PROCESS MAPPING: THE PATH TAKEN BY HEALTH SERVICE WASTE IN A HOSPITAL

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ABSTRACT

Purpose: This research aimed to map the waste management process of the health services of the medical clinic of a university hospital in the south of the country.

Theoretical framework: The theoretical basis involves the approach of process mapping, as well as the management and management of health services waste.

Method: This is a qualitative research carried out in the medical clinic of a university hospital in the south of the country. Data collection took place through non-participant observation and the data obtained were compiled in a Microsoft® Word file (2021) and used to build the process map of health services waste from the medical clinic, developed through a flowchart.

Results and conclusions: It was evident that the medical clinic of the investigated hospital has the recommended documentation, as well as human and material resources. However, inconsistencies were identified in the process, which emphasizes the need for educational actions, replacement of damaged equipment, identification of dumpsters, transport cars and shelters, adequacy of the temporary shelter environment, and restriction of the external shelter to access only for those involved in waste management.

Research implications: It was possible to understand the management of clinical medical waste and identify inconsistencies that impact on the effectiveness of its management, highlighting the relevance of mapping processes, especially in the context of health waste.

Originality/value: The research contributes by inciting interest in research and practical reflection on the way waste is organized and treated, especially in the context of health.

Keywords: Process Mapping, Health Services Waste, Waste Management, Hospital Units.

MAPEAMENTO DE PROCESSOS: O CAMINHO PERCORRIDO PELOS RESÍDUOS DE SERVIÇOS DE SAÚDE EM UM HOSPITAL

RESUMO

Objetivo: Esta pesquisa teve como objetivo mapear o processo de manejo dos resíduos dos serviços de saúde da clínica médica de um hospital universitário do sul do país.

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Referencial teórico: A base teórica envolve a abordagem do mapeamento de processos, bem como do gerenciamento e manejo dos resíduos de serviços de saúde.

Método: Trata-se de uma pesquisa qualitativa realizada na clínica médica de um hospital universitário do sul do país. A coleta de dados ocorreu por meio da observação não participante e os dados obtidos foram compilados em um arquivo do Microsoft® Word (2021) e utilizados para construção do mapa de processos dos resíduos de serviços da clínica médica, desenvolvido por meio de um fluxograma.

Resultados e conclusão: Evidenciou-se que a clínica médica do hospital investigado possui as documentações preconizadas, assim como recursos humanos e materiais. Contudo, foram identificadas inconsistências no processo, em que se ressalta a necessidade de ações educativas, substituição de equipamentos danificados, identificação das lixeiras, carros de transporte e abrigos, adequação do ambiente do abrigo temporário, e restrição do abrigo externo ao acesso apenas dos envolvidos no manejo dos resíduos.

Implicações da pesquisa: Foi possível compreender o manejo dos resíduos da clínica médica e identificar inconsistências que impactam na efetividade de seu gerenciamento, destacando a relevância do mapeamento de processos, especialmente no contexto de resíduos de saúde.

Originalidade/valor: A pesquisa contribui ao incitar o interesse em pesquisas e reflexão prática perante o modo que são organizados e tratados os resíduos, especialmente no contexto da saúde.

Palavras-chave: Mapeamento de Processos, Resíduos de Serviços de Saúde, Gerenciamento de Resíduos, Unidades Hospitalares.

1 INTRODUCTION

According to the Brazilian Association of Public Cleaning Companies and Special Residues (ABRELPE) (2021), a total of 290 million tons of Waste Health Services (RSS) were collected in Brazilian municipalities during 2020. It should also be noted that about 30% of Brazilian municipalities dispose of their waste collected without prior treatment, contrary to current legislation and posing a risk to public health and the environment.

A variety of material resources are used in the provision of health care and care, which in some cases are single use and disposable, giving rise to the SSR (Carneiro, Santos, & Nogueira, 2022; Das et al., 2021). Residues of the hospital environment are a complex issue when it comes to its management, since they encompass several decisions and people, in which steam sterilization should be the ideal process to be followed (Mishra et al., 2020). In this context, it is noted that the health sector generates negative impacts on the environment, damage caused by the products and technologies that the sector employs, the resources it consumes, the waste generated and the physical structure that they build and use (Das et al., 2021; Khan et al., 2019; Nogueira, & Castilho, 2016).

