, political, technical, educational, cultural, aesthetic and economic criteria for the generation, management, treatment and final disposal of solid waste. Mandelli (apud SCHNEIDER, 2001).

This definition summarizes well the concept of management, since it encompasses the fundamental bases for the implementation of management techniques, the criteria to be followed and the field of action of the same.

The management aims at the best use of the areas destined for the disposal of waste and the implementation of techniques for the minimization, reuse, reuse and recycling of the same, in addition to providing protection to public health and the environment.

Schneider (2001) points out that management is a vital factor for urban planning, although it has not occupied the discussion scenario with the vigor that would be desirable.

The Technical Regulation for the Management of Waste from Health Services, recently republished in harmony with the federal standards of the Ministries of the Environment, through CONAMA (Resolution No. 358 of 04/29/2005), and of Health, through ANVISA (Resolution No. 306

of 12/07/2004), referring to the management of waste from health services, defines management as the set of management procedures, planned and implemented based on scientific and technical, normative and legal bases, with the objective of minimizing the production of waste and providing the waste generated with a safe route, in an efficient way, aiming at the protection of workers, the preservation of public health, natural resources and the environment.

Confortin (2001) states that, in Brazil, the changes and concerns with the management of RSS occurred due to facts such as:

- Discovery of AIDS, which forced changes in the conduct of hospital hygiene.
- When the residues came into contact with patients, they were considered infectious.
- Small hospital incinerators have given way to centralized systems, due to environmental constraints and the increase in the amount of waste considered infectious.
- Since 1989, a new philosophy has emerged in waste management and several countries have established rules in which only a small portion of RSS is defined and treated as special.

Finally, the correct management of solid waste means not only controlling and reducing risks, but also achieving their minimization, from the point of origin, observing the rules regarding packaging, intra and extra unit collection, disposing of them in a safe and environmentally appropriate way, also increasing the quality and efficiency of services. Medical waste should be treated appropriately and, if possible, processed or recycled.

Cristina Lucia Sisino and Rosália Maria de Oliveira (2000), in their book Solid Waste, Environments and Health, A Multidisciplinary Vision, state that there must be changes in the patterns of consumption, production and generation of waste. Some strategies could be outlined based on the Agenda 21 programs, such as: minimization of waste production; maximization of waste treatment and disposal systems compatible with environmental preservation and expansion of the coverage of collection and final destination services. Waste is divided into household municipal solids; hospital, health and industrial services. Sisino and Oliveira discuss the environmental impact of Large Urban and Industrial Waste Dumps; bioremediation of affected areas; among other topics.

Sandro D'mato Nogueira (2008) in the book Meio Ambiente do Trabalho – O Princípio da Conservação na vigilância e na saúde ambiental. "In the hospital environment, energy in the form of electricity is a source of life." It is the energy that maintains the appliances that are often sustaining the patient's life. According to this author, a rationalized analysis of the infectious disease issues of medical waste as a whole is necessary.

Law No. 12,305/2010 established a deadline for the elimination of landfills and the environmentally appropriate final disposal of tailings until 2014. In 2012, the garbage dump in Gramacho, a poor neighborhood in Duque de Caxias that had been operating for 34 years and housed

about 1600 workers, officially closed in Rio de Janeiro, according to the Minister of the Environment, Izabella Teixeira, saying that the site will be an example of recovery of environmental liabilities. With the degradation of the environment and the decrease in the accelerated quality of life, today there is a greater concern that, in a way, is still not much This is noticeable in the way in which the issue of sustainability, the recycling of what is produced and the minimization of production is dealt with in Brazil. It is extremely important to dispose of this waste in a less harmful way.

In Brazil, the National Health Surveillance Agency (ANVISA), which in turn regulates, controls and inspects products and services that involve health risks, and the National Council for the Environment (CONAMA) have assumed the role of guiding, defining rules and regulating the conduct of the different agents with regard to the generation and management of waste from health services. with the aim of preserving health and the environment, ensuring its sustainability. CONAMA Resolution No. 005/03 was published, which defined the obligation of health services to prepare a waste management plan. After this effort, it reflected on the present day, with the publications of RDC ANVISA nº: 306/04 and CONAMA nº: 358/05.

Bill No. 7,047 of 2006, Solid Waste Management, talks about the legal certainty necessary for the solid waste sector.

Bill No. 203 of 1991 talks about packaging, collection, treatment, transportation and final disposal of health waste "Art. 16, II, give adequate final destination to the collected waste".

The Journal Saúde em Debate - CEBES (2005) deals with the minimization of waste production, increased production and the use of disposables after the industrial revolution. "The main causes of the progressive growth in the rate of generation of solid waste from health services (HCW) is the continuous increase in the complexity of care and the increasing use of disposable materials."

13 METHODOLOGY

Firstly, we read the dissertation works of the Postgraduate course in urban engineering of the Federal University of Paraíba – Study on the Management of Solid Waste of the Health Services of the Hospitals of João Pessoa – PB and (Thesis of ENSP-FIOCRUZ, 2008 – Araújo, E.P.) published and analyzed the case studies, projects and works developed in hospitals and treatment centers.

Afterwards, visits were made to the HRT, HRSM and Health Centers 01 and 02 of Taguatinga, for analysis and evaluation of the recycling methods used and possibilities of adaptation of existing projects or construction of new buildings.

Subsequently, an appropriate place was designed for the storage of the waste until the final destination.

14 DISCUSSION AND ANALYSIS OF RESULTS

This chapter aims to present and discuss the main observations made during the course of the work of this research, while answering whether the objectives initially planned were achieved and whether the questions throughout the research were answered. In addition, some difficulties encountered in the elaboration of the research are included.

Initially, when the theme was presented, for the development of the project, the only view was that hospital waste is potentially dangerous and infectious, and that there was no proper and adequate treatment. With the development of the project, the research showed us the concepts regarding waste and that in addition to recycling, there is the possibility of adapting these recycling methods to the various hospital waste, in order to generate energy to feed back the building itself. The advancement of research and the help of the advisor made it possible for us to visit hospitals and health centers, to see up close how waste should be processed, stored and collected. The research also showed us the proper treatments and the diversity of existing waste. In addition, we have seen that there are norms, laws, and responsible and supervisory bodies. However, during the visits, we found that the process of segregation to minimize waste is not exactly as it should be, because there are difficulties and specific needs of each hospital and health centers, which prevent the procedure from happening correctly.

In most of the visits we made to hospitals and health centers, we had difficulty finding people specialized in the field of RSS who would inform us how the stages from segregation to destination take place final. As a solution, in some informal preliminary conversations with the cleaning staff of the establishments visited, we found that there was no general planning of the stages that the HCW undergoes, nor an awareness of the professionals responsible for the disposal of each group of waste.

