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HEALTH IN FOCUS

MULTIDISCIPLINARY APPROACHES

Seven Publicações
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SUMMARY

COMBINED ORAL HORMONAL CONTRACEPTIVE USE AND FEMALE SEXUAL FUNCTION

https://doi.org/10.56238/sevened2024.030-001

Antônio Carlos Pinto Guimarães[1], Arthur Rodrigues da Cunha Bisneto[2] and Guilherme José de Souza Faria[3]

ABSTRACT

This study investigated sexual function in female college users and non-users of combined oral hormonal contraceptives (CHOC). The research was conducted using the Female Sexual Function Index (IFSF). The results indicated that the use of CHOCs may be associated with a higher prevalence of sexual dysfunction, providing subsidies for the development of contraceptive methods with less negative impact on female sexual function.

Keywords: Combined oral hormonal contraceptive. Sexual function. Sexual dysfunction. University women.

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INTRODUCTION

The approval of the first contraceptive pill in 1960 by the FDA in the United States brought major changes to family planning and female sexual function. Despite the widespread use of combined oral hormonal contraception (CHOC), the potential negative effects of this method on women's quality of life, particularly sexual function, are still often overlooked. This study aims to compare sexual function between users and non-users of CHOC, using the Female Sexual Function Index (SFSI), to investigate the impact of this method on female sexuality.

OBJECTIVE

To compare sexual function between women who are users and non-users of combined oral hormonal contraceptives (CHOC).

MATERIALS AND METHODS

This is a cross-sectional, observational, descriptive and quantitative research carried out with undergraduate students from a public university in Minas Gerais. The inclusion criteria were regularly enrolled women, aged between 18 and 35 years, who agreed with the Informed Consent Form (ICF). Pregnant women or those using other hormonal contraceptive methods were excluded.

RESULTS

A total of 83 responses to the questionnaire were obtained. The mean age of the participants was 23.7 years, and 48% of the women with a steady partner had sexual dysfunction. Of the participants who used CHOCs, 75.5% had sexual dysfunction. The results suggest a trend of association between the use of CHOCs and sexual dysfunction.

DISCUSSION

The data from this study point to a possible negative influence of CHOC on female sexual function. The literature is controversial regarding the effects of CHOC on libido, with some studies indicating a reduction and others finding no significant differences.

CONCLUSION

The results suggest that the use of combined oral hormonal contraceptives may be related to a higher prevalence of sexual dysfunction in college women. Previous studies also point to the possibility that the combination of ethinyl estradiol and different types of

progestogens may influence sexual function, but the evidence is still limited. In addition, mental health and the presence of factors such as the use of medications, such as antidepressants, may be important variables to be considered in future studies.

It is suggested that further studies, with larger samples and different age groups, can further investigate the long-term effects of the use of CHOCs on sexual function. These studies should include factors such as types of contraceptives, hormonal composition, and the presence of psychological comorbidities that may affect sexual function.

LITERATURE REVIEW

Since the introduction of combined oral hormonal contraceptives (CHOCs), the impact of these substances on female sexuality has been the subject of debate. Studies, such as those by Zethraeus et al. (2016), suggest that the use of CHOCs can cause a decrease in testosterone levels, which directly affects sexual desire. In addition, Wallwiener et al. (2015) discuss that different hormonal formulations, such as the combination of estrogens and progestins, can have varying effects on sexual function, depending on the composition of the contraceptive and the hormonal profile of the patient.

Another important aspect to consider is the psychological impact of contraceptive use, which can be associated with mood swings, stress, and anxiety, which, in turn, directly influences sexual function. These factors show that the effects of CHOCs on sexuality are multifactorial and should be evaluated with a holistic approach.

As well as cultural and psychological factors. Women with more stable relationships tend to report fewer sexual dysfunctions, regardless of the use of CHOCs, which suggests that sexual function is a complex and multifactorial phenomenon, which cannot be explained by hormonal influence alone.

In addition, Coelho and Barros (2019) discuss that the impact of CHOCs on sexuality can also vary with the time of use. Long-term users tend to develop greater adaptation to hormonal effects, while new users often report more sexual complaints in the first few months of use. This finding suggests that medical follow-up is essential in the first few months of CHOC use, to identify any changes in sexual function early and adjust the contraceptive method as needed.

In general, the literature points to the need for a more individualized approach to the choice and prescription of hormonal contraceptives, considering the potential impact on women's quality of life, including their sexual function.

EXPANDED METHODOLOGY

The methodology used in this study was based on a sample of 83 university women, between 18 and 35 years old, all volunteers. The Female Sexual Function Index (SFSI) was chosen as an assessment instrument because it is widely used and validated in studies on female sexuality. The IFSF assesses six domains of sexual function: desire, arousal, lubrication, orgasm, satisfaction, and pain.

To ensure the validity of the results, all participants were instructed to answer the questionnaire anonymously and online, avoiding any bias in the response due to embarrassment. Women who reported using other medications that could interfere with sexual function, such as antidepressants, were analyzed separately to assess the combined impact of these substances.

Data were analyzed using SPSS software, and correlation tests were applied to identify associations between the use of CHOCs and the different domains of sexual function. The results were adjusted to control for variables such as the presence of a fixed partner, comorbidities, and the duration of use of the CHOCs.

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NON-INVASIVE RESPIRATORY SUPPORT BY OXYGENATION HELMET IN ACUTE RESPIRATORY FAILURE: A SCOPING REVIEW

https://doi.org/10.56238/sevened2024.030-002

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ABSTRACT

Noninvasive ventilation (NIV) has shown promise in the context of acute respiratory failure, as it inhibits the progression of mild to moderate clinical conditions, sometimes sparing the need for invasive ventilation. One of the prominent interfaces, widely used in the scenario of the covid-19 pandemic, was the helmet device – a helmet made of transparent material that surrounds the patient's head like an air reservoir. Despite its wide use, the medical literature is little explored regarding the advantages and clinical indications for the use of this device. For these reasons, the present scoping review aims to elucidate, based on current clinical-scientific evidence, the main concepts, advantages, and challenges involved in NIV, focusing on the *helmet* device. According to the guidelines of the Joanna Briggs Institute, the search was carried out in the MEDLINE/PubMed database. After applying the eligibility criteria, supported by the PRISMA methodology, 33 articles were included and independently summarized and contemplated by peers. In this review, it was verified that NIV, through the *helmet* device, with the possibility of using positive pressure in the airways, is safe and can reduce the need for invasive ventilation, composing an important oxygen therapy option, in addition to being viable for use even outside the intensive care environment. There is still a discussion about which patients would benefit from this device, as well as the appropriate clinical moment to indicate this ventilatory support, demonstrating an important theme to be explored in future clinical trials.

Keywords: Acute respiratory failure. Non-invasive ventilatory support. Non-invasive ventilation. Oxygenation helmet. Helmet.

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INTRODUCTION

Acute respiratory failure (ARF) is one of the frequent medical emergencies, which had a high incidence in the years surrounding the Covid-19 pandemic (Grasselli *et al*., 2023). According to Bellani *et al.,* 2017: which presents discussions about the "*Large Observational Study to understand the Global Impact of Severe Acute Respiratory Failure (LUNG SAFE STUDY)",* pA may present as a more severe inflammatory response condition: acute respiratory distress syndrome (ARDS), defined by the Berlin criteria in the spectrum: mild, moderate and severe.

AfARI is underdiagnosed in Brazil and worldwide, especially when it presents in the mild form, a fact that makes the management of this condition divergent and conflicting in the medical literature (Bellani *et al.,* 2016). However, it is known that, regardless of the etiology of ARF, oxygen therapy is essential to the treatment of patients, who require various levels and modalities of ventilatory support and, currently, the role and efficacy of noninvasive respiratory support in this scenario is much discussed (Liengswangwong *et al.,* 2020).

Noninvasive ventilation (NIV) is a modality of ventilatory support that consists of the use of positive pressure through continuous end-expiratory pressure (CPAP) or two levels of pressure (BiPAP) in the airway, being provided by a non-invasive interface, that is, without a definitive airway – presence of a cuff inflated inside the trachea – including nasal mask, face or oxygenation helmet (Aswanetmanee *et al.,* 2023).

The benefit of using NIV lies in the fact that it avoids the main complications related to invasive mechanical ventilation (MV): barotrauma; aspiration and pneumonia associated with MV; complications related to the endotracheal tube; muscle weakness, among others (Hyzy *et al.,* 2024). The use of NIV has been proven effective in cases of exacerbated chronic obstructive pulmonary disease (COPD); acute edema of the lungs; immediately after high-risk extubation (Liengswangwong *et al*., 2020; Chao; Wang; Liu, 2022).

In the context of NIV, supplemental oxygen can be administered through different modalities and interfaces depending on the clinical presentation. In situations of mild hypoxemia, one option is low-flow oxygen therapy, which can be administered through a nasal cannula or Venturi mask. In cases of more severe respiratory failure, the use of a high-flow nasal cannula (HFNC) or non-invasive positive pressure ventilation can be chosen, which can be offered by face mask or device in the form of a helmet or *helmet* (Al-Dorzi; Kress; Arabi, 2022; Chaudhuri *et al.,* 2023).

Non-invasive helmet ventilation has been widespread in the medical community since the 2000s. Despite this, it was during the Covid-19 pandemic, in which the world had to face one of the largest humanitarian crises due to a shortage of health resources (Aswanetmanee

et al., 2023), that this device stood out as an alternative for the treatment of acute hypoxemic respiratory failure, in and out of intensive care (Grieco *et al.,* 2021; Coppadoro *et al.,* 2021).

The *helmet* device consists of a plastic helmet that seals the individual's entire head, behaving as an air reservoir (Chao; Wang; Liu, 2022). The benefits found are limited to the possibility of prolonged use even at higher levels of positive end-expiratory pressure, which can significantly contribute to the improvement of hypoxemia and the prevention of lung injury (Cesarano *et al.,* 2022).

Given the scenario presented, the present scoping review aims to gather data from the literature with the main concepts of NIV, focusing on the *helmet* device, as well as to identify what would be the advantages and challenges that exist to improve the use of this device in ARI frameworks.

2 THEORETICAL FRAMEWORK

As mentioned, NIV has several possible interfaces: face mask, nasal mask, full face mask, high-flow nasal catheter, and the *helmet* – the objective of analysis of the present study. Current studies have been dedicated to elucidating, in view of the possible clinical indications for the use of NIV, which would be the most appropriate interface for the baseline condition and the exacerbation condition, in addition to which device provides better adherence to treatment and greater tolerance (Khatib *et al*., 2021; Tverring; Åkesson; Nielsen, 2020).

In view of this, although Covid-19 presents a pathophysiology that diverges from the ARF previously studied, given that it presents a loss of pulmonary perfusion regulation, hypoxic vasoconstriction, and a state of hypercoagulability with consequent pulmonary microvascular coagulation, NIV was used on an emergency basis in these cases (Radovanovic *et al.,* 2020).

Among the interfaces used, at the height of hospital overcrowding, the use of the helmet stands out, which was seen as an alternative to face masks and other NIV models, especially if it proves to be safer in terms of the dispersion of viral particles, contributing to the intra-hospital control of the spread of Covid-19 (Amirfarzan *et al.,* 2021; Chao; Wang; Liu, 2022). In addition, it allowed the use of high positive pressures during prolonged treatments, associated with less air leakage and better fit for different facial anatomies, as well as a lower risk of skin lesions and eye irritation (Arabi *et al.,* 2022).

Thus, over the first three epidemic waves, the perception that helmets also contributed to harsh outcomes such as reduced mortality was progressive, a crucial fact for verifying the potential of using them in acute respiratory failure (Piluso *et al.,* 2023). However, despite the benefits already defined by the theory and practice of the use of *helmets* during the pandemic

period, there is still a gap in terms of consistent evidence that identifies the clinical indications and the profile of the patient who would best benefit from this interface (Grieco *et al.*, 2021).

3 METHODOLOGY

Literature review is a methodology that offers a broad and complete view of a topic, and should be conducted with well-defined criteria in order to obtain a solid basis for the advancement of knowledge and facilitate the development of theories (Snyder, 2019). Scoping reviews are a form of literature review that seek to understand what there is of knowledge in an area based on a comprehensive research question, being a method capable of bringing together the main concepts of a theme, demonstrating the dimension, fields explored and potential discussions about that same theme (Arksey; O'malley, 2005). So, such a proposal aims to investigate what is being researched on a certain topic, in addition to verifying the gaps in the literature and, in the future, raising new studies.

To this end, this study was based on the recommendations of the *Joanna Briggs Institute*, using the Population (or Problem), Concept and Context (PCC) method to identify the main data to be considered (Peters *et al.,* 2020). The problem raised was the feasibility of using the *helmet* as a mode of non-invasive ventilation; the Concept encompassed the understanding of the modes of non-invasive ventilation in general, the clinical indications and practical applications; and the Context is the growing number of adult patients in need of ventilatory support, whether or not hospitalized in Intensive Care Units (ICU). Thus, the question that guides the present scoping review is: "What are the advantages and challenges of the use of ventilation helmets among the various modes of noninvasive ventilation available for use in adult patients with acute respiratory failure?"

The protocol of this scoping review was registered in the *Open Science Framework* (OSF) platform in order to better develop and explore the content of this research. The project remains available for consultation through registration under DOI 10.17605/OSF.IO/XT8BP.

3.1 METHODS OF SEARCHING FOR PUBLICATIONS

The *Pubmed database* and descriptors compatible with the theme were used. The following keywords were listed: *"helmet", "non invasive ventilation", "non invasive support", "respiratory failure", "respiratory insufficiency",* and were used with the equivalent descriptors in the *Mesh Terms*, except for the term *helmet*, which was not found as a standardized descriptor, but was manually added to the search strategy.

The terms were concatenated with the Boolean operators 'AND' and 'OR'. The search identified 98 articles in the *Pubmed* database, considering the keywords chosen, the

language used (Portuguese, English, and Spanish), and the restriction on free full texts and the period of publication (2019 - 2024). The search strategy is shown in Chart 1.

Chart 1: Search strategy for articles in the PubMed database in order to answer the search question

Database	PubMed
Search Strategy with Boolean Operators	Search: (helmet) AND ((non invasive ventilation) OR (noninvasive support)) AND ((respiratory failure) OR (respiratory insufficiency)) Filters: Free full text, English, Portuguese, Spanish, Exclude preprints, from 2019 - 2024 Sort by: Most Recent
Expanded Search Strategy with Synonymous Terms	(("head protective devices"[MeSH Terms] OR ("head"[All Fields] AND "protective"[All Fields] AND "devices"[All Fields]) OR "head protective devices"[All Fields] OR "helmet"[All Fields] OR "helmets"[All Fields] OR "helmet s"[All Fields] OR "helmeted"[All Fields]) AND ("noninvasive ventilation"[MeSH Terms] OR ("noninvasive"[All Fields] AND "ventilation"[All Fields]) OR "noninvasive ventilation"[All Fields] OR ("non"[All Fields] AND "invasive"[All Fields] AND "ventilation"[All Fields]) OR "non invasive ventilation"[All Fields] OR (("noninvasive"[All Fields] OR "noninvasively"[All Fields] OR "noninvasiveness"[All Fields]) AND ("support"[All Fields] OR "support s"[All Fields] OR "supported"[All Fields] OR "supporter"[All Fields] OR "supporter s"[All Fields] OR "supporters"[All Fields] OR "supporting"[All Fields] OR "supportive"[All Fields] OR "supportiveness"[All Fields] OR "supports"[All Fields]))) AND ("respiratory insufficiency"[MeSH Terms] OR ("respiratory"[All Fields] AND "insufficiency"[All Fields]) OR "respiratory insufficiency"[All Fields] OR ("respiratory"[All Fields] AND "failure"[All Fields]) OR "respiratory failure"[All Fields] OR ("respiratory insufficiency"[MeSH Terms] OR ("respiratory"[All Fields] AND "insufficiency"[All Fields]) OR "respiratory insufficiency"[All Fields]))) AND ((ffrft[Filter]) AND (excludepreprints[Filter]) AND (english[Filter] OR portuguese[Filter] OR spanish[Filter]) AND (2019:2024[pdat]))

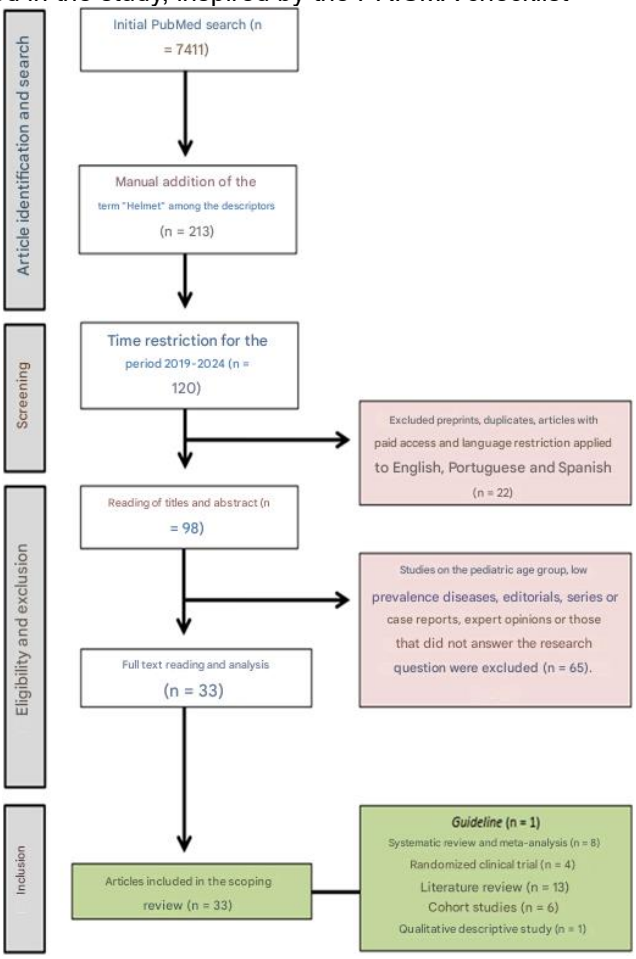
Source: Prepared by the authors

3.2 SELECTION CRITERIA

The selection of studies followed the recommendations of the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) (Galvão *et al.,* 2022). Two reviewers independently extracted the evidence. The disagreements were resolved by consensus or a third reviewer. For the eligibility of *the papers*, we considered reviews, observational studies, or clinical trials with adults undergoing treatment for ARF in or out of the ICU, except for chronic obstructive pulmonary disease or cardiogenic pulmonary edema.

Among the 98 selected articles and after reading the title and abstracts, articles involving pediatric age group or low-prevalence diseases and preclinical studies, case or experience reports, editorials and, in summary, articles that did not answer the research question were excluded. Then, 33 articles were selected for full reading. With the summarization of the main results and conclusions, the same 33 articles were used to construct the scoping review as initially proposed. The article selection flowchart, following the recommendations of PRISMA, is shown in Figure 1.

Figure 1 - Flowchart describing the process of search, identification, screening and exclusion and eligibility criteria of the articles included in the study, inspired by the PRISMA checklist



Source: Prepared by the authors

3.3 DATA EXTRACTION AND SUMMARIZATION PROCEDURES

The selected articles were grouped according to the central objective of the study, in order to bring together similar methodologies and contexts, making the data extraction better ordered during the discussion of the text. Initially, the articles that elucidated the choice of the best NIV interface in the context of ARF were gathered; Next, articles describing the use of *helmets* as the main therapy were evaluated . Subsequently, the review proposed to clarify the practical implications of the use of this device and the available configurations: pressure support ventilation (PSV) and continuous positive airway pressure ventilation (CPAP), also detailing what the literature demonstrates regarding the tolerability and limitations of the use of this device. Finally, based on the most recent evidence, within the context of the Covid-19 pandemic, the benefits raised by the practical use of the interface were discussed.

3.4 ETHICAL IMPLICATIONS OF THE STUDY

The present study is a literature review conducted in public domain databases, so it

does not require approval by an institutional ethics committee. Therefore, the method follows the regulatory standards set forth in Resolution No. 466/2012 of the National Health Council.

4 RESULTS AND DISCUSSIONS.

4.1 CHOICE OF INTERFACE FOR PROVIDING NVI IN THE CONTEXT OF IRpA

ARF is defined by the failure of the respiratory system to effect gas exchange satisfactorily, with insufficient blood oxygenation and, consequently, hypoxemia (reduced concentration of oxygen in arterial blood), which results in a decreased partial pressure of O2 (PaO2) and damage to the gradient of oxygen passage from the blood to the interstitium and tissues. generating hypoxia and compromising the main energy source of cells (Liengswangwong *et al.,* 2020). Therefore, in situations of hypoxemia, whether acute, chronic, or mild or severe, the treatment is to provide oxygen (Bigatello; Persenti, 2019). The selection of the interface that provides oxygen therapy is a clinical decision and is based individually on each patient, the clinical picture presented, comfort and anatomical applicability, with face masks being the most used (Rosà *et al.,* 2023; Menga *et al.,* 2022).

Among the studies evaluated, there are reviews that describe the main concepts involved in NIV oxygen therapy in Afr, and there are those that involved comparing the use of helmets with standard oxygen therapy, which was considered, in most studies, as an O2 flow rate lower than 15L/min via nasal cannula, face mask, or Venturi mask. As mentioned, both face masks and *helmets* can provide non-invasive ventilation by PSV or CPAP, reaching *positive end-expiratory pressure* (PEEP) of 5 to 8 cmH2O or PSV between 7 and 14 cmH20 (Menga *et al.,* 2021a).

Among the physiological factors related to face masks, there is an increase in airway pressure and an increase in arterial oxygenation, and there are even cardiac effects of functional improvement due to a reduction in right ventricular preload and left ventricular afterload, and such benefits result in a decrease in inspiratory effort and respiratory distress. One difficulty encountered is air leaks, given that there is often no adequate adherence of the device to the patient's face and this challenges the maintenance of a satisfactory PEEP (Menga *et al.,* 2021b; Grieco *et al.,* 2021; Rosà *et al.,* 2023).

The main characteristics and specifications regarding the *helmet* are explained in a separate topic, however, by way of initial definition, according to Rosà *et al.* (2023), the *helmet* is a kind of "hood" of different shapes, made of transparent material and manufactured with a "collar" that allows it to be attached to the patient's neck and shoulders, without touching him or her face. The device has a circuit with two tubes, for inhaled and exhaled gas, and needs to be fully expanded to ensure the necessary and effective pressurization that will

reach the patient's airway, which can be achieved through an increased PEEP (10-12 cmH2O) and higher support pressure, which allows the expansion of the interface and the "*washout*" effect, reducing dead space and carbon dioxide (CO2) retention. The *helmet* also allows adequate flow delivery conditions without the need for a humidifier or heater, especially in PSV mode (Grieco *et al.,* 2021; Rosà *et al.,* 2023).

The analysis of the studies allowed us to extract that clinical trials and observational studies comparing face mask NIV and helmet NIV for oxygen therapy in the context of ARF have a low level of evidence. Therefore, the most recent guidelines are still unable to offer definitive recommendations regarding the use of the *helmet* in these conditions, thus presenting conflicting indications.

Among the studies, the systematic review by Chaudhuri et. al. (2022) stands out, which demonstrated that the use of helmets reduced mortality (relative risk 0.56, 95% CI 0.33–0.95; low certainty) and orotracheal intubation index (relative risk 0.35, 95% CI 0.22–0.56; low certainty) when compared to face masks and indicates the possibility of a more cost-effective therapy. Compared with HFNC, helmets may also reduce the progression to intubation (relative risk 0.59, 95% CI 0.39–0.91) (Chaudhuri *et al.,* 2022), however, the quality of the evidence is low and, on both occasions, there was an uncertain effect on reducing mortality between the different devices.

4.2 HELMET AS AN ALTERNATIVE TO STANDARD OXYGEN THERAPY AND AS PRIMARY THERAPY

There are three issues that conflict with the practical use of noninvasive respiratory support: the use of NIV may be associated with failure to recognize severe acute respiratory syndrome early; NIV may be lower than MV to minimize the progression of lung injury and has the potential to cause such injury if excess tidal volume (above 8 ml/kg) is supplied; indicating NIV inappropriately may delay an inevitable OTI and result in negative outcomes, especially in patients with severe ARF (Buell; Patel, 2023).

In view of this, it should be considered that most studies with noninvasive respiratory support have generated data on NIV via face mask, therefore, the conflicts cited are largely not related to *helmet* (Coppadoro *et al.,* 2021). However, with the popularization of the *helmet* during the pandemic crisis, it was noted that the interface has its own characteristics and controversies, also presenting a potential to be an alternative to the more traditional noninvasive respiratory support, as evidenced in the most recent trials and discussed in this review.

From the understanding of the pathophysiology of ARF during spontaneous breathing,

which involves the mechanisms that lead to the condition of "*patient self-inflicted lung injury*" or P-SILI, it is known that ventilation provided via *helmet* has potentiate to reduce this risk of injury. Essentially, such configurations boil down to the possibility of providing high PEEP for an extended period, without interruptions and adverse effects already known from other interfaces (Cesarano *et al.,* 2022).

A high PEEP (10-15 cmH2O) can induce the recruitment of alveoli, preventing their collapse, promotes more homogeneous lung inflation, reducing inspiratory effort, and optimizes the ratio between ventilation and perfusion, resulting in more efficient gas exchange (Hong *et al.,* 2021). This is advantageous over face masks, as the increased PEEP in this device would cause even more significant air leaks, as well as increase patient discomfort during use. Another point to be highlighted is that, during the use of the *helmet*, especially in the PSV mode, it is common to have asynchrony between patient and ventilator, however, this does not generate discomfort, as the patient is able to inhale and exhale in the large reservoir that the interface provides (Cesarano *et al.,* 2022).

4.3 PRACTICAL IMPLICATIONS OF *HELMET* USE: SPECIFIC SETTINGS AND PATIENT TOLERANCE

In more detail, the *helmet* is constructed from a transparent, soft, inextensible synthetic material that wraps around the patient's head without coming into contact with the face and is anchored to the patient's neck or shoulders by means of a collar or straps. It generally has two connectors: one for gas inlet and one for gas outlet, and O2 can be supplied through a Venturi system, a turbine flow generator, or a fan (Coppadoro *et al.,* 2021).

As mentioned earlier, the *helmet* is capable of providing ventilation by two modes: non-invasive positive pressure ventilation (typically pressure support or PSV) and non-invasive continuous positive pressure ventilation or CPAP (Rosà *et al.,* 2023). Both PSV and CPAP are often described together under the generalist designation of noninvasive ventilation, but they have different mechanisms of action and, consequently, an individualized practical approach (Coppadoro *et al.,* 2021).

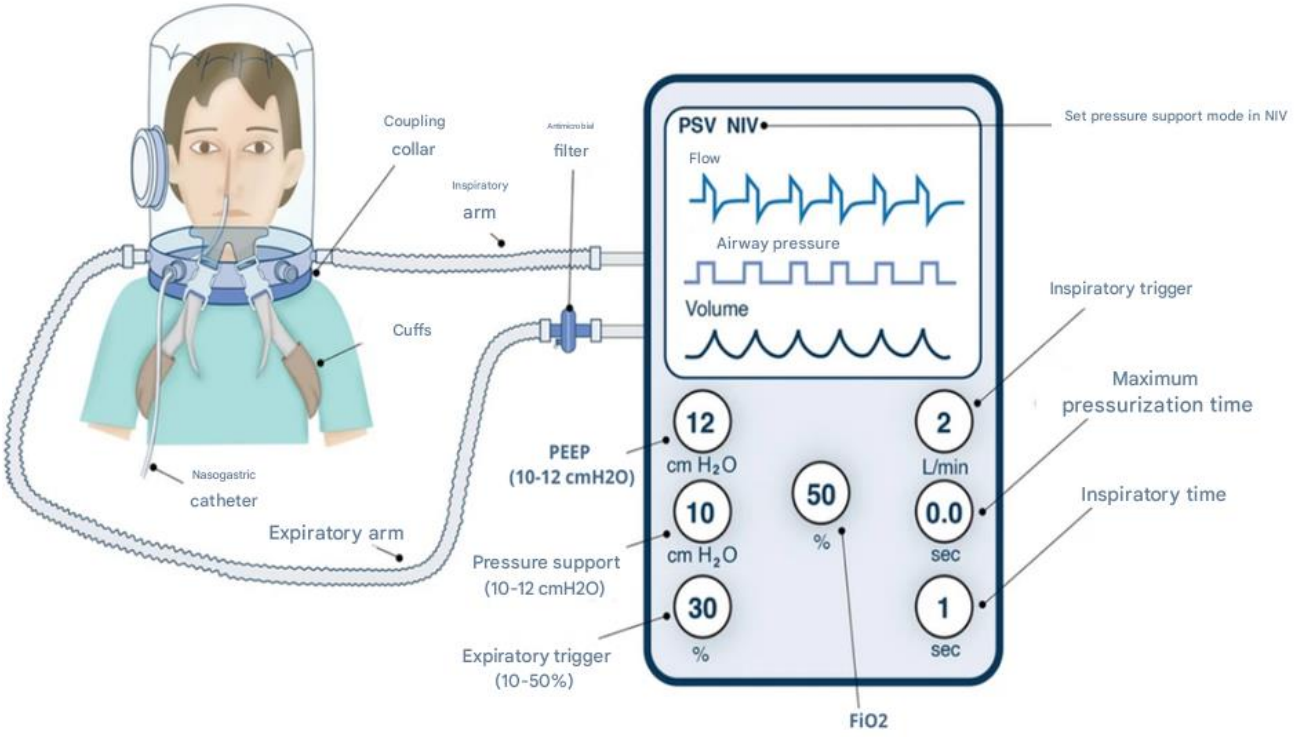
4.3.1 Pressure Support Ventilation (PSV)

The *helmet* is connected to a ventilator using two different connector systems: inspiratory and expiratory route, with a flow rate of about 100 L/min and a support pressure of 8 mmHg, which is increased according to the patient's respiratory rate reduction or the use of accessory muscles (Buell; Patel, 2023). The large dead space to be filled in the *helmet* requires high pressurization, which may result in lower inspiratory pressure in the patient's

airways, which may compromise synchrony with the ventilator.

Thus, specific adjustments that generate a higher PEEP are performed in order to achieve complete helmet expansion, maintain a high level of support pressure, and longer pressurization time (Coppadoro *et al.,* 2021). Therefore, it is preferable to have a circuit with two tubes instead of Y circuits, to adjust the PEEP between 10-15 cmH2O, to maintain a support pressure of about 10-14 cmH2O and to obtain a faster pressurization rate. In addition, in this ventilatory mode and with such settings, humidifiers are not necessary if the flow is maintained around 40 L/min (Cesarano *et al.,* 2022). A representative scheme of this mode of ventilation is depicted in Figure 2.

Figure 2 - Illustration of the *helmet* and circuit diagram configured for PSV



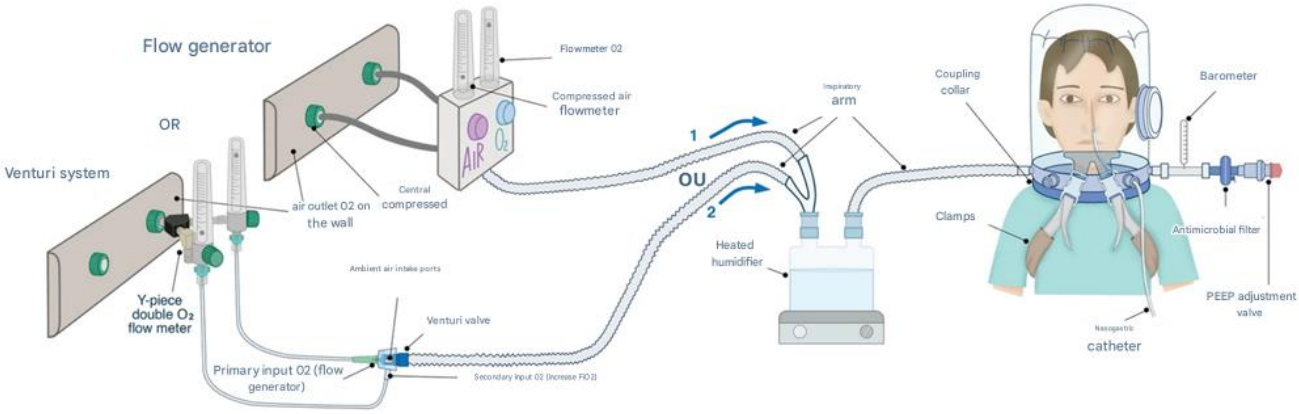
Source: Adapted from Grieco *et al,* 2022b.

4.3.2 Continuous Positive Pressure Ventilation (CPAP)

CPAP is characterized by the continuous flow of oxygen (about 60 L/min) to a variable FiO2 that fills the *helmet* and is dispersed throughout the environment through a valve connected to the expiratory port, which guarantees a PEEP, and can be offered by a ventilator (Cesarano *et al.,* 2022). Adequate flow is essential to expand and fill the helmet, generate positive pressure and avoid CO2 retention as much as possible (Coppadoro *et al.,* 2021), and a flow lower than 40 L/min is associated with significant inspiration of CO2 retained at the interface, so providing 50-60 L/min of flow and a PEEP 10-15 cm H2O represents the safest configuration to provide continuous positive pressure (Cesarano *et al.,* 2022).

Unlike the face mask, the *helmet* system allows for greater compliance for the patient to maintain inspiratory flow without additional effort, if the patient's demand is greater than the flow provided (Coppadoro *et al.,* 2021). In this mode, flow provided by a ventilator is not recommended, as the gas flow corresponds to the patient's minute ventilation and this is insufficient to "wash" CO2 and avoid retention (Buell; Patel, 2023; Coppadoro *et al.,* 2021). A representative scheme of this mode of ventilation is depicted in Figure 3.

Figure 3 - Illustration of the *helmet* and circuit diagram configured for CPAP



Source: Adapted from Grieco *et al,* 2022b.

4.3.3 Patient comfort and tolerability when wearing the *helmet*

As already mentioned, patient comfort is a key point for the success of non-invasive respiratory support. Brugnolli *et al.* (2023) conducted a qualitative study that evaluated the responses of 20 patients regarding feelings during the use of the *helmet*, and all participants described the first hours of use as a great challenge, in which the sensation of suffocation was present, in addition to the noise and pressure felt on the shoulders being points of great discomfort.

Despite this, the perception of these patients revealed that the fact that the helmet allows the maintenance of the diet, the use of glasses, headphones for music, reading books, consulting the cell phone, and communicating with the team and family members contributes to tolerance to the therapy and effectiveness (Brugnolli, *et al.,* 2023; Cammarota *et al.,* 2022). In addition, there are measures that can enhance the patient's comfort during the use of the *helmet*, such as positioning filters and humidifiers, strategically in the inspiratory connector, which attenuate the noise, adjust the humidification of the airflow, avoiding the side effect of xerostomia without excess humidity, which could condense at the interface and reduce visibility to the patient (Cammarota *et al.,* 2022, Coppadoro *et al.,* 2021).

4.4 LIMITATIONS TO BE CONSIDERED REGARDING THE USE OF THE *HELMET*

CO2 rebreathing is an issue to be discussed in the use of the *helmet* and may play a key role in clinical outcomes, since the interface, in principle, has a large "dead space" to be filled by expired CO2 that mixes with the supplied gas (Hong *et al.,* 2021). The concentration of CO2 inside the helmet depends on how much is produced by the patient, how much volume-minute is gene,rated and how much is "washed" by the high flow, and the concentration can reach levels of 18 mmHg when using Y ci,rcuits and that this can be reduced by up to 50% if two independent connectors are used for the inspiratory and expiratory routes. However, for patients with COPD exacerbation, face masks are more effective in reducing dyspnea precisely because of the more significant reduction in CO2 retention, although helmets have equivalent results in terms of better oxygenation and lower OTI index (Coppadoro *et al.,* 2021).

Increasing inspiratory pressure can contribute to removing excess CO2, as previously mentioned, which should be done with caution given the risk of increasing discomfort due to high flow (Hong *et al.,* 2021, Rosà *et al.,* 2023). In any case, continuous monitoring is pertinent, as another limitation of the helmet is that it does not allow an adequate measurement of the tidal volume supplied, since part of the flow supplied is used for expansion of the interface and does not directly enter the patient's airways, so the collection of arterial blood gases and constant pulse oximetry can be tools to ensure that there is an improvement in the oxygenation rate and PO2/FiO2 ratio, as well as the rebreathing of CO2 is as minimal as possible (Buell; Patel, 2023).

4.5 COMPARATIVE STUDIES AND CLINICAL OUTCOMES IN THE CONTEXT OF COVID-19

Based on pre-pandemic data, systematic reviews on clinical conditions other than Covid-19 demonstrated a superiority of *the helmet* among other non-invasive ventilatory modalities with regard to mortality and quality of life after hospitalization (Bellani *et al.,* 2021). Also, as pointed out in the systematic review by Ferreyro *et.al.* (2020), non-invasive helmet ventilation (RR, 0.26 [95% CrI, 0.14-0.46/ absolute risk, -0.32 [95% CrI%, -0.60 to -0.16] had a lower risk of progression to orotracheal intubation (25 studies, with 3,804 patients) when compared to nasal mask and high-flow catheter. In addition, in 21 studies (2,270 patients), the consequent reduction in mortality was observed with the use of helmets to the detriment of other interfaces. However, there are conflicting results as Peng et's review demonstrates. al, (2022), in which there were no differences in the mortality rate when comparing NIV with helmet and HFNC.

It is known that the main factor of severity and cause of ICU admission during Covid-

19 is ARDS, which can present a mortality of 30-40% of patients, even with optimized ventilatory support (Cammarota *et al.,* 2021; Piluso *et al.,* 2023). Noninvasive ventilation technologies were prominent in an attempt to prevent the patient from needing invasive MV (Beliero *et al.,* 2023; Duca *et al.,* 2020), and in the first wave of the pandemic, in the first half of 2020, there was a proportion that for every patient treated in the ICU with invasive mechanical ventilation, another patient was treated in other hospital settings with NIV (Bellani *et al.,* 2021; Coppadoro *et al.,* 2021).

During the pandemic, studies have attempted to assess the optimal management by comparing noninvasive ventilation interfaces. The indication of the *helmet* for Covid-19 was concentrated in patients who had mild to moderate ARDS, with no indication for MV, and the helmet was incorporated into protocols and guidelines of several hospitals around the world and the mode of ventilation most used by this interface was CPAP (Chao; Wang; Liu, 2022; Amirfarzan *et al.,* 2021). Observational studies with the helmet in CPAP mode have shown a positive outcome in more than 60% of patients, avoiding the need for OTI and also reducing mortality (Amirfarzan *et al.,* 2021; Bellani *et al.,* 2021). Accordingly, clinical trials with devices with the same characteristics also had a lower intubation rate and more ventilator-free days than users of high-flow nasal catheters (Chao; Wang; Liu, 2022; Michi *et al.,* 2023).

Divergently, in clinical trials such as the "*HELMET-COVID*" and "HENIVOT TRIAL", no statistical differences were evidenced between the interfaces in relation to mortality and days without ventilatory support (Arabi *et al.,* 2022). However, even so, the "HENIVOT TRIAL" pointed to the superiority of the helmet in relation to the HFNC in terms of the need for orotracheal intubation and mechanical ventilation, in agreement with Grieco et.al. (2021), which also points to an association with improved oxygenation and dyspnea, in addition to an increase in days free of invasive ventilation.

It was then possible to gather sufficient data to predict characteristic parameters of a patient who would best benefit from this technology, and some studies have proposed that the pre-treatment PaCO2 < 35 mmHg and the PaO2/(FiO2 x VAS dyspnea) ratio < 30 (in which VAS is a visual analog scale for the assessment of dyspnea and respiratory distress, varying the score from 0 to 10 as maximum discomfort) are findings that are related to a prognosis of greater benefits (Rosà *et al.,* 2023; Chao; Wang; Liu, 2022; Grieco *et al.,* 2022a).

It is necessary to consider that the factors responsible for the failure of non-invasive ventilation are related to the severity of the patient's own condition, and can be summarized in an intensely reduced PaO2/FiO2 ratio and high scores in *scores* such as SAPS III (Beliero *et al.,* 2023; Bellani *et al.,* 2021). In addition, there was also a concern about the performance of the patient after hospitalization for Covid-19. Rehabilitation after hospitalization of patients

using mechanical ventilation is, in fact, lower when compared to patients who received non-invasive ventilation and is directly related to the duration of ventilator use, but without significant difference between non-invasive interfaces (Arabi *et al.,* 2023; Michi *et al.,* 2023).

In summary, the *helmet* device, in CPAP mode, by reducing the need for invasive ventilation, has proven to be an important oxygen therapy option, since it also has the ability to mitigate the consequences of ICU bed shortages by having viable use even outside the intensive care environment, without major adverse events as demonstrated by Coppadoro et al. (2021) and Amirfarzan et al. (2021). Such findings suggest a potential advantage to be explored, in addition to the safety of helmet use in hypoxemic patients due to Covid-19 (Michi *et al.,* 2023).

4.6 LIMITATIONS OF THIS SCOPING REVIEW

Although recent studies with data from the pandemic period are promising, it is imperative to state that there is an important complexity when analyzing existing clinical studies, since they have some confounding factors. Among them, there is no standardization in relation to patient selection and choice of prototype according to different centers; Also, the tests with the use of the *helmet* depend on the causes inherent to the respiratory failure, as well as the baseline severity of the condition, the patient's cooperation and the team's experience**.** In addition**,** the studies are mostly monocenter, with restricted "n", and in some of the studies with positive results for satisfactory clinical outcomes, there was an association with factors such as: prone position, use of dexmedetomidine for greater patient comfort and adherence, manipulation by a team experienced in ventilatory management, restricted selection of patients in *status* pathological that did not cause a delay in the indication of OTI, previous comorbidities, and corticosteroid use (Piluso *et al.,* 2023; Al-Dorzi; Kress; Arabi*,* 2022).

5 CONCLUSION

Although there have been multiple trials and systematic reviews on noninvasive respiratory support in recent years, with an exponential momentum during the Covid-19 pandemic, it has not yet been possible to define a definitive approach or a protocol regarding the use of *helmets*, since there are divergences in the literature and limitations regarding the analysis of studies. In addition, there is no consensus on the population that would best benefit from the indication of this ventilatory support, what is the ideal time of use, or even standardized blood pressure parameters.

Even so, the *helmet* is widely used in bedside practice and this has been enough to generate clinically relevant data such as the association with a lower risk of progression to OTI and even a lower mortality rate found in some studies. In any case, regardless of the non-invasive ventilatory mode or interface used, the use of adequate flow to avoid CO2 retention, maintaining a satisfactory PEEP and protective ventilation minimizes the risks of P-SILI, in addition to strict monitoring and clinical surveillance are essential to avoid OTI delay in cases where necessary.

Therefore, it is possible to affirm that the *helmet* is a safe alternative as non-invasive respiratory support in patients with ARF according to the clinical context, but given the variability of the cases, the costs of each therapy and irregularity in the distribution of resources among the different hospital units, it is imperative that more multicenter and statistically significant studies be carried out, so that a formal and adequately evidence-based nomination can be established.

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THE IMPORTANCE OF THE NURSE IN THE HOME VISIT TO DIABETIC PATIENTS: AN EXPERIENCE REPORT

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ABSTRACT

Home visits are essential in the integrated care of patients with diabetes, providing personalized and accessible care, as highlighted by the World Health Organization (WHO). This experience report describes the activities carried out during the Mandatory Supervised Curricular Internship (ECSO) at the Basic Family Health Unit (UBSF), between March and June 2024, totaling 496 hours.

During visits, nurses play a key role in offering emotional support and health education, helping patients better understand their condition and promoting positive changes in their lifestyles. The educational approach enables patients to increase treatment adherence by improving health outcomes.

The main actions performed by the nurse include assessment and monitoring of blood glucose levels, guidance on diet and exercise, psychological support, personalized care planning, and referrals to other health professionals, if necessary. These interventions aim not only to empower patients in the management of their condition, but also to prevent interventions and complications for the person with diabetes.

Therefore, home visits are an effective strategy that not only improves glycemic control, but also strengthens self-care and promotes the well-being of diabetic patients, highlighting the importance of personalizing care and creating a supportive environment.

Keywords: Nurse. Home Visit. Family Health.

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INTRODUCTION

Home visits play a crucial role in the integrated care of patients with diabetes. According to the World Health Organization (WHO), these visits are essential to provide more personalized and accessible care, especially for patients with chronic conditions such as diabetes (Ministry of Health, 2020). Bringing health services closer to the home environment not only improves access to care, but also allows for a more comprehensive assessment of patient needs, including social, family, and environmental factors that can directly influence disease management (GOMES *et al;* 2021). Monitoring and encouraging adherence to the therapeutic regimen is an essential function of nurses, who discuss and help overcome barriers to treatment. Based on observation of the home environment, they collaborate with other healthcare professionals to adjust the care plan, ensuring its effectiveness and suitability for the patient's needs. They provide personalized and continuous care, promote health education, prevent complications, offer emotional support, monitor treatment adherence and allow adjustments in the care plan. Thus, nursing in home visits contributes significantly to improving the quality of life and health outcomes of diabetic patients (SILVA *et al;* 2017).

OBJECTIVE

To describe the experience as a student of the Mandatory Supervised Curricular Internship (ECSO), lived at the Basic Family Health Unit (UBSF), the home visits carried out by the nurse to the diabetic patient.

METHODOLOGY

This is an experience report, of a descriptive nature with a qualitative approach, based on experiences obtained during the ECSO discipline, prepared from the activities developed during the 496 hours carried out in the fifth year of the Nursing course at UBSF, between March and June 2024 in the city of Dourados MS.

RESULTS AND DISCUSSION

During the 496 hours of ECSO carried out at the UBSF, in addition to all the activities carried out, it was opportune to carry out the home visit to the diabetic patient. The home visits with the nurse during my ECSO played a crucial role in the integrated care of the patient with diabetes, providing personalized and holistic care. According to the World Health Organization (WHO), these visits are essential to improve access to health care and

enable a broad assessment of the patient's needs, taking into account all aspects (Ministry of Health, 2020). During visits, the nurse can offer emotional support, which is crucial for dealing with the negative emotions often associated with diabetes, such as fear, anxiety, and depression. Psychological support helps patients feel more secure and understood, which can improve treatment adherence and self-care. In addition, the health education provided during these visits contributes to a better understanding of patients' condition, promoting positive changes in lifestyle and disease management (BASILIO *et al;* 2024). In home visits, multidisciplinary care generates extraordinary results, so the role of the nurse in a multidisciplinary team is essential to ensure comprehensive and continuous patient care. It acts as a central point in communication between different health professionals (physicians, physiotherapists, nutritionists, psychologists, among others) and the patient, coordinating and facilitating the execution of the care plan (ALVES *et al;* 2019). The nurse is in direct contact with the patient and can observe subtle changes in their condition, allowing quick interventions and informing the team about these changes, they have a fundamental role in educating the patient and their families about the health condition, treatments and necessary care, promoting autonomy and adherence to treatment, often organizing care, ensuring that the plan established by the team is implemented in an efficient and coordinated manner. Nurses are trained to provide a more empathetic and humanized approach to the patient, helping to create an environment of trust, working on the identification of risks and the implementation of preventive measures to avoid complications in the patient's health status (ALVES *et al;* 2019). In addition to the functions mentioned, nurses perform other valuable attributions within the multidisciplinary team, further expanding their importance such as: Development of individualized care plans: Based on continuous patient assessment, nurses collaborate in the creation of a care plan that is personalized and meets the specific needs of the patient, taking into account the different aspects of their health. Mediation between patient and team: The nurse facilitates communication between the patient and the other members of the health team. Often, he translates medical and technical guidelines into a language accessible to the patient and their families, ensuring correct understanding and adherence to treatment. Monitoring and evaluation of treatments: The nurse is essential in monitoring the effectiveness of the prescribed treatments. It monitors the patient's response to medications, therapies, and interventions, communicating to the team any necessary adjustments. Training and leadership: In many cases, the nurse assumes a leadership role within the team, coordinating activities and training other team members to perform specific care, such as

wound management techniques, infection control, among others. Health promotion and disease prevention: In addition to caring for hospitalized patients or those undergoing treatment, nurses work in health promotion campaigns, public health education and the prevention of chronic diseases, such as diabetes and hypertension, providing guidance on healthy lifestyle habits. Resource management and care optimization: The nurse also works in the management of available resources, such as hospital materials and supplies, ensuring that the team works efficiently and that patients have access to what is necessary for their recovery. Emotional and psychological support: The nurse offers emotional support to both the patient and his family, being a point of comfort in times of uncertainty and anguish. It recognizes the psychological and emotional dimensions of care, especially in critical or terminal situations. This broad and versatile role makes the nurse a key player in the integration of care, ensuring that all areas of the patient's health are covered, providing a more holistic and effective approach (ALVES *et al;* 2019). During my practical experience, I observed how the health education approach during home visits is effective in training patients with diabetes. Nurses and healthcare professionals use these opportunities to provide detailed information about the disease, including proper diet, glycemic control, medication administration, symptom monitoring, and the importance of physical activity. This practice is personalized according to the specific needs of each patient, taking into account their family context and lifestyle, which significantly increases treatment adherence and improves long-term health outcomes (GOMES *et al;* 2021). The role of nurses in recognizing the territory where diabetic patients are inserted is crucial for the promotion of adequate and personalized care. These professionals play a key role in identifying the specific needs of the population, contributing to the improvement of public health. The nurse conducts a survey of the health conditions of the community, identifying risk factors and the particularities that affect diabetic patients, such as access to healthy foods and health services (Ministry of Health, 2006). One of the factors that can hinder an effective treatment is the patient's diet, the dietary aid to the diabetic patient is essential for the control of the disease and the promotion of a healthy life. These professionals play an active role in patient education and support, helping to implement lifestyle changes that are critical to diabetes management. Nutritional Education: The nurse advises patients on the importance of a balanced diet, rich in fiber and with a low glycemic index. This includes consuming vegetables, fruits (in moderation), whole grains, and lean proteins. Elaboration of Meal Plans: In collaboration with nutritionists, the nurse can assist in the creation of personalized meal plans that meet the specific needs of each patient, considering their preferences and

dietary restrictions. Blood Glucose Monitoring: The nurse teaches patients how to monitor their glucose levels, helping them understand how different foods affect their blood glucose. This practice is crucial to avoid hypoglycemia and hyperglycemia. Instructions on Reading Labels: Education on how to read food labels is critical for patients to identify hidden sugars and make healthier choices. Nurse intervention in the diet of diabetic patients can lead to better treatment adherence, more effective blood glucose control, and reduced risk of complications associated with diabetes. Ongoing education and support are key to empowering patients to manage their condition autonomously and healthily. Nurses play a crucial role in the dietary guidance of diabetic patients, contributing significantly to disease control and improved quality of life (Ministry of Health, 2022). The nurse acts as a link between health services and the community, facilitating communication and promoting prevention campaigns and early diagnosis of diabetes. By visiting patients in their homes, nurses can assess the family and social environment, adjusting the guidelines according to the realities experienced by the patients, and are able to develop specific programs that meet the needs of the local diabetic population, focused on the prevention and control of complications. In collaboration with other health professionals, the nurse integrates efforts to ensure that all aspects of care for diabetic patients are addressed, from nutrition to psychological support. The nurse has a vital role in recognizing and intervening in the territories where diabetic patients live. Its performance not only improves the management of the disease, but also promotes a more humanized care centered on the individual needs of patients (Ministry of Health, 2006). The role of nurses in the routine of diabetic patients who do not have a stable life structure is essential to ensure adequate care and promote treatment adherence. These patients often face additional challenges, such as food insecurity, many are unable to buy a healthier food, as mentioned above simply because the market value is more expensive in the product with healthier labels, lack of access to medicines and difficulties in maintaining a healthy lifestyle. The nurse must perform a comprehensive assessment of the patient's social and economic conditions, identifying barriers that may interfere with diabetes management, such as lack of access to healthy foods and medications. During the home visits, I was able to witness how nurses not only provide clinical care, but also offer emotional support and continuous monitoring of the patient with diabetes. They assess adherence to the treatment plan, perform regular physical exams, check blood glucose levels, and adjust therapies as needed. In addition, home visits allow early identification of any complications or difficulties that the patient may face in their home environment, enabling immediate interventions and preventing health

crises (SILVA *et al;* 2017). During the home visit to diabetic patients with altered glycemic values, nurses can implement various interventions to improve disease control and promote self-care. The main actions include: 1- Evaluation and Monitoring: The nurse must assess blood glucose levels and review the patient's history, identifying possible causes for the alteration, such as treatment adherence, diet and physical activity. 2- Health Education: Provide guidance on the importance of healthy eating, physical exercise and the correct administration of medications, including insulin, if necessary. The nurse should teach self-monitoring techniques for blood glucose and how to interpret the results. 3- Emotional Support: Offer psychological support, helping the patient to cope with the stress and anxiety related to their condition. This can include identifying emotional barriers that hinder self-care. 4- Care Planning: Together with the patient, develop a personalized care plan that includes realistic goals for glycemic control and strategies to achieve them. 5- Referrals: If necessary, refer the patient to other health professionals, such as nutritionists and psychologists, for more comprehensive care. These actions aim not only to improve glycemic levels but also to empower the patient in managing their condition. The lack of all the care mentioned above results in numerous problems, the most common being diabetic foot, a common and serious complication in patients with diabetes mellitus. Preventive action involves a combination of education, direct care, and regular monitoring, with the aim of avoiding injuries, infections, and amputations, which are frequent risks for these patients. One of the pillars of prevention is education. The nurse teaches the patient to identify warning signs, such as wounds, cuts, calluses, changes in color, and sensitivity in the foot. In addition, it advises on the importance of proper hygiene, careful drying of the feet, and the use of appropriate footwear, performing frequent inspections of the patient's feet, observing changes in the skin, nails and bone structure. This evaluation includes checking sensitivity, blood circulation, and the presence of lesions, using tools such as monofilament to test tactile sensitivity. The nurse identifies patients at higher risk of developing foot complications, such as those with neuropathy, poor circulation or who have uncontrolled blood glucose. By classifying these patients, he can propose a more intensive and specialized care plan. It advises on daily practices, such as avoiding walking barefoot, cutting nails correctly, not using irritating products or direct heat (such as hot compresses) on the feet. It also instructs you on choosing appropriate footwear that protects your feet without causing friction or pressure. If foot injuries are detected, the nurse is trained to perform the initial treatment, such as dressings and skin protection techniques. This helps prevent infections and aggravations, referring to other health professionals when necessary.

If he identifies a complication, he refers the patient to specialized care, such as a podiatrician or vascular surgeon, ensuring that the problem is treated properly and early. By acting preventively, nurses help reduce the risk of serious complications of the diabetic foot, improving the patient's quality of life and reducing the need for invasive interventions, such as amputations (SILVA *et al;* 2023).

