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Article

Drawing up a Health Services Waste Management Plan: Strategies and Impacts

Fabiana Silva Gomes[1], Élida Maria da Silva[2], Stone de Sá[3], Dirceu Raposo de Mello[4], José Luis Rodrigues Martins[5]

[1] Master's student at the Evangelical University of Goiás - UniEVANGÉLICA. ORCID: 0009-0005-9012-7797. E-mail: fabianasilvagomes1708@gmail.com

[2] Specialist (Serra da Mesa Fasem College). Master's student at the Evangelical University of Goiás - UniEVANGÉLICA. ORCID: 0009-0005-5060-0041. E-mail: elidamaria.89@gmail.com

[3] PhD in Pharmaceutical Innovation from the Federal University of Goiás (UFG). Lecturer at the Evangelical University of Goiás - UniEvangélica. ORCID: 0000-0002-1532-365X. E-mail: pedradesa@gmail.com

[4] PhD in Pharmaceutical Sciences from the State University Paulista Júlio de Mesquita Filho, UNESP. Lecturer at the Paulista University. ORCID: 0000-0001-6969-7799. E-mail: draposo@uol.com.br

[5] PhD in Biological Sciences from the Federal University of Goiás (UFG). Lecturer at the Evangelical University of Goiás - UniEvangélica. ORCID: 0000-0003-3516-5350. E-mail: jose.martins@unievangelica.edu.br

ABSTRACT

The management of Health Services Waste (HSW) is fundamental for the protection of public health and the environment. The objective of this study was to prepare a Health Services Waste Management Plan (HCWMP) for the Evangelical University of Goiás, Ceres Campus, located in the city of Ceres, Goiás, focusing on waste management strategies and reduction of environmental impact. The methodology adopted was exploratory, using the Web of Science database, which included articles from 2020 to 2024, and descriptive, analysing the waste generated at the university between August and November 2024. The results showed significant improvements after the implementation of the HCWMP, namely the creation of an exclusive room for the storage of waste, the reduction of contamination risks and compliance with legal regulations, such as CONAMA Resolution 358/05, as well as a reduction in the amount of waste distributed of up to 52% for Group A (infectious waste), 39% for Group B (chemical waste) and 9% for Group E (sharps materials). These data underline the importance of implementing the HCWMP for more efficient waste management, reducing the total volume collected and improving the separation of different types of materials. We conclude that the implementation of the HCWMP represents a significant milestone in optimising laboratory waste management, with benefits for public health and environmental protection. In this way, the HCWMP implemented at the Ceres campus has established itself as an effective model for sustainable waste management in the healthcare sector, providing an example that can be replicated in other institutions and reinforcing the importance of environmental education and training to ensure that its benefits are sustainable in the long term.
Keywords: healthcare waste; environment; waste management plan.

RESUMO

A gestão de resíduos de serviços de saúde (RSS) é fundamental para proteger a saúde pública e o ambiente. O presente estudo teve como objetivo a elaboração de um Plano de Gereniamento de Resíduos de Serviços de Saúde (PGRSS) para a Universidade Evangélica de Goiás, campus Ceres, localizada na cidade de Ceres, Goiás, com foco nas estratégias de gestão de resíduos e na redução do impacto ambiental. A metodologia adotada foi exploratória, com recurso à base de dados Web of Science, que incluiu artigos de 2020 a 2024,

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e descritiva, que analisou os resíduos gerados na universidade entre agosto e novembro de 2024. Os resultados indicaram melhorias significativas após a implementação do PGRSS, nomeadamente a criação de uma sala exclusiva para o armazenamento de resíduos, a redução de riscos de contaminação e o cumprimento das normas legais, como a Resolução CONAMA n.º 358/05, bem como uma diminuição da quantidade de resíduos distribuídos em até 52% para o grupo A (resíduos infectantes), 39% para o grupo B (resíduos químicos) e 9% para o grupo E (materiais perfuro cortantes). Estes dados reforçam a importância da implementação do PGRSS na gestão mais eficiente dos resíduos, reduzindo o volume total coletado e melhorando a separação dos diferentes tipos de materiais. Concluímos que a implementação do PGRSS representou um marco significativo na otimização da gestão de resíduos laboratoriais, trazendo benefícios para a saúde pública e para a preservação ambiental. Desta forma, o PGRSS implementado no Campus Ceres consolidou-se como um modelo eficaz de gestão sustentável de resíduos de serviços de saúde, sendo um exemplo replicável noutras instituições, além de reforçar a importância da educação ambiental e da formação contínua, garantindo que os seus benefícios sejam sustentáveis a longo prazo.
Palavras-chave: resíduos de serviços de saúde; meio ambiente; plano de gerenciamento de resíduos.

