

Evaluation of Minimization and Storage Management of Medical Waste at Hospital During the Covid-19 Pandemic

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Abstrak

Fasilitas kesehatan seperti rumah sakit menghasilkan limbah padat medis maupun limbah non medis. Pengelolaan limbah medis yang tidak baik berpotensi menimbulkan penyebaran sifat infeksi terutama pada kondisi pandemi Covid-19. Pengelolaan di sumber seperti minimasi dan pewadahan merupakan hal penting yang perlu dievaluasi. Tujuan dari studi ini adalah untuk mengevaluasi pengelolaan limbah medis rumah sakit berdasarkan upaya minimasi dan pewadahan. Penelitian ini dilakukan dengan cara observasi langsung dan kajian literatur. Temuan pada upaya minimasi sudah sesuai dengan peraturan seperti mengurangi penggunaan material yang mengandung bahan berbahaya dan beracun apabila terdapat pilihan *lane*, menghindari adanya penumpukan dan kadaluarsa terhadap pengadaan bahan kimia dan farmasi, dan melakukan pemisahan limbah non medis dan medis sesuai dengan kategori limbah. Dari segi pewadahan juga telah memenuhi standar dimana wadah dilengkapi dengan penutup dan terbuat dari bahan anti tusukan. Wadah juga dilengkapi dengan kantong dan simbol sesuai karakteristik limbah dengan pengangkutan internal minimal 1 kali sehari atau jika telah memenuhi 3/4 wadah. Petugas sampah menyiapkan dokumen serah terima limbah medis. Pengangkutan dari sumber penghasil ke tempat penampungan sementara (TPS) menggunakan troli berwarna kuning dengan simbol *biohazard*, tertutup rapat dengan jalur yang sudah ditentukan dan juga dilakukan pembersihan dan desinfeksi pada troli yang digunakan setiap hari.

Kata kunci: sampah medis, minimasi, pewadahan, Covid-19

Abstract

Health facilities such as hospitals produce medical waste and non-medical waste. Improper management of medical waste can cause the spread of infectious nature, especially during the Covid-19 pandemic. Therefore, management at the source, such as minimization and containment, is important and must be evaluated. This study evaluates hospital medical waste management based on minimization and containment efforts. This research was conducted by direct observation and literature review. The findings on minimization efforts are following regulations such as reducing the use of materials containing hazardous and toxic materials if there is a choice, avoiding accumulation and expiration of the procurement of chemicals and pharmaceuticals, and separating non-medical and medical waste according to the waste category. The container also meets the standard where the container is equipped with a cover and is made of puncture-resistant material. The containers are also equipped with bags and symbols according to the characteristics of the waste with internal transportation at least once a day or when the container has been filled. Garbage officers prepare medical waste handover documents. Transportation from the production source to the temporary shelter (TPS) uses a yellow trolley with a biohazard symbol, tightly closed with a predetermined route, and cleaning and disinfection are carried out on the trolleys that are used every day.

Keywords: medical waste, minimization, storage, Covid-19

I. INTRODUCTION

Hospital is a facility for carrying out health service activities that have a function and a place

for the education of health workers [1], [2]. Room facilities that the hospital must own are outpatient and inpatient rooms, emergency room, operating room, ICU, obstetrics and gynecology room,

sterilization room, medical rehabilitation room, medical record, radiology, laboratory, blood bank, pharmacy, room health workers, administrative and office rooms, education and training rooms, morgue, worship room, waiting room, counseling hall, nursing room, machine room, kitchen, laundry, garden, waste management area, sufficient parking space. The activities carried out by hospitals produce solid waste, which can negatively impact the environment [3]–[5].