FINAL CONSIDERATIONS

In short, home visiting plays an integral role in diabetes patient care by providing a holistic approach that not only treats the medical condition but also strengthens health education and fosters an ongoing supportive environment. This practice is based on the need to personalize care, maximizing quality of life and minimizing complications associated with diabetes. This approach, combined with personal experience and theoretical foundation, highlights how essential home visits are for effective diabetes management and patients' overall well-being (Ministry of Health, 2008). Home visiting is an effective strategy that not only improves glycemic control, but also strengthens self-care and promotes comprehensive well-being for diabetic patients. Proximity facilitates continuous monitoring and establishes a bond of trust and mutual support. Health education during these visits empowers patients with practical, personalized information about diabetes management, and I have observed how small changes can significantly improve patients' quality of life. In addition, I gained a better understanding of the daily barriers faced by patients, such as limited access to healthy foods and insufficient social support, motivating me more to seek creative solutions (MATOS *et al;* 2024).

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TRAUMATIC BRAIN INJURY: SURGICAL MANAGEMENT APPROACHES AND STRATEGIES FOR OPTIMIZING CLINICAL OUTCOMES

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ABSTRACT

Traumatic Brain Injury (TBI) is one of the main causes of mortality and morbidity, requiring careful surgical and clinical management to optimize clinical outcomes. This study performs a narrative review of the main approaches to control Intracranial Pressure (ICP) and surgical strategies applied in cases of TBI. The search for scientific articles was carried out in the PUBMED, LILACS, and SCIELO databases, covering studies published between 2014 and 2024. The results show that adequate control of ICP in Intensive Care Units (ICU), combined with less invasive approaches, contributes significantly to the reduction of complications and mortality associated with TBI. Pediatric management and cases of TBI due to firearm projectiles also require specific care due to the particularities of each context. The review highlights the importance of standardized protocols and a multidisciplinary team to improve the prognosis of patients. It is concluded that the application of evidence-based guidelines and the use of advanced technologies offer a promising approach to the treatment of TBI.

Keywords: Traumatic Brain Injury. Surgical management. Intracranial pressure. Intensive Care Unit. Prognosis.

INTRODUCTION

Traumatic Brain Injury (TBI) is a critical condition that represents one of the leading causes of mortality and disability worldwide. Often associated with car accidents, falls, and injuries due to violence, TBI imposes clinical challenges that require rapid and precise interventions to optimize the clinical outcomes of affected patients (RODRIGUES et al., 2021). In addition to the direct impacts on health, TBI also represents a significant burden for the public and private health systems, requiring considerable resources for care in urgent and emergency units, as well as in Intensive Care Units (ICU), where the management of critical cases is essential for the survival and recovery of patients (NETO, 2024).

The need for effective interventions in the management of TBI is especially relevant when considering the pathophysiology of the condition. One of the main concerns in the management of patients with TBI is the control of Intracranial Pressure (ICP), which is directly associated with the prognosis of patients. Studies show that proper ICP management in ICUs can significantly reduce mortality rates and improve patients' functional outcomes (RODRIGUES et al., 2021; BICALHO et al., 2024). Thus, the development and application of clinical protocols aimed at the control of ICP and other neurophysiological parameters are crucial for the treatment of TBI.

In the pediatric context, TBI requires specific approaches, considering the anatomical and physiological particularities of children, as well as potential long-term complications. In children, surgical management of TBI is complex and presents unique challenges due to increased skull fragility and susceptibility to serious neurologic complications. The literature highlights the need for interventions adapted to this group, aiming to minimize risks and maximize recovery potential (NETO, 2024; MELO, 2014).

In addition, the clinical aspects of TBI vary according to the severity of the injury and the mechanism of trauma, which makes the multidisciplinary approach essential in the management of these cases. Understanding clinical manifestations and individual responses to treatment is critical to guiding decision-making in the clinical setting. Studies have highlighted the importance of detailed clinical evaluation and continuous monitoring as pillars for improving prognosis in patients with TBI (DA SILVA et al., 2024).

Traumatic brain injury caused by firearm projectiles represents another category of TBI with specific implications and unique challenges. In a study conducted in São Paulo, the mortality and morbidity associated with this type of TBI were analyzed, highlighting the complexity of surgical management in these cases. The treatment and monitoring of these

patients require expertise and specific protocols, given the severity and variability of projectile injuries (SOUZA et al., 2013).

In view of the above, the present study aims to explore the approaches and strategies of surgical management in TBI, with a focus on optimizing clinical outcomes and reducing associated morbidity and mortality. Through a review of current surgical and clinical practices, we aim to identify the main factors that contribute to the improvement of the prognosis of patients with TBI in different clinical scenarios.

METHODOLOGY

The present study is a narrative review. The search began with the definition of descriptors and the choice of search platforms. The research was carried out in the online databases PUBMED, LILACS and SCIELO, from January to July 2024. The following descriptors related to the theme "traumatic brain injury", "surgical management", "treatment of severe TBI" and "clinical outcomes" were used, combined with the Boolean operator "AND", obtained through the DeCS/MeSH platform (Health Sciences Descriptors).

Data analysis was conducted in a standardized manner, following the inclusion criteria: articles published between January 2014 and February 2024, available in English and Portuguese, and with accessible full text. Exclusion criteria included studies addressing surgical interventions for lesions not associated with TBI, studies conducted exclusively in animals, research focused on pediatric populations with no applicability to adults, and literature reviews that did not present new evidence or significant advances in the surgical management of TBI.

The selection of articles was carried out by two evaluators, who independently mapped the studies, discussed the results, and kept a continuously updated data collection form. The evaluation followed a sequence, starting with the reading of the titles and, later, the abstracts of the publications identified as relevant. In cases of divergence in the selection of articles or in the extraction of data, consensus was adopted among the evaluators, with the possibility of consulting a third evaluator, if necessary.

In addition, studies identified through manual searches in journals, citation searches, and gray literature were included, ensuring comprehensive coverage of the topic "Traumatic Brain Injury and Surgical Management".

RESULTS

The initial search resulted in 494 publications, of which 18 met the proposed objectives after applying the inclusion and exclusion criteria, as well as reading the titles

and abstracts. On the PubMed platform, using the descriptors in titles and abstracts, 420 articles published between 1964 and 2024 were found, with a time restriction of 10 years (2014 to 2024), resulting in 210 articles. After applying the inclusion criteria, 20 studies were excluded, resulting in 190 articles, of which 180 were available in full (FULL TEXT).

On the LILACS platform, the initial search resulted in 150 articles. With the time restriction, the number was reduced to 90, and after applying the inclusion criteria, 10 were excluded, leaving 80. Of these, 65 articles were selected because they were available in full after the exclusion criteria.

On the SciELO platform, 120 articles were initially found, reduced to 60 with the time constraint. After applying the inclusion and exclusion criteria, 50 articles were maintained.

A duplicate check was performed between the articles of the three platforms, resulting in 270 unique articles, with 15 duplicates removed. After reading the titles and abstracts, the final number of articles was reduced to 21 papers, with a final selection of 7 studies directly related to surgical management to optimize results in TBI.

DISCUSSION

The literature on TBI management highlights the control of Intracranial Pressure as one of the determining factors for the prognosis of patients. According to Rodrigues et al. (2021), ICP control in ICUs is associated with better clinical outcomes, as it prevents the development of secondary complications, such as brain herniations. In situations of severe TBI, emergency surgical decompression can be a decisive intervention, especially when noninvasive methods of ICP control are insufficient to stabilize the patient.

Another relevant aspect in the management of TBI is the need for continuous monitoring. According to the study by Bicalho et al. (2024), the implementation of standardized protocols for monitoring neurophysiological parameters in ICUs favors a rapid response to critical changes, which can reduce mortality. The introduction of advanced monitoring devices in ICUs, such as cerebral oxygenation monitoring systems, has contributed significantly to a more assertive and less invasive approach in patients with TBI.

In the pediatric public, the management of TBI requires adaptations due to the anatomical and physiological differences of the children. Neto (2024) highlights that surgical treatment in children should consider the possibility of long-term complications, since the children's brain is developing. Thus, surgical interventions should be applied judiciously, prioritizing less invasive approaches and, whenever possible, combining surgery with neuropsychological support therapies to optimize functional recovery.

For Souza et al. (2013), TBI caused by firearm projectiles is one of the most complex types of trauma to treat, as it often causes extensive brain injuries that are difficult to manage surgically. The cases analyzed by the neurosurgery service of Santa Casa de São Paulo reinforce the need for an experienced team to treat these patients, as well as specific protocols for TBI by firearm, which include surgical and postoperative approaches adapted to the severity of the condition.

Melo's (2014) analysis also points to the importance of multidisciplinary care in the management of TBI. According to the author, the presence of professionals from different specialties, such as neurosurgeons, intensivists, and specialized nurses, contributes to a comprehensive and effective approach, especially in complex scenarios such as pediatric treatment and gunshot wounds.

The use of less invasive approaches in the management of TBI in adults has shown promise, according to observations by Da Silva et al. (2024). This type of approach, when possible, minimizes the risks associated with surgery and allows for a faster recovery. In cases of mild to moderate TBI, minimally invasive surgery, combined with an intensive rehabilitation protocol, favors the functional rehabilitation of patients, reducing the length of hospital stay and the risk of hospital infections.

Another important point discussed by Bicalho et al. (2024) is the role of ICUs in the implementation of integrated care for patients with TBI. Modern ICUs, equipped with advanced monitoring technologies and teams trained to manage TBI, offer an essential infrastructure for the success of interventions. Care protocols, effective communication between team members, and quick decision-making are critical to controlling potential complications and to successful treatment.

Finally, it is notable that the literature emphasizes the importance of evidence-based protocols, as discussed by Rodrigues et al. (2021). The standardization of conducts in the management of TBI, combined with the use of updated guidelines, contributes to the improvement of clinical outcomes, allowing a safer and more effective treatment of patients with TBI, both in adults and children.

CONCLUSION

The surgical and clinical management of traumatic brain injury is a complex field, which requires an integrated, evidence-based approach to optimize the prognosis of patients. The review showed that ICP control, continuous monitoring, and the adequacy of surgical techniques to each specific case are fundamental pillars for reducing mortality and

improving clinical outcomes. In addition, the multidisciplinary approach stands out as a key element for success in the treatment of TBI cases in different contexts.

These interventions, in addition to the standardization of protocols and the use of new technologies, offer a promising perspective for the treatment of TBI. With the advancement of research and the implementation of increasingly effective practices, it is expected that the morbidity and mortality rates associated with TBI can be further reduced, promoting a more complete functional recovery for patients.

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THERAPEUTIC APPROACHES IN THE MANAGEMENT OF SEPSIS IN PATIENTS WITH INFECTIVE ENDOCARDITIS

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ABSTRACT

Sepsis is a critical medical condition that results from the body's inadequate response to an infection, leading to potentially life-threatening organ dysfunction. This study focuses on the management of sepsis in patients with infective endocarditis, a rare but serious infection that has a high rate of complications and mortality. Analysis of the data from this systematic review indicated that the combination of antimicrobial therapy and surgical interventions can significantly improve clinical outcomes. In addition, early identification of pathogens and appropriate choice of antibiotics have been identified as crucial to the effectiveness of treatment. Collaboration between different medical specialties proved to be essential for effective management, providing a multidisciplinary approach that integrates clinical and surgical care. The results of this review provide valuable insights for clinical practice, underscoring the need for evidence-based protocols to optimize the treatment of sepsis in infective endocarditis and thus improve health outcomes for affected patients.

Keywords: Endocarditis. Sepsis. Therapeutics.

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INTRODUCTION

Sepsis is a serious systemic infection characterized by the presence of microorganisms in the bloodstream, which can lead to multiple organ dysfunctions and, in extreme cases, organ failure. When the amount of bacteria in the bloodstream is significantly elevated, there is an increased risk of developing infective endocarditis, even in individuals with structurally normal heart valves. This condition results from the adhesion of microorganisms to cardiac structures, forming vegetations that can compromise valve function and generate systemic complications (Armstrong, 2024)

Infective endocarditis is a rare disease, but it is associated with a high rate of serious complications, often presenting as a complex syndrome. Despite technological advances and the trend towards early surgical intervention, clinical outcomes, especially mortality, did not show a significant reduction. This suggests the need for a more detailed search for information that can offer new perspectives on the management and treatment of this condition (INCOR, 2023).

The diagnosis of infective endocarditis is challenging, requiring a multidisciplinary approach that includes detailed clinical evaluation, laboratory tests, and imaging. Early and accurate identification of the etiological agent is essential for the appropriate choice of antimicrobial therapy, which should be initiated as soon as possible to reduce mortality associated with the disease (Lima et al., 2024)

The aim of this study is to conduct a systematic review of therapeutic approaches in the management of sepsis in patients with infective endocarditis, focusing on how different treatment strategies impact clinical outcomes. The aim is to identify and analyze surgical interventions and antimicrobial therapy options, evaluating their efficacy and their relationship with mortality and associated complications. In addition, it is intended to investigate the importance of multidisciplinary management and the integration of care in the optimization of treatment, aiming to provide insights that can contribute to better clinical practices and, consequently, to the improvement of outcomes in patients affected by this serious condition. This analysis is intended to serve as a guide for the medical community, highlighting the need for personalized, evidence-based approaches to the management of sepsis associated with infective endocarditis.

METHODOLOGY

The methodology used to carry out this systematic review followed the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), which aim to ensure transparency and quality in the preparation of systematic reviews and meta-

analyses. These guidelines provide a set of items that guide researchers in conducting and reporting reviews, promoting a critical evaluation of the included studies (Moher et al., 2009). The research question, "In patients with infective endocarditis, how do different therapeutic approaches in sepsis management impact clinical outcomes compared to standard therapeutic approaches?", was structured according to the PICO strategy, which stands for Population, Intervention, Comparison, and Outcome, facilitating the formulation of clinical questions and the identification of relevant evidence (Higgins et al., 2011).

The search for relevant literature was conducted in the PubMed databases, using Health Sciences descriptors (DeCS) such as "Sepsis" and "Endocarditis", combined with the Boolean operator AND, which allowed the location of articles that address both conditions simultaneously. Articles in English, Spanish and Portuguese from the last 5 years were included, ensuring a wide range of publications relevant to the theme.

The inclusion criteria for this systematic review were: primary studies evaluating therapeutic interventions in the management of sepsis in patients with infective endocarditis; articles published in peer-reviewed scientific journals; and studies that provided data on clinical outcomes, such as mortality rates and complications. On the other hand, studies that addressed only literature reviews, unconfirmed cases of infective endocarditis, opinion articles, comments, and case reports that did not present quantitative or qualitative data relevant to the research question were excluded from the analysis. This methodology aims to ensure the inclusion of robust and high-quality evidence that can contribute to the understanding of best practices in the management of sepsis associated with infective endocarditis.

RESULTS

The results of the research were obtained from the analysis of the databases, with emphasis on the sCIELO platform, where 19 articles related to the topic in question were initially found. The search was guided by specific keywords that reflect the nature of research on therapeutic approaches in the management of sepsis in patients with infective endocarditis. After applying year filters, limiting studies to a range from 2020 to 2024, the number of relevant articles was reduced to 17. This initial selection highlights the relevance and timeliness of the research, evidencing an effort to focus on publications that reflect the most recent practices and findings in the field.

In the next stage, a careful analysis of the titles and abstracts of the 17 selected studies was carried out. During this evaluation, 10 articles were excluded. The reasons for this exclusion were diverse, including the lack of relevance to the topic addressed, the

duplication of studies already considered, and the non-compliance with the inclusion criteria established for this systematic review. This rigorous screening process was essential to ensure that only the most relevant and quality articles were considered, reflecting the intention to provide a robust and informative analysis on the impact of therapeutic interventions on sepsis associated with endocarditis.

After the complete reading of the remaining nine texts, only seven articles proved to be adequate to answer the research question formulated. These seven studies, after detailed analysis, addressed different aspects of therapeutic interventions, including the comparison between surgical and non-surgical treatments, the efficacy of antimicrobial regimens, and the importance of multidisciplinary management in optimizing clinical outcomes. The inclusion of these articles represents a significant contribution to the understanding of the topic, providing a comprehensive view of current practices in the management of sepsis in patients with infective endocarditis.

DISCUSSION

The comparison between different therapeutic approaches in the management of sepsis in patients with infective endocarditis is central to the understanding of clinical outcomes. The data demonstrate that patients who underwent surgical interventions had a significantly lower mortality rate compared to those who received only antimicrobial treatment. This evidence suggests that the surgical approach, especially in cases with neurological complications, can improve clinical outcomes, corroborating the trend observed in several publications in the area. Surgery has been shown to be effective in reducing mortality, especially in patients who faced hemodynamic deterioration or persistent infection (Correia et al., 2024)

Early identification of infectious agents through blood cultures and the use of echocardiography are essential for appropriate management, allowing the differentiation between the types of endocarditis and the choice of the most appropriate therapy. Antibiotic administration should be adjusted to the identified microorganism, which improves survival rates and decreases mortality associated with sepsis (Barbosa et al., 2023)

In addition, the article emphasizes the importance of emerging bacterial resistance as a critical challenge in the treatment of infective endocarditis. The need for prolonged antimicrobial therapy and monitoring of antibiotic levels are critical to ensure complete eradication of the infection. The development of new antibiotic combinations and the implementation of personalized therapies are indicated as promising areas to improve clinical outcomes. Evidence suggests that while standard approaches are essential, the

integration of surgical strategies and active management of bacterial resistance may lead to more favorable clinical outcomes compared to conventional therapeutic approaches (Lima et al., 2024).

The mortality rate observed in patients undergoing surgery was lower compared to those who received antimicrobial treatment alone. This indicates that, in situations where there are neurological complications or hemodynamic deterioration, surgical intervention may be crucial to improve clinical outcomes (Barbosa et al., 2023). Early surgical intervention, especially in patients with complications such as congestive heart failure or abscesses, has been shown to improve clinical outcomes. Perioperative mortality ranged between 5% and 15%, depending on factors such as the severity of the infection and the hemodynamic condition of the patient (Fortes and Fortes, 2021).

In addition, the presence of comorbidities, such as diabetes and HIV infection, was identified as a predictor of complications and mortality, emphasizing the importance of individualized management. The absence of fever at clinical presentation has been related to a delay in diagnosis, which may prolong the time to initiation of appropriate therapy, thereby increasing the risk of cerebral embolization. This information underlines the need for more agile care focused on strategies that integrate both clinical and surgical treatment, depending on the patient's condition. In summary, the management of sepsis in patients with infective endocarditis requires a multidisciplinary approach and evidence-based decision-making, considering the specificities of each case to optimize clinical outcomes (Barbosa et al., 2023).

The implementation of a multidisciplinary approach is pointed out as a critical aspect in the management of infective endocarditis. Guidelines from the European Society of Cardiology (ESC) and the American Heart Association (AHA) emphasize the importance of a collaborative team that includes cardiologists, infectious disease specialists, and surgeons. This collaboration is essential for optimizing sepsis management and minimizing complications, as effective communication between team members is crucial to ensure that all aspects of patient care are adequately addressed. Research suggests that by integrating different specialties into treatment, clinical outcomes can be significantly improved, confirming that multidisciplinary therapeutic approaches can have a positive impact on mortality and morbidity associated with infective endocarditis (Mourad et al., 2023, Otto et al., 2020).

CONCLUSION

The systematic review of therapeutic approaches in the management of sepsis in patients with infective endocarditis highlighted the complexity and severity of this condition, in addition to highlighting the importance of appropriate interventions to improve clinical outcomes. The data analyzed suggest that the combination of effective antimicrobial therapy and surgical interventions when indicated is crucial to reduce mortality and associated complications. The articles included in the review demonstrated that, despite advances in diagnosis and treatment, mortality is still high, especially in patients with significant comorbidities. Therefore, early identification of pathogens and careful selection of antibiotics, as well as continuous evaluation of the patient's clinical conditions, are essential to optimize the therapeutic response.

In addition, the analysis of the studies highlighted the need for a multidisciplinary approach, involving cardiologists, infectious disease specialists, surgeons, and other specialists. This collaboration is critical to ensuring that every aspect of patient management is addressed, from clinical management to necessary surgical interventions. The evidence collected in this systematic review can serve as a guide for clinical practice, proposing the development of treatment protocols that integrate evidence-based strategies, aiming to improve the quality of care and health outcomes of patients with infective endocarditis. Continued research in this area is necessary to deepen the understanding of the efficacy of different interventions and to explore new approaches that may emerge, thus contributing to the reduction of mortality and the improvement of the quality of life of these patients.

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THE EVOLUTION OF PSYCHIATRIC HOSPITALS IN BRAZIL: AN EXPERIENCE REPORT

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ABSTRACT

This paper addresses the evolution of Brazilian psychiatric hospitals, from their origin during the colonial period to the challenges faced in contemporary times. The history of these institutions, marked by inhumane practices and the emergence of mental health policies, is contextualized. The problematization lies in the ineffectiveness of hospitals, influenced by

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the lack of integration between health policies and human rights, and by the persistence of a prison approach. The general objective of this work is to understand the applicable legislation and its implications in psychiatric hospitals, as well as to identify challenges and future perspectives. Its specific objectives are: a) To present the main sources for research on the subject; b) Discuss the need for specialized multidisciplinary teams and humanization in psychiatric hospital environments. To this end, it conducts a bibliographic and documentary review (technical pillar), under the Giftedean neoperspectivist paradigm (epistemological pillar) and hypothetical-deductive reasoning (logical pillar). The results highlight legal advances, such as the Psychiatric Reform Law and the Psychosocial Rehabilitation Assistance, but also point to challenges, such as overcrowding and lack of investment. In the discussion, the need for a more humanized and integrated approach is emphasized, in addition to the importance of deinstitutionalization and social reintegration. It is concluded that, in order to promote an effective transformation in the mental health care model, investments in public policies, professional training and strengthening of the psychosocial care network are necessary, ensuring respect for the rights and dignity of people with mental disorders.

Keywords: Psychiatric hospitals. HCTPs. Psychiatric reform. Experience report. Psychiatry.

INTRODUCTION

Psychiatry in Brazil, from the colonial period to the present day, reflects a significant evolution. During colonial Brazil, care for the mentally ill was precarious, predominantly provided by healers and religious. However, with the advancement of scientific knowledge and the influence of the French and Industrial Revolutions, especially in the late eighteenth and early nineteenth centuries, psychiatric care began to adopt a medical and state approach, culminating in the inauguration of the Hospice in Rio de Janeiro, which served as a model for other institutions (MIRANDA SÁ JR., 2007).

The evolution of psychiatric hospitals in Brazil reflects both advances and challenges. Inaugurated as part of the commemoration of the Coming of Age of Emperor Pedro II, the Hospice of Rio de Janeiro represented a modernization in the care of the mentally ill, but faced problems due to the lack of resources and the growing population served. Throughout the twentieth century, there were reform efforts, but the lack of specific drugs and the search for profit in social security assistance led to a division in the therapeutic approach, with a growing privatization of treatment (MIRANDA SÁ JR., 2007; CACTUS INSTITUTE, 2024).

Psychiatric Custody and Treatment Hospitals (HCTP) in Brazil reflect the diverse realities of psychiatric care, from public institutions to public-private partnerships. These hospitals, forged as prison hospitals, maintain their legal existence, facing challenges in relation to treatment and the quality of life of patients. The search for a more humanitarian and effective approach to psychiatric care continues to be a challenge in the country (JÚNIOR, 2023; MIRANDA SÁ JR., 2007).

Oliveira et al (2022) discuss the situation of people with mental disorders in conflict with the law in Brazil, focusing on the Psychiatric Custody and Treatment Hospitals (HCTP), which are institutions inserted in the prison system and considered an intersection between health and justice. Despite the advances of the Psychiatric Reform, these institutions and the people who are inserted in them remain stigmatized, with their human rights frequently violated. The text highlights the importance of advancing in this debate, raising questions to seek solutions that guarantee well-structured mental health care based on scientific evidence (SANTOS; WOULD; PINTO, 2015; SOARES FILHO; BUENO, 2016).

The Custody and Psychiatric Treatment Hospitals (HCTPs), despite being called "hospitals", are integrated into the security systems and inserted into the penitentiary system, under the management of the Penitentiary Administration Secretariats. Although intended for treatment and health care, these institutions are governed by criminal

legislation, resulting in an intervention model marked by contradictions (OLIVEIRA et al, 2022).

According to Soares Filho and Bueno (2016), this dichotomy between health policies and penal enforcement norms generates a predominantly judicial treatment, with little participation of health and social assistance services, disconnected from clinical evaluation and perpetuating the stigmatization of patients. This approach also leads to prolonged hospitalizations, loss of family ties, and inappropriate use of public resources that could be directed to more inclusive community services (OLIVEIRA et al, 2022).

Magalhães and Altoé (2020) investigate whether HCTPs adopt practices aligned with the principles of the Brazilian Psychiatric Reform. To exemplify this analysis, the authors present a clinical case of a patient followed during an internship in an HCTP. Although the principles and objectives of the Psychiatric Reform are not widely applied in the HCTPs, they observe the performance of some psychosocial actions in these institutions.

Reflecting on the changes in the process of the cessation of hazard examination in HCTPs, Magalhães and Altoé (2020) state that, previously, this examination was conducted by the Institute of Forensics and could result in the dishospitalization of patients. Now, called "Multiprofessional and Expert Examination of Psychosocial Care" (Empap), it is carried out in the patient's own unit, with the participation of the technical team. This change values the psychosocial perspective and expands the analysis beyond medical and judicial criteria. Although there have been advances, challenges still persist in the extra-hospital care network, and the invisibility of patients with mental disorders in conflict with the law persists (SANTOS; WOULD; PINTO, 2015; SOARES FILHO; BUENO, 2016).

The HCTP, although subject to pressures for its extinction, still remains a robust institution. Overcoming deinstitutionalization requires not only dehospitalization, but also the implementation of anti-asylum actions. All those involved, including users, health professionals, managers and society, must engage in this process. Existing public policies, such as Law 10.216/01 and the resolutions of the National Council of Justice, provide important guidelines, but their effectiveness depends on the support of the executive branches. In the field of mental health, disorder is the starting point for innovation, and although we do not have definitive answers, we seek to stimulate reflections on these questions (MAGALHÃES; ALTOÉ, 2020; OLIVEIRA et al, 2022).

For Santos, Farias and Pinto (2015), there is an urgent need to review the legal principles related to non-imputable asylums, especially considering the lack of integration of Law No. 12,160 with other legislation, which may compromise the achievement of the central objective of the Anti-Asylum Law: a society free of asylums, including the judiciary.

Despite some efforts, such as the PAI-PJ and Paili projects, which propose outpatient alternatives for people with mental disorders in conflict with the law, the Psychiatric Custody and Treatment Hospitals (HCTP) still persist as institutions that combine prison and health aspects, challenging the ideals of deinstitutionalization and humane treatment in mental health.

On the other hand, the authors (SANTOS; WOULD; PINTO, 2015) state that the discourse of dangerousness, based on the measure of security, continues to unilaterally privilege social security, without considering the advances in mental health and human rights policies. It is crucial to build a security policy that does not respond to violence with more institutionalized violence in HCTP, but prioritizes humanitarian treatment in Psychosocial Care Centers and other mental health devices. Criminal justice needs to recognize non-imputability, acquitting individuals and guaranteeing them specialized care, regardless of whether they are labeled as "criminal-madmen," in order to promote a more just and humane approach to those in conflict with the law and suffering from mental disorders.

That said, the following research problem questions arise: a) What are the main advances in Psychiatry in Brazil from the colonial phase to the present day?; b) How were the Brazilian psychiatric hospitals structured and how did they work? c) What are they, how many are there and how do the Brazilian HCTPs work?; d) What are the main challenges and future perspectives regarding the evolution of Brazilian psychiatric hospitals?.

The general objective of this work is to understand the applicable legislation and its implications in psychiatric hospitals, as well as to identify challenges and future perspectives. Its specific objectives are: a) To present the main sources for qualitative and quantitative research on the subject; b) Discuss the need for specialized multidisciplinary teams and humanization in psychiatric hospital environments.

This work was structured in 5 chapters. In this first one, dedicated to its Introduction, the following are presented: the theme, the contextualization, the problematization, the research problem-questions, the objectives, and the structure of the work. In the second chapter, its methodological foundation is presented, dividing it into three categories: epistemological pillar, logical pillar and technical pillar. The third chapter develops a review of Brazilian psychiatric hospitals, in five sub-themes: asylums, sanatoriums and psychiatric hospitals; evolution of the Brazilian mental health network; current structure and functioning of psychiatric hospitals; List of Brazilian psychiatric hospitals: where to find it?; and a reflection on the legislation applicable to Brazilian psychiatric hospitals. The fourth chapter

presents the conclusions and final considerations of the work. And then the references consulted are presented.

METHODOLOGICAL FOUNDATION

EPISTEMOLOGICAL PILLAR

Neoperspectivist Paradigm

The neo-perspectivist paradigm, proposed by Gifted (BREVIÁRIO, 2021; 2023), suggests the coexistence of two realities: one absolute and objective, and the other partial and subjective. This author postulates that all the answers to research questions already exist, however, we know them only partially and subjectively due to our imperfection (BREVIÁRIO, 2022; KÖCHE, 1997; PIAGET, 1973). The guiding questions of this work are: a) What are the main advances in Psychiatry in Brazil from the colonial phase to the present day?; b) How were the Brazilian psychiatric hospitals structured and how did they work? c) What are they, how many are there and how do the Brazilian HCTPs work?; d) What are the main challenges and future perspectives regarding the evolution of Brazilian psychiatric hospitals?. These questions illustrate the premise of the neo-perspectivist paradigm, highlighting that the answers already exist, but our understanding of them is limited by our human condition.

LOGICAL PILLAR: HYPOTHETICAL-DEDUCTIVE METHOD

The hypothetical-deductive method, according to Breviário (2022), aims to ensure a high degree of certainty and reliability in scientific investigation, following the precepts outlined by Karl Popper. This method, structured in three moments - problem, proposed solution and falsification tests - offers a rigorous approach to scientific research (DÉBORA et al, 2018; POPPER, 1972).

In this work, the guiding hypotheses were formulated from this perspective, addressing the evolution of Psychiatry in Brazil, the impacts of the Psychiatric Reform, the future of Psychiatric Custody and Treatment Hospitals (HCTPs) and the need to respect human rights. The hypotheses are as follows:

> a) Psychiatry in Brazil has evolved a lot, both qualitatively and quantitatively, which is reflected in the training of health professionals, in the growing humanization employed in psychiatric institutions and in the number of hospital units, beds, professionals and services provided.

b) The Psychiatric Reform brings many benefits to the mentally ill, but it also brings a great concern about how they will be adequately treated without psychiatric hospitals.

c) HCTPs are destined for an imminent end.

d) Mentally ill people are not criminals, delinquents, or dangerous to society.

e) Respect for human, civil, criminal, educational, professional, and religious rights must be the fundamental element for the human and integrated progress of Brazilian psychiatric hospitals.

Based on these hypotheses, deductive reasoning was applied, based on various sources, including the Bible and scientific publications, seeking to reach robust and integrated conclusions on the subject of Brazilian psychiatric hospitals (MARCONI; LAKATOS, 2003; 2007; 2008).

TECHNICAL PILLAR

Narrative Literature Review (RBN)

Narrative Literature Review (RBN), also known as Literature Search, is a fundamental technique that not only helps to define and solve known problems, but also makes it possible to explore new areas not yet completely understood. This approach allows for analysis from different perspectives, producing new conclusions and insights (BREVIÁRIO, 2021; SEVERINO, 2007). According to Rodrigues (2007), RBN offers means to explore new areas and solve already known problems, in addition to allowing a broader coverage of phenomena when the research problem requires the collection of data dispersed in space.

Unlike field research, RBN is based on the search for information in books and other publications, exploring data already available in previous records. This technique is particularly useful when the research problem requires the collection of data dispersed in space, as it allows a broader coverage of phenomena (MARCONI; LAKATOS, 2003; 2007; 2008). Gil (2010) points out that bibliographic research allows the researcher to cover a wider range of phenomena than those that could be investigated directly, providing a solid basis for the initial understanding of a theme.

However, it is important to consider that, as secondary sources, bibliographies may contain inaccurate data, requiring a critical and comparative analysis of different sources to ensure the reliability of the information. Following a work script that involves the exploration of sources, selective and analytical reading, preparation of cards and data analysis, RBN offers a solid basis for the initial understanding of a theme, enabling further deepening

through more advanced research techniques. This approach is especially useful for researchers seeking to understand complex and unknown issues, before engaging in more detailed investigations, such as case studies or action research (BREVIÁRIO, 2021; MARCONI; LAKATOS, 2003; 2007; 2008).

In this study, twenty bibliographic sources were consulted, including contributions from: Gil (1999; 2010); Breviary (2021; 2022; 2023); Rodrigues (2007); Severino (2007); Miranda Sá Jr. (2007); Magalhães and Altoé (2020); Soares Filho and Bueno (2016); Santos, Farias and Pinto (2015); Piaget (1973); Köche (1972); Marconi and Lakatos (2003; 2007; 2008); Oliveira et al (2022); Débora et al (2018); Popper (1972); Marques (2017). These authors provided a solid theoretical basis for the research, covering a variety of relevant topics, such as narrative literature review, hypothetical-deductive method, and neo-perspectivist paradigm, among others.

Narrative Documentary Review

Documentary Review, also known as documentary survey, is a research technique that aims to collect primary and secondary data indirectly, establishing a non-participant relationship between the researcher and the object investigated (GIL, 1999; 2010; BREVIÁRIO, 2021). According to Gil (1999), paper sources can provide data rich enough to avoid wasting time in field research, being essential for social investigations that rely heavily on documents. This technique utilizes different types of documents, such as statistical records, written institutional records, personal documents, and mass communications, to obtain a wide range of information relevant to social research.

The documents used in this technique are typified by Gil (1999) in four distinct categories, including statistical records, written institutional records, personal documents and mass communications. These documents provide essential data on socioeconomic, political, and cultural aspects of society, enabling a comprehensive understanding of the object of study. In addition, they allow the researcher to access historical and contemporary information efficiently, contributing significantly to the theoretical basis of the research (MARCONI; LAKATOS, 2003; 2007; 2008).

Thus, documentary surveys are fundamental for the theoretical foundation based on sources, providing primary and secondary data that enrich the understanding of the investigated theme. This technique enables a detailed and comprehensive analysis of social phenomena, contributing to the advancement of knowledge in various areas of knowledge (RODRIGUES, 2007).

As for the documentary sources, twenty-one official documents of the Brazilian government were used in this work, including laws and documents from official websites (BRASIL, 2001; 2002a; 2002b; 2003a; 2003b; 2004a; 2004b; 2004c; 2004d; 2005a; 2005b; 2005c; 2019a; 2019b; 2022; 2023a; 2023b; 2024; ARAÚJO, 2024; JUNIOR, 2023; CACTUS INSTITUTE, 2024). These materials provided concrete data and supported legal and political aspects addressed in the research.

PSYCHIATRIC HOSPITALS IN BRAZIL

ASYLUMS, SANATORIUMS AND PSYCHIATRIC HOSPITALS

The mental health scenario throughout history has been marked by different types of institutions aimed at the treatment of mental and chronic illnesses. Among these institutions, asylums, sanatoriums, and psychiatric hospitals stand out, each with its specific characteristics, similarities, and differences (OLIVEIRA et al, 2022).

Historically, asylums were places of internment for people with severe mental disorders, where they were often subjected to inhumane treatment and isolation practices. In contrast, sanatoriums emerged as treatment centers for chronic diseases, especially tuberculosis, offering specific care for patients with this condition. Psychiatric hospitals, on the other hand, are health institutions specialized in the treatment of severe mental disorders, offering a variety of therapeutic services and intensive care for patients (SOARES FILHO; BUENO, 2016).

With the advent of the Psychiatric Reform, a significant change occurred in the panorama of mental health services in Brazil. While asylums and sanatoriums were gradually deactivated due to inhumane practices and the need for a more humanized approach, psychiatric hospitals continued to exist, although with a renewed focus on community integration, reduction of hospitalization time and respect for patients' rights (BRASIL, 2002a; 2002b; 2003; 2004a; 2004b; 2004c; 2004d; 2005a; 2005b; 2005c; 2019; 2022; 2023a; 2023b; 2024).

In addition, another category of institution emerges in this context: the Psychiatric Custody and Treatment Hospitals (HCTP). These hospitals are intended for the treatment of people with mental disorders who have committed crimes, offering mental health care while complying with security measures determined by the courts. Thus, HCTPs differ from other Brazilian psychiatric hospitals in their specific function of combining psychiatric treatment with judicial security measures. Although some still pejoratively call them judicial asylums, they are not inhumane with the old asylums, where the mentally ill were disrespected, there were no therapeutic workshops and multidisciplinary teams as there are today, and they

were treated with electric shocks instead of medication (MAGALHÃES; ALTOÉ, 2020; SAINTS; WOULD; PINTO, 2015).

In summary, although they share the common goal of providing health care for specific groups of patients, asylums, sanatoriums, and psychiatric hospitals differ in their histories, therapeutic approaches, and treatment focuses. While asylums and sanatoriums have been gradually replaced by more humanized approaches, psychiatric hospitals and HCTPs continue to play an important role in the treatment and rehabilitation of people with mental disorders in Brazil (OLIVEIRA et al, 2022; MAGELLAN; ALTOÉ, 2020; BRAZIL, 2019).

EVOLUTION OF THE BRAZILIAN MENTAL HEALTH NETWORK

The mental health network in Brazil had its formal beginning with the creation of the first psychiatric hospital in 1841, the Hospício Pedro II, in Rio de Janeiro. Initially, these institutions were inspired by the European model, focusing on the segregation and control of patients with mental disorders (SOARES; WOULD; PINTO, 2015).

In the beginning, Brazilian mental health was marked by inhumane practices and precarious conditions in psychiatric hospitals. Patients were often subjected to cruel treatment, isolation, and neglect. The lack of public investment and social stigmatization contributed to the perpetuation of these conditions (SOARES FILHO; BUENO, 2016).

Throughout the twentieth century, several initiatives were taken to improve the mental health network in Brazil. The Psychiatric Reform, which began in the 1970s and was consolidated in the 2000s, represented an important milestone. This reform promoted deinstitutionalization, with the closure of asylums and the creation of community services, such as the Psychosocial Care Centers (CAPS) and the Therapeutic Residential Services (SRT). There was also a gradual increase in public and private investments in mental health, including the expansion of access to psychiatric drugs and therapies (MAGALHÃES; ALTOÉ, 2020)..

The Psychiatric Reform in Brazil represents a milestone in the mental health policy of the Unified Health System (SUS). This process aims to transform the care model, previously centered on psychiatric hospitals, to a more inclusive and community-based model (BRASIL, 2005a; 2005b; 2005c).

Criticism of the hospital-centered model (1978-2991), which predominated in the treatment of mental disorders, began to gain strength in 1978. During this period, movements and debates emerged that questioned the effectiveness and humanity of this model, driving the search for more humanized alternatives. From the 1990s onwards, the

implementation of the extra-hospital mental health network began (1992-2000). This involves the creation of Psychosocial Care Centers (CAPS), therapeutic residential services, and other forms of community care, aiming at the decentralization and humanization of care (BRASIL, 2003; 2005a; 2005b; 2005c; 2019; 2024).

The enactment of the National Mental Health Law (Law 10.216/2001) represented a significant advance in the process of Psychiatric Reform. This legislation reinforced the rights of users of mental health services and established guidelines for the deinstitutionalization and humanization of treatment. The III National Conference on Mental Health, held in 2001, was an important milestone in the consolidation of the Psychiatric Reform. In this event, users and family members had an active voice and contributed significantly to the formulation of policies and guidelines in the area of mental health (BRASIL, 2002a; 2002b; 2004b; 2024).

One of the central strategies of the Psychiatric Reform is the progressive reduction of the number of beds in psychiatric hospitals. This aims to promote the deinstitutionalization and treatment of patients in the community environment, favoring social reintegration and comprehensive care. The periodic evaluation of psychiatric hospitals has been an important tool to monitor the deinstitutionalization process and ensure the quality of care. This practice contributes to identifying good practices and challenges to be overcome in the mental health network. Therapeutic residences are one of the care modalities provided for by the Psychiatric Reform. They are collective residential spaces, where patients can live autonomously, receiving support and professional monitoring. These residences aim to promote the social reintegration and autonomy of users (BRASIL, 2005c; 2023a; 2023b).

The Back Home Program is an initiative that aims to promote the dehospitalization and social reintegration of patients admitted to psychiatric hospitals. Through this program, patients receive support to return to family and community life, ensuring the necessary follow-up for their reintegration. An important strategy of the Psychiatric Reform is the progressive reduction of the number of beds in large psychiatric hospitals. This measure seeks to decentralize care and promote the expansion of the psychosocial care network in the municipalities, strengthening community services (BRASIL, 2003; 2005a; 2005b; 2005c).

The municipality of Campina Grande, in Paraíba, is an example of success in the implementation of the Psychiatric Reform. Through an integrated and articulated policy between the various sectors of health and social assistance, the municipality was able to significantly reduce the number of beds in psychiatric hospitals and expand the offer of community services (OLIVEIRA et al, 2022; BRAZIL, 2005b; 2005c).

The judicial asylums represented a challenge for the Psychiatric Reform. These institutions, intended for the treatment of people with mental disorders in conflict with the law, often reproduce asylum practices and violate the human rights of patients. Overcoming this model requires the implementation of mental health policies in the prison and judicial systems, aiming to ensure adequate treatment and rehabilitation of patients (MAGALHÃES; ALTOÉ, 2020; SOARES FILHO; BUENO, 2016).

The progressive reduction in the number of beds in psychiatric hospitals is a complex challenge, which involves the construction of a psychosocial care network capable of meeting the demands of users. In the medium and long term, it is expected that this measure will contribute to the consolidation of a more humanized and inclusive care model, privileging the social reintegration and autonomy of patients (SANTOS; WOULD; PINTO, 2015; BRAZIL, 2023a; 2023b).

The construction of a mental health care network requires the articulation and integration of different services and equipment, aiming to ensure comprehensive and accessible care for users. The concepts of network, territory and autonomy are fundamental in this process, as they guide the organization and planning of mental health actions. The mental health care network must be built based on the needs and demands of users, taking into account the characteristics and peculiarities of each territory. The territorialization of services allows for a greater approximation between professionals and the community, favoring the identification and resolution of local problems (ARAÚJO, 2024).

The Psychosocial Care Centers (CAPS) are the main equipment of the Psychosocial Care Network (RAPS) of the Unified Health System (SUS). They offer care to people with psychological distress, mental disorders, and problems related to the use of alcohol, crack, and other substances, both in crisis situations and in psychosocial rehabilitation processes (CACTUS INSTITUTE, 2024; ARAÚJO, 2024).

The CAPS multiprofessional teams offer a variety of services, including psychotherapy, occupational therapy, neuropsychological rehabilitation, therapeutic activities, medication follow-up, and family and home care (INSTITUTO CACTUS, 2024). There are different types of CAPS, according to the definitions of the Ministry of Health:

1. **CAPS I:** Serves all age groups for severe and persistent mental disorders, including the use of psychoactive substances. It is present in cities and regions with at least 15 thousand inhabitants.
2. **CAPS II:** Similar to CAPS I, but serves cities and regions with at least 70 thousand inhabitants.

3. CAPS III: Offers up to 5 vacancies for night care and observation for people of all age groups with severe and persistent mental disorders, also serving cities and regions with at least 150 thousand inhabitants.

4. CAPS for children and adolescents: Intended for the care of children and adolescents with severe and persistent mental disorders, including the use of psychoactive substances, in cities and regions with at least 70 thousand inhabitants.

5. CAPS AD: Specialized in serving all age groups with alcohol and other drug use disorders, also in locations with at least 70 thousand inhabitants.

6. CAPS AD III: Offers 8 to 12 vacancies for night care and observation, operating 24 hours a day for people with alcohol and other drug use disorders, in cities and regions with at least 150 thousand inhabitants.

7. CAPS AD IV: Intended for the care of people with severe conditions and intense suffering resulting from the use of crack, alcohol and other drugs, with 24-hour operation, including holidays and weekends, in municipalities with more than 500,000 inhabitants and state capitals.

Based on the presentation by Dr. Helvécio Miranda Magalhães Júnior, Secretary of the Secretariat of Specialized Care of the Ministry of Health (SAES/MS), the Brazilian health system had, in December 2022, a total of 2,836 CAPS, with half of them being of the CAPS I type. The Northeast Region concentrated 35% of these CAPS, while only 285 were aimed at the child and adolescent population, with only 7 of them located in the North Region (INSTITUTO CACTUS, 2024; BRAZIL, 2024).

The Psychosocial Care Network (RAPS) works as an instrument dedicated to comprehensive mental health care, based on the principles of human rights, supported by evidence and guided by specific guidelines. This network is based on the National Mental Health Policy of the Ministry of Health, which aims to organize mental health actions throughout Brazil, covering prevention, promotion, assistance, care, rehabilitation and social reintegration activities. (CACTUS INSTITUTE, 2024; BRAZIL, 2024).

The inclusion of mental health in primary care is essential to ensure a comprehensive and preventive approach to mental health problems. The articulation between mental health services and the family health program (FHP) allows for the early identification of mental disorders, the longitudinal follow-up of cases and the promotion of actions to promote mental health in the community (BRASIL, 2003; 2005a; 2005b; 2005c).

The construction of a mental health care network for children and adolescents is a priority in mental health policy. This network should offer specialized and integrated

services, capable of meeting the specific needs of this age group, ensuring universal and equitable access to mental health care from early childhood to adolescence (BRASIL, 2005b; 2002; INSTITUTO CACTUS, 2024).

The Social Inclusion through Work Program (PIT) is an initiative that aims to promote the social and professional reintegration of people with mental disorders. Through this program, users receive support and monitoring to enter or return to the labor market, contributing to their autonomy and integration into society (INSTITUTO CACTUS, 2024; BRAZIL, 2005b).

The Centers for Coexistence and Culture (CCC) are spaces for coexistence and leisure for users of mental health services. These centers offer recreational, cultural, and educational activities, promoting socialization, strengthening community bonds, and empowering users (INSTITUTO CACTUS, 2024; BRAZIL, 2005c).

The active participation of family members and users of mental health services is essential for the success of the Psychiatric Reform. These actors should be recognized as protagonists in the process of planning, implementing and evaluating mental health policies and actions, ensuring a participatory and democratic approach in the construction of the care network (ARAÚJO, 2024). The policy of alcohol and other drugs in Brazil faces historical and structural challenges. For decades, there has been an omission on the part of public health in relation to the confrontation of the abusive use of psychoactive substances, resulting in a scenario of vulnerability and exclusion for users (OLIVEIRA et al, 2022; MAGELLAN; ALTOÉ, 2020).

The organization of the alcohol and other drug care network involves the articulation and integration of different services and equipment, aiming to offer comprehensive and humanized care to users. This network should cover everything from prevention and harm reduction to treatment and social reintegration of users, ensuring an equitable and universal approach to problems related to the consumption of psychoactive substances (SOARES FILHO; BUENO, 2016; BRAZIL, 2024).

However, Brazilian mental health still faces significant challenges. The lack of adequate resources, the poor distribution of services, the shortage of qualified professionals, and the persistent stigmatization are obstacles to be overcome. In addition, the country's economic and political crisis can negatively impact investments in mental health. Accessibility and equity in access to mental health services are important challenges to be faced by the Psychiatric Reform. It is necessary to ensure universal and equitable access to mental health care, especially for vulnerable groups and those in situations of greater social exclusion. The training of qualified human resources in mental health is

fundamental for the success of the Psychiatric Reform. It is necessary to invest in the training and updating of health professionals, ensuring a humanized, comprehensive, and evidence-based approach to user care (OLIVEIRA et al, 2022; ARAÚJO, 2024; JÚNIOR, 2023).

The cultural debate around mental health involves complex issues, such as the stigma and social exclusion of people with mental disorders, overcoming the value attributed to the hospital-centered model of care, and the role of the media in promoting a culture of respect and inclusion. The scientific debate in mental health is fundamental to guide care policies and practices. It is necessary to value the production of scientific knowledge in the area of mental health, ensuring an evidence-based approach and promoting the development of new strategies and effective interventions (INSTITUTO CACTUS, 2024).

Currently, the mental health network in Brazil is composed of a variety of services and initiatives, from CAPS to psychiatric hospitals and reception units. There have been significant advances in promoting social inclusion and respect for the human rights of people with mental disorders. However, regional disparities and structural challenges persist that limit the reach and quality of services (ARAÚJO, 2024; JÚNIOR, 2023).

Despite the challenges, there are promising prospects for the progress of mental health in Brazil. Growing awareness of the importance of mental health, the adoption of evidence-based approaches, and the participation of civil society are key to driving positive change. Continuous investments in prevention, treatment, and rehabilitation, together with inclusive public policies and an integrated approach to health, can contribute to a more effective and humanized mental health network in the country (BRASIL, 2019; 2023a; 2023b; 2024; JÚNIOR, 2023).

CURRENT STRUCTURE AND FUNCTIONING OF PSYCHIATRIC HOSPITALS

Brazilian psychiatric hospitals are structures intended for the treatment of severe mental disorders, offering hospitalization for patients who need intensive care. The structure of these hospitals can vary, but generally includes inpatient units, outpatient clinics, occupational therapy areas, doctors' offices, medication rooms, cafeterias, living areas, and administrative spaces (INSTITUTO CACTUS, 2024; OLIVEITA et al, 2022).

The functioning of Brazilian psychiatric hospitals is based on a multidisciplinary approach, with the aim of offering comprehensive care to patients. Patients are admitted through medical referral or in psychiatric emergency situations. After admission, they are evaluated by a multidisciplinary team to determine the appropriate treatment plan, which

may include medication, individual and group therapy, psychosocial interventions, and rehabilitation activities (BRASIL, 2019; CACTUS INSTITUTE, 2024).

The Psychiatric Custody and Treatment Hospitals (HCTP) are specific structures intended for the treatment of people with mental disorders who have committed crimes. In addition to providing mental health care, HCTPs have the additional function of complying with court-ordered security measures. Generally, these hospitals have a structure similar to that of traditional psychiatric hospitals, but with additional security measures, such as access control and monitoring (SANTOS; WOULD; PINTO, 2015; SOARES FILHO; BUENO, 2016; OLIVEIRA et al, 2022; MAGELLAN; ALTOÉ, 2020).

In the Brazilian legal system, article 26 of the Penal Code addresses the issue of the non-imputability of agents who commit unlawful acts without understanding the unlawful nature of the fact, whether due to mental illness or incomplete mental development. On the other hand, article 87 of the Penal Execution Law stipulates that penitentiaries are intended for those sentenced to imprisonment in a closed regime (ARAÚJO, 2024).

Further exploring the criminal legislation, in articles 99 and following of the Penal Execution Law, we find the provision of Custody and Psychiatric Treatment Hospitals for the treatment of non-imputable and semi-imputable. Such hospitals are used as a safety measure for those diagnosed with mental illness. The World Health Organization defines mental illness as morbid changes in mood or thinking, associated with deterioration in global functioning and/or expressive distress (ARAÚJO, 2024; SOARES FILHO; BUENO, 2016).

In 2011, a study was conducted by the Federal University of Brasília to geographically map the Custody Hospitals and Treatment Wards in Brazil. The result revealed the existence of twenty-three Custody Hospitals and three Psychiatric Treatment wards. However, this amount is considered negligible in view of the demand for adequate treatment for offenders and the overcrowding of penitentiaries (ARAÚJO, 2024; SAINTS; WOULD; PINTO, 2015).

Psychiatric Custody and Treatment Hospitals (HCTPs), in simple terms, represent a fusion between penitentiary institutions and psychiatric hospitals, intended for the treatment of non-imputable or semi-imputable individuals due to mental illnesses. The issue of HCTPs involves a dilemma between public safety and health policies. Despite the Psychiatric Reform, these hospitals have not advanced in terms of care for the mentally ill, which directly impacts the effectiveness of safety measures (ARAÚJO, 2024; (SANTOS; WOULD; PINTO, 2015; SOARES FILHO; BUENO, 2016).

According to data from the National Penitentiary Department, in 2010 there were only 30 HCTP units in operation, in addition to a psychiatric treatment ward. This covered approximately three thousand six hundred people, including the mentally ill and drug addicts.

The hospitals have two teams of professionals: one linked to the prison system (executioners, guards, etc.) and another from the health area (psychiatrists and psychologists). The question then arises as to which professional is best suited to lead the HCTPs. Currently, the responsibility lies with the professionals of the prison system. In view of these considerations, the question arises as to whether the security measure is the appropriate method of treatment for the mentally ill (ARAÚJO, 2024).

Brazilian psychiatric hospitals have multidisciplinary teams composed of professionals from different areas, including psychiatrists, psychologists, general practitioners, occupational therapists, physical educators, social workers, nutritionists, cooks, cleaners and security guards (SANTOS; WOULD; PINTO, 2015; SOARES FILHO; BUENO, 2016).

The following table presents the types of professionals present in Brazilian psychiatric hospitals and their respective contributions:

Professional	Contributions
Hospital Managers	Responsible for the administration and management of psychiatric hospitals, ensuring the proper functioning and quality of the services provided.
Psychiatrists	They carry out the diagnosis, treatment and follow-up of patients with mental disorders, prescribing medications and conducting therapies.
Psychologists	They offer psychological support to patients, performing individual or group assessments, treatments, and therapies to promote emotional well-being.
General Practitioners	They work in basic health care, performing clinical evaluations, general monitoring of patients' health and referrals to specialists.
Occupational Therapists	They develop therapeutic and occupational activities to assist in social reintegration and in the improvement of patients' autonomy and skills.
Physical Educators	They design and coordinate physical activity and rehabilitation programs, promoting the physical and mental health of patients.
Social Workers	They provide social support to patients and their families, providing social assistance, guidance and referrals to benefits and external resources.
Nurses	Responsible for direct patient care, medication administration, clinical follow-up and assistance in general.
Speech-Language Pathologists	They perform evaluations and therapies for the diagnosis and treatment of communication, language and voice disorders, assisting in the rehabilitation of patients.
Nutritionists	Responsible for planning and monitoring the patients' diet, aiming at promoting health and improving quality of life.
Cooks	They prepare meals according to nutritional guidelines, ensuring an adequate and balanced diet for patients.

Cleaners	They clean and maintain the hygiene of the environments, contributing to a safe and comfortable environment for patients.
Guards	They ensure the safety of facilities and patients, preventing conflicts and ensuring the physical and emotional integrity of all.
Lawyers	Providing legal assistance to patients and handling legal issues
Prosecutors	They represent the State and monitor the legal proceedings involving patients.
General Service Assistants	They perform maintenance of building, electrical, plumbing, gardening, etc. services.

