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Liquid Waste Management at the Environmental Health Installation at Dumai Regional Public Hospital

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ABSTRACT

The management of hospital liquid waste should be a concern based on WHO data indicating that 75% - 90% of the waste generated is household waste and 10% - 25% is hazardous waste, thus requiring management in accordance with applicable regulations. The aim of this research is to investigate the management of liquid waste carried out at the Environmental Health Installation of Dumai Regional Public Hospital in 2023. The research method used a qualitative descriptive design. Research informants were obtained using purposive sampling technique involving 6 individuals consisting of liquid waste management implementers, head of departments, and installation heads, as well as parties involved in liquid waste supervision. Data collection was conducted through in-depth interviews, document analysis, and field observations. Findings indicate the need to enhance the competency of Environmental Health Installation personnel in managing liquid waste. The management of liquid waste is expected to comply with the Standard Quality Control of Liquid Waste Management. Periodic monitoring of the physical, chemical, and microbiological quality of liquid waste is necessary. In conclusion, the management of liquid waste at the Environmental Health Installation of Dumai Regional Public Hospital in 2023 has been well conducted. This residency report demonstrates that the procedures for collection, storage, handling, and disposal of liquid waste at the hospital are in accordance with prevailing safety, environmental, and health standards.

Keywords: Hospital Liquid Waste, Medical Waste, WWTP

1. INTRODUCTION

Hospital is a health service facility that produces a lot of waste, both domestic or household waste and medical waste. Attention to medical waste must be made a priority because it has a negative impact on the surrounding environment. According to the data, around 70-90% of waste originating from health facilities is risk-free or general waste and similar to household waste. The remaining around 10-25% is hazardous waste that can cause various types of health impacts (Herman & Wahyuni, 2023).

To anticipate the negative impact of this waste, the Government through the Ministry of Health has made regulations governing the waste management procedures from health care facilities stated in the Minister of Health Regulation No. 2 of 2023 concerning Environmental Health, in one of the articles, namely article 24, which states that every health facility is obliged to carry out a waste treatment process generated and must also manage its waste according to applicable regulations (Minister of Health Regulation No. 2, 2023).

Dumai Regional Public Hospital is one of the government-owned health facilities that has implemented waste management regulations

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for both solid and liquid medical waste. Which is managed directly in the hospital environmental health section. From the results of initial observations in the field and document searches, there has been a good separation between the disposal of solid medical waste and liquid waste, where solid medical waste already has its own place and incineration has been carried out using an incinerator. For liquid waste, there are already holding tanks from all parts of Dumai Regional Public Hospital.

The liquid waste management carried out has its own standards, processing liquid waste from toxic to safe disposal must go through several filtering stages. However, Dumai Regional Public Hospital is a type B hospital with 20 treatment rooms that generate both solid and liquid waste, quite a lot of waste is generated with a total of 316 patient beds and produces quite a lot of waste. For this reason, researchers are interested in looking back at the liquid waste management at the Dumai Regional Public Hospital whether it is in accordance with the standards set out in the Minister of Health Regulation Number 2 of 2023. The purpose of this study is to determine the implementation of liquid waste management carried out at the Environmental Health Installation of the Dumai Regional Public Hospital in 2023.

2. RESEARCH METHOD

The method used is a descriptive qualitative research method with thorough observation. The research was carried out from November 27 to December 14, 2023, located at the Environmental Health Installation of Dumai Regional Public Hospital. Determination of priority problems is done by brainstorming with experts. The sampling technique used to determine informants is purposive sampling technique, namely informants obtained with certain criteria (Sugiono, 2019). Informants are research subjects who can provide information to students about the problem being studied. Informants in this residency study include key informants, namely informants who are directly involved in the matter being researched. The total research informants were 6 (six) people consisting of liquid waste management implementers, room heads and installation heads and supervisors of waste management implementation from the PPIRS Committee and K3RS Committee. Data collection was carried out by in-depth interviews, document review and direct field observations. In-depth interviews were conducted using an interview guide for all informants. At the end of data collection activities, data validation and analysis were carried out. [Data analysis is divided into 6 stages, namely, data transcription, data coding, analysis process, data presentation in matrix form, data analysis at the time of data collection, and content analysis to analyze data.