The solid waste generated from the activities of health facilities consists of medical and non-medical waste [6]. The percentage of medical waste tends to be smaller but can cause various health impacts because this waste contains infectious waste. Infectious waste management is categorized as a bio-hazard, so exceptional management is required [7]. Non-infectious medical and non-medical waste has the same properties as urban domestic waste, so their management will be the same as household waste [8], [9]. Improper management of solid waste from health facilities will trigger health risks such as disease transmission (hepatitis, diarrhea, measles, AIDS), radiation hazards, chemical hazards, and the risk of work accidents. For this reason, it is necessary to manage solid waste from health facilities appropriately to minimize the dangers posed as a source of environmental pollution [10].

From source to final processing, solid waste management from Jakarta health facilities has not been carried out correctly [11]–[13]. One of the contributing factors is limited operational costs. Therefore, we need a plan to determine the right solid waste management system. Improvements in the cost aspect are expected to improve the existing management system to improve the quality of the environment.

If solid waste treatment is not carried out in health facilities, the pollution level will be much higher than the current high level of pollution. Therefore, it will be more effective to strive for “waste minimization” and save costs on solid waste management. In addition, waste minimization reduces solid waste that must be collected, processed, and disposed of and reduces the use of raw materials and energy.

II. RESEARCH METHOD

This research was conducted at Hospital X, East Jakarta City, DKI Jakarta. The research location was carried out at Hospital X, a military hospital designated as one of the Covid-19 referral hospitals. The time of this research was carried out from

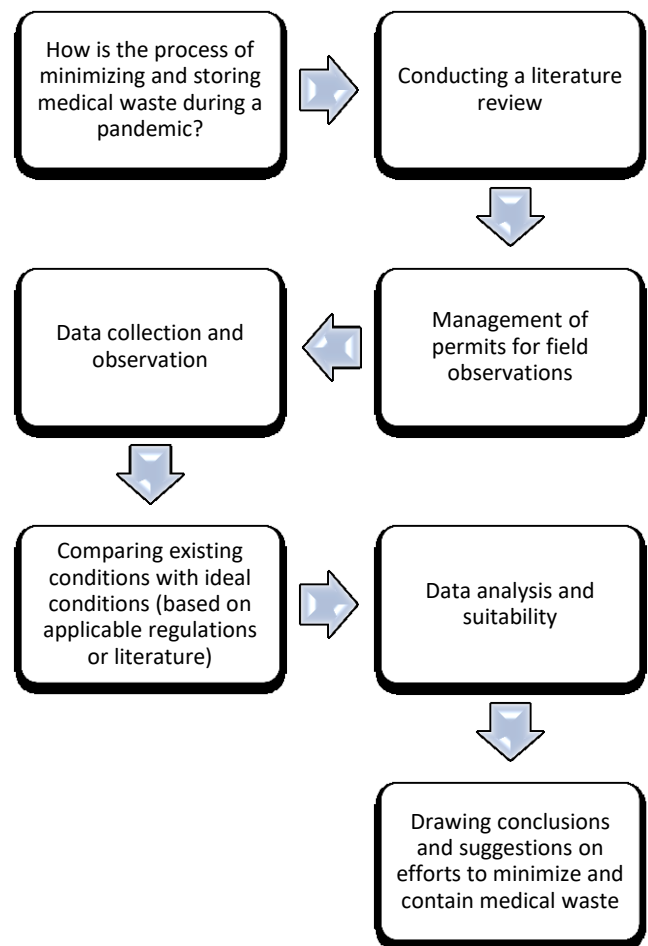


Figure 1. Research process flowchart

January to June 2021. The flow of this research process can be seen in Figure 1.

Data collection techniques in research are observation and documentation. Then a literature study and data collection that support the design were carried out by conducting observations with a checklist system at each stage from storage to the final process, measuring the amount of Covid-19 solid waste generation, and conducting interviews with related parties regarding the availability of land to design the last management unit. As a result, the design criteria were obtained from various kinds of literature, and the design of the Covid-19 waste treatment system was based on compliance with relevant regulations.

III. RESULT AND DISCUSSION

Reduction and sorting of medical, solid waste in Hospital X are carried out by conducting interviews with the health and safety of the hospital and conducting direct observations and analysis based on regulations, as shown in Table 1.

