

Informing compliance factors regarding hospitals waste management procedures in Indonesia: a scoping review

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ABSTRACT

The hospital staff's non-compliance in managing hazardous waste can hurt the environment and public health. There are various practicals to mitigate the harmful effects of hazardous medical waste on the environment and public health. However, there needs to be evidence to provide accurate data regarding compliance with hazardous waste management at hospitals in Indonesia. This study aims to assess and map the determinants affecting hospital liquid medical waste management. This study examined electronic databases from 2017-2023. Studies were screened based on inclusion and exclusion criteria. The study was grounded in the scoping review to inform compliance factors regarding waste management in Hospitals. One article describes compliance with the regulation, and the other concerns supervising hospital waste management. Those articles are not detailed enough in describing supervision, so we suggest further research about supervision support to foster the management process and the result of hospital waste management. Regulation is essential for all processes and products that affect the environment. Compliance with guidelines needs to become a habit and improve over time.

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1. INTRODUCTION

A hospital is a type of healthcare facility that offers all-inclusive medical services, including emergency, inpatient, and outpatient care [1]–[6]. Hospitals, however, are also gathering areas for both ill and well individuals, and because of improper medical waste management, they can spread illness and result in nosocomial infections [5]–[10]. Hospitals have a significant negative influence on the environment because of the enormous amounts of hazardous and toxic waste they produce, both medical and non-medical. The majority of medical waste management does not adhere to the necessary standards set forth by current rules, according to earlier studies on hospital waste processing [3], [11]–[16]. Both medical and non-medical waste are produced by hospital operations and other supporting activities; solid and liquid waste are not given enough attention in waste management. Meanwhile, these all result in illness and poisoning from the environment [4], [17]–[20].

Waste is defined as a substance that was discarded after its first use or after it was worthless, damaged, and useless, whether in liquid or solid form, contains dangerous and toxic ingredients because of their physical-chemical nature, concentration, or amount that can harm or damage the environment and provide a direct or indirect threat to human existence, the environment, health, and other living things [21]–[23]. Environmentally friendly waste management techniques, cautious use, and safe use are the cornerstones of medical waste management regarding hazardous and poisonous products. To coordinate and raise the standard of the medical waste management system at each installation, there needs to be a defined division of work [24], [25]. Management of hazardous and toxic medical waste is one of the most serious problems at the present moment in health facilities since infectious medical waste, has a high potential to transmit contagious diseases either through direct or indirect contact through environmental media. Pollution from medical waste can be minimized with effective and efficient processing to reduce environmental pollution [20], [21], [23], [26]. It is imperative to take appropriate measures to mitigate the risk of rapid transmission in hospitals, as it is linked to the medical waste management system. Standardization and strict implementation of medical waste management are crucial for controlling sources of infection, particularly in light of the COVID-19 pandemic [27]–[30].

However, our understanding of the various determinants that aggravate liquid waste management in public and private hospitals in Indonesia is limited. Most of the studies revealed they just speak about waste management in general, not only liquid, and minimal data on public hospitals. Many challenges related to waste management in hospitals are caused by a lack of assistance and a supervision system regarding effective and safe waste management. The hospital management should establish systems to ensure compliance with national legislation on waste management by providing appropriate training and resources to all staff members. Regular supervision of waste management practices is crucial in promoting best practices and creating a safe working environment for the staff, visitors, and the environment. Considering that studies have reported poor waste management practices due to insufficient knowledge and inadequate training in other parts of the country, it is important to develop a feasible supervision technique and training curriculum that covers waste management practices appropriately in the hospital's waste management systems. This scoping review aims to assess and map the various determinants affecting hospital liquid medical waste management. This study provides important procedures for conducting reviews, including the method of searching and selecting articles and steps in analyzing the articles obtained.

2. METHOD

2.1. Search strategy and selection criteria

Through an analysis of the literature, this review sought to identify the factors that influence hospitals' handling of hospital liquid medical waste. The review question focused on “What were the determinant factors that contributed to managing liquid medical waste in hospitals in Indonesia? The studied domains were liquid, solid, medical waste, and hospitals in Indonesia. This scoping review used Google Scholar and PubMed to find possible papers. Only original articles released between August 2017 and the end of November 2023 in both Indonesian and English were included in the search parameters. To ensure research accuracy, we spoke with academic librarians with experience scoping review studies when developing our search technique. To find more relevant papers, a manual search of the included studies' reference list was done. In the course of citation chaining, we looked for potentially acceptable manuscripts cited on Google Scholar. We also used the ProQuest dissertation and thesis database to scan the grey literature for identified unpublished material. This scoping review considered various preprinted articles such as medRxiv. Table 1 presents the literature search through the database databases keywords PubMed (Liquid OR solid OR liquid waste OR solid waste OR hospital waste OR hospital liquid waste OR hospital solid waste) and (Waste management OR hospital waste management OR hospital liquid waste management OR hospital solid waste management).