15 FINAL THOUGHTS

From this research and data collection regarding solid waste in general and waste from health services, we conclude that there is still a lack of initiatives to encourage policies and management to raise awareness in society in relation to this important and indispensable theme for sustainable development. We have seen that initiatives such as the creation of laws and inspections have been created to try to solve the obstacle, but there are still constant problems. Recycling is still a highly recommended method and solution of paramount importance to continue the economy, sustainable development and energy efficiency.

According to the National Solid Waste Policy, it established that environmental education is a fundamental instrument for the success of this purpose of the government and society, to change a culture in relation to the disposal of waste. In fact, in the law, there is no mention of garbage, which is a word proscribed by the law, but residue or reject, which allows us to use all the material. To change this, it is important to know what is already being done in society so that we have a policy that is in

tune with the solutions that the population has been finding.

As a result, we understand how hospital architecture needs to be humanized, being able to have better energy use and thus work on its sustainability; We also raise elements that can benefit, in addition to the health institution, the population and the environment.

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ATTACHMENTS

ANNEX I

Seqüência dos passos para elaboração do PGRSS

Passo 1 - Identificação do problema

Abrange o reconhecimento do problema e a sinalização positiva da administração para início do processo.



O que fazer

- Definir, provisoriamente, um responsável pelas tarefas.
- Analisar os contextos local, estadual e nacional no qual deverá se inserir o PGRSS, nos aspectos econômico, social, político, jurídico etc.
- Identificar as políticas nacionais em vigor no campo de resíduos sólidos.
- Levantar o que já é realizado na gestão de resíduos nos serviços públicos, Ongs, grupos de base, iniciativas locais.



- Estudar a documentação existente: relatórios internos, literatura sobre o assunto, estatísticas oficiais, alvarás, autos, licenciamento, etc.
- Realizar uma avaliação preliminar dos resíduos de serviços de saúde - RSS gerados pelo estabelecimento e da gestão destes.
- Mapear todas as áreas do estabelecimento envolvidas com RSS.

- Elaborar uma estratégia de trabalho.
- Obter o respaldo da direção da instituição.
- Discutir com a direção todas as etapas de trabalho.



Resultado do passo 1:

- *conhecimento preliminar do problema;*
- *plano preliminar de trabalho;*
- *aprovação da Diretoria.*

Passo 2 - Definição da equipe de trabalho

Abrange a definição de quem faz o que e como.



O que fazer

- Designar profissional para a elaboração e implantação do PGRSS. Os requisitos para a função são:
  - ter registro ativo junto ao seu conselho de classe;
  - apresentar a Anotação de Responsabilidade Técnica - ART, ou o Certificado de Responsabilidade Técnica, ou documento similar quando couber.
- Compor uma equipe de trabalho, de acordo com a tipificação dos resíduos gerados.



Tome nota: a escolha da equipe

O responsável legal é aquele que consta do alvará sanitário emitido pela vigilância sanitária. O responsável pelo PGRSS deve atender às exigências do capítulo IV da RDC nº306/04. O responsável técnico dos serviços de atendimento individualizado pode ser o responsável pela elaboração e implantação do PGRSS.

Quanto mais complexos forem os processos encontrados no estabelecimento, maiores são as exigências técnicas da equipe que deverá elaborar e implementar o PGRSS. Em estabelecimentos maiores, o grupo deve ser multidisciplinar.

O sucesso de qualquer trabalho depende muito da maneira como são escolhidos os membros de uma equipe e de como estes utilizam os recursos, como dividem o trabalho e normatizam sua relação interna (para a comunicação, a gestão de conflitos e outros processos). Por isso, recomenda-se que a escolha dos membros da equipe deve estar respaldada em:

- *formação técnica para as tarefas;*
- *responsabilidades: qualificações para as atribuições e funções;*
- *avaliação das competências de cada um e sua melhor utilização.*

A equipe de trabalho deve ser treinada adequadamente para as tarefas e participar de todas as etapas do plano. O responsável pelo PGRSS deve elaborar, desenvolver, implantar e avaliar a aplicação do PGRSS, de acordo com as especificações legais já mencionadas e supervisionar todas as etapas do plano.



Resultado do passo 2:

- *responsável pelo PGRSS definido;*
- *equipe de trabalho composta e treinada.*

Passo 3 - Mobilização da organização

Abrange o envolvimento da organização para a realização do PGRSS. Objetiva sensibilizar os funcionários sobre o processo que será iniciado, disseminando informações gerais e específicas sobre RSS e o PGRSS.

O que fazer

- Promover reuniões com os vários setores para apresentar a idéia, o possível esquema de trabalho e o que é esperado de cada unidade.
- Promover atividades de sensibilização sobre a temática, como, por exemplo, conferências, oficinas, filmes e outras.
- Criar formas permanentes de comunicação com os funcionários, como, por exemplo, um painel que seja regularmente atualizado com informações

sobre temáticas ambientais e o desenvolvimento do PGRSS.

- Organizar campanhas de sensibilização sobre necessidade do PGRSS.
- Preparar um questionário para levantar a percepção dos funcionários sobre o meio ambiente, de forma a identificar eventuais questões chaves relacionadas aos resíduos de serviços de saúde.
- Divulgar os resultados da pesquisa a todos os funcionários, por meio de cartazes, folhetos e outros meios disponíveis na organização.





Tome nota:

Todas estas sugestões podem e devem ser interligadas, fazendo parte de um plano de comunicação. Assim, terão maior eficácia.



Resultado do passo 3:

- *conhecimento, por todos os funcionários, da importância de se gerenciar os RSS e do que é o PGRSS;*
- *envolvimento dos funcionários na execução, implantação e manutenção do PGRSS.*

Passo 4 - Diagnóstico da situação dos RSS



Abrange o estudo da situação do estabelecimento em relação aos RSS. A análise identifica as condições do estabelecimento, as áreas críticas. Fornece os dados necessários para a implantação do plano de gestão.



Tome nota:

É necessário efetuar o registro preciso e cuidadoso de todas as informações obtidas que serão utilizadas no próximo passo.

O que fazer

Levantamento das atividades

- Proceder ao levantamento de todas as atividades do estabelecimento, com visitas às áreas administrativas, setores ou unidades especializadas e outras.



Tome nota:

As atividades devem ser informadas pelo profissional da saúde responsável pelo setor.

O profissional que está realizando o levantamento deve ter capacidade técnica para relacionar os possíveis tipos de resíduos em função do tipo de atividade daquele setor.