In short, Brazilian psychiatric hospitals are complex structures that require the collaboration of a multidisciplinary team to offer effective and humanized care to patients with mental disorders. Each professional plays an important role in promoting the health and well-being of patients, contributing to a therapeutic and safe environment (OLIVEIRA et al, 2022; ARAÚJO, 2024).

The report on the national inspection of Brazilian psychiatric hospitals (BRASIL, 2019) offers valuable contributions to the evolution of these institutions in the country. By highlighting various aspects related to the rights and conditions of patients, the report aims to promote significant changes and improvements in the mental health system. Some of the key contributions include: a) Emphasis on Patients' Rights; b) Identification of Problems and Deficiencies; c) Recommendations for Improvement; d) Promotion of Deinstitutionalization; e) Promotion of Public and Political Debate.

In summary, the report offers a comprehensive analysis of conditions and practices in Brazilian psychiatric hospitals, highlighting areas for improvement and providing recommendations to promote a more humanized and effective approach to the treatment of mental disorders. Their contributions are essential to drive the evolution of psychiatric hospitals and move towards a more just, inclusive, and respectful mental health system for human rights (BRASIL, 2019).

LIST OF BRAZILIAN PSYCHIATRIC HOSPITALS: WHERE TO FIND IT?

According to many documents consulted on official websites of the Brazilian government (BRASIL, 2001; 2002a; 2002b; 2003a; 2003b; 2004a; 2004b; 2004c; 2004d; 2005a; 2005b; 2005c; 2019a; 2019b; 2022; 2023a; 2023b; 2024), to find an updated list of Brazilian psychiatric hospitals, one can search for information in different sources, such as: a) Ministry of Health; b) State Health Secretariats; c) Regional Councils of Psychology and Medicine; d) Mental Health Associations and NGOs; e) Online or Library Research.

When seeking information on Brazilian psychiatric hospitals, it is important to check the date of update of the sources and seek information from multiple sources to obtain a

comprehensive and accurate view of the current situation (BRASIL, 2002a; 2002b; 2003; 2004a; 2004b; 2004c; 2004d; 2005a; 2005b; 2005c; 2019; 2022; 2023a; 2023b; 2024).

The National Registry of Health Establishments (CNES) is a system developed by the Brazilian Ministry of Health to record and maintain detailed information about health facilities across the country. The CNES is a fundamental tool for the planning, management, and evaluation of the Brazilian health system, providing essential data for the formulation of health policies, resource allocation, and monitoring of the supply of health services (BRASIL, 2024).

The CNES covers a wide range of health establishments, including hospitals, clinics, basic health units, specialty centers, laboratories, among others. Each establishment is identified by a unique number in the system, known as the CNES Code, which facilitates the tracking and reference of specific information about each health unit (BRASIL, 2019; 2024).

Some of the information recorded in the CNES includes:

1. **Location data:** Address, telephone, e-mail and geolocation of the health facility.
2. **Physical characteristics:** Type of establishment, number of beds, number of service rooms, physical structure, among others.
3. **Human resources:** Number and types of health professionals, including doctors, nurses, nursing technicians, among others.
4. **Services offered:** Medical specialties, procedures performed, availability of equipment, among others.
5. **Bonds and management:** Relationship with municipal, state or federal management bodies, responsible for administration and financing, among others.

The CNES is accessible through the CNES Web system, an online platform that allows health managers to register and update information at all levels of the health system. In addition, the CNES makes data available for public consultation through Tabnet, a data tabulation and visualization system that allows the analysis of information on health establishments throughout the country. In summary, the CNES is a crucial tool for the effective management of the Brazilian health system, providing accurate and up-to-date data on health facilities, which contributes to improving the quality and access to health services throughout the country (BRASIL, 2019; 2024).

In practice, public mental health services can be found in several ways:

1. Accessing **CNES Web** through the link <http://cnes2.datasus.gov.br/Mod_Ind_Unidade.asp? Status> to locate the nearest public services.

2. Accessing the **Vita Alere Institute's Mental Health Map** through the link <https:// republica.org/emnotas/conteudo/tudo-sobre-os-servicos-de-saude-mental-no-brasil/>. This map shows where and how to seek free psychology and psychiatry services.

In addition, this initiative, which had technical support from Google, offers a virtual map with contacts for online care and a face-to-face map with addresses of various types of mental health services, such as CAPS (Psychosocial Care Center), CAISM (Integrated Mental Health Care Center), psychiatric hospitals, NGOs and clinics linked to educational institutions (BRASIL, 2019; 2024). This platform also directs care according to the type of patient, whether for the general public, health professionals, or specific groups, such as people affected by the loss of family and friends due to Covid-19, the elderly, pregnant women, and adolescents (BRASIL, 2019; 2024).

To facilitate the search for help, the website provides an explanatory guide on how treatment with psychologists works, the role of psychiatrists, and in which situations it is recommended to seek a psychiatric hospital (BRASIL, 2019; 2024).

Based on an updated query carried out on CNES Web (BRASIL, 2024), it is found that there are 416,744 health establishments in Brazil, classified into 26 categories, as shown in the following table:

Code	Description	Total
000	OTHER	1.134
001	BASIC HEALTH UNIT	47.785
002	HEALTH MANAGEMENT CENTER	6.885
003	REGULATION CENTER	1.907
004	SUPPLY CENTER	1.183
005	TRANSPLANT CENTER	49
006	HOSPITAL	6.619
007	NORMAL OBSTETRIC AND NEONATAL CARE CENTER	130
008	EMERGENCY CARE	5.916
009	PHARMACY	15.127
010	HEMATOLOGICAL AND/OR HEMOTHERAPY CARE UNIT	751
011	TELEHEALTH CENTER	192
012	HOME CARE UNIT	1.175

013	CHICKEN OF PREVENTING DOENCAS AND AGGRAVATIONS AND PROMOCAO DA SAUDE	4.800
014	HEALTH SUPPORT HOUSES	787
015	REHABILITATION UNIT	12.035
016	AMBULANT	264.997
017	PSYCHOSOCIAL CARE UNIT	4.224
018	DIAGNOSTIC SUPPORT UNIT	31.071
019	SPECIAL THERAPIES UNIT	2.870
020	DENTAL PROSTHESIS LABORATORY	2.111
021	ZOONOSE SURVEILLANCE UNIT	1.768
022	LABORATORIO DE SAUDE PUBLICA	1.133
023	REFERENCE CENTER FOR WORKERS' HEALTH	380
024	SERVICO DE VERIFICACAO DE OBITO	73
025	IMMUNIZATION CENTER	1.642
TOTAL		416.744

The Inspection Report (BRASIL, 2019), published by the Federal Council of Psychology, characterized the hospital services specialized in Psychiatry in Brazil. The report presented is the result of the National Inspection carried out in December 2018, covering 40 Psychiatric Hospitals in seventeen states, distributed in the five regions of the country. This initiative was conducted in an interinstitutional manner, involving the National Mechanism for Preventing and Combating Torture (MNPCT), the National Council of the Public Prosecutor's Office (CNMP), the Public Ministry of Labor (MPT) and the Federal Council of Psychology (CFP).

According to CNES Web, among the 6,619 hospitals currently in Brazil, 5,377 (81.3%) of them are general hospitals and 1,024 (15.5%) are specialized hospitals, and only 104 are psychiatric hospitals, housing a set of 28,650 existing psychiatric beds and 16,042 managed/financed by the SUS, of which 3,092 are state and 25,558 are municipal. This reduction in the number of beds is a consequence of the strategy implemented since the beginning of the Psychiatric Reform in 2001, which seeks to progressively reduce the dependence on beds in psychiatric hospitals, while strengthening and expanding the extra-hospital network, including Psychosocial Care Centers (CAPs), Therapeutic Residential Services (SRTs), mental health beds in general hospitals, and mental health initiatives in primary care (BRASIL, 2019; 2024).

With regard to investments in mental health in 2023, the Secretariat of Specialized Health Care of the Ministry of Health reports an investment of R$32.4 million between March and May of the same year. This investment enabled the creation of 27 CAPS, 10 of which were CAPS I and 7 were CAPS children's and adolescents, along with the installation

of four reception units, 55 SRTs and 159 new beds in general hospitals (BRASIL, 2019; 2024).

According to the National Penitentiary Department, the current Brazilian prison population is 644,305 prisoners, of which 616,930 (95.75%) are male and 27,375 (0.0425%) are female. Since there are a total of 481,835 vacancies, there are 162,470 prisoners more than the maximum capacity allowed, that is, prison overcrowding; despite this, in 6 FUs there is a surplus of vacancies, while in the remaining 20 FUs there is a deficit; São Paulo concentrates 187,267 (29%) of the national prison population. To get an idea of how costly managing this entire population is to the treasury, in December 2023 alone, the Brazilian prison system cost a total of R$2,103,514245.67 to the public coffers, of which R$1,451,093,845.68 were spent on personnel and R$652,420,399.99 spent on other expenses; the average cost of the prisoner per Federative Unit was R$3,000.83 (in the month) (BRASIL, 2022; 2023a; 2023b).

In December 2022, there were 27 HCTPs in Brazil, including 11 male, 1 female and 15 mixed; there was a population of 1,869 prisoners/interns compulsorily to comply with security measures, among which 1,747 men and 142 women, all determined by the State Court (BRASIL, 2022). However, the number of HCTPs grew to 32 in 2023, which currently house about 4.7 thousand people, including those who meet the criteria for improper acquittal (JÚNIOR, 2023). On June 30, 2023, there were 2,121 prisoners on security measures (internment) (BRASIL, 2023a), and on December 31, 2023, this population rose to 2,314 (BRASIL, 2022; 2023a; 2023b).

The Anti-Asylum Law (Law No. 10.216/2001) provides for the closure of judicial asylums in Brazil, which will impact all Brazilian HCTPs. The deadline for the extinction of these hospitals was established by Resolution No. 487 of the National Council of Justice (CNJ), signed by Minister Rosa Weber in February this year. This measure implies the release of inmates from judicial asylums next year, who will receive outpatient care by multiprofessional teams through the Unified Health System (SUS) (JÚNIOR, 2023; OLIVEIRA et al, 2022).

To ensure psychiatric treatment after the closure of judicial asylums, the CNJ resolution provides for the use of "Psychosocial Care Networks (Raps)". These networks consist of a variety of mental health care services and equipment, including Psychosocial Care Centers (CAPS), Therapeutic Residential Services (SRT), Coexistence and Culture Centers, Reception Units (UAs) and comprehensive care beds in general hospitals. These resources are distributed at different levels of health care, from Primary Care to General

Hospital Care, and include deinstitutionalization and psychosocial rehabilitation strategies (JÚNIOR, 2023; ARAÚJO, 2024).

A REFLECTION ON THE LEGISLATION APPLICABLE TO BRAZILIAN PSYCHIATRIC HOSPITALS

The legislation applicable to Brazilian psychiatric hospitals is an extremely important topic, as it regulates the rules and guidelines that guide the operation of these institutions and the treatment of people with mental disorders. In this context, it is essential to understand the laws and regulations that govern this specific field of mental health in Brazil (MAGALHÃES; ALTOÉ, 2020; BRAZIL, 2019; CACTUS INSTITUTE, 2024).

First, the Psychiatric Reform Law (Law 10.216/2001) stands out, which represents a milestone in the country's mental health policy. This law establishes the principles and guidelines for the promotion of comprehensive care for people with mental disorders, advocating the progressive replacement of psychiatric hospitals by community services and respect for the human rights of patients. It establishes the rights and protection of people with mental disorders in Brazil, in addition to redesigning the mental health care model. This law represents a milestone in the protection of the rights of people with mental disorders in Brazil, promoting a more humanized and inclusive approach to mental health care (BRASIL, 2001).

Law No. 10,708/2003 (BRASIL, 2003a) instituted psychosocial rehabilitation assistance for patients affected by mental disorders who have been hospitalized. Let us see the main contributions of this legislation: a) Psychosocial Rehabilitation Assistance; b) "Back Home" Program; c) Amount and Duration of the Benefit; d) Requirements for Obtaining the Benefit; e) Continued Mental Health Care; f) Suspension and Interruption of the Benefit; g) Budgetary Resources and Regulation.

In addition, the Mental Health Law, Law No. 13.819 (BRASIL, 2019b), reinforces the Brazilian State's commitment to promoting mental health and guaranteeing the rights of people with mental disorders. This law establishes guidelines for the organization of the psychosocial care network, the prevention and treatment of mental disorders, and the protection of the rights of users of mental health services. It has brought a series of significant contributions to the promotion of rights and the improvement of mental health care in Brazil. Below are some of the key contributions of this legislation:

1. **Promotion of Mental Health as a Fundamental Right:** The Law reinforces mental health as a fundamental right of the human person, establishing public

policies to prevent mental illness, promote quality of life, and ensure universal access to mental health services.

2. Guarantee of the Autonomy and Dignity of People with Mental Disorders: The legislation emphasizes respect for the autonomy and dignity of people with mental disorders, ensuring them the right to active participation in the decision-making process about their treatment and care.

3. Prevention and Promotion of Mental Health: The Law establishes actions and strategies for the prevention of mental disorders and the promotion of mental health, including educational campaigns, training of health professionals, and the promotion of healthy environments.

4. Strengthening the Psychosocial Care Network (RAPS): The legislation strengthens the Psychosocial Care Network (RAPS), determining the articulation between the different points of mental health care, such as the Psychosocial Care Centers (CAPS), the Therapeutic Residential Services (SRT) and the Coexistence and Culture Centers.

5. Protection of the Rights of Persons with Mental Disorders in Hospitalization Situations: The Law establishes measures to protect the rights of people with mental disorders in hospitalization, guaranteeing them access to information, legal assistance, and monitoring by their family members or legal representatives.

6. Incentive to Deinstitutionalization and Social Reintegration: The legislation encourages the deinstitutionalization of people with mental disorders, promoting their social reintegration through planned discharge programs and assisted psychosocial rehabilitation.

7. Inspection and Social Control: The Law provides for mechanisms for inspection and social control over the implementation of mental health policies, including the creation of monitoring committees and the strengthening of health councils.

In the specific scope of psychiatric hospitals, the legislation determines minimum standards of quality and safety in patient care. This includes the need for adequate physical structure, a qualified multiprofessional team, and respect for patients' rights, such as the right to privacy, dignity, and autonomy (BRASIL, 2019b; CACTUS INSTITUTE, 2024).

Another important aspect of the legislation applicable to psychiatric hospitals is the regulation of the operation of Psychiatric Custody and Treatment Hospitals (HCTP). These institutions, intended for the treatment of people with mental disorders in conflict with the

law, must follow specific standards of safety and care, ensuring adequate treatment and respecting the rights of patients, even in the face of the legal circumstances that led them to hospitalization (BRASIL, 2019b; ARAÚJO, 2024).

However, despite the existence of comprehensive and detailed legislation, there are still challenges in enforcing the rights of people with mental disorders in Brazilian psychiatric hospitals. Overcrowding, lack of investment in infrastructure and human resources, and the persistence of asylum practices are some of the problems that compromise the quality of care and the guarantee of patients' rights (BRASIL, 2019b; OLIVEIRA et al, 2022).

Given this scenario, it is essential that there is a continuous effort on the part of the State, civil society and mental health professionals to ensure compliance with current legislation and promote an effective transformation in the mental health care model in Brazil. This requires investments in public mental health policies, training of professionals, and the strengthening of the psychosocial care network, aiming to ensure the right to health and dignity of people with mental disorders (SOARES FILHO; BUENO, 2016; SAINTS; WOULD; PINTO, 2015; BRAZIL, 2019b; CACTUS INSTITUTE, 2024).

CONCLUSIONS AND FINAL CONSIDERATIONS

CONCLUSIONS

Currently, facing the challenges presented by hospitals is a complex task, because, despite their ineffectiveness, they find legal support for their existence. To mitigate this ineffectiveness, it is crucial that there is a significant increase in the financial investment destined to the Psychiatric Custody and Treatment Hospitals, together with the implementation of the Psychiatric Reform. In this way, in addition to punishing the crimes committed, patients would be treated with dignity and seen as human beings in search of recovery.

It is extremely important that the mentally ill are perceived as individuals with rights and dignity, even in the face of the limitations of the HCTPs. After all, the purpose of resocialization of the individual must also be considered in the application of the security measure. Otherwise, there is a risk that the patient, upon returning to society after the end of the security measure, may commit crimes again if he has not received adequate treatment during the period of hospitalization.

The findings of this research offer a comprehensive and chronological view of the evolution of Brazilian psychiatric hospitals, highlighting from the colonial period to contemporary challenges. By addressing historical aspects, such as the transition from religious to medical care, the inauguration of the Hospice in Rio de Janeiro and the

advances brought about by the Psychiatric Reform, the text highlights the complexity of this process and the multiple actors involved. In addition, the analysis of pertinent laws, such as the Psychiatric Reform Law, Law No. 10,708/2003 and the Mental Health Law, offers an overview of the policies and guidelines that guide the functioning of psychiatric hospitals and the treatment of mental disorders in Brazil. This historical and legal contextualization is crucial to understand not only the advances made, but also the persistent challenges, such as overcrowding and lack of investment, highlighting the continued importance of public policies, professional training, and strengthening of the psychosocial care network to ensure respect for the rights and dignity of people with mental disorders.

This research contributes significantly to the understanding of the laws and policies that govern Brazilian psychiatric hospitals, highlighting both the advances and the challenges faced in this field. Key contributions include a comprehensive analysis of relevant laws, such as the Psychiatric Reform Law, the Psychosocial Rehabilitation Assistance Law, and the Mental Health Law, providing a bird's-eye view of the legal guidelines guiding the treatment of mental disorders in Brazil. In addition, this research highlights the importance of humanizing mental health care and promoting the dignity and rights of patients, pointing to the need for investments in public policies and practices that favor deinstitutionalization and social reintegration.

FINAL CONSIDERATIONS

The theoretical and methodological limitations of this research include the predominance of a descriptive approach and the lack of a more in-depth critical analysis of mental health policies and practices in the Brazilian context. Despite the diversity of sources used, such as laws, academic articles and institutional reports, there is a gap in relation to the incorporation of multidisciplinary perspectives and practical experiences of professionals and users of mental health services. In addition, the absence of quantitative data and statistical analyses limits the complete understanding of the impact of policies and practices on Brazilian psychiatric hospitals, making it difficult to identify trends and patterns over time.

For future research, a more interdisciplinary and participatory approach is suggested, incorporating different perspectives, such as the experience of users of mental health services, for a more complete understanding of the challenges and opportunities in the transformation of the mental health care model in Brazil. Additionally, conducting longitudinal studies and quantitative analyses could provide additional insights into trends and the impacts of mental health policies over time.

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ETHICAL AND LEGAL PROCEDURES TO REFUTE ERRONEOUS MEDICAL REPORTS

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ABSTRACT

This study addresses the issue of inadequate medical reports, a theme that arises from the need to understand the ethical and legal procedures in their contestation, as well as the challenges faced by gifted people who receive such diagnoses. The problematization lies in the lack of understanding of the specific characteristics of giftedness, leading to medical

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errors, negligence and/or malpractice on the part of mental health professionals. The general objective is to provide a review of the ethical and legal principles involved in the challenge of erroneous medical reports, offering guidance on the procedures to be followed in this process. Its specific/secondary objectives are: a) to highlight the importance of considering the specific context of each ethical situation; b) to provide a practical approach to dealing with ethical dilemmas in clinical practice; c) explore fundamental ethical issues related to medical practice; d) to provide a solid basis for understanding the ethical and legal principles involved in challenging medical reports. The methodologies employed involve review of academic-scientific texts as well as relevant legal works and applicable legislation (technical axis), under the Giftdean neoperspectivist paradigm (epistemological axis), and hypothetical-deductive reasoning (logical axis). The results indicate that the production of solid evidence and consistent legal argumentation are essential to refute erroneous medical reports, while an accurate understanding of the characteristics of giftedness is essential to avoid them. The main findings highlight the importance of awareness and adequate training of mental health and legal professionals, as well as the implementation of individualized approaches to diagnosis, prognosis, and treatment.

Keywords: Medical reports. Psychiatric Reform. Medical ethics. Civil and criminal procedural law. Right to health.

INTRODUCTION

Beauchamp and Childress (2013) produced the book "Principles of biomedical ethics", which is a classic reference in biomedical ethics and offers a framework for analyzing ethical issues in medicine, which can be useful when considering the ethical aspects of refuting erroneous medical reports. The authors present the four fundamental principles of biomedical ethics: autonomy, beneficence, non-maleficence, and justice. These principles offer a framework for evaluating and addressing ethical issues in medical practice, including situations where medical reports are in question. By applying these principles, healthcare providers and patients can consider the ethical implications of refuting erroneous medical reports, prioritizing patient well-being and respecting their autonomy.

Gillon (1994) expands on the four principles of medical ethics (autonomy, beneficence, non-maleficence and justice) and highlights the importance of considering the specific context of each ethical situation. It emphasizes the need to pay attention to the scope of ethical issues, recognizing that different contexts may require different emphases on ethical principles. When addressing misguided medical reports, it is essential to consider how each principle applies to the specific situation, taking into account patient well-being, the doctor-patient relationship, and issues of distributive justice.

Jonsen, Siegler, and Winslade (2015) offer a practical approach to dealing with ethical dilemmas in clinical practice, highlighting the importance of continuous ethical reflection by health professionals. They provide guidance on how to involve patients and their families in the ethical decision-making process, promoting transparency and mutual respect. By challenging misguided medical reports, this practical approach emphasizes the importance of clear and empathetic communication with patients and the pursuit of informed consent at every stage of the process.

Annas and Grodin (2018), in the book "The Nazi doctors and the Nuremberg Code: Human rights in human experimentation", explore fundamental ethical issues related to medical practice, including informed consent and the responsibility of health professionals, which are relevant when challenging erroneous medical reports. While the primary focus is on ethics in medical research, this book highlights fundamental ethical principles such as respect for human dignity and voluntary and informed consent. It offers a historical perspective on ethical violations in medical practice and highlights the importance of learning from these mistakes to avoid repeating them in the future. By challenging erroneous medical reports, this historical context can provide a broader understanding of the ethical and legal implications involved, reinforcing the need to respect patients' rights and autonomy.

These references can provide a solid basis for understanding the ethical and legal principles involved in challenging medical reports. By incorporating these principles into their actions, academics and professionals will be following guidelines recognized in the academic and professional community (Beauchamp; Childress, 2013; Gillon, 1994; Jonsen; Siegler; Winslade, 2015; Annas; Grodin, 2018).

Refuting erroneous medical reports can be a challenging process, but there are ethical and legal procedures that can be followed to address this situation (Beauchamp; Childress, 2013; Gillon, 1994; Jonsen; Siegler; Winslade, 2015; Annas; Grodin, 2018). According to these authors, here are some steps that can be considered:

1. Review of documents: Careful review of the medical report and all related documents, including test results, medical history, and hospital records. One should make sure to fully understand the content of the report and identify any errors or discrepancies.

2. Obtaining a second medical opinion: Seeking the opinion of another qualified healthcare professional to review the medical report. This second opinion can help confirm whether the original report was correct or whether there are reasons to dispute it.

3. Communication with the treating physician: contacting the medical officer responsible for the report to discuss your concerns in a respectful and professional manner, providing concrete and objective evidence to support the claims, and requesting a review of the report if necessary.

4. Mediation or arbitration: If direct communication with the doctor does not solve the problem, one should consider resorting to a mediation or arbitration process. This may involve appointing a neutral third party to help resolve the conflict impartially.

5. Consulting with a specialized lawyer: If all previous attempts have failed, it is advisable to seek legal advice from a lawyer who specializes in medical and health issues. They can help assess the feasibility of challenging the medical report and advise on the next legal steps to take.

6. Review by regulatory committees or bodies: in some cases, it is possible to refer the case for review by health commissions or regulatory bodies. They may investigate complaints of medical malpractice and provide a formal resolution.

7. Consideration of legal action: If all other options have been exhausted and there is substantial evidence of medical error, it may be necessary to consider legal action against the doctor or healthcare institution responsible for the

erroneous report. This may include filing a formal complaint, filing a lawsuit for medical negligence, or seeking compensation for damages.

That said, the following research problem-questions arise: a) What are the ethical and legal procedures to refute inadequately provided medical reports?; b) What is the importance of multidisciplinary and specialized teams to avoid medical errors, negligence and/or malpractice?; c) What are the appropriate ethical, civil and criminal penalties for physicians who provide inadequate reports?; d) What are the reparations provided for in the legislation for patients who had property and/or moral damage caused by inadequate medical reports?.

The general/main objective of this work is to provide a review of the ethical and legal principles involved in the challenge of erroneous medical reports, offering guidance on the procedures to be followed in this process. Its specific/secondary objectives are: a) to highlight the importance of considering the specific context of each ethical situation; b) to provide a practical approach to dealing with ethical dilemmas in clinical practice; c) explore fundamental ethical issues related to medical practice; d) to provide a solid basis for understanding the ethical and legal principles involved in challenging medical reports.

This work was structured in 4 chapters. In this first one, dedicated to its Introduction, the following are presented: the theme, the contextualization, the problematization, the research problem-questions, the objectives, and the structure of the work. In the second chapter, its methodological foundation is presented, dividing it into three categories: epistemological pillar, logical pillar and technical pillar. The third chapter develops a bibliographic and documentary review on the subject, categorizing it into four groups: general procedures; ethical procedures; legal procedures; gifted people who received wrong medical reports. The fourth presents the conclusions and final considerations of the work. And then the references consulted are presented.

METHODOLOGICAL FOUNDATION

EPISTEMOLOGICAL PILLAR

Neoperspectivist Paradigm

The neo-perspectivist paradigm, introduced by gifted (Breviário, 2021; 2023), proposes the coexistence of two distinct realities: one absolute and objective, and the other partial and subjective. According to this author, all the answers to research questions are already present, however, our understanding of them is limited due to our human imperfection (Breviary, 2022; Köche, 1997; Piaget, 1973). The central questions of this study are: a) What are the ethical and legal procedures for contesting medical reports

provided inappropriately?; b) What is the relevance of multidisciplinary teams specialized in the prevention of medical errors, negligence and/or malpractice?; c) What are the applicable sanctions, both ethical, civil and criminal, to physicians who issue inadequate reports?; d) What are the compensations provided for in the legislation for patients who have suffered material and/or moral damage due to incorrect medical reports? These questions exemplify the premise of the neo-perspectivist paradigm, emphasizing that the answers are already present, but our understanding of them is constrained by human nature.

LOGICAL PILLAR: HYPOTHETICAL-DEDUCTIVE METHOD

The hypothetical-deductive method, as described by Breviário (2022), seeks to ensure a high level of certainty and reliability in scientific investigation, following the principles established by Karl Popper. This method, consisting of three steps - problem formulation, solution proposition, and falsification tests - provides a rigorous approach to scientific research (Débora et al., 2018; popper, 1972).

In this work, the guiding hypotheses were formulated from this perspective, reflecting the premises underlying the general objective and the specific objectives of the work, providing directions for research and discussion on the ethical and legal principles involved in the contestation of medical reports. The scientific hypotheses are as follows:

1. Hypothesis 1: The application of the ethical principles of autonomy, beneficence, non-maleficence, and fairness in the analysis and approach of mistaken medical reports can provide an effective framework for assessing the ethical implications of these situations in medical practice.

2. Hypothesis 2: Consideration of the specific context of each ethical situation is crucial when addressing mistaken medical reports, and different contexts may require different emphases on the ethical principles of autonomy, beneficence, nonmaleficence, and justice.

3. Hypothesis 3: A practical approach to dealing with ethical dilemmas in clinical practice, which emphasizes ongoing ethical reflection, transparency, and mutual respect, can help address the ethical challenges associated with challenging misguided medical reports.

4. Hypothesis 4: Exploring fundamental ethical issues related to medical practice, such as informed consent and the responsibility of health professionals, can provide valuable insights to deal with the challenge of mistaken medical reports.

Based on these hypotheses, deductive reasoning was adopted, supported by a variety of sources, which include not only scientific publications, but also references such as the Bible. The objective was to reach comprehensive and solid conclusions on the subject of Brazilian psychiatric hospitals (Marconi; Lakatos, 2003; 2007; 2008).

TECHNICAL PILLAR

Narrative Literature Review (RBN)

Narrative Literature Review (RBN), also known as Literature Search, is an essential technique that not only assists in defining and solving known problems, but also allows for the exploration of new areas not yet completely understood. This approach enables an analysis from different perspectives, generating new conclusions and insights (Breviário, 2021; Severino, 2007). Rodrigues (2007) states that RBN offers means to explore new areas and solve problems that are already known, in addition to allowing a broader range of phenomena when the research problem requires the collection of data dispersed in space.

Unlike field research, RBN is based on the search for information in books and other publications, exploring data already available in previous records. This technique is particularly useful when the research problem requires the collection of data dispersed in space, as it allows for a more comprehensive coverage of phenomena (Marconi; Lakatos, 2003; 2007; 2008). Gil (2010) points out that bibliographic research allows the researcher to cover a wider range of phenomena than those that could be investigated directly, providing a solid basis for the initial understanding of a theme.

However, it is important to consider that, as secondary sources, bibliographies may contain inaccurate data, requiring a critical and comparative analysis of different sources to ensure the reliability of the information. Following a work script that involves the exploration of sources, selective and analytical reading, preparation of cards and data analysis, RBN offers a solid basis for the initial understanding of a theme, enabling further deepening through more advanced research techniques. This approach is especially useful for researchers seeking to understand complex and unfamiliar issues, before engaging in more detailed investigations, such as case studies or action research (Breviary, 2021; Marconi; Lakatos, 2003; 2007; 2008).

In this study, thirty-five bibliographic sources were consulted, including contributions from: Annas and Grodin (2018); Beauchamp and Childress (2013); Borgerson (2013); Breviary (2021; 2022; 2023); Débora et al (2018); Gil (1999; 2010); Gillon (1994); Gonçalves (2015); Jonsen, Siegler and Winslade (2015); Köche (1997); Magalhães and Altoé (2020); Marconi and Lakatos (2003; 2007; 2008); Marques (2017); Nunes and Silva

(2010); Oliveira et al (2022); Pereira (2019); Piaget (1973); Popper (1972); Rodrigues (2007); Schneiderman, Jecker and Jonsen (1990); Sebastião (2006); Severino (2007); Souza (2013); Stoco (2018); Tavares (2020); Tucci (2015); Webb et al (2009; 2016); Dawson (2012); Silverman (2005); Piechowski (2011). These authors provided a solid theoretical basis for the research, covering a variety of relevant topics, such as narrative literature review, hypothetical-deductive method, and neo-perspectivist paradigm, among others.

Narrative Documentary Review

Document review, also known as documentary survey, is a research technique that aims to collect primary and secondary data indirectly, establishing a non-participant relationship between the researcher and the object investigated (Gil, 1999; 2010; Breviary, 2021). According to Gil (1999), paper sources can provide data rich enough to avoid wasting time in field research, being essential for social investigations that rely heavily on documents. This technique utilizes different types of documents, such as statistical records, written institutional records, personal documents, and mass communications, to obtain a wide range of information relevant to social research.

The documents used in this technique are typified by Gil (1999) in four distinct categories, including statistical records, written institutional records, personal documents and mass communications. These documents provide essential data on socioeconomic, political, and cultural aspects of society, enabling a comprehensive understanding of the object of study. In addition, they allow the researcher to access historical and contemporary information efficiently, contributing significantly to the theoretical basis of the research (Marconi; Lakatos, 2003; 2007; 2008).

Thus, documentary surveys are fundamental for the theoretical foundation based on sources, providing primary and secondary data that enrich the understanding of the investigated theme. This technique enables a detailed and comprehensive analysis of social phenomena, contributing to the advancement of knowledge in various areas of knowledge (Rodrigues, 2007).

As for the documentary sources, twenty-one official documents of the Brazilian government were used in this work, including laws and documents from official websites (Brasil, 2017; CFM, 2018; 2020; 2021; Ribeiro, 2020; Souza, 2013; STJ, 2007; TJSC, 2011; TJPB, 2019). These materials provided concrete data and supported legal and political aspects addressed in the research.

PROCEDURES FOR REFUTING REPORTS

GENERAL PROCEDURES

Although the specific procedures adopted in psychiatric hospitals to refute erroneous medical reports may vary depending on the institution and the country, many of the ethical and legal principles discussed above are applicable in psychiatric contexts (Beauchamp; Childress, 2013; Gillon, 1994; Jonsen; Siegler; Winslade, 2015; Annas; Grodin, 2018; Oliveira et al, 2022; Magalhães and Altoé, 2020). The authors list common/general procedures to refute erroneous medical reports and exemplify them with real clinical cases:

1. Peer review and second medical opinion: In psychiatric hospitals, it is common for cases to be reviewed by a multidisciplinary team, including other psychiatrists, psychologists, and social workers. Clinical Case: A patient is diagnosed with schizophrenia by a psychiatrist, but a second psychiatrist on staff, after reviewing the case and performing new evaluations, identifies that the patient's symptoms are more consistent with a bipolar mood disorder. The second medical opinion helps to refute the erroneous report and adjust the treatment plan.

2. Open and collaborative communication with the patient and family: It is essential to involve the patient and their family in the decision-making process and ensure that their concerns are heard and considered. Clinical Case: A psychiatric patient disputes his diagnosis of borderline personality disorder, claiming that his symptoms are more consistent with post-traumatic stress disorder due to past traumatic events. The medical team conducts a detailed review of the patient's history, including life history and family feedback, and adjusts the diagnosis based on this information.

3. Mediation and resolution of internal conflicts: When disagreements arise between members of the medical team or between the team and the patient/family, it is important to resolve these conflicts in a constructive and collaborative way. Clinical Case: A medical team in a psychiatric hospital cannot reach a consensus on a patient's diagnosis. A neutral mediator is assigned to facilitate communication between team members, allowing everyone to voice their concerns and perspectives. Together, they review all available evidence and arrive at a consensus diagnosis and unified treatment plan.

4. Review by ethics committees and external review: In cases of persistent disputes or significant ethical concerns, it is possible to resort to hospital ethics

committees or external reviews by independent experts. Clinical Case: A psychiatric patient alleges medical negligence due to an incorrect diagnosis that resulted in inadequate treatment. The hospital institution conducts a thorough review of the case, involving its ethics committee and consulting with external experts in forensic psychiatry. Based on the findings of these reviews, the institution takes appropriate corrective action and implements policies to prevent similar errors in the future.

These examples illustrate how the ethical and legal principles discussed above can be applied in clinical practice in psychiatric hospitals to refute erroneous medical reports. The multidisciplinary approach, transparency in communication, and the search for collaborative conflict resolution are fundamental to ensure the quality and safety of mental health patient care (Beauchamp; Childress, 2013; Gillon, 1994; Jonsen; Siegler; Winslade, 2015; Annas; Grodin, 2018; Oliveira et al, 2022; Magalhães and Altoé, 2020).

ETHICAL PROCEDURES

Tom L. Beauchamp and James F. Childress (2013), in their work "Principles of Biomedical Ethics", outline the fundamental ethical principles that guide medical practice. The first of these principles is autonomy, which emphasizes respect for the patient's capacity for self-determination. This means that healthcare providers must recognize and respect patients' informed choices and decisions, even if they disagree with them. In terms of refuting inadequate medical reports, this principle highlights the importance of actively involving patients in the process of reviewing and challenging their diagnoses, ensuring that their opinions and concerns are considered.

The second principle, beneficence, focuses on the obligation of health professionals to act in the best interests of patients, seeking their well-being and benefit. This implies that, when refuting erroneous medical reports, professionals should seek to correct diagnostic errors in order to promote the health and well-being of the patient. This may involve seeking a second medical opinion, reviewing evidence, and readiness to modify treatment if necessary based on more accurate information (Beauchamp; Childress, 2013).

The third principle, non-maleficence, highlights the obligation of health professionals not to cause harm to patients. When refuting inadequate medical reports, professionals must be careful not to damage the patient's trust in the medical team or the health system as a whole. This requires a sensitive and empathetic approach when dealing with the patient and clear and transparent communication about the review process and the results (Beauchamp; Childress, 2013).

Finally, the principle of fairness requires that resources be distributed fairly and equitably, taking into account the individual needs of patients. This means that when refuting erroneous medical reports, providers must ensure that all patients have equal access to a fair and impartial review of their diagnoses, regardless of their socioeconomic status or status. This may involve access to medical second opinion resources or the possibility of challenging medical decisions through appropriate review and appeal channels (Beauchamp; Childress, 2013).

"Clinical Ethics: A Practical Approach to Ethical Decisions in Clinical Medicine" (2015), by Albert R. Jonsen, Mark Siegler, and William J. Winslade, offers a comprehensive overview of how to address ethical dilemmas in clinical practice. The authors highlight the importance of continuous ethical reflection on the part of health professionals, emphasizing the need to consider not only ethical principles, but also the values and interests of patients.

One of the main ethical procedures discussed by the authors is the importance of open and collaborative communication with patients and their families. This involves not only informing the patient about their diagnosis and treatment options, but also actively involving them in the decision-making process, respecting their autonomy and ability to choose. In addition, health professionals must recognize and respect the individual values and preferences of each patient, ensuring that their concerns are heard and considered (Jonsen; Siegler; Winslade, 2015).

Another ethical procedure highlighted by the authors is the need for a multidisciplinary approach to solve complex ethical dilemmas. This means engaging an interdisciplinary team of healthcare professionals, including doctors, nurses, social workers, psychologists, and others, to ensure comprehensive assessment and informed decision-making. By collaborating with colleagues from different areas of expertise, practitioners can enrich their understanding of the case and identify more appropriate ethical solutions (Jonsen; Siegler; Winslade, 2015).

In addition, Jonsen, Siegler and Winslade (2015) emphasize the importance of seeking informed consent at all stages of the patient care process. This involves not only obtaining the patient's consent for specific medical procedures, but also ensuring that they fully understand their condition, the treatment options available, and the potential risks and benefits associated with each of them. An informed and voluntary consent is essential to ensure that medical decisions are made together with the patient, respecting their dignity and autonomy.

Finally, the authors (Jonsen; Siegler; Winslade, 2015) highlight the importance of transparency and honesty in clinical practice. Healthcare professionals should be frank and

transparent when discussing diagnoses, prognosis, and treatment options with patients, avoiding misleading information or concealment of relevant facts. Open and honest communication helps build trust between the patient and the medical team, facilitating an effective partnership in the care process and decision-making.

The book "Medical Futility: And the Evaluation of Life-Sustaining Interventions", written by Lawrence J. Schneiderman, Nancy S. Jecker and Albert R. Jonsen (1990), addresses ethical issues related to medical futility and decision-making about life support interventions. The authors highlight the importance of considering not only the medical aspects but also the values and preferences of patients and their families when evaluating the futility of a medical intervention.

One of the key ethical procedures discussed by the authors is the need for a thorough and honest evaluation of the efficacy and benefits of medical interventions deemed futile. This involves not only considering the expected clinical outcomes, but also taking into account the patient's preferences and expectations regarding quality of life and well-being. Health professionals should be prepared to openly discuss with patients and their families the limitations of medical interventions and help them make informed decisions that are aligned with their values and care goals (Schneiderman; Jecker; Jonsen, 2018).

In addition, Schneiderman, Jecker, and Jonsen (1990) highlight the importance of a collaborative, patient-centered approach when assessing medical futility. Healthcare professionals should work in partnership with patients and their families, recognizing their expertise on their own life experiences and preferences. This requires open and empathetic communication, where patients' concerns and values are respected and taken into account in clinical decision-making.

Another ethical procedure discussed by the authors is the need for an impartial and objective evaluation of the futility of medical interventions. This involves utilizing clear and transparent criteria to determine whether an intervention is futile based on sound scientific and clinical evidence. Health professionals should avoid personal bias or external influences when evaluating the futility of an intervention, ensuring ethical and principled decision-making (Schneiderman; Jecker; Jonsen, 2018).

Finally, the authors highlight the importance of respecting the decisions of patients and their families, even if they disagree with them. Health professionals must recognize the patient's right to autonomy and self-determination, ensuring that their choices are respected and supported, even if it means refusing a medical intervention that is considered futile. This requires a sensitive and compassionate approach, where healthcare providers work

together with patients and their families to find solutions that meet their individual needs and preferences (Schneiderman; Jecker; Jonsen, 2018).

Kirstin Borgerson (2013), in her work "On Defining Disease: An Evolutionary Perspective", offers a critical analysis of the concept of disease and its ethical and social implications in medical practice. One of the main ethical procedures discussed by the author is the need for careful reflection on how we define and classify diseases. Borgerson argues that definitions of disease are influenced by a variety of factors, including cultural values, political interests, and scientific advances, and that these definitions have significant ethical consequences for patients and society as a whole.

Another ethical procedure addressed by Borgerson is the importance of recognizing the diversity and complexity of health and disease experiences. The author highlights that perceptions of health and disease can vary widely across different cultures, social groups, and individuals, and that it is essential to take this diversity into account when evaluating and treating patients. This requires a sensitive and culturally competent approach on the part of healthcare professionals, where patients' values and beliefs are respected and valued (Borgerson, 2013).

In addition, Borgerson (2013) emphasizes the need for a holistic and integrated approach to understanding and addressing health and disease issues. This involves not only considering the biological and physiological aspects of a medical condition, but also the psychological, social, and environmental aspects that can influence an individual's health. Healthcare providers should take a broad, interdisciplinary perspective when evaluating patients, recognizing that factors such as stress, trauma, and social inequalities can play a significant role in health and well-being.

Another point addressed by Borgerson (2013) is the importance of an evidence-based approach in medical practice. The author argues that clinical decisions should be informed by sound and up-to-date scientific evidence, ensuring that patients receive the best care available. This requires a critical evaluation of the medical literature and a willingness to adapt clinical practices based on the latest research findings.

Finally, Borgerson (2013) highlights the importance of patient participation in the decision-making process about their health and medical care. Healthcare professionals should collaborate with patients by actively involving them in the development of treatment plans and respecting their individual preferences and values. This requires open and transparent communication between healthcare providers and patients, where patients' concerns and opinions are valued and respected.

These authors and works offer a theoretical and practical basis for understanding the ethical principles involved in the refutation of inadequate medical reports. By applying these principles, health care professionals can ethically and responsibly address issues related to the accuracy and correctness of medical diagnoses (Beauchamp; Childress, 2013; Jonsen; Siegler; Winslade, 2015; Schneiderman; Jecker; Jonsen, 2018; Borgerson, 2013).

The Federal Council of Medicine (CFM, 2018; 2020; 2021) establishes ethical guidelines to deal with the refutation of inadequate medical reports. First, it is essential that the patient or his legal representative, when identifying a possible error or inadequacy in the medical report, seek detailed information about the contestation procedures with the CFM. The Council advises that any complaint related to the ethical conduct of doctors be made through the CFM Ombudsman's Office.

When filing a complaint with CFM (2018; 2020; 2021), it is important to provide detailed information about the case, including copies of relevant documents such as the disputed medical report, medical records, and any other materials that may support the claim. Additionally, it is essential to include the patient's personal information, such as their name, address, and contact phone number, so that CFM can reach out for more details if necessary.

The timeframe for each step of the procedure may vary, but CFM is generally committed to investigating and responding to complaints in a timely and efficient manner. However, it is important to note that the process can take some time, as it involves careful analysis of the information provided and conducting appropriate investigations (CFM, 2018; 2020; 2021).

As for the penalties applied to doctors in case of unethical practices, the CFM has the power to apply disciplinary measures, which may include warnings to the revocation of professional registration, depending on the severity of the unethical conduct identified. These penalties aim to ensure the protection of patients and the maintenance of the highest ethical standards in medical practice, contributing to the integrity and reliability of the health system as a whole (CFM, 2018; 2020; 2021).

LEGAL PROCEDURES

A relevant author who addresses the legal procedures to refute inadequate medical reports is José Rogério Cruz and Tucci (2015), in their work "Practical Manual of Labor Hearing". Tucci is a renowned Brazilian jurist specializing in civil procedural law and labor law. In his book, he provides detailed guidance on the legal procedures involved in challenging medical reports in labor lawsuits, addressing aspects such as the presentation

of evidence, questioning of experts, and available resources to challenge medical reports considered inadequate.

Tucci (2015) begins his work by highlighting the importance of producing robust evidence and presenting reasoned arguments to refute medical reports considered inadequate. One of the main legal procedures discussed by Tucci is the use of contradictory technical opinions and expert reports to contest the validity and accuracy of the questioned medical reports. The author explores the nuances of the production of expert evidence and offers practical guidance on how to counter unfavorable medical reports during labor hearings.

In addition, Tucci (2015) addresses the procedural mechanisms available to challenge medical reports, such as the filing of appeals, the performance of complementary expertise and the presentation of contradicts in relation to the experts appointed by the court. The author provides clear guidelines on how to proceed in the face of medical reports considered flawed, incomplete or biased, in order to ensure justice in the judicial process.

Another aspect discussed by Tucci (2015) is the importance of solid legal argumentation and the presentation of relevant jurisprudential precedents to support the challenge of inadequate medical reports. The author emphasizes the need to base allegations on legal norms, specialized doctrine, and previous court decisions, in order to increase the probability of success in refuting the contested reports.

Finally, Tucci (2015) emphasizes the importance of strategic and proactive action by lawyers and parties involved in the process, seeking to explore all legal possibilities and available resources to refute medical reports considered inadequate. His work serves as a practical and comprehensive guide for legal professionals dealing with issues of expert evidence and challenges to medical reports in the context of labor hearings.

Another relevant author in this context is André Ramos Tavares (2020), in his work "Curso de Direito Procedual Civil". Tavares is a Brazilian jurist and university professor with extensive experience in civil procedural law. In his book, he explains the legal aspects related to the challenge of medical reports in the context of civil procedure, addressing topics such as the production and evaluation of expert evidence, the requirements for contesting reports and the procedural mechanisms available to refute medical diagnoses considered inadequate.

Tavares (2020) emphasizes the importance of producing solid expert evidence and formulating consistent legal arguments to refute the validity and reliability of the questioned medical reports. One of its central approaches is the strategy of presenting specific challenges to the contested medical reports, using procedural resources such as the

manifestation on the expert report and the formulation of additional questions to the experts appointed by the court. The author examines the techniques and methods to prepare effective challenges, aiming to highlight any flaws, omissions or trends in the reports under analysis.

Discussing the relevance of diligence and proactivity on the part of lawyers and parties involved in the process, Tavares (2020) points out that they seek to ensure a thorough analysis of the contested medical reports and adequate preparation for the procedural acts related to the challenge of expert evidence. The author offers practical guidance on how to deal with medical reports considered unsatisfactory or biased, ensuring compliance with the principles of adversarial and full defense.

The strategy of producing counter-evidence and contradictory technical opinions to contest the validity and accuracy of the medical reports under discussion is another crucial aspect addressed by Tavares (2020), who presents the legal guidelines on how to obtain and present supplementary evidence that may impact the judicial decision. The author emphasizes the importance of presenting robust and well-founded evidence to reinforce the legal argument in the refutation of the questioned medical reports.

Tavares (2020) also highlights the need for a strategic and careful approach in challenging medical reports in the context of civil proceedings, seeking to explore all legal options and procedural resources available to challenge contested reports and safeguard the interests of the parties involved. His work is a comprehensive and up-to-date manual for legal professionals who face challenges related to challenging expert medical reports in legal litigation.

These works offer a comprehensive understanding of the legal procedures involved in refuting inadequate medical reports. By providing detailed guidance and pertinent legal analysis, they contribute to the training of legal professionals and stakeholders in the judicial process, assisting in the defense of rights and the search for justice in cases involving challenges to medical diagnoses (Tucci, 2015; Tavares, 2020).

Physicians who work in emergencies face an increased risk of being held civilly liable for their professional conduct. It is essential that these professionals adopt maximum responsibility in their practices, since the absence of certain procedures, such as the prescription of exams or the hospitalization of patients, can cause damage to health and even death, in addition to triggering legal implications, such as lawsuits before the Class Council or lawsuits for medical error.

Ribeiro (2020) analyzes legal cases that address medical liability for omission in carrying out diagnostic tests. Generally, liability occurs when the lack of these tests results

in a harmful outcome for the patient, which could be avoided if such procedures were performed. According to him, two initial points must be clarified: in general, the civil liability of doctors is subjective, depending on proof of guilt, that is, negligence, recklessness or malpractice in medical practice; And it is necessary to differentiate error from fault, since medical error is a failure in professional practice, while fault is related to the doctor's lack of diligence in the face of a clinical condition.

Eduardo Nunes de Souza (2013) addresses this distinction, highlighting that medical error is a failure in professional practice, not assessing fault, but rather comparing the procedures adopted with those that, in theory, could avoid the damage. Liability for medical error is, as a rule, subjective, being intrinsically linked to proof of fault. The analysis of the physician's civil liability requires caution, considering its subjective nature. In the context of contemporary civil law, the traditional psychological concept of guilt gives way to the observance of standards of conduct. These standards, not easily defined abstractly, should be extracted from the professional practice of the medical community, demanding a dialogue between the judge and specialists. This makes it possible to distinguish "medical error" from situations in which the physician acts with fault, subjecting himself to liability for the damages caused, according to the general theory of civil liability (Souza, 2013).

There is a doctrinal understanding that establishes that the hospital can be held responsible for the conduct of doctors, especially when there is an employment relationship between them. In addition, in aesthetic procedures, the professional's fault is presumed if the intended result is not achieved, which represents a mitigation of subjective liability (Ribeiro, 2020; Bernardes, 2019; Sebastião, 2006).

The legal procedures for suing physicians for inadequate medical reports are supported by Brazilian legislation, especially the Code of Medical Ethics, the Code of Civil Procedure, and Law No. 13,467/2017 (Brasil, 2017), which deals with labor reform and establishes guidelines for the accountability of health professionals in cases of negligence or malpractice. In addition, works such as "Responsabilidade Civil do Médico", by Caio Mário da Silva Pereira (2019), and "Erro Médico e Responsabilidade Civil", by Rui Stoco (2018), offer a theoretical-legal basis for analyzing these issues.

Two cases judged illustrate the consequences of the lack of prescription of complementary tests. In a case in Rio Grande do Sul (STJ, 2007; TJPB, 2019), a patient was compensated due to the lack of diagnosis of rib fractures, while in Paraíba, a doctor was convicted of manslaughter of a pregnant patient who had severe symptoms, but did not have adequate tests prescribed. The Court of Justice of Santa Catarina (TJSC, 2011) also established an understanding of civil liability for medical error, stating that the claim for

compensation will only be accepted when it is proven that the professional acted with malpractice, recklessness or negligence. The theory of loss of a chance is also recognized as a criterion for evaluating civil liability arising from medical errors, when they reduce the patient's concrete chances of cure.

Another case, presented to the TJSP, addresses a lawsuit regarding compensation for moral and material damages due to a medical error (Nunes; Silva, 2010; Gonçalves, 2015). The lower court judgment was favorable to the plaintiff, recognizing the civil liability of the State. The civil liability of the public administration was analyzed in the light of the theory of administrative risk, requiring unequivocal proof of failure in the health service. The medical error was confirmed by an expert report, which established the causal link between the medical conduct and the damage to the patient. There was negligence in medical care, resulting in material damage. According to Nunes and Silva (2010), the understanding of the STJ and TJSP on the pension to the parents of the deceased was applied, even without proof of economic dependence. As for moral damages, proportional and reasonable values were recognized and fixed, as advised by Gonçalves (2015). The sentence was partially reformed in relation to the pension, but maintained with regard to moral damages. The appeal was dismissed, and the adhesive appeal was partially granted.

GIFTED PEOPLE WHO RECEIVED WRONG MEDICAL REPORTS

Cases of gifted people who have been mistakenly diagnosed with various psychological and psychiatric pathologies are more common than one might imagine. Lack of understanding about the specific characteristics of giftedness often leads to misdiagnosis by mental health professionals. These exceptionally talented individuals can be confused with patients with schizophrenia, bipolar disorder, autism, ADHD (Attention Deficit Hyperactivity Disorder), borderline, among other conditions (Webb et al, 2009; 2016; Dawson, 2012; Silverman, 2005; Piechowski, 2011).

These misconceptions can occur due to the similarity between the symptoms presented by gifted people and those associated with certain pathologies. For example, characteristics such as emotional intensity, accelerated thinking, tendency to distraction, sensory sensitivity, and creativity can be misinterpreted as signs of psychological disorders (Webb et al, 2009; 2016; Dawson, 2012; Silverman, 2005; Piechowski, 2011).

However, many gifted people have been able to refute these inadequate medical reports, demonstrating their high abilities and giftedness. Through specific assessments carried out by professionals specialized in identifying and understanding the characteristics of giftedness, these individuals were able to evidence their exceptional abilities in areas

such as cognition, creativity, leadership, problem-solving ability, and artistic or academic talent (Webb et al, 2009; 2016; Dawson, 2012; Silverman, 2005; Piechowski, 2011).

Real cases illustrate this situation, in which people initially diagnosed with psychiatric disorders were later identified as gifted. After further evaluation, these individuals received a new diagnosis that reflected their true gifted condition, enabling access to interventions and support that were more appropriate to their needs (Webb et al, 2009; 2016; Dawson, 2012; Silverman, 2005; Piechowski, 2011). Here are some real cases of gifted people who receive wrong medical reports:

1. Nadia Comăneci:

Initial diagnosis: Mental retardation (at 6 years of age)

As he refuted:

- Attended a regular school and excelled in his studies.
- At the age of 14, she became the Olympic champion in individual all-around gymnastics, achieving the first perfect score of 10 at an Olympics.
- Graduated in Physical Education from the University of Bucharest.
- She published her autobiography, "Nadia: The Autobiography of a Gymnast," which details her struggles and achievements.

2. Paul Graham:

Initial diagnosis: Dyslexia (as a child)

As he refuted:

- Overcame his reading challenges and became an avid reader.
- He attended Princeton University, where he majored in philosophy.
- Co-founded Y Combinator, a successful startup incubator that has launched companies like Airbnb, Dropbox, and Reddit.
- Has written several influential essays on technology and startups.

3. Mary Temple Grandin:

Initial diagnosis: Autism (at 2 years of age)

As he refuted:

- He learned to speak at the age of 4.
- Attended a regular school and graduated with honors.
- Earned a doctorate in animal science from the University of Illinois at Urbana-Champaign.
- He has published several books on autism and animals, including "Animals in Translation: The Visionary Life of Temple Grandin" and "Thinking in Pictures: My Life with Autism".

- Became an international speaker on autism, advocating for neurodiversity and inclusion.

4. Albert Einstein:

Initial diagnosis: Mental retardation and dyslexia (as a child)

As he refuted:

- Demonstrated exceptional mathematical and scientific skills from an early age.
- He attended the Technical University of Zurich, where he graduated in physics.
- Published four groundbreaking papers in 1905, which established his reputation as one of the world's leading physicists.
- Developed the theory of relativity, which revolutionized our understanding of space, time, and gravity.
- Won the Nobel Prize in Physics in 1921 for his work on the photoelectric effect.