2.2. Study selection process

2.2.1. Eligibility criteria

Participant types were taken into account for all research projects in Indonesia that involved both public and private hospitals. Intervention types: nothing was done in this regard. The determinant elements that were substantially influencing Indonesia's hospital waste management were assessed in this scoping review.

Types of outcome measures articles and studies were reviewed to determine whether they report management of hospital waste before, during, or after COVID-19 and or management of hospital liquid waste before, during, or after COVID-19. Studies also included data that can be calculated statistically if they report it. Letters, comments, case reports, or reviews were excluded.

Types of study observational and longitudinal study designs involving hospital waste management in Indonesia were taken into consideration in the evaluation. The analysis was not supported by any qualitative studies that we included. Two stages of the review process were carried out. Following the inclusion and exclusion criteria, the two reviewers evaluated the literature in the first stage based on title and abstract. Every article, including full text versions, that made it beyond the first round was examined again in the second. The acquired articles fell into one of three categories: "included," "excluded," or "uncertain." If there was disagreement between the two reviewers, a third reviewer was consulted. The inclusion criteria were quantitative study, hospital liquid waste, the hospital located in Indonesia, and articles written between 2017 and 2023 in English and Indonesian. Meanwhile, the exclusion criteria were qualitative studies and articles written before 2017.

Table 1. Literature searches through the database

Databases	Keywords
Pubmed	<i>Liquid OR Solid OR Liquid waste OR solid waste OR Hospital waste OR Hospital liquid waste OR Hospital solid waste) AND (Waste management OR Hospital waste management OR Hospital liquid waste management OR Hospital solid waste management)</i>
Google Scholar	<i>Liquid OR Solid OR Liquid waste OR solid waste OR Hospital waste OR Hospital liquid waste OR Hospital solid waste) AND (Waste management OR Hospital waste management OR Hospital liquid waste management OR Hospital solid waste management)</i>

2.2.2. Data extraction

Numerous factors were extracted from the data, including the following: author, publication year, study site, design, and aims; participant; outcome measurement; measurement scale utilized; data quality; and author suggestion. Based on international publications, the data extraction was completed. Filtering journals dealing with hospital waste management was done after the initial round of data extraction was completed. The handling of hospital waste in Indonesia is the subject of the next phase, at the end.

2.2.3. Quality assessment

This scoping review's research articles' risk of bias was evaluated by four investigators on their own. The review procedure used several critical evaluation tools, such as the CASP checklist for observational research, depending on the type of study. The next step is created using the quality evaluation results as a guide.

2.2.4. Data synthesis

The results were synthesized narratively using the retrieved data. Based on study questions, determinant factors, result kinds, and health implications, the data was categorized. A narrative was used to present the outcomes of the quantitative data. In order to confirm the analysis results, a team meeting will be held when the data analysis is primarily completed by four reviewers (MK, TRS, S, and PAP).

3. RESULTS AND DISCUSSION

3.1. Literature search

A search of an electronic database turned up seventy articles. Every paper was located using PubMed and Google Scholar. After the first round of exclusions, eight duplicates were eliminated, leaving 62 sources for the title and abstract screening. The 54 publications in all were deemed possibly relevant; the inclusion and exclusion criteria were examined in conjunction with the full texts to determine eligibility. After being selected for this scoping review, six papers were left for synthesis. The procedure of selecting studies is outlined in Figure 1 of the PRISMA flowchart [31].

3.2. Component of hospital-based-waste management

Six articles reflect on waste management in hospitals [32]–[37]. All of these articles are quantitative and are conducted in a variety of Indonesian contexts, including private hospitals [33], [35], [36], public hospitals [34], [37], and private and public hospitals [32]. Most articles examine various categories of hospital waste in conjunction with the regulation. Six articles examined specific categories of waste management: liquid and solid waste [32], [36], [37], liquid [33], and solid [34], [35]. These articles explore waste management in hospitals and do not focus on public and health services or blockchains regarding the included waste management in hospitals.

