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Evaluation of hospital's obedience in medical solid waste management

Yuni Lisafitri[1], Merza Rahmawati[1], Rizka Firdausi Pertiwi[1], and Bambang Prasetio[1]

[1]*Department of Environmental Engineering, Institute Technology of Sumatera, 35365, Lampung, Indonesia*

Waste is an environmental issue that quite unsettling right now. Hospitals are health facilities for community but also become one of waste contributor. Waste from hospital activities was called medical waste. Medical waste can be a source of disease for humans and other living organism and can disrupt environmental stability if not managed properly. The management of medical waste must be appropriate with regulations, but there are still many health facilities that have not managed according to the regulations. This study was conducted to evaluate of medical waste management in hospital to government regulation No. 101/2014 and Regulation of environment and forestry minister No. 56/2015. The research was conducted through several step from literature study to direct survey in the field through interviews and observations of the medical waste management. That information is evaluated in accordance with the waste management that has been regulated in government regulation No. 101/2014 and regulation of environment and forestry minister No. 56/2015. There are seven activities in the management of hazardous and toxic waste but this hospital only carry out two steps, such as collection and storage activities. Some of their doing in collection and storage activities was still not accordance with the regulations.

Keywords: Environmental, Hazardous, Regulation, and Toxic waste.

1. INTRODUCTION

Increasing of human population is related to increasing in amount of waste was produced by human activities. Waste becomes a source of pollutants, diseases that can endanger the health of humans, other living things and the environment. Wastes are considered to be hazardous and toxic if they have these characteristic such as flammable, reactive, explosive, corrosive, radioactive, infectious, irritant and bio accumulative characteristics [1]. Characteristics of hospital waste were infectious and dangerous. Medical waste is classified as hazardous because it's contain microorganisms if it's exposed to humans can cause disease. The main sources of this waste come from the operating room, laboratory, ICU, dialysis and polyclinics [2]. There is a relation between the environment and health. A healthy society can be achieved with a good environment as well. The hospital as a health service facility should pay attention to that relation. On the other hand, the hospital is a contributor waste because one of it is derived from medical activities as well as in considerable quantities [3]. Hospital activity will produce a number waste which contain microbial or virus [4].

*Email Address: lisafitri_yuni@yahoo.com

It is necessary to study the medical solid waste management and see its compliance with government regulations so as not endanger the environment. The management of medical solid waste is slightly different from other hazardous and toxic waste management. Therefore, the government has regulated the management of medical waste generated by health service facilities in the government regulation No. 101/2014 [5] and regulation of environment and forestry minister No. 56/2015 [6]. It is a guide for health service facilities in managing medical waste including the infectious waste that their produces.

A study on the management of hazardous and toxic waste (including medical solid waste) in RSUD Gunungtua, North Padang Lawas District, North Sumatera Province, waste collection stage was done without sorting process, it was found that all waste were collected in the same container [7]. The inappropriate management of medical solid waste will result in an impact on human health because hospital waste is a source of harmful diseases. The study participants consisted of 123 resident doctors, 92 nursing staffs, 13 laboratory technicians, and 54 cleaners in Rajkot and found that only 4.3% of those participants were trained in medical waste management (8). Therefore, the

importance of medical waste management training needs to be emphasized so that medical solid waste management practice is appropriate and does not produce a bad impact. So, this study was conducted to find out how to manage infectious hospital waste and evaluate the obedience of infectious hospital waste management with regulation of environment and forestry minister No. 56/2015.

2. LITERATURE REVIEW

a. Characteristics of Hospital Waste

In general, the waste generated by the hospital is classified into several categories based on the potential hazard and the persistence of the nature that may cause problems [6]:

General Waste is Waste that does not require special or non-hazardous treatment (domestic waste) such as waste from food or beverages, waste washing, packaging materials. The amount is about 80% of the total waste generated by the hospital.

Pathological Waste This waste belongs to a class of hazardous waste derived from organ tissues, placental body parts, blood, and body fluids.

Infectious Waste This waste belongs to the very dangerous waste because it contains microorganisms which are viewed from the concentration and quantity when exposed to humans can cause disease. The main sources of this waste come from the operating room, laboratory, ICU, dialysis and polyclinics.

Waste Objects Sharp Wastes of sharps such as tools used in hospital activities (syringes, knives, blood-contaminated scissors, body fluids, and microbiological materials). This waste falls into the very dangerous category.

Pharmaceutical Waste This waste belongs to a very dangerous place which includes pharmaceutical products, medicines, chemicals that have expired.

Cytotoxic waste is Materials that are contaminated or may be contaminated with cytotoxic drugs during compounding, transport or in cytotoxic therapy.

