Perception of a community on the risks of exposure to hospital waste in Belém – PA, Brazil

Percepção de uma comunidade sobre os riscos da exposição ao resíduo hospitalar em Bélem – PA, Brasil

Percepción de una comunidad sobre los riesgos de exposición a desechos hospitalarios en Bélem – PA, Brasil

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Abstract
Exposure to hospital waste generates global concern as it causes various problems to the environment and human beings, especially when it involves large quantities, such as those from big cities. The population seeks to understand the waste generated in society, including Health Service Waste (HSW), which is responsible for transmitting infectious diseases when improperly disposed of. This study aims to explain the understanding of residents living near health centers about the risks they may face during exposure to this waste in the city of Belém-PA. Initially, a literature review was conducted, followed by interviews with 20 individuals residing near health units, using questionnaires with objective and open-ended questions. The responses were analyzed, revealing that 75% of respondents had already encountered some type of HSW near their homes. Furthermore, it was evident that most people are unaware of the composition of HSW, even after being exposed to it, or the diseases that can be acquired. It was concluded that health centers still generate exposure to their waste, requiring better training in waste treatment, and highlighting the need for social reeducation regarding the handling, knowledge of the type of waste, its composition, and contamination.

Keywords: Waste from Health Services. Infectious Diseases. Training in Treatment. Social Re-Education. Waste Composition.

Resumo
A exposição aos resíduos hospitalares gera preocupação mundial, pois provoca diversos problemas ao ambiente e ao ser humano, principalmente quando são quantidades volumosas, como as oriundas de grandes cidades. A população busca conhecer os resíduos gerados na sociedade, incluindo os Resíduos de Serviços de Saúde (RSS), responsáveis pela transmissão de doenças infectocontagiosas quando descartados de forma incorreta. O presente trabalho visa explicar a compreensão dos moradores próximos aos centros de saúde quanto aos riscos que podem sofrer durante a exposição a esse resíduo na cidade de Belém-PA. Inicialmente, foi realizado um levantamento bibliográfico e, posteriormente, entrevistas com 20 indivíduos residentes próximos as unidades de saúde, por meio de formulários de perguntas objetivas e discursivas. As respostas foram analisadas, obtendo-se que 75% dos entrevistados já haviam deparado com algum tipo de RSS próximo às suas residências. Ainda, evidenciou-se que a maioria não conhece a composição do RSS, mesmo já tendo sido exposta, nem as doenças que podem ser adquiridas. Concluiu-se que os centros de saúde ainda geram exposição aos seus resíduos, necessitando de melhor capacitação no tratamento, além de evidenciar a necessidade...
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Introduction

A silent and alarming public health and environmental pollution problem is the improper disposal of hospital waste. Medical facilities generate waste from hazardous chemicals, radioactive materials, and infectious substances, the latter of which require proper disposal (Andeobu, Wibowo & Grandhi, 2022). The main risk associated with this type of waste is contamination by the human immunodeficiency virus (HIV), which causes acquired...
immunodeficiency syndrome (AIDS), potentially infecting numerous people and causing other risks (Satyanarayana, Johri & Prakash, 2012).

All solid waste generated in healthcare facilities is considered hospital waste if produced in these environments, even if it involves biological and non-biological waste (Sinha et al., 2020). The composition of hospital waste can vary, including infectious waste (biological risk), pathological, radioactive materials from exams like X-rays, and other treatments requiring radioactive substances for diagnoses (Yim, 2022). Additionally, it may consist of materials for wound cleaning, contaminated blood, human remains including aborted fetuses, contaminated syringes, expired antibiotics, expired therapeutic medications, and other materials posing potential risks to human health (Pozzetti & Monteverde, 2017).

According to Gonzaga and Miranda (2016), we live in a society they call the "civilization of waste" due to the enormous amount of non-degradable waste we generate, which does not decompose for many generations. Regarding hospital waste, the authors specifically state that this type of waste can be classified into different types of materials, including disposable waste generated from laboratory activities, clinical diagnostics, veterinary clinics, and health centers. Medication ampoules, scalpels, syringes, and various other materials of pharmaceutical, outpatient, and/or hospital origin can be classified as potential vectors of pathogens. Therefore, the authors argue that such waste needs to be properly disposed of in a way that prevents contamination through contact with the environment and vulnerable individuals susceptible to contracting pathogens from hospital waste sources.