Table 1. Suitability analysis of medical solid waste minimization in Hospital X

No.	Activity	Regulation	Appropriate	Not appropriate	Description
1	Reducing the use of materials that contain hazardous and toxic materials if there are other options	PerMenLHK No. P.56 of 2015 Article 6 points (2) [14]	√		Replacement of hazardous substances for x-rays, namely fixers and developers
2	Avoiding the accumulation and expiration of the procurement of chemicals and pharmaceuticals	PerMenLHK No. P.56 of 2015 Article 6 points (2) [14]	√		In every procurement of goods, funds and patient needs are considered. The validity period of the drug is two years, and no expired drug has been found. If found, the drug will be returned to the supplier
3	Perform periodic maintenance on equipment	PerMenLHK No. P.56 of 2015 Article 6 points (2) [14]		√	Equipment maintenance has not been carried out regularly and does not have data collection, and the hospital does not have a target time for treatment during the pandemic period; only equipment maintenance is carried out in 3 rooms
4	Separating non-medical and medical waste according to the waste category	PerMenLHK No. P.56 of 2015 Article 6 points (2) [14]	√		 The trash cans have been separated and differentiated with different labels and packaging colors

Minimizing waste is an effort to reduce the volume of concentration, toxicity, and danger of the waste from the production process by reducing it at the source and or using it by 3R (reuse, recycle, recovery [15]. Waste minimization is also an effort to decompose the amount of waste produced by health care facilities. There are several efforts to minimize waste, from prevention to several techniques such as changes in raw materials, changes in technology, good work processes, and changes to products that do not contain hazardous waste.

Based on Table 1 regarding the analysis of the reduction and segregation of medical, solid waste at Hospital X, as shown in the table, the hospital has eliminated the use of hazardous waste materials used for X-rays, namely fixers and developers, which function as photo washers. Fixers containing Ammonium Ttiosulphate can irritate and are classified as hazardous waste. The developer contains Hydroquinone, hazardous waste that is irritating and toxic. To avoid the accumulation and expiration of the procurement of chemicals and pharmaceuticals, this is done by limiting the quantity in the procurement of goods, especially considering the funding and patient needs for chemicals and pharmaceuticals. If there is any

remaining medicine, it will be returned to the supplier. In addition, the hospital has carried out maintenance and cleaning of the equipment. Still, it has not been comprehensive and periodically recorded during Covid-19, only three rooms have been treated due to the large number of rooms used for Covid-19 patients, and the funding has not been sufficient to make this effort. PerMenKes No. 7 of 2019, periodic equipment maintenance is known two times a year for each room, including data collection, storage and cleaning, and tool calibration [16]. The last effort the hospital has complied with is regulation because it has separated medical and non-medical waste.

The separation is done by separating the containers used to accommodate waste and separating the containers for sharp medical waste with a safety box.

The storage and packaging of medical solid waste in Hospital X are carried out by conducting interviews with the hospital's occupational health and safety department and conducting direct observations and analysis based on regulations, as shown in Table 2.