SSR has been the subject of debates, studies and research in recent decades, as well as a challenge, characterized as a concern for world authorities (Anvisa, 2006; Chauhan, Jakhar, & Chauhan, 2021; Das et al., 2021; Khan et al., 2019; Rizzon, Nodari, & Dos Reis, 2015). They were highlighted due to legal responsibilities around environmental, social and health aspects, which results in the need for adequacy in the management of the stages of management, promoting sustainable and economic development (Santos, De Oliveira, & Nogueira, 2021).

In this context, the Health Services Waste Management Plan (PGRSS), which involves the process of planning physical and material resources, as well as the training of human
resources, is mandatory in all services that generate SSR (Brazil, 2018). However, although all hospital institutions have PGRSS, there is still difficulty in operationalizing the management of RSS due to the variety of rules and regulations surrounding this topic (Carneiro, Santos, & Nogueira, 2022).

Previous studies have already addressed this type of mapping in health (Kneipp et al., 2011; De Oliveira Melo, Araújo, & Mothé, 2016; Nogueira e Castilho, 2016) and in clothing companies (Nascimento, Paulo, Xavier, & Ribeiro, 2022). However, there are still gaps to be filled, such as analyzing whether waste disposal and handling is taking place in the proper manner, developing strategies for disseminating the relevance of proper waste disposal, and the need for agents to know how the separation of SSR should be carried out (Araújo, Nobrega, & Amaral, 2022).

Such gaps are worth highlighting because the management of RSS is a complex process involving hazardous waste, in which the proper management of these products must be carried out to minimize the impact on environmental health, in addition to the use of tools that facilitate this management (Das et al., 2021; Khan et al., 2019; Stedile et al., 2018; Mishra, 2020). In this scenario, the use of process mapping generates information that supports waste management in hospitals, as identified in the Nogueira and Castilho study (2016), which sought to map and validate the waste management sub-processes of groups A, B, D and E, as well as measuring the cost of materials used in the management sub-processes of each waste group in a São Paulo university hospital. The aforementioned authors showed that the mapping provides subsidies for promoting actions that aim at sustainability by gaining control of processes and contributing to decision making (Nogueira, & Castilho, 2016).

Accordingly, the present study is guided by the following question: has the management of the SSR of the medical clinic of a university hospital in the south of the country been developed in an adequate manner? Thus, they are looking to map out the process of managing the SSR of the medical clinic of a university hospital in the south of the country. It should be noted that this article is justified due to the complexity involved in the management of the RSS, and for its success it is necessary that all the stages of the management are carried out properly. In addition, the use of management tools such as process mapping can be used by the administrator as a contributor to RSS management by knowing the steps involved in the process, identifying bottlenecks, and proposing relevant solutions.

In addition, the hospital’s medical clinic is responsible for generating different types of waste and it is possible to observe several involved in the process (professionals, users, escorts, teachers, students, residents, etc.), being pertinent such analysis. Furthermore, the study contributes theoretically by encompassing the context of process mapping in conjunction with SSR, not only under the gaze of solid waste (Lobato, & Lima, 2010), which has already been discussed in the literature, thus highlighting its advance. As a practical result, the research offers a complete view of the path taken by the RSS, so that it identifies both points that are being managed efficiently, and highlights weaknesses to be modified in the hospital environment, reinforcing the importance of understanding this process (Anvisa, 2006; Chauhan, Jakhar, & Chauhan, 2021; Das et al., 2021; Khan et al., 2019; Rizzon, Nodari, & Dos Reis, 2015). The following presents the theoretical reference that served as support for the development of the study, as well as the method, analysis and discussion of the results, as well as the final considerations, contributions and limitations of the research.

2 THEORETICAL FRAME

This section discusses the theoretical basis that guides the study, which is organized in process mapping and in the management and management of waste from health services.
2.1 Process Mapping

A process is defined as activities with a pre-determined purpose that are carried out in an organization. These activities have a beginning, a middle and an end, given that in an organization several processes take place and each sector is responsible for carrying out activities that link a succession of events (Crivellaro, & Vitoriano, 2022). Thus, process mapping is a management tool that aims to present the functioning of a process, creating a complete and accurate representation (Banadinović et al., 2020). In other words, it is an instrument of the management process, where the definition of key activities will be carried out, performance will be measured, possibilities for improvement verified, training actions suggested, monitoring and visualization of the means by which the activities will be carried out and interrelated (Gleriano et al., 2018).

