

The study of solid waste management system of hazardous and poisonous material in public health centers of Barito Kuala Regency, South Kalimantan

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Keywords: Management system, Solid waste of hazardous and poisonous material, Public health center

Publication date: July 9, 2018

Abstract

Medical waste is infectious and dangerous. This poses a serious threat to environmental health and requires special management prior to final disposal. The problem was the increasing number of hospitals, clinics and diagnostic laboratories in Barito Kuala Regency had an effect to the quality and quantity of waste produced. This study aimed to identify the management system of solid waste included the type and amount of waste generated by public health centers in Barito Kuala Regency. The research method used was a field observation method and field data collection through inventory, formal and informal interview. The results showed that the average amount of solid waste of hazardous and poisonous material of public health centers in Barito Kuala Regency was 0.040 kg/day. The composition of solid waste of hazardous and poisonous material of public health centers in Barito Kuala Regency was infectious non-sharps waste (65%), sharp infectious waste (26%), pharmaceutical poisonous (8%), and infusion bottle (1%). The result of identification is known that public health centers in Barito Kuala Regency had conducted solid waste of hazardous and poisonous material management started from sorting, collecting, and transporting. However, at the temporary storage stage it still did not have a special place for storing of solid waste of hazardous and poisonous material. While at the stage of destruction/burning it was still less than the maximum and for infectious waste should be destroyed no later than 2 (two) days.

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Introduction

Environmental problems are closely related to the health world. The existence of interactions in it allows the spread of disease if it is not supported by good environmental condition and sanitary (Paramita, 2007). Public health center according to (Trihono, 2010) is a technical implementation unit of regency/municipality health service responsible for organizing health development in a working area. Public health center is one of the health service units which in its activity produce medical waste and nonmedical waste either in solid or liquid form. Medical waste in the form of solid at public health center is usually generated from activities that come from the treatment room (for inpatient health centers), general polyclinics, dental polyclinics, maternal and child clinics/MCH, laboratories and pharmacies.

The medical waste management of a public health center has a complex problem. These wastes need to be managed in accordance with the existing rules so that environmental management must be systematic and sustainable. Planning, implementation, and continuous improvement on public health center management must be carried out consistently. In addition, human resources who understand the problems and environmental management become very important to achieve good environmental performance (Adisasmito, 2008).

The increasing rate of generation of solid waste of hazardous and poisonous material (medical solid waste) produced by Public health center must be balanced with good management system of solid waste generation so it does not pollute the environment. Environmental Health Requirements of Hospitals states that health facilities are compulsory to manage their waste (Kepmenkes RI. No.1204/Menkes/SK/X/ 2004).

Characteristics of solid waste of hazardous and poisonous material according to (Peraturan Pemerintah RI. No. 101 tahun 2014) that is Explosive, Flammable, Reactive, Toxic, Infectious and Corrosive.

Medical waste generated by health services is 10-25% and the remaining 75-90% is domestic waste. Although fewer medical wastes are produced than domestic waste, the risk to the environment is potentially greater if it is not handled properly. Research conducted at Brookdale University Hospital and Medical Center concluded that 70-80% of infectious waste from hospitals was a noninfectious waste mixed with infectious waste due to poor management.

Hazardous and toxic wastes of public health centers are solid wastes comprising infectious waste, sharps wastes, expired chemical wastes, spills, or packaging residues, pathological waste, radioactive waste, pharmaceutical waste, cytotoxic waste, waste with heavy metal content high, and pressurized gas/pressure container waste. (Permen LHK RI. No. 56 tahun 2015).

Medical solid waste generated by public health centers in Barito Kuala Regency, no research has been done on the generation, composition and management. So it is necessary to identify the management patterns of the resulting medical solid waste. This study aimed to identify the management system of solid waste included the type and amount of waste generated by public health centers in Barito Kuala Regency.

Materials and methods

Materials

The equipments used during the research were portable scales, gloves, masks, tubs/sample boxes, rulers, cameras and computers.

Methods

Direct observation/measurement method was used to obtain the primary data in the form of existing management condition needed to calculate the amount of generation and composition of solid waste of hazardous and poisonous material of Public health center. The frequency of sampling time and data collection was 8 consecutive days.