Introduction

As posited by Udayanga et al. (2023), the management of health service waste (HCW) comprises a series of measures devised to curtail the quantity of waste produced and guarantee its secure disposal. This issue has become increasingly prominent in discussions pertaining to public health and sustainability. In recent years, the production of health service waste (HCW) has increased considerably, driven by the expansion of health services and the advance of new technologies and treatments (Mahjoob et al. 2023). This scenario highlights the urgent need for effective strategies for the proper management of this waste, which encompasses not only collection and final disposal, but also segregation, packaging and transportation (Mekaro et al. 2022).

Brazilian legislation, in particular, establishes rigorous guidelines for the management of HCW. The National Health Surveillance Agency (ANVISA) has established a significant precedent with Collegiate Board Resolution (RDC) No. 222/2018, which requires all generators of healthcare-related waste (HSW) to develop and implement a comprehensive Health Services Waste Management Plan (HCWMP). The plan must be a comprehensive document that describes all stages of waste management, as well as including actions aimed at protecting public health and the environment (Al-Barakati and Rani, 2023).

Recent studies have underscored the significance of implementing PGRSS in an optimal manner, emphasizing the necessity to educate the professionals involved and enhance awareness about the appropriate segregation of waste (Addas et al., 2024). A paucity of training and non- compliance with legal guidelines can result in suboptimal practices that compromise public health and exacerbate environmental issues, such as soil and water contamination (Amos et al., 2020).

In this context, the preparation of a health service waste management plan (HCWMP) represents a crucial instrument for guaranteeing the appropriate administration of this waste (Anjum et al., 2024). The plan comprises a series of defined procedures for the segregation, packaging, transportation, treatment and ultimate disposal of the generated waste. The plan's significance lies in its capacity to organise practices within healthcare facilities, with a view to ensuring the safety of workers, patients and the environment (Ben-Romdhane et al. 2023). It is crucial for companies and workers to adopt an approach that encompasses continuous training and the dissemination of knowledge regarding the hazards associated with waste. This approach ensures that all stakeholders are aware of the significance of implementing these practices and preventing accidents and contamination (Da Silva and Reis, 2023).

It is of the utmost importance to adopt a systemic approach to the management of healthcare workers (HCWs). This implies that consideration must be given not only to the management practices themselves, but also to the interactions between the different agents involved, such as managers, health professionals and the community (Cecere et al., 2024). The objective of the study is to develop a Health Service Waste Management

Plan that will optimise waste management strategies and reduce the environmental and public health impacts associated with such waste.

Methodology

This study adopts an exploratory sequential mixed-methods approach, with a focus on descriptive research. The exploratory strategy enables a comprehensive understanding of the situation being analyzed. This approach is fundamental for the researcher, as it allows for a more in-depth understanding of the topic and can help identify and resolve possible problems related to the management of Health Service Waste (HCW) in the laboratories of the Evangelical University of Goiás (UniEVANGÉLICA) - Ceres Campus, located in the city of Ceres, Goiás.

The research took place in the laboratories of the Health area, which include courses such as Biomedicine, Pharmacy, Physiotherapy, Nursing, Aesthetics and Cosmetics (CST), Radiology (CST) and Physical Education. The aim was to investigate the management of health service waste (HCW) generated in these laboratories, with the aim of analyzing handling practices, identifying the types of waste and examining the problems related to the management of these materials, comparing the data obtained with current legislation and standards.

Waste on campus is generated in various laboratories, including Anatomy, Chemistry I and II, Multipurpose I and II, Clinical Analysis, Pharmacology, Microscopy I and II, Sterilization, Parasitology, Pharmacotechnics, Cosmetology, Electrothermophototherapy, Kinesiotherapy, Human Movement, Salon School, Manual Therapies and Health Skills.