It is important to note that these are just a few examples of gifted people who have refuted their misguided medical reports. There are many other cases that have not been mentioned here. It is also important to remember that not all gifted people present the same challenges or demonstrate their abilities in the same way. Diagnosing giftedness can be a complex process and is not always easy to identify. It is important for mental health professionals to be aware of the biases and stereotypes that can affect the diagnosis of giftedness, especially in relation to minority groups. Adequate support and resources can be crucial for the development and success of gifted people (Webb et al, 2009; 2016; Dawson, 2012; Silverman, 2005; Piechowski, 2011; Marques, 2017).

These examples illustrate how misdiagnoses can occur and how a more careful assessment, conducted by professionals specializing in giftedness, can lead to a more accurate understanding of the individual needs of these people. These experiences highlight the importance of awareness and adequate training of mental health professionals to recognize and distinguish the characteristics of giftedness from the clinical manifestations of psychological disorders. In addition, they emphasize the need for an individualized and holistic approach in the evaluation and treatment of each patient, taking into account their uniqueness and potentialities (Webb et al, 2009; 2016; Dawson, 2012; Silverman, 2005; Piechowski, 2011; Marques, 2017).

CONCLUSIONS AND FINAL CONSIDERATIONS

CONCLUSIONS

Medical opinions play a crucial role in health, guiding diagnoses, treatment plans, and the patient's overall well-being. However, there are cases where medical opinions may

be inaccurate or erroneous, leading to misdiagnosis, inappropriate treatments, and potential harm to patients. In such cases, individuals have the right to challenge and seek to refute these medical opinions.

This paper deepens the procedures and considerations involved in the refutation of medical opinions, covering ethical, legal and psychological aspects. It aims to empower individuals and healthcare professionals with the knowledge and tools to navigate these complex situations effectively.

While the specific procedures for refuting medical opinions may vary by institution and country, a number of overarching ethical and legal principles guide the process. These principles are crucial to ensure fairness, transparency, and patient well-being throughout the process.

When medical opinions are challenged, legal frameworks provide individuals with the means to seek redress and challenge misdiagnoses. Specific legal procedures may vary by jurisdiction, but some general principles apply:

1. **Seeking Information and Support:** Patients or their legal representatives should first seek detailed information about the procedures for challenging medical opinions from relevant authorities, such as the medical board or patient advocacy groups.
2. **File a Complaint:** If a patient believes that there has been an ethical breach or professional misconduct, they can file a complaint with the appropriate regulatory body, such as the medical board.
3. **Providing Evidence: Detailed** information and supporting documentation, such as copies of the disputed medical opinion, medical records, and any other relevant materials, must be provided to substantiate the claim.
4. **Understanding the Process:** The timeframe for each step of the procedure may vary, but the regulatory body is typically committed to investigating and responding to complaints quickly and efficiently.
5. **Penalties for Unethical Conduct:** If unethical practices are proven, the regulatory body has the authority to impose disciplinary measures, which can range from warnings to suspension or revocation of medical license.

Refuting medical opinions can be a psychologically challenging experience for individuals, often involving emotions such as frustration, anxiety, and even anger. It is crucial to provide psychological support and guidance throughout the process to help individuals cope with these emotions and navigate the complexities of the situation.

Initially, this study addressed general procedures adopted in psychiatric hospitals to refute erroneous medical reports, highlighting the importance of peer review, open communication with patients and family members, mediation of internal conflicts, and review by ethics committees. The exemplified clinical cases demonstrate how these multidisciplinary practices contribute to adjusting diagnoses and treatment plans, ensuring the quality of mental health care. The application of these ethical and legal principles in clinical practice promotes a collaborative and transparent approach, which is essential for the safety and well-being of patients.

Next, the ethical procedures described by Beauchamp and Childress, Jonsen, Siegler and Winslade, Schneiderman, Jecker and Jonsen, and Borgerson provide a solid basis for addressing ethical issues in the refutation of inadequate medical reports. The importance of patient autonomy, open and collaborative communication, multidisciplinary approach, objective assessment of medical futility, and consideration of patient values and preferences is highlighted. In addition, the Federal Council of Medicine establishes clear guidelines for dealing with complaints related to inadequate medical reports, emphasizing the importance of transparency, careful investigation, and the application of disciplinary measures when necessary, in order to protect patients and maintain the highest ethical standards in medical practice. These ethical procedures contribute to ensuring the quality, integrity, and reliability of the health system, promoting respect for the rights and well-being of patients.

Secondly, it can be inferred that both José Rogério Cruz e Tucci and André Ramos Tavares offer detailed guidance and pertinent legal analysis on the procedures for challenging inadequate medical reports in labor and civil lawsuits. His works serve as comprehensive manuals for legal professionals, contributing to the training of those involved in the judicial process and assisting in the search for justice in cases involving challenges to medical diagnoses. In addition, the importance of diligence and proactivity on the part of lawyers and interested parties is evident, in order to ensure a thorough analysis of the contested medical reports and adequate preparation for the procedural acts related to the challenge of expert evidence.

Based on the cases presented and the analysis of diagnostic misconceptions in relation to gifted individuals, we can conclude that the lack of understanding about the specific characteristics of giftedness can lead to misdiagnosis by mental health professionals. These misconceptions often occur due to the similarity between the symptoms presented by gifted people and those associated with certain psychological and psychiatric pathologies. However, real cases illustrate how many gifted people have been

able to refute these inadequate medical reports, demonstrating their exceptional abilities through specific evaluations carried out by specialized professionals. These experiences highlight the importance of awareness and adequate training of mental health professionals to recognize and distinguish the characteristics of giftedness from the clinical manifestations of psychological disorders. In addition, they emphasize the need for an individualized and holistic approach in the evaluation and treatment of each patient, taking into account their uniqueness and potentialities.

FINAL CONSIDERATIONS

The research carried out comprehensively addressed the legal procedures to contest inadequate medical reports, as well as the diagnostic misconceptions in relation to gifted people. The academic-scientific works, the legal works as well as the applicable legislation, provided a detailed analysis of the legal strategies adopted by legal professionals to refute erroneous medical reports, highlighting the importance of producing solid evidence and consistent legal argumentation. In addition, the actual cases of gifted people who received misdiagnoses underscore the need for a more accurate understanding of the characteristics of giftedness by mental health professionals, as well as the implementation of individualized approaches to diagnosis and treatment.

Strengths of the research include the presentation of concrete cases that illustrate the challenges faced by individuals who challenge inadequate medical reports and those who are misdiagnosed as gifted. In addition, the analysis of legal procedures offers valuable insights for legal professionals and stakeholders in the judicial process. However, some limitations can be identified, such as the lack of focus on certain aspects of legal procedures and the absence of a more in-depth approach to the nuances of giftedness and its diagnoses.

It is suggested that future research explore more deeply the strategies for contesting medical reports in different legal contexts and improve the understanding of the characteristics of giftedness, especially in relation to the clinical manifestations of psychological disorders. In addition, investigations into the effectiveness of specific interventions to address diagnostic misconceptions and to support the development of gifted individuals can contribute significantly to clinical and legal practice.

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A LOOK AT BURNOUT SYNDROME IN THE BUSINESS ENVIRONMENT

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ABSTRACT

This study investigates the quality of life at work and the role of organizational psychologists who work to understand and improve the functioning of organizations, aiming at the well-being of employees and healthy environments. It focuses on the presence of Burnout Syndrome, an emotional disorder caused by overwork, which generates physical and emotional exhaustion. This scenario can result in a heavy organizational environment, with demotivation and disconnection of employees. Thus, the present study presents as a problematization the respective question: How does Burnout syndrome occur and what are the main motivational factors for this occurrence? In the search for answers to this problem, this work has as its general objective to demonstrate the presence of Burnout syndrome and its consequences in the business environment, the methodological procedure undertaken in the research is based on secondary data from bibliographic and electronic research, in order to understand how Burnout Syndrome occurs and what are the main motivational factors for this occurrence. It also addresses stress, differentiating it into "stress" (good) and "eustress" (bad), explaining how adequate levels can boost creativity, while in excesses it has negative impacts, characterizing "eustress". Finally, the text proposes a discussion about the object of study to seek answers to the problematization and achieve the objectives established in the research.

Keywords: Burnout Syndrome. Professional Exhaustion. Business Environment.

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INTRODUCTION

A study on Burnout Syndrome in the business environment The research investigates the quality of life at work, where there are specialized organizational psychologists who explore the topic to understand and improve the functioning of organizations and the well-being of employees, aiming to promote healthy and balanced environments that meet physical and emotional needs.

This work plays an important and effective role in the cognition of Burnout in business environments to promote a more productive and sustainable organizational climate. Thus, we point out as relevant the realization of this study, it is extremely important for Commercial Management and to become aware that happy and engaged people provide an environment of high performance and productivity for organizations.

The emotional issue is a topic that has great focus nowadays and many professionals end up sick and even going through Burnout without even realizing it.

Therefore, it is very important to raise awareness of the risks of overwork, pressure, and stress.

With this view, we present as theoretical support, some authors that you have probably heard about this term stress, a few times during the day. Nowadays it is very common and used even by children when they feel irritable or anxious.

In the literature, there are two terms: stress and eustress, as mentioned in the article by Azevedo (2010) and Kitamura (2023). Stress is characterized as good and eustress is characterized as bad. A small level of stress leads to greater creativity when the situation calls for new ideas and solutions (Chiavenato, 2008). An exorbitant level of stress, on the other hand, brings negative physical and psychological consequences to the human being, so we call eustress.

When we bring the topic to the business context, we can see that the evolution of the management view of *headcount* associated with the quality of life of workers is extremely important for better turnover management in this post-pandemic scenario and also for the administration of a healthy organizational climate. With this transformational leadership, employees feel more motivated and engaged, with a sense of belonging to something much greater within the organization, directly impacting their quality of life and the company's productivity. (Souza et. al, 2023, p. 6)

That said, we can make an addendum, with the explanation made in a research by Gary Evans "The Importance of the Physical Environment" from Cornell University (2005, p. 50), the environment has a direct influence on our behavior. As Chiavenato (2010) adds,

the environment can affect our physical integrity and psychological and intellectual well-being.

Therefore, we understand that the reflexes are directly linked to the moral integrity of people, given this, we can see that the new vision of management in organizations focused on the employee, has been gaining strength over the years, exercising and propagating empathetic projects and attitudes of health and safety at work, taking care of people and valuing their employees better.

This work contemplates as a methodological path the collection of secondary data based on bibliographic and electronic research, being based on renowned authors in the area of Business Administration, Public Health and Mental Health.

Thus, the present study problematizes the respective question: How does Burnout syndrome occur and what are the main motivational factors for this occurrence? In the search for answers to this problem, this work has the general objective of demonstrating the presence of Burnout syndrome and its consequences in the business environment.

To achieve the general objective, we delimit the respective specific objectives, contextualize the Burnout syndrome, verify the possible business events that may cause this syndrome in the subject, investigate the Burnout syndrome in the business environment.

Thus, we begin to discuss the object of study, in order to dialogue possible answers about the problematization and aim at the objectives established in the present study.

THEORETICAL FOUNDATION

A BRIEF LOOK AT BURNOUT SYNDROME

The term "burnout" is of English origin and refers to something that has stopped working because of energy exhaustion (France, 1987). It was used for the first time in 1974 by Freudenberger, who defined it as a feeling of failure and exhaustion, resulting from the excessive use of energy and resources (França, 1987; Perlman and Hartman, 1982).

Research on burnout began with health professionals, who, because of their roles, need to maintain direct and continuous contact with other people (such as health, mental health, and social services workers). According to Lautert et al. (1995), in the hospital context, stress is visible in the behavior of professionals, resulting in unmotivated, apathetic and fatigued teams, which leads to conflicts and dissatisfaction among them. However, they often face a dehumanized and impersonal healthcare system, which they have to adapt to.

Interest in studies on burnout has grown due to three factors, pointed out by Perlman and Hartman (1982). First, the importance of improving Quality of Life and the changes in

the concept of health promoted by the WHO (World Health Organization). Secondly, the increase in the demands and expectations of the population in relation to social, educational and health services. And, finally, the awareness of researchers, public agencies and clinical services about the severity of burnout, realizing the need to deepen research and prevention, since its effects were more complex and harmful than previously known.

In the 80s, studies emerged with worrying results. Burnout symptoms were identified in professional groups that were not considered to be at risk, as it was believed that, as they were vocational professions, these workers obtained bonuses in various spheres, from personal to social. In addition, people with seemingly balanced personalities were found to develop burnout upon entering certain work environments.

After more than 25 years of studies on burnout, Maslach and Leiter (1997) state that the problem is no longer limited to professions in the areas of health and education. Nowadays, burnout is seen as a phenomenon that can affect practically all professions, especially those that involve intense and constant interpersonal contact.

They highlight that many professions require frequent interactions, whether with clients, colleagues, supervisors or in work teams. Currently, it is perceived that, due to the nature of the positions, there are professions at risk and at high risk of burnout, while few are considered low risk.

In this way, burnout has been analyzed from four main approaches throughout its development.

The first approach was to the clinic, introduced by Herbert Freudenberger in 1974. He noted that burnout occurs when a person works intensely without meeting their own needs, resulting in a state of exhaustion. For him, burnout was the price paid for dedicating himself deeply to helping other people.

Christina Maslach (1976), in turn, brought a social-psychological view. She pointed out that the work environment and the type of activities performed are the main factors that lead to burnout. Stress, in this case, arises from the role played by the person, aggravated by the overload of tasks.

Cary Cherniss (1980) expanded this view by focusing on the organizational perspective. He argued that the characteristics of companies and their organizational structures are largely responsible for burnout. In addition, Cherniss (1980) pointed out that the three dimensions of burnout, emotional exhaustion, depersonalization, and low achievement are mechanisms that people develop to deal with stress and frustration in the workplace.

And finally, psychologist Christina Maslach is one of the pioneers in the study of burnout, with an approach that emphasizes the influence of social and organizational factors on the development of the syndrome, considering the impact of interpersonal relationships and the work environment on the emotional exhaustion of professionals (Maslach & Leiter, 1997). This approach indicates that contemporary society, with its focus on individualistic values and little incentive to communitarianism, does not facilitate the involvement of professionals in careers dedicated to the care of other people Farber (1991); Byrne (1999).

CONTEXTUALIZATIONS OF BURNOUT SYNDROME

Although there is still no consensus on the definition of burnout, the proposal by Maslach and his collaborators is the most accepted among researchers. Burnout is seen as a multidimensional phenomenon, composed of three dimensions: emotional exhaustion, depersonalization, and decreased professional fulfillment at work. These dimensions have been discussed in several studies over the years, among the authors who articulate a thought about these three dimensions of the syndrome, we can highlight Maslach (1976), Maslach and Jackson (1981), Leiter and Maslach (1988 and 1997), Maslach (1993), Maslach and Golberg (1998).

With this view, emotional exhaustion is characterized by a lack of energy and a deep emotional exhaustion. This state can be accompanied by frustration and tension, especially among workers who feel they are no longer able to serve their customers or colleagues as they once did.

The main cause of exhaustion at work is overload and personal conflicts in relationships. In this way, depersonalization, or dehumanization, refers to the treatment of customers, colleagues, and the organization as objects, resulting in emotional insensitivity. In this state, affective bonds are replaced by a rational approach, leading to feelings of cynicism and emotional dissimulation. Individuals in this condition tend to experience anxiety, irritability, loss of motivation, decreased work goals and commitment, as well as a reduction in idealism and more self-centered behavior.

The decrease in personal fulfillment at work is marked by a negative self-evaluation. Workers feel dissatisfied with their professional development and unhappy with themselves, experiencing a drop in perceptions of competence and success at work, as well as difficulties interacting with others, such as customers, patients, students, or colleagues.

Burnout Syndrome is recognized as a form of occupational stress that affects professionals involved in care activities, such as services, treatments or education Maslach

and Leiter (1999). This syndrome manifests itself in professions that require continuous attention and care for other people Maslach and Jackson, (1981; 1984a, 1984b); Leiter and Maslach, (1988), Maslach, (1993), This experience develops in a complex social context Maslach and Goldberg, (1998). Burnout reflects a crisis of the individual in relation to his work, but not necessarily in relationships with colleagues. Maslach, Jackson and Leiter (1996).

According to Maslach and Leiter (1997, p.18), burnout is not only an individual problem, but is related to the social environment in which the person works.

While there is a growing consensus on the concept of burnout, it is crucial to differentiate it from stress. Many authors consider stress and burnout to be synonymous, but this view is inadequate, because, despite their similarities, these concepts are not identical Farber, (1991). Burnout is often seen as a form of work-related stress Maslach and Jackson, (1982); Cordes and Dougherty, (1993) or as an intensification of the typical symptoms of stress Kyriacou and Sutcliffe (1978).

The temporal and relational aspect of burnout is what distinguishes it from stress. This relational basis originates from the emotional tension and resources that the individual uses to deal with interactions in different work situations Maslach (1993). In addition, the negative or maladaptive nature of burnout also differentiates it from stress. According to Byrne (1993), burnout represents the final phase of the individual's frustrated attempts to cope with the stress caused by adverse working conditions.

It is relevant to note that depersonalization can be a valid coping strategy, allowing a certain interpersonal distance between the professional and the client. However, this dimension becomes negative when it is linked to emotional exhaustion, generating feelings that are difficult to control and that affect the professional's performance and perception of competence.

According to Bregalda and Valle Filho (2020), Burnout Syndrome (BS) emerges as a psychic disorder of a depressive nature, gaining prominence as a state of physical and mental exhaustion intrinsically linked to exhausting working hours. Its relevance is recognized as a public health problem approved by the status of legitimate medical diagnosis by the International Classification of Diseases, ICD-11, of the World Health Organization (WHO). In Brazil, BS affects approximately 30% of more than 100 million workers, and is particularly alarming among health professionals, reaching a surprising prevalence of 78.4%.

Yu et al. (2019) In the context of Korean medical professors, it was identified that individual characteristics of self-concept have an influence on the overall perception. The

study revealed that a more positive professional self-concept is correlated with higher self-esteem in the profession, and there is a trend towards a lower incidence of burnout among these professionals.

BURNOUT SYNDROME IN THE BUSINESS ENVIRONMENT AND ITS CONSEQUENCES

Several variables are linked to burnout, so Cordes and Dougherty (1993), in their analysis of several studies, classified the factors that contribute to burnout into three categories. The first refers to the characteristics and functions of the position, highlighting that the relationship between the professional and his clients is the most significant. In this category, aspects such as overload, ambiguity, and conflict are important.

The second category encompasses organizational characteristics, which include contextual factors and systems of rewards and punishments. Finally, the third category involves personal characteristics, such as age, gender, length of work, and social support.

Researchers Leiter and Maslach (1988) Maslach and Jackson, (1984a); Maslach and Leiter, (1997); Leiter and Harvie, (1996); Layman and Guyden, (1997); Maslach and Godberg, (1998), argue that burnout syndrome results from both personal and environmental factors, but most studies indicate that environmental factors, especially job characteristics, are more associated with high levels of burnout than personal, demographic, or personality factors.

THE CONSEQUENCES OF BURNOUT IN THE WORKPLACE

What is currently known about the possible consequences of burnout highlights the importance of recording its impact, considering the amount, potential severity, affected domains, and, in many cases, the irreversibility of the consequences. Burnout often results in deterioration of physical and emotional well-being. Affected professionals often feel exhausted, fall ill frequently and face problems such as insomnia, ulcers and headaches Maslach (1976; 1978), as well as issues related to blood pressure, muscle tension and chronic fatigue Maslach and Leiter (1997). Studies also indicate a relationship between burnout and alcoholism, mental illness, marital conflict, and suicide.

To deal with physical problems, many professionals resort to the excessive use of tranquilizers, drugs and alcohol. Other health problems associated with burnout include flu, colds, headaches, anxiety, and depression, as pointed out by Aluja (1997). The main psychological effects include depression, anxiety, and psychosomatic disorders, accompanied by feelings of inferiority, resignation, and unhappiness. Individuals with high levels of burnout tend to count the hours until the end of the day, think frequently about the

next vacation, and use medical certificates to relieve stress and tension at work (Wisniewski and Gargiulo, 1997).

From an organizational point of view, burnout syndrome is strongly related to low employee morale, absenteeism and turnover Maslach, (1978). The intention to leave the company and what is called "psychological exit" from work are significant consequences, representing some of the strategies that individuals adopt to cope with emotional exhaustion Lee and Ashforth, (1993, 1996). Although resignation is not common due to labor market restrictions, "psychological disconnection" is a more serious problem.

This refers to a depersonalization and low engagement with the goals and results of the team and the organization. The individual can remain in the job, but his performance decreases, resulting in a performance far below his potential, which can aggravate his physical and psychological well-being, also affecting the quality of organizational results. Cordes and Dougherty (1993) associate burnout with negative organizational outcomes and various personal dysfunctions. In addition, Maslach and Leiter (1997) state that burnout can cause a significant deterioration in work performance, also impacting the individual's family and social relationships.

The importance of meaningful work, strong relationships, positive team structures, and social connections are crucial for both professional and personal well-being.

Factors that precede Burnout, especially in the context of teachers, have impacts that affect both personal states and life situations, and can intensify negative challenges. Frequent reports highlight the worsening of depression and anxiety due to professional stress.

Thus, when considering aspects of teachers' personal daily lives as influences on stress and mental health, it is essential to analyze healthy habits and their maintenance. Studies by Padilla and Thompson (2016) explore how teachers' exhaustion is related to their social network, family, sleep, and leisure. Pfeffer (2018) notes that people often do not understand their reactions to stress at work, resulting in failures in the emotional skills to deal with such situations.

METHODOLOGY

The present analysis of the Burnout Syndrome was carried out through a literature review. The objective was to examine some studies and scientific articles already published that address the causes, effects and interventions related to Burnout in the workplace.

A selection of articles from academic journals and books that address the theme was carried out. The sources were accessed through Google Scholar, with inclusion criteria

consisting of studies that presented empirical data or relevant theoretical reviews on Burnout Syndrome.

The evaluation of the data was carried out in a qualitative way, allowing the identification and classification of the main topics addressed in the studies, including risk factors, effects on mental health and prevention strategies.

The research strictly followed ethical guidelines, ensuring that all sources were correctly cited and acknowledged. Limitations include dependence on available research and possible lack of agreement on definitions and metrics of the syndrome.

RESULTS AND DISCUSSIONS: A LOOK AT BURNOUT AND THE BUSINESS ENVIRONMENT

The study of Burnout Syndrome in the business environment reveals a worrying scenario, where emotional exhaustion, depersonalization, and the feeling of low personal fulfillment directly affect employees and the productivity of organizations. These symptoms are frequent in high-pressure environments and where there is an overload of responsibilities, which can lead to serious physical and mental health problems, as noted in the reviewed literature.

CONTRIBUTING FACTORS TO BURNOUT

From the collected data and the bibliographic analysis, it was identified that Burnout is driven by a combination of personal and organizational factors. Factors such as work overload, lack of recognition, lack of social support, and role ambiguity were recurrent in the discussions. Professionals who face high emotional demands and have little control over their tasks are more susceptible to the syndrome. This result is in line with studies by Chiavenato (2008), who points out that stressful work environments may initially promote a healthy level of stress, but in excess, they result in eustress – negative and harmful stress.

In addition, the literature highlights the influence of organizational structure on Burnout. As Cherniss (1980) points out, the type of management and corporate culture have a direct impact on the well-being of employees. Organizations that prioritize productivity over employees' quality of life tend to have higher rates of Burnout, something particularly exacerbated in the post-pandemic scenario, where many professionals faced new forms of pressure and isolation in remote work.

IMPACTS OF BURNOUT ON THE BUSINESS ENVIRONMENT

The data analyzed point to several negative impacts of Burnout for both the employee and the organization. Among them, the following stand out:

Increased absenteeism and turnover: Employees with high levels of emotional exhaustion and depersonalization often use more medical certificates and, in some cases, end up leaving the company. This entails additional costs for the organization, such as the need to hire and train new employees; Decreased productivity and performance: Emotional exhaustion decreases employees' ability to focus on their tasks and maintain high-quality performance. Professionals affected by the syndrome demonstrate less motivation and engagement, which directly affects the results of the team and the organization as a whole; Compromised mental and physical health: Symptoms such as insomnia, anxiety, depression, and cardiovascular problems are common among those who suffer from Burnout. These effects, according to Maslach and Leiter (1997), not only impact the individual, but also increase the cost of health insurance and the need for therapeutic interventions for the organization.

BURNOUT MITIGATION AND PREVENTION STRATEGIES

Based on the references used, it is possible to outline some practices that can help reduce the incidence of Burnout in companies. The concept of transformational leadership, as highlighted by Souza et. al. (2023), plays a crucial role in motivating employees, as inspiring and empathetic leadership can create a healthier work environment. Another relevant point is the promotion of a safe physical and psychological environment, as pointed out by Gary Evans (2005), where the physical environment directly affects the behavior and well-being of employees.

Investing in psychological support and social support programs can help employees face stressful situations in a more positive way. Additionally, policies that encourage work-life balance, such as flexible working hours and regular breaks, are key to preventing emotional burnout.

COMPARISON WITH PREVIOUS STUDIES

Compared to the initial studies by Freudenberger (1974) and the advances in the 1980s, which focused mainly on health professionals, it is now perceived that Burnout is a more comprehensive phenomenon. Professionals from all sectors can be affected, especially those who are in constant interpersonal contact and who occupy positions of high responsibility. The findings of this study corroborate the view of Maslach and Jackson

(1981), who maintain that Burnout is multidimensional, varying in severity according to the work environment and the characteristics of the function performed.

LIMITATIONS AND SUGGESTIONS FOR FUTURE STUDIES

While the study provides a comprehensive overview of the factors that contribute to burnout and its impacts on the business environment, it is recognized that the use of secondary data represents a limitation. For future investigations, it is recommended to carry out empirical studies with primary data, such as interviews and questionnaires applied directly to professionals in different sectors. Such research can deepen the understanding of the nuances of Burnout and the strategies that best adapt to specific contexts.

In summary, the analysis of the results reinforces the importance of a healthy work environment, capable of minimizing the risks of burnout and maximizing the productive potential of employees. Investing in the physical and mental well-being of employees not only improves the quality of life of workers but also contributes to a more productive and sustainable organizational climate.

THE CHALLENGES AND ACTIONS OF COMPANIES

Burnout Syndrome has a significant impact on companies, affecting employee productivity, increasing absenteeism and turnover, which generates extra recruitment and training costs. Burnout also results in depersonalization, creating a toxic work environment and damaging interpersonal relationships, which can affect the quality of services and customer satisfaction, as well as compromising the company's reputation.

Financially, companies suffer from the loss of business, increased health costs, reduced profits and the need to hire temporary labor. Creativity and innovation are also hindered, limiting the organization's competitive capacity.

To mitigate these impacts, it is crucial to implement preventive measures, such as promoting employee well-being, properly managing workload, and creating an environment that values mental health and work-life balance.

SOLUTIONS TO PROMOTE THE MENTAL WELL-BEING OF EMPLOYEES.

Work-Life Balance: Encourage clear boundaries, flexible schedules, and after-hours disconnection to avoid burnout; Social Support: Promote collaboration among colleagues and programs to strengthen interpersonal relationships to increase emotional resilience; Autonomy and Participation: Give employees more autonomy and involve them in decisions about their tasks to increase their sense of accomplishment and control; Workload

Assessment: Evaluate and redistribute tasks regularly to avoid overload and burnout; Positive Work Environment: Create a culture that values well-being, recognizes achievements, and provides opportunities for growth, improving satisfaction and reducing burnout.

Burnout requires a broad approach to its prevention and mitigation. Strategies such as work-life balance, social support, stress management, greater autonomy, redistribution of workloads, and a positive work environment are essential to face Burnout.

Reflecting on business sayings such as: "everything is urgent and deadlines are tight" illustrates the constant pressure of routine in the twenty-first century, where the search for speed often leads to burnout. Although time off work is a form of treatment for Burnout Syndrome, it is crucial that the Human Resources department and coordination are involved in the professional's reintegration, identifying and eliminating stressors in the work environment.

Adjustments in the working day and redistribution of tasks may be necessary to lighten the load. Increasingly, companies must provide regular psychological support, as healthy employees tend to perform better, developing skills such as emotional intelligence, promoting mental health, and improving quality of life.

PREVENTION OF BURNOUT SYNDROME IN COMPANIES

To prevent Burnout Syndrome, it is essential that companies adopt measures based on organizational models of social interaction and cognition. The first step should be training and awareness about the syndrome. Thus, some important practices include:

Review of Work Objectives: Evaluate the realism and feasibility of the team's goals, in addition to reviewing performance evaluation methods and workloads with the participation of employees; Secure Recruitment: Implement recruitment mechanisms that promote job security and empower employees by offering clarity in roles, feedback, training, and autonomy; Clarity in Authorities: Establish clear lines of authority and responsibility, in addition to fostering creativity and autonomy at work. Stress Analysis: Assess stress levels and mental load in tasks, distributing responsibilities in a balanced way and monitoring overtime; Measurement Mechanisms: Create tools to assess equity in the workplace and strengthen team spirit and social bonds; Organizational Climate Assessment: Constantly monitor the work climate and culture, considering aspects related to Burnout.

Feedback mechanisms, such as satisfaction and performance reviews, are crucial for identifying risky behaviors. Among psychometric tools, the Maslach Burnout Inventory (MBI) is widely used.

The systematic implementation of these practices, combined with a specific analysis of each case and dialogue with employees, can help Human Resources in the prevention of the syndrome.

FINAL CONSIDERATIONS

At this point, we move on to the final considerations, for which we highlight the relevance of the study of Burnout Syndrome in the business environment, a topic that is increasingly pertinent in the current scenario. The main objective of demonstrating the presence of Burnout and its consequences in organizations was achieved through a detailed analysis of the factors that contribute to the development of the syndrome, as well as the consequences for employees and companies.

It is observed that Burnout, characterized by emotional exhaustion, depersonalization and reduced personal fulfillment, affects professionals from different areas, especially those in direct and continuous contact with other people. The impacts range from a drop in productivity to physical and mental health problems, such as insomnia, depression, and anxiety. In this context, the promotion of healthy and sustainable work environments, which contemplate both the physical and emotional well-being of employees, becomes essential.

This study reinforces the importance of management practices that value human capital and promote transformational leadership, which fosters a sense of belonging and motivation among employees. In addition, the survey points out that an adequate physical environment and a positive organizational climate have a direct influence on the quality of life at work and on the productivity of companies.

Finally, when reflecting on the results obtained, it is concluded that awareness and prevention of Burnout Syndrome are fundamental to promote a more productive and balanced work environment. By implementing management practices focused on health and well-being, companies not only reduce turnover and absenteeism, but also contribute to strengthening a healthy organizational culture, in which the employee is seen as the organization's main asset.

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BIOPSYCHOSOCIAL PROFILE OF A COHORT OF CHILDREN BORN PRETERM DUE TO COVID-19 IN PREGNANT WOMEN

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ABSTRACT

The study sought to identify the biopsychosocial profile of infants born preterm due to COVID-19 during pregnancy. The inclusion criteria were: premature birth, period from 2021 to 2022, COVID-19 during pregnancy. Participants were 11 children, with a mean gestational age of 31.34 (±2.16) weeks, chronological age 32.18 (± 5.68) months, birth weight 1536.82 (±304.30) grams, Apgar score at the 1st minute 5.55 (±2.94), 7.82 (±1.47) at the 5th minute, and length of hospital stay of 45.0 (±18.72) days. 81.81% of the children had neonatal jaundice, 72.72% had sepsis, and 54.54% required resuscitation. The findings related to pregnancy, birth, socioeconomic and ICF allowed us to classify the population as at biopsychosocial risk, justifying the importance of continuous monitoring of this population, seeking to avoid or minimize delays.

Keywords: Infant. Prematurity. COVID-19. Pregnant.

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INTRODUCTION

COVID-19 is a viral infectious disease that has caused worldwide apprehension, due to its high transmission rate, wide variety of symptoms and mortality, the most common symptoms being: fever, cough, dyspnea, fatigue, sputum, headache, hemoptysis and diarrhea (World Health Organization, 2020). In view of this, measures were necessary to control transmission, such as social isolation, systematic hand washing, the continuous use of masks, gloves, and also eye protection (Noronha *et al*., 2020; Lu; Liu; Jia, 2020).

In 2020, the Ministry of Health (MoH) included pregnant and postpartum women as a risk group for COVID-19, since complications were observed during pregnancy, during childbirth and postpartum, and can affect newborns, mainly increasing the risk of prematurity (Avila; Carvalho, 2020; Woodworth *et al*., 2020; Brazil, 2020). Studies have pointed out that pregnant women who test positive for COVID-19 can face obstetric complications, such as premature rupture of the membrane, preeclampsia, miscarriage, and premature labor. In the fetus, fetal distress, low birth weight (less than 2500 grams), and the need for hospitalization in intermediate or intensive care units may occur (Wastnedge *et al*., 2021; Dávila-Aliaga *et al*., 2021).

When viral infection occurs, especially in the third trimester of pregnancy, it can cause complications such as the need for maternal hospitalization in the ICU, intrauterine and neonatal death, thus confirming the increased severity and risk of the disease in pregnant women (Zaigham; Andersson, 2020). It was also observed that respiratory complications and fever, as a result of infection, during pregnancy, were correlated with the increased risk of attention deficit disorder and autism spectrum disorder in infants born preterm (Horning *et al*., 2018; Dreier *et al*., 2016).

Other risk factors considered for the pregnant woman and the fetus are comorbidities such as obesity, diabetes, and hypertension (Pitilin *et al*., 2021), which can contribute to the evolution of more severe conditions and complications (Costa *et al*., 2022). Among the complications in pregnant women, the most observed has been emergency preterm birth, increasing the risk of maternal and neonatal death (Li *et al*., 2020).

Prematurity is responsible for more than one in five of all deaths of children under 5 years of age, and is considered an important indicator of maternal and child health (Ramos; Cuman, 2009; World Health Organization, 2023), reflecting socioeconomic conditions, aspects related to reproductive health, and the quality of care offered during prenatal care, childbirth, and newborn care (Kerber *et al*., 2015).

According to Formiga, Silva and Linhares (2018), prematurity and low birth weight are the main risk conditions associated with a longer period of hospitalization of the

newborn, leading to a series of challenges for the health and functionality of babies, due to biological fragility, and it is common to observe motor deficiencies resulting from the immaturity of the central nervous system (Santos *et al*., 2021).

It is worth mentioning another risk factor for prematurity, which is the low socioeconomic level (Cascaes *et al*., 2008), as it contributes to poor nutrition, greater physical and psychological stress, inadequate health care during pregnancy, among others. In addition, during the pandemic, among the measures adopted to contain contamination by COVID-19, social isolation impacted the health care of this population (Noronha *et al*., 2020; Anderson *et al*., 2020), with a consequent decrease in the continuity of prenatal consultations, putting the health of the mother and child at risk (Honorato, 2022).

Considering the biopsychosocial aspect, it is observed that social isolation limited the child's interaction with family and friends, causing deceleration, absence or delay in their development. The most observed changes in the child's behavior are difficulty concentrating, changes in sleep and eating patterns, greater attachment to parents, irritability, and greater exposure to screens, indicating the influence of the environmental context on the child's sensorimotor development (Da-Mata *et al*., 2020).

Based on these premises, it is necessary to take a comprehensive look to understand the impacts caused on infants born to mothers infected by the virus. To identify such impacts, it is important to use a multidimensional, multidirectional and dynamic instrument such as the International Classification of Functioning, Disability and Health (ICF). This is a biopsychosocial model, which in a multidisciplinary view of disability, allows us to understand the complex relationship between the individual's health condition, personal factors and external factors that influence their life, addressing four components: Body Functions and Structures, Activity and Participation, Environmental Factors and Personal Factors (Jardim, P; Jardim, K, 2022; World Health Organization, 2001).

Thus, the present study is justified by the scarcity of conclusive studies relating COVID-19 in pregnant women and its repercussions on infants, seeking to understand the biopsychosocial aspects of possible maternal and/or infant sequelae resulting from the infection.

The aim of the study was to identify the biopsychosocial profile of infants born prematurely, whose mothers were diagnosed with COVID-19 during pregnancy.

METHODOLOGY

This is a cohort study, which seeks to measure the risk that an exposure or risk factor can trigger a disease (Hochman *et al.,* 2005), of a descriptive nature with a qualitative-

quantitative approach, whose population was selected by convenience. This is part of the research project "*Evaluation and monitoring of the sensorimotor development of infants born preterm due to COVID-19 in pregnant women – Multicenter cohort study",* approved by the Research Ethics Committee (CAAE 58300622.6.0000.5154), opinion no. 5.487.649.

The inclusion criteria were: premature birth with a gestational age of less than 37 weeks, due to COVID-19 in the pregnant woman, chronological age of up to three years and eleven months, and authorization from parents/guardians to participate in the study through the signing of the Informed Consent Form (ICF). The non-inclusion criteria were non-compliance with the inclusion criteria, lack of response to contact, and non-acceptance to participate in the study. And, as an exclusion criterion, the absence on the date scheduled for the evaluation.

Based on a preliminary survey of hospitalizations in the NICU of the Clinical Hospital of a Federal University, in the State of Minas Gerais, the electronic medical records of pregnant women who tested positive for COVID-19 and progressed to premature birth were consulted. Thus, the eligible cases were selected for the study and the parents/guardians were contacted by telephone. During this contact, everyone was informed about the objectives of the study and invited to participate in the research. Those who agreed to participate signed the informed consent form authorizing the child's participation in the research. The scheduling for the evaluation was carried out according to the availability of those responsible, and the evaluation was carried out online by video call on *Google Meet* or in person.

The data on the children were obtained through an anamnesis, the parents or guardians also answered the questionnaire on socioeconomic criteria (ABEP, 2020), and then the interview with the *ICF (International Classification of Functioning, Disability and Health)* Checklist.

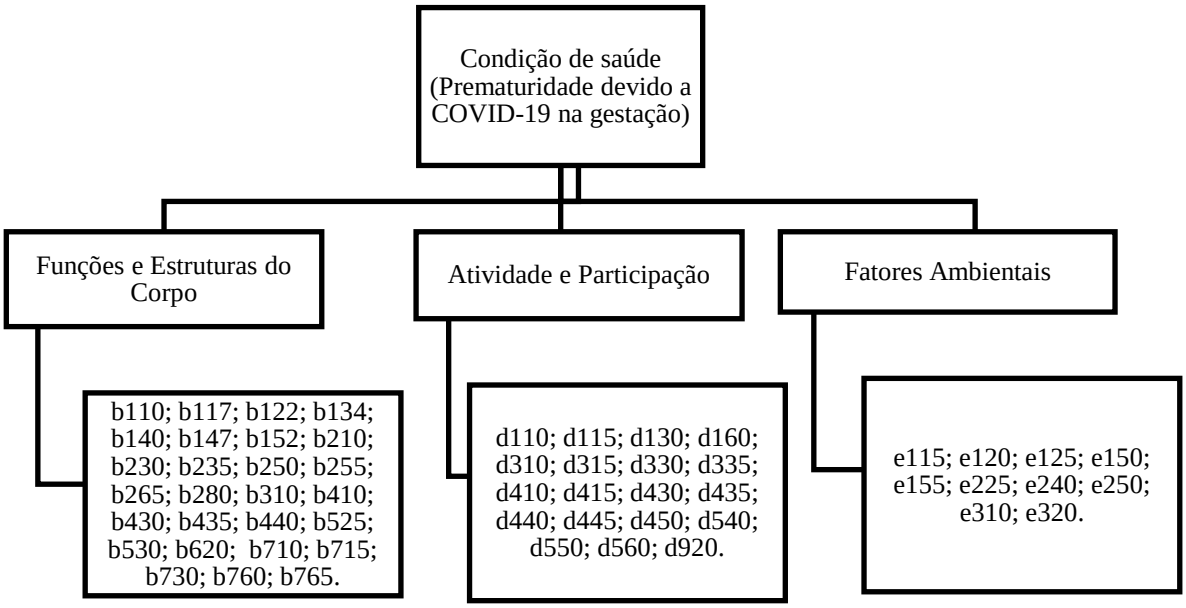
The evaluation was based on the biopsychosocial health model using the ICF and its specific variant for children and young people, the International Classification of Functioning, Disability and Health for Children and Young People (ICF-CJ). Both classifications categorize the main domains related to health aspects, covering Body Functions and Structures, as well as Activity and Participation. This approach also takes into account Environmental Factors and Personal Factors (WHO, 2011).

Based on the age group of the participants, the objectives of the study and the available scientific production, 56 categories were selected from the *ICF* Checklist, in order to collect data on: Body Functions and Structures (27 categories), Activity and Participation (19) and Environmental Factors (10), seeking to verify the biological and social

characteristics of the study population, as well as to identify health demands, describe and analyze the child's biopsychosocial and socioeconomic profile.

The data were analyzed according to the answers obtained in the previously selected categories following the following quantifiers: 0 – No disability/difficulty (0 - 4%); 1 – Mild disability / difficulty (5 – 24%); 2 – Moderate disability / difficulty (25 – 49%); 3 – Severe disability / difficulty (50 – 95%); 4 – Complete disability / difficulty (96 – 100%); 8 – Unspecified (Should be used whenever there is not enough information to specify the severity of the disability); 9 – Not applicable (Should be used in situations where it is inappropriate to apply a specific code) (Figure 1). In addition to the quantifiers, the different categories of Environmental Factors were considered as barriers (-) or facilitators (+).

Figure 1 – Interaction model of the ICF components and previously selected categories in each domain, Uberaba, MG, 2024.



Legend: b110 (functions of consciousness); b117 (intellectual functions); b122 (global psychosocial functions); b134 (functions of sleep); b140 (functions of attention); b147 (psychomotor functions); b152 (emotional functions); b210 (functions of vision); b230 (auditory functions); b235 (vestibular functions); b250 (gustatory function); b255 (olfactory function); b265 (tactile function); b280 (sensation of pain); b310 (voice functions); b410 (cardiac functions); b430 (functions of the hematological system); b435 (functions of the immune system; B440 (Breathing Functions); B525 (defecation functions); B530 (Weight Maintenance Functions); B620 (voiding functions); b710 functions related to joint mobility); B715 (stability of joint functions); B730 (functions related to muscle strength); B760 (functions related to the control of voluntary movement); B765 (functions related to the control of involuntary movement). D110 (observe); D115 (listen); D130 (imitate); D160 (focus attention); D310 (communicate and receive oral messages); D315 (communicate and receive non-oral messages); d330 (talk); d335 (produce non-verbal messages); D410 (change the basic body positions); D415 (maintain basic body position); D430 (lifting and transporting objects); D435 (moving objects with the lower limbs); D440 (fine hand motor activities); D445 (use of the hand and arm); D450 (floor); D540 (dressing); D550 (eat); D560 (drinking); D920 (Recreation and Recreation). E115 (products and technologies for personal use in daily life); E120 (products and technologies to facilitate mobility and personal transportation); E125 (products and technologies for communication); E150 (architecture, construction, materials and architectural technologies in public buildings); e155 (architecture, construction, materials and architectural technologies in private buildings); E225 (weather); E240 (light); E250 (sound); E310 (close family); E320 (friends).
Source: The authors (2024).

The answers obtained were stored in a database in *Excel® format for later analysis. The data were submitted to descriptive statistics identifying absolute and relative frequency, position measures (mean and median) and variability (standard deviation).*

RESULTS

Based on the survey of NICU admissions in the period between 2021 and 2022, 317 medical records were consulted. Of these, 29 were eligible for the study, but only 10 mothers agreed to participate in the study, one of them with twin birth, totaling 11 participants. Table 1 shows the sociodemographic and clinical-functional profile of the participants.

Table 1 - Sociodemographic and clinical-functional profile of the infants evaluated, Uberaba, MG, 2024.

Variable	N (total = 11)	Frequency (%)
Gender		
Female	4	36,36%
Male	6	54,54%
Gestational Age		
Between 28 to 32 weeks and six days	6	54,54%
Between 32 to 36 weeks and six days	5	45,45%
Birth Weight		
Between 2499 and 1500 grams	6	54,54%
Between 1499 and 1000 grams	5	45,45%
Apgar 1st minute		
Greater than 7	7	63,63%
Less than or equal to 7	4	36,36%
Apgar 5th minute		
Less than 7	3	27,27%
Greater than or equal to 7	8	72,72%
Length of Stay		
Less than or equal to 30 days	3	27,27%
Longer than 30 days	8	72,72%
Jaundice		
Yes	9	81,81%
No	2	18,18%
Need for resuscitation		
Yes	5	45,45%
No	6	54,54%
Because		
Yes	8	72,72%
No	3	27,27%
O2 supplementation		
Yes	8	72,72%
No	3	27,27%
Non-invasive ventilation		
Yes	7	63,63%
No	4	36,36%
Mechanical Ventilation		
Yes	3	27,27%
No	8	72,72%

Source: The authors (2024).

Table 2 presents the sociodemographic and clinical-functional characterization of the 10 mothers who participated in the study.

Table 2 - Sociodemographic and clinical-functional profile of the pregnant women evaluated, Uberaba, MG, 2024.

Variable	N (total = 10)	Frequency (%)
Age		
Older than 27 years	4	40%
Less than or equal to 27 years old	6	60%
Schooling		
Fundamental I	1	10%
Fundamental II	1	10%
Medium	6	60%
Superior	2	20%
Infection period		
Less than or equal to 25 weeks of GA	4	40%
Greater than 25 weeks of GI	6	60%
Symptoms		
Difficulty breathing	5	50%
Dry cough	4	40%
Fever	4	40%
Headache	4	40%
Complications		
Bradicardia fetal	2	20%
IUGR	2	20%
Preeclampsia	2	20%

Legend: GA – gestational age; IUGR – intrauterine growth restriction.
Source: The authors (2024).

The socioeconomic conditions of the 11 participants were obtained from the ABEP questionnaire (2020), with 63.63% having an average family income of R$1,805.91 (Class C2) and 18.18% having an average family income of R$5,449.74 (Class B2), as shown in table 3.

Table 3 – Socioeconomic classification of participants according to ABEP, Uberaba, MG, 2024.

Participants	Punctuation	Classification
1	23	C1
2	19	C2
3	21	C2
4	20	C2
5	29	B2
6	29	B2
7	20	C2
8	21	C2
9	22	C2
10	17	C2
11	34	B2

Legend: ABEP classification: A - 45 to 100 points; B1 – 38 to 44 points; B2 – 29 to 37 points; C1 – 23 to 28 points; C2 – 17 to 22 points; D/E – 0 to 16 points.
Source: The authors (2024).

Regarding the *ICF Checklist* , in the "Body Functions and Structures" component, it was possible to observe that 45.45% of the participants presented alterations in categories

b140, b152 and b440; 27.27% of the participants in categories b122, b134, b235, b280 and b435 (Table 4).

Table 4 – Results related to the "Functions and Structures of the Body" component, according to the number of participants who presented changes in relation to disability in the respective items, Uberaba, MG, 2024.

Categories	No	Lightweight	Moderate	Grave	Complete	Frequency (%)
Intellectual Functions (b117)	10	1	0	0	0	9,09
Global Psychomotor Functions (b122)	8	2	0	1	0	27,27
Sleep Functions (b134)	8	1	1	0	1	27,27
Attention Functions (b140)	6	2	3	0	0	45,45
Psychomotor Functions (b147)	9	1	0	1	0	18,18
Emotional Functions (b152)	6	2	2	0	1	45,45
Vision Functions (b210)	0	0	1	0	0	9,09
Vestibular Functions (b235)	8	2	1	0	0	27,27
Gustatory Function (b250)	11	0	1	0	0	9,09
Touch Function (b265)	0	2	0	0	0	18,18
Pain Function (b280)	8	0	3	0	0	27,27
Voice Functions (b310)	9	1	1	0	0	18,18
Cardiac Functions (b410)	9	1	0	1	0	18,18
Functions of the Hematology System (b430)	10	0	1	0	0	9,09
Functions of the Immune System (b435)	8	0	1	1	1	27,27
Breathing Functions (b440)	6	3	0	1	1	45,45
Defecation Functions (b525)	7	2	2	0	0	36,36
Weight Maintenance Functions (b530)	9	1	1	0	0	18,18
Joint Mobility Functions (b710)	10	0	0	1	0	9,09
Joint Stability Functions (b715)	10	0	0	1	0	9,09
Functions of Muscle Strength (b730)	10	1	0	0	0	9,09
Functions of Voluntary Motion Control (b760)	9	0	2	0	0	18,18
Functions of Involuntary Movements (b765)	10	0	1	0	0	9,09

Source: The authors (2024).

In the "Activity and Participation" component, the results showed that 81.81% of the participants presented alterations in the "Dressing" category, with 6 participants qualifying it as moderate disability, and 45.45% in the "Speaking" category (Table 5).

Table 5 – Results related to the "Activity and Participation" component, according to the number of participants who showed changes in relation to disability in the respective items, Uberaba, MG, 2024.

Categories	No	Light weight	Moderate	Grave	Complete	Frequency (%)
Imitate (d130)	10	0	0	1	0	9,09
Focus Attention (d160)	10	0	1	0	0	9,09
Communicating and Receiving Oral Messages (d310)	9	0	0	2	0	18,18
Communicating and Receiving Non-Verbal Messages (d315)	7	0	1	0	3	36,36
Talking (d330)	6	1	1	0	3	45,45
Producing Non-Verbal Messages (d335)	8	0	1	0	2	27,27
Change Basic Body Position (d410)	10	1	0	0	0	9,09
Floor (d450)	8	1	0	2	0	27,27
Dress-Up (d540)	2	0	6	2	1	81,81
Eat (d550)	8	1	1	1	0	27,27
Beber (d560)	10	0	0	1	0	9,09
Recreation & Recreation (d920)	8	0	1	1	1	27,27

Source: The authors (2024).

Regarding the facilitators and barriers of the "Environmental Factors" component (Table 6), the categories "Close family" (90.90%) and "Friends" (72.72%) stood out as facilitators, and the "Climate" category (72.72%) stood out as barriers. On the other hand, the "Light" category was scored as a barrier for 9.09%, but also as a facilitator for 27.27%, indicating diversity in the context and reality of each participant.

Table 6 – Results referring to the categories of the "Environmental Factors" component considering it to be a facilitator or barrier, Uberaba, MG, 2024.

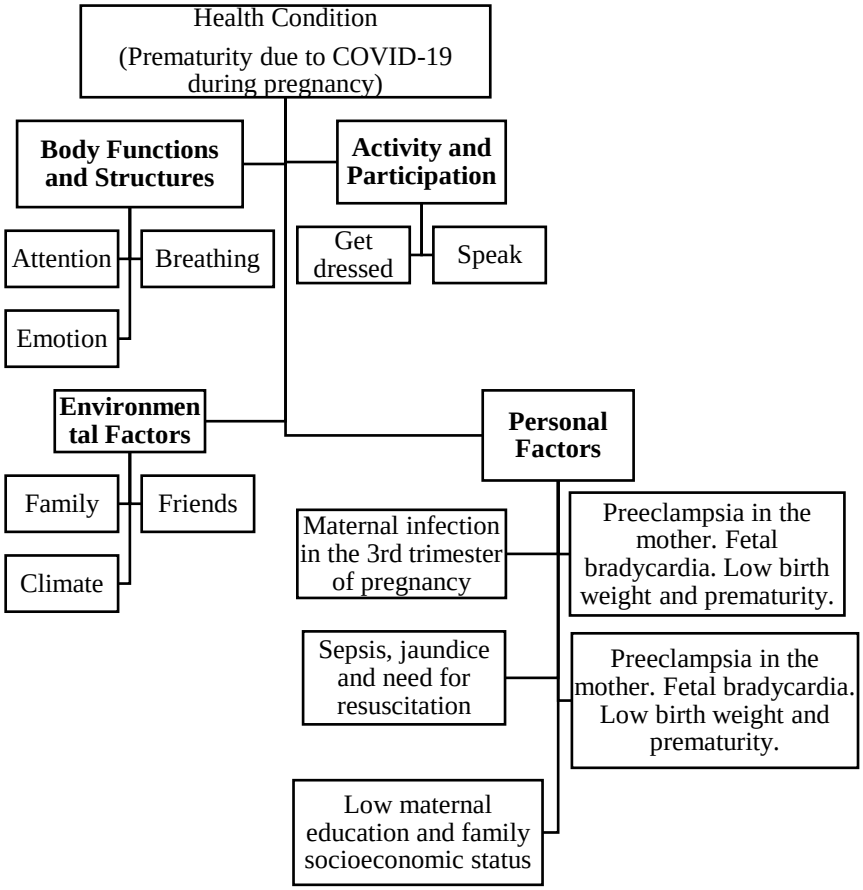
Categories	Facilitator	Barrier	None
Products and Technologies to Facilitate Mobility and Personal Transport (e120)	1	0	10
Architecture, Construction, Materials and Architectural Technologies in Public Buildings (e150)	0	2	9
Climate (e225)	0	8	3
Light (e240)	1	3	7
Sound (e250)	0	3	8
Close Family (e310)	10	1	0
Friends (e320)	8	1	2

Source: The authors (2024).

In summary, the profile of the study population is the low socioeconomic level of the family, higher incidence of infection of the mother by COVID-19 at the beginning of the third trimester of pregnancy, with complications in the pregnant woman and repercussions on the fetus and baby. In addition, the little social interaction due to the isolation imposed by the pandemic significantly influenced the development of infants. Negative aspects were also found in functionality (alterations in attention, breathing and emotional issues), disability (difficulty in dressing, verbal communication and social interaction) and health (prematurity,

low birth weight, longer hospitalization, need for resuscitation and ventilatory support and greater predisposition to sepsis and jaundice) (Figure 2).

Figure 2 – Biopsychosocial profile of infants whose mothers were infected with COVID-19 during pregnancy, Uberaba, MG, 2024.



Source: The authors (2024).

DISCUSSION

The identification of risk conditions for sensorimotor development, as early as possible, allows the planning of strategies in order to mitigate the impact of future consequences on the child. Seeking to contribute to a comprehensive look at the health condition of infants born prematurely due to COVID-19 during pregnancy, the present study aimed to outline the biopsychosocial profile of this population, and, to this end, used the biopsychosocial approach through the *ICF* checklist.

It is known that prematurity and low birth weight are risk conditions for newborns and infants, as it requires a longer hospitalization period and, consequently, greater exposure to external factors that can compromise their development (Formiga; Silva; Linhares, 2018). Such conditions have also been considered for those born due to complications of COVID-19 during pregnancy.

