

Implementation of Medical Waste Management and Environmental Responsibility

(Disclosure at RSUD R.T. Notopuro, Sidoarjo)

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Abstract— This study aims to determine the application of environmental accounting in medical waste management and the disclosure of environmental responsibility at Raden Tumenggung Notopuro Regional General Hospital, Sidoarjo. The object of this research is Raden Tumenggung Notopuro Regional General Hospital, Sidoarjo. Data were collected through direct observation and interviews. This study employed descriptive analysis. The results indicate that the hospital has implemented proper waste treatment procedures and has demonstrated its responsibility toward the surrounding environment, ensuring that medical waste management does not cause adverse effects on the environment or local residents.

Keywords: *Medical waste; medical waste management implementation; environmental responsibility disclosure.*

I. INTRODUCTION

Hospitals are essential institutions that aim to enhance public health by providing a broad range of health services, including inpatient, outpatient, and emergency care. However, they also generate medical waste, which can have significant negative impacts if not managed properly. This waste, including contaminated materials, pharmaceuticals, and hazardous substances, poses risks to both human health and the environment. Proper management of medical waste is crucial to prevent the spread of diseases and environmental degradation.

Various authorities define medical waste as byproducts of medical activities that require special handling due to potential hazards. The World Health Organization (WHO) includes all materials from medical activities that necessitate safe management. Similarly, the Environmental Protection Agency (EPA) specifies that such waste includes infectious and hazardous materials requiring careful handling. In Indonesia, the Ministry of Health categorizes medical waste as residues from medical activities that could pose infection risks and therefore demand special handling. Johns Hopkins University likewise highlights the importance of managing medical waste from healthcare facilities to protect public health.

Regulations, such as the Minister of Environment and Forestry Regulation No. P.56/Menlhk-Setjen/2015, govern the treatment of hazardous and toxic waste from healthcare institutions. These regulations outline waste

generation to final disposal, including sorting, collection, transportation, storage, and processing of medical waste before landfilling.

At Sidoarjo District General Hospital, a class B Education facility, the significant volume of medical waste generated necessitates proper management to prevent environmental pollution. The hospital incurs increased costs for medical waste management, mainly due to the frequent transportation required for treatment facilities. The COVID-19 pandemic has exacerbated this issue, as rising patient numbers have led to more frequent waste accumulation and transport, thereby increasing the hospital's waste management expenses.

II. LITERATURE REVIEW

A. Medical Waste

According to the World Health Organization (WHO), medical waste from healthcare facilities may include hazardous materials that pose risks to human health and the environment. WHO offers comprehensive definitions and guidelines for managing this waste to protect public health and prevent environmental harm.

The World Health Organization (WHO) categorizes medical waste into several types based on its characteristics and associated hazards:

- 1) Infectious Waste: Contaminated with pathogens, including blood and medical items, and requires careful handling to prevent disease transmission.
- 2) Sharp Waste: Includes objects such as syringes and broken glass that can cause injury or infection.
- 3) Chemical Waste: Contains hazardous substances from cleaning agents and pharmaceuticals, posing risks of poisoning and environmental pollution.
- 4) Pharmaceutical Waste: Comprises expired or unused medications that may cause environmental contamination and health hazards if improperly disposed of.
- 5) Radioactive Waste: Generated from radiological procedures and requires careful management to prevent radiation exposure.
- 6) General/Domestic Waste: Consists of non-hazardous materials, such as paper and plastic, which may still pose hygiene and pollution concerns if mismanaged.

B. Medical Waste Management

Under the Resource Conservation and Recovery Act (RCRA) in the United States, medical waste management involves handling waste that meets hazardous waste criteria. Although RCRA primarily regulates general hazardous waste, it also encompasses medical waste classified as hazardous.