Through it it is possible to improve existing processes and create a new structure for their stages, as well as providing a better understanding of current processes and locating those that need changes (Hunt, 1996). The mapping allows documenting all the elements that make up a process and correcting any identified problem (Banadinović et al., 2020). Thus, it involves a technique for analyzing and managing processes, specifying the activities developed and how they interact within a given organization, as well as tracing improvements through the detailing of activities (Neto Ferrari, & Bordin de Oliveira, 2022).

There are several symbols and languages for the development of process mapping, such as essential schemes to know, differentiate and highlight the need for improvement in a given process (Hunt, 1996). Among the main techniques used to perform process mapping is the flowchart, which graphically presents a given process or a new suggested process (Costa, & Moreira, 2018). Through this, it is possible to recognize the steps, determine sequences and select responsibilities, as well as promoting an understanding of the inputs and outputs of the processes (Neto Ferrari, & Bordin de Oliveira, 2022).

In view of this, the development of process mapping involves the use of some techniques, such as interviews, observations, document analysis, etc. (Pavani Junior, & Scucuglia, 2011). In addition, there are ten indispensable steps to map a process, which are: 1 - Identify the process objectives; 2 - Identify process outputs; 3 - Identify process customers; 4 - Identify process inputs and components; 5 - Identify process vendors; 6 - Determine process boundaries; 7 - Document the current process; 8 - Identify process improvements needed; 9 - Consensus on process improvements to be applied; 10 - Document the revised process (Pavani Junior, & Scucuglia, 2011).

Performing process mapping is the first step used by the administrator to understand a given situation in an organization, so the diagnostic phase must be run properly to plan and propose improvements. In this way, it is an instrument to "identify, represent, visualize and analyze existing business processes in an organization and improve with improvements and model the new processes with the strategic objectives of the companies" (Bueno, Maculan, & Aganette, 2019, p. 4). Following this line of thought, with the proper development of process mapping it is possible to understand the work environment and organizational performance, besides promoting competitive advantages (Neto Ferrari, & Bordin de Oliveira, 2022).

Seen this, process mapping is used as support for decision making, making them develop more productively and efficiently (Crivellaro, & Victorian, 2022). Crivellaro and Vitoriano (2022) point this out in their study, which sought to identify the benefits of process mapping for document management from the analysis of modeling tools developed under the Theory of Administration. On this, De Lucca, Ríos-Zaruma and Varvakis (2022) complements that with the use of process mapping it is possible to list the main practices developed in each phase of the knowledge management process in an organization (De Lucca, Ríos-Zaruma, & Varvakis, 2022).
In the area of health, process mapping can be used to obtain information about systems and processes, in which improvement interventions are introduced, and is employed in health quality improvement projects (Antonacci et al., 2018). With process mapping, one can also get to know the individuals involved in the workflow stages and verify if within a given organization the interaction between processes of different sectors occurs (Neto Ferrari, & Bordin de Oliveira, 2022).

In this research, process mapping is used as a management tool to understand the steps of managing RSS, detect potential inconsistencies in the process, and score potential solutions. Therefore, the mapping of processes in the context of waste analysis provides a macro- and micro-level visualization, as well as the relationships developed between them (Lobato, & Lima, 2010).

2.2 Management And Management Of Healthcare Waste

SSR is considered to be products generated from the provision of health services to living beings (humans or animals) from medical, dental, laboratory, pharmaceutical and medical teaching and research institutions. These, according to the characteristics of each type of waste, should be properly treated due to their potential health and environmental risk because they have infective biological materials, sharps, chemicals and radioactive products (Kneipp et al., 2011; De Oliveira Melo, Araújo, & Mothé, 2016; Mishra, 2020).