3.3. Regulation of waste management in hospitals

Rules governing waste processing are covered in three articles [32], [33], and [35]. The Minister of Health's Regulation No. 1204 from 2004 [36] serves as the general principles for hospital waste regulations. Regulations No. P.68/MENLHK/Setjen/KUM.I/8/2016 by the minister of environment and forestry regarding the hospital liquid wastewater quality standards and Regulation Number 7 of 2019 by the minister of health regarding the hospital environmental health to the Implementation of Safeguarding Liquid Waste [32], [33]. The hospital waste management outcome and the use of standard operating procedures are the elements governed or adhered to by the regulations. A few of the regulations' implementation flaws, like management's lack of dedication and focus on waste management officers, have an impact on the efficacy and efficiency of waste management outcomes [33]. We decided on six hospital waste management regulations from 1995 to 2019 [38]–[43]. All of these regulations are produced at the national level. The resume of these regulations is presented in Table 2.

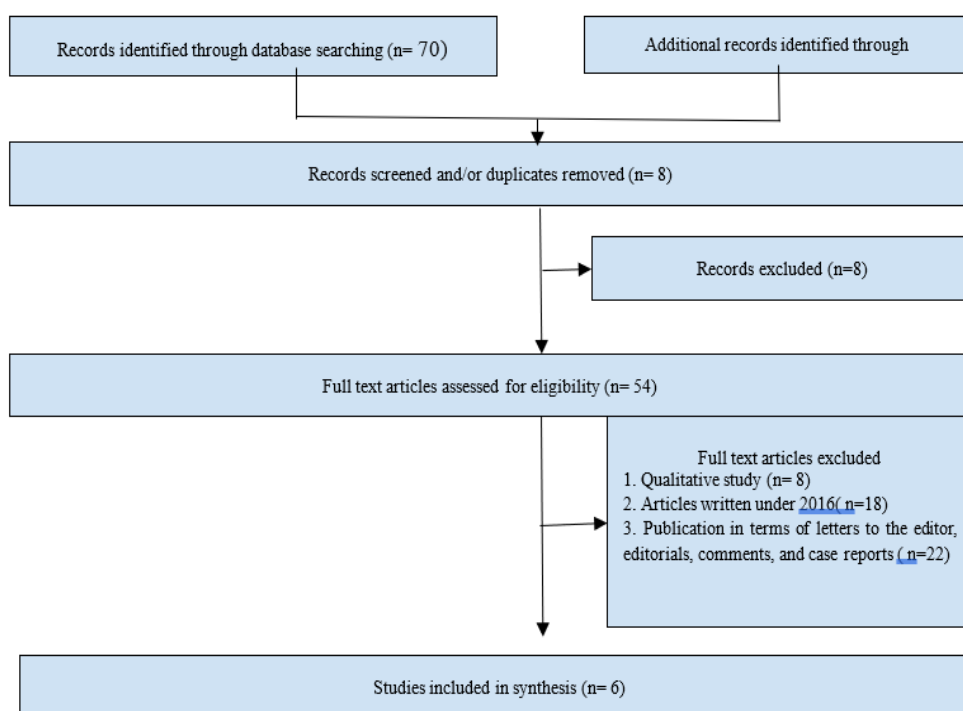


Figure 1. PRISMA flow illustrating study/article included [31]

Table 2. Resume the regulations regarding hospital waste management [38]–[43]

Regulations	Levels	Component
Regulation of the Minister of Environment and Forestry No.P.68/MENLHK/Setjen/KUM.I/8/2016	National	Domestic wastewater quality standards
Regulation of the Minister of Environment No.P.56/menlhk/setjen/kum.1/4/2015	National	Procedures and technical requirements for management of hazardous and toxic waste from health service facilities
Letter of the Minister of Environment and Forestry No. SE.3/MENLHK/PSLB3/PLB.3/3/2021	National	Management of B3 Waste and Waste from (Covid-19)
Regulation of the Minister of Health No. 1204 in 2004	National	Hospital environmental health requirements
Regulation of the Minister of Health Number 7 of 2019	National	Hospital environmental health
Regulation of the Minister of Environment No. 58/MENLH/12/1995	National	Standards of liquid waste for hospital activities

3.4. Factors related to compliance with waste management in hospitals

It was necessary to increase the percentage of hospitals reporting their hospital waste management activity on a regular basis from 2019 to 2020 to just 12%. Hospital waste management compliance rose from 82% to 86% during the COVID-19 pandemic, according to research by Putri *et al.* [32]. Prior to the 2019 COVID-19 pandemic, hospitals in Indonesia have to comply with hospital waste management standards based on the availability of environmental documents and environmental health units. Because the

availability of environmental health units affected the level of compliance in both years, the availability of environmental health units was the sole factor that mattered during the COVID-19 pandemic in 2020 [32].