Identificação dos resíduos

- Identificar os resíduos, classificados nos grupos definidos - A, B, C, D, E, recicláveis (papel, plástico, metal, vidro, matéria orgânica) - (PARA SABER MAIS, ver capítulo 3 e anexo 3). É importante verificar detalhes sobre os tipos de resíduos, bem como condições específicas em que são gerados no estabelecimento.



Tome nota:

Em situações excepcionais, mas não raras, pode-se ter um determinado resíduo de origem desconhecida. Nestes casos, deve-se proceder da seguinte maneira:

1. *Avaliar as características do resíduo, em relação à sua periculosidade.*
2. *Identificar os possíveis riscos associados para a adoção de medidas de controle.*

Acondicionamento dos resíduos (PARA SABER MAIS, consulte o anexo 5)

- Identificar que tipos de recipientes são utilizados como contenedores dos RSS.
- Identificar os tipos de embalagens: sacos, plásticos, bombonas, caixa de papelão, caixa para perfurocortantes etc.
- Verificar se a quantidade de embalagens é compatível com os resíduos gerados.

- Identificar e verificar se existe definição e padronização dos contenedores e embalagens.
- Verificar se estão sendo respeitados os limites de preenchimento dos contenedores e embalagens.
- Verificar a adequação das embalagens para os resíduos químicos perigosos, em função das suas propriedades físicas.
- Verificar a existência de acondicionamento em recipiente adequado para os perfurocortantes.
- Verificar se os contenedores são de material lavável, resistente à punctura, ruptura e vazamento, com tampa provida de sistema de abertura, com cantos arredondados e resistentes ao tombamento.

Coleta e transporte interno

- Verificar se a coleta está sendo feita separadamente de acordo com o grupo de resíduos e em recipientes específicos a cada grupo de resíduos.
- Descrever as coletas abordando sua forma em função do grupo de resíduos, tipos de recipientes, carros de coleta, equipe, quantidade, freqüência, fluxos de resíduos etc.
- Verificar se o dimensionamento da coleta está adequado ao volume gerado, número de funcionários disponíveis, número de carros de coletas, equipamentos de proteção individual - EPIs necessários conforme as normas de saúde e segurança do trabalho e demais ferramentas e utensílios utilizados na coleta.
- Verificar se existe padronização de turnos, horários e freqüência de coleta para os diferentes tipos de resíduos.
- Verificar a técnica do manuseio da coleta: fechamento dos sacos, transporte dos sacos, uso de EPIs.
- Verificar se o tipo de resíduo está compatível com a cor do saco.
- Verificar se, para o transporte manual, os recipientes estão adequados.
- Verificar o transporte mecânico e uso de carro de coleta.
- Verificar se os carros de coleta estão devidamente identificados com símbolos de segurança.
- Verificar o estado de conservação dos carros de coleta.

Fluxo da coleta interna

- Verificar o traçado e desenhar os roteiros (itinerários) das coletas até o abrigo externo.
- Levantar as freqüências, fluxo, nível de ruído e horário das coletas.
- Levantar e sistematizar as características de cada roteiro para os diversos resíduos.
- Verificar a compatibilidade de roteiros previamente definidos para cada tipo de resíduo e horários das coletas em função da distribuição de roupas, alimentos e medicamentos, períodos de visita ou de maior fluxo de pessoas ou de atividades.

Quantificação dos RSS

- Levantar a quantidade de cada tipo de resíduo gerado por setor, por meio de volume ou pesagem;
- Estabelecer um período de coleta dos dados, ou seja, turno/dia/semana/mês.

Armazenamento interno e externo

- Verificar as condições de armazenamento existentes.
- Verificar o armazenamento dos resíduos de acordo com a regra de segregação por tipo de resíduo (PARA SABER MAIS, consulte o anexo 1).
- Verificar se as embalagens com resíduos estão contidas em recipientes devidamente fechados.
- Verificar se o número de contenedores é compatível com a quantidade e tipos de resíduos gerados.
- Verificar se os ambientes disponíveis para guarda temporária atendem aos requisitos mínimos de dimensionamento, equipamentos e segurança.
- Verificar se as salas de resíduos e abrigos estão compatíveis com tipos de resíduos gerados e sua quantidade.
- Verificar como é efetuada a limpeza do ambiente de armazenamento interno e externo.
- Verificar como é realizado o processo de coleta externa.
- Verificar quais os tipos de contenedores existentes no abrigo de resíduos.
- Verificar se a construção do local de armazenamento externo é exclusiva para resíduos.
- Verificar se os abrigos possuem símbolo de identificação (ver tabela à pág. 43), em local de fácil visualização, de acordo com a natureza do resíduo.
- Verificar a existência de abrigos com separação para os diferentes tipos de resíduos.
- Verificar o armazenamento dos resíduos químicos perigosos considerando as medidas de segurança recomendadas.
- Verificar a existência de resíduos sem identificação.
- Verificar se o abrigo de resíduo químico do grupo B perigoso está projetado, construído e é operado de acordo com as normas de segurança e higiene.
- Verificar para onde está sendo encaminhado o efluente da lavagem do abrigo e da área de higienização.

Área de higienização

- Verificar se o abrigo possui área de higienização para carros de coleta interna e demais equipamentos utilizados, dotada de ventilação, cobertura, iluminação artificial, ponto de água (preferencialmente quente e sob pressão), piso impermeável, drenagem e ralo sifonado.

Coleta e transporte externo

- Verificar quais são as empresas coletoras e se as mesmas emitem

certificação de conformidade com as orientações do órgão de limpeza urbana.

- Verificar o sistema de coleta adotado, se em contenedores basculáveis mecanicamente ou manualmente, freqüência de coleta, se ocorre disponibilização dos contenedores pela empresa.
- Verificar os tipos de veículos utilizados de acordo com sua adequação às normas.
- Verificar se o veículo possui sistema de contenção para líquidos.
- Verificar o procedimento da coleta pelos funcionários da equipe de coleta, quanto ao rompimento de sacos, liberação de líquidos ou contaminação do ambiente.
- Verificar o uso de EPIs pelos funcionários da empresa.

Tratamento

- Verificar se o estabelecimento possui tratamento prévio ou tratamento interno ou se o serviço é terceirizado.
- Verificar quais são os tipos de tratamento dispensados aos resíduos.
- Verificar se os resíduos do grupo A, que requerem tratamento prévio à disposição final, estão sendo tratados em equipamentos adequados e licenciados e quais não estão sendo tratados.
- Identificar as empresas tratadoras de resíduos de serviços de saúde e se as mesmas emitem certificação de conformidade com as orientações do órgão ambiental.
- Verificar se as empresas terceirizadas que cuidam do tratamento dos resíduos estão licenciadas pelo órgão ambiental.
- Verificar quais resíduos químicos perigosos estão sendo submetidos a tratamento, quais estão sendo dispostos em aterro, e quais estão sendo submetidos a processo de reutilização, recuperação ou reciclagem.
- Verificar a existência de rede coletora com tratamento de esgoto.
- Verificar o processo para decaimento de rejeitos radioativos (se houver).