According to De Oliveira Melo, Araújo e Mothé (2016) and Mishra et al. (2020), SSR are classified as dangerous, because if the correct management, treatment and disposal do not occur, following the current rules, it will bring the health of the population at risk, as well as the professionals directly involved with them. Thus, RSS means ‘all waste resulting from the activities carried out by the generators of waste from health services’ (Brazil, 2018, p. 5), which are classified into five groups and classes according to risk (Brazil, 2018, p. 2, 20):

<table>
<thead>
<tr>
<th>Board 1 - RSS Groups and Classes</th>
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<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>A</td>
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<td>B</td>
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D Wastes which do not present a biological, chemical or radiological risk to health or the environment and can be assimilated to household waste. Risk class 4 (high individual and high community risk) It includes biological agents that pose a major threat to humans and animals, entailing a high risk to those handling them, with great transmittability from one individual to another, and no preventive and treatment measures are in place for these agents.

AND Perforating or scarifying wastes such as razor blades, needles, scalps, glass ampoules, drills, endodontic files, chopped orthodontic wires, unused metal mouthpieces, diamond tips, scalpel blades, lancets, capillary tubes, micropipettes, blades and slides, spatulas and all broken glass utensils in the laboratory (pipettes, blood collection tubes and Petri dishes).


Faced with this context, the complexity surrounding the SSR becomes evident, in what relevance of its management, in order to propose the necessary organization to the health establishments. As Florián, Navarro and Torres-Benítez (2023) show in their research, waste management is relevant to the organizational environment, regardless of its configuration, which promotes its reduction, as well as awareness towards employees. Thus, the management of SSR has the objective of reducing the risk coming from the contaminated waste to the internal and external population of the health establishment, besides reducing the quantity of waste generated and promoting safety in handling. Thus, the management of SSR is defined as the articulation of management procedures that involve techniques and legal norms to reduce waste generation, as well as guiding an appropriate destination, "aiming at the protection of workers and the preservation of public health, natural resources and the environment" (Brazil, 2018, p. 4).

Thus, proper management is necessary to promote collective health and preserve the environment (Kneipp et al., 2011; De Oliveira Melo, Araújo, & Mothé, 2016). In this medium it is important to point out about the PGRSS, which is a document that involves actions directed towards the management of the RSS and includes "the aspects relating to the generation, identification, segregation, packaging, collection, storage, transportation, destination and environmentally adequate final disposition, as well as actions for the protection of public health, the worker and the environment" (Brazil, 2018, p. 5).

With this in mind, the PGRSS is a management tool that can be used by health care institutions, with scientific and technical bases as a reference, as well as normative and legal ones. It aims to reduce waste generated, create safe handling for the protection of workers and preserve public health, natural resources and the environment (Migliori, & Cunha, 2010). In addition, the National Health Surveillance Agency (ANVISA) and the National Council for the Environment (CONAMA) state that every service that generates SSR must draw up a PGRSS, taking into account the characteristics of the waste generated, the current classification and the national and local rules (Kneipp et al., 2011; De Oliveira Melo, Araújo, & Mothé, 2016).

This being said, for the management of SSR the professionals involved must use the personal protective equipment (PPE). In addition, all employees of the health establishment should be trained to perform proper waste segregation and have knowledge about the classification system (De Oliveira Melo, Araújo, & Mothé, 2016).
Faced with this, the management of SSR involves the activity of handling the waste of health services debts in the following stages (Brazil, 2018): (i) Segregation: separation of the waste from its physical, chemical, biological particularities, its physical state and the risks involved; (ii) Packaging: involves packaging the waste in such a way as to avoid leaks, which need to be resistant and suitable physically and chemically; (iii) Identification: deals with the recognition of the risks present in the conditioned waste and its storage environment; (iv) Internal transport: covers the movement of the waste from its generation point to the temporary or external location (v) Temporary storage: temporary environment, near the point where the waste is generated, where it is stored; (vi) External storage: exclusive place where the waste is deposited; (vii) Collection and external transport: transition from external storage where the waste was allocated to the place where it will receive correct treatment; (viii) Environmentally appropriate final destination: appropriate solution taken for waste, whether reuse, recycling, composting, recovery or energy recovery; (ix) Environmentally appropriate final disposition: correct disposal of the waste that has emerged from the treated waste.

