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Evaluation of Solid Medical Waste Management

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Abstract: Medical solid waste management still faces obstacles several problems such as the lack of use of complete personal protective equipment (PPE) by officers and the absence of special routes for transporting waste. This study aims to evaluate medical solid waste management in hospitals. The method used was qualitative with a purposive sampling technique of 10 informants at the location concerned. Data was collected through in-depth interviews, field observations, and document review, then processed and analyzed using a triangulation table of sources and methods. Even though hospitals have SOPs that are socialized to staff, adequate human resources, funds, facilities and infrastructure, not all of them meet the requirements. The waste reduction process has not been implemented, TPHS B3 has been used as a rest area for officers, the sulo has not been closed because medical waste is buried in non-medical waste, and there is no waste transportation route available. The research results show that the management of medical and non-medical waste is not fully in accordance with applicable regulations. Therefore, it is recommended that hospitals reduce waste, monitor waste officers, and provide special routes for transporting waste in accordance with applicable regulations

Keywords: Hospital; Evaluation; Management; Medical Solid Waste

Introduction

In existence, humans should strive to improve their quality of life. Not only measured in economic terms, improving the quality of life can also be determined by the quality of human health itself (Ahmed et al., 2020). One of the things that is very influential for human health is the quality of the environment with efforts that can be made by humans is to maintain the role of the natural environment so that it continues to provide benefits for human life and other organisms (Carmona, 2019). Because good environmental quality can sustain the order of human life (Rosmaida et al., 2024).

Related to the function of the environment, in the context of human health, one of them is the role and function of the hospital as a place and facility that plays a role for it (Kewengian, Pinkan, 2019). A hospital is an institution that provides health services, including care, treatment and medical testing (Ghimire et al., 2020). Hospitals are health care institutions for the community that have their own characteristics that are influenced by the development of health science, technological advances, and socio-economic conditions of the community. This requires efforts to improve the quality of services that are better and can be reached by all levels of society, with the aim of achieving optimal health status (Leonita & Yulianto, 2014).

As it turns out, besides having a positive impact on patient care, it can also have negative consequences, such as adversely affecting humans, because hospitals are a source of disease spread that can hinder the healing and recovery process of patients (Aiken et al., 2018). The results of hospital services have the potential to cause other negative impacts, namely medical and non-medical waste consisting of liquid, solid and gas forms. Many hospitals have not optimally managed the waste formed. If the hospital fails to manage its waste, then the human goal will not be achieved in improving health status. By having to manage hospital waste disposed of in accordance with applicable regulations. Because if

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not, the opposite will happen, the hospital will become an environment that causes disease for humans (Pieper et al., 2017).

Waste has become a serious problem and also threatens survival, which is further exacerbated by the increase in the global population which increases the consumption of everyday consumer goods which produces more waste (Septianingrum et al., 2023). The increasing number of patients each month will have an impact on the volume of medical waste produced, which can threaten environmental sustainability with potential pollution. Therefore, a waste management policy is needed to control the production of medical waste (Dewi et al., 2022).

The increase in demand for medical services in 2019 resulted in the rapid use of disposable protective products such as masks, gloves, goggles, isolation gowns, and protective clothing. This has led to a drastic increase in the production of medical waste globally. Hospital data services also generate medical waste that is included in the category of Hazardous and Toxic Materials (B3). Medical waste is defined as the remains of the process of diagnosis, treatment, immunization of humans and animals, as well as research activities, biological production, and related testing. The types of medical waste generated by hospitals include radioactive waste, infectious waste, pathological and anatomical waste, cytotoxin waste, and chemical and pharmaceutical waste (Minister of Health Regulation No. 7 of 2019 concerning Hospital Environmental Health). Therefore, collecting this waste as soon as possible in the appropriate waste bin is crucial to minimize its negative impact on the environment and human health (Fiqra et al., 2023).