Table 2. Suitability analysis of medical solid waste storage in Hospital X

No.	Activity	Regulation	Appropriate	Not Appropriate	Description
1	The container is equipped with a lid	PerMenLHK No. P.56 of 2015 Appendix III Part B [14]	√		 The container used has a lid
2	Made of puncture-resistant material	PerMenLHK No. P.56 of 2015 Appendix III Part B [14]	√		As in the picture above, the container is made of plastic and iron so it has anti-stab properties
3	Equipped with bags and symbols according to the characteristics of the waste	PerMenLHK No. P.56 of 2015 Appendix II Part A [14]	√		In the picture above it can also be seen that the container has been lined with a yellow bag but is not equipped with a symbol for the type of waste
4	Internal transportation at least 1 time a day or when the container is fulfilled	PerMenLHK No. P.56 of 2015 Appendix III Part D [14]	√		 Do it 2 times a day every morning and evening
5	Garbage officers prepare medical waste handover documents	Bapedal No. 1 of 1995 Attachment Point 2 [17]	√		Recording is done in the logbook as shown in the attachment
6	Transportation from the source of production to the TPS uses a yellow trolley with a biohazard symbol, tightly closed with a predetermined route	PerMenLHK No. P.56 of 2015 Attachment III Part F [14]	√		Transportation uses 100L wheeled plastic containers, and the route is carried out from the farthest room to the closest to the TPS, as shown in the attachment
7	Used trolleys are cleaned and disinfected every day	PerMenLHK No. P.56 of 2015 Attachment III Part F [14]	√		Trolley cleaning is done by spraying disinfectant after each waste transport
8	Weighing and recording are carried out when the waste is handed over to the TPS	Bapedal No. 1 of 1995 Attachment Point 2 [17]		√	Recording and weighing are carried out every time waste will be transported by a third party
9	Garbage workers use the specified PPE	PerMenLHK No P.56 Year 2015 Appendix VII [14]		√	Officers use masks, gloves, and medical head protection, with closed clothes but do not use aprons.

Based on Table 2 regarding the container and packaging used regulations in Bapedal No. 1 of 1995 PerMenLHK No. P.56 of 2015 [14]. From the results of these observations, it is known that the hospital's container and packaging process has complied with several aspects. The containers used are made of plastic and iron, which are strongly resistant to sharp object punctures and are coated with plastic. With the color according to the

category, internal transportation of waste is carried out two times a day, every morning and evening. When transportation is used, a yellow trolley with a biohazard symbol uses a predetermined path starting from the furthest point on the 4th floor to the 1st floor and then placed at the TPS for hazardous waste after the trolley is cleaned by disinfection. Medical waste containers have given different colors according to their category. It is

necessary to have the marking symbols and labels for hazardous waste, which is carried out as an identity for hazardous waste to be easily recognized and managed. Separation based on the type and characteristics of hazardous waste, especially for infectious waste that has the potential to transmit disease. Transportation of medical waste at the Haji General Hospital Surabaya is carried out only once a day using a closed trolley intended to avoid aesthetic disturbances due to spills that are feared to be in contact with humans [18]. Officers carry out transportation to TPS through a particular route, namely a route that does not pass many patients or hospital visitors.

However, there are still found not following regulations such as in the waste packaging process, such as yellow bags that are not equipped with symbols and labels at TPS due to increased waste generation. Officers only pack with the appropriate color of the bag. In addition, hospitals do not yet have reports on sending and weighing internal waste (source to TPS), and this can be optimized so that it is known the amount of waste that is put into the temporary storage area for hazardous waste and the amount of waste generated from each room. The PPE used by officers who only use masks, gloves, medical head protection, clothing with short sleeves, and aprons does not follow the regulations and SOPs that the hospital has set. Officers must also use PPE consisting of headgear, gloves, aprons, closed shoes, and closed clothing, following regulations when carrying out waste collection activities to prevent contamination of diseases contained in the waste. In addition, the PPE that officers already use must be appropriately managed [9], [19]–[21].

Before the waste must be placed in a temporary storage area, the officer weighs and records the weight of the waste in a logbook [22], [23]. However, the composition of the waste produced by each hospital is different depending on the specialization of the hospital, type of hospital, socio-economic community, culture, use of single-use equipment, packaging materials, and waste management practices [24]. Therefore, to identify the composition and generation, it is necessary to record and weigh the waste from the source because the function specifications of each room influence the characteristics of medical waste which can be different in each room.

IV. CONCLUSION

Minimizing waste is an effort to reduce the amount of medical waste produced as a whole. The reduction has been carried out according to

regulations, but equipment maintenance has not been carried out regularly and does not have data collection and hospitals do not have a target time of treatment during the pandemic. Meanwhile, in the storage process, the recording, and weighing process, each waste will be transported by a third party and it is also found that officers still do not use PPE completely.

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