Disposição final

- Verificar quais os tipos de disposição final existentes.
- Caso a disposição final seja o aterro sanitário ou célula especial de RSS, verificar se os mesmos possuem licenciamento ambiental.

Política de gestão ambiental

- Verificar a existência de política de gestão ambiental no estabelecimento.
- Verificar a existência de gestão de riscos ambientais.
- Verificar a existência de Sistema de Gestão Ambiental - SGA.
- Verificar a necessidade de adequação do espaço físico do estabelecimento para atender normas, legislações e facilitar o correto gerenciamento dos RSS.

- Propor adaptações ao PGRSS, onde for necessário, considerando a avaliação feita e outras auditorias internas e externas.
- Discutir com a equipe e o setor responsável pelas adaptações propostas e considerá-las no orçamento.



Tome nota:

Além de verificar o andamento do projeto em seus elementos tangíveis, uma boa avaliação deve:

- *ser uma ferramenta de gestão mais do que uma ferramenta de controle;*
- *inserir-se num processo de informação, de comunicação e de busca de educação ambiental e melhoria;*
- *melhorar a capacidade da instituição de compreender as realidades nas quais intervém, agir e se organizar de maneira eficaz e eficiente;*
- *facilitar a avaliação de maneira que as equipes e os responsáveis tenham uma idéia clara da gestão dos RSS;*
- *aperfeiçoar os indicadores identificados durante o planejamento para avaliar o desempenho da implantação.*



Resultado do passo 8:

- *PGRSS avaliado;*
- *modificações, adaptações e redefinições;*
- *propostas implantadas.*

Capacitação e treinamento

- Levantar cursos, treinamentos e campanhas voltados a todos os envolvidos no gerenciamento, bem como suas freqüências, onde o foco é a questão ambiental (abastecimento de água, resíduos sólidos, esgotos, poluição do ar, sustentabilidade e outros).

Avaliação global dos dados levantados

- Elaborar um relatório baseado em fatos comprobatórios e na pesquisa realizada seguindo os passos acima listados.
- Abordar, no relatório, as seguintes questões: a descrição de todos os procedimentos relacionados à gestão dos RSS; os aspectos problemáticos; as referências às legislações, regulamentos, normas etc.
- Apresentar formalmente o relatório de diagnóstico ao gestor do estabelecimento para o esclarecimento de dúvidas e ajustes pertinentes.



Tome nota: Os cuidados na elaboração do relatório

Para garantir que a análise seja eficaz para a elaboração do plano, é preciso que o relatório de diagnóstico seja:

- sintético, de leitura fácil, que ressalte a informação essencial, eliminando o que for dispensável para a ação;

- preciso, com os caminhos descritos de forma clara e emblemática, sem proselitismo;

- estruturado, de forma a contemplar as grandes linhas de orientação;

- coerente, garantindo a lógica da sucessão de ações descritas com títulos compatíveis com o conteúdo, argumentos claros e pertinentes;

- comprobatório, evitando conclusões frágeis e difíceis de serem provadas;

- impessoal, evitando críticas e citações de pessoas da organização relacionadas a áreas com problemas.

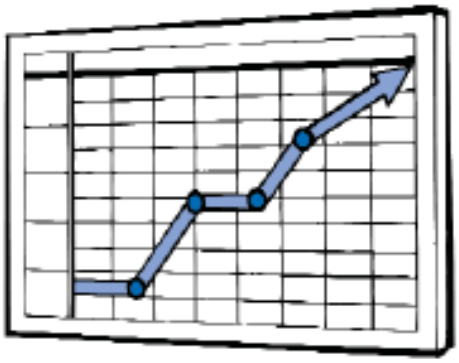


Resultado do passo 4:

- *Relatório contendo a análise da situação atual do serviço de saúde quanto à gestão dos RSS e identificação de situações críticas, semi-críticas e não críticas.*

Passo 5 - Definição de metas, objetivos, período de implantação e ações básicas

Corresponde à organização e sistematização de informações e ações que serão a base para a implantação contínua do PGRSS.



O que fazer

- Delimitar o quadro de intervenção e a dotação financeira preliminar para a seqüência dos trabalhos.



Tome nota:

O PGRSS pode ser feito por meio de gestão direta ou em parceria. Para definir isso, é preciso saber em que campo se deseja atuar e quais as grandes linhas metodológicas e as implicações de se fazer diretamente ou não.

- Decidir quais as metas a serem atingidas.
- Indicar o momento adequado para se dar início à execução do plano e definir cronograma.
- Construir os objetivos que levarão ao atingimento das metas.
- Dimensionar a equipe de trabalho, relacionando número de empregados, cargos, formação e responsabilidade técnica.
- Dimensionar espaços necessários, materiais e equipamentos.



Tome nota:

A finalidade principal do PGRSS é estabelecer as condições necessárias para a segurança do processo de manejo dos resíduos. Outras finalidades específicas de cada estabelecimento podem ser nomeadas, para cumprir as metas que forem estipuladas. Abaixo, exemplos de objetivos:

- *Criar práticas de minimização dos resíduos.*
- *Substituir os materiais perigosos, sempre que possível, por outros de menor periculosidade.*
- *Reduzir a quantidade e a periculosidade dos resíduos.*
- *Propiciar a participação e envolvimento dos funcionários do estabelecimento.*
- *Atrelar ao gerenciamento um trabalho de responsabilidade, co-responsabilidade e responsabilidade social.*
- *Conhecer a realidade local ou regional da coleta, tratamento e disposição final dos resíduos sólidos.*
- *Conhecer os diferentes tipos de resíduos gerados nas várias áreas de um estabelecimento prestador de serviços de saúde, propiciando a diminuição dos riscos à saúde e a preservação do meio ambiente, por meio de medidas preventivas e efetivas.*
- *Criar coleta seletiva de materiais recicláveis.*
- *Criar o manual de boas práticas em manejo dos resíduos sólidos.*
- *Criar procedimentos básicos e adequados para o correto gerenciamento dos resíduos sólidos.*
- *Criar procedimentos de auditoria interna e supervisão.*
- *Melhorar as medidas de segurança e higiene no trabalho.*
- *Minimizar os riscos sanitários e ambientais derivados dos resíduos sólidos (contaminação do solo, água, catadores etc.).*
- *Desenvolver um trabalho de prevenção contra os riscos potenciais decorrentes do manuseio dos resíduos sólidos, com o pessoal da coleta.*

Investimentos econômico-financeiros

- Relacionar e quantificar os investimentos necessários para a implantação e avaliação do PGRSS (ver modelo 1 anexo a este capítulo).