The impact of hospital activities includes the production of waste, which consists of liquid, gaseous and solid waste derived from medical and nonmedical activities (Arlinda et al., 2022). The waste can be divided into two categories, namely general waste and hazardous waste (Zhou et al., 2022). Hazardous waste from hospitals has the potential to cause illness or injury due to its infectious, genotoxic, toxic, radioactive and sharps properties (Pavitasari et al., 2022). The risk of exposure to hazardous waste is not only experienced by medical personnel such as doctors, midwives, and nurses, but also by hospital employees, patients' families, patients, the surrounding community, and visitors (Indonesian Minister of Health, 2020).

Waste produced by various human activities, whether in the form of liquid, gas, or solid waste, needs to be managed properly to prevent environmental pollution and health risks. The increase in medical waste is in line with population growth and the need for health services. This medical waste comes from various health service facilities such as hospitals, clinics, doctors' practices, dental clinics, blood banks, veterinary clinics, and medical research and laboratory facilities (Debora et al., 2023).

Medical waste generated by institutions such as health centers, polyclinics, and hospitals falls into the biohazard category because it contains bacteria, viruses, and other harmful substances that are highly detrimental to the environment (Thamlikitkul et al., 2019). This waste must be destroyed by burning at temperatures above 800 degrees Celsius. However, the management of medical waste from various health institutions in Indonesia has not yet reached adequate professional standards (Indonesian Minister of Health, 2020).

Many hospitals do not comply with regulations regarding the disposal and treatment of medical waste (Chindam, 2021). Therefore, as infectious waste providers, hospitals are expected to manage their waste responsibly and in accordance with applicable regulations (Deress et al., 2019). Medical waste management procedures are regulated in the Minister of Environment and Forestry Regulation No. P.56/MenlhkSetjen/2015 on Procedures and Technical Requirements for the Management and Sorting of Hazardous Waste from Health Care Facilities. These steps include the reduction and sorting of B3 waste, storage, transportation, processing, burial, and landfilling of B3 waste generated from health care facilities.

According to data from the Indonesian Health Profile in 2019, nationally, the percentage of hospitals treating waste according to standards in that year reached 42.64%, an increase from 33.63% in the previous year, and has reached the 2019 Strategic Plan target of 36% (Himayati et al., 2018). In accordance with the 2019 Strategic Plan, the handling of medical waste in hospitals and health centers is set to reach 36%, with the percentage of hospitals that treat medical waste according to standards reaching 42.64%. West Sumatra has exceeded the 2019 Strategic Plan target by treating medical waste according to standards to reach 55.56% (Hanifah, 2023).

Hospitals in Indonesia generate large amounts of waste that have the potential to threaten health and negatively impact the environment. Research (Goni et al., 2021) on liquid waste management in hospitals in Indonesia shows that only about 53.4% of hospitals carry out liquid waste treatment processes, and only about 57.5% conduct checks on the quality of their liquid waste. So it can be understood how much potential hospitals have as a source of disease transmission and polluting the environment. As for solid waste, many hospitals have not carried out optimal management,

including not segregating between medical and non-medical, infectious and non-infectious waste and many things are done not based on established regulations.

Medical waste management requires special handling unlike domestic waste (Agamuthu et al., 2021). These wastes must be placed in containers according to their type, be it chemical, radioactive or by volume. The next step after the collection of medical waste is the treatment process and it should not be disposed of directly into a domestic waste disposal site. If the waste is gaseous, additional steps are required with dust and gas emission reduction equipment. Waste minimization efforts are also required by reducing, reusing, and recycling the materials. Greening is also recommended to reduce pollution from gaseous waste and to absorb dust (Himayati et al., 2018).

According to research conducted by Astuti et al. (2014), medical waste management in hospitals is still not optimal. Medical waste is often mixed with non-medical waste and sharps. Destruction of solid medical waste using incinerators does not always reach adequate temperatures, so sharps are not fully decomposed. In temporary shelters, there is often a problem with cats entering the containers. Examination of the quality of liquid waste management showed that phosphate, ammonia and suspended residue exceeded the recommended quality standards (Rafida, 2019).