Radioactive Waste These wastes may be solid, liquid or gas contaminated with radionuclides, and result from in vitro / in vivo analysis of body tissues and fluids, or organs during tumor localization.

b. Waste Management B3

Hazardous and toxic waste management of hospitals has been regulated in government regulation No.101/2014 and regulation of environment and forestry minister No.56/2015. Based on government regulation No. 101/2014, reduction of hazardous and toxic waste can be done through material substitution, process modification; and/or the use of environmentally friendly technologies. Storage of hazardous and toxic waste shall be carried out by any person producing hazardous and toxic waste. Not allowed to mix the hazardous and toxic waste with the other waste in storage.

Storage of hazardous and toxic waste shall also be furnished with hazardous and toxic waste management licenses for hazardous and toxic waste storage activities. Packaging of hazardous and toxic waste is carried out by using packaging was made of materials which can pack hazardous and toxic waste in accordance with the characteristics of hazardous and toxic waste to be stored, having a strong cover to prevent spills during storage, removal or transport and in good condition, not leaking, not rusty, or undamaged. The packaging of hazardous and toxic waste must be labeled. The hazardous and toxic waste label shall at least include information on: the name of hazardous and toxic waste; identity of hazardous and toxic waste producer, date of generating hazardous and toxic waste; and date of packaging of hazardous and toxic waste [5, 6].

3. METHODOLOGY

This field study was conducted by visiting the hospital (study case: Imanuel hospital in Bandar Lampung) which became the object of research. This hospital is one of the hospitals in Bandar Lampung that has more than 10 polyclinics with average number of patients as 14.582 people. The first purpose of field study was to observe the real condition and collecting necessary data (primary and secondary data). Primary data collection is done through interviews of the head of Sanitary Department (1 correspondent) and waste collection worker (3 correspondents) at hospital. Second, through visiting the site we can observe the process of medical waste management such as collecting, separating, storage, transporting, utilization and medical waste processing. Then, we also measured quantity of medical waste daily (kg) for two weeks. Secondary data was collected from literatures from various sources. The data obtained were analyzed descriptively.

4. RESULTS AND DISCUSSION

a. Identification of Medical Waste

Wastes from this hospital were contained medical solid waste, domestic solid waste, and liquid waste. Medical waste was one of hazardous and toxic waste. Characterizations of medical waste are infectious, toxic, and dangerous (radioactive) [4]. Every work unit in the hospital that produced waste is given a garbage disposal separated based on waste characteristics. This is accordance with regulations [5,6]. Medical solid wastes generated by this hospital are infectious, pathology, pharmaceutical, chemical and sharp waste. But in this hospital when the study was conducted, medical waste was only separated into infectious waste and sharps waste. Based on interview, the hospital only produce a little pharmaceutical and chemical waste, so these waste collect one time in around one month. This waste is managed by supplier then pharmaceutical and chemical waste was recovered to pharmaceutical and chemical suppliers.

b. Identification of Medical Waste

Interview and filling the questionnaire was done to the sanitary head for 2 hours. Then, field observation of medical waste management had been done for several days. Medical waste management such as collection, storage and waste transportation was observed. Waste transportation and processed was doing by Tenang Jaya Company. The process of medical solid waste management that carried out by this hospital showed in Figure 1.

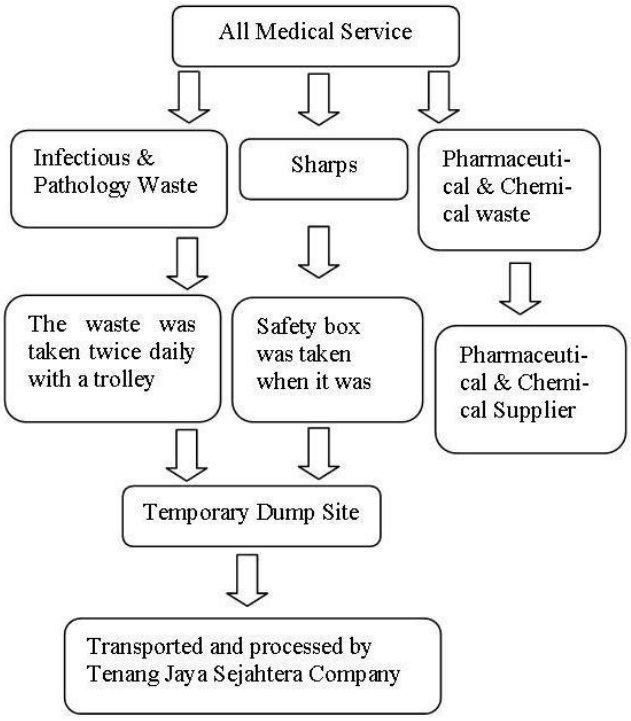

Figure 1. The process of medical solid waste management carried out by unit of waste management in the hospital.