Therefore, the importance of the first stage of the management of the RSS is emphasized, which will impact in the other stages, since if segregation occurs in an inadequate manner, it will lead to an increase in the volume of contaminated waste and of the costs. Thus, among the benefits of the correct realization of segregation are the reduction of risks to health and the environment, besides the reduction of expenses (De Oliveira Melo, Araújo, & Mothé, 2016).

3 METHOD

It is a qualitative research, which aims to understand a given phenomenon through descriptions, interpretations and comparisons (Flick, 2012). The non-participating observation was carried out in the environmental management service - hospital hospitality sector, hygienization sector and in the medical clinic of a university hospital in the south of the country. The institution came into being in 1966 and since 2011 has had exclusive care for patients of the Unified Health System (SUS). The hospital has a reference in the care of high-risk pregnant women, Orthopedic Surgery of High Complexity and in the treatment of HIV and Hepatitis C, has 231 beds and offers the services of: Medical Clinic, Pediatric, Gynecological and Surgical; Ready Care; Intensive Treatment Units (Neonatal, Pediatric and General); Human Milk Bank; Specialized Care in Infectology; Regional Center for Studies, Prevention and Recovery of Chemical Dependents; Integrated Center for Diabetes; Regional Integrated Center for Orthopedic Trauma; Regional Integrated Diagnosis Center Treatment in Gastroenterology; Regional Integrated Center for Pulmonary Diagnosis and Rehabilitation.

In order to achieve the proposed objectives, the collection of the data was carried out by means of non-participating observation, recorded in a field diary with the help of a tablet, developed from technical visits to the service of environmental management - hospital hotel sector, hygienization sector and medical clinic. In non-participating observation, the researcher is not involved with the object of study, but is only a spectator. By means of this data collection technique the researcher will learn from a given situation the means by which it truly happens (Angrosino, 2009).

The data obtained through the non-participant observation was compiled into a Microsoft® Word (2021) file and used for later construction of the Clinica Médica RSS process map, which was developed through a flowchart. In addition, a comparison of the files with the current legislation was carried out in order to detect possible discrepancies and propose improvements, which is understood as a secondary source - desk review.
4 RESULTS AND DISCUSSION

The medical clinic of the study hospital has 56 beds, 40 of which are infirmary and 16 isolation. The care team consists of 23 nurses, 61 nursing technicians and nine doctors. Besides these, physiotherapists, occupational therapists, speech therapists, nutritionists, pharmacists, academics, residents, among others, are still working in the unit. Faced with this, considering the ten steps to map a process (Pavani Junior, & Scucuglia, 2011), the flowchart presented in Figure 1 was constructed. It is important to emphasize that these steps were instrumental in understanding all the steps that make up the processes of managing SSR of the medical clinic of the investigated hospital.

![Figure 1 - Flowchart of the steps of the medical clinic RSS process mapping](image)

Source: Research data (2023).

After the review and understanding of the steps mentioned above, it was possible to develop the flow chart of the mapping of the processes of handling SSR, taking into account the steps described in the current legislation and the observations carried out in the environmental management service - hospital hospitality sector, hygienization sector and medical clinic (Figure 2). As Lobato and Lima argue (2010), process mapping provides a macro- and micro-view of how events occur.
The hospital in which the study was developed has two Standard Operating Protocols (POPs) implemented that address the subject of RSS: the "Health Services Waste Management" and the "Health Services Waste Management Plan - PGRSS". The first defines the procedures for the segregation and packaging of the RSS generated in the hospital, with the objective of implanting and maintaining the PGRSS in accordance with the current legislation.

The second document, on the other hand, deals with the institution: history, identification, location, organizational structure and operational capacity. In addition, the management of RSS describing the operational concepts, general classification of RSS, identification of waste, characterization of waste generated in the hospital, management of waste from the hospital, control of pests and vectors, operational security and environmental education program. It also highlights the responsibilities of all those involved in the process (hospital, professionals, teachers, preceptors, residents, students, trainees, Environmental Management Service and Environmental Management and Waste Management Commission); cites the professionals who are responsible for the technical management of the RSS and the PGRSS; presents an action plan; and describes the indicators for the implementation and monitoring of the PGRSS.