Andalas University Hospital is included in the category of teaching hospitals according to Law Number 44 of 2009 concerning Hospitals. In accordance with Article 22, this hospital organizes comprehensive education and research in the fields of medical professional education, continuing medical education, and education of other health workers (Herman, 2018)

Based on information contained on the official website of Unand Hospital, this hospital is one of the State University Hospitals (RSPTN) managed by Andalas University. Its location is within the Unand Limau Manis campus complex, in Pauh sub-district, Padang city, West Sumatra. RSUA operates as a Type B General Hospital with a capacity of 200 beds. In 2024, Unand Hospital recorded a bed occupancy rate (OTT) of 37% with its main focus on malignancy and gastrointestinal diseases. Its facilities are equipped with comprehensive facilities and infrastructure including in-hospital patient care, out-of-hospital care, operating rooms, emergency department, pharmacy, intensive care unit, ambulance services, referral admissions, as well as supporting services such as radiology, laboratory, and nutrition. In addition, there is also a state-of-the-art radiotherapy facility on-site (Asnawi et al., 2019).

Hospital services generate various types of waste, including medical and non-medical waste such as gaseous, solid, and liquid waste containing pathogens as well as hazardous chemicals and toxic medical devices (Samadder et al., 2021). Solid waste is divided into two categories: medical and non-medical (Dn et al., 2023). Healthcare activities in hospitals make them the largest contributor of waste, including Hazardous and Toxic Material (B3) waste, which has great potential to pollute the environment (PermenLHK, 2015).

The source of solid waste comes from several rooms including the inpatient room, emergency room, ICU, outpatient, surgery/OOP room, medical support rooms such as laundry and nutrition, hemodialysis, and the delivery room (Kwikiriza et al., 2019). The results of the study (Hanifah, 2023) said that the increase in the amount of medical waste at Andalas University Hospital was due to service activities carried out, namely in 2020 amounting to 29.316 kg and in 2021 it increased to 45.503 kg due to the pandemic. For the following year, 2022 amounted to 30.483 kg and 2023 amounted to 34.414 kg. The results of the average data recap of this hospital can serve approximately 300 patients/day.

The results of preliminary research conducted in January 2024 at Andalas University Hospital, through direct observation and dialog with the Head of the Environmental Health Installation. It was explained that the staff had carried out the solid medical waste management process in accordance with the standard operating procedures (SOP) set by hospital management. However, the fact that we found that there were still some health workers who did not work according to the SOP steps, namely not separating waste according to the type of waste and still found some waste management officers not using complete PPE such as eye protection, foot / boot protection, helmets and aprons. In addition, there is still no special route for transportation of waste to temporary storage, TPS floors that are not routinely cleaned and there is no incinerator available so that the transportation and final management of medical waste is carried out by a third party.

Given that the Andalas University Hospital is classified as a new hospital and is located on the Andalas University campus environment which if waste management is not carried out in accordance with established regulations, it will endanger the community and the environment around the hospital. Based on the background description above, the authors are interested in conducting research to find out the medical solid waste management system at Andalas University Hospital with the title "Evaluation of Solid Medical Waste Management at Andalas University Hospital".

Method

This type of research is descriptive research that uses a qualitative approach. Descriptive research is a type of research that describes existing phenomena, both phenomena created by humans and natural phenomena, in various forms of activity, change, relationships, similarities and differences between phenomena with one another. Descriptive research aims to provide information about the state of the research object at the time the research was conducted, or in other words, answer questions relating to the status of the research object at that time (Barlian, 2016).

Qualitative descriptive research displays data as it is without manipulation or other treatment. The aim is to provide a comprehensive description of an event or to explain a phenomenon that occurs. This is done by describing several variables related to the problem to be studied. This research also details data related to situations that occur in the field, such as attitudes and views that exist at that location (Rusandi et al., 2021).

Data collection method:

Primary Data Collection

Primary data is data obtained directly from sources when researchers conduct research such as informants/samples/respondents (Barlian, 2016). Primary data in this study comes from:

Interview

Serves to reveal information across time, relating to the past, present and future. The resulting data is open, unlimited and comprehensive (Staller, 2022).