Medical waste management under the Resource Conservation and Recovery Act (RCRA) involves a detailed process for handling hazardous medical waste. The key steps include:

- 1) Identification and Classification: Determine whether the waste meets hazardous criteria (e.g., corrosive, flammable) or is listed as hazardous under RCRA.
- 2) Collection: Gather hazardous waste in secure, labeled containers to prevent leakage and contamination.
- 3) Storage: Store waste in facilities with environmental controls and secure access to minimize hazards.
- 4) Transport: Use registered transporters and proper containers with hazard labels to ensure safe transport.
- 5) Processing: Treat waste through methods such as incineration or recycling, in compliance with RCRA standards, with specialized methods for highly hazardous wastes.
- 6) Disposal: Dispose of waste in RCRA-compliant landfills and manage residuals to prevent environmental contamination.
- 7) Documentation and Reporting: Maintain waste management records and report to environmental authorities as required by RCRA.
- 8) Compliance and Inspection: Adhere to RCRA regulations, conduct regular inspections, and address non-compliance issues.
- 9) Risk Management and Improvement: Assess and improve waste management practices to enhance safety and minimize environmental impact.

RCRA ensures the proper management of hazardous medical waste from generation to disposal, protecting human health and the environment.

III. RESEARCH METHODOLOGY

A. Type of Research

The research employed qualitative descriptive methods, which are used to gain knowledge or develop theories about specific topics during a certain period.

B. Data Source

This study utilized both primary and secondary data. Primary data, including qualitative information, was collected through interviews with Instansi Penyehatan Lingkungan (IPL) staff regarding hospital waste management processes. Secondary data included flowcharts detailing the stages of medical waste, interview transcripts, and records of medical waste management facility location.

C. Data Analysis Technique

Researchers used direct observation to collect primary and secondary data at the hospital, including waste reports, environmental policies, photographs of medical waste management, and staff interviews. They analyzed the data using a qualitative descriptive method to assess whether the medical waste treatment system at Raden Tumenggung Notopuro Sidoarjo Hospital aligned with WHO and RCRA guidelines. The analysis aimed to identify any gaps between the hospital's practices and the regulations, leading to conclusions based on this assessment.

IV. RESULT AND DISCUSSION

A. Medical Waste Management

Effective waste management is crucial for health facilities, particularly hazardous medical waste, to prevent risks to both the hospital environment and the community. At Raden Tumenggung Notopuro Sidoarjo Hospital, waste management is handled internally and through partnerships with third parties, including PT Wastec International, PT Prasadha Pamunah Limbah Industri (PPLI), PT Jaya Jagat Raya (JJR), and PT Jasa Madivest. These collaborations are essential due to the large volume of waste, which increased significantly during the COVID-19 pandemic.

Mr. Fadjar explained, "*Limbah medis yang diolah di RSUD Raden Tumenggung Notopuro Sidoarjo dibagi menjadi tiga, yaitu limbah medis cair, limbah medis padat, dan limbah domestik. Sedangkan limbah yang dihasilkan selama pandemi COVID-19 dikategorikan sebagai limbah medis padat seperti gaun sekali pakai, masker, sarung tangan, benda tajam, dan jarum suntik.*"

The researchers then inquired about changes in the volume of medical waste generated by the hospital during the pandemic years 2020-2022. Then, one of the IPL staff answered, "*Ya ada peningkatan pada volume limbah, terutama limbah medis Covid-19. Di tahun 2020 belum ada limbah Covid-19 yang dihasilkan, namun pada 2021 terdapat limbah Covid-19 yang dihasilkan sebanyak 62,885 ton.*"

Table 1 The Amount of Medical Waste

	2020	2021	2022
Medical Waste (ton)	244.442	190.74144	183.04241
COVID Medical Waste (ton)	-	62.55253	5.67366
COVID Vaccine Medical Waste (ton)	-	0.33282	0.03733

B. Procedures for Waste Management

Proper waste management, especially of hazardous waste, is essential to prevent health issues and environmental pollution, as outlined in Minister of Environment and Forestry Regulation Number P.56/Menlhk-Setjen/2015. This regulation specifies procedures and technical requirements for managing hazardous and toxic waste from healthcare facilities. Medical waste treatment aims to alter the biological or chemical properties of waste to minimize or eliminate its potential danger to human health.