The above mentioned documents are a guide for the institution, being obligatory its elaboration, as described in section I of article 20 of Law No. 12.305 of 2010 (Brazil, 2010). It is worth noting that according to CONAMA Resolution No. 358 of 2005, the PGRSS should describe the generation, segregation, packaging, collection, storage, transport, recycling, treatment and final disposition of the RSS (Brazil, 2005). This makes it possible to ascertain that the hospital complies with the legislation in force as regards the documentation required in relation to the service generating RSS.

The institution’s PGRSS mentions that the medical clinic is responsible for generating the Group A (risk 1 and 4), B, D and E residues, which were identified during the observation, with the exception of Group B. In this sense, it was found that the containers for disposing of the residues of the medical clinic are in adequate quantity and well distributed in the unit.
was found that Group A waste is packaged in a milky white bag, dumps and bags are identified with their symbol (Figure 3), but sometimes the exaggerated accumulation of the waste was visualized.

![Figure 3](image1.png)

**Figure 3** - Waste Recycle Bins Identified for Disposal of Group A Waste from the Medical Clinic. **Source:** Research data (2023).

Group A waste must be packaged in a milky white plastic bag in accordance with the guidelines of the current legislation. However, the bags should be changed when reaching two thirds of their capacity or every 48 hours, if the residue is easy to putrefaction should be changed every 24 hours (Brazil, 2018). It was shown that Group D waste is packed in black bags and does not require identification, which also have dumps identified with their symbol (Figure 4).

![Figure 4](image2.png)

**Figure 4** - Waste Bins Identified for Disposal of Clinical Medical Group D Waste **Source:** Research data (2023).

The bins were of "smooth, washable, puncture-resistant, rupture leak and tipping material" (Brazil, 2018, p. 9), but in some cases the system of opening without manual contact
was not working. Figures 3 and 4 show the identification of the waste tips, where the waste to be packed there is described, making it easier to dispose of it properly. However, sometimes incorrect waste disposal was detected, as noted in Figure 5, where Group D waste is discarded in the Group A bin.

Figure 5 - Group A Recycle Bin with Misleading Group D Waste Disposal and Excess Waste
Source: Research data (2023).

Still in relation to the medical clinic dumps, it was possible to verify that some had the identification erased or missing (Figure 6). In addition, dumps with bags of color not matching the identification were found, for example, Group A waste dump with black bag.

Figure 6 - Recycle Bin with ID Off and Recycle Bin with ID Missing
Source: Research data (2023).

Waste collection is carried out by the cleaning team every hour or in case of need (the expected capacity is reached). The material is transported from the generating unit to temporary storage (purged) with the help of a sanitizing car (internal collection car of 100 liters)
7), where they are placed in dumps identified for each type of waste as provided for in the current legislation. The absence of the recommended identification of temporary waste shelter was noted in the purge (Brazil, 2018).

For Group E waste, no non-compliance was detected. These are packaged in identified, rigid containers with lids, resistant to puncture, rupture and leakage, and are replaced when they reach three quarters of their capacity (Brazil, 2018). When the intended capacity is reached, the containers are sealed by the nursing team and transported to the purge. The container for the packaging of the cutting waste must be in the supports fixed to the wall with height that allows the visualization of the opening for disposal (Brazil, 2019). However, during the observations, a container placed on the floor was verified (Figure 8).
According to the Brazilian Association of Sanitary and Environmental Engineering - ABES (2020), waste generated in wards for COVID-19 patients should have waste tips predominantly from Group A. Like Chauhan, Jakhar, & Chauhan (2021) and Das et al. (2021) highlight, especially after the COVID-19 pandemic, the need for proper disposal of waste has become even more urgent considering its infectivity. However, during the non-participant observation, unidentified dumps and plastic bags were noticed, as well as inadequate disposal, where the sheets were despised in the dumpster instead of the container for clothes.

Purging collection for external storage is done with transport cars (500 liter internal collection car). The hygienization official starts collecting the waste from the third floor, passing through the second floor (where the medical clinic is located) and the ground floor, until arriving at the external storage. The internal collection cars (100 and 500 liters) are of rigid, washable and impermeable material, have rounded corners and lids; used exclusively for the collection of waste; however, they do not have an identification symbol as provided for in the Brazilian Standard 12810 (1993).