Observation

To complement the interview technique that has been carried out. Observation aims to directly observe the object of research, so that researchers are able to record and collect data needed for research (Von Soest, 2023).

Documents

This stage is the completion of the previous two instruments. Documents in qualitative research can be in the form of images, monumental works as well as writings and images (Waruwu, 2023).

Secondary Data Collection

Secondary data collection is not obtained directly from data sources (Barlian, 2016), but through data collectors or third parties, such as documents, articles, journals, SOPs, hospital profile data, and everything that can support in analyzing solid medical waste management in hospitals.

The research to be carried out is conceptually a scientific activity that starts from an existing problem. The existing problem is where solid and liquid waste in this hospital has not been managed ideally. Therefore, the goal to be achieved is to determine the ideal efforts in terms of solid and liquid waste management terms of solid and liquid waste management.

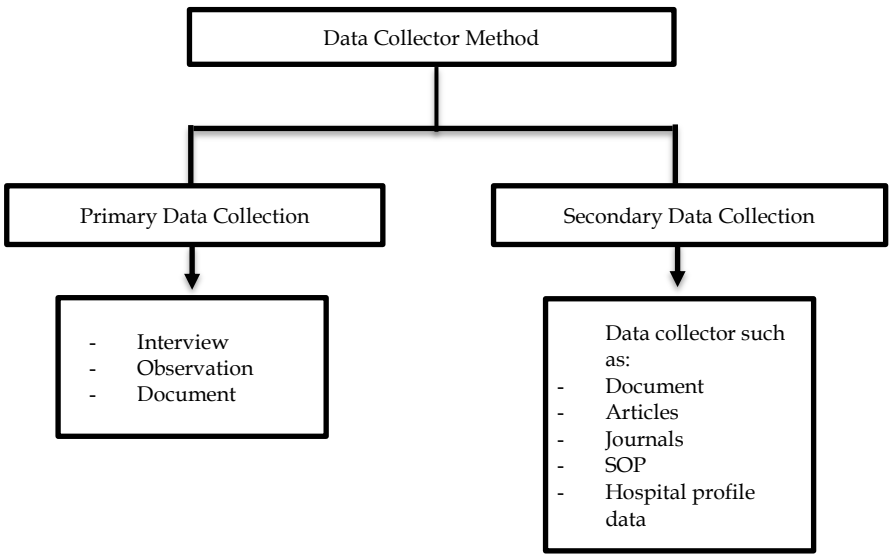

Figure 1. Data Collection Method

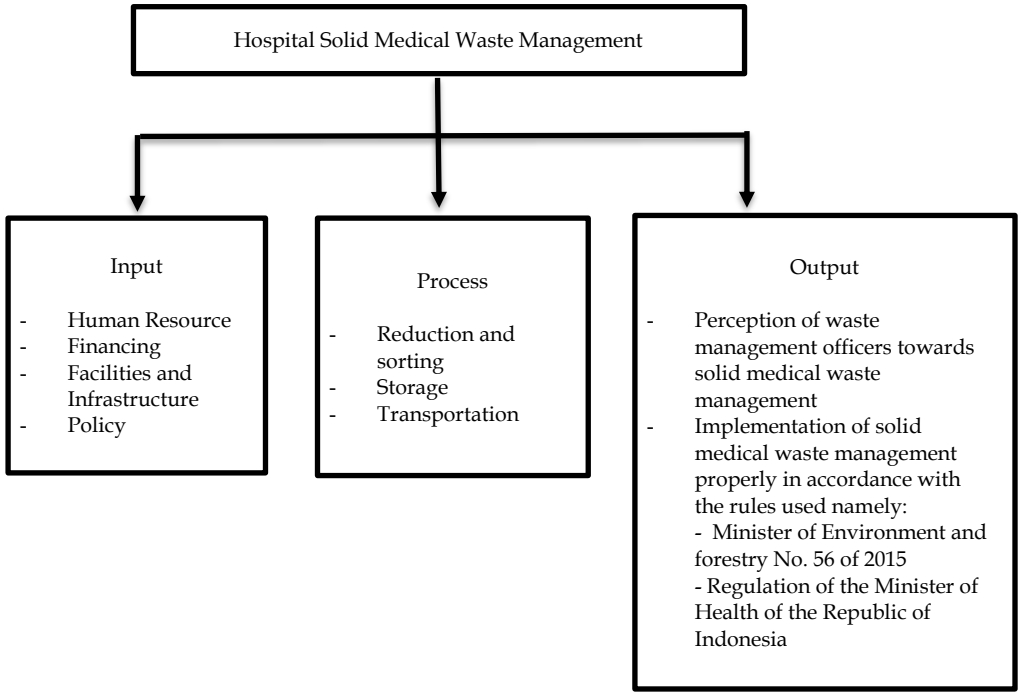

Figure 2. Conceptual Framework

Result and Discussion

Input Component

Human Resources

Human Resources (HR) is the main asset that is vital in an effort to improve and protect the organization (Pramanasari et al., 2023). HR also plays a key role in the success of an organization because HR that has quality and competence can provide optimal service to customers and the community (Marselina et al., 2024). Solid medical waste management at Unand Hospital is carried out by the hospital's environmental health installation (Pramanasari et al., 2023). This installation is led by a head who has a Diploma III in Environmental Health, with the help of one operator who graduated from high school. However, the number of sanitarian personnel at Unand Hospital is considered insufficient considering the many tasks they have to perform, such as the management of solid waste, liquid waste, and other environments.

Waste management in hospitals is carried out by sanitation personnel. According to Minister of Health Regulation No. 7/2019, the person in charge of environmental health in class A and B hospitals must have an education in environmental health, sanitation, environmental engineering, or sanitation engineering, with a minimum of an S1 or Diploma IV degree. The number of environmental health personnel in hospitals is adjusted to the workload and type of hospital. They They are required to attend specialized training in the field of hospital environmental health organized by the government or related parties, in accordance with applicable regulations (Hapsari, 2010).