Ms. Ina explained, "*Limbah diambil dari beberapa ruang perawatan, kemudian limbah dipilah sesuai dengan jenis limbah dan dimasukkan ke dalam polybag yang sesuai, terdapat 5 warna polybag yang masing-masing warna berbeda dengan jenis limbahnya (Hitam untuk limbah domestik, merah untuk limbah radioaktif, ungu*

untuk limbah sitotoksik, kuning untuk limbah infeksius, patologi dan anatomi, dan coklat untuk limbah kimia dan farmasi). Limbah domestik yang baik akan langsung dibuang ke TPA, dan limbah medis lainnya akan dibuang ke TPS B3 untuk diolah sebagian dan sebagian lagi dikirim ke pihak ketiga untuk diolah juga, pengolahan limbah ini dengan cara dibakar sehingga limbah medis padat ini menjadi abu.”

The researcher compared Ms. Ina’s explanation of medical waste management with the procedures outlined in Regulation P.56/Menlhk-Setjen/2015 by the Indonesian Ministry of Environment and Forestry. The study examined the procedures for managing solid medical waste at Raden Tumenggung Notopuro Regional General Hospital in Sidoarjo and compared them with the regulatory guidelines.

Table 2 Shows Differences in Waste Management Procedures Between Regulations and The Hospital

Medical Waste Management	Regulation	Hospital
Collecting the waste from several rooms in the hospital	√	√
Sorting medical waste by type of waste by putting the waste in different polybag	√	√
Waste storage in a waste bank	√	√
Waste management (incinerator or third party)	√	√
Disposal of medical waste (buried)	√	√

The researcher’s analysis indicates that the hospital has correctly implemented waste management in accordance to the Regulations of the Minister of Environment and Forestry of the Republic of Indonesia Number P.56/Menlhk-Setjen/2015, which outlines procedures and technical requirements for hazardous and toxic waste management from healthcare facilities.

C. Environmental Responsibility Disclosure

According to WHO and RCRA guidelines, hospital environmental responsibility disclosures should cover various aspects. Researchers found that RSUD R.T. Notopuro Sidoarjo manages medical waste, reflecting one aspect of environmental responsibility. However, other aspects were unclear, leading researchers to interview IPL staff for further insights.

The researcher inquired about various aspects of environmental management at the hospital. Staff confirmed that energy audits are conducted to monitor and reduce consumption through the use of LED lighting. For water management, the hospital ensures proper treatment of both general and wastewater to prevent contamination. Chemical use is managed cautiously due to its hazards, with careful handling of hazardous medical waste. Educational programs include posting awareness posters for staff, patients, and visitors. Additionally, the hospital regularly reports on waste management, including documentation of materials, energy use, and other relevant data. Based on the interviews, researchers concluded that RSUD R.T. Notopuro Sidoarjo effectively discloses environmental responsibility, having addressed all aspects required by the World Health Organization (WHO) and the Resource Conservation and Recovery Act (RCRA) regulations.

CONCLUSION AND SUGGESTIONS

Conclusion

This study aims to analyze the implementation of medical waste management and environmental responsibility disclosure at Raden Tumenggung Notopuro Sidoarjo Regional General Hospital during the pandemic. Based on the analysis and discussion, the following conclusions are obtained:

1. Raden Tumenggung Notopuro Sidoarjo Regional General Hospital has properly managed hazardous medical and domestic waste. The hospital handles waste independently and collaborates with third parties, including PT Wastec International, PT Prasadha Pamunah Limbah Industri (PPLI), PT Jaya Jagat Raya (JJR), and PT Jasa Madivest.
2. Researchers compared the waste management procedures and technical requirements implemented by Raden Tumenggung Notopuro Sidoarjo Regional General Hospital with those outlined in the Minister of Environmental and Forestry of the Republic of Indonesia No. P.56 /Menlhk-Setjen/2015. They found no differences in process and stages of waste treatment at the hospital and in the regulation. It can be concluded that the waste management practices at the hospital are in compliance with the regulation.

Raden Tumenggung Notopuro Regional General Hospital Sidoarjo has demonstrated environmental responsibility by fulfilling all aspects outlined in the regulations according to the World Health Organization (WHO) and the Resource Conservation and Recovery Act (RCRA).

Suggestions

Based on the conclusion of this study, the following suggestions for future research are proposed:

1. Further research should be conducted in other hospitals that served as referral centers during the pandemic to increase the credibility and reliability of the findings.
2. This study covered only a three-year period and focused on solid medical waste treatment and related environmental costs. Future research could extend a longer time frame, including -pre and -post pandemic periods, and explore other environmental costs beyond waste treatment.

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