Gonzaga and Miranda (2016) also discuss the legislation implemented for the treatment of solid waste, noting that Law 12.305/2010 marked a significant regulatory milestone for the treatment and disposal of waste, classifying them into various qualitative divisions. For example, there is a difference between the waste generated by the pharmaceutical industry and the waste generated by the textile industry. Additionally, Ferreira's studies from 1995 (Ferreira, 1995) advocated for expanding knowledge about waste disposal in general, particularly in hospitals. This idea of education is very important because, with information, citizens will be more alert when encountering situations involving these types of waste and can prevent themselves or others from contracting diseases due to a lack of information. Therefore, it is extremely important to disseminate the dangers of living amidst such waste.

To give an idea of the increase in hospital waste, a study conducted in the United States
indicated that the rate of hospital waste generated can reach 10 kg per occupied bed in just one day. This equates to more than 3.6 tons of hospital waste produced per bed annually in the country (Li & Jeng, 1993). During the COVID-19 pandemic, Ramteke (2020) reported a daily amount of 36 tons of waste, based on data obtained by the Central Pollution Control Board of India, along with an increase of more than 600% in the generation of biomedical waste in the country. In Bangladesh, it is estimated that about 15,000 tons of waste were due to COVID-19 (Rahman & Sahu, 2020). Finally, in China, hospital waste production generated approximately 500 tons of waste related to the novel Coronavirus (Silva et al., 2021).

In Brazil, the treatment of hospital waste, also known as Health Service Waste (HSW), is regulated by the Collegiate Board Resolution - RDC No. 306/2004 and the National Environment Council Resolution - CONAMA No. 358/2005, as long as this waste is managed for appropriate final disposal. Furthermore, it holds the generators of this waste accountable for its proper management through the development of a Health Service Waste Management Plan (PGRSS), which involves classifying, segregating, collecting, and storing the waste for external transportation (Aquino, Silva & Sanches, 2017).

Thus, it is the responsibility of the generator to monitor and evaluate the PGRSS, developing strategies and control instruments to ensure the effectiveness of the implemented plan. According to the National Health Surveillance Agency (ANVISA), Resolution RDC No. 222 of March 28, 2018, stipulates that HSW must be segregated at the time of generation, classifying them into different groups.

In the state of Pará, in the Amazon region of Brazil, specifically in the municipality of Altamira, research was conducted on the microbial diversity present in hospital waste from a public agency in this municipal unit, located in the southwestern region of Pará (De Sousa et al., 2015). Studies have shown that this waste presents a high biological risk as it contains colonies of potentially pathogenic microorganisms, meaning they can cause diseases. Notably, the microorganism Escherichia coli was found in most of the components of the sample collected at the hospital, present in more than one-fifth of the samples. This microorganism can cause diseases such as urinary tract infections, low intestinal fluid retention, hemolytic-uremic syndrome, and hemorrhagic diseases such as colitis. The authors highlighted the need for careful handling of this waste, raising concerns about the inadequate separation of hospital waste and reporting the lack of appropriate technology to provide a final destination for the waste that is not subject to social exposure (De Sousa et al., 2015).

Thus, it is important to evaluate methods for disposing of this waste. According to
Zanon (1990), in his studies from the 1980s and 1990s on the final disposal of hospital waste, despite the massive reduction of waste by up to 90% of its initial volume, incineration is not a method that fully solves the problem. This is because some microorganisms are resistant to high temperatures and survive, resulting in incomplete sterilization of materials and the potential to contract an infectious disease or harmful contamination. Alternatively, the author argues that autoclaving is a safe sterilization method that can be used for waste with potential biological risk. This method involves sterilizing waste by subjecting these materials to highly heated and pressurized steam in a vacuum environment, destroying all pathogens due to the extreme conditions.