Considering the classification of premature infants according to the WHO (2023), it was found in the present study that 54.54% of the children were born very prematurely (with a gestational age between 28 and 31 weeks and six days) and 45.45% moderately preterm (between 32 and 36 weeks and six days). In addition, six children had low birth weight (between 2499 and 1500 grams) and five had very low birth weight (between 1499 and 1000 grams) (Brasil, 2023), which contributed to the longer hospitalization time of infants, in addition to greater exposure to harmful external factors. These results corroborate what has been described in the literature on the consequences of pregnant women's infection with COVID-19 in the fetus, such as: prematurity, fetal distress, low birth weight, need for ventilation, and hospitalization in the NICU (Wastnedge *et al*., 2021; Dávila-Aliaga *et al.,* 2021).

Regarding the complications observed during hospitalization, such as neonatal jaundice (81.81%), sepsis (72.72%), and need for resuscitation (45.45%), similarities were found with the study by Ferrugini et al. (2022), observing the frequency of unfavorable outcomes in pregnant women exposed to the virus, higher incidence of newborn resuscitation, and jaundice. Among the complications observed, respiratory complications stand out, requiring O2 supplementation (72.72%), noninvasive ventilation (NIV) (63.63%), and mechanical ventilation (27.27%), such results are similar to those observed in studies on the subject, with the need for ventilatory support by means of continuous positive airway pressure (CPAP), due to respiratory distress in the newborn (Gidlof *et al.,* 2020; Diaz *et al*., 2020).

Regarding the period of contamination by COVID-19 in pregnant women, it was found that on average it was at 26.82 (±5.40) weeks of gestational age, that is, the beginning of the third trimester of pregnancy, a period considered at risk for complications, including fetal and neonate death, thus confirming the increased severity and risk of the disease in pregnant women (Zaigham; Andersson, 2020). Among the complications in the mothers of the study participants, in addition to emergency preterm birth (100%), which in itself already increases the risk of maternal and neonatal death (Li *et al*., 2020), preeclampsia was also observed in the mother (20%), and in the fetus IUGR and bradycardia (20%), confirming what has been described in the literature, that such complications compromise the oxygenation and well-being of the fetus (Dashraath *et al.,* 2020; Elshafeey *et al.,* 2020).

The most frequent symptoms reported by the mothers in the present study were difficulty breathing, dry cough, fever and headache, and only one mother had associated comorbidity. The same symptoms were also observed in the study by Costa et al. (2022),

highlighting headache followed by cough as the first symptoms, and approximately 85% of pregnant women had no associated comorbidities.

According to socioeconomic status, most participants were found to fall into Class C2, confirming the association between low socioeconomic status and the incidence of preterm birth (Cascaes *et al*., 2008; Almeida *et al.,* 2012), added to the higher risk of contracting COVID-19 due to social vulnerability.

Another important factor is the mother's level of education, which may be related to the structuring of an environment favorable to children's motor development (Corsi *et al.,* 2016). According to Dinkel, Snyder and Cacola (2017), there is a correlation between the economic factor, the level of education of the parents, the high number of premature births, the predisposition to neuromotor alterations, and, consequently, delay in motor development, so it is important to understand the contextual factors to the child's development, in order to establish strategies in relation to child care. In the present study, despite the socioeconomic classification of the families, it was observed that 60% of the mothers had completed high school or incomplete higher education, which may have contributed to greater care and prevention of delays in the infants in the study.

Considering that social isolation was, among other measures, the most adopted to control the transmission of COVID-19, the repercussion of the child's proximity to family members, as well as the distance from friends, significantly impacting children's motor development (Da-Mata *et al*., 2020), is noticeable. These repercussions were also observed in our study, where 90.90% of the answers indicated the proximity to the family as a facilitator for life and, as a barrier, 27.27% considered the lack of contact with friends.

It is worth mentioning that children's behavioral changes can be observed and attributed to the little social interaction imposed by the pandemic, highlighting among these, difficulty concentrating, changes in sleep and eating patterns, greater attachment to parents, irritability, and greater exposure to screens (Da-Mata *et al*., 2020). Such changes were also observed in the present study, where 27.27% of the participants reported changes in relation to sleep and 45.45% in relation to attention and speech, results similar to those observed in the study by Evaristo, Queiroga, and Capellini (2023).

Based on the results observed, despite the limitation due to the small number of participants in the study, it is possible to affirm the importance of continuous surveillance of the development of children born during the COVID-19 pandemic whose mothers were infected by the virus, as there are several factors that can contribute to global developmental delay, in addition to prematurity and low weight.

FINAL CONSIDERATIONS

The results allowed us to verify a risk profile for delays in neurosensorimotor development in the population studied, justifying the need and importance of expanding public health policies for newborns and infants at risk due to exposure to COVID-19. The identification of possible risks guides the early and personalized planning of strategies, considering individuality, family and social context, seeking to mitigate and/or prevent impacts on development and also implement monitoring and early intervention measures.

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IMPACT OF THE COVID-19 PANDEMIC ON THE DIAGNOSIS AND TREATMENT OF CANCER PATIENTS IN THE STATE OF SERGIPE

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ABSTRACT

Objective: This study conducted in Sergipe aimed to investigate the impacts of the COVID-19 pandemic on the diagnosis and treatment of cancer patients. Methods: A quantitative cross-sectional study of an observational-analytical nature was carried out, involving a sample of the oncology population exposed to the public emergency of COVID-19. Data collection initially took place through an electronic questionnaire disseminated by WhatsApp, later carried out in person in the waiting rooms of two public hospitals in Sergipe, due to low electronic adherence. The questionnaire included 22 objective multiple-choice questions about oncological disease and COVID-19. Results: A total of 103 individuals participated in the study, with a mean age of 56.2 years. Men were older than women (p=0.049). Breast cancer was the most prevalent, followed by head and neck cancer. The reported feelings included sadness, fear, anxiety and nervousness when they received the cancer diagnosis. Positive testing for COVID-19 was reported by 42.7% of the participants. Conclusion: No significant impacts were observed on the diagnosis and treatment of neoplasms during the COVID-19 pandemic, despite changes in health services. Participants reported no absences or interruptions in cancer treatment, maintaining medical appointments and performing exams as needed.

Keywords: Cancer. COVID-19. Quality of Life.

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INTRODUCTION

The global COVID-19 pandemic, triggered by the SARS-CoV-2 coronavirus, has brought a number of significant challenges and transformations to society since 2019. To mitigate the spread of the virus, control and prevention measures were implemented, such as social distancing, the use of masks, and the suspension of non-essential services (1). While these policies have been essential, they have generated significant impacts on society, with particularly adverse effects for individuals with cancer.

Before the pandemic, cancer was already one of the leading causes of global morbidity and mortality, responsible for 9.6 million deaths in 2018, consolidating itself as the second leading cause of death worldwide (2). However, COVID-19 has added a new layer of complexity and concern for cancer patients, healthcare professionals, and healthcare systems at large. Access to health services has been hampered by the reallocation of resources and teams to address the health emergency, resulting in the cancellation of consultations, exams, and surgeries. This scenario may have worsened the prognosis of several diseases (3).

The oncology sector, in particular, has faced and continues to face significant repercussions due to the complex interplay between cancer and the COVID-19 pandemic. It is believed that there have been delays in screening and intervention schedules (4). The pandemic has exposed a critical dilemma between maintaining screening services and the risk of spreading the virus, even as advances in immunization have improved the epidemiological landscape of COVID-19-related cases and deaths (5).

In the current global epidemiological scenario, it is essential to investigate the impacts of the COVID-19 pandemic on the diagnosis and treatment of cancer patients. There are indications of a possible reduction in medical procedures and follow-up appointments, which may result in a significant increase in late cancer diagnoses and, consequently, a higher mortality rate in the coming years. Analyzing these repercussions allows us to identify effective approaches to mitigate the adverse consequences of the pandemic on the health and well-being of these patients, in addition to contributing to the improvement of public health guidelines and clinical procedures aimed at combating cancer during health crises. Therefore, this study aims to investigate the impact of COVID-19 on cancer diagnosis and treatment.

MATERIAL AND METHOD

This is a cross-sectional study, with a quantitative approach and observational-analytical character, conducted with a sample of the oncological population exposed to the

public emergency of COVID-19. The research was approved by the Research Ethics Committee (CEP), under registration protocol 57272922.0.0000.5546 and opinion No. 5.635.258. All participants were duly informed about the scope and objectives of the study and, after detailed explanation, provided consent for participation. The ethical procedures adopted followed resolutions 466/2012 and 510/2016 of the National Health Council, in addition to the provisions related to the protection of personal data established in the General Data Protection Law (LGPD) - Law No. 13,709, of August 14, 2018.

Data collection was carried out through an electronic questionnaire hosted on Google Forms, chosen to optimize the efficiency in information collection (6). The questionnaire was answered by participants diagnosed with cancer between the years 2019 and 2021, after the beginning of the COVID-19 pandemic.

Data collection took place during the relaxation phase of social distancing measures, between 2022 and 2023. During this period, the establishments were operating normally, and the population had resumed face-to-face activities (7). In addition, the immunization campaign against COVID-19 was already at an advanced stage.

The research was disseminated through online platforms, including WhatsApp groups of the responsible researchers and emails sent to members of the scientific community. Initial adherence was limited, which led to the formation of partnerships with the oncology sectors of two public hospitals in Sergipe to expand dissemination. With the authorization of these hospitals, the disclosure was carried out in person in the waiting rooms of the oncology sector, where interested parties received the link to the questionnaire by email or phone.

The study protocol included a questionnaire with 22 objective multiple-choice questions, prepared by the researchers, and structured as follows:

- Identification of participants: Gender, age and state of residence in Brazil.
- Aspects related to oncological health: Medical diagnosis of neoplasia, emotional aspects associated with the discovery of cancer, type of cancer diagnosed, type of cancer treatment performed, and presence of metastasis.
- General health-related information: Positive test for COVID-19, protective mask wearing practices, continuity of cancer treatment during the pandemic, history of immunization against COVID-19, and comorbidities considered risk factors for COVID-19, such as obesity, diabetes mellitus, heart disease, respiratory diseases, hypertension, and other chronic diseases.

- Quality of life: Level of satisfaction with the quality of life related to cancer treatment during the pandemic, measured by the Likert scale, from 1 (very poor) to 10 (very good).

Eligibility criteria included:

- Age 18 years or older.
- Residence and domicile in the state of Sergipe.
- Ability to access the questionnaire through Google Forms.
- Self-report of medical diagnosis of cancer.
- Oncological treatment between 2019 and 2021.

Participants who did not complete all the questions on the questionnaire, who did not report a history of oncological disease, who did not self-report antineoplastic treatment between 2019 and 2021, or who were not residents and domiciled in the state of Sergipe were excluded.

For the statistical analysis of the collected data, the Statistical Package for Social Sciences (SPSS) software, version 20, was used. The level of statistical significance was set at 5% ($P<0.05$) to determine the means, and the data were presented as values with standard deviation. Statistical analyses included Student's t-test and two-way Analysis of Variance (ANOVA). The dependent variable considered was testing positive for COVID-19, while the independent variables included gender, age, type of cancer treatment, mask use practices, history of immunization against influenza and COVID-19, and presence of comorbidities.

RESULTS

A total of 110 individuals were interviewed, 49 in virtual format and 61 approached in person in the waiting room of the oncology sector of two public hospitals in Sergipe. In the face-to-face approach, after accepting to participate in the research, the researchers sent the virtual questionnaire to WhatsApp or via the participant's email to be filled out.

In the analysis of the responses, 103 participants were considered eligible. The mean age of the participants was 56.2 years (±16.80), and 55.3% were female. There was a statistically significant difference in age between men and women, with males presenting a more advanced mean age (61.18 years) when compared to females (49.52 years), with a p value of 0.049 (Student's T).

Regarding the types of cancer, the most prevalent was breast cancer, followed by head and neck cancer, with a statistically significant difference for these cancers related to

the others (p<0.001). In addition, the type of treatment most commonly indicated by the medical team was chemotherapy concomitant with radiotherapy (p<0.001) (Student's T).

Among the self-reported feelings of the interviewees when receiving the diagnosis of cancer were sadness, fear, anxiety and nervousness. However, a major effect of these emotional feelings on cancer diagnosis was not identified [F(4, 1.030) = 1.027, p=0.396], according to the results of analysis of variance (ANOVA). Data elucidated in Table 1.

Table 1. Distribution of participants with self-reported cancer related to gender, oncological diagnosis, type of cancer and treatment performed (n=103).

Variables	n (%)	p (value)
Sex		0,278
Female	57 (55,3)	
Male	46 (44,7)	
Type of cancer		0,000*
Breast	25(24,3)	
Head and neck	24 (23,3)	
Prostate	13 (12,6)	
Marrow	11(10,7)	
Lung	6(5,8)	
Intestine	4(3,9)	
Stomach	3(2,9)	
Liver	3(2,9)	
Leukaemia	3(2,9)	
Skin	3(2,9)	
Uterus	3 (2,9)	
Thyroid	2(1,9)	
Esophagus	1(1,0)	
Ovary	1(1,0)	
Pancreas	1 (1,0)	
Type of antineoplastic treatment performed		0,000*
Exclusive chemotherapy	39 (37,9)	
Exclusive radiation therapy	10 (9,7)	
Quimiotherapy and concomitant radiotherapy	54 (52,4)	
Emotional aspects related to the discovery of cancer		0,396
Sadness	21 (20,4)	
Nervousness	13 (12,6)	
Anxiety	15 (14,6)	
Indifferent	24 (23,3)	

Self-reported positive testing for COVID-19 was recorded in 42.7% (n=44) of the participants and no statistically significant difference in ages was observed between the groups of participants with positive tests {54.02 years (±18.33)}, and negative tests {57.85 years (±15.53)}.

It was observed that fear of contracting COVID-19 was present among those who self-reported testing positive for SARS-COV 2. However, despite this fear, the majority (63.1%) did not fail to attend medical appointments (Table 2).

Table 2. Comparison of participants with self-reported positive (n=44) and negative tests for COVID-19 (n=59) related to the variables: gender and cancer treatment

Variables	Positive test for COVID-19 n(%)	Negative Test for COVID-19 n(%)	p (value)
Gender			0,321
Female	27 (61,4)	30 (50,8)	
Male	17 (38,6)	29 (49,2)	
Self-report of metastasis			0,155
Yes	13(29,5)	10(16,9)	
No	31 (70,5)	49 (83,1)	
Cancer discovery			0,283
Before the pandemic (January and February 2019)	6(13,6)	15(25,4)	
During the pandemic (March 2019 to 2021)	34(77,3)	41(69,5)	
In the year 2022	4(9,1)	3(5,1)	
During the pandemic, did you carry out medical exams and consultations?			0,174
Yes, without fear of contracting COVID-19	9(20,5)	22(37,3)	
Yes, afraid of contracting COVID-19	32(72,7)	33(55,9)	
No, afraid of contracting COVID-19	3(6,8)	4(6,8)	
During the pandemic, did you undergo chemotherapy/radiotherapy?			0,459
Yes, without fear of contracting COVID-19	12(27,3)	23(39,0)	
Yes, afraid of contracting COVID-19	30(68,2)	34(57,6)	
No, afraid of contracting COVID-19	2(4,5)	2(3,4)	
In the pandemic, did you miss chemotherapy/radiotherapy sessions?			0,440
There was never a lack of	34(77,3)	50(84,7)	
He was absent because he felt sick as a result of the treatment	4(9,1)	2(3,4)	
He was absent for fear of contracting COVID-19	6(13,6)	7(11,9)	
During the pandemic, did you carry out medical exams and consultations?			0,174
Yes, without fear of contracting COVID-19	9(20,5)	22(37,3)	
Yes, afraid of contracting COVID-19	32(72,7)	33(55,9)	

Among the participants who tested positive for COVID-19, 22.7% reported needing to be hospitalized ($p<0.001$). In addition, many participants indicated that they contracted the disease while attending closed environments, as shown in Table 3.

Regarding the general health status of the participants, assessed using a Likert scale, the average was 7.88 (±1.43) for the group that tested positive for COVID-19. These results suggest a positive assessment of the participants' general health status.

Table 3. Comparison of participants with self-reported positive (n=44) and negative COVID-19 (n=59) tests related to contamination, COVID-19 care, as well as immunization

Variables	Positive test for COVID -19 n(%)	Negative test for COVID-19 n(%)	p (value)
Do you think you contracted COVID-19 in			0,000*
Hospital for cancer treatment	6(13,6)	------	
Indoor environments such as markets, shops, etc	22(50,0)	-----	
Family member who visited the participant	16(36,4)	------	
He wore a protective mask			0,562
Yes, in all locations	16(36,4)	27(45,8)	
Yes, indoors only	20(45,5)	21(35,6)	
No	8(18,2)	11(18,6)	
COVID-19 Immunization			0,467
Two doses	6(13,6)	8(13,6)	
Booster dose	38(86,4)	49(83,1)	
Not immunized	0	2(3,4)	
After immunization, did the fear of contracting COVID-19 persist?			0,218
Yes	15(34,1)	20(33,9)	
Yes, but safer with the vaccine	15(34,1)	12(20,3)	
No	14(31,8)	27(45,8)	

DISCUSSION

The present research reflects the reality of the state of Sergipe, located in the northeast of Brazil. Sergipe is the smallest state in territorial extension in the country, covering approximately 0.26% of the national territory, with an estimated population of about 2,210,004 inhabitants. This geographic and demographic contextualization is crucial to understand the applicability of the results obtained in the regional context of Sergipe (8).

The mean age of the participants diagnosed with cancer was 56.2 years, which is similar to the findings of national studies that indicate a predominant incidence in the population over 50 years of age (9,10). Data from the Individualized Production Bulletin (BPA-I) system revealed an age group of 55 to 59 years during the three-year period from 2020 to 2022 (11). In contrast, the literature documents that most cancers arise in individuals over 60 years of age, due to biophysical changes in the cell matrix in this age group, which contribute significantly to tumor development (12). However, it is crucial to consider the contemporary factors that impact the general population, such as tobacco use, obesity, lack of physical activity, excessive alcohol consumption, a diet low in fruits and vegetables, exposure to infectious agents, and excessive sun exposure, all of which are predisposing to the development of malignant tumors. These data elucidate the findings related to the incidence of cancer in the population under 60 years of age (13).

There was a disparity in the mean age between men (61.15 years) and women (49.52 years). The literature reports that the incidence of cancer in the male population

often occurs in those over 65 years of age (14). On the other hand, in the female population, 43% of cancer diagnoses occur in individuals under 50 years of age. This data highlights a significant age difference at the time of diagnosis between genders (15). Studies indicate that the prevalence of cancer is higher in the population over 60 years of age, regardless of gender. However, when looking at significant variations between genders, it is essential to consider that cancer incidence is influenced by several factors, such as genetic predisposition, exposure to carcinogens, lifestyle, and hormonal factors, which may differ between men and women (13).

In the population studied, breast cancer accounted for 24.2% of the cases, followed by head and neck cancer (23.3%) and prostate cancer (12.6%). These results are in line with the regional estimates of the Department of Informatics of the Unified Health System (DataSUS), which indicate that prostate cancer represents 38.1% of cancers in the male population of the Northeast region, while breast cancer corresponds to 28.1% of diagnoses in the female population of the same region (11). Annual estimates for 2023 also report that head and neck cancer in the Northeast ranks second in prevalence, with approximately 10,070 new cases (16)

It was observed that 52.4% of the patients interviewed underwent combined treatment. It is important to note that each therapeutic approach is individually selected by the medical team. The rationale for implementing combination therapies lies in the ability to employ different mechanisms of action, thereby reducing the likelihood of developing resistant cancer cells (2). In addition, cancer treatments vary considerably, depending on the type of cancer, the stage of the disease, and the individual needs of each patient. In many clinical situations, the use of multiple treatment modalities is necessary to maximize efficacy in the fight against cancer (17).

It is well documented that cancer has a comprehensive and significant impact on the physical and mental health of individuals, in addition to affecting their social conditions and quality of life(18). The disease is seen as a significant threat, triggering feelings of helplessness, hopelessness, fear and apprehension, often accompanied by depression due to the difficulty in accepting the diagnosis (19,20). In the present study, 29.1% of the participants reported fear, 20.4% sadness, 12.6% nervousness and 14.6% anxiety at the time of diagnosis, feelings involved in the process of discovering cancer. Studies in the field of psychology show that 80% of cancer patients report emotional changes that can culminate in depression during the clinical process (19).

These feelings tend to intensify in the face of the uncertainties of the COVID-19 pandemic, adding to the fear of contracting the virus. In the self-report of the participants in

this study, 69.9% expressed fear of contracting COVID-19. The literature also points to negative feelings, such as sadness, depression, and anxiety, in a large part of the population during the pandemic period (21,22). It is known that cancer patients belong to the risk group and are more susceptible to respiratory tract infections due to systemic immunosuppression caused by cancer treatment and by the disease itself (23)

The results showed that, despite the risk of contracting COVID-19, more than half of the patients regularly attended appointments and exams. It is believed that the fear of worsening the prognosis of the cancerous disease is the main factor for this impairment, since delays in the initiation of cancer treatment or its interruption significantly increase the risk of cancer failure and mortality (24). For example, a 60-day delay in starting procedures increases the risk of death by 26% (25).

To mitigate the effects of social distancing measures, public health actions related to the planning of new cancer diagnoses were developed by the Division of Early Detection and Support to the Network Organization of INCA (Didepre). Initially, it was proposed to postpone the performance of screening tests during the peak of contamination. However, with the update of the guidelines, the flexibility for carrying out elective procedures in general was published. Actions related to cancer diagnosis and screening significantly impacted the lives of the population during the first year of the pandemic and negatively affected cancer care, with potential long-term repercussions. (26,27).

The literature reports significant reductions in breast cancer diagnosis, as well as in medical consultations with mastologists, in the performance of ultrasound and mammography exams, in addition to biopsies and surgeries during the pandemic period. However, it was observed in 2020 that the supply of chemotherapy and radiotherapy was not affected. Despite delays in diagnosis and treatment due to cancellations of procedures considered non-essential, 77.3% of the patients in this survey were able to receive the diagnosis during the pandemic. This high percentage is remarkable, even with the decrease in screening and diagnosis by the SUS (28)

The survey also showed that despite the fear (63.1%) of contracting COVID-19, many (42.7%) tested positive at some point during treatment. It is observed that the fear of contamination was predominant in the population as a whole, and not only among those who were part of the risk group, all of whom were susceptible to contracting SARS-Cov2 (29).

Among cancer patients affected by COVID-19, 22% reported having been hospitalized and having undergone advanced clinical procedures to combat SARS-CoV-2. It is known that cancer patients are considered a risk group and have a greater predisposition

to develop severe forms of COVID-19 due to immunosuppression (23). They have a 3.5-fold increased risk of requiring mechanical ventilation and ICU stay, compared to patients without neoplastic disease (30). In addition, 41.7% of the participants reported having comorbidities, such as metabolic and heart diseases, factors that aggravate the clinical conditions of COVID-19. In addition, 26.2% of the participants were elderly.

In the post-pandemic period, 39.8% of participants reported using masks exclusively indoors as personal protective equipment. This data suggests a high adherence to the use of masks in these environments, even after the release of the use by government agencies, and this is one of the measures proven to be efficient to reduce contagion (31) .

Of the participants, 98.1% received at least two doses of immunization against COVID-19, corroborating the recommendations of the SUS on the importance of priority immunization of the risk group. Vaccination adherence was especially high in the onco-hematological population (32). However, 34.1% of the patients in the present study expressed fear after immunization, despite feeling safer. This fear can be attributed to the perception that the vaccine was developed quickly due to the global state of emergency, generating distrust as to its effectiveness with possible side effects

Of the total number of participants, 81.5% reported having undergone cancer treatment uninterruptedly, even during periods of social isolation. The hospitals ensured the continuity of treatment, despite the decrease in the number of patients, and used appropriate strategies to ensure the physical and mental integrity of the patients (24). This behavior demonstrates the resilience and commitment of health services, indicating the effectiveness of the strategies implemented to maintain the continuity of treatment in adverse conditions.

Since 1863, the importance of a safe hospital environment for the patient has been emphasized, highlighting aspects such as good lighting, cleanliness, ventilation, temperature, care with odors and noise, prioritization of isolation, and reduction of beds per ward (33). Such actions were rigorously carried out during the pandemic and contributed to the improvement of health conditions. Therefore, Florence Nightingale's environmentalist theory has never been as present as in this pandemic period, which helped in the continuity of care in treatment during the pandemic (34)

It is pertinent to note that cancer, a condition with no definitive cure, affects millions of people globally and is one of the leading causes of mortality. Despite the global emergency caused by the COVID-19 pandemic and the significant changes in the routine of health services, the fight against cancer has remained robust and efficient. Interestingly, patient testimonials suggest that the fear associated with cancer outweighs, in many cases, the

concern about COVID-19. This can be attributed to the long history of the oncological disease, which lacks a definitive cure, contrasting with the COVID-19 pandemic, which offers prospects for control through immunization. This insight highlights the complexity of cancer patients' emotions and priorities, pointing to the need for personalized and sensitive approaches in public health contexts.

Among the limitations of this research is the system used in data collection. Dissemination in digital media has not effectively reached the general population, especially the elderly, who often face difficulties in the functional use of digital media. Due to low adherence, data collection had to be carried out in person at hospitals, proving to be more effective in this context than the digital approach.

In addition, because it is a disease about which the population avoids talking or sharing their doubts and emotions, some participants did not complete the questionnaire. Therefore, it is essential that future research deepens the study of the impact of the COVID-19 pandemic on cancer patients, providing a more detailed analysis of this interaction.

CONCLUSION

Of the participants, 42.7% reported having tested positive for COVID-19. The vast majority wore masks and were immunized with the booster dose, demonstrating adherence to the recommended preventive measures.

The present research elucidates that no significant impacts were observed in the conduct of the diagnosis and treatment of neoplasms, even in the face of changes in the functioning and systematics of health services during the pandemic. It was found that the participants maintained regularity in medical consultations, exams and oncological treatments made available by the public health service, without significant interruptions.

COLLABORATORS

Oliveira, P. F. contributed with the conception and design or analysis and interpretation of the data; is responsible for all aspects of the work in ensuring the accuracy and completeness of any part of the work; responsible for the final approval of the version to be published. 4. Nascimento, F.C and Santos, M.E.A contributed to the writing of the article and Silva, N.S.G and Santana, J. O contributed to the relevant critical review of the intellectual content.

CONFLICT OF INTEREST

The authors inform that there is no potential conflict of interest, including political and/or financial interests associated with patents or ownership, provision of materials and/or inputs and equipment used in the study by the manufacturers.

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INTELLECTUAL DISABILITY ACROSS THE LIFE COURSE: DEFINITION, CLASSIFICATION, AND INTERVENTION STRATEGIES

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ABSTRACT

Intellectual disability is characterized by significant limitations in intellectual and adaptive functioning, affecting a substantial part of the global population, with an estimated prevalence between 1% and 3%, being higher in men and in developing countries. The concept has evolved from a simplistic view to a more comprehensive approach, considering both cognitive deficits and adaptive challenges. The etiology of the condition is multifactorial, with genetic and environmental causes, and diagnosis is based on IQ tests and adaptive behavior assessments. It is classified as mild, moderate, severe and profound. This systematic review article examines definitions, classifications, etiologies, and lifelong interventions of people with intellectual disabilities. It includes studies published between 2000 and 2024, in English or Portuguese, in the PubMed, Scopus, Web of

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Science, PsycINFO, and SciELO databases. Data analysis will be qualitative and, where applicable, will include meta-analysis, using specific tools to assess the quality of studies. Interventions for intellectual disability involve a multidisciplinary approach, with an emphasis on behavioral strategies and family support, in addition to the management of comorbidities. The review highlighted the need for early and ongoing interventions to improve the quality of life for individuals and their families, as well as the importance of targeted public policies. It also identified gaps in the literature, especially regarding the variability of studies, suggesting the need for more robust research for the development of effective management strategies.

Keywords: Intellectual disability. Prevalence. Aetiology. Diagnosis. Early intervention.

INTRODUCTION

Intellectual disability, characterized by significant limitations in intellectual functioning and adaptive behavior, represents a complex and multifaceted condition that impacts the lives of millions of individuals around the world. Traditionally, intellectual disability has been understood as a condition of interrupted or incomplete development of the mind, marked by cognitive difficulties that affect the ability to learn, reason, and perform daily activities autonomously. From Kraepelin's first description, which simplified the condition as a generalized failure in the brain, to more contemporary definitions, there has been a significant evolution in the understanding and diagnosis of intellectual disability.

The evolution of the concept of intellectual disability reflects advances in research and clinical practice, with a gradual shift from a simplistic approach to a more holistic and multifaceted view. In 1959, the American Association of Mental Disability (AAMR) introduced a more comprehensive definition, describing the condition as significantly below-average intellectual functioning associated with impairments in adaptive behavior. Over time, the terminology evolved into "intellectual disability" and definitions were refined to consider the complexity of the condition, encompassing not only cognitive limitations but also adaptive challenges that affect individuals' everyday lives.

The etiopathogenesis of intellectual disability is complex and multifactorial, involving an interaction of biomedical, social, behavioral, and educational factors throughout life. Although genetic causes have become more evident, representing a significant part of cases, up to 40% of cases, especially those with mild impairment, do not have an identifiable etiology. The most common genetic causes include trisomy 21 and fragile X syndrome, while prenatal, perinatal, and postnatal factors also play a crucial role in the development of the condition. Understanding these factors is essential for the diagnosis, treatment, and prevention of intellectual disability.

The diagnosis of intellectual disability requires the presence of three main conditions: significantly below-average intellectual functioning, with an intelligence quotient (IQ) of 70 or less; impairments in adaptive functioning in at least two areas; and onset of symptoms before the age of 18. The classification of intellectual disability ranges from mild to profound, reflecting the severity of cognitive and adaptive deficits. In mild cases, with IQs between 50 and 70, individuals can learn basic skills and perform semi-skilled activities with supervision. In moderate cases, with IQs between 35 and 49, learning is more limited and requires constant supervision. Severe and profound cases, with IQs between 20 and 34 and below 20, respectively, present significant difficulties and require ongoing support and intensive care.

The clinical evaluation of intellectual disability is a comprehensive process that includes detailed anamnesis, physical examination, and complementary tests. The work-up should address personal and family history, including genetic and environmental factors, and consider the presence of medical and behavioral comorbidities. Genetic and metabolic tests, as well as neuroimaging tests, are often used to elucidate the etiology and guide treatment. Early and continuous intervention is essential to optimize the social functioning and quality of life of individuals with intellectual disabilities.

This systematic review of the literature aims to provide a detailed analysis of the definitions and classifications of intellectual disability, as well as lifelong intervention strategies. The review will address the evolution of concepts and classifications, highlight best practices, and identify gaps in the current literature. The methodology will include the definition of strict inclusion and exclusion criteria, a comprehensive search in academic databases, and the application of qualitative and quantitative data analysis techniques. This work seeks to consolidate existing knowledge, provide recommendations for clinical and educational practice, and guide future research in the area.

METHODOLOGY

We aim to answer the following research questions: (1) What are the most widely accepted definitions and classifications for intellectual disability? (2) What etiological factors are most often associated with intellectual disability? (3) Which interventions are considered most effective for the management of intellectual disability at different stages of life?

The inclusion criteria for this review were studies that address intellectual disability with an emphasis on definitions, classifications, etiology, and intervention strategies, published in English or Portuguese, between 2000 and 2024. Studies of any methodological design, such as cohort studies, clinical trials, and reviews, were included. Exclusion criteria were articles that do not focus directly on intellectual disability, studies outside the established time frame, and studies not published in peer-reviewed journals or irrelevant gray literature.

For data collection, the following databases were searched: PubMed, Scopus, Web of Science, PsycINFO and SciELO. Relevant books in the area were also consulted to ensure comprehensive coverage of the topics covered.

The search strategy included terms such as "intellectual disability," "intellectual developmental disorder," "classification of intellectual disability," "etiology of intellectual disability," and "intervention strategies for intellectual disability." Searches were adjusted as needed for each database to ensure comprehensive coverage.

The study selection process involved two stages. First, the initial screening of titles and abstracts was carried out to identify potentially relevant articles. Then, the full texts of the selected articles were evaluated to confirm compliance with the inclusion criteria. Study selection was performed by two independent reviewers, and discrepancies were resolved by consensus or by a third reviewer when necessary.

Data were extracted from each included study using a standardized form, which included variables such as study characteristics, definition and classification of intellectual disability, etiological factors investigated, and reported intervention strategies. Data extraction was conducted by two independent reviewers to ensure accuracy, and discrepancies were resolved through discussion.

Study quality was assessed using the Cochrane risk of bias tool for clinical trials and the Jadad scale for clinical trials. For systematic reviews, AMSTAR (A MeaSurement Tool to Assess systematic Reviews) was used. Quality assessment was performed by two independent reviewers, and disagreements were resolved by consensus.

The data were synthesized using qualitative analysis methods and, when appropriate, meta-analysis. The qualitative analysis involved the categorization of definitions, classifications, etiological factors, and interventions into main themes. For the meta-analysis, the studies were grouped based on the homogeneity of the data and the outcomes evaluated. The analysis was performed using the RevMan software.

Because this systematic review is based on published data, no specific ethical considerations related to research with human subjects were necessary.

LITERATURE REVIEW

Intellectual disability refers to an interrupted or incomplete development of the mind, marked by significant limitations in both intellectual functioning and adaptive behavior. Historically, Kraepelin described the condition in a simplified way, stating that "the feeble-minded are people in whose brain not many things occur." However, in 1959, the American Association of Mental Disabilities (AAMR) offered a more precise definition, explaining that "mental retardation" is characterized by below-average intellectual functioning, manifesting itself during the developmental period and associated with impairments in adaptive behavior. As the term "mental retardation" was replaced by "intellectual disability", the conceptualization also evolved. Today, intellectual disability is defined as a condition that compromises the development of cognitive, language, motor and social skills, essential for the global level of intelligence. These limitations affect the individual's ability to adapt to the demands of daily life, both personally and socially. The American Association on Intellectual

and Developmental Disability (AAIDD) emphasizes that these limitations are expressed in conceptual, social, and practical adaptive skills, reinforcing that the condition arises during the developmental phase and impacts several areas of life, from learning to social interaction and functional autonomy.

EPIDEMIOLOGY OF INTELLECTUAL DISABILITY

In Brazil, there are no studies that precisely define the population frequency of intellectual disability, which forces us to base our estimates on data projected from other realities. This scenario reflects, in part, a historical lack of interest, since the condition offers few possibilities for pharmacological intervention and its social impact is often underestimated, despite being a field of study since the introduction of psychiatry in the country. International studies indicate that the prevalence of intellectual disability varies between 1% and 3%, and a recent meta-analysis points to an average prevalence of about 1%. The condition is more frequent in males in all age groups and its incidence is higher in developing countries, where rates are almost double those seen in high-income nations. In addition, intellectual disability occurs less frequently in urban areas (0.4%) compared to rural areas (1.02%). These disparities suggest that socioeconomic factors and access to health care directly influence the prevalence of the condition.

ETIOPATHOGENESIS AND RISK FACTORS FOR INTELLECTUAL DISABILITY

The etiopathogenesis of intellectual disability is a multifactorial construct that involves a complex interaction of biomedical, social, behavioral, and educational factors throughout life. Although injuries, infections, and toxins have become less frequent causes due to advances in prenatal care, genetic factors have gained prominence. In up to 40% of cases, especially those with mild involvement, it is not possible to identify a specific etiology. Understanding the causes of intellectual disability can help in the treatment and even prevention of some cases. These risk factors can occur in the prenatal, perinatal, and postnatal periods, and are divided into three major categories: organic, genetic, and sociocultural. The most common genetic causes include trisomy 21 and fragile X syndrome. However, most cases present with an overlap of genetic, environmental, and sociocultural factors, reflecting the complex nature of the condition.

Among the factors that act before conception, genetic causes stand out, which can be dominant, recessive or sex-linked. Among the pathologies of dominant inheritance, several syndromes are included, which often involve intellectual disability associated with ectodermal, mesodermal, muscular or bone malformations. Examples include

neuroectodermatoses or phacomatoses, such as tuberous sclerosis, characterized by hamartomatous lesions in various tissues, and neurofibromatosis, which manifests with café-au-lait spots and areas of hypo- or hyperpigmentation. Other dominant conditions are craniofacial dysostosis, such as Apert syndrome, with marked craniofacial features, and Marfan syndrome, associated with tall stature, long limbs, and ligament laxity.

In recessive inheritance pathologies, metabolic disorders are common. Among them, diseases of lipid metabolism, such as Tay-Sachs disease and Niemann-Pick disease, and disorders of mucopolysaccharides metabolism, such as Hurler's disease and Maroteaux syndrome, stand out. Disorders of glucose metabolism, such as glycogenosis (von Gierke's disease), and protein metabolism, such as phenylketonuria – diagnosed by the heel prick test – are also relevant. Phenylketonuria, with a prevalence of 1:15,000, is characterized by intellectual disability, light skin and hair, as well as seizures. These examples illustrate the wide range of genetic and metabolic conditions that can contribute to the development of intellectual disability, highlighting the importance of further research to identify still unknown causes, especially in mild cases.

About 50% of miscarriages are caused by chromosomal aberrations established in the zygote, resulting from failures in the production of gametes. These pathologies can be classified into anomalies of the somatic and sex chromosomes. Trisomy 21, or Down syndrome, is the most frequent somatic chromosome anomaly, occurring in approximately 1 in every 600 live births, with an increase proportional to maternal age. Other trisomies, such as Edwards trisomy (chromosome 18) and Patau trisomy (chromosomes 13 to 15), also have great clinical relevance, although they are less common.

Among the anomalies of the sex chromosomes, Klinefelter syndrome stands out, characterized by tubular testicular dysplasia, XXY karyotype, hypogonadism, and long limbs. Turner syndrome, with X0 karyotype, is manifested by short stature, ovarian dysgenesis, transient congenital lymphedema, and bone malformations. The condition known as superfemale, with karyotype XXX, can cause mental retardation, hypoplasia of the middle third of the face, and inconstant amenorrhea.

Prenatal factors are essential for the prevalence and prevention of intellectual disability. Congenital infections, such as toxoplasmosis, cause significant impairments, including Sabin's tetrad (intellectual disability, microcephaly, intracranial calcifications, and chorioretinitis). Congenital rubella also causes hearing and visual impairment, while congenital syphilis causes physical malformations such as saber tibia and Hutchinson's teeth. Cytomegalovirus is another relevant viral infection. In addition, prenatal malnutrition contributes to insufficient fetal development, and physical factors, such as radiation

exposure, as well as immunological factors, such as blood incompatibility, can compromise fetal development.

The most common prenatal poisoning is caused by fetal alcohol syndrome, which is manifested by mental retardation, growth deficiency, microcephaly, and craniofacial changes. Endocrinological disorders, such as diabetes and thyroid disease, increase the risk of malformations. Intrauterine hypoxia, resulting from uterine hemorrhage, placental insufficiency or intoxication, also interferes with fetal development.

In Brazil, perinatal factors are particularly important due to deficiencies in maternal and child care. Complications such as neonatal anoxia, hypoxia and tocotraumatism, in addition to prematurity, are some of the main causes of intellectual disability.

In the postnatal period, infections, head trauma, malnutrition, and sensory and family deprivation should also be considered. Infections such as bacterial meningoencephalitis (caused by H. influenzae and S. pneumoniae) and viral meningoencephalitis (caused by H. influenzae and S. pneumoniae) are the main culprits. Deprivation, when associated with other risk factors, can aggravate the condition, but they are rarely isolated causes. Even with diagnostic advances, about 30% of cases of intellectual disability remain without established etiopathogenesis, which highlights the need for further studies in the area.

CLINICAL PICTURE OF INTELLECTUAL DISABILITY

The main manifestations of intellectual disability include delays in cognitive development and deficits in social adaptive functioning. Children with this condition often have significant language delays, with difficulties in both comprehension and expression. The response to external stimuli is usually slow, and there are difficulties in discriminating details such as colors and sizes. Global cognitive performance (analysis, reasoning, comprehension, calculation, and abstraction) is compromised according to the severity of the condition, while the ability to concentrate is reduced, with difficulty in remembering information and the formation of inaccurate memories being common.

Emotionally, these individuals tend to have naïve and immature reactions, and many are shy and withdrawn. Emotional control is limited, resulting in impulsive behaviors. Motor coordination is also impaired, with many patients experiencing clumsy and exaggerated movements. Aggressive, self-destructive, and stereotyped behaviors (such as body shaking, head banging, or hair pulling) are frequent in some cases.

Compared to the general population, children with intellectual disabilities are at higher risk of comorbidities, such as epilepsy (22%), cerebral palsy (20%), anxiety disorders (17%), oppositional defiant disorder (12%), and autism spectrum disorder (10%). Symptoms

such as restlessness, impulsivity, irritability, and frequent crying are common, as well as visual and hearing difficulties, present in 5% to 10% of cases. The use of hearing devices, corrective lenses or surgeries can alleviate these problems, but patients with multiple disabilities remain a major challenge in clinical care and care.

DIAGNOSIS AND CLASSIFICATION

The diagnosis of intellectual disability, according to the DSM-5 and ICD-10 criteria, requires the presence of three main conditions: intellectual functioning significantly below average, with an intelligence quotient (IQ) equal to or less than 70; concomitant impairments in adaptive functioning in at least two areas, such as communication, self-care, social skills, use of community resources, self-direction, among others; and onset of symptoms before the age of 18, in the developmental period. IQ is assessed by specific tests that measure various skills, such as reading, arithmetic, vocabulary, memory, and abstract reasoning. Although it has a strong hereditary component, environmental factors also exert a great influence on the development of intelligence.

The classifications of intellectual disability vary according to the severity of cognitive deficits and social adaptation. In mild cases, with IQ between 50 and 70, which account for about 80% of cases, there are delays in developmental milestones, such as walking and talking. These children are able to establish proper communication and learn basic skills, but they have difficulty with abstract concepts and complex reasoning. Generally, they reach the seventh grade and can carry out semi-qualified activities with some level of supervision. In moderate cases, with IQs between 35 and 49, which correspond to 12% of cases, development is slower and learning generally does not exceed the third or fourth year of school. They are able to perform simple activities, but they need constant supervision.

In severe cases, with IQs between 20 and 34, which account for 3% to 4% of cases, children face significant developmental delays and have marked difficulties in language and basic self-care skills, requiring ongoing support. In deep cases, with an IQ of less than 20, which comprise 1% to 2% of cases, the limitations are severe, with most patients unable to take care of themselves. These individuals often experience seizures, associated physical disabilities, and reduced life expectancy.

Diagnosing intellectual disability requires a comprehensive assessment of cognitive and behavioral skills. Children with more severe forms are usually identified earlier, due to the significant contrast with typical development. Mild forms, on the other hand, are often only diagnosed during the school phase, when learning difficulties arise. The differential diagnosis should be made with caution, considering conditions such as specific

developmental disorders, learning disabilities, and factors such as anxiety or depression, which can influence academic and cognitive performance without necessarily indicating intellectual disability.

CLINICAL EVALUATION

The clinical evaluation of patients with intellectual disabilities begins with a detailed anamnesis, addressing fundamental aspects of personal and family history. It is essential to collect data on the individual's neuropsychomotor development, behavior, social interaction, and school performance. In addition, the history of previous treatments, including medications, and quality of life should be considered. In family investigation, the aim is to identify relatives with genetic or neurobehavioral disorders and to investigate the consanguinity between the parents, due to the increased risk of genetic diseases. Maternal history of miscarriages, neonatal death, alcohol or drug use during pregnancy, as well as congenital infections and hypoxemia, may provide clues about possible causes of intellectual disability.

Physical examination contributes to etiological elucidation and to the identification of clinical comorbidities. Detailed evaluations of anthropometric measurements (weight, height, head circumference), in addition to growth velocity, are essential. The presence of body dysmorphia may suggest genetic or syndromic etiologies, guiding the choice of genetic testing. Physical evaluation should include careful examination of the ears, nose, oropharynx, as well as a complete ophthalmologic evaluation, including fundus, visual field, and visual acuity. Cardiopulmonary, abdominal, genitourinary, back, extremity, and skin assessment is also important. The neurological examination should be thorough, considering neuropsychomotor development. In addition, the child's behavior, including attention, impulsivity, motor skills, and social interaction, must be carefully observed. Parental interaction also deserves attention, both to investigate physical characteristics suggestive of genetic disorders and to assess disorders related to caregiver stress or burden.

With regard to complementary tests, specific genetic tests may be necessary, especially in cases with suspected conditions such as Down syndrome, fragile X syndrome, Rett syndrome, and muscular dystrophies. If no genetic etiology is suspected, the microarray technique (CMA) can be used, allowing the diagnosis of up to 20% of previously unidentified cases. In addition, metabolic tests are indicated, especially when there are other clinical manifestations, such as seizures or hepatomegaly. The heel prick test, performed on newborns in Brazil, screens for metabolic disorders such as hypothyroidism,

phenylketonuria, and galactosemia, important causes of intellectual disability. In patients with neurological findings, neuroimaging tests, such as magnetic resonance imaging, may be requested, as well as the electroencephalogram, in cases of seizures or developmental regression.

TREATMENT AND MANAGEMENT

Treatment of diseases associated with intellectual disability, such as phenylketonuria, hypothyroidism, and hydrocephalus, should be initiated immediately to avoid long-term damage. However, the focus of this topic is to discuss the ongoing follow-up and management of common clinical disorders in individuals with intellectual disability, regardless of their etiology. Early intervention is crucial, involving family support and strategies to minimize the impact of cognitive difficulties. The main objective is to optimize the social functioning of the individual, adopting a multidisciplinary approach.

Follow-up of these children should follow a similar pattern to that of typically developing children, including regular childcare visits, vaccinations, growth assessment, and accident prevention. However, it is essential to pay special attention to development, school performance, social interaction and quality of life, in order to detect and intervene when necessary. With the proper support, these individuals can achieve significant progress in learning and communication. Early and continued interventions may be needed in areas such as speech therapy, occupational therapy, physical therapy, behavioral interventions, family support, special school assistance, and nutritional assessment, including guidance on appropriate diets.

Individuals with intellectual disabilities are at increased risk for a range of medical comorbidities, such as cataracts, visual and hearing impairments, congenital heart disease, seizures, and constipation. The identification and treatment of these comorbidities are essential to improve the overall functioning of the individual. The most common comorbidities include seizures, cerebral palsy, gastrointestinal motility disorders, thyroid disease, and behavioral disorders. Neurodevelopmental disorders and mental illnesses, such as autism, attention deficit hyperactivity disorder (ADHD), depression, and anxiety, are also frequent. Additionally, some individuals may be at increased risk for suicidal ideation and substance abuse compared to their typically developing peers. Management of these comorbid conditions should be performed by a multidisciplinary team and include family and educational guidance, specific behavioral interventions, and pharmacologic treatment when necessary. However, the diagnosis and treatment of these conditions often occur late and inadequately.

A common complaint from family members is the presence of behavioral changes, such as repetitive movements, self-aggression and aggressive behaviors. These behaviors can present significant risks to the individual and others, requiring pharmacological intervention and, in some cases, intensive follow-up in a hospital environment. Communication difficulties can complicate the evaluation of behavioral disorders, and it is essential to investigate behavioral changes and explore possible stressors, such as hypoxia, pain, intoxication, infection, trauma, and abuse. A detailed physical examination is necessary to identify potential sources of discomfort, from minor skin lesions to serious conditions such as bone fractures.

Behavioral interventions can be highly beneficial for improving social, behavioral skills, and adaptive functions. Behavioral techniques, such as offering options to choose from and promoting reflections on attitudes and consequences, are helpful. Specific therapies can address problems such as frustrations or needs. For adolescents, group therapy can improve social interaction. Individual guidance on sexuality, transition to adulthood, and preparation for independent living in the community are also important and should be considered.

When behavioral and environmental interventions are not sufficient, pharmacologic therapy may be a necessary option. This treatment is often used in cases with associated comorbidities, although excessive use of multiple drugs should be avoided unless absolutely necessary. It is crucial to consider the potential side effects and drug interactions. Medications for behavioral disorders can negatively impact attention, concentration, learning, and quality of life, as well as cause temporary or permanent motor disorders. Some psychotropic drugs, such as atypical antipsychotics (risperidone, clozapine, quetiapine), tricyclic antidepressants (imipramine, amitriptyline), mood stabilizers, and anticonvulsants, can result in weight gain. Drug intervention, when well adjusted, can improve mental health, functioning, and social interaction, as well as reduce caregiver stress. Children with ADHD may benefit from the use of psychostimulants such as methylphenidate, while those with impulsive behaviors may respond positively to atypical antipsychotics such as risperidone.

Seizure disease has a higher incidence in children with low IQ and in those with cerebral palsy, affecting up to 50% of these patients. This condition is associated with an increased risk of death, and specific guidance should be provided to caregivers. More than one anticonvulsant is often required to control seizures, and serum dosing of these drugs may be useful to maintain therapeutic levels and prevent toxicity.

Cerebral palsy, which refers to a non-progressive motor impairment, affects more than a third of patients with intellectual disabilities. It can be associated with changes such as spasticity, immobility, strabismus, low visual acuity, sphincter dysfunctions, growth changes and malnutrition. Pharmacological treatment for spasticity may include muscle relaxants such as Baclofen®, which has fewer sedative effects. Botulinum toxin can be used to treat dysfunctions in specific muscle groups when medication is not effective. In some cases, orthopedic surgeries may be necessary. Special care should be taken to prevent pressure ulcers and fractures due to bone demineralization in patients with prolonged immobility and nutritional deficiency.

Sleep disorders are common and can impair learning. Initial evaluation should exclude clinical conditions such as obstructive sleep apnea, seizures, and gastroesophageal reflux, and promote good sleep hygiene. Genetic conditions such as Prader-Willi and Down syndromes may be associated with characteristic sleep disorders, and polysomnography may be required for detailed evaluation.

Adults with intellectual disabilities have an increased risk of cognitive decline, and patients with Down syndrome are more likely to develop Alzheimer's disease. However, there are still no standardized criteria to assess memory and cognition in these patients. The diagnosis of dementia must show evidence of worsening cognitive functions relative to previous functioning, excluding treatable causes of cognitive decline such as adverse drug effects, sleep disturbances, social stressors, and metabolic disorders.

Gastrointestinal disorders are common and can include dysphagia and constipation. Dysphagia can be caused by dysmotility of the gastrointestinal tract, esophageal reflux, and gastric emptying disorders. Methods to reduce the risk of bronchial aspiration include modifying the consistency of food and considering the use of gastrostomy or jejunostomy for caloric support. Constipation, often secondary to immobility and lack of physical activity, can also result from medical disorders such as hypothyroidism and use of anticholinergic medications. Treatment should include increased fluid intake, a laxative diet, and, when necessary, the use of laxatives, suppositories, and enemas.

Oral hygiene is an important aspect, with periodontal disease being common. Light sedation with lorazepam may be required for dental treatments in uncooperative children, while deeper sedation, which requires cardiorespiratory monitoring, may be required in extreme cases.

Obesity is prevalent among people with intellectual disabilities, due to factors such as inadequate eating habits, less physical activity, associated chronic diseases, and the use of psychotropic drugs. Monitoring weight, height, and body mass index is crucial, as is

promoting healthy lifestyle habits, including regular exercise and a balanced diet. The potential weight gain associated with some psychotropic drugs should also be considered when choosing drug treatment.

RESULTS

In the systematic review, several studies on intellectual disability were analyzed, revealing a rich diversity in the methodologies used and in the populations investigated. The included studies encompassed a variety of research designs, with a predominance of observational approaches and cohort studies, reflecting different aspects and perspectives of the condition. Most of the research focused on children, but studies with adult populations were also considered, providing a comprehensive view of intellectual disability throughout the life cycle.

The data collected indicate that the prevalence of intellectual disability globally varies between 1% and 3% of the population, with an approximate average of 1%. It was noted that the condition is more common in developing countries, where the prevalence is significantly higher than in high-income countries. This discrepancy is accentuated by socioeconomic factors and unequal access to health care, evidencing the influence of these factors on the prevalence of intellectual disability. In addition, the condition is less frequent in urban areas compared to rural regions, suggesting that environmental and socioeconomic factors play a crucial role in the variation in prevalence.

The etiopathogenesis of intellectual disability is multifaceted, involving a complex interaction between genetic, organic, and environmental factors. Among the genetic causes identified, trisomy 21 and fragile X syndrome stand out, which are often associated with significant intellectual deficits. Other genetic conditions, such as hamartomatous lesions and craniofacial dysostoses, have also been identified in several studies, pointing to a diverse range of genetic etiologies. Organic and environmental factors, including congenital infections and exposure to toxins during pregnancy, remain relevant causes, reflecting the importance of a comprehensive approach in understanding the etiology of intellectual disability.

With regard to diagnosis, intellectual disability is characterized by significantly below-average intellectual functioning, with an intelligence quotient (IQ) of 70 or less, combined with significant impairments in adaptive functioning. The classification of intellectual disability cases reveals a wide range of severity, from mild deficits, where individuals can achieve some degree of independence and basic communication, to severe and profound cases, which require ongoing support and intensive intervention. Difficulties in development

and social adaptation vary considerably, with the severity of deficits influencing the need and type of support needed.

Detailed clinical evaluation is crucial for identifying the causes and comorbidities associated with intellectual disability. Thorough investigation of the anamnesis, physical examination, and complementary tests, such as genetic and metabolic tests, are essential to elucidate the etiology and guide treatment. The presence of physical features suggestive of specific genetic conditions and the identification of comorbidities, such as seizures and behavioral disturbances, have direct implications for clinical management. Early treatment and intervention, which include multidisciplinary support and specific therapies, have shown significant benefits, improving quality of life and promoting the social integration of individuals with intellectual disabilities.

DISCUSSION

The results of the systematic review address crucial aspects of intellectual disability, offering a comprehensive view of its prevalence, etiology, diagnosis, and management. This section discusses key findings, comparing them to existing knowledge, and addressing theoretical, practical, and future directions implications for research.

The review reveals that the prevalence of intellectual disability varies globally between 1% and 3%, with greater frequency in developing countries and rural areas. This pattern suggests that socioeconomic factors and unequal access to health care play a significant role in the observed prevalence. In addition, the etiopathogenesis of intellectual disability is multifactorial, involving complex interactions between genetic, organic, and environmental factors, reflecting the diversity and complexity of the condition. The diagnosis, based on significant deficits in intellectual and adaptive functioning, shows a wide range of severity, from mild deficits to severe and profound cases.

The findings corroborate the existing literature on variability in the prevalence of intellectual disability and reinforce the importance of socioeconomic and environmental factors in determining prevalence. The higher frequency of the condition in developing countries and in rural areas is in line with previous studies that highlight inequalities in access to health care and adverse socioeconomic conditions as critical determinants. The diversity in the causes identified, which include genetic and environmental factors, reflects the complexity of the etiology of intellectual disability and underlines the need for an integrated approach to understanding and management.