3. RESULTS AND DISCUSSION

3.1 Overview of the Environmental Health Installation at Dumai Regional Public Hospital

From the results of observation and document tracking, the Environmental Health Installation of Dumai Regional Public Hospital is directly under the Deputy Director of Services with the related field, namely the Support Sector. Currently, the Environmental Health Installation has stood alone, coordinated by a head of installation and a head of room.

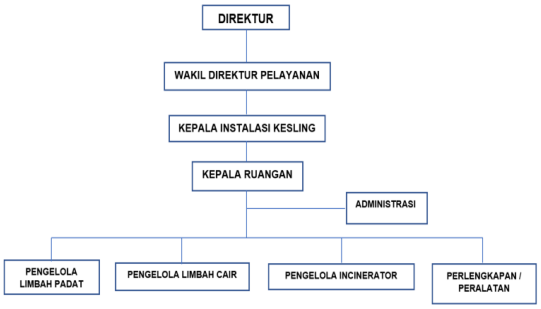

Figure 1. Organizational Structure of Environmental Health at Dumai Regional Public Hospital

In managing waste, the Environmental Health Installation has differentiated between solid medical waste management and liquid medical waste. And there are already people in charge of their respective sections. For solid medical waste management, it has been well structured, there is already an incinerator for destroying infectious waste and sharp objects. Where the combustion residue has been well managed through a third party as stated in the cooperation agreement between the two parties. For liquid waste, there is already liquid waste

management in accordance with applicable regulations. Liquid waste from all rooms in Dumai Regional Public Hospital is channelled through a piping system that uses gravity and a pumping system for certain parts.

The results of Tapi Tapi et al's (2021) research entitled Solid Medical Waste Management at Tobelo Regional Public Hospital showed that the results of the sorting process in all rooms did not sort, the medical waste containment process at Tobelo Regional Public Hospital, out of 11 rooms studied there were 2 (18.18%) rooms that did not meet the requirements because they did not have containers for waste and 9 other rooms met the containment requirements with a percentage (81.82%), the transportation process met the requirements because waste transportation used a trolley of anti-rust material having a cover and the officers also used PPE, the temporary storage process showed that all rooms that produce solid medical waste were temporarily accommodated in a temporary storage area with an area of 11 x 8 meters, easy to clean, closed containers, and waterproof so it is said to meet the requirements, Tobelo Regional Public Hospital's final disposal process does not have an incinerator but Tobelo Regional Public Hospital uses a third party to process hospital waste.

Currently, Dumai Regional Public Hospital has been accredited with Plenary Type B hospital type with a total of 316 beds with a total number of 1340 employees, with various professions ranging from Doctors, Nursing Staff, Medical Engineering Personnel, Pharmacy, Nutrition and Public Health Scholars, and other non-health education. The percentage of employees at Dumai Regional Public Hospital is dominated by female workers at 76.56%. And male workers by 29.24%. For visits to Dumai Regional PublicHospital during 2022 reaching 138,571 visits from Inpatient, Outpatient and ER (Dumai Regional Public Hospital, 2022).

In the administrative process, the Environmental Health Installation is responsible to the Support Sector under the control of the Deputy Director of Services. In terms of support for the implementation of activities at the Environmental Health Installation, it is sufficient, but from the results of interviews with Supporting Informants, it was found that there needs to be an SOP / Standard Operating Procedure in the management of liquid waste that has not been well documented. Because it is still in the form of a manual book from the provider company. This needs to be a concern in making technical guidelines whose legality is known by the Hospital Director as an important document in the hospital in supporting accreditation. And from the availability of PPE in carrying out tasks, it is already available properly and used by officers as needed.