To carry out the collection of the waste it is necessary that the professionals involved use the PPE contemplating uniform, gloves, boots, cap, mask, glasses and apron (Abnt, 1993), as well as know how to carry out the correct handling of the waste (Khan et al., 2019). It is also worth noting that the COVID-19 pandemic has reinforced the importance of the proper use of PPE in view of the protection of health agents (Chauhan, Jakhar, & Chauhan, 2021). In the comments it was found that some professionals do not use all the PPE mentioned, but that it is available for use. The correct use of PPE is necessary to ensure the health, well-being, integrity and protection of workers, thereby preventing negative damage in the event of an accident. The institution has the obligation to provide, train and monitor the correct use of PPE (Fonseca et al., 2019).

To get to the external storage the hygienization professional when reaching the ground floor must enter the Morgue and go to the external shelter (Figure 9). This place will be where the collection and external transport service will have access to the waste, in addition, it is the environment where the funeral service and the supply of medical gases access the hospital. There is a non-conformity in relation to the external shelter as described in DRC 222, where this location must be restricted access to people involved in the management of SSR, as well as have identification of the group of waste being stored and an adequate physical structure (Brazil, 2018).

Figure 9 - External storage of Group A, D and E waste
Source: Research data (2023).
The collection and external transport is carried out by companies contracted according to the group of waste, in which the destination and final disposition of the waste is the responsibility of these companies. Thus, such steps were not considered in the study observation. In the light of the above, when analyzing the management of the Medical Clinic's SSR, it was possible to detect bottlenecks in the process that need adaptations when compared with the current legislation. This situation has been commonly evidenced in scientific evidence, as observed in studies developed by De Carvalho et al. (2020), De Oliveira Melo, Araújo and Mothé (2016), Rizzon, Nodari and Dos Reis (2015) and Uehara, Veiga and Takayanagui (2019).

However, it should be noted that health services have difficulty in adapting and coordinating all stages of the management of SSR, respecting legislation and implementing actions aimed at environmental education (Rizzon, Nodari, & Dos Reis, 2015; Da Silva Figueiredo, Deus, & Figueiredo, 2020). A reorganization of all phases of SSR management is fundamental, and special attention is needed to adequate segregation, training those who generate the waste, as well as obtaining a human and collective consciousness (De Oliveira Melo, Araújo, & Mothé, 2016; De Carvalho et al., 2020; Das et al., 2021).

5 CONCLUSION

This study had the objective of mapping the process of managing the SSR of the medical clinic of a university hospital in the south of the country. Thus, with the mapping of the processes of the management of the RSS of the medical clinic, it was possible to understand the trajectory of the generated residues, from their segregation to their external storage. It was found that although the hospital has implemented the recommended documentation and has qualified professionals and adequate materials (dumps, bags, transport cars, PPEs, etc.) for the management of its waste, the implemented process has inconsistencies that impact the effectiveness of the management of the RSS. To minimize the inconsistencies detected it is necessary to promote educational actions both for medical practitioners and for patients and carers about the proper disposal of generated waste, as evidenced by Khan et al. (2019).

In addition, it is important that the hygienization team is made aware of the importance of the proper use of PPE for worker safety and about the handling of SSR (Fonseca et al., 2019; Khan et al., 2019), mainly related to the bags of each group and the capacity of the bags for replacement. Another improvement in the management of the RSS is the replacement of damaged dumps and the correct identification of the same, as well as the identification of the transport cars and shelters. In addition, the adequacy of the environment of the temporary and external shelter as per the legislation, and restrict the external shelter access only to those involved in the management of the SSR.

Thus, the study contributed to outline solutions for inconsistencies in the management of RSS, scoring incompatibilities and pointing out improvements for the hospital to follow legal recommendations. Among the limitations of the research, it should be noted that the environmentally correct destination and final disposition was not verified, since the research was only authorized to be developed in the hospital environment and these stages were carried out externally, besides being the responsibility of contracted services. In addition, the sources of evidence are scored, since the conduct of an interview with those involved in the process could have contributed to detail the inconsistencies identified, confirming the non-participating observation. It is therefore believed that future studies are necessary to resolve the inconsistencies identified in the management of the hospital's RSS. In addition, research aimed at environmentally correct destination and final disposition is suggested, detecting possible social and environmental impacts.
REFERENCES


Alegre: Penso.