The results of this review are in line with previous studies that identified trisomy 21 and fragile X syndrome as common genetic causes of intellectual disability. However, the

review also highlights the growing importance of environmental and organic factors, such as congenital infections and toxic exposures, which may have been underestimated in previous studies. The higher prevalence in rural areas corroborated the findings that socioeconomic factors and living conditions significantly impact the prevalence of intellectual disability, in line with evidence indicating that poverty and lack of access to medical care contribute to the higher incidence of the condition in certain populations.

While the review offers a comprehensive view, there are limitations that should be considered. Variability in the quality of the included studies and the lack of consistent data in some regions may have influenced the results. In addition, the predominance of observational studies may have introduced selection biases and limitations in the generalization of findings. The absence of high-quality studies in some geographic areas also limits the ability to provide an accurate estimate of the prevalence and causes of intellectual disability.

The findings have important implications for clinical practice and public policy. Early identification and multidisciplinary management of intellectual disability are essential to optimize the development and quality of life of affected individuals. The evidence that early intervention and ongoing support can significantly improve outcomes suggests that public health policies should emphasize the importance of early screening and intervention in vulnerable populations. In addition, the review underscores the need for targeted strategies to address socioeconomic inequalities and improve access to health care.

The review identifies several gaps that need to be addressed in future research. The need for more robust, high-quality studies to confirm prevalence and identify specific causes in different geographic contexts is evident. In addition, further research on the interaction between genetic and environmental factors may offer a deeper understanding of the etiology of intellectual disability. Longitudinal and intervention studies are needed to assess the effectiveness of management and early intervention strategies, as well as to develop new approaches to treat and support individuals with intellectual disability.

CONCLUSION

This systematic review provides a detailed view of intellectual disability, addressing its epidemiological, etiological, diagnostic, and management dimensions. The analysis of the available data highlights the significant prevalence of the condition and its geographic variations, reflecting the influence of socioeconomic factors and access to health care. The multifactorial complexity of intellectual disability, involving genetic, organic, and

environmental aspects, underlines the need for a holistic and integrated approach to diagnosis and treatment.

The review also reveals the crucial importance of early intervention and ongoing support, emphasizing that appropriate strategies can lead to substantial improvements in the quality of life and development of affected individuals. Recognizing gaps in the existing literature and identifying areas for future research are essential to advancing the understanding and management of intellectual disability.

In summary, an in-depth understanding of the causes and characteristics of intellectual disability is critical for the development of policies and practices that promote equity in access to diagnosis and treatment. Promoting effective preventive and intervention strategies is vital to meeting the needs of people with intellectual disabilities and their families, ensuring a better quality of life and support that is better suited to their diverse needs.

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MANAGING PSYCHOLOGICAL STRESS OF UNIVERSITY STUDENTS THROUGH YOGA PRACTICE: AN INTEGRATIVE REVIEW

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ABSTRACT

Introduction: High levels of stress in university students are associated with psychological distress and can affect their academic performance. Mind-body exercise modalities such as yoga apparently produce effects on the management of stress symptoms and consequently, psychological distress. Objective: This study aims to present scientific productions on the effects and implementation of yoga practice programs in the management of psychological stress in university students. Methodology: This is an integrative review of the PEDro, LILACS, Web of Science and Pubmed electronic databases. 10 experimental studies were selected for discussion. Results/Discussion: It was evidenced that practicing yoga is cost-effective in the management of student stress. The most researched modality is Hatha Yoga and although significant, the effect size of the stress interventions ranged from moderate to small. There are still some gaps in the intensity and proportion of movements and meditation that would potentially show better results, and more research is needed on the topic. Final Thoughts: Implementing yoga into the academic curriculum can be a favorable coping strategy for the stress associated with higher education.

Keywords: Yoga. University Student. Mental health. Psychological Stress.

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INTRODUCTION

College students are particularly susceptible to experiencing high levels of psychological stress. The most common predictors of stress in this population are: individual, environmental, and coping factors. Personality trait such as neuroticism is an example of individual factors. Living situation, social support, and campus resources are examples of environmental factors. And coping refers to the strategies that individuals use to manage stress and negative emotions 1.

A cross-sectional study conducted in 2020 investigated depression, anxiety, and stress rates among Spanish students. In a sample of 1,074 university students, 34.5% had moderate levels of stress, among the factors associated by the authors, the following stand out: problematic behavior with internet use, smoking, low self-esteem, being a woman, alcoholism and poor eating habits. In their conclusions, the authors highlighted the need for interventions to promote mental health among university students2.

Brazilian epidemiological studies show high levels of stress among university students. Demonstrating a prevalence of 73.3% self-perceived stress through the Adult Stress Symptom Inventory (LIPP) among nursing students 3. In this population, stress was associated with factors such as age and marital status. Another study found an even higher rate using the Stress Perception Scale (EPS-10) demonstrating 76% of moderate to high stress associated with the consumption of substances such as alcohol, tobacco and other drugs 4.

There is a growing interest in the literature in the use of mind-body approaches to manage stress in a healthy way. Alternatives such as yoga and meditation have constantly been suggested to reduce self-reported stress and stress biomarkers, as well as increase mindfulness and self-compassion5. Although there is a lot of enthusiasm in research on the mechanisms by which yoga practice acts on the minds and emotions of practitioners, there is no consensus on the results on the outcome of stress 6.

The objective of this study is to perform an integrative literature review in order to present the effects of yoga practice and the implementation of practice programs on the psychological stress of university students. It is hoped that this review will contribute to the understanding of the practice and provide subsidies for future research and interventions aimed at coping with the stress associated with the academic context.

METHODOLOGY

The literature review, even if of the integrative type, was structured based on the recommendations of the PRISMA checklist - Preferred Reporting Items for Systematic

Reviews and Meta-Analysis. Four databases were consulted: Physiotherapy Evidence Database (PEDro), Latin American and Caribbean Literature on Health Sciences (LILACS), Web of Science, and United States National Library of Medicine (PUBMED). The search took place in the first half of 2024, with no limitations on language or place of publication.

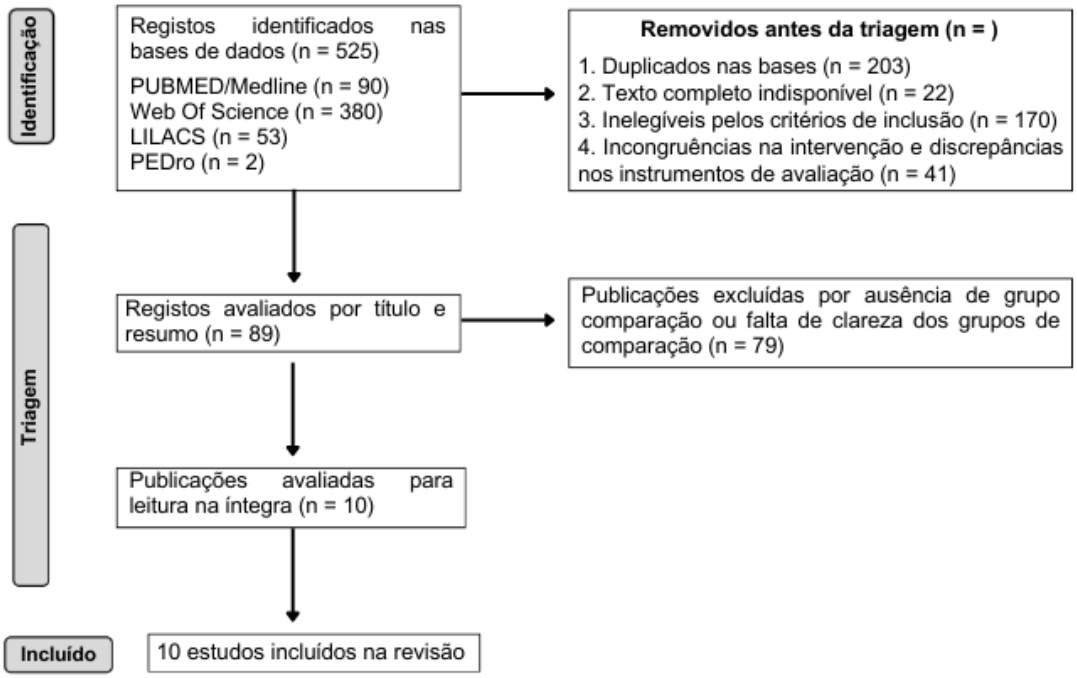
The research strategy was delimited based on the PICOS tool (P= Population: university students aged 18 years or older; I= Intervention: submitted to Yoga-based training in the management of self-reported stress, anxiety, and depression; C= Comparison: comparison between exposed and unexposed groups; O= Outcome/outcome: effects of yoga programs on university stress management). The searches in the databases occurred after the authors defined the guiding question of the review: "Would the practice of yoga be an effective and efficient non-pharmacological alternative in the management of self-perceived psychological stress in university students?"

Pre-established descriptors were used, consulted in the Health Sciences Descriptors (DeCS / MeSH): "Yoga – Yoga"; "Stress" and "College Students". The terms were applied in both English and Portuguese by two independent authors who applied the same strategies and discussed the need for consensus in the choice of included articles.

The inclusion criteria were defined based on categories, namely: (i) study design, (ii) sample, (iii) intervention and comparison, (iv) outcomes evaluated by self-report instruments, and (v) year of publication. Experimental studies with samples of university students that compared the effects of yoga practice to control groups or other intervention modalities for psychological stress evaluated with self-report instruments, published between January 2014 and September 2024, were included.

The exclusion criteria determined were: Duplicate studies in the consulted databases, articles that combined medications with non-pharmacological approaches and/or yoga, study protocols, pilot studies of clinical trials that did not have a comparison group. The flowchart shown in Figure 1. presents the stages of optimized searches in the databases, which resulted in the inclusion of 10 articles selected according to criteria established in the review.

Figure 1. PRISMA Flowchart (2020)[7]



RESULTS

The summary of the results of the selected studies is available in **Table 1.** 10 intervention studies were selected , seven of which were controlled clinical trials and three experimental studies without radomization, which examined the effects of yoga practice on the psychological stress of university students. The total number of participants in the 10 studies included in the review is 1,481 with ages ranging from 18 to 25 years. The intervention time between the studies ranged from 06 to 12 weeks.

As shown in **Table 1**, the interventions with *Yoga* varied in modality and time of intervention. In all studies, the intervention through *yoga* was administered by a certified and experienced instructor. The management model was mostly face-to-face, but two studies made online interventions. Each study applied a varied amount of postures consistent with the yoga modality and the practices associated with each modality

The modalities of yoga practice mentioned among the selected studies were: Hatha Yoga [8, 9, 10, 11, 12, 13, 14, 15], Kundalini Yoga16 and Kripalu Yoga17.

The Hatha Yoga modality, also known as "Classical Yoga", corresponds to the application of breathing techniques associated with psychophysical postures within a certain sequence and closure with meditation or relaxation. In addition to varied movements, this modality has certain sequences such as greetings (sets of 12 or more

movements repeated for a certain time). Within the practice of Hatha Yoga there are also philosophical practices, songs and purification practices.

Kundalini Yoga is derived from classical Yoga and is a form of Yoga that involves chanting, chanting, breathing exercises, and repetitive postures to promote a heightened state of consciousness. Finally, the Kripalu Yoga modality is a modality also derived from classical yoga and the classes consist of a brief didactic overview of yoga theory and techniques, meditation, diaphragmatic breathing, warm-up exercises, yoga postures of gentle to moderate intensity and a final relaxation practice.

Table 1: Summary of the selected studies. Goiânia – GO, 2024.

Author/year	Objectives	Methods	Results
Kim, 2014	To evaluate the effects of 12 weeks of Yoga under stress and glycemic parameters in 27 nursing students	GY: (*Hatha Yoga Group*) received intervention for 12 weeks, once a week 60-minute classes CG (Control group): Received no intervention. Pre- and post-12-week evaluations for both groups using the following instruments: SLS (stress) and digital glucometer (blood glucose)	There were significant differences between the groups over time for the stress outcome (*Yoga vs*. control, p<0.001). The yoga group had a reduction in the LSS scores in the time and group interactions. There were significant differences between the two groups in postprandial blood glucose (yoga group vs. control group, p<0.001). There was a reduction in the IG blood glucose level in relation to the CG before and after the 12-week intervention.
Falsafi, 2016	Compare the effectiveness of Yoga vs. Meditation vs. Meditation Control in coping with depression and stress in 90 university students	GY (*Hatha Yoga* Group), GM (Mindfulness Group) and CG (Control), with 75-minute interventions, 1 time a week, for 8 weeks. Evaluations before and after 08 weeks and a *12-week follow-up* for the three groups by the instruments: BDI (depression), SAH (anxiety), SLSI (student stress), SCS (compassion), CAMS (mindfulness)	Both intervention groups (Yoga and Mindfulness) achieved improvements in stress, anxiety, and depression scores relative to the control group (no intervention) (p< 0.01) on the 8-week pre- and post-intervention measures. There appeared to be no differences between GY and GM, except for the levels of self-compassion that were higher in the GM and were maintained after a *12-week* folow up.
Park *et al.,* 2017.	To examine the feasibility and differential efficacy of cognitive behavioral stress management (CBSM) and *yoga* for physical and mental health of 34 college students.	Study with three groups: GY (*Kripalu Yoga* Group), GCC (Cognitive Behavioral Therapy Group) and CG (Control Group). 8-week interventions with weekly 60-minute sessions. Pre- and post-intervention assessments of 08 weeks and a follow-up of 24 weeks. For the three groups, the following instruments were used: DASS-21 (depression, stress and anxiety), DERS (emotional regulation), BSCS (self-control), MAIA-VB2 (interoceptive awareness).	There were no significant differences within or between the groups comparing baseline and the 8-week post-intervention and at the 24-week follow-up for the outcomes: stress, depression, anxiety. There were significant differences pre- and post-intervention at 8 weeks within the GY and GCC for emotion regulation (p = 0.054; p = 0.026), and only in the GY for interoceptive awareness (p = 0.026). There were no changes within the CG. At follow-up, GY increased emotion regulation and reduced impulsivity. The GCC and CG did not show differences

Gorvine *et al*., 2019.	To compare the effects of yoga vs. mindfulness on self-compassion, mindfulness, and perceived stress in 92 college students;	GY (Vinyasa Yoga Group) and GM (Mindfulness Group) received 10 weeks of intervention. Pre- and post-intervention assessments for both groups by the instruments: PSS-10 (perceived stress), MAAS (mindful attention), SCS-SF (self-compassion).	There was no significant difference between the groups in the outcome stress (p= 0.38), self-compassion (p= 0.18), and mindfulness (p=0.45) However, the study indicated that individuals with higher levels of self-compassion showed more significant reductions in stress.
Papp *et al.,* 2019.	To investigate the short-term effects of high-intensity *hatha yoga* (HIY) exercise on depression, stress, and sleep quality of 44 college students.	The GY (High *Intensity Yoga* Group) and CG did not receive intervention, but were advised to continue with routine physical exercises. Pre and post-intervention evaluations of 06 weeks by the instruments HADS (depression), PSS (perceived stress), PSQ (sleep quality), ISI (insomnia).	There were no statistically significant differences between the groups for the outcomes stress, anxiety, depression, sleep, or self-rated health. However, the outcomes analyzed within the IG itself comparing baseline with post-intervention assessments, demonstrated that higher doses of high-intensity yoga were associated with lower depression scores and better sleep quality.
Tong *et al.,* 2021.	To examine the effects of *yoga* and fitness exercises on stress and the underlying mechanisms in two periods: acute effect: (immediately) and the chronic effect (after 12 weeks). 191 college students	GI (Hatha Yoga Group) GC (Fitness Exercise Group). The study was carried out in two stages: Acute and chronic effects of the intervention. Assessments for acute effects after 60 minutes of intervention and assessment for chronic effects after 12 weeks. For both groups in the two stages in the pre and post-intervention moments: DASS (depression, anxiety and stress), MASS (conscious attention), SPANE (positive and negative experience), ELISA (salivary cortisol).	Acute effects: Significant differences in interaction between group and time (pre- and post) for stress and mindfulness, demonstrating a significant reduction in stress ($p<0.001$) and increased mindfulness ($p<0.001$), immediately after yoga class and marginal (non-significant) outcome for fitness exercise ($p>0.005$). Chronic Effects: Between-group and time-to-group interactions for stress and mindfulness were significant The follow-up analysis revealed a non-significant reduction in stress after a yoga class and a significant increase in stress levels in the exercise group. Not significant increase in mindfulness in GY but significant reduction in EG. No differences in salivary cortisol at all times of the study. .
Gao *et al.,* 2022	To investigate the efficacy of a yoga intervention combined with aromatherapy in reducing stress and improving sleep quality in 89 female college students.	GY (Hatha yoga group) and GYA (yoga + lavender oil aromatherapy). Pre- and post-intervention assessments of 12 weeks using the following instruments: PSS-14 (perceived stress), PSQI (sleep quality).	There was no significant difference in stress or sleep levels between the groups, but there was a difference in the results of a sleep disorder PSQI subscale. There was an improvement in stress scores in both groups, with a large effect size (0.15). There was no improvement in sleep in the GY and there was a marginal improvement in the GYA, but also not significant.
Chang *et al.,* 2022.	To assess the impact of short *online Upa Yoga*	GI (received Upa Yoga with two modalities, *Namaskar* Yoga and *Nadi Shuddhi*	The IG showed significant stress reduction and improved well-being in students, group-time interaction

	sessions on the mental health and well-being of 679 college students during the COVID-19 pandemic.	through 25-minute videos) CG (No intervention/waiting list) The control group received no intervention for the first 4 weeks and then participated in 8 weeks of practice. Pre- and post-intervention assessments during 12 weeks using the instruments: PSS-10 (perceived stress), PANAS (positive and negative affect), PHQ-4 (patient health), BRS (resilience).	demonstrated significant difference in stress between groups and a moderate effect size on stress between intervention and control groups during the study period.
Brandão *et al.,* 2024.	To examine the effectiveness of an *online Kundalini Yoga* intervention on psychological functioning in 106 college students.	GI (*Kundalini Yoga* via *Zoom* for 60 minutes weekly), GC1 (autogenic relaxation for 0 minutes weekly), and GC2 (no intervention). Pre and post 06 weeks evaluations by the instruments: DASS-21 (depression, anxiety and stress), SCS (self-compassion), ICAC (self-concept), DERS (emotional regulation), SWBQ (spiritual well-being)	In the stress outcome, the results showed a significant main effect, only in the comparison between baseline and post-intervention time, but there were no differences between the groups, and there was, therefore, no group effect or interaction effect between time and group. Secondary outcomes indicated that GI improved self-compassion, extrinsic affect, and personal and community spiritual well-being compared to active and passive CG1 and GC2.
Castelote-Caballero *et al.,* 2024	To analyze the effectiveness of a yoga-based intervention in reducing stress, improving emotional well-being, and decreasing state-anxiety and trait-anxiety in 129 college students.	GI (Hatha yoga for 02 weekly sessions of 60 minutes) and CG (did not receive intervention). Pre and post 12-week assessments using the following instruments: PSS (stress), WEMWBS (mental well-being) and STAI (state-trait anxiety).	There were significant differences in group-time interaction over time, but not in group. The study demonstrated significant between-group differences in the post-intervention measures with a small effect size for the outcome stress, emotional well-being, and anxiety. The IG experienced significant reductions for the outcomes analyzed compared to the CG.

Legenda: LSS: Life Stress Score. BDI: Beck's Depression Inventory . SLSI: Student Life-stress Inventory. SCS: Stress-induced cognition scale. CAMS: Cognitive and Affective Mindfulness Scale. DASS-21: Depression Anxiety Stress Scale. DERS: Difficulties in Emotion Regulation Scale. BSCS: Brief Self-Control Scale. MAIA-VB2: Multidimensional Assessment of Interoceptive Awareness. HADS: Hospital Anxiety and Depression Scale. PSS: Perceived Stress Scale. PSQ: Pittsburgh Sleep Quality. ISI: Index: Insomnia Severity Index. MASS: The Mindful Attention Awareness Scale. SPANE: Scale of Positive and Negative Experience. ELISA: Enzyme-Linked Immunosorbent Assay. PANAS: Positive and Negative Affect Schedule PHQ-14: Patient Health Questionnaire. ICAC: Inventário Clínico de Auto-Conceito .. SWQ: Spiritual Well-Being Scale. WEMWBS: The Warwick-Edinburgh Mental Wellbeing Scale. STAI: The State-Trait Anxiety Inventory

Of the authors who used the Hatha Yoga modality, four reported the sequence of surya Namaskar, this series is composed of a set of 12 movements, namely: pranamasana, hasta utthanasana, padahastasana, ashwa sanchalanasana, parvatasana, Ashtanga Namaskara, Bhujangasana, Ashwa Sanchalanasana, Padahastasana, Hasta Utthanasana, Pranamasana [9, 11, 12, 14].

Two authors did not mention which movements they used in the intervention [8, 17]. One study carried out blocks of free classes with variations of postures without obeying any

sequence [10]. And another study used free sequence, adopting three blocks of distinct movements applied in alternate weeks [15]. All authors associated the movements with breathing exercises and meditation/relaxation at the end.

The authors who used the Kundalini yoga modality detailed their intervention in six steps that consisted of: chanting, breathing exercises, determined postures (they did not mention which ones), relaxation, meditation, and closing with chants again [16].

The instruments used to assess stress levels in the population of university students were self-report questionnaires, the main ones being: Life Stress Scale for University Students, Student Life Stress Inventory, Anxiety and Depression Stress Scale (DASS-21), Perceived Stress Scale [8, 9, 10, 11, 12, 13, 14, 15, 17, 16].

The groups used as a comparison to yoga modalities to investigate the effects on the outcome of stress were: Control groups (without any intervention) [8, 11, 12, 15, 17], (Cognitive Behavioral Therapy (CBT) [17], Mindfulness [10], Physical conditioning exercises [13], Hatha Yoga associated with aromatherapy [14] and autogenic relaxation [16].

The practice of face-to-face yoga showed superior effects in reducing stress scores when compared to Control Groups, i.e., groups that did not receive any intervention during the study period [8, 9, 11, 12, 15, 16, 17,] or physical conditioning exercises [13]; similar results when compared to practices based on meditation or psychosocial therapies such as, Mindfulness [8, 10, 17] and CBT [17], as well as yoga associated with aromatherapy [14].

The application of online yoga practice interventions presented results similar to face-to-face interventions, with better results when compared to control groups [9] and indifferent results in the group-time relationship when compared to psychosocial modalities [16].

DISCUSSION

Apparently, an important element in stress management involves including a perception of consciousness between the mind and body, because in all the results favorable to the reduction of stress levels among university students, mental practices were highlighted.

Stress was a psychological measure constantly associated with other variables in the evaluations of the included studies, and most studies evaluated other mental health outcomes associated with stress as the primary outcome of the investigation [13, 16, 17]. Secondary outcomes such as emotional regulation [16, 17], self-compassion [10, 16], and sleep quality [12, 14] were reported as factors associated with stress, or rather, with coping with stress, being directly proportional to the intensity of stress experienced.

The work of Gorvine et al. [10] explored this relationship in its results. The authors stated that the higher the self-compassion scores, the lower the perceived stress scores among individuals. Therefore, even if the practice of yoga does not directly demonstrate direct results in reducing the stress levels reported by the participants, increasing the levels of self-compassion will indirectly offer tools to cope with stress due to changes in the structure of the psychological profile and personality traits.

Regarding the mechanisms possibly associated with the satisfactory results of the practice of Yoga in mental health, there is strong evidence in the literature that the practice of Yoga promotes the inhibitory tone of cortical GABAergic. Exposure to yoga practice for 12 weeks increases levels of thalamic GABA and dopamine in the ventral striatum18.

Studies based on neuroscience justify the effects of yoga practice by mentioning the bioelectrical activity of the brain, apparently, yoga increases brain activity in the regions of the amygdala and frontal cortex [19]. Meditation leads to changes in the anterior and dorsolateral cingulate cortex and increased alpha waves, which are relevant during conscious awareness and working [memory20].

Beta-type brain wave activity is present throughout the motor cortex during the execution of isotonic contractions and slow movements, typical of the practice of asanas in yoga, these waves are related to gains in academic performance and high capacity for arithmetic calculations [21].

A combination of physical practices, breathing exercise, and meditation is able to stabilize the autonomic nervous system, with emphasis on parasympathetic innervation, thus being competent in reducing arousal, being able to improve stress and anxiety levels, and improve emotional resilience and spirituality [14, 16]. Practicing yoga appears to regulate the autonomic nervous system, reducing sympathetic activity and increasing the production of neurotransmitters such as serotonin and dopamine, which is directly associated with emotional well-being and stress reduction [15].

The stress indices associated with higher education are a subject of recurrent concern in the clinical, academic and scientific communities. The short, medium and long-term repercussions lead to psychological, social and even physical debilitation. Measures to cope with academic stress through non-pharmacological mechanisms is also a change in lifestyle, and a permanent and cost-effective countermeasure is possible for this population.

Despite presenting significant results with effect sizes ranging from small to moderate, the cost-benefit of implementing yoga programs is promising. This review was guided by the question "would the practice of yoga be an effective and efficient non-

pharmacological alternative in the management of self-perceived psychological stress in university students?" and the answer to this question is "Yes".

The suggestion for future research is that future studies present a clearer outline of intervention protocols, as well as the dose and more active comparison groups can offer safe implementation subsidies to be applied in practice by Higher Education Institutions.

FINAL CONSIDERATIONS

The practice of yoga proved to be efficient in reducing stress scores, being a superior approach to the control group, physical exercise, relaxing music and has effects similar to cognitive behavioral therapy and *mindfulness*. In view of the data collected in this review, the implementation of yoga programs is presented with a favorable cost-benefit, since it is possible to apply numerous variations and modalities of different forms of administration.

Suggestions for future rehearsals are the elaboration of more rigorous protocols, with a detailed description of the sequences of movements adopted and types of meditation applied in the practice. Another important issue for future perspectives is about the exposure dose, the studies were very varied, and it is not possible to establish a safety parameter for the therapeutic effects.

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THE WORK OF THE MULTIDISCIPLINARY TEAM IN HOME NUTRITIONAL THERAPY FROM THE PERSPECTIVE OF THE UNIFIED HEALTH SYSTEM: A LITERATURE REVIEW

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ABSTRACT

Home care is considered a health care modality that should offer care to patients at home, involving health promotion and disease prevention actions, long-term and palliative care. The objective of this study is to discuss the contributions of multidisciplinary teamwork and its performance in home nutritional therapy. A search for articles was carried out based on the analysis of data available in *MEDLINE, LILACS, Google* Scholar, and CAPES Journals, using a comprehensive search strategy to identify studies published between January 2013 and September 2023. Nutritional care is a primordial factor, extremely important in home care, given that home nutritional therapy is defined as an effective care method for recovering the nutritional intake of sick individuals, home nutrition is described in the literature as an economical and safe treatment. Based on the reviewed studies, it is perceived that Home Nutritional Therapy becomes effective when there is a prepared multidisciplinary team, adequate training for the team and caregivers, as well as interactions between them, making it possible to minimize errors in the application and adherence to diets. The studies also highlight challenges and gaps to be overcome. It is crucial to promote a more integrated approach among health professionals, invest in continuing education, develop effective protocols, and strengthen interdisciplinary communication to ensure more efficient, safe, and patient-centered home nutrition therapy.

Keywords: Nutrition. Nutritional Therapy. Home Nutrition.

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INTRODUCTION

The 8th National Health Conference, held in 1986, and the Federal Constitution of 1988 are considered milestones in the conquest of several rights for the population in the democratic regime. Health was transformed into a right of citizenship and a duty of the State, giving rise to the process of creating a public, universal and decentralized health system, the SUS. Subsequently, there were debates about collective health and primary care, with a view to improving the living conditions of citizens (Souza *et al*., 2020).

The Unified Health System (SUS) is the result of decades of struggle for an egalitarian and universal health system. This system is always undergoing intense advances, seeking to ensure the guarantee of care and treatment for individual and collective health, covering procedures from primary care to high complexity, despite the difficulties and obstacles faced in the management of services (Sousa; Fernandes, 2020).

Based on the different experiences, the Ministry of Health adopted the Family Health Program (FHP) model, advancing in the reorganization of health care in the SUS, and becoming the Family Health Strategy (FHS) in subsequent years. The increased importance of primary care has brought to the municipalities challenges of reorganizing the teams, in order to guarantee users the operation through pedagogical technical support methodologies and clinical care (Mattos *et al*., 2022).

With the creation of the Family Health Strategy (FHS), the systemic character of the SUS became more evident and necessary, the program implemented as a strategy to guide health practices, and for the consolidation of primary care in Brazil, requires associative and interactive processes, aiming to meet health needs from a singular and multidimensional point of view, that is, from multiple determinants (Backes *et al*., 2014).

From this perspective, it can be stated that the multiprofessional team is central in the FHS, teamwork and/or interdisciplinary action presupposes significant exchanges of concepts, theories, methods, practices, so that each individual who has a certain specific knowledge works in an integrated and articulated way (Almeida, 2014; Backes *et al*., 2014).

Changes in the demographic and epidemiological profile in Brazil and in the world have made it necessary to adapt the health care model, leading several countries to adopt Home Care (HC) as a form of strategic care for health care, making it possible to rationalize hospital beds, reduce costs and organize patient-centered care (Rajão, Martins, 2020).

Home care is considered a health care modality that should offer care to users at home, involving health promotion and disease prevention actions, long-term and palliative care. Home care has a multidisciplinary team with the presence of: nurse, doctor, physiotherapist, speech therapist, psychologist, nutritionist, nursing assistants and

technicians, among others. Home care processes should be standardized, with dynamic review, and modified according to quality indicators (Franca, 2018).

According to the literature, AD concentrates a large number of patients with chronic diseases, who need adequate follow-up for their evolution, maintenance or recovery of their functional status. Nutritional monitoring is necessary to prevent readmissions, since nutritional status directly influences clinical evolution (Leindecker *et al*., 2023).

Nutritional therapy aims to maintain or recover the nutritional and functional status of patients. It can be performed orally, through the use of supplements and nutritional supplements, enteral in patients who for some reason cannot or cannot feed orally, using tubes or ostomies when the gastrointestinal tract is fit, or even through the intravenous route when the digestive tract cannot be used (Aanholt *et al*., 2017).

Nutritional therapy has expanded in the home environment, given that home care aims to continue hospital care, minimizing clinical complications and early readmissions, providing clinical and nutritional recovery through the monitoring of the multiprofessional team (Aanholt *et al*., 2017).

Together with the multidisciplinary team, the nutritionist is responsible for adapting the supply of food through the dietary prescription of each patient, respecting the limitations imposed by each disease, as well as the personal and financial availability of the service. When applied correctly, nutritional therapy promotes improvements in nutritional indicators, reducing morbidity rates and the risk of complications, as well as shorter hospitalization time and cost reduction (Moreira, 2010). The objective of this study is to discuss the contributions of multidisciplinary teamwork and its performance in home nutritional therapy.

Communication is a complex, dynamic and flexible process, which has structured elements, which can produce positive or negative effects. It is a structural basis of health literacy, and allows the construction of relationships between people. Multidisciplinary teamwork in health is a practice in which communication between professionals is part of the daily work, and the agents operate the articulation of technical interventions through the symbolic mediation of language (Bezerra; Alves 2019; Valladão *et al*., 2022).

Therefore, there is a need to consider two dimensions inherent to teamwork: the articulation of actions and the interaction of professionals. Contact with the patient in home care, as it takes place outside a health facility, requires networked care, where the development of knowledge and skills of the professionals who are part of the team will be imposed to facilitate the care of the patient's needs (Bezerra; Alves, 2019).

Home care is a potential strategy for reducing costs through dehospitalization, in addition to reducing the risk of secondary infections and repetitions. Home care promotes

humanized care, as it is provided in the safety of the home and favors the autonomy and trust of the patient and family (Cavalcante *et al*., 2022).

Nutritional care is a primordial factor, extremely important in home care, given that home nutritional therapy is defined as an effective care method for the recovery of sick individuals, home nutrition is described in the literature as an economical and safe treatment (Bolognese *et al*., 2022).

Despite this, there is a lack of studies that analyze the performance of the multidisciplinary team of nutritional therapy in the home environment. There is also a limited number of authors who discuss the effectiveness of home nutritional therapy. As it is a relevant topic, it is extremely important to discuss the team's performance, care protocols and the effectiveness of therapy in the patient's evolution.

THEORETICAL FRAMEWORK

HOME NUTRITIONAL THERAPY

Home care initiatives linked to hospitals are generally aimed at dehospitalization and contributing to the reduction of operational costs of services, providing a decrease in the average length of stay in hospitalization institutions, and reducing the intercurrence of infectious complications related to prolonged hospitalizations (Franca, 2018).

Nutritional therapy can be defined as the provision of oral, enteral, or parenteral nutrients in formulas aimed at maintaining or restoring nutritional status. Enteral nutrition refers to nutrition delivered through the gastrointestinal system through a catheter, tube, or stoma that delivers nutrients at a point distal to the oral cavity. Parenteral nutrition refers to the supply of nutrients through the intravenous route. Nutritional therapy should be considered as part of the integrated care plan when patients are unable or will not eat enough to sustain their nutritional needs (Mahan; Raymond, 2018).

In the home context, enteral and parenteral nutritional therapy has a similar indication to hospital indication, and the care already started in the hospital is continued at home. For the approval of home nutritional therapy (NTD), some requirements are necessary, such as: patient in clinical conditions that allow the continuity of treatment at home, tolerance to TND, environment in adequate conditions, patient, caregiver or family member with intellectual capacity to understand the recommendations, in addition to the presence of a multidisciplinary team (SBNPE, 2012).

The Resolution of the Collegiate Board (RDC) 63 of July 2000 and Ordinance 272 of 1998, provides for the technical regulation with minimum requirements for the practice of enteral and parenteral nutritional therapy, respectively. These legislations define the

multidisciplinary nutritional therapy team (EMTN) as "a formal group, mandatorily constituted of at least one professional from each category, namely: doctor, nutritionist, nurse and pharmacist, and may also include professionals from other categories, qualified and with specific training".

NT is considered safe and has a satisfactory cost-benefit ratio, when well indicated, planned and monitored by the specialized team. The success of home nutritional support depends on careful therapeutic planning and coordinated actions together with the multidisciplinary team, the patient, the family, and the caregiver (Cuppari, 2019).

In Brazil, the practice of NTD has been regulated since 2011, with the most recent legislation being Ordinance 825 of the Ministry of Health (2016), establishing the guidelines for home care represented by the Better at Home program (Franca, 2018). Ordinance 825 divides home care into three modalities, facilitating the understanding of the patient's care profile, enabling the adequacy of the management of human resources, necessary materials, and intersectoral flows. In addition, the ordinance highlights the need for the multidisciplinary team to act as educators, guiding and training the caregivers of users in care, involving them in the performance of care, respecting their limits and potentialities and making them subjects of the process.

The home care booklet "Better at home", published in 2013 by the Ministry of Health, highlights that the professional dimension is the core of care management, the moment of encounter between the worker/team and the user, an intercessory space between those who bear the health needs and those who are willing to care. It is a space of great creative power that permeates external determinants (beliefs, education, etc.), which influences both staff and users, and is also marked by a degree of freedom and responsibility in the action of workers.

Despite the whole scenario regarding the growth of TND, clinical benefits and the involvement of the health team in the follow-up of patients in home care, there is a gap in the literature regarding data related to home nutritional care in the country (Aanholt, 2017). The scarcity of studies related to the theme makes it difficult to compare the characteristics of patients who use the service, as well as to analyze the effectiveness of the care provided in this modality of therapy. Aanholt (2017) points out that this issue may be related to the lack of criteria in registering these patients in a single system for a systematic and permanent analysis.

THE MULTIDISCIPLINARY HOME CARE TEAM

The attributions of the multiprofessional team in the care of patients in home care, according to the Ministry of Health, are: help in body care, stimulation and help in feeding, getting out and returning to bed, sitting at the table, help in locomotion, changes in decubitus, serving as a link between the user, the family and the health team, administering medications, among others. The multidisciplinary health team needs to integrate care in a broad way, covering all aspects (biological, physical and social), with care being provided to the patient as well as to the family and community. Care must be elaborated through new methods of acting, in order to integrate with practice and respond to the health needs of people in different situations (Hilzendeger *et al*., 2014).

Araujo *et al*. (2018), highlight the role of the nursing team in patient care in home care, the team performs several activities, acting in care, management, education, and other priority activities both in individual and team care, such as team coordination and routine procedures in home visits.

The nutritionist is part of the home care team and has a central role in the effectiveness of home nutritional therapy, performing the instrumentalization of the nutritional diagnosis, meeting the needs of the patient by observing their specificities and sociocultural values. It proposes appropriate and necessary dietary guidelines, adapting them to the habits of the family unit, culture, physiological conditions, and food availability (Araujo *et al*., 2018).

The work of Araujo *et al*. (2018) also highlights the service of the physiotherapist professional, who works in home care in the aggravations of chronic degenerative and traumatic diseases, as a rehabilitator. And in order to prevent and promote mental health, the work of the psychologist is necessary for the maintenance of healthy aspects, always considering the resources available in the community and its potential.

Care is a sum of decisions regarding the use of technologies, articulations of professionals and environments in a given time and space that tries to be as appropriate as possible to the patient's needs. The complexity of the individual makes multidisciplinary care necessary, considering the environment in which he is inserted and his clinical, social and affective condition. The team's work must respect ethical and human values, as well as individual autonomy, in addition to establishing bonds so that the center of their attention is comprehensive care (Brasil, 2015).

THE COMMUNICATIVE PROCESS AND MULTIPROFESSIONAL TEAMWORK IN HEALTH

The theories discussed by Ciamponi and Peduzzi (2000) highlight that the term "team" in the context of health refers to obtaining goods and products to meet human needs. It is the team's responsibility to obtain results that express the purpose of the work it produces. There is a relationship between complementary dimensions: work and interaction, characterizing teamwork. In this context, the team constitutes a practice in which communication between professionals is part of the daily work and the agents operate the articulation of their different works through the mediation of language (Ciamponni; Peduzzi, 2000).

The multidisciplinary health team can also be defined as the involvement of several professionals with different backgrounds and specialties. The articulation of different perspectives of the professionals who make up the multidisciplinary health team enables the development of actions that go beyond the rationality of curative care, centered on the immediate resolution of individual problems. The interaction between this team and the exchange of various technical knowledge, as well as the planning, cooperation and discipline among the professionals that compose it can enhance the achievement of positive results, impacting the patient's improvement, results that would not be produced by any professional alone (Bezerra; Alves, 2019).

Failure in communication between health professionals, and between them and patients and companions, has been one of the main factors that contribute to the occurrence of adverse events during treatment. Ineffective communication is among the causes of 70% of errors made in health care. The process of effective communication requires a great deal of social interaction, which demands the active participation of professionals, managers and patients. The process of interactivity of the multiprofessional team directly reflects on the provision of care, well-being, and patient safety (Santos *et al*., 2021).

Valadão (2022) highlighted that communication problems can produce unsafe behaviors, and fall into three categories: communication channel failure, system failures (not used or used infrequently), and failure to send messages (the receiver is misunderstood or delayed). Fragile communication, both in Brazil and in other countries, is considered one of the main factors responsible for adverse events and safety incidents that affect patients.

With regard to home nutritional therapy, the importance of follow-up and monitoring by the multidisciplinary team is relevant in order to prevent complications and favor the adherence of patients and their families to treatment. When home nutritional therapy is

prescribed, the team is able to provide all the necessary support in relation to assistance, care and guidance. In this sense, it can be stated that there is a greater need for interaction between the team, given that in home care not all professionals are always present at the same time. The training and formation of the team transforms professional practice, and can be understood as learning-work (Guimarães, 2022).

Backes *et al*. (2014), highlighted in their studies that failures in the interaction of the multiprofessional team may be related to failures in the academic training of health professionals, and is also based on the biomedical model, whose consequences are the reproduction, fragmentation and linearity of interventions related to the health-disease process. The study highlights that in the curricular guidelines of undergraduate health courses, two courses do not mention teamwork, they are: nursing and nutrition. Professionals who are protagonists when it comes to nutritional therapy, both in hospital and at home. Thus, it can be said that this educational deficiency can harm the practice of multidisciplinary interaction, as it is necessary to have the formation of organizing thinking, the understanding of processes and theories to then make it possible.

METHODOLOGY

The present work was carried out in terms of qualitative research, in this type of research, there is an interpretative and naturalistic approach to the world. In the clinical field, the scenario of health experiences is highlighted, defining the qualitative clinical method, and seeking to interpret the meanings of a psychological and sociocultural nature brought by individuals (patients, health professionals, etc.), about the phenomena pertinent to the field of health and disease problems. The complexity of qualitative research comes from the fact that there is no unique strategy for its methodological and interpretative conduction. The qualitative approach is recommended when there is little knowledge about the phenomenon or when it is necessary to describe it according to the subject's point of view (Lopes; Fracolli, 2008).

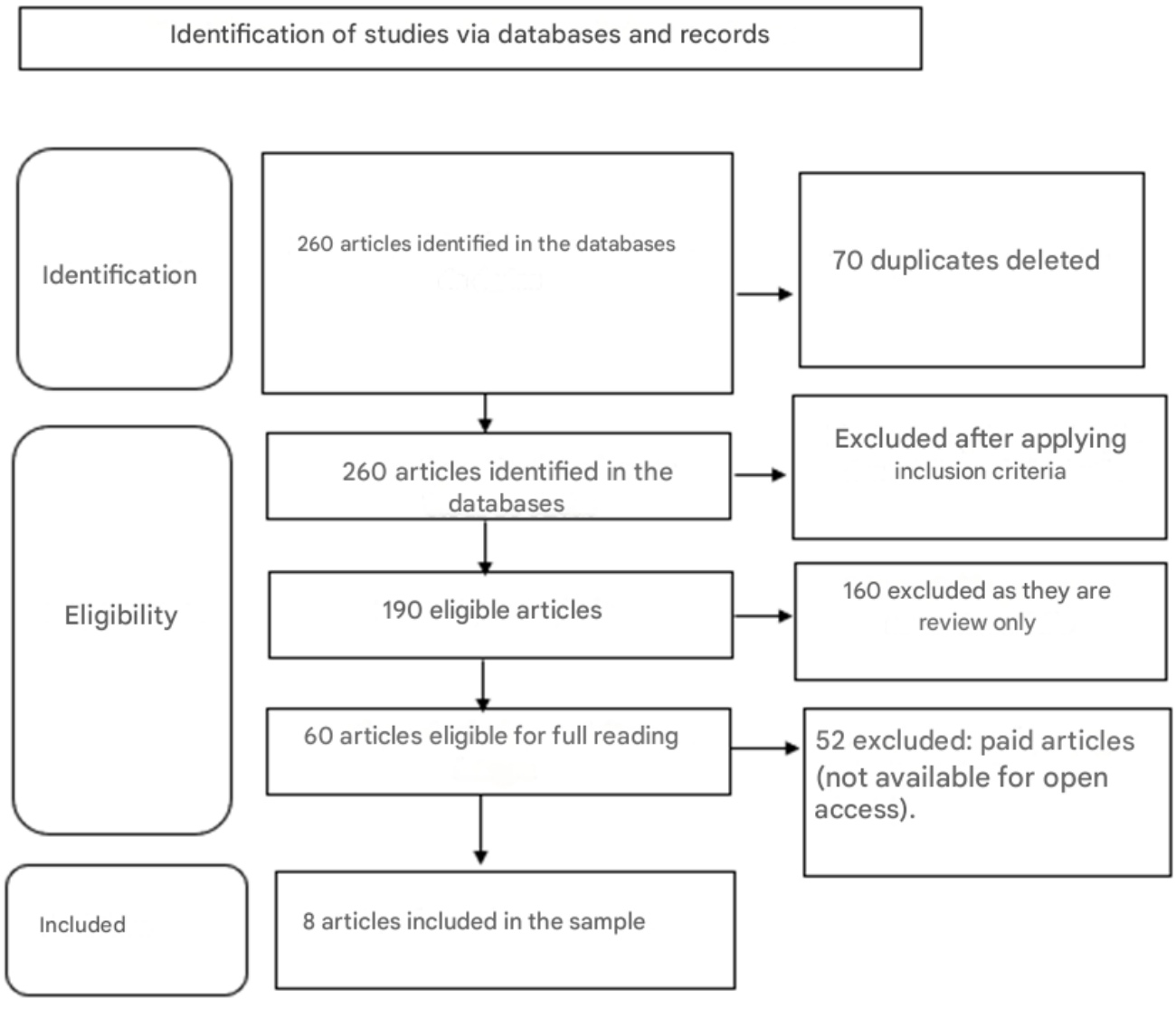
A literature review was carried out, defined by Moreira (2004) as a type of study that analyzes the bibliographic production in a given thematic area, within a time frame, providing an overview or state of the art report on a topic, making it possible to highlight new ideas, methods, sub-themes that have received greater or lesser emphasis in the selected literature.

A search for articles was carried out based on the analysis of data available in *MEDLINE, LILACS, Google* Scholar, *PubMed,* and CAPES Journals, using a comprehensive search strategy to identify studies published between January 2013 and

September 2023 in Portuguese, English, and Spanish. The following descriptors were used: multidisciplinary health team; nutritional therapy, home nutritional therapy. Priority was given to works published in the last 10 years, including complete texts that are directly or indirectly related to the theme addressed, texts in Portuguese, English or Spanish. Studies in languages other than those mentioned, articles that are not related to the theme, and studies unavailable for download were excluded.

With the application of the search methods described, 260 articles were found. Next, the inclusion criteria were applied, in the following order: from the selection of articles with full text available, 190 articles were found; When clinical trials and treatment were selected, 160 articles were found. Finally, when searching for articles published in the last 10 years (2013-2023), 60 articles were found (Figure 1).

Figure 1 – Selection of articles – Prepared by the author



RESULTS AND DISCUSSION

After the critical evaluation of titles and abstracts, based on the exclusion criteria, 08 articles were selected, as outlined in figure 1 of the methodology. The articles are described in chart 1, organized by categories: Author, title, objective and results, respectively.

Chart 1 – Articles organized by categories: Author, title, objective and results. Source: Prepared by the author.

Author	Title	Objective	Results
Prado *et al*., 2022.	Elaboration of a protocol for the management of parenteral nutritional therapy in a public hospital in southwestern Bahia	Develop a NPT protocol to systematize care and direct the team in flows, conducts and procedures.	Verification of the lack of protocols for NPT; Professionals from the multidisciplinary team work individually; Lack of communication between professionals; Late initiation of nutritional therapy; Errors in the statute of limitations; Difficulties with the evolution and discontinuation of NPT.
Aanholt *et al*., 2022.	Hispanic American Survey of Nutrition Therapy in Home Care Services	to know how home nutritional therapy (NTD) is performed in the member countries of the Latin American Federation of Parenteral and Enteral Therapy	77% of discharge orientations occurred on the same day or up to one day before discharge; 71% of the orientations were in writing; Low indication of prescription of exclusive artisanal diet.
Almeida *et al*., 2021.	Home enteral nutritional therapy: experience of continuing education	OBJECTIVE: To evaluate an educational intervention on home enteral nutrition therapy.	In the evaluation of the activity, the following stood out: Discussion and a multiprofessional view on the subject (20.8%); Collective constructions with other professionals (16.7%); Know and problematize reality (10.4%); Communication among Professionals (8.3%).
Tallarico *et al*., 2019.	Home parenteral nutritional therapy: epidemiological profile and prevalence of the main complications in a private service in Brasília, DF	OBJECTIVE: To evaluate the epidemiological profile of patients using PDNT and its infectious, metabolic, and hepatic complications at a private Nutritional Therapy service in Brasília, DF, Brazil.	Primary bloodstream infection (BSI) was present in 1.43 per 1,000 catheters/day and the germs isolated in cultures were: Gram-positive coccus (50%); Gram-negative bacillus (25%); fungus (25%); Prophylactic therapy was used in 50% of the patients, hyperglycemia occurred in 31.81% and hepatic dysfunction in 36.36%; The risks of NPT can be reduced when the multidisciplinary team, patients, and caregivers are adequately trained.
Matsuda (2019).	Effects Adverses in nutritional therapy: perceptions of professionals from the multidisciplinary team	Effects Adverses in nutritional therapy: perceptions of the professionals of the multiprofessional team.	The theory of vulnerability pointed to the predominance of the individual dimension; Need to strengthen training programs; Lack of protocols that help in the performance of professionals.
Cavagnari *et al*., 2023.	Factors associated with home nutritional	To analyze home nutritional therapy and identify	Low weight and a classification suggestive of sarcopenia predominated in the participants;

Author	Title	Objective	Results
	therapy in patients under palliative care	nutritional status in patients under palliative care at home.	Most of them had a broken wing sign (70.8%), loss of the Bichat ball (66.7%) and loss of mass in the upper and lower limbs; Only one patient was with the value infused according to his caloric needs.
Souto (2016).	Effect of multi- or uniprofessional guidance on the adaptation of the diet of patients using home enteral nutrition	OBJECTIVE: To evaluate the effect of uniprofessional and multiprofessional guidance on the adaptation of home enteral nutrition in patients discharged from the Hospital de Clínicas de Porto Alegre.	Discharge guided predominantly by only one professional; none of the interviewees reported difficulties in preparing or administering the diet or even in the hygiene of the tube; a much larger number of caregivers who received multiprofessional guidance; None of the patients who received multi-orientation had tube obstruction as a complication.
De Sousa *et al*., 2021.	Analysis of the effectiveness of nutritional therapy in patients under palliative care of the Better at Home program in the municipality of Queimadas-PB	OBJECTIVE: To analyze the effectiveness of enteral nutritional therapy in patients in palliative care assisted by the Better at Home Program promoted in the municipality of Queimadas - PB.	Prevalence of underweight (50%), followed by normal weight (40%), overweight (10%); The most commonly present complications were constipation (31%), abdominal distension (28%), and vomiting (22%); 60% of the patients received adequate caloric intake.

Prado *et al*. (2022) conducted a study where a protocol for parental nutrition was developed, aiming to systematize care and guide the team in procedures, conducts, and flows to minimize complications in hospitalized patients. The authors' study was carried out between May 2019 and February 2021 in medical and surgical sectors, intensive care units, and emergency rooms of a Public Hospital in Southwest Bahia. Gaps in the institution were identified, such as failures in communication between professionals, conflicts in their attributions, delay in the start of parenteral nutrition, errors in the prescription and choice of the access route, lack of laboratory monitoring, difficulties in the evolution and discontinuation of PN.

These deficiencies analyzed by Prado *et al.* (2022), guided the elaboration of the PN management protocol, however, this represents only an initial step. The implementation in the hospital unit and the training of the entire team are steps to be followed. In the work of Prado *et al*. (2022), demonstrated that the multidisciplinary hospital team also has deficiencies in functioning as well as the home team, it can be said that home care is an extension of the hospital, therefore, for home care to become effective, the hospital multiprofessional team must be prepared and follow the care protocols, since it is during hospital discharge that the team carries out home care guidelines.

Aanholt *et al.* (2022), conducted a survey on home nutritional therapy in Latin America, an epidemiological, descriptive and cross-sectional study, with data from a *survey* authored by BRASPEN. The survey sought to know how TND is in Latin America. There was the participation of 17 Latin American countries and Spain. Brazil contributed with the largest number of respondents, with more than half of the participants, corresponding to 57%.

The findings of the survey showed that 77% of the participating health professionals practice hospital guidance for continuity of care at home up to one day before discharge, different from what is recommended in the literature, given that planned discharge is a recommendation of the World Health Organization, being a tool used to guarantee the patient continuity of clinical and nutritional care at home, safely. Therefore, the ideal is that the process starts from the patient's admission, involving the multidisciplinary team, the family, the patient, and the responsible caregiver, which should facilitate the understanding of the therapeutic needs (Aanholt *et al*., 2022).

Aanholt *et al*. (2022) also draw attention to the data found in the study regarding the low indication of prescription of artisanal diet, the study revealed that only 8% of the participants used an exclusive artisanal diet, pointing out that most use industrialized ready-to-eat diets, which may be related to the need for practicality on the part of the team, or caregivers. The authors highlight that the artisanal diet is an interesting option for the elderly, and when combined with the industrialized diet (mixed) offers better prognosis, given that it is easier to provide nutrients to these patients.

In addition, the findings of Aanholt *et al*. (2022), showed that a third of the professionals do not deliver the guidelines in writing, and pass on the techniques of nutritional therapy and home care verbally, an action that generates doubts for the family and patient. The findings of the survey demonstrate a lack of interaction among the multidisciplinary team, as well as a lack of compliance with the protocols that systematize care and guide the team.

Almeida *et al*. (2021) reported an experience through an educational intervention carried out in a public general teaching hospital, focused on care in home enteral nutrition therapy. A 200-minute workshop was conducted, using hermeneutic-dialectical approaches, including theatrical expressions, discussions and the construction of themes for an educational video on guidelines for hospital discharge.

The participants in the discussion carried out in the educational intervention by Almeida *et al.* (2021), pointed out as the main challenges in care in TNED the construction of interdisciplinarity, the organization of health services, the definition of shared know-how,

and even the presentation of health policies. The educational actions presented aimed at the autonomy of the subject in the care process, given that most of the NDT errors can be avoided through guidance given to the caregiver by the multidisciplinary team. The workshop proved to be an effective method for bringing professionals closer to the theme, contributing to the identification of the need for improvements in clinical practice.

In a study of Home Parenteral Nutritional Therapy (NPNT) in a private Nutritional Therapy service in Brasília, retrospective data of 22 patients with a median age of 52 years were analyzed, most of whom were women (54.5%). The leading causes of bowel failure (IF) included gastrointestinal tract neoplasms (44%), short bowel syndrome (12%), and Crohn's disease (8%). Several complications were observed: primary bloodstream infection (BSI) was reported in 1.43 per 1,000 catheters/day, with germs such as Gram-positive coccus (50%), Gram-negative bacillus (25%), and fungi (25%). Prophylactic blockade therapy was used in 50% of the patients, while hyperglycemia occurred in 31.81% and hepatic dysfunction in 36.36%. Bowel rehabilitation was observed in 24% of the patients (Tallarico *et al.*, 2019).

In the study by Tallarico *et al*. (2019) emphasize that NPT offers benefits, but also brings complications. The multidisciplinary team and adequate training of patients and caregivers can reduce these complications. Control of caloric overload, the use of balanced complex lipid emulsions, and cyclic infusion have been suggested to prevent liver disease. This experience proved to be relevant to review practices and discuss new ways for the discharge of patients with enteral tube in home therapy, in addition to opening possibilities for the creation of an educational video (Tallarico *et al.,* 2019).