Given the resolutions, regulations, and knowledge about the composition, segregation, treatment, and contamination risks of Health Service Waste (HSW), this study aimed to assess what pedestrians and residents living near the health centers of the Emergency Care Unit (UPA) - Marambaia and Santa Casa de Misericórdia, both located in the city of Belém-PA (Amazon region - Brazil), understand about the composition of hospital waste, the treatment measures for this waste, and the level of contamination they are subjected to by having their homes located near health centers or by frequenting these areas.

**Methodology**

The research was initially qualitative, which according to Chiapetti (2010), aims to value concrete perspectives and personal perceptions to understand the individuals involved in the topic. Subsequently, a questionnaire with multiple-choice questions and answers was constructed, quantifying the responses through percentage graphs, which allowed for the evaluation and reflection on the studied context. As a result of this approach, a large sample of the population was not necessary; however, strategies were used to make the work more objective by selecting people living near the Santa Casa de Misericórdia Hospital and UPA - Marambaia. This aimed to collect the opinions of Belém residents on the improper disposal of hospital waste in the region.

2.1 Location

The study was conducted in the city of Belém, the capital of the state of Pará. The city is located in northern Brazil, situated in the Amazon biome, founded in the year 1616, and has
a territorial extension of 1,059.466 km², with coordinates 01°27‘20” S 48°30‘15” W and a population of 1,393,399 people (IBGE, 2012). According to Santos (Santos, Coelho-Ferreira & Lima, 2018), Belém is the second-largest metropolis in the northern region of the country, with a tropical climate and abundant rainfall, generally having an annual precipitation index of 3,000 millimeters. The sample collection took place at the Santa Casa de Misericórdia Hospital, located in the Umarizal neighborhood, and UPA - Marambaia, located in the Marambaia neighborhood, the urban area of Belém (Figure 1).

**Figure 1**

*Map of Belém with the collection sites (Marambaia and Reduto neighborhoods).*

Source: Maurício Martins/IBGE (2024); Belém City Hall (2014)
2.2 Sample Collection

The research can be characterized as a case study, which, according to Pereira et al. (2018), consists of open-ended questions within the proposed environment, in this case, the area near hospitals in the Metropolitan Region of Belém, aiming to observe and analyze phenomena relevant to this specific context. To achieve this objective, oral interviews were conducted at the homes of people living near the hospitals. A questionnaire with objective and open-ended questions was used as a data collection instrument. The questions followed a line of reasoning about the disposal of hospital waste, focusing on points such as the residents' understanding of what constitutes hospital waste and its proper disposal. In total, 20 residents were interviewed for this research, and they answered the interviews anonymously.

2.3 Statistics

For the treatment of results and creation of graphs, Microsoft Excel® was used, and the method adopted for data interpretation was Discursive Textual Analysis (DTA) by categorization, as highlighted by Moraes and Galiazzi (2006). This method begins with the unitization of data, separating it from the participants' reports. Next, the categorization process is carried out, identifying significant and similar parts of the reports obtained through the data collection instrument during the interview. This process leads to numerous possibilities for new discussions and relates the interviews to the thoughts of other authors, aiming to enrich the initially proposed discussion.

Results and Discussion

The first question of the questionnaire was about the population's understanding of hospital waste in general. The responses to this question varied widely, and the percentage analysis is presented in Figure 2's graph.
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Figure 2
Responses to the question "What do you understand as hospital waste?" (%).

One of the responses provided was that hospital waste consists of "waste generated by the treatment of various patients with mild or severe illnesses." This is not entirely true, as hospital staff can also generate this waste, as previously reported. However, the answer in question has some logic, although it does not encompass the entire issue. The interviewee is aware that waste generated by patients admitted to these hospitals also falls under the type of waste researched here.

Bandages, used ampoules, gauze and syringes, blood (assuming it's used blood bags) were among the most common answers to the first question, which is very encouraging to note. It reveals a considerable number of people who are well informed about how to recognize hospital waste when they see it, and this is crucial for ensuring care and prevention of contact with these objects.