Medical waste management is carried out by medical staff when sorting it and by cleaning staff when transporting and treating it. All medical personnel are required to segregate the medical waste generated, while cleaning service personnel, who on average have graduated from senior high school, are also responsible for solid waste management in the hospital.

It is recommended that Unand Hospital, as a type B hospital, place a sanitarian with a bachelor's degree (S1) in environmental health/sanitation/environmental engineering/sanitization engineering as the person in charge of environmental health, to ensure compliance with regulations in handling hospital waste. It is also recommended that they appoint an environmental health coordinator who has a bachelor's degree in the field, as graduates have advantages in management, in-depth analysis, and problem-solving strategies and innovation. In addition, it is suggested that hospitals consider further education for sanitarian personnel to obtain an S1 degree, in accordance with the requirements of Permenkes No. 7/2019. It is also important for hospitals to improve the knowledge and skills of personnel directly involved in solid medical waste management through specialized training (Yati et al., 2022).

Financing

Unand Hospital has allocated funds to manage their solid medical waste, which originates from

Andalas University. These funds are used for transportation of solid medical waste to a third party responsible for its final treatment. This budget does not cover the cost of providing facilities and infrastructure, but focuses on payment based on the amount of medical waste (kg) treated by the third parties.

According to research conducted by (Silalahi, 2021), it is important for hospitals to have a dedicated budget allocation to comply with applicable rules and regulations, so that the funds are not misused for purposes other than waste management. With a separate budget for waste management, the allocation of funds will be more transparent and detailed, ensuring that all needs in waste management can be met effectively.

In contrast to the study (Yunita, 2020), additional funding is required to improve facilities and infrastructure for solid medical waste management. PP No. 101/2014 requires every individual who generates hazardous waste to manage it, including hospitals that generate infectious solid waste, so hospitals must be responsible providing special funds for waste management.