In order to obtain information on the physical, spatial, hierarchical and functional organization of the institution, as well as on the management of HCW, on-site observations were made with teachers, students, laboratory technicians and internship supervisors. These observations made it possible to identify physical, human and operational aspects related to the management of HCW generated in laboratories.

Data on management practices was collected using the technique of non- participant observation, using a pre-established script. This approach allowed the researcher to focus on the most pertinent information for the study.

Non-participant observation is a data collection technique in which the investigator observes the object of study without interfering or interacting with the environment or the participants. In this way, it is possible to obtain data objectively and impartially, recording information without influencing the behavior or dynamics of the group (De arruda et al., 2023).

The search for articles to support the study was conducted in the Web of Science database, using the keywords "Waste in Healthcare", "Environment" and "Health". The database searches will be conducted using the title, abstract and keyword fields, with adjustments for each database to ensure the inclusion of relevant studies for the analysis.

The search was restricted to articles published between 2020 and 2024, ensuring the use of recent data. Initially, one hundred and two (102) articles were found, of which thirty-five (35) articles and five (05) were selected according to the established inclusion criteria, serving as the basis for the preparation of the HCWMP. In addition, current legislation was taken into account, ensuring an exhaustive analysis of the subject.

The following criteria were used to determine which participants were eligible for inclusion in the study:

- The articles in question must have been published within the last five years, specifically between 2020 and 2024.

- The articles must pertain directly to the management of healthcare waste, waste management in general, the environment and health.
- Peer-reviewed articles that are indexed in the Web of Science database.
- The articles are published in either English or Portuguese.

The following criteria will result in exclusion from the study:

- The exclusion of articles pertaining to non-health-related waste, including domestic and construction waste.
- Studies that have not undergone peer review or that do not meet the established methodological quality criteria.
- Documents that require payment to access the full text in PDF format.

A descriptive research study was conducted with the objective of providing a detailed account of the characteristics of the waste generated and the population involved in the management of this waste. This study was conducted based on the data provided by the Evangelical University of Goiás (UniEVANGÉLICA) - Ceres Campus, situated in the city of Ceres, Goiás, between August and November 2024. The research comprised the following elements.

- An analysis of the quantity of waste generated, with consideration given to the various categories and classifications.
- The objective is to identify the waste management practices adopted by the institution, with a focus on their environmental impact and public health implications.

The mixed methodology was selected with the aim of providing a comprehensive view of health service waste (HCW) management. Group A, B and E waste is collected monthly by the company HM Solução Ambiental, and a Waste Transport Manifest (MTR) is generated to record the quantity and final destination of the waste, which is weighed by group.

The data obtained from the MTRs was organised in a table for comparison, analysing the period from August to November 2024 and comparing it with the same period in 2023. The aim of this analysis was to identify changes following the implementation of the HCWMP. For this purpose, Excel software (version 2016) was used and the variables of interest were grouped by year and type of waste generated.

The process was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. All stages, from the removal of duplicates to the full reading of the articles, followed a strict flow to ensure the credibility of the results (de Raadt et al., 2021). The flowchart detailing the article selection process is shown in Figure 1.