Some of the responses regarding the concept of hospital waste simply referred to it as waste originating from outpatient environments. This type of vague response suggests that some interviewees may not know exactly what constitutes this waste; they only know where it comes from but have little idea of what it consists of and how dangerous it can be if they meet genetic material from a patient infected with a highly dangerous disease. Biomedical waste is different from regular waste, and there are different types of hazardous waste, such as chemical, radioactive, universal, or industrial waste. Medical facilities generate hazardous waste from chemicals and radioactive materials. These wastes are typically not infectious but require proper disposal. Some wastes are considered to pose multiple risks, such as tissues preserved in formalin (Passos & Do Amaral, 2020).

Medical waste results from a variety of activities within a hospital. Domestic waste is generally related to the kitchen, office, and consultation rooms, and is similar to municipal
waste. Different medical procedures such as cobalt therapy, chemotherapy, hemodialysis, surgery, childbirth, organ resection, autopsy, biopsy, laboratory procedures, injections, etc., are performed in the hospital and lead to the generation of infectious hospital waste and sharps contaminated with blood and patient secretions, radioactive and chemical waste. All of these are labeled as hazardous waste and should be disclosed to the public as a way to inform them and keep the population alert to this issue (Silva, Dos Santos & De Oliveira Marquez, 2021).

Residents living near healthcare facilities were questioned about how they believed the disposal of what they consider and understand as hospital waste should be carried out. The aim was to verify whether residents are aware of the basic procedures for treating hospital waste and how they evaluate this type of treatment, considering that at some point most have been exposed to waste from health services.

In general, most understand that waste from health services should be properly separated and segregated from common waste, that is, it can be inferred that they understand that there is a difference between residual waste from common establishments and hospital waste, but none of the interviewees mentioned the categories and classifications of these wastes according to Brazilian legislation.

In addition to the segregation and proper separation of hospital waste, some residents suggest the use of specialized third-party companies for the treatment of waste from health units, with the use of a specialized team, a vehicle to collect the waste within the health units and proper disposal in a specific area for treatment. Among the residents interviewed, two suggested the use of incineration in the treatment of waste.

From the analysis of the responses shown in Figure 3, it was possible to observe that there is some understanding regarding the disposal of hospital waste, even if this understanding is very basic. After all, according to Brazilian legislation, which provides for the technical regulation for the management of health service waste (HSW), there is a determination for the segregation of this waste within health units, considering its physical, chemical, and biological characteristics, its physical state and the risks involved.

Due to the high risk of contamination of hospital waste, Pinto and Nogueira (2019) state that the stages of segregation and packaging are the most important in the entire treatment process, precisely because of the proximity and direct and indirect contact that exist with the workers responsible for this waste and with the residents who live around the health facilities. Only after these steps should the waste be sent to the locations where they will undergo proper treatment and then be disposed of without posing any risk to human health or damage to the
environment.

Regarding the conclusions of Pinto and Nogueira (2019), it becomes interesting and appropriate for the bodies responsible for the treatment of health service waste to use media and alternative means to inform residents near health facilities and the general population about the composition of hospital waste, its risks to health and the environment, and how it is properly treated.

**Figure 3**

*Answers to the question “In your opinion, how do you think hospital waste should be disposed of correctly?” (%)*

The interviewees were asked whether they, as residents living near healthcare centers, had ever encountered improperly discarded medical waste (needles, syringes, used bandages, among other contaminants) in their neighborhood. This question was objective, and the percentage of responses can be observed in Figure 4. This question was based on the potential diseases that could be spread through the improper disposal of potentially contaminated medical waste, aiming to inquire whether individuals had ever seen any type of medical waste on the streets near their homes.
Figure 4

Answers to the question 'Have you ever encountered incorrectly discarded hospital waste (syringes, needles, bandages, gauze, among other contaminants) in the area where you live?' (%).

Based on the reports collected through the questionnaires, it is confirmed that a large proportion of participants have encountered improperly discarded hospital waste in the area near their residence. However, no harm to the health of the residents was observed. Furthermore, another portion of participants stated that they have never seen hospital waste in the vicinity of their homes and, consequently, also indicated that the disposal is done properly. Thus, it is known that there is a limited number of processes dedicated to the handling of hospital waste by hospitals, particularly regarding the selection and separation of specific waste, proper removal with identification labels, and correct disposal.