Minister of Environment and Forestry Regulation No. 6 (2021) explains that the process of managing medical waste in health facilities, including hospitals, clinics, and medical laboratories, involves strict and orderly procedures. This begins with the separation of medical waste at its source, then the waste is collected in special containers according to the type such as infectious waste, sharps, chemicals, and pharmaceuticals. This waste is then destroyed by methods such as autoclaving or other thermal treatments to ensure that existing pathogens are killed. Sharp waste is destroyed and transformed into a safe form, while chemical waste is chemically treated or converted into harmless materials. The medical waste treatment process must comply with established safety, environmental, and health standards, and follow applicable government regulations.

3.2 Dumai Regional Public Hospital WWTP Unit

Liquid waste that has entered the septic tank in all rooms is continued to the Liquid Waste Installation through a piping system to the equalization tank. In the equalization tank, the wastewater is stirred and mixed and the garbage is separated so that the wastewater is easy to pump into the initial sedimentation tank. In the initial sedimentation tank, stirring and sedimentation separation are also carried out to be channelled to the aeration and membrane tank. This aeration process is also assisted by the presence of a diffuser which functions to regulate the air solution (02) into the waste water. This process produces the pollutant load of liquid waste in this stage can reach an

optimum value (in the decomposition of COD and BOD). In this tank, because the aeration process is carried out, it activates the decomposing bacteria or degrading bacteria. The results of this decomposition are then passed through the membranes which produce decomposed waste water so that it can reduce the level of turbidity.

The next stage is that the waste water is pumped into the final sedimentation tank for the process of separating sedimentation. The wastewater that has been separated from sedimentation is added with chlorine before being discharged into the water body. The provision of chlorine is done to reduce the types of germs present in the waste water so that the number of germs and bacteria is in accordance with the standards that have been set. The final result of this final sedimentation tank is channelled to the holding tank before being discharged to the water disposal outlet. Where in the final holding tank before being discharged, the quality of the waste water discharged into the water body has been monitored. One of the things applied at this Environmental Health Installation is measuring the quality of wastewater by putting live fish in the final holding tank to assess the quality of O (Oxygen) levels before wastewater is discharged. And in this tub, periodic checks are also carried out on the physical, chemical, and bacteriological / microbiological quality.

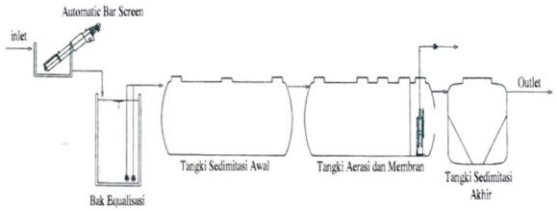

Figure 2. Hospital Wastewater Treatment Diagram

Based on the results of interviews with key informants, the chlorine process has been carried out but there are obstacles found such as the availability of chlorine which is still a problem so that in the routine examination of waste quality it is still found that the final results of the microbiological examination are not in accordance with the quality standards of liquid waste. And this is supported by the results of document search where the results of laboratory examinations, both physically and chemically, found several changes in the decrease in laboratory results before and after processing, but on microbiological/ bacteriological examination it was still found that there were laboratory values that were still the same as the total coliform value before and after processing. This is probably due to the chlorine process not being maximally carried out on the results of the final sediment treatment. So that on the laboratory examination schedule, the results of waste treatment have not been given chlorine.

Figure 3. Liquid Waste Treatment Process at Dumai City General Hospital

The importance of this chlorine process is to reduce or decrease the number of pathogenic bacteria in the treatment of liquid waste, so that the waste discharged into the water body is in accordance with the quality standards for liquid waste listed in the Minister of Environment Regulation No. P56 of 2016 concerning the Parameters of Liquid Waste Quality. This is a concern at the Environmental Health Installation in this case the Management for increased supervision of the final results of this liquid waste management.

3.3 Human Resources

From the existing documents, the environmental health installation for human resources in this Environmental Health consists of 18 people with an education classification of three Public Health Scholars with a specialization in Environmental Health, one Public Health Scholar with a specialization in Occupational Health and Safety and 14 (Fourteen) personnel with high school education background. In addition, personnel at

this Environmental Health Installation are assisted by Cleaning Service personnel who are in all parts of the hospital as collectors and transporters of waste to TPS (Temporary Disposal Site). There is one personnel who has competence in liquid waste management so that the liquid waste management process can be carried out. In human resource competencies, there is still a need for improvement and development by attending courses or technical training related to liquid waste management. In addition, the competency of the employment status of environmental health personnel needs to be increased from Honorary to Civil Servant. The availability of budget and training programs for the certification of liquid waste management personnel needs to be further improved.