Cronograma de implantação e execução do PGRSS

- Ordenar as propostas de ação em função de sua prioridade.
- Definir, para todas, o que fazer, quando e como.



Tome nota:

Cada proposta de ação deve incluir:

- *Descrição da ação*
- *Resultados esperados*
- *Recursos humanos necessários*

- *Materiais necessários*
- *Recursos econômicos necessários*
- *Data de implementação e cronograma.*

- Definir os recursos necessários para implantar as ações, como compra de contenedores e outras que não dependem de obras.
- Elaborar projetos para as obras civis necessárias, de acordo com especificações técnicas e orientações de normas técnicas do Ministério do Trabalho, do órgão de vigilância, do órgão de controle ambiental e da legislação sanitária e ambiental em vigor, assim como das normas e padrões estabelecidos pelos serviços públicos (por exemplo, de água e esgoto).
- Obter, dos órgãos públicos, aprovação para construção de abrigos, ampliação de sala de resíduos, tratamento e outras obras estabelecidas no plano de ação.
- Obter os recursos necessários.



Resultado do passo 5:

- *metas, objetivos e período de realização do PGRSS definidos;*
- *relatório contendo todas as ações propostas, com indicação de recursos e tempo para implantação.*

Passo 6 - Elaboração do PGRSS

Abrange o plano para o gerenciamento contínuo dos resíduos de serviços de saúde.



O que fazer

- Hierarquizar os problemas diagnosticados, verificando: sua gravidade ou urgência; os custos de sua resolução (financeiros, humanos e materiais); o

prazo e o esforço necessários para isso; a facilidade de envolvimento da organização no processo de mudança.

- Verificar a efetividade dos programas de prevenção ambiental e promoção da saúde existentes.
- Seguir um roteiro para a construção do plano de acordo com as legislações sanitárias e ambientais.



Tome nota:

Cada PGRSS é único, mesmo que se tratem de estabelecimentos com as mesmas atividades. O que os diferencia é estar de acordo com o diagnóstico específico. Grande parte das informações necessárias ao roteiro de elaboração do PGRSS vem, portanto, das análises da situação existente obtidas no diagnóstico.

Não é incomum, ademais, mudanças no PGRSS ou até mesmo substituição do plano inicial, no decorrer da pesquisa, diagnóstico e desenho das primeiras propostas. É aí que reside o valor do plano, constituindo-se em uma base sólida para acertos e ajustes.

Dados sobre o estabelecimento

- Informar os dados gerais do estabelecimento (ver modelo 2, anexo a este capítulo).
- Informar os componentes da equipe e/ou empresa que elabora e implementa o PGRSS, com identificação da ART e números de registro dos conselhos de classe, quando for o caso (ver modelo 3 anexo a este capítulo).
- Informar a caracterização do estabelecimento (ver modelo 4 anexo a este capítulo).
- Informar quais são as atividades e serviços predominantes no estabelecimento (ver modelo 5 anexo a este capítulo).

Caracterização dos aspectos ambientais

Abastecimento de água

- Informar qual o sistema de abastecimento (rede pública ou solução alternativa - poço, caminhão-pipa etc.). No caso de poço, informar a licença de uso e outorga.
- Informar se existe aplicação de produtos químicos na água para o abastecimento.
- Informar se existe o controle interno ou externo de qualidade da água .

Efluentes líquidos

- Informar a forma de esgotamento sanitário dos efluentes.
- Informar se existe tratamento ou não dos efluentes no estabelecimento ou na rede coletora.

Emissões gasosas

- Informar se existe geração de vapores e gases, identificar e localizar os pontos de geração.

Tipos e quantidades de resíduos gerados

- Identificar e quantificar os tipos de resíduos gerados ou a serem gerados no estabelecimento em cada setor (unidade) gerador (ver modelo 6 anexo a este capítulo).

Segregação

- Informar as formas de segregação que serão adotadas para os grupos A, B, C, D, incluindo os recicláveis, e E.
- Informar quais os EPIs e EPCs a serem utilizados.

Tipo de acondicionamento

- Descrever os tipos de acondicionamento que serão adotados em função dos grupos de resíduos, suas quantidades diárias e mensais.
- Identificar a forma de acondicionamento que será adotada para a segregação proposta.
- Informar quais os EPIs e EPCs necessários.
- Descrever como e onde serão acondicionados os resíduos dos grupos A, B, C, D e E, considerando os tipos de contenedores, sacos plásticos, bombonas, salas de resíduos, abrigo e suas identificações em função do tipo de resíduos nas áreas internas e externas do estabelecimento.
- Informar as cores e símbolos padronizados para cada tipo de resíduos.

Coleta e transporte interno dos RSS

Coleta interna

- Informar o método de coleta e transporte que será adotado.
- Descrever as formas de coleta em função dos grupos de resíduos, tipos de recipientes, carros de coleta, equipe, freqüência e roteiros adotados.
- Informar se a coleta adotará o armazenamento temporário.
- Determinar a rotina e freqüência de coleta para cada unidade ou setor do estabelecimento.
- Informar os EPIs e EPCs utilizados para realizar a coleta do resíduo.
- Informar como serão higienizados os carros coletores, produtos utilizados e freqüência.

Roteiros de coleta

- Determinar os roteiros de coleta, de acordo com o volume de resíduos gerados por tipo de grupo.



Tome nota:

A rota de coleta interna deve observar as outras rotinas de fluxo de material limpo, evitando, sempre que factível, o chamado roteiro cruzado. Um roteiro pode ser traçado, buscando-se, através de tentativas, a melhor solução que atenda simultaneamente a condicionantes tais como o sentido, freqüência e horário, evitando-se, assim, o já mencionado fluxo cruzado e percursos duplicados ou improdutivos.

- Informar a rotina e freqüência de coleta para cada unidade ou setor do estabelecimento.

Transporte interno

- Informar como serão os transportes internos de resíduos, se separadamente em carros ou recipientes coletores específicos a cada grupo de resíduos.
- Definir os tipos e quantidade de carros coletores que serão utilizados para o transporte de cada grupo de resíduos, capacidade dos carros, identificação, cores etc.

Armazenamento temporário dos RSS

- Caso seja adotado, identificar a localização, tipos de resíduos a serem armazenados, freqüência de coleta.
- Informar os tipos e quantidades de coletores para a guarda temporária de resíduos e as sinalizações para identificação dessas áreas.
- Informar como serão higienizados esses espaços e freqüência de limpeza.