In some areas surveyed, participants reported that waste collection and processing are carried out by a third-party company. As a result, in some locations, residents do not tend to observe quantities of hospital waste in front of their homes. When discussing absolute numbers, the majority of individuals stated that they have seen hospital waste discarded near their homes, but they do not report any illnesses among family members. On the other hand, the minority of interviewees have not encountered the presence of hospital waste in their residential area and further stated that the disposal is well-managed and carried out by the third-party company, through collection and removal in identified company trucks, with proper labeling of the waste to be discarded.

Based on the results observed in Figure 4, it was possible to note how people living near major hospital centers are the most likely to suffer the consequences of mishandled hospital waste, as the majority of interviewees stated that they have observed improperly discarded hospital waste near their homes. Therefore, it is evident how dangerous the presence
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of hospital waste can be, as the material can pose problems for both the environment and human health. Cafure and Patriarcha-Graciolli (2015) emphasize the level of risks that can be perceived by the period of exposure to the waste, ranging from instantaneous to chronic exposure, the probability of occurrence, and severity, which can mainly cause a decrease in the quality of life of the population that had contact with the discarded material, either directly or indirectly.

Figure 5 presents the percentage of responses regarding the question about the safety of exposure to hospital waste. The objective was to verify whether citizens, especially those living near UPAs (Emergency Care Units), are aware of the risk to their health based on statements that encompassed possible health problems and harm, either to the interviewee or a relative, in addition to verifying a desire to move due to fear of contamination.

Figure 5
Answers to the question 'Do you feel safe regarding exposure to hospital waste living near a healthcare center?' (%).

Half of the interviewees feel safe regarding hospital waste, including those who are neighbors of healthcare centers, also stating that they have never suffered any type of problems or consequences arising from exposure. This statement indicates that there is a certain level of correct treatment of healthcare waste, with proper segregation and selective collection by third-party companies using sealed trucks for the storage and transportation of this waste, especially infectious waste.

According to one of the residents living near the Emergency Care Unit, there is a periodic collection of both common and infectious waste. A third-party company is called upon for the collection of common waste, which is stored inside a transport container without proper segregation for recycling. Infectious waste, on the other hand, is collected and
Transported by sealed trucks, without confirmation that it receives proper treatment within the facility that generates this waste.

In contrast, a portion of the interviewees reported that they have never suffered any harm caused by exposure to hospital waste. However, they do not feel safe near these locations, and those who live close to these institutions are considering moving to areas farther away. This reasoning makes it clear that, even without suffering consequences or seeing their relatives affected by health problems, people do not feel safe living near these establishments, a fact that is due to the common belief that all hospital waste is infectious and harmful to health.

The interviewed individuals reported feeling threatened when they see bags of common waste in front of healthcare facilities, which are discarded like everyday household waste. They immediately assume it to be infectious, when in reality it only contains food scraps, packaging, and other similar items.

On the other hand, a minority of the research participants stated that they feel safe near healthcare centers, even though they have experienced problems caused by this exposure. According to one resident, there is a very strong smell coming from the storage and treatment of hospital waste at the UPA (Emergency Care Unit), where she reports having suffered from poisoning and suffocation due to the odor.

Through on-site verification by one of the authors, it was possible to confirm the resident's information. A resident near the UPA, located in the Marambaia neighborhood in the city of Belém, described that her entire family, including herself, suffered from the flu caused by the Influenza A/H3N2 virus - which is currently experiencing a surge in registered cases at the time this research is being conducted. It was reported that the common waste dumped in front of the UPA was mixed with infectious waste due to the demand from patients.

Thus, it is clear that those most affected by exposure to hospital waste are the nearby residents, and that the establishment must strictly follow all agreed-upon protocols. Finally, none of the interviewees chose the last option, reporting problems and confirming insecurity.