A fund of three hundred million rupiah has been set up to finance the transportation of solid medical waste by a third party. Payment is made based on the weight of infectious solid waste transported and treated annually from the hospital, at a rate of seventeen thousand rupiah per kilogram. At Unand Hospital, funds for solid medical waste management are sufficient.

Facilities and Infrastructure

The results showed that Unand Hospital has been equipped with sufficient facilities and infrastructure to manage solid medical waste, such as B3 Waste TPS, coldstorage, trash bins, sulo, safety boxes, and PPE. The evaluation also shows that the amount and condition of the available infrastructure is adequate.

In the management of solid medical waste in hospitals, the available facilities and infrastructure must comply with the requirements listed in the Minister of Health Regulation No. 7/2019. However, in practice, there are still deficiencies in the facilities and infrastructure, such as waste bins that are not equipped with proper symbols and are only labeled or written, the absence of dedicated lanes for waste transportation through ramps, the use of public lanes, and hospital waiting rooms. In addition, personal protective equipment used by infectious waste transporters was incomplete, including the absence of special coveralls, helmets, aprons, and goggles. One important component in the solid medical waste management process is the use of Personal Protective Equipment (PPE).

According to the Minister of Health Regulation No. 7 of 2019, officers who handle solid medical waste are required to use Personal Protective Equipment such as hats or helmets, masks, eye protection, long clothes, special industrial aprons, foot protection or boots, and special gloves. However, the results of field observations show that there are still officers who do not comply with the use of personal protective equipment thoroughly.

Facilities and infrastructure to manage solid medical waste at Unand Hospital are adequately available and in good condition. However, there are still shortcomings such as the absence of special lanes for transporting waste and symbols for trash bins. This finding is in line with (Nopiyanti, 2021) which noted that there is no special lane or elevator for transporting waste, so that when transporting it must pass through the hospital hallway to avoid contact with visitors.

From these problems, it is desirable that hospitals provide a special lane for officers to transport waste, which does not cross public areas or waiting rooms. In addition, it is hoped that the hospital will place B3 waste symbols in accordance with regulation of the minister of environment and forestry Number 56 of 2015 in the trash can in every room that produces waste.

Policy

A regulated policy is essential in hazardous waste management in healthcare. With this policy, hazardous waste management in health services can be carried out effectively. This policy is the main guideline for Unand Hospital in carrying out hazardous waste management in accordance with Health Minister Regulation No. 7 of 2019 and Minister of Environment Regulation No. 56.

Hazardous waste management policies, especially infectious solid waste in hospitals, are outlined in Standard Operating Procedures (SOPs). The documents that guide the hospital are the Minister of Health Regulation and the Minister of Environment and Forestry Regulation, which are only recognized by the Environmental Health Installation. Meanwhile, medical officers in each hospital service room only recognize the policy through Standard Operating Procedures.

Government regulations and standard operating procedures (SOPs) for solid medical waste management are not available in every room where waste is generated as they are only available in the form of archived documents and not displayed.

All staff at Unand Hospital who are directly involved in solid medical waste management have received socialization on the appropriate Standard Operating Procedures. The responsibility to deliver this Standard Operating Procedure is carried out by the Environmental Health Installation in collaboration with

the hospital's Infection Prevention and Control (PPI) committee.

It is expected that hospitals can place regulations and standard operating procedures (SOPs) regarding solid medical waste management in every room that generates waste, so that all officers can know the applicable regulations and understand the policy well (Jumaah et al., 2021).

Process Component

Reduction and sorting

Unand Hospital has not implemented hazardous waste reduction as mandated by the Minister of Environment and Forestry Regulation No. 56 of 2015 on hazardous waste management in hospitals. These measures include avoiding the use of hazardous materials, recycling, and efficiently organizing the environment to reduce the flow of medical waste.