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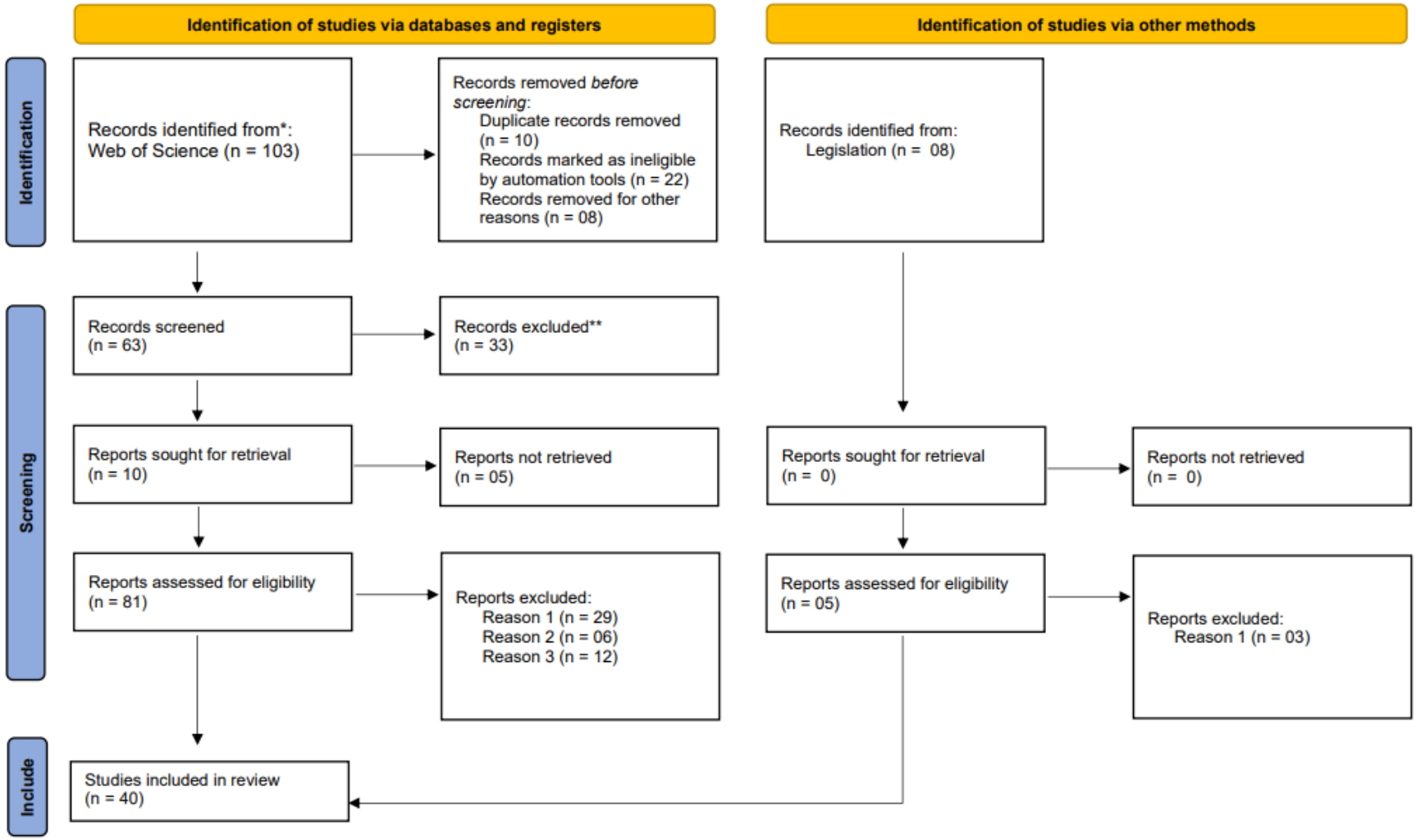

Figure 1. PRISMA 2020 flowchart for identifying, screening and including studies in the research. Source: Author 2

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Development and Implementation of the Health Services Waste Management Plan (HCWMP)

The methodology for drawing up the Health Care Waste Management Plan (HCWMP) adopts an objective approach, enabling a clear understanding of its stages and facilitating its effective implementation (Nwosu et al., 2024). The process begins by establishing the plan's objectives, which should direct the team's efforts towards efficient management of waste and associated risks. The HCWMP should reflect the institution's commitment to public health and the environment, with a view to reducing risks and complying with legal regulations (Campos et al., 2022).

To ensure the effectiveness of the plan, the formation of the team responsible is essential. The roles and responsibilities of each member must be clearly defined, and an organisational chart drawn up to visualise the hierarchy and attributions, from management to supervision (Chelly et al., 2024). Once this has been defined, the stage of diagnosing the current situation is carried out, which involves a detailed survey of the waste generated, its quantities and the associated risks. This analysis should also consider the institution's infrastructure, internal processes and environmental impacts. Collecting data on performance indicators and assessing the physical structure are fundamental to understanding the scenario and identifying critical points in waste management (Matos et al., 2020; Gardner and Childs, 2022).