The results of Gnaro et al's (2022) research show that competent human resources are responsible for several important matters, especially they must be able to properly identify and classify liquid waste in accordance with applicable standards, including medical, chemical, and domestic waste. Then, these human resources will supervise and coordinate the process of collecting, storing, and transporting liquid waste to a safe and regulatory-compliant processing or disposal site.

Based on the results of interviews with key informants and key informants, it was found that out of a total of 18 personnel in the Environmental Health Installation, only one person has certification as a liquid waste manager but is still honorary status / TKPK (Manpower with Work Agreement) and one civil servant staff does not have certification in this waste management and does not have an Environmental Health educational background. So, it is necessary to increase competence and improve the status of honorary personnel to become ASN (State Civil Apparatus) personnel through the recruitment of PPPK / P3K (Government Employees with Work Agreements) personnel.

Minister of Environment and Forestry Regulation No. 6 (2021) explains that competent human resources in waste management in hospitals have an in-depth understanding of the types of waste, associated risks, and safe procedures. They understand waste collection, storage, handling, and disposal according to standards. These human resources are able to manage the processes well and they can convey information about risks and best practices to provide training for better environmental awareness.

3.4 Facilities, infrastructure and administration

The Environmental Health Installation has stood alone, the budget for the Environmental Health Installation has been budgeted in the supporting sector which is the direct supervisor in supervising and monitoring the implementation of waste management at the Dumai Regional Public Hospital. The procurement system for environmental health needs is directly from the supporting section. The reporting system is good enough through reports to the health office and to the provincial level. However, there is no standard SOP known by the Hospital Director. Because it is still in the form of a manual book from the supplier company. The technical guidelines can be used as SOPs that apply in the Environmental Health Installation. In this case, management's attention in the procurement and monitoring of the implementation and creation of applicable standards in liquid waste management can be a concern in the next management program.

In addition, support from accreditation for this liquid waste management has been stated in the accreditation standards and also the implementation guidelines for this liquid waste management can be seen in the Minister of Health Regulation number 2 of 2023 concerning Environmental Health. In this Ministerial Regulation, it has been explained how to properly manage liquid waste so that it is in accordance with environmental health quality standards. Some of the things that become the focus of management's attention include the liquid waste piping system, which must always be monitored and evaluated, especially during the rainy season because there will be overcapacity when it rains. In terms of budget, the Environmental Health Installation has received support with the availability of a government budget every year, making it easier to carry out activities at the Environmental

Health Installation better, but what needs to be paid more attention to is the provision of chlorine for the final sedimentation stage, which needs to be a concern because laboratory results are still found. microbiology which is the same between the results before and after liquid waste treatment.

According to Permenkes No. 18 (2020) regarding infrastructure facilities in medical waste management of health care facilities, among others: standard operating procedures, processing rooms, protective buildings, Medical Waste processing equipment, such as incinerators and other technologies that meet the requirements, storage facilities, motorized vehicles to transport Medical Waste, office space, weighing equipment, parking area, Occupational Safety and Health (K3) equipment such as PPE, fire extinguisher, spill kit, warning signs, and safety shower, Wastewater Treatment Plant (WWTP), electrical installation , water installation, sanitation facilities, such as toilets, sinks, workshops and warehouses, fuel tanks and security facilities.

From the problems found, it can be seen that the Environmental Health Installation of Dumai Regional Public Hospital has become a separate installation with a clear organizational structure where the Environmental Health Installation is directly under the Deputy Director of Services in the Support Sector. On a legal basis, a strong organization has been formed because there is already a Head of Installation and a Head of Room and waste management has been differentiated between the person in charge of solid medical waste and liquid waste. In addition, resources are complete because they already have a Public Health Scholar with an Environmental Health education background, but need to increase competence and special training on environmental health and hospital liquid waste management. The head of the installation already has a certification in liquid waste management and other personnel have never attended training and competency improvement as hospital environmental health personnel and there are still environmental health personnel with high school education backgrounds. Of the 18 total environmental health personnel, only one person is a civil servant and does not have an Environmental Health education background, including the head of the installation and the head of the room who are still contract workers.