The conformity of medical solid waste management that carried out by this hospital with existing regulation is listed in Table I. The obedience of hospital can be seen at this table and this hospital hadn't been done all action that regulated in these regulations due to they were not know all information in these regulations and they hadn't trained about hazardous and toxic waste management. The observation of medical waste management in hospital including quantity recorded of medical waste that generated daily (Table II). Quantity of waste was different every days, several day had more waste than the other days. There are many factors that affected it, such as number of patient, several of patients, type of treatment, and type of disease and to discuss this issue, further study is needed.

Table II. Quantity of medical waste was collected daily in hospital

Days	Quantity of Waste (Kg)	
	Infectious waste	Sharps waste
1	174.0	3.0
2	65.0	1.5
3	88.0	2.0
4	93.0	2.0
5	275.0	4.5
6	90.0	2.0
7	61.0	1.5
8	224.0	4.0
9	87.0	2.0
10	133.5	3.0
11	32.0	1.0
12	139.5	3.0
13	59.0	1.0
14	96.0	2.0

Table I. Management of hospital medical waste based on government regulation No. 101/2014 and regulation of environment and forestry minister No. 56/2015

No.	Waste Management	Government regulation No. 101/2014 and Regulation of environment and forestry minister No. 56/2015	Action in Hospital
1	Temporary dump site for medical and domestic waste	Temporary dump site for medical waste separate with domestic waste	Yes
2	Waste Storage	Storage of medical waste based on characteristics	Yes, there are three room at Temporary dump site for three medical waste characteristics
3	Waste Sorting	Containers are distinguished by colors (Red = radioactive, yellow = pathological infection, brown = chemical, purple = cytotoxic) and symbols. Symbol embedded according to waste characteristics	Yes, the container is distinguished by color but the symbol has not been embedded on infectious waste container
4	Storage of infectious waste	Maximum 2 days (temperature > 0 ^{o}C) Maximum 90 days (temperature < 0 ^{o}C)	No, 1 month at temperature > 0 ^{o}C
5	Storage of sharps waste	Wastes of sharps are stored in a safety box with symbol	Yes
6	Medical waste management	Incinerator, etc	No
7	Medical waste management	If do not have waste treatment technology and processing rights, so medical waste submitted to 3rd party	Yes, Tenang Jaya Sejahtera Company
8	Medical waste's field collector	Use instrument such as helmet, thick gloves, masks, long sleeves, trousers, goggle, boots and plastic aprons	No
9	Medical waste's field collector	The head of the hospital waste management unit and field collector are given training in management of dangerous and hazardous/medical waste	No

c. Collection Activity

Based on interview of sanitary unit's chief, medical waste in hospital was collected from every room and unit twice in one day at 6.00 AM and 15.00 PM (UTC+7). Medical waste and non-medical waste separately was collected from every unit and room (ICU, patient room, operation room, etc.) by field collector. Pathology waste was made into one pack with infectious waste. Infectious waste use a yellow plastic wrap without symbol and sharp waste using brown cardboard with a given symbol according to the character of the waste. Management of infectious waste hasn't been in accordance with regulation of environment and forestry minister No. 56/2015 because the symbol should be attached to the yellow plastic wrap.

d. Storage Activity

Based on Regulation of environment and forestry minister No. 56/2015, medical waste especially for infectious waste can be stored for two days at temperature greater than 0°C. If will keep it more than 2 days (maximum 90 days) must be stored in a freezer with temperature less than 0°C while for hazardous and toxic waste including sharps waste such as syringes, needles and the other waste can be kept for maximum of 90 days for more than 50 kg/day and maximum of 180 days for equal or less than 50 kg/day.

e. Transportation and Processing Activity

In Indonesia every person, group or company that processes hazardous and toxic waste shall have license from Ministry of Environment and Forestry (government regulation No. 101/2014). The hospital has incinerator but don't have the license to use it for waste treatment so they use third party (Tenang Jaya Sejahtera Company) to process their medical waste. The location of Tenang Jaya Sejahtera Company far from hospital so medical waste must be transport to the location and that transportation was also done by Tenang Jaya Sejahtera Company. The hospital cannot use incinerator also because the location of hospital near house residents [3].

5. CONCLUSIONS

Management of medical solid waste in the hospital was done according government regulation No. 101/2014 and regulation of environment and forestry minister No. 56/2015. In transportation and processing activity, the hospitals have done according the regulation. But, some action in collection and storage activity did not accordance with the regulations. The hospital stored infectious waste in temporary dump site for one month but they just stored that waste in yellow trash bag and didn't store it in freezer. The hospital must store it in freezer if it stored for more than two days. Second, medical waste field collector didn't use instrument for their safety. The collector must use instrument for their safety.

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