Based on the information obtained, the HCWMP is drawn up, recording the procedures for the proper handling of each type of waste. The plan covers all the necessary stages, from segregation and packaging to storage, collection and final disposal of the waste (Slutzman et al., 2023). As illustrated in Figure 2, the management process follows a structured flow, encompassing collection, transport, treatment and final disposal, with the aim of reducing environmental impacts and promoting sustainable practices (Kanno et al., 2021).

Figure 2: Waste flow: from point of generation to final disposal. Source: Author (2024).

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Implementing the HCWMP requires the plan to be widely publicised to all those involved, as well as ongoing training for the team. In addition, acquiring the right equipment is fundamental to guaranteeing the correct execution of management practices. Implementation planning must include the identification of material and human resources, ensuring that all processes are carried out according to the established guidelines (Phrophayak et al., 2024).

After implementation, continuous monitoring of performance indicators becomes essential to evaluate the plan's effectiveness. Carrying out periodic evaluations allows areas in need of improvement to be identified, ensuring that waste management takes place in an efficient and sustainable manner (Ghali et al., 2023). In this way, the integration of all these stages results in a safe and well- structured system, promoting sustainability and ensuring compliance with current regulations, with positive impacts for both the institution and the community.

Results and Discussion

As established by CONAMA Resolution 358/05, the aim of the Health Services Waste Management Plan (HCWMP) is to minimize the generation of waste and manage it properly, while respecting environmental and public health standards. In line with this guideline, the implementation of the HCWMP in August 2024 enabled a comparative analysis of the 2023 and 2024 data, showing an overall reduction in the amount of waste collected. This decrease reflects the new practices adopted to optimize waste management and minimize environmental impacts, demonstrating the plan's effectiveness in promoting more sustainable and safer disposal.

Table 1 shows the amount of waste collected (in kilograms) from August to November 2024, after the implementation of the plan, classified into groups A, B and E, as well as the monthly and accumulated totals, accompanied by the PA (accumulated total amount) and RF (accumulated percentage relative to total collection) values. The data shows a significant reduction in total waste in 2024 (182.0 kg) compared to 2023 (271.5 kg), which represents a drop of approximately 33%, indicating greater efficiency in segregation, waste reduction, increased recycling and proper waste disposal, as well as being directly associated with the implementation of the HCWMP.

Group A showed significant variations over the months analyzed, with peaks in October and November 2023 (45.0 kg and 52.0 kg, respectively). This increase can be attributed to improper and disorganized disposal, in which waste from other classes, such as paper towels, syringe packaging, reagent kits and empty vials, were improperly disposed of in this group. In 2024, with the adoption of more effective segregation practices, there was a reduction in the volumes collected, with the highest value recorded being 31.3 kg in November.

Group B showed an irregular distribution over the months, with zero values in September 2023, which was explained by the absence of practical classes during this period. When the HCWMP was implemented, it was observed that in August and November 2024, there was also no waste from this group. This is justified by the use of assertive techniques with the correct neutralization of some acids, which allowed them to be disposed of in the sink without causing environmental damage, eliminating the need for storage in specific containers (Kesham et al., 2020).

On the other hand, October 2024 saw the highest volume of Group B waste over the year, which can be explained by the change in the glycerin preservative solution used on cadavers and organic parts. This solution, made up of phenic acid, boric acid, 96% ethyl alcohol, 37% formaldehyde and biodistilled glycerin, generated a significant amount of chemical waste. Group E, on the other hand, which had the lowest collection values among the groups, recorded a slight increase in October 2023 (18.2 kg) and maintained small variations in 2024.

In 2024, the percentage distribution of waste indicated that Group A accounted for 52% of the total collected, followed by Group B with 39% and Group E with 9%. This data reinforces that the implementation of the HCWMP has contributed to more efficient waste management, reducing the total volume collected and improving the segregation of the different types of materials.

Table 1. Impact of Implementing the HCWMP in 2024 on Waste Generation by Group at the Ceres Campus.