Armazenamento para a coleta externa dos RSS

- Informar a quantidade de contenedores a ser utilizada para cada grupo de RSS, capacidade volumétrica de cada um e disposição na área.
- Informar a rotina do armazenamento externo do estabelecimento de saúde.
- Descrever a rotina de recepção dos RSS das coletas internas.
- Informar como são higienizados o abrigo, os contenedores, carros coletores e com que freqüência.
- Informar os EPIs e EPCs a serem utilizados.

Coleta e transporte externo dos RSS

- Informar se a coleta externa é realizada pelo setor público ou empresa contratada ou sob concessão.
- Informar o tipo de veículo utilizado para o transporte.
- Informar a rotina e freqüência de coleta externa do estabelecimento para os diferentes tipos de resíduos gerados.
- Informar o destino dos resíduos coletados, por tipo.
- Anexar os documentos comprobatórios (licenças, alvarás e outros) das

empresas coletoras, dos transbordos, quando houver (ver modelo 7 anexo a este capítulo).

Tratamento dos RSS

- Descrever o tratamento interno para os resíduos, especificados por tipo de resíduo (ver modelo 8 anexo a este capítulo).
- Descrever o sistema de decaimento de rejeitos radioativos.
- Descrever os tipos de tratamento externo adotados para cada grupo de resíduos e quais os equipamentos e instalações de apoio, incluindo os seguintes aspectos: tecnologias de tratamento adotadas; nome da empresa responsável pela operação do sistema; localização das unidades de tratamento, endereço e telefone; responsável técnico pelo sistema de tratamento, nome, RG, profissão e registro profissional.
- Informar os EPIs e EPCs necessários.
- Anexar os documentos comprobatórios (licenças, alvarás, documentos de monitoramento definidos pelo órgão ambiental) dos sistemas e tecnologias adotados.

Disposição final dos RSS

- Informar as formas de disposição final dos RSS e especificar por tipo de resíduos.
- Informar quais as empresas que executam a disposição final dos RSS.
- Anexar os documentos comprobatórios (licença ambiental, documentos de monitoramento, definidos pelo órgão ambiental) de que a empresa está apta a realizar o serviço.
- Indicar a localização das unidades de disposição final adotadas para cada grupo de resíduos e seus respectivos responsáveis técnicos (nome, RG, profissão, registro profissional, empresa ou instituição responsável e telefone) (ver modelo 9 anexo a este capítulo).

Outras avaliações de riscos

- Informar o mapa de risco do estabelecimento, se houver.

Serviços especializados

- Informar se o estabelecimento possui SESMT, CIPA, PPRA e PCMSO.

Recursos humanos, CCIH, CIPA, SESMT e Comissão de Biossegurança

- Abordar as inter-relações entre as diversas estruturas existentes no estabelecimento (CCHI, CIPA etc.).
- Fazer um resumo das responsabilidades e qualificações de cada um (ver modelo 10 anexo a este capítulo).

Capacitação

- Descrever as capacitações a serem realizadas, nas formas inicial e de

educação continuada (ver modelo 11 anexo a este capítulo).

Controle de insetos e roedores

- Informar e descrever as medidas preventivas e corretivas do programa de controle de insetos e roedores.

Situações de emergência e de acidentes

- Descrever as ações a serem adotadas em situações de emergência e acidentes. Por exemplo: procedimento adotado em caso de derramamento, greve de funcionários etc.

Identificação e locação em esquemas ou fluxogramas

- Informar os locais de geração de resíduos por grupo, os fluxos e os roteiros a serem executados por tipo de resíduos, locais de armazenamento, contenedores etc.

Indicadores de execução e avaliação

- Especificar o que se quer avaliar, quais as mudanças propostas e mensuráveis, levando em conta o objetivo ou resultado fixado.
- Informar quais os indicadores para acompanhar a execução/ implementação do PGRSS e medição do impacto do plano (ver modelo 12 anexo a este capítulo que contém os indicadores mencionados na RDC ANVISA nº 306/04).



Tome nota: O que são indicadores

O monitoramento e avaliação do progresso de qualquer gestão de resíduos sólidos devem ser baseadas em instrumentos de aferição, denominados indicadores, que servem para saber a qualquer momento qual é a situação em relação ao que foi planejado. Os indicadores são descrições operacionais (em quantidade, em qualidade, de acordo com o público-alvo ou localização) dos objetivos e resultados do PGRSS e que podem ser medidos de maneira confiável.

Os indicadores, portanto, devem servir para avaliar resultados. Eles podem medir o desempenho do PGRSS (estágio de andamento do projeto ou de uma atividade, durante a fase de execução) ou o impacto do PGRSS (efeitos que o plano gerou na população-alvo ou no meio socioeconômico).

Um número limitado de indicadores e de fontes de verificação pode substituir uma infinidade de dados e de estatísticas acumuladas nos projetos e, ao mesmo tempo, aumentar a qualidade do acompanhamento. Muitas vezes, os bons indicadores só são "descobertos" durante a ação. Assim, não se deve hesitar em rever os indicadores durante as revisões periódicas do PGRSS. Em certos casos, não é necessário inventar indicadores, estes já existem.

• Especificar a fonte de informação ou o meio de coleta da informação necessária para a avaliação.



Tome nota:

Um bom indicador deve ser:

- *sensível: capaz de registrar diversos tipos de modificações num dado período de tempo;*
- *específico: atribuído a um objetivo/ resultado. O mesmo indicador geralmente só pode ser utilizado uma vez;*
- *mensurável: seja em termos quantitativos ou qualitativos;*
- *exeqüível: os dados necessários para sua leitura estão à disposição podendo ser obtidos no tempo necessário e mediante recursos proporcionais ao objetivo a ser medido;*
- *plausível: as mudanças medidas estão diretamente ligadas às intervenções do PGRSS;*
- *confiável: quando utilizado por várias pessoas, num contexto idêntico, chega ao mesmo resultado.*

Validação

• Após a redação de todo o plano, obter a validação deste pelo gestor do estabelecimento ou instituição.



Tome nota:

O PGRSS é um documento de referência para que o estabelecimento implante o plano, explique-o interna e externamente e para quaisquer outras ações de gestão de resíduos de serviços de saúde.



Resultado do passo 6:

- *PGRSS elaborado;*
- *forma de avaliação definida;*
- *documento contendo relatório validado pelo gestor.*

Passo 7 - Implementação do PGRSS

Abrange as ações para a implementação do PGRSS, com base no documento contendo o plano validado pelo gestor do estabelecimento ou instituição.