Matsuda (2019) studied the perception of professionals of multiprofessional nutritional therapy teams about advents in this area and their level of national management. The author used the vulnerability theory in her study, it was observed that, in the Individual dimension, the central concerns were focused on the patient, access (routes of administration), prescription and especially administration of solutions. In the Programmatic dimension, protocols for the administration of nutritional therapy and training programs were identified. In the Social dimension, institutional norms and guidelines were mentioned, excluding Ministerial Ordinances, whose content would facilitate the work of professionals. It was evident in the study that there were no significant differences in the reality of multiprofessional teams in Brazil, as well as in the profile of professionals and in the occurrence of adverse events.

Cavagnari *et al*. (2023) conducted a prospective observational study aimed at analyzing home nutritional therapy and identifying the nutritional status of patients in

palliative care at home. The authors highlighted that most of the patients participating in the study had low weight. The predominant formula used in home nutritional care was hyperprotein. Some patients received mixed food, offered by caregivers, even though it was contraindicated by professionals, which can be pointed out as one of the factors for the prevalence of low birth weight in patients.

Souto (2016) conducted a cross-sectional study with adult individuals who were discharged from the hospital using a tube for enteral feeding. The objective of this study was to evaluate the effect of uniprofessional and multiprofessional guidance on NDT guidance. According to the author's results, 94.4% of the times when discharge guidance was given, the caregiver was present. The orientation was predominantly performed by only one professional, 68.5% of the time. The caregiver was responsible for preparing the diets in most cases, and most reported having no previous knowledge of the guidance on these tasks. None of the patients who received multidisciplinary counseling had tube obstruction as a complication, whereas 11.1% of the patients who received uniprofessional counseling had this complication.

De Sousa *et al*. (2021) carried out a qualitative and quantitative descriptive study, using data from patients in the Better at Home program, with the objective of analyzing the effectiveness of ENT in patients in palliative care assisted by the program, in the municipality of Queimadas – PB. Regarding gastrointestinal complications, 40% of the sample had diarrhea, 20% constipation, and 10% abdominal distension. Regarding nutritional status, 50% were underweight. The planned nutritional intake in relation to the actual one proved to be efficient. Despite this, the authors highlight that there are specific cases of inadequacy in the preparation of the diet, made by caregivers and patients, which can be explained by the lack of knowledge, as well as by the lack of attention, and it is up to the team of the Better at Home program to carry out the training for better manipulation and adherence to the diet.

The lack of well-established protocols for the direction of the multiprofessional team, as well as the lack of planning of continuing education actions for professionals and care are points highlighted by most of the studies analyzed. The study by De Sousa *et al.* (2021) demonstrated that the Better at Home program is being effective in home care, adequately offering the necessary caloric intake.

The inadequacies in the NDT found by De Sousa *et al*. (2021) and Cavagnari et al. (2023), are pointed out as the result of errors in communication between caregivers and the team, and can be corrected with actions mentioned by other authors, such as Tallarico *et al*. (2019) demonstrated in his study on NPT, where it was possible to minimize complications

through the application of a protocol where the multidisciplinary team received adequate training.

FINAL CONSIDERATIONS

The studies mentioned offer different perspectives on nutritional therapy in varied contexts, from hospitals to home care. Based on the reviewed studies, it is perceived that Home Nutritional Therapy becomes effective when there is a prepared multidisciplinary team, adequate training for the team and caregivers, as well as interactions between them, making it possible to minimize errors in the application and adherence to diets.

The performance of the multidisciplinary team is highlighted as a key point in this process. Effective communication between health professionals is essential to ensure the quality of care, prevent complications, and favor patient adherence to treatment. The interaction between the various team members, each with their own expertise and specific knowledge, is essential to achieve positive results that would not be possible individually.

However, the studies also highlight challenges and gaps to be overcome. Issues such as communication failures between professionals, lack of well-defined protocols, delays in the start of nutritional therapy, errors in the prescription and choice of the access route, as well as difficulties in the evolution and discontinuation of treatment, were identified as areas that require attention and improvement.

The reviewed literature points to the need for greater emphasis on the education and qualification of health professionals, especially in the context of home nutritional therapy. In addition, the implementation of clear protocols and the improvement of interprofessional communication are essential to optimize the effectiveness of this type of treatment.

It is crucial to promote a more integrated approach among health professionals, invest in continuing education, develop effective protocols, and strengthen interdisciplinary communication to ensure more efficient, safe, and patient-centered home nutrition therapy.

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CYSTITIS IN YOUNG WOMEN: A LITERATURE REVIEW

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ABSTRACT

Introduction: Urinary tract infection (UTI) is a very prevalent disease, with high occurrence in women, affecting the urethra, bladder, ureters and kidneys, and may manifest due to the invasion of exogenous bacteria or the proliferation of microbiota from the digestive tract. Objective: to present the latest updates on the topic of cystitis in young women. Methodology: this is an integrative literature review, whose articles were identified through a search in the digital libraries Medical Publications (PubMed), Scientific Electronic Library Online (SciELO) and Google Scholar during the first half of 2024. Results: 13 studies published between 2012 and 2022 were selected to continue the study. Conclusion: despite the high incidence of the disease, studies on the etiology and treatment of UTI are quite concise. What has been shown new are the prophylactic methods that have been studied, however, there is still a lack of their long-term benefits.

Keywords: Cystitis. Urinary tract infections. Women.

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INTRODUCTION

Urinary tract infection (UTI) is a very prevalent disease, with a high occurrence in women, affecting the urethra, bladder, ureters and kidneys. The reason why the incidence is higher in females is mainly due to anatomical issues, such as a shorter urethra and the short distance between the anus and the urethral meatus (LAZARROTO, 2012). This provides an easy translocation of the bacteria present in the anal region to the urethral region. In addition, improper water intake may be associated with the onset of UTI. According to Nerbass *et al*. (2021), carried out an experiment with nursing technicians from a health center, and concluded that professionals who reported low water intake had a higher prevalence of cystitis compared to those who ingested the appropriate amount of water.

UTI can manifest itself due to the invasion of exogenous bacteria or the proliferation of the microbiota from the digestive tract, the latter being the most common to occur (HADDAD, FERNANDES, 2019). *Escherichia coli,* a normal bacterium of the human gut microbiota, is the most common cause of UTI, accounting for up to 85% of infections (SAMPAIO *et al.,* 2022). Other pathogens may also be present and responsible for the infection, such as *Staphylococcus saprophtycus, Klebsiella pneumoniae, and Proteus mirabilis* , which account for 4% of acute cystitis infections (HADDAD, FERNANDES, 2019).

Gram-negative Escherichia coli bacteria are microorganisms that do not have the ability to survive and/or multiply outside their natural environment. However, some of these bacteria may have strains with high virulence power, leading to the pathogenesis of the disease, which are called uropathogenic *E. coli* (UPEC). For its permanence and proliferation in the urinary tract, *E. coli* has fimbriae, polysaccharide capsule, iron acquisition systems, and secretes toxins. The fimbriae are used to attach to the bladder epithelium, in this way, a process of vacuolization of the bacteria inside the cell occurs. The colony can be protected from the host's immunity, and thus ascend to the kidneys (SILVA, 2022).

Complicated and uncomplicated, it is a way of classifying this type of infection according to prognosis. It is said to be uncomplicated UTI when it occurs in young, non-pregnant women and in the absence of structural or functional abnormalities of the urinary tract. On the other hand, the categorization of complicated is when it affects patients who fit into at least one of the following conditions: pregnant, diabetic, with kidney failure, urinary tract obstruction, immunosuppressed, who have undergone kidney transplantation, history of UTI in childhood, presence of indwelling urinary catheter or nephrostomy, in addition to anatomical or functional dysfunctions (DA SILVA *et al*., 2021; HADDAD, FERNANDES, 2019).

There is another classification of urinary tract infection, but in relation to frequency, it can be isolated or recurrent. The first type is when a single infection occurs in a woman who has no previous history of UTI, and resolves quickly with antimicrobials in an empirical way. The recurrent one, also called relapse, concerns a woman with at least two cases of UTI in a period of six months or three in a period of twelve months (NUNES, 2022).

Several studies seek the best way to avoid contracting the pathology. Behavioral reeducation of women is essential, such as adequate water intake and correct hygiene of the perianal region. In a review study by Llano *et al.* (2020), showed that patients with a history of recurrent UTI who took cranberry juice significantly decreased symptoms of the infection. The explanation is due to the metabolization of flavonoids - such as prostacyclins - present in the juice, such as phenylpropionic, phenyl acetic, benzoic and cinnamic acids. These metabolites have been shown to have an inhibitory action on the adhesion of UPEC to urinary tract cells. In this context, this study seeks to highlight the latest updates on the topic of cystitis in young women.

MATERIALS AND METHODS

The present research is an Integrative Literature Review (RIL). The articles were identified through a search in the digital libraries Medical Publications (PubMed), Scientific Electronic Library Online (SciELO) and Google Scholar during the first half of 2024, using the terms according to the Health Sciences Descriptors (DeCS): "Cystitis", "Women", "Prophylaxis" and "Relapse". Eligible studies were limited to Portuguese and English, using full-text articles or books. Meeting summaries, comments, news and letters were excluded. There was a limitation of the publication date restricting the years 2012 to June 2022. Reference lists of eligible articles were searched for relevant studies. Finally, the articles were discussed and synthesized so that there was a better understanding of the theme, they were carefully read so that the necessary information could be extracted.

RESULTS

This integrative review was based on the analysis of 13 studies published between 2012 and 2022 available on the PubMed, SciELO, and Google scholar platforms in English and Portuguese.

From these data, a table was elaborated to promote the characterization of the articles used. The variables considered for this stage were: author/authors, year, research title, type of study, and published journal (Table 1). After completion, it was observed that most of the selected articles date from 2022 (35.7%), followed by articles published in 2021

(28.5%) and the remaining articles date from 2020 (7.1%), 2018 (14.2%) and 2012 (7.1%). Due to the language of origin, the selected studies were mostly written in Portuguese (78.5%) and the others in English (21.4%). Table 2 presents an analysis of the contents of the scientific productions analyzed, their objectives and final considerations.

Table 1: Characterization of the articles included in the literature review regarding the author(s), year, title of the article, type of study and journal. Gurupi, Tocantins, Brazil, 2024.

No.	Author(s)/Year	Article title	Type of study	Magazine
1	Viana, Carvalho 2022 - Dates	Efficacy of prophylactic treatment in women with uncomplicated recurrent urinary tract infections (cystitis): an integrative review. Efficacy of prophylactic treatment in women with recurrent uncomplicated urinary tract infections (cystitis): an integrative review.	Review Article	Journal of Ethics and Political Philosophy
2	Tano *et al.,* 2022	Susceptibility to first-choice antimicrobial treatment for urinary tract infections caused by Escherichia coli isolates from urine samples from women in the southern Brazilian community. Susceptibility to first choice antimicrobial treatment for urinary tract infections to escherichia coli isolates from women urine samples in community South Brazil.	Original article	The Brazilian Journal of Infectious Diseases
3	Silva, 2022	Analysis of the type II toxin-antitoxin system in the bacterial physiology of a hybrid strain: atypical enteropathogenic Escherichia coli and extraintestinal E. coli. Analysis of the type II toxin-antitoxin system in physiology bacterial strain of a hybrid strain: Escherichia coli atypical enteropathogenic and extraintestinal E. coli.	Original article	Butantan Institute Repository
4	Nunes, 2022	Urinary tract infection by escherichia coli and its resistance to ciprofloxacin. Urinary infection by escherichia coli and its resistance to ciprofloxacin.	Review Article	Cogna Repository
5	Sampaio *et al.,* 2022	Urinary tract infections in women. Urinary tract infections in women.	Review Article	Medicine Science and Art

6	DA Silva *et al.,* 2021	Risk factors for urinary tract infections: an integrative review. Risk factors for urinary tract infections: integrative review.	Review Article	Electronic Journal Health Collection
7	Nerbass *et al.,* 2021	Nursing technicians have a higher prevalence of urinary tract symptoms and infections than other occupations in dialysis units. Female nurses have a higher prevalence of urinary tract symptoms and infection than other occupations in dialysis units.	Original article	Brazilian Journal of Nephrology
8	Silva, Souza, 2021	Urinary tract infection in pregnant women: an integrative review. Urinary tract infection in pregnant women: an integrative review.	Review Article	Research, Society and Development
9	Da Silva, Cimadon, 2021	Use of vaccinium macrocarpon (cranberry) in the prophylaxis of urinary tract infections: an integrative review. Use of Vaccinium macrocarpon (Cranberry) in the prophylaxis of urinary tract infections: integrative review.	Review Article	Challenges Magazine
10	Llano, Arribas, Bartolomé, 2020	Cranberry Polyphenols and Prevention of Urinary Tract Infections: Relevant Considerations. Cranberry polyphenols and prevention against urinary tract infections: relevant considerations.	Review Article	Molecules
11	Naber, Wagenlehner, 2018	New antibiotics in the treatment of urinary tract infections. Novel antibiotics in the treatment of urinary tract infections.	Review Article	European Urology Focus
12	Haddad, Fernandes, 2019	Urinary tract infection. Urinary tract infection.	Review Article	Female
13	Lazarotto, Gomes, Pereira, 2012	Clinical evaluation of uncomplicated urinary tract infection in women. Clinical evaluation of not complicated urinary infection in women.	Review Article	Facene/Famene

Source: Survey data

Table 2: Analysis of the contents of the scientific productions included. Gurupi, Tocantins, Brazil, 2024.

No.	Authors no	Purpose of the Article	Key considerations
1	Viana, Carvalho 2022 - Dates	Observe, analyze, and understand through an integrative review the main Results achieved in the literature regarding the efficacy of prophylactic treatment in women with uncomplicated recurrent urinary tract infections.	The use of *Vaccinium macrocarpon* – Cranberry has been used since they have antimicrobial action on the plant. It is a good ally in UTI therapy and, therefore, the indication is that there may be greater dissemination among patients affected by UTI as an alternative to the use of antibiotics.
2	Tano *et al.*, 2022	Evaluate or profile antimicrobial susceptibility towards the first-line treatment for UTI caused by *E.coli* isolated in urine samples from Women of the community and presence of extended-spectrum beta-lactamase (ESBL).	The antimicrobial susceptibility profile was similar to that reported in the literature, with resistance to TMP-SMX greater than 30% in the samples studied. Nitrofurantoin maintains high sensitivity rates in excess of 90%. Quinolone resistance increases proportionally with age, as does ESBL.
3	Silva, 2022	To analyze the toxin-antitoxin (TA) type II system in the bacterial physiology of a hybrid strain: *Escherichia coli* atypical enteropathogenic and *E. coli* extraintestinal	The data indicate that the TA systems seem to be involved in the stress response of the hybrid strain: *atypical enteropathogenic* Escherichia coli and extraintestinal *E. coli*, therefore involved in its physiological processes. Increased gene expression occurred when the bacterium was exposed to acidic environments and environments of nutritional stress.
4	Nunes, 2022	Show than or Indiscriminate use from drugs without a medical prescription is serious and is very frequent in the days from Today, consequently bacteria have been creating a large resistance drugs and they are not effective incombat the infection.	There is a high prevalence of UTI in men and women caused by *Escherichia Coli* in the hospital setting. There is an indiscriminate use of drugs without a medical prescription, causing a major public health problem, as inappropriate use leads bacteria to have a great resistance to certain drugs that were effective some time ago and are not able to fight infection today.
5	Sampaio *and*	Review the etiology, pathogenesis, diagnosis	The main route of infection is ascending, from the retrograde access of perineum bacteria, through

	al., 2022	and treatment of urinary infections in women.	from the urethra to the bladder. *E. coli* is the most common cause of UTIs, accounting for 85% of community-acquired infections and 50% of hospital-acquired infections. Whenever possible, urine should be collected for evaluation of abnormal elements and antibiogram sediment and culture before starting treatment in patients with urinary tract infection. It recommends treatment with fosfomycin and nitrofurantoin according to the European Association of Urology.
6	Da Silva *et al.,* 2021	Analyze risk factors for urinary tract infections.	The main risk factors evidenced were the use of bladder catheters, unprotected sexual practices, previous genital infection, antibiotic resistance, lack or excess of hygiene in the genital areas, urethral anatomy, hyperglycemia, and hormonal changes.
7	Nerbass *et al.,* 2021	To compare the prevalence of self-reported urinary symptoms and infections and hydration markers between dialysis nursing technicians and other occupations sharing the same work environment.	The nursing technicians of the dialysis units reported a lower fluid intake and a higher prevalence of symptoms and urinary tract infection than the administrative and multidisciplinary team. In addition, employees who perceived environmental barriers to adequate hydration had a higher prevalence of urinary problems.
8	Silva, Souza, 2021	Do an integrative review addressing the main microbiological agents, clinical classifications, complications and therapeutic conducts in pregnant women.	These infections are usually caused by bacteria from the intestinal microbiota that contaminate the urinary tract, with Escherichia coli standing out with a greater predominance in 80% of cases. For effective treatment, it is necessary to identify the bacteria causing the infection, to select the appropriate antibiotic. Therefore, in order to reduce and control cases of urinary tract infections, prenatal consultations and early tests should be carried out to diagnose the infection in order to prevent possible perinatal and maternal complications.
9	Of Silva, Cimadon, 2021	Identify through a review of literature Antimicrobial properties Not present *Vaccinium macrocarpon,* its preventive effect and how adjuvant in the treatment of UTIs.	The information allows us to conclude that the use of *Vaccinum macrocarpon* is an effective therapy in cases of urinary infection, and is a prophylaxis for cases of recurrent infection due to the action of proanthocyanidins and anthocyanidins, which are the active ingredients present in the fruit, which prevent the fimbriae of the bacteria from being able to attach themselves to the wall of the urinary tract and thus cannot adhere and lead to infection

10	Llano, Arribas, Bartolomé, 2020	Analyze the protective effect of cranberry against urinary tract infections.	Consumption of cranberry (Vaccinium macrocarpon) has been shown to be effective in reducing the occurrence and severity of UTIs in women and preventing the adherence of pathogenic bacteria to the urinary tract. In addition, it may also decrease UTI-related symptoms by suppressing inflammatory cascades as an immune response to bacterial invasion
11	Naber, Wagenlehner, 2018	Report on studies on new antibiotics that are under development for the treatment of urinary tract infection.	Several new antibiotic agents for urinary tract infections include combinations of β-lactam/β-lactamase inhibitors with cephalosporins and carbapenems. Siderophore cephalosporins, novel aminoglycosides, fluoroquinolones and tetracyclines are also in clinical development.
12	Haddad, Fernandes, *2019*	To describe urinary tract infection through a literature review.	The main pathogen involved in UTI in women is E. coli, which is responsible for about 80% of all episodes of infection. UTI can be classified as both complicated and uncomplicated. In the case of acute uncomplicated bacterial cystitis in women, antimicrobial treatment in monodose or short course (three days) is preferred. In all cases of acute pyelonephritis, 10 to 14 days of antimicrobial treatment should be completed in an outpatient and/or inpatient setting. Fosfomycin and nitrofurantoin are considered drugs of choice in many countries. Urine culture is recommended only for recurrent UTI, in the presence of associated complications and in the presence of failure of initial treatment.
13	Lazarotto, Gomes, Pereira, 2012	Promote a clinical review of possible pathogens as well as the correct way to identify, diagnose and treat this type of pathology.	The microbiota of an uncomplicated UTI in women consists mainly of Escherichia coli (75 to 95%), with occasional infections of other enterobacterial species, such as Proteus mirabilis, Klebsiella pneumoniae, and other bacteria such as Staphylococcus saprophyticus. It is important to emphasize that the prescription of antibiotics should preferably be guided through urine culture and antibiogram, respectively. However, this fact should not be a reason to postpone the start of treatment in symptomatic cases. It suggests the use of nitrofurantoin and quinolones for empirical treatment.

Source: Survey data

DISCUSSION

Urinary tract infection is a pathology of great incidence in the health area, and can be found due to the recurrent complaints of patients who seek medical care. In the hospital

environment, the incidence of UTI among men and women is similar, however, when making a cut of this environment, the prevalence in women is noted, this is due to both anatomical issues - smaller urethra in relation to men - and monthly hormonal oscillations (NUNES, 2022; SILVA *et al.,* 2021). According to Nunes (2022), due to the high incidence of the pathology, women have acted without medical consent and self-medicated with antimicrobials, causing, in many cases, bacterial resistance against the drug and, thus, increasing the chances of causing pyelonephritis, the most serious stage of urinary infection, thus becoming a public health problem with a more expensive treatment for the State, when requiring hospitalization and high-potency antibiotic therapy.

This literature review shows that the gold standard test for the identification of the pathogen that causes urinary tract infection is urine culture and antibiogram. The authors strongly indicate its use before starting treatment. However, the empirical prescription of antibiotics prescribed by a medical professional is still of great value and, in most cases, with a good prognosis. This is due to several randomized clinical trials showing that, for the most part, the etiological agent of UTI is *Escherichia coli* -Gram-negative enteric bacteria- which has been shown to be sensitive to the antibiotics nitrofurantoin and fosfomycin (LAZARROTO, GOMES, PEREIRA, 2012; HADDAD, FERNANDES, 2019).

In an analysis of different studies, the population and the scientific community saw as an alternative to antibiotic therapy, the use of herbal medicines that can act against the pathogen most present in UTI, *E. coli*. The use of Vaccinium macrocarpon (cranberry) has shown excellent results as a prophylactic means in cases of UTI. The active ingredients present in the fruit prevent the fimbriae of the bacteria from being able to attach themselves to the wall of the urinary tract, and thus, they do not adhere and are not able to reproduce and lead to infection. (DA SILVA, CIMADON, 2021; LLANO, ARRIBAS, BARTOLOMÉ, 2020).

Despite the evidence in the use of herbal medicine, to date the guidelines do not recommend the use of cranberry as the first choice in UTI prophylaxis. However, the prescription of the same can be done individually, based on a good analysis of the patient, taking into account risks and benefits (HADDAD, FERNANDES, 2019; VIANA, CARVALHO, 2022).

FINAL CONSIDERATIONS

Although there is due importance in better understanding cystitis in young women, studies on the etiology and treatment of UTI are quite concise and consequently of its complications. Thus, despite the high incidence of the disease and the possible serious

complications, the articles analyzed presented results that are already known. Studies point to the current use of nitrofurantoin and fosfomycin for outpatient treatment. Some evidence points to promising results regarding the knowledge of new prophylactic methods for this pathology, such as the use of *Vaccinium macrocarpon* (cranberry). Thus, more clinical studies are needed to prove which medications are effective for each pathogen, especially those with the highest incidence, also contemplating the complications that occur more frequently and the best possible treatments exposing their long-term benefits.

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EPIDEMIOLOGICAL AND SPATIAL ANALYSIS OF LEPROSY IN THE MUNICIPALITY OF RIO BRANCO / ACRE / BRAZIL (2006-2016). SPATIAL ANALYSIS OF LEPROSY IN RIO BRANCO / ACRE / BRAZIL

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ABSTRACT

In this work, the epidemiological and spatial analysis of leprosy was performed along the borders of the Amazon in the municipality of Rio Branco, in the state of Acre, based on secondary data obtained from national public databases. The number of registered contacts, examined contacts and new confirmed cases of the disease identified between 2006-2016, based on information from the National Surveillance System (SINAN), were used. The calculated detection rate and prevalence rate were classified according to recommendations by the Ministry of Health. To spatial evaluation, due to the low number of cases per district/year, triennial aggregation (2006-2008, 2010-2012 and 2014-2016) was used to evaluate the number of new cases of the disease and the mean detection rate. The cumulative prevalence rate was assessed in the period from 2006 to 2016. Spatial exploration of the distribution of new cases of leprosy by district using the Local Empirical Bayesian Model was applied, which smoothed the effects of random fluctuation of disease rates resulting from the calculation of small areas. The data showed high detection rates (1.62/10,000 inhabitants) in the year 2016, while the prevalence rate accumulated throughout the 2006-2016 period (29.76/10,000 inhabitants) was considered hyperendemic. Spatial analysis revealed that there was a reduction in the number of new cases from 2014 to 2016, the same for the mean detection rate in the period. Spatial analysis identified many hyperendemic leprosy areas in the municipality requiring specific public policies geared towards an active search for new cases of the disease.

Keywords: Leprosy. Epidemiology. Spatial analysis. Rio Branco. Acre.

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INTRODUCTION

Leprosy is a chronic infectious disease presenting clinical forms that affect 200,000 individuals every year in the world. Both *M. leprae* or *M. lepromatosis* have been reported to be associated with the disease. Mycobacteria infect either macrophages in the skin or Schwann cells of the peripheral nerves, which can lead to irreversible neurological damage. Epidemiological evidence suggests that the main form of transmission of the disease is direct contact between untreated multibacillary patients and their household contacts[1,2].

Leprosy is a neglected tropical disease that continues to reach the poorest groups in low- and middle-income countries, demanding great efforts from health services[3]. The introduction of multidrug therapy (MDT) for the disease in 1981 lead to a reduction in the overall prevalence of leprosy with millions cured since the 1980s. Nevertheless, there have been 200,000 new leprosy cases steadily detected every year over the past 10 years[4,5]. Contact tracing together with chemoprophylaxis, immunoprophylaxis and new tools for early diagnosis can interrupt the chain of transmission of the disease, in order to reduce these numbers[6-9].

The geographic distribution of the disease in Brazil shows the highest incidence of leprosy in poorest regions, clusterized into 10 areas (around 44%) of new cases in the states of Mato Grosso, Pará, Maranhão, Tocantins, Goiás, Rondônia and Bahia[10]. Although the incidence rate of leprosy is slightly decreasing in the country, the detection in the states of the North, Central-West and Northeast regions is still high when compared to the states of the Southeast and South regions.

Leprosy settled in the state of Acre in the beginning of the 20th century with the migratory currents of the rubber cycle[11]. At present, the detection rate of leprosy in the state of Acre is lower than the average of the states in the North region, but still higher than the national average. The spatial distribution of the disease shows that most of the municipalities of Acre have high endemicity (very high or hyperendemic) for leprosy. The capital of Acre, Rio Branco, presented a detection rate of 34.78 cases/100,000 inhabitants in 2010, a very high level of endemicity. However, in the last years these numbers are decreasing, like the observed reduction in 2019 year to 9.08 cases/100,000 inhabitants. The analysis of the coefficients of leprosy detection in children under 15 years of age in the state of Acre in 2010 showed that several municipalities have high rates of cases (12.54 cases/100,000 inhabitants), among them the municipality of Rio Branco (very high). More recently, a reduction in this rate of detection of the disease in children under 15 years of age has been observed throughout the country, being more pronounced in the north region[12].

Several studies have used spatial analysis for the study of neglected tropical diseases, such as malaria[13], leishmaniasis[14], schistosomiasis[15], tuberculosis[16] and leprosy[17-18]. Geolocation is an important tool for the analysis of neglected tropical diseases, especially leprosy, where it can contribute to the improvement of policies for tracing new cases, essential for the containment of the disease. Here, we evaluated spatial distribution in city of Rio Branco, Acre State from 2006 to 2016 and found high detection rates (1.62/10,000 inhabitants) in 2016. The accumulated prevalence rate throughout the 2006-2016 period (29.76/10,000 inhabitants) was considered hyperendemic, despite a reduction in the number of new cases from 2014 to 2016. Geolocation could provide strategies to locate new cases, and when combined with chemoprophylaxis, could reduce the prevalence faster.

Thus, this research aimed to carry out the spatial analysis of leprosy in Rio Branco/Acre/Brazil, focusing on contact tracing and identifying the population at greatest risk, contributing to the interruption of the disease transmission chain and to public policies that lead to early diagnosis of new cases.

MATERIAL AND METHODS

CHARACTERIZATION OF THE STUDY AREA

Acre is located in the north region of Brazil (see Supplemental Material 1). It has international borders with Peru (W) and Bolivia (S) and by Brazilian states of Amazonas (N) and Rondônia (E). The state has low socioeconomic indicators, and most municipalities have poor infrastructure and basic sanitation (65.41% have piped water distribution systems, 14.78% have sewage systems and 74.29% have garbage collection). The state has poor education (57.6% of the young population has only partial or no access to education) and high illiteracy rates[19].

EPIDEMIOLOGICAL EVALUATION OF LEPROSY IN THE MUNICIPALITY OF RIO BRANCO / AC

For the epidemiological evaluation of leprosy in the municipality of Rio Branco/AC, data included the number of registered contacts, examined contacts and new confirmed cases of the disease identified between 2006-2016, as well as the operational classification (multibacillary or paucibacillary) of these cases obtained from the Municipal Epidemiological Surveillance Secretary, based on information from the National Surveillance System (SINAN). Population data was obtained from the 2000 and 2010 Census, in addition to population estimates made by the Brazilian Institute of Statistics and Geography (IBGE) in

the intercensorial period. From these data, the yearly detection rate of the municipality (2006 to 2016) was calculated, in addition to the prevalence rate accumulated over the period studied. The calculated detection rate and prevalence rate were classified according to recommendations by the Ministry of Health[20].

SPATIAL ANALYSIS OF LEPROSY IN THE MUNICIPALITY OF RIO BRANCO/AC

For the spatial analysis of leprosy in the municipality of Rio Branco/AC, a population-based descriptive study was carried out based on the quantitative method for the manipulation of secondary data on the disease, in the period from 2006 to 2016. For that, the number of new confirmed leprosy cases per district in the period between 2006 and 2016, obtained from the Municipal Epidemiological Surveillance Secretary, based on information from SINAN, were used. Population data by district were derived from estimates made from the number of consumer units registered by Eletrobrás/Acre in the period, considering the average of three residents per household, as determined by IBGE in the 2010 Census.

The municipality of Rio Branco/AC has 143 districts, divided into 11 regionals (see Supplemental Material 2). Of these, eight districts did not present the relevant information and were, thus, disregarded in this study. In addition, population and socio-demographic data are available by municipality and not by district, making more detailed analysis impossible.

Due to the low number of cases per district/year, triennial aggregation (2006-2008, 2010-2012 and 2014-2016) was used to evaluate the number of new cases of the disease and the mean detection rate. The cumulative prevalence rate was assessed in the period from 2006 to 2016 [21]. According Ministry of Health[20], data were stratified (divided into classes) as follows: New cases (0, 1-5, 6-10, 11-15 or 16-20); Mean detection rate per 10.000 inhabitants (low (< 0.2), medium (0.2 to 0.9), high (1.0 to 1.9), very high (2.0 to 3.9) or hyperendemic (≥ 4.0)); Cumulative prevalence rate per 10.000 inhabitants (low (<1.0), medium (1.0 to 4.0), high (5.0 to 9.0), very high (10 to 19) or hyperendemic (≥20).

Spatial exploration of the distribution of new cases of leprosy by district using the Local Empirical Bayesian Model was applied, which smoothed the effects of random fluctuation of disease rates resulting from the calculation of small areas[21]. However, districts that did not have any information (number of new cases and/or population) were considered zero for calculation purposes. This procedure consisted of the estimation of spatial means, having as neighborhood criterion the proximity condition between the districts. The fourth order neighborhood (four nearest districts) was considered. These analyzes were

performed in Software R for Linux (version 3.4.2)[22], using the function packs ("spdep", "rgdal" and "Tidyverse").

The updated cartographic base, in digital format, was made available by the Municipal Government of Rio Branco (Datum 32719 WGS 84 UTM zone 18S). Subsequently, maps were developed using open-source data spatialization software (QGIS 2.18.14). Data tabulation was performed with Microsoft Excel Software (Microsoft Office 365).

ETHICS APPROVAL

This project was approved by the Ethics Committee (CEP-UFAC: Opinion no. 750,553; CEP- Fiocruz: Opinion no. 775,694; CEP- HC/Acre: Opinion No. 910,309).

RESULTS

EPIDEMIOLOGY OF LEPROSY IN THE MUNICIPALITY OF RIO BRANCO/AC

From 2006 to 2016, it was possible to verify that there were 4,098 registered contacts, 2,603 examined contacts and 1,122 new cases of leprosy in the municipality of Rio Branco/AC (mean of 102 cases/year). In addition, it was possible to observe a fluctuation in the number of registered contacts and examined contacts over the period, with a tendency of improving the number of contacts in recent years, mainly from the year 2013. Among the 1,122 new cases of leprosy between 2006 to 2016, 457 patients were classified as paucibacillary (PB) and 665 as multibacillary (MB). It was also possible to observe a reduction in the number of new cases of the disease in the period studied (from 195 new cases in 2006 to 61 new cases in 2016), with an apparent stability in recent years.

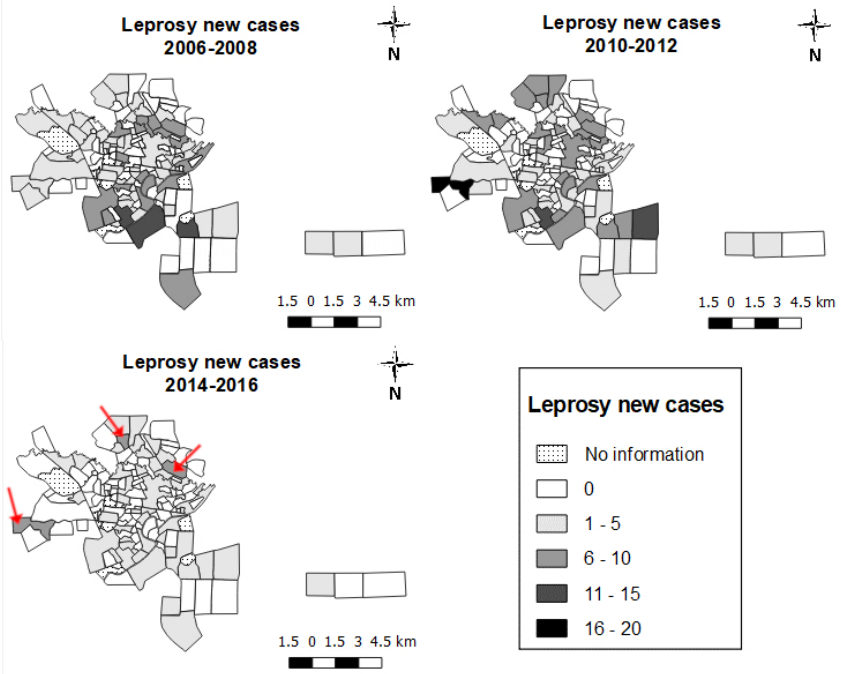
In addition, it was possible to calculate the detection rate per year and the prevalence rate in the period. The detection rate showed a decrease in the period studied but was still high in the year 2016 (1.62/10.000 inhabitants). The accumulated prevalence rate in the period between 2006 and 2016 (29.76/10,000 inhabitants) was even more critical, being classified as hyperendemic.

SPATIAL ANALYSIS OF LEPROSY IN THE MUNICIPALITY OF RIO BRANCO/AC

Spatial analysis of the number of new cases of leprosy showed that most of the districts of the municipality of Rio Branco/AC presented cases of the disease in the period evaluated, with a prevalence of 1 to 5 cases of the disease (Figure 1). In addition, it was possible to observe that there was a reduction in the number of new cases of leprosy and the number of districts with new cases of the disease from 2014 to 2016, when compared to

2006 to 2008 or 2010 to 2012. However, some districts indicated on the map (Calafate, Tancredo Neves and Vitória) presented a higher number of new cases, (6 to 10 new cases) over the last period (2014-2016). It is important to highlight that these districts house predominantly low-income populations with poor sanitation[23].

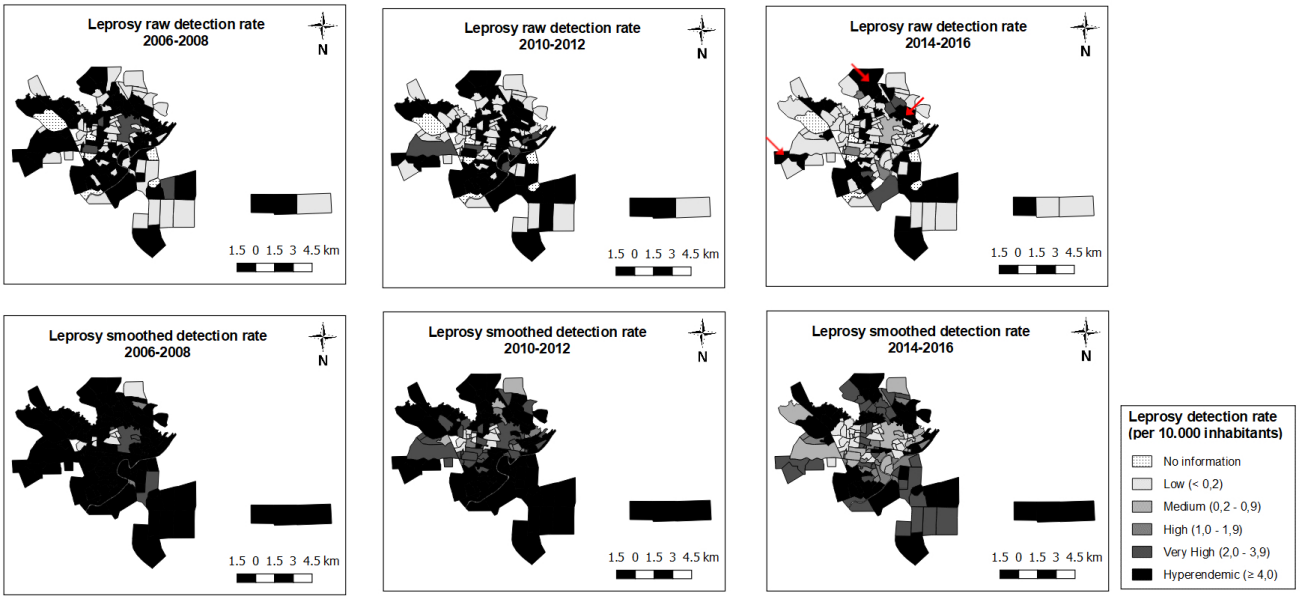
Figure 1: New cases of leprosy by districts in the municipality of Rio Branco/AC in triennia 2006-2008, 2010-2012 and 2014-2016.



Data source: Municipal Epidemiological Surveillance Secretary (SINAN). Maps: Elaborated with QGIS Software (2.18.14).

Spatial analysis of the mean leprosy detection rate showed that there was a reduction in the 2014-2016 period. However, many districts were still classified as hyperendemic for the disease. This was observed both in the raw mean detection rate (Figure 2 - top) and in the smoothed mean detection rate, by the Local Empirical Bayesian Method (Figure 2 - bottom). It is important to highlight that the same districts identified previously as having a higher number of new cases (Calafate, Tancredo Neves and Vitória – Figure 1), were also shown to have a high raw mean detection rate of leprosy (Figure 2 - top).

Figure 2: Leprosy detection rate (per 10.000 inhabitants) by districts in the municipality of Rio Branco/AC in triennia 2006-2008, 2010-2012 and 2014-2016. Top: Raw detection rate. Bottom: Smoothed detection rate by Bayesian Local Empirical Method.



Data source: Municipal Epidemiological Surveillance Secretary (SINAN). Maps: Elaborated with QGIS Software (2.18.14).

From Table 1, it is possible to observe that the raw mean detection rate in the 2006-2008 period was hyperendemic in more than half of the districts (51.85%). In the 2010-2012 period there was a reduction in this situation, but still almost half of the districts presented a very high or hyperendemic endemicity (3.70% and 43.71%, respectively). Only in the 2014-2016 period, was a considerable reduction in the endemicity of the disease observed. However, many districts (27.41%) were still hyperendemic for leprosy. When analyzing the smoothed mean detection rate by the Local Bayesian Empirical Method, it was possible to observe that the values were even more expressive when calculating the detection rate of the district.

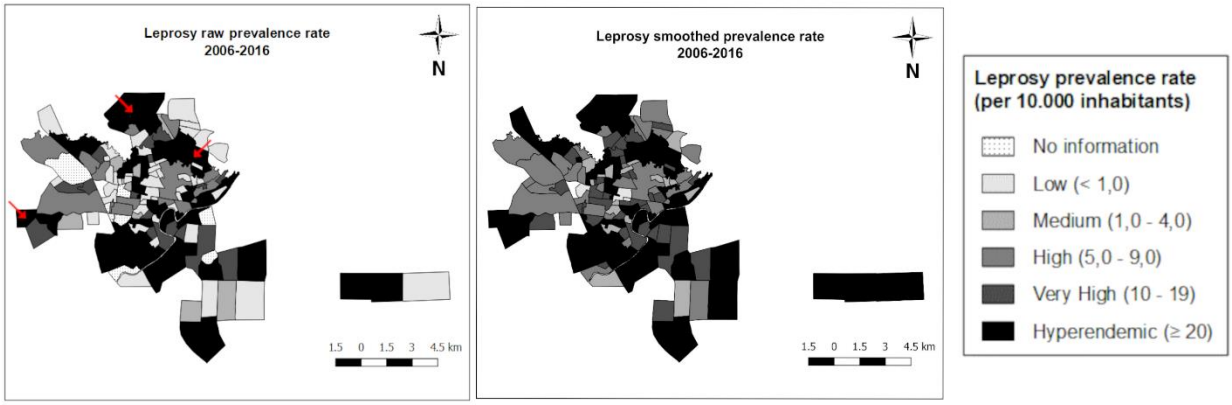
Table 01: Classification of raw and smoothed mean detection rate of leprosy by districts in the municipality of Rio Branco/AC.

Classification of leprosy raw mean detection rate (districts (%))				
Low	**Medium**	**High**	**Very High**	**Hyperendemic**
2006-2008 Triennium				
61 (45,19)	0 (0)	0 (0)	4 (2,96)	70 (51,85)
2010-2012 Triennium				
71 (52,59)	0 (0)	0 (0)	5 (3,70)	59 (43,71)
2014-2016 Triennium				
88 (65,19)	0 (0)	5 (3,70)	5 (3,70)	37 (27,41)
Classification of leprosy smoothed mean detection rate (districts (%))				
Low	**Medium**	**High**	**Very High**	**Hyperendemic**
2006-2008 Triennium				
8 (5,93)	0 (0)	2 (1,48)	4 (2,96)	121 (89,63)
2010-2012 Triennium				
13 (9,63)	3 (2,22)	7 (5,19)	28 (20,74)	84 (62,22)
2014-2016 Triennium				
30 (22,22)	15 (11,11)	18 (13,33)	29 (21,48)	43 (31,86)

Data source: Municipal Epidemiological Surveillance Secretary (SINAN).

Spatial analysis of the accumulated prevalence rate of leprosy in the districts of the city of Rio Branco/AC in the period between 2006 and 2016 presented most of the districts as hyperendemic, very high or high endemicity for the disease. This was observed in the raw prevalence (Figure 3 - top) and intensified in the smoothed prevalence by the Local Empirical Bayesian Method (Figure 3 - bottom). It should be noted once again that the districts of Calafate, Tancredo Neves and Vitória (indicated on the map) presented hyperendemicity for the disease (Figure 3 - top).

Figure 3: Leprosy prevalence rate (per 10.000 inhabitants) by districts in the municipality of Rio Branco/AC in the period from 2006 to 2016. Top: Raw prevalence rate. Bottom: Smoothed prevalence rate by Bayesian Local Empirical Method.



Data source: Municipal Epidemiological Surveillance Secretary (SINAN). Maps: Elaborated with QGIS Software (2.18.14).

From Table 2, it was possible to observe that the raw cumulative prevalence rate in the period (2006-2016) was classified as high (12.59%), very high (12.59%) or hyperendemic (37.05%). When analyzing the smoothed cumulative prevalence rate by the Local Bayesian Empirical Method, it was possible to observe once again a high (22.96%), very high (24.44%) or hyperendemic (39.26%) endemicity.

Table 2: Classification of raw and smoothed prevalence rate of leprosy by districts in the municipality of Rio Branco/AC.

Classification of leprosy raw prevalence rate (districts (%))				
Low	**Medium**	**High**	**Very High**	**Hyperendemic**
46 (34,07)	5 (3,70)	17 (12,59)	17 (12,59)	50 (37,05)
Classification of leprosy smoothed prevalence rate (districts (%))				
Low	**Medium**	**High**	**Very High**	**Hyperendemic**
3 (2,22)	15 (11,11)	31 (22,96)	33 (24,44)	53 (39,26)

Data source: Municipal Epidemiological Surveillance Secretary (SINAN).

DISCUSSION

Although the reduction in the prevalence of the disease has been observed in recent years, it has not been proportionally monitored by the fall in the rate of detection of new cases. This demonstrates that prevalence alone is not a good indicator to accompany the control of leprosy. The elimination strategy is not being effective in blocking the transmission of the disease, which contributes to the continuance of endemicity in Brazil[11]. Thus, incidence and prevalence records, as well as evaluation of disabilities, cure percentage and

contact examination seem to show weaknesses, which may represent an underestimated number of cases, also suggesting the occurrence of problems in data feeding in information systems[24]. Therefore, as approached by some authors[5,7,25-27], contact surveillance of leprosy patients, that represent a population of high-risk for the maintenance of the endemic, is crucial in contributing to early diagnosis, treatment and interruption of the disease transmission chain. The spatial analysis performed in this work is important because, although most of the endemic areas for leprosy are in the north and central-west regions, almost a third of the studies on the disease are carried out in the Southeast region[28].

From the data obtained from the Municipal Epidemiological Surveillance, it was possible to observe higher number of multibacillary patients, which also deserves attention. This may suggest that due to the lack of effective diagnostic methods for the disease and proper training of health services, the number of paucibacillary patients may be underreported. In addition, the lack of accurate clinical diagnosis by health professionals outside reference centers for the disease leads erroneously to the treatment of paucibacillary patients as multibacillary, which increases the numbers of people classified in this group. Therefore, since the evolution of the disease is slow (months to years), a question that must be asked is whether the number of new cases of the disease recorded per year is not underestimated, as discussed in the literature[29], considering the absence of an early diagnosis methodology and the strategy adopted for contact surveillance.

According to ILEP[30], the coefficients of detection can be analyzed from two points of view: the first, reflects the active transmission of leprosy, which generates new cases in the area; the second, the possible existence of hidden prevalence, which identifies more cases through strategies and plans for disease control. In this sense, the decreasing trend in the mean detection rate in the municipality should not lead to a decrease in efforts by local authorities and health professionals, since the data suggest the endemic persistence, as pointed out in the literature[31].

Some papers in the literature related to the spatial analysis of leprosy performed in Bayeux/PB[32], Duque de Caxias/RJ[33], Vitória/ES[34], Juazeiro/BA[35] and Bahia[36] have demonstrated that this tool allows the evaluation of the relationship between socioeconomic factors and the incidence of the disease. As shown in other regions of Brazil[37,38], the distribution of leprosy in the districts of Rio Branco/AC was characterized as heterogeneous and did not seem to respect regional boundaries or any other geographic/environmental factor. However, detection and prevalence rates were higher in districts with lower infrastructure and with a lower income population, suggesting a strong influence of

unfavorable living conditions with the disease (hygienic conditions, sanitation, poverty, and malnutrition), as indicated by some authors[23,39-40].

We could not retrieve the operational classification according to the districts, but the collected data (see Supplemental Material 3) showed that the municipality of Rio Branco registered about 60% of multibacillary cases in the past 10 years (2006-2016). Thus, the frequency of MB patients indicate that late diagnosis and active transmission is common in Rio Branco.

Although our data were informative, it is worth mentioning that other relevant information for districts was not available, such as income and schooling. Also, the sewage system does not follow the limits of districts or census evaluations. This disconnection and outdated information made it difficult to associate data collected from social and environmental factors. Therefore, in this study it was not possible to establish a relationship between different factors with the disease since it requires a more in-depth analysis of the data.

CONCLUSIONS

The spatial analysis of leprosy provided information that would not be visualized merely with tabular data. This identification provides clear and accurate data on the areas in which the disease is effectively installed, presenting a greater risk for transmission, evidencing the districts that deserve greater attention. This study may serve as a contribution to the planning of public health policies for the disease in the municipality of Rio Branco and the state of Acre, highlighting the areas of greater vulnerability to leprosy. Thus, it would be possible to perform an active search for the disease in the most endemic districts, through the conduction of dermatological clinical evaluations by a multidisciplinary team, as well as the collection of samples from the population. The use of this strategy is very important and should be prioritized by the competent agencies, especially in the state of Acre, where this analysis had not yet been carried out. In addition, it is also suggested that a health education campaign be carried out with the population, aiming to avoid the spread of the disease.

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AUTHORS 'CONTRIBUTIONS

RSP, OGC and MOM contributed to the conception, design, analysis and interpretation of the research data, as well as to the writing, critical review and approval of the article. CSF contributed to the analysis and interpretation of the research data, as well as to the writing, review and approval of the article.

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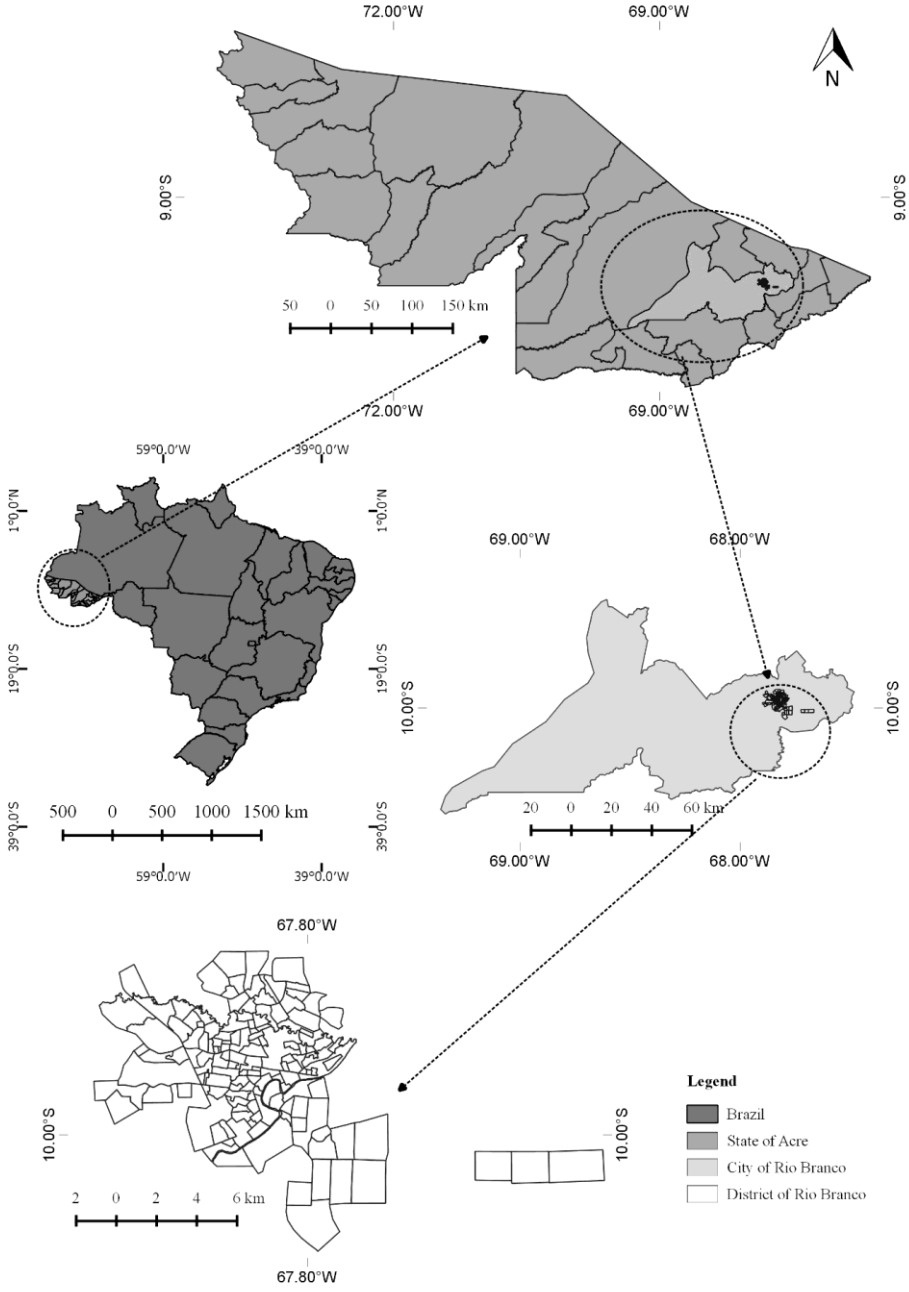
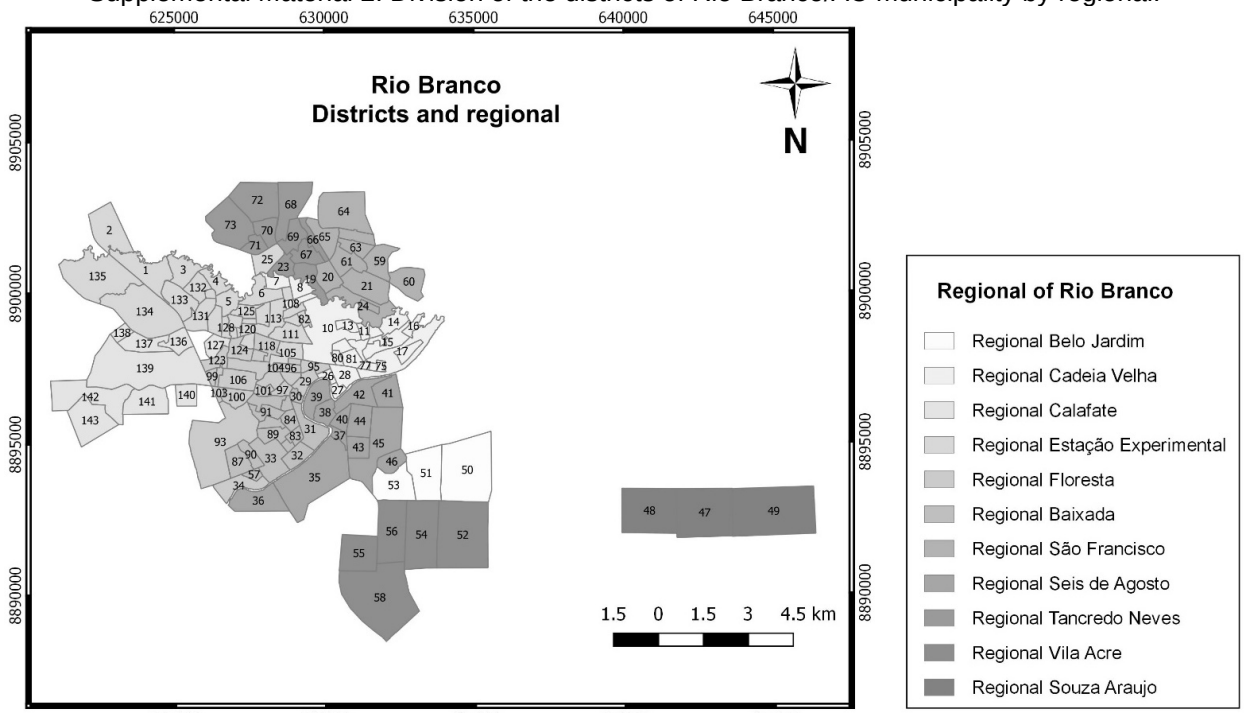
Supplemental Material 1: Map of location of the municipality of Rio Branco, in the state of Acre, Brazil.