For the liquid waste treatment unit itself, it has been carried out well and the existing facilities and infrastructure are in accordance with the standards for liquid waste treatment as stated in the Regulation of the Minister of Environment of the Republic of Indonesia number 68 of 2016 concerning the quality standard of waste for health service facilities, explaining that it is necessary to manage this liquid waste through an installation that supports the quality of the effluent so that it does not exceed the quality standard set by the government (Nurmansyah & Ulfah, 2023).

For the liquid waste management system, it has been carried out well, but there are still things that need to be improved and become a concern for management, one of which is the availability of standard operating procedures / SOPs where these SOPs really need to be made to ensure that the work done meets quality standards and according to the competence of the officer who does it. For SOPs on liquid waste management and other SOPs needed in the Environmental Health Installation to be immediately signed by the director so that it will protect officers in carrying out their daily activities.

This is illustrated in a study conducted by Rejeki, M, 2014 which says that in order for waste management optimization to run well, the development of SOPs / SOPs that guide the work of WWTP management so that the installation runs more optimally and SOPs that regulate other aspects related to waste and disease transmission, for example waste disposal. and protection from waste contamination (Rejeki et al., 2014).

According to the results of the microbiological examination of liquid waste, it is necessary to provide chlorine so that the results discharged into the water body are clean from pathogenic germs that will have an impact on the environmental health of the community. This is supported by research conducted at Koesnadi Bondowoso Hospital which says that the effectiveness of giving chlorine at the final stage of liquid waste treatment obtained effective results in reducing the number of germs. Where the process takes place when

chlorine comes into direct contact with the organism and with the right dose (Julianto et al., 2023).

In addition, research that supports the provision of chlorine in wastewater treatment says that disinfection / killing germs aims to reduce and kill pathogenic microorganisms present in liquid waste. The mechanism of killing germs is strongly influenced by the condition of the disinfectant and the microorganisms (Eunike, 2019). In addition, several studies that support chlorine administration at the final stage have a very good impact on reducing the number of pathogenic germs so that the water discharged into the water body is no longer harmful to the surrounding environment (Hasan, 2006).

CONCLUSION

The management of liquid waste at the Environmental Health Installation of Dumai Regional Public Hospital in 2023 has been well conducted. This residency report demonstrates that the procedures for collection, storage, handling, and disposal of liquid waste at the hospital are in accordance with prevailing safety, environmental, and health standards. This shows the commitment of Dumai Regional Public Hospital in maintaining environmental cleanliness and the safety of its patients and staff. Thus, the results of this residency report provide a positive picture of the efforts of Dumai Regional Public Hospital in managing liquid waste in 2023.

RECOMMENDATION

Based on the description above, several suggestions or recommendations that can be proposed to hospital management and the Environmental Health Installation include: Increase in the training budget for hospital Environmental Health personnel in coordination with the Program and reporting section as well as proposals expected from the supporting sector, increase in the employment status of environmental health human resources to become civil servants through participation in the selection of First Aids in Accident (PPPK) personnel so that trained personnel can continue to work at Dumai Regional Public Hospital and can add more trained personnel in the future, preparation of Standard Operating Procedures (SOPs) that are adjusted to the Minister of Health Regulation Number 2 of 2023 concerning Environmental Health. Such as the addition of the Chlorine process at the final sedimentation stage, so that the discharged liquid waste no longer contains toxic substances / bacteria, improvement and development of liquid waste management so that it can manage liquid waste from hospitals in the Dumai city area more effectively and efficiently, increase cooperation with the ministry of environment in the process of supervising liquid waste management, increasing coordination with the Health Office in training certified environmental health personnel for liquid waste management for the needs of Dumai city.

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