O que fazer

- Estabelecer, das ações, procedimentos e rotinas concebidos no PGRSS, os prioritários, indispensáveis ao início da operação.
- Estabelecer um plano de contingência até que todas as ações necessárias para implantar o plano estejam prontas.
- Executar as obras planejadas.
- Fazer o acompanhamento estratégico e operacional das ações.



Tome nota:

Para a implementação do PGRSS é indispensável observar os seguintes requisitos:

- *a disponibilidade de recursos financeiros;*
- *se a equipe técnica está capacitada;*
- *o comprometimento de todos os funcionários, iniciando com a alta diretoria até os serviços menos representativos.*



Resultado do passo 7:

- *PGRSS implantado.*

Passo 8 - Avaliação do PGRSS

Estabelece os períodos e formas de avaliação do PGRSS, de acordo com indicadores.

O que fazer

- Verificar se os resultados esperados foram ou serão atingidos e, se existirem diferenças, quais as razões.
- Verificar se outros indicadores, com melhor desempenho e mais pertinentes que os estabelecidos, podem ser utilizados na continuidade do plano.
- Elaborar um quadro de acompanhamento apontando o resultado da avaliação.

ANNEX II

Sugestões para registro das informações necessárias para o PGRSS

Modelo 1 - Dados gerais do estabelecimento

Razão social	
Nome fantasia	
Tipo de estabelecimento	
Propriedade	pública ( ) filantrópica ( ) privada ( ) outro ( )_____
CNPJ	
Endereço	
Bairro	
Município	
Estado	
Fone(s)	
Fax	
Site	
E-mail	
Horários de funcionamento	24h ( ) diurno ( ) noturno ( ) emergência ( )
Responsável legal	
Data de fundação	

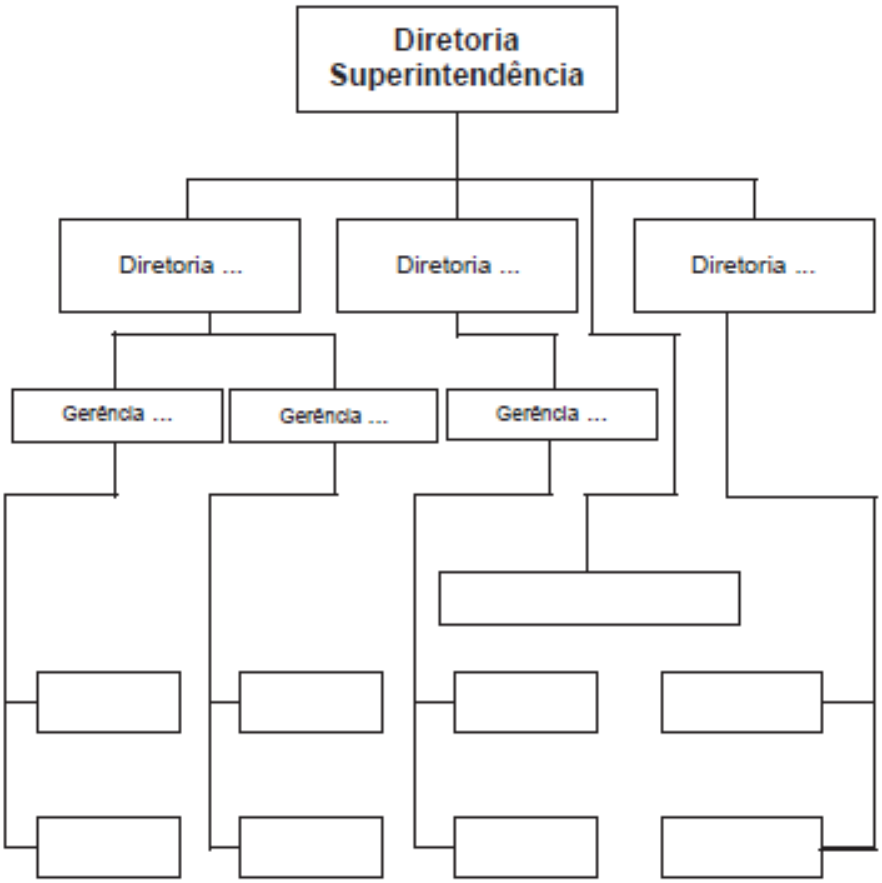
Modelo 2 - Componentes da equipe de elaboração

Responsável pelo PGRSS	
Identificação ART do responsável	
Número do conselho de classe	
Nome dos técnicos/ cargos	
Nome da empresa contratada	
Identificação ART da empresa	
Número do conselho de classe	

Modelo 3 - Caracterização do estabelecimento

Número total de funcionários	existentes: _____ a serem contratados: _____ total: _____
Condição de funcionamento do estabelecimento Tipo de serviços terceirizados Número total de funcionários de empresas terceirizadas Área total construída Área total do terreno	em atividade ( ) em implantação ( ) em expansão/modernização ( ) em relocalização ( ) manutenção ( ) limpeza ( ) serviços clínicos ( ) outros ( ) _____
Alvará sanitário	nº. _____ Data de validade: _____
Licença ambiental (quando exigido)	nº. _____ Data de validade: _____
Horários de funcionamento Estrutura física	 tipo de construção: _____ número de pavimentos: _____
Abastecimento de água	tipo: concessionária ( ) captação própria ( ) consumo interno (quantidade): _____ número de reservatórios: _____
Condições urbanas do entorno	condições de acesso: _____ risco de enchentes: _____ risco de deslizamento: _____
Coleta de esgoto sanitário	Coleta e tratamento público_____ Só coleta: _____ Sem coleta: _____ Tratamento próprio: _____

Modelo 4 - Exemplo de organograma do estabelecimento



Modelo 5 - Caracterização das atividades e serviços do estabelecimento

Tipos de especialidades médicas e/ou assistenciais	
Número de atendimentos/dia	
Número de leitos por especialidade (hospitais)	
Número de profissionais	
Tipo de contrato dos profissionais	direto ( ) terceirizado ( ) misto ( )

Modelo 6 - Tipos de resíduos gerados

Quantidade de resíduos coletados por unidade

Unidades	Grupos de resíduos										Medido	Estimado
	A1	A2	A3	A4	B	C	D	E	RE	ES	t/mês	l/mês

A = resíduos do grupo A.
B = resíduos do grupo B.
C = rejeitos do grupo C.
D = resíduos do grupo D.
E = resíduos perfurocortantes.
RE = resíduos recicláveis (papelão, vidro, metais, outros).
ES = resíduos específicos (entulho, móveis, eletroeletrônicos, lâmpadas fluorescentes etc.).