YEAR	2023				2024				TOTAL	
Group of Waste	August	September	October	November	August	September	October	November	Absolute Frequency (KGs)	Relative Frequency (%)
A	13,4	32,4	45,0	52,0	15,1	20,2	27,0	31,3	236,4	52,0
B	26,1	0,0	58,0	19,0	0,0	30,0	42,6	0,0	175,7	39,0
E	0,0	2,0	18,2	5,4	1,2	6,6	1,8	6,2	41,4	9,0
Total Month (Kg)	39,5	34,4	121,2	76,4	16,3	56,8	71,4	37,5	-	-
Total (Kg)	**271,5**				**182,0**				**453,5**	**100**

Group A (infectious waste)

Group B (chemical waste)

Group E (sharp materials)

Source: Author (2024).

Before the HCWMP was put in place, healthcare waste was stored improperly in a laboratory used for practical classes. The waste, both liquid and solid, was disposed of in a disorganized manner, without suitable containers or specific identification, which created significant risks for workers' health and the environment. With the creation of a separate room for the temporary storage of this waste, safety conditions have been substantially improved. The environment now has a properly structured and signposted area, which allows for more efficient control of the segregation and proper storage of waste.

The implementation of the HCWMP resulted in a reduction in the risk of contamination. Before the plan was implemented, the inadequate storage of waste, the lack of identified containers and the absence of professionals trained in proper handling increased the chances of contamination for both workers and the environment. With the creation of an appropriate room and the continuous

training of those involved, waste is segregated correctly and the risks of contamination are minimized. Correct segregation also prevents mixed disposal, which could result in more serious risks to public health.

Another important advance was compliance with the standards and legislation governing hospital waste management. When the HCWMP was implemented, it enabled strict compliance with the guidelines for waste segregation, packaging, internal transportation, treatment and final disposal. The university now complies with environmental standards, resulting in safer management and compliance with health and safety legislation, such

as CONAMA Resolution 358/05, which stipulates guidelines for the treatment of waste generated in the health sector.

The reduction in environmental impact was also noted by De Arruda Junior et al (2023). It was found that with proper waste management and correct segregation, environmental impacts were considerably reduced, since the HCWMP ensures that waste is treated in an environmentally correct way, avoiding contamination of water resources, soil and air. The final disposal of waste is carried out in a safe and sustainable manner, with proper treatment of group A, B, D and E waste, which contributes to the preservation of the environment.

Drawing up and implementing the HCWMP not only contributed to improving waste management conditions, but also had a significant impact on the training of the professionals involved in this process. Through continuous guidance and training, employees have gained a better understanding of the risks associated with the waste generated and the importance of following the rules established to ensure safety. This has resulted in a safer environment, both for employees and for students, teachers and the community, reducing the risks of contamination and other damage to public health.

Waste from Groups A, B and E and Subgroup A1, generated during practical activities, is stored safely in the freezer with the registration number 061613, located in the "Sterilization Laboratory C110". In addition, the use of blue 200-liter and 50-liter drums, specifically for the disposal of biological and chemical waste, and storage in a separate and properly identified room (C105) reflect the awareness and training of the professionals involved.

At the same time, Group D waste is temporarily stored outside the institution on the first floor, where there is a separate garbage can, while the other floors have strategically distributed garbage cans. Group A, B and E waste remains where it was generated or is sent for temporary storage (freezers and drums) until the monthly collection by the company responsible, ensuring proper and safe disposal.

In the study by Housni et al. (2022), it was observed that these procedures, aligned with the guidelines of the HCWMP, guarantee the proper and safe handling of waste, minimizing the risks of contamination. Monthly collection, carried out by the specialized company "HM Solução Ambiental LTDA", and forwarding for final disposal, follow the rules and contribute to compliance with environmental and health practices. Training professionals was therefore crucial to ensuring that the stages of the HCWMP were carried out correctly, resulting in significant improvements in safety and waste management.

The proper management of healthcare waste at the Evangelical University of Goiás - Ceres Campus is a priority, aimed at protecting the health of the institution's students, teachers and employees, as well as preserving the environment. As discussed by Lattanzio et al. (2022), segregation at source, safe packaging, temporary storage and final disposal of waste are practices that contribute to the efficient and sustainable management of HSW, in accordance with current regulations. By following these guidelines, the university ensures not only compliance with legislation, but also a commitment to environmental responsibility and health safety. Finally, the packaging and identification of waste at the Evangelical University of Goiás - Ceres Campus is carried out as shown in Figure 3.