Source: Prepared by Cleilton Sampaio de Farias (IFAC Professor) (2018).

Supplemental Material 2: Division of the districts of Rio Branco/AC municipality by regional.



Data source: Secretaria de Vigilância Epidemiológica Municipal (SINAN NET). Maps: Elaborated with QGIS software (2.18.14). Legend of districts: 1- Distrito Industrial, 2- Loteamento Vila Maria, 3- Mocinha Magalhães, 4- Loteamento Joafra, 5- Paz, 6- Conquista, 7- Horto Florestal, 8- Vila Ivonete/PROCOM/SOLAR, 9- Loteamento São José, 10- Bosque, 11- Baixa da Colina, 12- Casa Nova, 13- Conjunto Guiomard Santos, 14- Conjunto Jardim Tropical, 15- Morada do Sol, 16- Adalberto Aragão, 17- Cadeia Velha, 18- Baixa da Cadeia Velha, 19- Raimundo Melo, 20- Placas, 21- Vitória, 22- Conjunto Oscar Passos, 23- Vila Nova, 24- São Francisco, 25- Loteamento Novo Horizonte, 26- Papoco, 27- Base, 28- Centro, 29- Preventório, 30- Volta Seca, 31- Aeroporto Velho, 32- Ayrton Senna, 33- Sobral, 34- Invasão da Sanacre, 35- Taquari, 36- Loteamento Praia do Amapá, 37- Triângulo Novo, 38- Quinze, 39- Cidade Nova, 40- Triângulo Velho, 41- Santa Terezinha, 42- Seis de Agosto, 43- Comara, 44- Vila do DNER, 45- Areial, 46- Maurí Sérgio, 47- Vila Alberto Sampaio, 48- Vila Santa Cecília, 49- Dom Moacir, 50- Belo Jardim II, 51- Belo Jardim I, 52- Residencial Rosa Linda, 53- Santa Inês, 54- Loteamento Santo Afonso, 55- Vila da Amizade, 56- Loteamento Santa Helena, 57- Boa Vista, 58- Vila Acre, 59- Eldorado, 60- Loteamento Jardim São Francisco, 61- Chico Mendes, 62- Loteamento Jaguar, 63- Conjunto Ouricuri, 64- Loteamento Santa Luzia, 65- Parque dos Sabiás, 66- Conjunto Xavier Maia, 67- Wanderley Dantas, 68- Alto Alegre, 69- Conjunto Adalberto Sena, 70- Tancredo Neves, 71- Defesa Civil, 72- Montanhês, 73- Jorge Lavocat, 74- Conjunto São Francisco, 75- Baixa da Habitasa, 76- Habitasa, 77- Cerâmica, 78- José Augusto, 79- Aviário, 80- Ipase, 81- Capoeira, 82- V.W. Maciel, 83- Glória, 84- Pista, 85- Boa União, 86- Palheral, 87- Plácido de Castro, 88- Bahia Velha, 89- Bahia Nova, 90- João Paulo II, 91- João Eduardo II, 92- João Eduardo I, 93- Floresta Sul, 94- Jardim Nazle, 95- Dom Giocondo, 96- Abraão Alab, 97- Conjunto Castelo Branco, 98- Ivete Vargas, 99- Nova Esperança (fragmento), 100- Mauro Bittar - LBA - Vila Betel, 101- Novo Horizonte, 102- Conjunto Habitar Brasil, 103- Residencial José Furtado, 104- Mascarenhas de Morais, 105- 7º BEC, 106- Nova Esperança, 107- Conjunto Bela Vista, 108- Jardim América, 109- Jardim Manoel Julião, 110- Boa Esperança, 111- Isaura Parente, 112- Santa Quitéria, 113- Nova Estação, 114- Conjunto Manoel Julião, 115- Residencial Iolanda, 116- Conjunto Esperança, 117- Doca Furtado, 118- Estação Experimental, 119- Conjunto Tangará, 120- Loteamento Isaura Parente, 121- Loteamento dos Engenheiros, 122- Conjunto Paulo C. de Oliveira, 123- Jardim Europa, 124- Flor de Maio, 125- Geraldo Fleming, 126- Parque das Palmeiras, 127- Jardim de Alah, 128- Residencial Petrópolis, 129- Conjunto Mariana, 130- Jardim Brasil, 131- Jardim Primavera, 132- Conjunto Rui Lino, 133- Conjunto Tucumã, 134- Campus da Universidade Federal do Acre, 135- Conjunto Universitário, 136- Pedro Roseno, 137- Chácara Ipê, 138- Conjunto Jardim Universitário, 139- Portal da Amazônia, 140- Village Tiradentes, 141- Waldemar Maciel, 142- Calafate, 143- Conjunto Laélia Alcântara.

Supplemental Material 3: General data on leprosy in period 2006-2016 in Rio Branco/Acre/Brazil.

Year	Registered Contacts	Contacts Examined	New cases	MB	PB	Population	Detection Rate	Prevalence Rate
2006	743	40	195	92	103	314.127	6,21	
2007	471	394	129	63	66	290.639	4,44	
2008	514	456	123	68	55	301.398	4,08	
2009	388	201	104	65	39	305.954	3,40	
2010	470	305	126	71	55	336.038	3,75	
2011	384	295	116	69	47	342.299	3,39	
2012	339	257	92	61	31	348.354	2,64	
2013	193	170	67	47	20	357.194	1,88	
2014	146	126	50	40	10	363.928	1,37	
2015	217	185	59	42	17	370.550	1,59	
2016	233	174	61	47	14	377.057	1,62	
Total	**4098**	**2603**	**1122**	**665**	**457**	**-**	**-**	**29,76**

Data source: Municipal Epidemiological Surveillance Secretary (SINAN).

BOVINE BRUCELLOSIS: EMPHASIS ON PREVENTION AND CONTROL

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ABSTRACT

Every year Brazil advances in cattle production, facing challenges that cause economic losses, including diseases. This chapter aims to address the general aspects of brucellosis, with a focus on prevention and control. Brucellosis is a bacterial infection caused by bacteria of the genus Brucellas spp., of chronic evolution, whose main clinical sign in the herd is abortions in the final third of gestation, of wide worldwide distribution, of significant importance due to economic losses and its zoonotic character, in addition to being a notifiable disease. The economic importance attributed is related to the possibility of infection in humans, productive losses of the herd, death of animals, decrease in milk production, early disposal, elimination of animals of high zootechnical value and condemnation of carcasses at slaughter. It is estimated a loss of 10% to 25% of the productive efficiency of infected animals. Being considered an occupational disease, they affect farmers, handlers, veterinarians, vaccinators, laboratory workers, slaughterhouse workers, due to the routine of direct contact with infected animals and/or their secretions. In 2001, the government established the National Program for the Control and Eradication of Brucellosis and Tuberculosis (PNCEBT), revised by IN No. 10 of 2017. The PNCEBT recommends the vaccination of bovine and buffalo females between 3 and 8 months of age against brucellosis, elimination of carriers, tests with negative results for transit regardless of the purpose and certification of properties free of brucellosis or tuberculosis. The lack of knowledge and negligence about brucellosis puts the health of productive herds and citizens at risk.

Keywords: Zoonoses. Preventive measures. Cattle farming.

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INTRODUCTION

Cattle production has exponential growth every year. According to the IBGE, in 2022, Brazil reached a milestone of 234.4 million cattle, an increase of 4.3% compared to 2021 (Brasil, 2023a). Regardless of economic exploitation, whether focused on beef or milk, producers face challenges in breeding, with market variation, high input prices, low financial recognition and diseases in the herd that cause economic losses.

Among the diseases that affect the herd is Brucellosis, a bacterial infection caused by bacteria of the genus *Brucellas spp.,* of chronic evolution, whose main clinical sign in the herd is abortions in the final third of gestation, of wide worldwide distribution, has a significant importance due to economic losses and its zoonotic character (Brasil, 2017a. Sola, *et al*., 2014).

The economic importance attributed to zoonoses is related to the possibility of infection in humans, productive losses of the herd, death of animals, drop in weight gain, decrease in milk production, early disposal, elimination of animals of high zootechnical value and condemnation of carcasses at slaughter. It is estimated a loss of 10% to 25% of the productive efficiency of infected animals, losing the authority and credibility of the production unit where the disease is detected (Murakami *et al.*, 2009; Barcellos *et al.*, 2019).

Over the years, noting the importance of zoonoses, the government established programs aimed at prevention and eradication, contributing to the sustainability of national livestock, governed by the Ministry of Agriculture, Livestock and Supply (MAPA) (Nicodemo; Gusmão, 2012), among them is the National Program for the Control and Eradication of Brucellosis and Tuberculosis (PNCEBT).

The PNCEBT was instituted in 2001, revised in 2017 by Normative Instruction No. 10, with the objective of reducing the prevalence and incidence of brucellosis and tuberculosis, aiming at eradication. The current legislation recommends compulsory sanitary measures and voluntary adherence measures. Among the compulsory measures are vaccinations of bovine and buffalo females between 3 and 8 months of age against brucellosis, elimination of carriers, tests with negative results for transit and participation in livestock events. The voluntary measure, on the other hand, consists of the certification of brucellosis-free properties (Brasil, 2017; Brazil, 2024b).

In 2013, Normative Instruction No. 50, of September 24, 2013, listed the diseases subject to Mandatory Notification, where brucellosis falls into diseases of immediate notification in confirmed cases (Brasil, 2013).

Being considered an occupational disease, that is, an illness related to the exercise of work, which affects; farmers, handlers, veterinarians, vaccinators, laboratory workers, slaughterhouse workers, due to the routine of direct contact with infected animals and/or their secretions, handling of vaccines, risk of contamination via penetration through intact or injured skin, formation of aerosols, and the handling of carcasses of infected animals (Brasil, 2024b).

Possible gaps in knowledge about Brucellosis put the health of productive herds and citizens at risk. Therefore, this chapter aims to address the general aspects of this zoonosis, focusing on prevention and control.

BOVINE BRUCELLOSIS

ETIOLOGICAL AGENT

Brucellosis is an infectious-contagious disease, with a chronic evolution and diffuse granulomatous character (Paulin; Ferreira Neto, 2003), of great importance for public health due to its zoonotic characteristic. Its etiological agent is bacteria of the genus *Brucella spp.,* characterized by infertility and abortion in the final third of gestation in bovine and buffalo species (Brasil, 2017a). The disease has some synonyms such as Bang's disease or disease, infectious abortion, contagious abortion, these described for cattle, while in humans it is known as undulating fever, Maltese fever, Mediterranean fever and Gibraltar fever (Megid; Brook; Paes, 2016).

Caused by an obligate intracellular bacterium, they belong to the class *Proteobacteria*, gram negative, short rods measuring from 0.6 to 1.5 micrometer (μm) by 0.5 to 0.7 μm in size, immobile and non-spore-forming, considered aerobic, multiply in the range of 20 to 40 Degree Celsius (ºC), where 37 ºC is the ideal temperature, pH from 6.6 to 7.4, some strains require carbon dioxide (CO2) supplementation for multiplication (Sola *et al*., 2014; Megid; Brook; Paes, 2016), affects several species, including domestic animals, wild animals and humans (Ayres; Rabbit; Neto, 2018).

Species include *Brucella abortus, Brucella militensis, Brucella suis, Brucella canis, Brucella ovis, Brucella neotomae, Brucella microti, Brucella ceti, Brucella pinnipedialis,* and *Brucella inopinata.* There is no specificity as to the host that infects, but a predilection for the corresponding species (Gomes, 2013; Sola *et al*., 2014).

They may present primary cultures with smooth or rough colonial morphology, which may vary in strict rough or mucoid, morphology associated with the biochemical composition of the lipopolysaccharide of the cell wall, and for some species are related to the virulence of the agent. B . *abortus, B. melitensis and B. suis* usually have a smooth morphology and

can evolve into rough or mucoid, ceasing to be pathogenic. Although cattle and buffaloes are susceptible to *B. suis* and *B. melitensis,* the most important species is *B. abortus*, which is responsible for the vast majority of infections (Brasil, 2024b).

The resistance of this species outside the host is about five days at room temperature, 30 to 37 days in the soil and 75 days in the fetus (Gomes, 2013; Sola *et al*., 2014). Favorable conditions of pH, temperature and light favor the viability of the agent in water, fetuses, placental remains, feces, wool, hay, materials and clothing (Sola *et al.*, 2014).

EPIDEMIOLOGY

Brucellosis is distributed worldwide, being considered one of the main zoonoses (Sola *et al.*, 2014). In Brazil, it is characterized by being an endemic disease in almost the entire national territory, regardless of the mode of creation and economic exploitation (Megid; Brook; Paes, 2016).

The species *B. abortus* is the most widely spread, preferentially infecting buffaloes and cattle, and is the most important for cattle farming, due to economic losses (Costa *et al.*, 2022).

Brazilian states present variations, due to their territorial dimension and their own characteristics (Lage *et al*., 2008). According to the data processed in 1975, bovine brucellosis was present throughout the national territory. The estimated prevalences by regions were as follows: Central-West 6.8%; Northeast, 2.5%; North, 4.1%; Southeast, 7.5% and South, 4%. Other surveys were carried out over the years, but they did not show significant changes in relation to the 1975 data, indicating a prevalence of 4 and 5% of seropositive animals (BRASIL, 2006), so the epidemiological situation of brucellosis in Brazil is not well elucidated (Lira, 2015).

The southern region of the country, especially the state of Santa Catarina (SC), has a low prevalence of the disease, due to this low, vaccination is not mandatory, being an example to be followed by the other states, seeking to achieve the eradication of brucellosis (Ferreira Neto, 2009).

According to the Coordination of Information and Epidemiology - Animal Health, MAPA (2024), 432,644 cases of Brucellosis in cattle were recorded in Brazil from 1999 to 2023, showing a higher number of cases in 2004 (Brasil, 2024d).

TRANSMISSION

Transmission can happen directly and indirectly. The direct form happens through contact with secretions from infected cows, which eliminate the agent at the time of calving, abortion or during the puerperal period. The form of indirect contagion is through contaminated water, pastures, and fomites (Brasil, 2020c). In cattle, most infections occur through ingestion of contaminated pastures, food and water, the direct form also occurs from direct contact with the infected animal or contaminated semen (Megid; Brook; Paes, 2016; Battle-axe; Szyfres, 2003).

Contamination of pastures and food occurs through the elimination of discharge and fetal membranes from infected cows, as well as contact with aborted fetuses and infected newborn calves. The risk of postpartum contamination depends on the amount of microorganisms excreted, the survival of these microorganisms in the environment and the probability of the animals being exposed to sufficient amounts for infection (Radostits *et al.*, 2002).

Females contaminated after aborting for the first time become chronic carriers, eliminating the bacteria through milk, urine and uterine discharges during subsequent births, and new episodes of abortion may or may not occur (Radostits *et al.*, 2002; Pacheco, 2007). From the third pregnancy onwards, after infection, abortions do not occur, due to immune development and the reduction of necrosis present in the placentomas, allowing the birth of calves (Paulin; Ferreira Neto, 2003).

The bacterium can be found in semen, but the incidence of transmission by natural breeding is low, and it is not characterized as the most frequent form of occurrence of the disease. The vagina has specific barriers that hinder infection by this route, while in artificial insemination, where semen is deposited directly in the uterine body, the vaginal barriers do not play their role, becoming an important route in transmission (Megid; Brook; Paes, 2016), being deposited in an environment conducive to the multiplication of the agent (Brasil, 2006; Lage *et al.*, 2008).

The introduction of infected animals into healthy herds is the main risk for rural properties. The acquisition of new animals must be from places with sanitary conditions, free or with negative diagnostic tests, in order to ensure the health of the herd (Lage *et al.*, 2008; Ribeiro *et al.*, 2008; Meirelles - Batoli; Shah; Mathias, 2014).

Transmission to humans occurs through the consumption of raw milk and dairy products from unpasteurized milk from infected animals, through direct contact with tissues and/or secretions of these animals, blood, urine, vaginal secretions, aborted fetuses and, especially, the placenta. Inhalation of bacteria in contaminated environments. There are

reports of sexual and congenital transmission, blood transfusion, and organ or tissue transplants, which are uncommon by these means (Meirelles - Bartoli; Shah; Mathias, 2014; De Jesus Lawinsky, 2010).

Considered an occupational zoonosis, it affects farmers, handlers, veterinarians, laboratory workers, slaughterhouse-slaughterhouse workers, due to its ability to penetrate intact or injured skin and mucous membranes, in addition to the formation of aerosols. The microorganism can be isolated in the udder and uterus, the handling of a carcass of an infected animal can represent a serious exposure (Lage *et al.*, 2008; Radostits *et al.*; 2002, Brazil, 2024b).

The survival of *Brucella spp.* in milk and dairy products, it is correlated with environmental factors and the presence of other microorganisms that can prevent its multiplication, and the permanence time can vary from 15 to 90 days. Refrigeration inhibits its multiplication, but in freezing its viability is maintained. The rapid pasteurization process (Costa, 2003) and sterilization methods are effective in inactivating the microorganism (Paulin; Ferreira Neto, 2003), rapid pasteurization consists of heating the milk in a laminar layer between 72ºC and 75ºC for fifteen to twenty seconds, followed by refrigeration at 5ºC (Resende *et al.*, 2019; Brazil, 2020b).

The B19 and RB51 vaccines indicated by the PNCEBT have a pathogenic character for humans, and there are reports in the literature of accidental infections, especially in veterinarians and vaccinators (Lage *et al*., 2008, Brazil, 2024b).

Cases of brucellosis due to ingestion of meat or meat products is uncommon since the number of bacteria in the muscle is low, in addition to the fact that the consumption of raw meat is rare, while the consumption of blood and bone marrow can be considered potential in the transmission of the disease. The survival of the microorganism in meat depends on the degree of contamination and the type of processing. The bacteria can remain in the cells of the phagocytic monocytic system, in uterine secretions, in the mammary gland and in the bone marrow. The disposal of tissues that concentrate a large amount of bacteria can minimize or even avoid the contamination of carcasses and viscera during slaughter (Pessegueiro *et al.*, 2003; Sola *et al.,* 2014).

KNOCKING

The pathogenicity of *Brucella* is related to the factors that allow its invasion, survival, and intracellular multiplication in host cells (Radostist *et al*., 2002; Xavier, 2009). It penetrates the body through the oral, nasopharyngeal, conjunctival, genital mucosa or direct contact with the skin, and the main route for cattle is the oropharyngeal (Gorvel; Moreno,

2002; Campanã *et al.*, 2003; Ribeiro *et al*., 2008). After penetration, they are taken to regional lymph nodes and disseminated to the body. It produces cellular and humoral responses, forming hyperplasia and lymphadenitis (Lage *et al.,* 2008; Neta *et al.*, 2009).

One of the characteristics of the infection is the resistance of the bacterium to the defense mechanisms of phagocytic cells, surviving in macrophages for long periods (Barbosa *et al.*, 2016), which can remain quiescent for months (Acha; Szyfres, 2003).

B. Abortus has a predilection for pregnant uterus, udder, testicle, male sex glands, lymph nodes, joint capsules, and synovial membranes. The agent can spread freely or within macrophages, via the blood and lymphatic routes, lodging in the lymph nodes, especially the supramammary lymph nodes, and in hematopoietic organs, such as the spleen, liver and other tissues, and can escape the immune response (Radostits *et al*., 2002; Lage *et al.*, 2008; Xavier, 2009).

Infection of the pregnant uterus occurs by hematogenous route and the changes vary according to the intensity of the infection and length of gestation. The affinity of *brucellas* for trophoblasts is correlated with the presence of erythritol and progesterone concentrations in the placenta (Paulin; Neto, 2008).

The organs of predilection for infection are those that offer the necessary conditions for its development, erythritol - four-carbon polyhydric alcohol - present in the pregnant uterus, osteo-articular tissues, breast tissues and organs of the male reproductive system. Humans, horses, rabbits and rodents have low or no erythritol production, due to this fact, the impact of brucellosis on the reproductive system in these species is irrelevant (Ribeiro *et al*., 2008; Xavier, 2009).

The multiplication of *B. abortus* in the uterine environment triggers an inflammatory reaction of the placentomas that evolves to necrosis, destruction of the villi, and detachment of the cotyledons and caruncles. In acute cases, this process triggers abortion. In processes where necrosis is of low intensity, there is a high deposition of fibrin between the villi, making the abortion late, which can allow the pregnancy to reach term, generating products of low survival. Fibrin deposition predisposes to retained placenta. The lesions compromise the maternal-fetal circulation, which can lead to the death of the fetus, and may be due to the bacteria themselves, depending on the concentration in the amnion. It may develop macerated and/or mummified fetuses (Paulin; Neto, 2008).

The immune development of the animal after the first episode of abortion decreases the number and size of lesions in the placentomas in subsequent pregnancies. Causing abortions to become infrequent, predisposing to other clinical manifestations, such as retained placenta, stillbirth or the birth of weak calves, chronic metritis or endometritis, and

consequently subfertility, infertility, or sterility (Lage *et al.,* 2008; Ribeiro *et al.*, 2008; Xavier *et al.*, 2009).

Megid; Brook; Paes (2016) believe that there is an individual variation in relation to the susceptibility of the disease, because when it settles in a herd not all animals become infected.

CLINICAL SIGNS

The striking clinical signs in cattle and buffaloes are abortion around the 5th to 7th month of gestation and infertility, causing retained placenta, metritis, and occasionally permanent sterility, or stillborn or weak animals (Brasil, 2020c), which can affect the mammary gland in chronic cases. It is estimated that 20% of infected animals do not abort and 80% abort only once (Megid; Brook; Paes, 2016; Radostits *et al.*, 2002; Brazil, 2020c).

In males, the infection is mainly located in the testicles, seminal vesicles and prostate. The scrotum may be swollen, the testicles may present degeneration, adhesions and fibrosis. The clinical manifestations are: orchitis, epididymitis, low libido and infertility (Radostits *et al.*, 2002; Megid; Brook; Paes, 2016; Brazil, 2020c).

The bacterium can be found in the bursa, tendons, muscles and joints, leading to arthritis, specifically in the carpal and tarsal joints, spondylitis and bursitis, in the thoracic and lumbar vertebrae, and can reach the bone marrow (Paulin; Ferreira Neto, 2003; Radostits *et al.*, 2002; Megid; Brook; Paes, 2016).

Calves born to infected cows can become latent carriers, are born healthy and may or may not have maternal antibodies. The infection occurs in cattle of all ages, but is common in sexually mature animals, particularly dairy cattle (Radostits *et al.,* 2002).

In men, the symptoms of brucellosis are nonspecific. In the acute phase, weakness, malaise, muscle pain and continuous, irregular or intermittent fevers are described, similar to a strong flu. The pains are characterized by headaches, and can affect the joints. The chronic form is predominant. Neuropsychic symptomatology involves signs of melancholy, irritability, prostration, inappetence, hypertension, dyspnea, or even decreased fertility. Nausea, vomiting, abdominal discomfort are common symptoms when transmission occurs through food, especially the consumption of unpasteurized milk or dairy products (Schmitt *et al.*, 2017; De Jesus Lawinsky, 2010).

DIAGNOSIS

Brucellosis can be diagnosed by direct and indirect methods, and the methods can be used alone or together, with emphasis on clinical diagnosis, based on clinical signs and

animal history, such as the occurrence of abortions, birth of weak calves and sterility in females and males of the herd (Lage *et al*., 2008).

Direct diagnostic methods include agent isolation and identification, immunohistochemistry, and nucleic acid detection methods by polymerase chain reaction (PCR) (Sola *et al.,* 2014). The detection of the presence of the bacterium is the safest method, with a slow, expensive and high risk process for laboratories, due to the direct manipulation of tissues and excreta of the animals, or indirect, by the search for an immune response to the microorganism (Lage *et al*., 2008)

Among the methods, it is designated that each country adopts its diagnostic protocol, considering its factors (Costa, 2003). The indirect method is recommended according to the PNCEBT, instituted by IN SDA No. 10, of March 3, 2017 (Brasil, 2017a).

Among the indirect diagnostic methods are the Buffered Acidified Antigen (AAT), 2 - Mercaptaethanol (2 - ME), Fluorescent Polarization (FPA), Complement Fixation (FC) and the Antigen for the Milk Ring Test (TAL) (Brasil, 2017a, 2020c).

The AAT is a screening test, the TAL is a monitoring test and the 2-ME, FC and FPA confirmatory tests (Aires; Rabbit; Neto, 2018; Brazil, 2024c).

The diagnosis is indicated for females vaccinated with B19 aged 24 months or older, in females not vaccinated or vaccinated with RB51, aged 8 months or older and in males destined for reproduction aged 8 months or older (Brasil, 2024c).

IMPORTANCE FOR PUBLIC HEALTH

Brucellosis is considered one of the most relevant zoonoses, with wide distribution and worldwide significance, with a high prevalence in some countries and regions, causing health and economic problems, however, it is little known, difficult to diagnose, underreported and neglected in humans (Schmitt *et al.*, 2017).

The symptomatology in humans is nonspecific, so it is important, based on the clinical suspicion, to carry out a good anamnesis to obtain clinical information relevant to the case, emphasize the occupational type, contact with animals, ingestion and form of food consumption, due to non-specificity the disease can be confused with others (Schmitt *et al.,* 2017).

Boudertte; Sano, (2023), analyzed the data of cases notified to the Notifiable Diseases Information System (SINAN) in the period 2014−2018, obtained 3,612 suspected notified cases of human brucellosis, of which 25% were confirmed. The South region had the highest percentage of reported cases, representing 22%, 75% of the cases were men, 53% had occupational correlation and 63% of the cases evolved to cure. Stating that human

brucellosis is an endemic disease in the country, with an increase in reported cases and incompleteness of recorded information.

According to Lira (2015), he reported in his work information that in 2011 the Hospital Information System of the SUS - SIH/SUS, of the Ministry of Health, reported in the period from January 2008 to April 2011, 108 hospitalizations due to brucellosis, 13 in the North region, 17 in the Northeast region, 34 in the Southeast region, 38 in the South region and 6 in the Midwest region.

Its economic impacts generate barriers to the national and international market to the trade of animal products and losses in the industry: condemnation of raw materials, price drops, devaluation for the foreign market, and high costs with control, eradication and research programs (Pacheco *et al.*, 2008).

PREVENTION AND CONTROL

In Brazil, prevention and control measures are based on the PNCEBT, established in 2001 by the Ministry of Agriculture, Livestock and Supply (MAPA) and revised in 2017, with the aim of reducing the impact of these zoonoses, aiming at the eradication of these diseases (Brasil, 2017a). It can be associated with its own state programs, due to the local diversities of each region (Baptista *et al.*, 2012; Sola *et al., 2014).*

The program specifies mandatory preventive measures, such as vaccination of bovine and buffalo females from 3 to 8 months of age, with the B19 or RB51 vaccine, notification of confirmed cases to the Official Veterinary Service (SVO), elimination of positive animals, certification of properties and classification of the federative units (FU's) as to the degree of risk for the disease (Hayashi *et al.,* 2020; Brazil, 2020c; Meirelles - Bartoli; Sousa: Mathias, 2014).

Vaccination is mandatory for all bovine and buffalo females between 3 and 8 months of age, with the live lyophilized vaccine made with sample 19 of *Brucella abortus* (B19) or with the non-inducing vaccine of agglutinating antibodies, RB51. Bovine females over 8 months old that have not been immunized with B19 may be vaccinated with RB51 (Brasil, 2017a).

Study carried out by MAPA on vaccination rates in bovine and buffalo calves against brucellosis from 2014 to 2022. In summary, the highest vaccination rate with a percentage of 81% was in 2017. The number of existing females is greater than the number of vaccinated females, representing 25,745,207 and 19,001,313 respectively. Chart 1 describes the federative units with the respective years of highest vaccination coverage and their percentage (Brasil, 2024d).

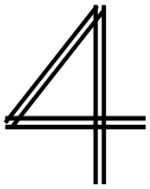
Frame 1- Data on the highest vaccination percentage of the states and their respective years.

UF	% VACCINATION	YEAR
AC	98,8%	2020
TO THE	65,6%	2021
ON THE	70,8%	2019
AP	61,5%	2019
THREE	71,6%	2018
THAT	2,31%	2022
DF	98,9%	2022
IS	63%	2020
GO	92,65%	2012
BUT	62,6%	2018
MG	83,7%	2022
MS	90,7%	2022
MT	99,5%	2014
PA	98,5%	2016
PB	263,5%	2021
ON	95,9%	2015
PI	59,2%	2016
PR	80,2%	2021
RJ	75,5%	2017
RN	50,7%	2019
RO	95,1%	2014
RR	97,6%	2018
RS	93,9%	2014
SC	0,6%	2022
HERSELF	27,6%	2022
SP	80,4%	2021

Source: Adaptation Brazil, 2024d.

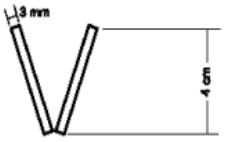
According to the PNCEBT (2017), vaccination must be carried out under the responsibility of the registered Veterinarian or his registered assistants, and it is mandatory to mark with a burning iron or liquid nitrogen on the left side of the face. Females vaccinated with B19 should be marked with the last digit of the vaccination year, as shown in figure 1, and those vaccinated with RB51 should be marked with a "V", as shown in figure 2.

Figure 1 - Example of iron for marking females vaccinated with the B19 vaccine.



Source: Personal archive, 2024.

Figure 2 - Definition of iron for marking females vaccinated with RB51.



Source: Brazil, 2017a.

The state of São Paulo has removed the obligation of iron marking as a method of identifying animals vaccinated against brucellosis, suggesting ear identifiers as a method, aiming at the well-being of the animals (São Paulo Department of Agriculture, 2024).

The standardization of the classification of FUs took place through a partnership between MAPA and the Collaborating Center for Animal Health of the Faculty of Veterinary Medicine and Animal Science of the University of São Paulo (FMVZ/USP). The classifications are based on epidemiological surveys, in order to know the prevalence of brucellosis in Brazil (Brasil, 2020a).

The action strategies through the classifications of the FUs regarding the degree of risk for these diseases are defined through the definitions and application of animal health defense procedures appropriate to the different realities (Brasil, 2020a).

The degrees of risk of FUs are based on classes A to E, determined by the prevalence of the disease from studies standardized by MAPA, where classification A has a prevalence of focus < 2%, B prevalence is ≥ 2 to < 5%, C has values ≥ 5 to < 10%, D ≥ 10% and E has unexplored revalence, and at levels 0 to 3, where 0 has non-existent enforcement actions, 1 has low actions, 2 has medium actions, and level 3 has high actions, where these actions are proposed in an action plan in accordance with animal health defense (Brasil, 2017a; Brazil, 2020a; Brazil, 2024).

The detection of a focus case, it is necessary to sanitize the property, starting from the interdiction, elimination of all positive animals and later presentation to the Official Veterinary Service (SVO) of negative herd tests. During sanitation, the animals on the property will not be allowed to transit, in excess of those intended for immediate slaughter or upon presentation of a negative diagnostic test (Brasil, 2020a).

Hygiene and disinfection of facilities, milking machines, sheds, paddocks, maternity paddocks or places where pregnant animals or animals undergoing sanitary treatment and other areas of potential animal circulation help in the environmental control of the agent. (Brazil, 2006; Schmitt *et al.,* 2017). It is necessary to carry out prior cleaning of the facilities, removing beds, straw, manure for better action of the disinfectants, the material removed must be burned or undergo disinfection processes, table 2 specifies disinfectants indicated for carrying out the management (Brasil, 2006).

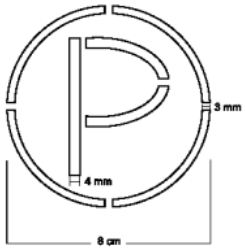
Frame 2- Main disinfectants that help in the disinfection of facilities in cases of bovine brucellosis.

DISINFECTANT	CONCENTRATION	EXPOSURE TIME	INDICATED USE
Sodium Hypochlorite	5%	1 hour	Facilities and utensils
Formaldehyde	5%	1 hour	Facilities, utensils and clothing
Calcium Hypochlorite	2,5%	1 hour	Facilities and utensils
Lime (Calcium Hydroxide)	15%	1 hour	Facilities and Ground
Cresols	5%	1 hour	Facilities
Phenol	1%	1 hour	Facilities
- Caustic soda (Sodium hydroxide)	2 - 3%	3 hours	Facilities and utensils

Source: Adaptation Brazil, 2006.

Animals that are positive for the diagnostic test for brucellosis should be marked, by the veterinarian responsible for performing the exam, with a hot iron or liquid nitrogen, on the right side of the face with a "P" contained in a circle of eight centimeters in diameter, as shown in Figure 3. The slaughter time is conditioned to thirty days after the reactive diagnosis (Brasil, 2006; Brazil, 2017a, Meirelles - Bartoli; Shah; Mathias, 2014).

Figure 3 - Iron model for marking positive animals.



Source: Brazil, 2017a.

Obtaining the certificate of free-breeding establishment is obtained by vaccinating all females between 3 and 8 months of age and two herd tests with consecutive negative results with an interval of 6 to 12 months, the second being mandatory to be carried out in a laboratory of the National Network of Agricultural Laboratories of the Unified System of Attention to Agricultural Health. The maintenance of the certificate is conditioned by the presentation to the official veterinary service of negative herd tests with maximum intervals of twelve months (Brasil, 2017a).

By the end of 2018, there were a total of 1,932 certified brucellosis-free properties in Brazil. Of the 27 FUs, 12 have certified properties, and 95% of these properties are located in the south of the country (Brasil, 2020a).

The issuance of the animal transit permit (GTA) for the transit of cattle or buffaloes, for any purpose, is required upon proof of vaccination, and the negative certificate issued by

the registered veterinarian (BRASIL, 2017a). The certificate is valid for sixty days, counting from the date of blood collection for diagnosis (Brasil, 2017a).

For humans, the recommended preventive measures are the consumption of pasteurized and/or boiled milk and/or dairy products, consumption of foods that have a quality verification seal from the Municipal Inspection Service (SIM), State Inspection Service (SIE), Federal Inspection Service (SIF) or MAPA (Brasil, 2020c).

For the occupational group, the use of personal protective equipment (PPE) is recommended, especially in vaccine management, in the manipulation of placentas, calves (Costa *et al.,* 2022; Schmitt *et al.*, 2017).

CARCASS CONDEMNATION DATA

According to the Open Data Portal of the Ministry of Agriculture, Livestock and Supply from the year 2000 to 2024 (partial until the month of March), during these 20 years there was the condemnation of 6,833 animals (table 3) for Brucellosis (Brazil, 2024d), with a varied destination, which can be rendering, partial or total condemnation, sterilization by heat, cold treatment, autoclaving/incineration, ingredient manufacturing. The destination is carried out according to the descriptions of RIISPOA (2020), according to the findings in the inspection line.

Picture 3- Data on carcasses condemned for brucellosis from 2000 to 2024 (partial until March).

FU	CONVICTION
AC	7
AM	2
BA	56
DF	-
ES	22
GO	89
MA	690
MG	770
MS	38
MT	219
PA	1566
PE	-
PR	535
RJ	-
RO	766
RR	3
RS	73
SC	436
SP	250
TO	1311
TOTAL	**6833**

Source: Adaptation Brazil, 2024d.

FINAL CONSIDERATIONS

Due to the facts presented, it is concluded that brucellosis is a disease present in Brazilian herds and is still neglected by many. Those working in livestock farming should be better instructed about the disease. A point of contribution would be the better dissemination of the general aspects of these diseases, emphasizing the risk and focusing on prevention and control measures in a clear and simple way, aiming to increase knowledge, consequently the execution of sanitary measures of the herd and actions for one's own benefit.

Field technicians and official veterinary services are the best disseminators of information, and can contribute by bringing practical knowledge to the field, especially to producers and rural workers.

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THE LINGUAL ORTHODONTICS AND THE SOCIAL SIX: A CASE REPORT

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ABSTRACT

Lingual orthodontics has emerged as an effective alternative to address the growing demand for discreet orthodontic treatment, particularly among adult patients. The primary motivation for seeking orthodontic care is often the desire to improve facial aesthetics, driving a significant increase in the number of adults pursuing corrective dental procedures over the past two decades. This case report highlights the Social Six Technique, developed by Scuzzo and Takemoto, as a streamlined and efficient solution for treating Class I malocclusion with anterior crowding. This technique offers a fast, precise, and practical approach to achieving optimal results, making it a cost-effective alternative to systems like Invisalign™ and other aligner-based treatments.

Keywords: Lingual orthodontics, Orthodontics, Invisalign™.

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INTRODUCTION

Orthodontics has traditionally aimed to improve dental alignment and occlusion, focusing on function and aesthetics. In recent years, the aesthetic aspect of orthodontics has gained prominence, especially among adult patients concerned about the visibility of braces. The "social six," referring to the maxillary and mandibular anterior teeth (central incisors, lateral incisors, and canines), are critical in shaping an individual's smile and self-esteem.

The lingual orthodontics has been an interesting alternative for orthodontic treatment for patients who do not accept conventional orthodontic treatment, in the case of the vestibular technique.

The lingual orthodontics in recent years has been highly sought after by patients and professionals in search of a differential market adding financial value and market differentiation.(Hohoff et al., 2003; Mo et al., 2013)

However lingual orthodontics requires a different technique, a lot of training and study. By requiring specific instrumental, brackets and wires. Besides indirect bonding which undoubtedly is very labor intensive and maybe need to be rebonded at the time of placement of the brackets in the mouth (Gorman, 1998; Fillion, 2010).

The lingual orthodontics is an invisible technique that attracts many patients and one of the ways to accomplish is the social system six, where is an option of treatment in patients Class I. This technique is bonded in the canine to canine lingual surface in both archs. This technique was proposed by Takemoto and Scuzzo (Takemoto & Scuzzo, 2001; Scuzzo et al., 2010)

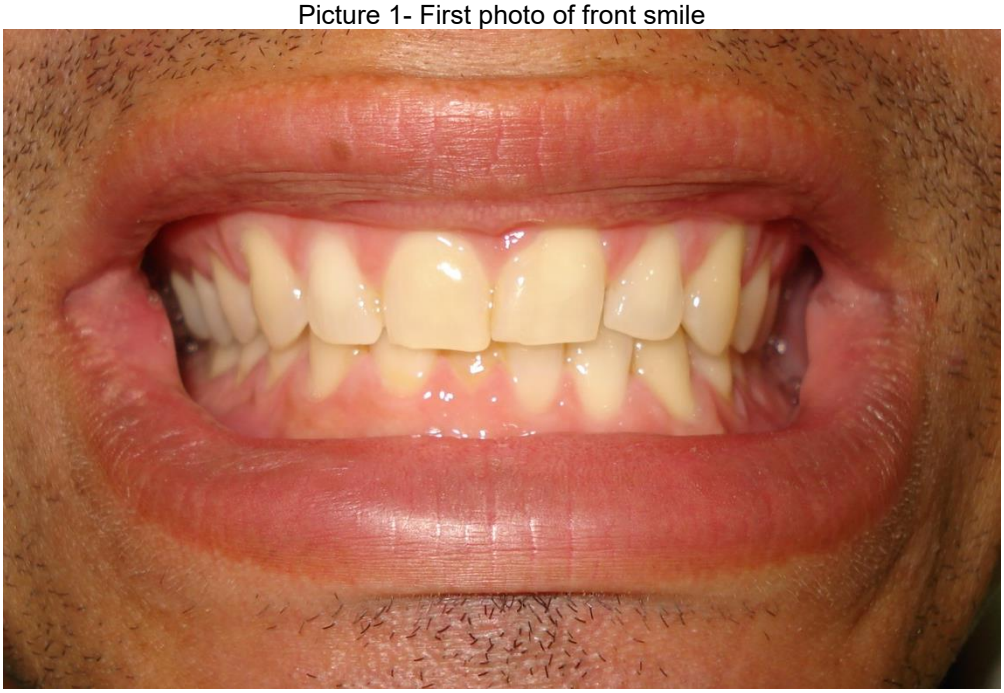
Lingual orthodontics is a revolutionary approach that caters to this aesthetic demand by positioning orthodontic brackets and wires on the lingual surfaces of the teeth, rendering them nearly invisible. Despite its advantages, lingual orthodontics presents unique challenges, such as technical complexity and higher costs. This paper explores the mechanics, clinical applications, and social implications of lingual orthodontics, with an emphasis on treatments targeting the social six.

CASE REPORT

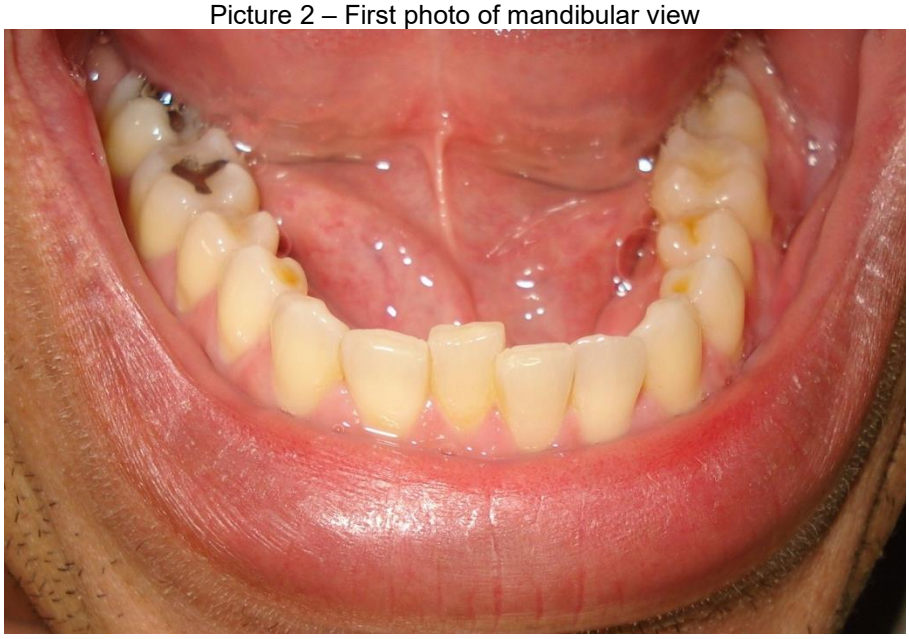
Patient L. E., 32 years old, signed the patient consent form, had Angle Class I malocclusion, with crowding and misalignment of the upper and lower archs, refused to use the conventional vestibular orthodontic technique, the patient wanted to make an orthodontic treatment that was supposedly invisible, because it had already used appliance and bothered a lot with the appearance and also the discomfort that four years device

brought. Thus we use the technique of lingual brackets prescription STB (ORMCO Orthodontics, USA), starting with indirect bonding. And putting a stainless steel wire 012 lingual for 3 months, 014 lingual wire for 2 months. The stripping method was used to gain space in the mandibular arch. After the 016 lingual wire was used for 1 month and ending with a string of 016 x 016 with TMA for 4 months, using the small continued ligature. Finally integrated torque 10 months later, placing a bonded retainer in the top and bottom. And it was finished perfectly, with all teeth aligned and a perfect smile, leaving the patient very satisfied with his smile.

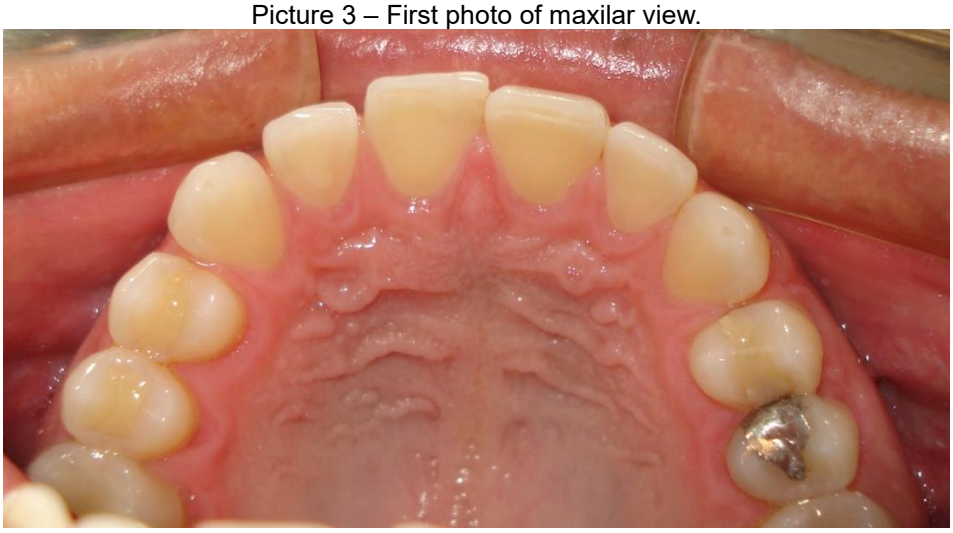
Picture 1- First photo of front smile



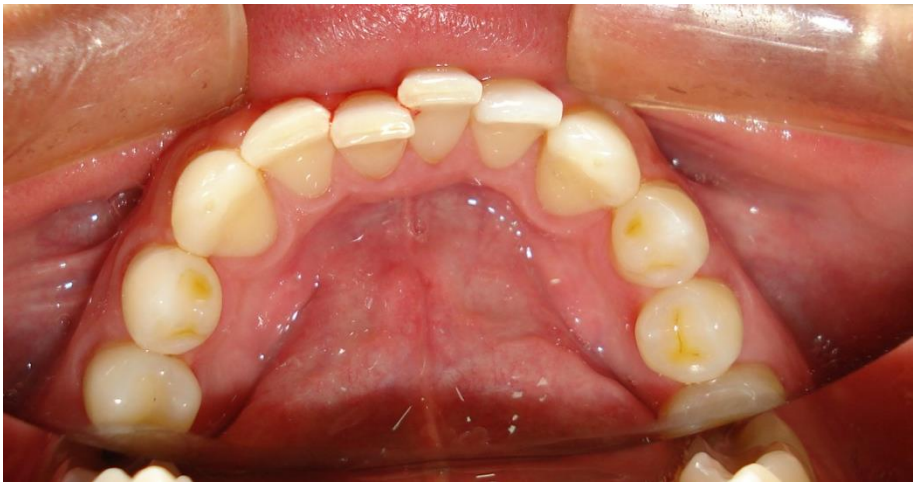
Picture 2 – First photo of mandibular view



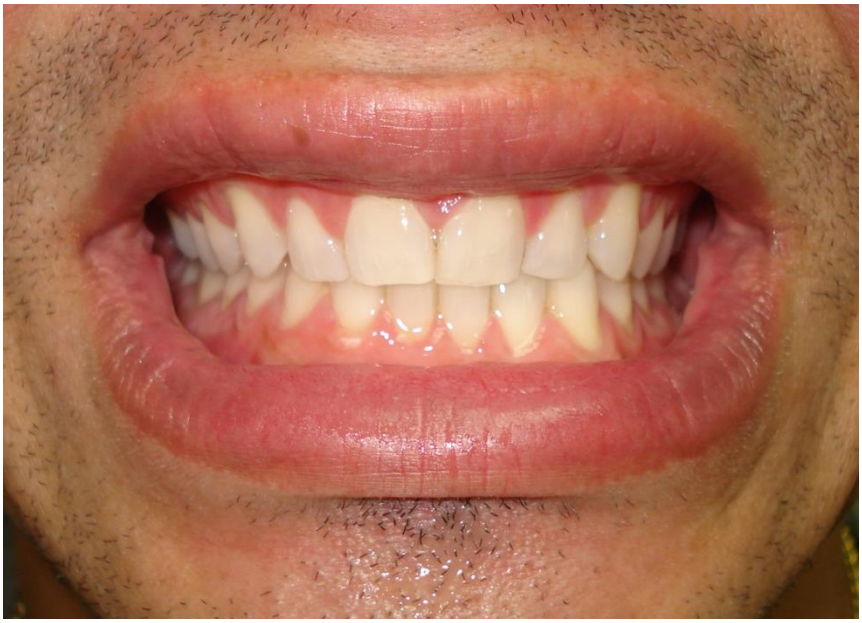
Picture 3 – First photo of maxilar view.



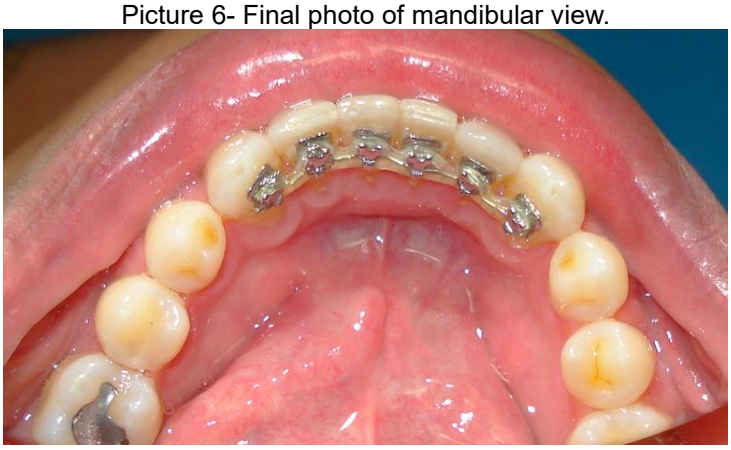
Picture 4- Photo of mandibular view with mirror.



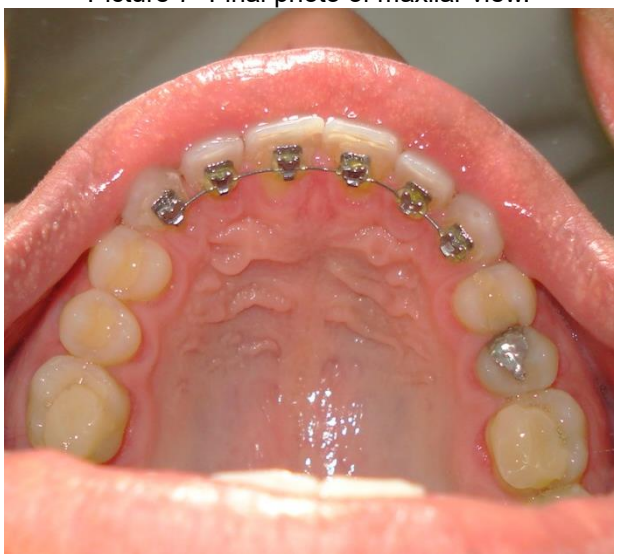
Picture 5- Photo of final smile.



Picture 6- Final photo of mandibular view.



Picture 7- Final photo of maxilar view.



LINGUAL ORTHODONTICS: AN OVERVIEW

HISTORY AND EVOLUTION

The concept of lingual orthodontics dates back to the 1970s when Kurz et al. developed appliances to cater to patients prioritizing discretion (Kurz et al., 1982). Over the decades, advancements in digital technology, such as 3D imaging and CAD/CAM systems, have refined lingual orthodontic appliances, making them more precise and efficient.

CURRENT TECHNOLOGIES

Modern lingual orthodontics employs custom-made brackets and wires tailored to each patient's dental anatomy. Technologies like Incognito™ and SureSmile® have further enhanced treatment accuracy by leveraging digital planning and manufacturing (Wiechmann et al., 2003).

THE "SOCIAL SIX" IN ORTHODONTICS

Importance of the Social Six

The social six are the teeth most visible during speech and smiling, playing a crucial role in interpersonal interactions and self-confidence. Orthodontic treatment targeting these teeth can significantly improve a patient's aesthetic appearance, often with reduced treatment times compared to full-arch approaches (Sarver et al., 2015).

FOCUSED TREATMENT STRATEGIES

Lingual orthodontics targeting the social six is particularly suited for patients with mild to moderate alignment issues. These cases often involve crowding, spacing, or minor rotational corrections. The approach emphasizes efficient tooth movement while preserving aesthetics throughout the treatment.

BIOMECHANICS OF LINGUAL ORTHODONTICS

Lingual orthodontics operates on the same biomechanical principles as traditional braces but with unique adaptations:

1. **Bracket Positioning**: The lingual surface curvature requires custom-fit brackets to ensure optimal adhesion and force distribution.
2. **Force Application**: Precise control of forces is essential to avoid unwanted torque or tipping.
3. **Archwire Customization**: Wires are pre-shaped based on digital models to align with the lingual anatomy and achieve desired outcomes (Fillion, 1997).

ADVANTAGES OF LINGUAL ORTHODONTICS

The primary advantage of lingual orthodontics is its invisibility, making it an ideal choice for adults in professional or social settings.

Lingual systems are highly personalized, leading to improved patient comfort and more predictable results (Wiechmann et al., 2003).

Focusing on the social six allows for expedited results in cases where full-arch treatment may not be necessary.

LIMITATIONS AND CHALLENGES

Lingual orthodontics requires specialized training and skills due to the difficulty of accessing and manipulating lingual surfaces (Geron & Romano, 2001).

Patients may experience initial discomfort, including tongue irritation and speech difficulties, which generally subside within weeks.

Custom appliances and advanced technology contribute to higher costs compared to traditional orthodontic options.

Lingual orthodontics is suitable for a wide range of cases, including:

1. **Mild to Moderate Crowding**: Especially in the social six region.
2. **Aesthetic-Driven Patients**: Adults in public-facing roles or those prioritizing discreet treatment.
3. **Interdisciplinary Care**: Cases involving pre-prosthetic or post-orthognathic surgery alignments.

Research indicates that focused treatment of the social six using lingual braces can achieve significant improvements within six months, depending on case complexity (Smith et al., 2018).

Recent technological advancements have transformed lingual orthodontics:

1. **3D Imaging and Printing**: Enables precise planning and fabrication of custom appliances.
2. **Artificial Intelligence**: Facilitates treatment simulations and improves outcomes (Alford et al., 2020).
3. **Self-Ligating Brackets**: Reduces friction, enhancing patient comfort and efficiency.

The growing popularity of lingual orthodontics reflects broader societal trends toward personalization and aesthetic optimization. Patients value the ability to improve their smiles discreetly, aligning with contemporary norms of professional and social presentation.

CONCLUSION

Lingual orthodontics is a sophisticated and effective approach to orthodontic treatment, offering unparalleled aesthetic benefits for patients prioritizing discretion. Cheaper than Invisalign™ treatment. Its focus on the social six allows for targeted treatment, enhancing smiles while maintaining patient confidence throughout the process. While challenges remain, ongoing advancements in technology and training promise to make this treatment more accessible and efficient.

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