Only one of six articles discusses the supervision of hospital waste management. The importance of supervision is because that is a process for implementing the desk job, evaluating, and correcting to implement the work according to the original plan. One of the most challenging tasks is hazardous and toxic materials waste management, therefore supervision needs to be given great consideration. Activities related to dynamic monitoring should take seriously the current state of hazardous and toxic materials waste issues. An increase in the intensity of waste processing counteracts the rise in waste generated [44].

3.5. Discussion

Medical waste poses numerous threats to the health of everyone, including patients, healthcare personnel, and the community, so addressing it in healthcare institutions is essential. Medical waste management has an effect on the environment in a number of ways, such as a decrease in environmental quality that can interfere with and harm people's health who live in surrounding areas of healthcare facilities and outside of communities, as well as the emergence of occupational health issues in the form of formal occupational diseases brought on by infectious, sharp medical waste. Chemical-containing objects pose a significant danger of spreading infections like HIV and Hepatitis B, such as needlestick injuries from used or unsterile needles [45], [46].

Hospital waste management needs to know the type of hospital waste, the regulations, and compliance with hospital waste management. Generally, there are two types of hospital waste: liquid and solid. We need a waste water treatment plant (WWTP) for liquid to reduce the quantity of infectious material and minimize the spread of microorganisms [33]. The solid waste needs an autoclave or an incinerator [36], [37]. The principles of B3 waste management (directorate of environmental health, directorate general of public health) consist of, first, all waste producers are legally and financially responsible for using waste management, which is safe and environmentally friendly. Secondly, in the principle of vigilance, those who handle or manage ethically are responsible for exercising high vigilance. Third, key principles govern health protection and safety through handling efforts as quickly as possible, assuming that the risks that may occur are sufficiently significant. Fourth, the principle of proximity in handling hazardous waste minimizes transfer risks [47], [48].

The requirement to increase hospital compliance with reporting of hospital waste management (HWM) operations by assigning personnel with the necessary training in data recording, reporting, and submission. It's crucial to apply administrative consequences, such as fines, regulations from the government, and written alerts, to hospitals that fail to disclose their hospital waste management operations [32]. Hospital waste management requires supervision because the system is getting better. On the other hand, in the absence of oversight, waste management will decrease. This study supports other studies that found that, according to [37], the public hospital in Pelalawan regency was monitoring the management of medical waste of hazardous and toxic materials using three indicators: establishing measuring devices (standards), carrying out assessments, and implementing corrective measures. However, there are still weaknesses in this system, meaning that the supervision being provided is not ideal. The small amount of funding that was available for his study, the lack of personnel skilled about environmental laws and regulations to oversee medical waste, and the lack of public awareness regarding the process for making complaints in the event of pollution are some of the challenges he faced [49].

Supportive supervision is a new strategy that research studies and program assessments recommend to make supervision more favorable to improvements in health worker performance. Supportive supervision broadens the range of supervision techniques by integrating peer and self evaluations as well as community feedback. With supportive supervision, the workforce as a whole becomes the focal point of supervisory activities instead of just one official. Many parties, including peers, health care providers, and formally recognized supervisors as well as informal supervisors, apply a crucial idea in helpful supervision. By enhancing communication, emphasizing problem-solving, encouraging teamwork, and offering guidance and assistance to enable healthcare professionals to track and enhance their performance, supportive supervision promotes excellent outcomes [50], [51].

3.6. Strengths and limitations

It is the first to compile this body of literature for the purpose to comprehend the trends in waste management in Indonesian healthcare establishments. This review contains a number of noteworthy limitations, including the use of title searches to find pertinent literature. Therefore, considering the limitations of the search, it's probable that pertinent studies ought to have been included. To find further publications, we did, however, scan the reference lists of the included research. Second, a variety of research conducted in hospital settings were examined.

Therefore, the implications of the study's findings should be regarded cautiously, as it did not clarify a consistent feature in other types of healthcare institutions, such as private clinics and public health centers. To reduce this bias, the authors utilized predefined criteria to choose which articles to include and standardized templates for data extraction.

4. CONCLUSION




We can conclude that assessing and mapping the various determinants affecting hospital liquid medical waste management is very important. Regulation is the most crucial factor to regulate all the processes and products that affect the environment. Compliance with regulations needs to become a habit and improve over time. We suggest supportive supervision to do that.

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