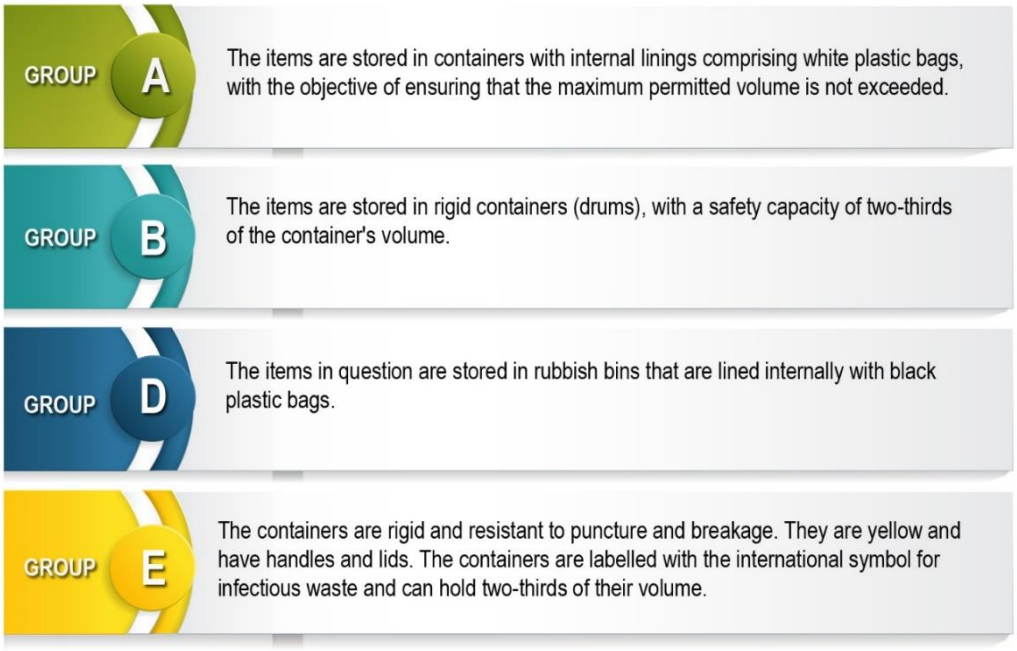

Figure 3: Packaging of waste, with emphasis on segregation and safety. Source: Author (2024).

In the Chemistry Laboratories, the Pharmacotechnics and Cosmetology Laboratory, the Sterilization Laboratory, the Anatomy Laboratory and the Warehouse, exposure to chemical risks is a constant problem due to the use of potentially dangerous substances and materials. To minimize these risks, various measures have been adopted, such as the mandatory use of Personal Protective Equipment (PPE), which is essential for protecting workers against chemical and biological agents, as seen in the study by Tiruneh et al. (2024). Keshan et al. (2020) states that proper segregation of waste generated in laboratories and educational campaigns on biosafety contribute to a safer working environment, reducing the risk of accidents and the possibility of contamination.

According to Robat et al. (2022), promoting vaccination in accordance with public health recommendations reinforces prevention against infectious diseases, especially those that can be transmitted by biological agents present in the hospital and laboratory environment. Jangre et al. (2024) states that constant awareness and guidance on the proper disposal of materials helps to maintain a more controlled and safe environment.

With regard to biological risks, especially those associated with sharp materials such as needles, scalpels and broken glass, precautionary measures include the use of rigid and suitable containers for disposing of these items. Ravindra et al. (2024) mention in their study that awareness campaigns on the correct disposal of these materials aim to sensitize everyone involved, ensuring that waste is disposed of safely, avoiding exposure to potentially contaminated materials.

Mol et al. (2022) observed that specific measures for handling waste and equipment, educational campaigns focused on biosafety play a fundamental role in the continuous training of those involved, reinforcing the importance of safety during laboratory activities. The use of PPE, the safe handling of materials and the correct disposal of waste are crucial points in these campaigns.

According to Pereira et al. (2023) the HCWMP can promote sustainability by encouraging the reuse and recycling of waste, such as recyclable materials, and by seeking more sustainable alternatives, such as the use of biodegradable materials, reducing the environmental impact of waste management. Reducing the amount of waste going to landfill is also an important objective of the plan, helping to minimize environmental impacts.