Quantidade de resíduos coletados por grupo de resíduos

Grupos	Total de resíduos (kg/mês)
A	
B	
C	
D	
E	
Recicláveis	
ES	

Modelo 7 - Informações sobre coleta e transporte externo

Empresas coletoras de serviços

Nome(s) das empresa(s)	CNPJ/ CPF	Tipos de resíduos	Documentos legais

Freqüência de coleta

Tipo de resíduos	Diariamente	Dias alternados	Semanal	2 x ao dia	Outra freqüência

Tipos de veículos utilizados na coleta

Tipos de resíduos	Tipos de veículos				
	Saveiro	Basculante	Baú	Compactador	Outros, especificar

Modelo 8 - Tipos de tratamento interno e externo dos resíduos

Grupos de resíduos	Tipos de tratamento	
	Interno	Externo
A		
Sub-grupo		
A1		
A2		
A3		
A4		
A5		
B		
C		
D		
E		

Modelo 9 - Informações sobre a destinação final dos resíduos

Tipo de disposição final	Empresa – endereço	Grupo de resíduos			
		A	B	D	E

Modelo 10 - Responsabilidades e qualificações das equipes de CCIH, Cipa, SESMT e Comissão de Biossegurança

Nome do funcionário	Cargo	Formação	ART ou similar
Total			

Modelo 11 - Capacitação da equipe de implantação do PGRSS

Nome do funcionário	Treinamentos realizados		Treinamentos a realizar
	Próprios	Terceirizados	

Modelo 13 - Equipamentos necessários e recursos correspondentes

Equipamentos	Unidade	Quantidade	Valor unitário (R$)	Valor total (R$)
Obras civis	Discriminar os tipos de obras necessárias			
Equipamentos de coleta	Discriminar os tipos de equipamentos, modelo, fabricante etc.			
Equipamentos de informática	Discriminar os tipos de equipamentos, modelo, fabricante etc.			
Outras máquinas e equipamentos	Discriminar os tipos de equipamentos, modelo, fabricante etc.			
Móveis e utensílios	Discriminar o mobiliário e os utensílios necessários			
Recursos humanos	Discriminar as pessoas necessárias por área de formação e atuação			
Outros	Discriminar outros investimentos (ex.: gastos com treinamento, aquisição de manuais técnicos etc.)			

APPENDAGES

(FRONT)

LIXO INFECTANTE (GRUPO A)



Descartar na LIXEIRA BRANCA E SACO BRANCO LEITOSO. Esses resíduos são altamente perigosos, logo, são encaminhados para incineração.

LIXO QUÍMICO (GRUPO B)

Devem ser acondicionados com base nas recomendações específicas do fabricante para condicioná-los e descartá-los.

LIXO RADIATIVO (GRUPO C)

Devem ser acondicionados em recipientes de chumbo, com blindagem adequada ao tipo e ao nível de radiação emitido e ter simbologia de radiotativo.

LIXO COMUM (GRUPO D)

Descartar na LIXEIRA CINZA E SACO TRANSPARENTE. Fraldas, sobras de alimentos, peças descartáveis de vestuário, plásticos, materiais de assistência ao paciente NÃO contaminados com sangue ou secreção, são exemplos de resíduos desse grupo.



LIXO PERFUROCORTANTE (GRUPO E)

Descartar imediatamente em recipiente resistente à ruptura e vazamento, que sejam vedados, identificados e com alça para transporte seguro.



ATENÇÃO!!!

NÃO DESCARTAR AGULHAS EM SACOS PLÁSTICOS PARA EVITAR ACIDENTES



EQUIPAMENTOS DE PROTEÇÃO INDIVIDUAL (EPI's)

*LUVAS;
*ÓCULOS;
*BOTAS;
*MÁSCARA;
*AVENTAL;
*JALECO.



ALUNAS/PESQUISADORAS: INGRID C.S.B.LOPES E PRISCILLA B.S.DOMENECH
FONTE: RDC 306/04 ANVISA E CONAMA 358/05

COMPANHA DE CONSCIENTIZAÇÃO À SAÚDE E AO MEIO AMBIENTE

RESÍDUOS DE SERVIÇOS DE SAÚDE



UniCEUB - PROJETO DE INICIAÇÃO CIENTÍFICA
AGOSTO/2014

(BACK)

O QUE SÃO RESÍDUOS DE SERVIÇOS DE SAÚDE - RSS?

São detritos gerados nos estabelecimentos de saúde durante a prestação de serviços assistenciais e de diagnóstico, podendo tornar-se risco à saúde pública e ao meio ambiente.

DIRETRIZES LEGAIS

ANVISA - RDC nº 306/04: Regulamento Técnico para o gerenciamento dos resíduos de serviços de saúde;
CONAMA - Resolução nº 358/05: tratamento e disposição final do RSS;
PNRS - nº 12.305/2010 - Prevê a prevenção e a redução na geração de resíduos, tendo como proposta a prática de hábitos de consumo e a destinação ambientalmente adequada dos rejeitos sustentável e um conjunto de instrumentos para propiciar o aumento da reciclagem e da reutilização dos resíduos sólidos.

ATENÇÃO!!!



É RESPONSABILIDADE DO PROFISSIONAL DE SAÚDE, A SEGREGAÇÃO E O ACONDICIONAMENTO CORRETOS DOS RESÍDUOS PRODUZIDOS!!

CLASSIFICAÇÃO DOS RSS:

GRUPO A: Resíduos contaminados com sangue ou secreção em forma livre, assim como produtos de assistência a isolamento de contato por microorganismos de relevância epidemiológica.



GRUPO B: Resíduos contendo substâncias químicas que podem apresentar risco à saúde pública ou ao meio ambiente, dependendo de suas características de inflamabilidade, corrosividade, reatividade e toxicidade. Ex.: resíduos de medicamentos e ou medicamentos vencidos.



GRUPO C: Quaisquer materiais resultantes de atividades humanas que contenham radionulídeos em quantidade superiores aos limites de isenção especificados nas normas de CNEN e para os quais a reutilização é imprópria ou não prevista.



GRUPO D: Resíduos que não apresentam risco biológico, químico ou radiológico à saúde ou ao meio ambiente, como por exemplo, papel de uso sanitário, fraldas, restos alimentares de paciente, entre outros.
PAPEL - COLETOR AZUL
METAL - COLETOR AMARELO
VIDRO - COLETOR VERDE
PLÁSTICO - COLETOR VERMELHO



GRUPO E: Materiais perfurocortantes ou escarificantes, tais como: agulhas, pontas diamantadas, lâminas, vidros quebrados no laboratório ou outros similares.



COMO SEPARAR OS RESÍDUOS PRODUZIDOS NOS ESTABELECIMENTOS DE SAÚDE?



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