Unand Hospital is expected to implement a solid medical waste reduction policy in accordance with the Minister of Environment and Forestry Regulation No. 56/2015 on the procedures and requirements for hazardous and toxic waste management in hospitals. Measures that can be taken include reducing solid medical waste through elimination or reduction practices at the source, such as replacing mercury thermometers with digital thermometers, substituting hazardous chemicals with non-toxic ones for cleaning, and implementing a FIFO system in the use of chemicals. In addition, hospitals can also reduce solid medical waste by reusing medical equipment, such as scalpels and glass bottles, after appropriate washing and sterilization. This reduction effort can also involve recycling materials such as organic materials, plastics, paper, glass, and metals through additional chemical, physical, or biological processes (Peng et al., 2020).

According to the research results, Unand Hospital has categorized solid waste based on its type, such as medical/infectious waste, non-infectious medical waste, non-medical waste, and sharps waste according with research (TapiTapi et al., 2021). However, there is still mixing between medical and non-medical waste. Medical sharps waste is collected separately in safety boxes, while the bins are lined with black plastic bags for non-infectious solid waste and yellow plastic bags for infectious solid waste. Each bin is also labeled according to the nature of the waste, although there is no symbol (Adu et al., 2020).

Unand Hospital has not yet reduced solid medical waste, but has separated waste although there is still a mixture of medical and non-medical waste. To solve this problem, it is expected that Unand Hospital can plan and implement solid medical waste reduction. Steps that can be taken include reducing medical waste by replacing hazardous materials such as mercury thermometers with digital ones, as well as reusing medical equipment such as scalpels and glass packaging after washing and sterilization. Waste segregation in bins can also be improved by ensuring medical personnel follow established SOPs (Letho et al., 2021).

Storage

At Unand Hospital, solid medical waste management is carried out by separating the waste into three types in each room that produces it. Every morning, afternoon, and evening shift, cleaning service officers collect waste from their respective rooms to the transfer room on each floor. Then, the waste is transported by two cleaning service officers to the Hazardous and Toxic Waste Site (TPS) which is equipped with cold storage. The Unand Hospital B3 Waste TPS has received a permit from the Padang City Environmental Agency and is located next to the hospital, separate from the main building.

The Temporary Shelter for Hazardous and Toxic Waste (B3) at Andalas University Hospital complies with the provisions listed in the Minister of Environment and Forestry Regulation No. 56 of 2015. This facility must have an impermeable floor, layered with concrete or cement, equipped with water access, easily accessible for waste storage, lockable to prevent unwanted access, easily accessible by waste transportation vehicles, and equipped with ventilation, lighting, cleaning equipment, and personal protective equipment. This finding is in line with the study of Nazila et al. (2017) which states that solid medical waste storage must be a closed building that is locked, accessible only by officers. In this B3 shelter, there is also cold storage as a cooling place for untreated infectious B3 waste for two days, in accordance with applicable regulations.

Based on the provisions of the Minister of Environment and Forestry Regulation No. 56 of 2015, hazardous waste storage sites must be located in areas free from flooding and not prone to natural disasters. The storage location must be clearly marked and placed separately from settlements. However, there are still some discrepancies that need to be corrected, such as the absence of alarms, first aid kits, and fire extinguishers for emergencies, as well as deficiencies in daily cleaning activities for walls, floors, and ceilings. In some tool rooms for waste transportation, it was found that they were used as resting places for waste workers.

In order to overcome this problem, it is expected that the hospital can facilitate the hazardous waste site by providing alarms, first aid kits, and fire extinguishers (Eaton, 2021). In addition, it is necessary to conduct strict supervision of the B3 Waste TPS to prevent misuse as a

resting place for waste officers (Danang Aji Kurniawan et al., 2021).

Transportation

The transportation of solid medical waste at Unand Hospital is handed over to cleaning service officers. Waste that has been collected from the waste bins is tied up and transported by 15 cleaning service officers from the room that produces the waste. The waste is collected in the transfer room on each floor, and then transported by 2 waste transport officers to the B3 Waste TPS. Waste transportation uses a yellow wheeled sulo that is closed, strong, leak-proof, and in good condition, making it easy to push. The transportation process is carried out three times a day in the morning, afternoon, and evening, through the ramp and through the public lane and hospital waiting room.