According to Janik-Karpinska (2023), a recycling program is a set of organized and systematic actions aimed at collecting, treating and properly disposing of recyclable waste, with the aim of reducing environmental impact and promoting sustainability. These programs, implemented by institutions, companies, public bodies or communities, involve separating recyclable materials and transporting them to specific collection points and, eventually, processing these materials to turn them into new products or reuse them in some way. In this context, the University's recycling program aims to correctly dispose of the recyclable waste generated, such as paper, cardboard and plastic, collaborating not only with sustainability, but also with reducing the local environmental impact.

The recyclable waste (cardboard boxes) generated by the University is stored in a specific container, located next to the Sociedade São Vicente de Paulo (S S V P) Unidade Vicentina old people's home, at Avenida Bernardo Sayão, 2959, in the Vila Nova neighborhood, in the city of Ceres - Goiás. This storage point was strategically chosen to facilitate access and collection logistics, ensuring that recyclable materials are disposed of in a structured and protected manner. Waste is collected twice a week, in both the morning and afternoon, with the team responsible for collection ensuring that the entire disposal process is carried out correctly.

The company COTRESP, which collects waste, collects recyclable materials from Monday to Saturday and sends them for recycling, thus contributing to the preservation of natural resources and reducing the need for new materials. Oduro-Kwarteng (2021) in his study demonstrates the importance of the recycling cycle as an example of the circular economy, a fundamental concept for sustainability, as it promotes the reuse of materials and minimizes the exploitation of natural resources. To ensure safety when handling waste, the collection team uses rubber gloves and PVC boots, which are essential to protect workers from the risk of contamination.

The frequency of collection was defined based on the amount of waste generated and the need to keep the environment clean and organized. Efficient collection, carried out twice a week, helps prevent the accumulation of waste, avoiding the emergence of disease vectors and keeping the university's internal and external areas free of garbage. The implementation of the recycling program reflects the university's commitment to sustainability and environmental awareness.

As well as helping to reduce environmental impact, the program promotes education and the involvement of the local community in ecological practices. The partnership with COTRESP, which collects and disposes of waste responsibly, strengthens the institution's role in preserving the environment. In this way, the institution not only complies with its legal obligations, but also positions itself as an example of good environmental practices, demonstrating how systematic and organized actions can inspire other organizations to adopt similar measures for efficient waste management, promoting a more sustainable future.

As postulated by Nolasco et al. (2021), the correct identification and segregation of waste (Table 2) is essential to prevent cross-contamination and ensure that each type of waste is treated according to its hazardousness, from storage to final disposal.

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WASTE	IDENTIFICATION
GROUP A and E	
GROUP B	
GROUP D	

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Table 2: Identification and segregation of waste according to its hazardousness. Source: Author (2024). 193

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Conclusion

The implementation of the Health Services Waste Management Plan (HCWMP) at the Evangelical University of Goiás - Ceres Campus represented a significant milestone in the optimization of laboratory waste management, bringing benefits to both public health and environmental preservation. A comparative analysis of the waste generated between August and November 2023 and 2024 showed a significant reduction of approximately 33% in the total volume of waste, demonstrating the plan's effectiveness in minimizing generation and properly segregating materials.

Among the groups analyzed, Group A (infectious waste) was the most representative, corresponding to 52% of the total waste collected, followed by Group B (chemical waste, 39%) and Group E (sharp materials, 9%). The correct segregation of waste, coupled with the implementation of a suitable space for temporary storage and the continuous training of those involved, contributed to reducing biological and chemical risks, ensuring a safer environment for students, teachers and staff.

In addition, educational campaigns, the use of Personal Protective Equipment (PPE), training on correct disposal, compliance with environmental regulations (especially CONAMA Resolution 358/05), and the implementation of safe disposal practices demonstrate the university's commitment to shaping a culture of safety, health and sustainability. With these actions, the university not only complies with legal requirements, but also contributes to environmental preservation and the well-being of all those involved in academic activities.

In this way, the PGRSS implemented at the Ceres Campus has established itself as an effective model for the sustainable management of healthcare waste and is an example that can be replicated by other institutions, as well as reinforcing the importance of environmental education and continuous training, ensuring that its benefits are sustainable in the long term.

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