Regarding exposure to hospital waste, in the question about understanding the risk of exposure to hospital waste on the form, residents were asked about the consequences that this exposure could cause, as shown in Figure 6. Through this question, it was possible to assess the level of personal health care of each resident and how much they know about the risks of contamination and accidents due to exposure to healthcare waste. The question was objective with four alternatives and was asked as follows: "Considering that you might be exposed to
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Hospital waste, mark the possible consequences that this would bring you.”.

From the data obtained, it was possible to observe that half of the interviewees stated that they could contract serious diseases if exposed to hospital waste, but they do not know exactly which ones. Even living near the UPA - Marambaia and Santa Casa, half of the interviewees do not know about the possible diseases they could acquire by coming into contact with any waste disposed of or treated incorrectly. It is due to this impasse that it becomes even more necessary to strictly follow all biosafety protocols regarding the management, treatment, and disposal of healthcare waste. Similar to those who would not know what diseases they could contract, some of the interviewees believe they could contract serious diseases and know exactly what they would be.

Figure 6
Answers to the question ‘Considering that you might be exposed to hospital waste, what are the possible consequences that this would bring you?’ (%).

The smallest portion of interviewees believe they would not suffer any consequences, as they are vaccinated against various types of diseases. However, it is necessary to pay attention to the data that reveals that half of the people interviewed do not know the consequences that contact with hospital waste would bring them. This means that if health units are not properly treating hospital waste according to biosafety standards, workers, residents, and passersby in areas near healthcare centers are at great risk of contamination and accidents with chemical substances and sharp objects.

Some believe that the risk of contamination is extremely low and that minimal care is enough to avoid endangering human health and the environment. However, Silva et al. (2002), through a structured questionnaire directed at a network of experts in the Federal District, obtained data that point to a possibility of harm to human and environmental health, associated
with various pathogens present in hospital waste. The results also indicate a certain environmental persistence capacity of various pathogenic microorganisms, thus demonstrating levels of risk to biological exposure when there is inadequate treatment.

The issue of hospital waste in the city of Belém has received little attention so far and needs to be highlighted to raise awareness among the city's population.

The segregation of waste into distinct groups becomes even more important, as it allows for the sale to entities that work with recycling, thus saving resources, such as wasted materials and payment for outsourced collections, which charge by quantity, and obtaining profits from the trade of recyclable materials. This practice would have a direct positive impact on reducing the accumulation of generated waste and increasing recycled materials, raising awareness and preserving the environment, decreasing the extraction of natural resources, energy consumption, and protecting collaborators and employees. Indeed, proper training of waste management personnel can help in this task, as well as informing the population about the numerous risks that waste exposure can cause.

**Final Considerations**

The management of hospital waste in Belém faces numerous challenges, similar to other developing countries worldwide, reflecting an acute need for evaluation and expansion of the local healthcare infrastructure. In the absence of financial and technological resources, measures such as waste segregation at the source can help reduce the environmental impact of hospital waste, as well as the cost of final waste disposal. It is important to have alternatives for healthcare waste treatment methods, focusing on low-cost solutions to mitigate impacts. One such alternative would be the construction of large treatment facilities, promoting the recycling of various waste with reuse potential.

Waste storage, transportation, and disposal activities can be systematized through the development of a management information system. Waste disposal activities can also be outsourced by hiring specialists, leading to job growth and poverty reduction as a side effect of these actions. Cleaner and safer healthcare waste management in the city of Belém requires a more dynamic public policy formulation that reflects the reality of residents, especially those living near areas where improper disposal of hospital waste may occur, such as healthcare centers.

It is essential to identify any gaps in the administrative/organizational structure of
healthcare waste management within hospitals, also examining whether waste management practices are impacting the health of hospital staff. Additionally, sustainable and environmentally friendly solutions for the disposal of hospital waste should be explored in greater detail, aiming to mitigate the problem of hospital waste and improve the living conditions of the population of Belém.

In future research, it is suggested that studies should not focus solely on conducting situational analyses of hospital waste management in a single municipality, but also throughout the entire state, or at least in other municipalities that can serve as comparative parameters with the study conducted in this work.

References


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