During field observations, the researchers found that staff collected medical and non-medical waste together when transferring them to the transfer room. They also found that there were officers who mixed these two types of waste in one sulo. The sulo was not previously lined with a larger plastic container and could not be sealed because the waste was already very full and piled up. In addition, waste transporters did not use complete personal protective equipment such as aprons, special clothes, disposable masks, and often rolled up their sleeves.

According to the Minister of Environment and Forestry Regulation No. 56 Year 2015, the process of collecting and transporting waste on-site must be done effectively and efficiently by considering several things, such as planning a logical route to avoid crowded areas or goods. Each zone or area must have a responsible personel. Medical waste management personel shouldwear safety equipment such as masks, thick gloves, long-sleeved shirts, long pants, aprons, and boots.

Transportation of medical and non-medical waste should be separated to prevent mixing and contamination of hazardous or toxic materials. When transporting waste to Hazardous and Toxic Waste Management Sites (TPS B3), it is advisable to use dedicated lanes and ensure that the sulo is not overfilled or overloaded, so that it can be closed safely and avoid potential hazards.

Output Component

The results of the study at Unand Hospital showed that the management of B3 waste there has not fully complied with the Regulation of the Minister of Environment and Forestry No. 56 of 2015 and the Regulation of the Minister of Health No. 7 of 2019. There are still several shortcomings that need to be fixed, such as the lack of activities to reduce solid medical waste and the lack of proper waste sorting between medical and non-medical waste. Trash bins are only labeled without appropriate symbols, there is no special lane for transporting medical waste, and the B3 waste TPS is used as a resting place for waste officers. In addition, officers were still found not using complete PPE in the process of managing solid medical waste.

The final management of solid medical waste from hospitals by a third party, which has entered into an MoU with Unand Hospital, is carried out in collaboration with PT. Artama Indonesia and the West Sumatra Provincial Environmental Service. The transportation cost from PT. Artama Indonesia is IDR 17.000 per kilogram, while from the West Sumatra Provincial Environmental Service it is IDR 15.000 per kilogram, and is carried out once a week.

Based on the Regulation of the Minister of Environment and Forestry No. 56 of 2015, the management of B3 waste from health service facilities aims to reduce or even eliminate the hazardous or toxic nature of the waste produced, with the hope that hospitals can plan effective medical waste reduction strategies at Unand Hospital. After conducting socialization regarding the SOP for waste management, it is important for hospitals to start continuous monitoring and evaluation to avoid errors in sorting medical and non-medical waste and to ensure that there is no mixture between the two. In addition, hospitals are advised to provide a special route for waste transport officers who do not cross public areas or waiting rooms, and to install B3 waste symbols in accordance with the Regulation of the Minister of Environment and Forestry Number 56 of 2015. It is also important for hospitals to review B3 waste storage areas so that they are not misused as resting places for officers, as well as to increase supervision of the solid medical waste management process and optimize the use of Personal Protective Equipment (PPE) for all solid medical waste management officers.

Conclusion

Based on the research that has been conducted regarding the Evaluation of Solid Medical Waste Management at Andalas University Hospital, the following conclusions can be drawn: for the management of solid medical waste in the unand hospital has used the rules of the minister of environment and forestry No. 56 of 2015 with the rules of the minister of health No. 7 of 2019 but there are still many who have not complied and are not in accordance with the provisions should be, including the head of the hospital sanitation installation has not met the minimum

requirements of a bachelor's degree, there are still many waste officers who do not use complete personal protective equipment, do not have special lines for waste and there are still many that must be improved again from the hospital and waste management is of particular concern.

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Conceptualization, D. F. K, N. S.; preparation of the first draft D.F.K, N.S.; discussion of results D.F.K, N.S, E.B, N.C.; methodology N.S.; analysis D.F.K.; conclusions D.F.K.; review and editing D.F.K, N.S. All authors have read and approved the published version of the manuscript.

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Conflicts of Interest
The authors declare no conflict of interest.

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