The method of calculating the amount of generation and composition of solid waste of hazardous and poisonous material of public health center was the whole of the solid waste of hazardous and poisonous material from the results of the public health center activities taken from the location of public health center, and then the volume would be measured and weighted. The sum of all volumes was calculated and obtained the average of the generation and composition of solid waste of hazardous and poisonous material, in accordance with SNI (Indonesian National Standard) 19-3964-1994 on the method of sampling and measurement of samples of solid waste of hazardous and poisonous material composition of Public health center by using the following formula.

While to identify the management system of solid waste of hazardous and poisonous material of public health center was obtained through interview with a field observation method and a field data collection through inventory, formal and informal interviews. Interviews were conducted toward employees directly related to the management of solid waste of hazardous and poisonous material at the public health center.

Results and discussion

Based on the measurements made in the room that produced the average medical waste at most of the five public health centers in Barito Kuala Regency, the difference of the average amount of generation of solid waste of hazardous and poisonous material of each location was Berangas Public health center with the average amount of generation of solid waste of hazardous and poisonous material of 0.046 kg/day and the volume of solid waste of hazardous and poisonous material of 1.28 liters/day, Semangat Dalam public health center with the average amount of solid waste of hazardous and poisonous material of 0.036 kg/day and the volume of solid waste of hazardous and poisonous material of 1.08 liters/day, Anjir Muara

public health center with the average amount of solid waste of hazardous and poisonous material of 0.041 kg/day and the volume of solid waste of hazardous and poisonous material of 1.20 liters/day, Anjir Pasar public health center with the average amount of solid waste of hazardous and poisonous material of 0.038 kg/day and the volume of solid waste of hazardous and poisonous material of 1.13 liters/day and Mandastana public health center with the average amount of generation of solid waste of hazardous and poisonous material of 0.040 kg/day and the volume of solid waste of hazardous and poisonous material of 1.20 liters/day.

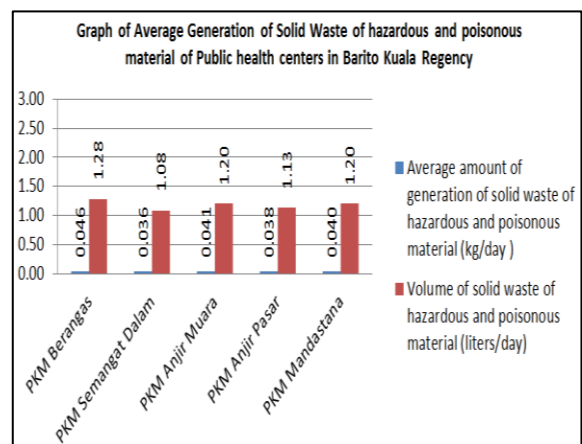


Fig. 1. Graph of Average Generation of Solid Waste of hazardous and poisonous material of Public health centers in Barito Kuala Regency.

So the average amount of generation of solid waste of hazardous and poisonous material of Public health centers in Barito Kuala Regency was 0.040 kg/day. Medical waste tended to be infectious and poisonous chemicals that could affect human health, worsening environmental sustainability if it was not managed properly. Public health center medical waste was all waste generated from public health center activities in solid and liquid forms (KepMenkes RI No. 1428/Menkes/SK/XII/2006).

Health care waste comprising liquid waste and solid waste had the potential to cause transmission that could lead to illness or injury.

The hazardous nature of the health care waste might be due to one or more of the following characteristics (Pruss, 2005): waste contained infectious agents, genococyte waste, chemical or hazardous waste or, radioactive waste and waste contained sharp objects.

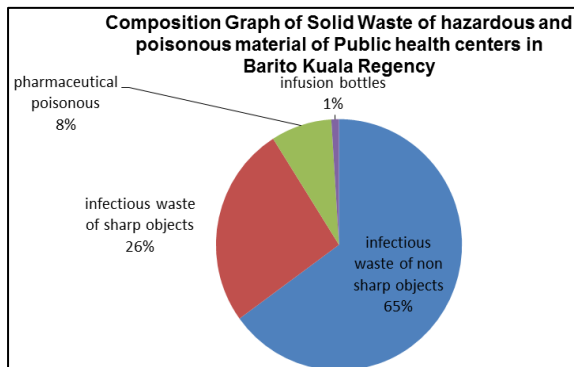


Fig. 2. Composition Graph of Solid Waste of hazardous and poisonous material of Public health centers in Barito Kuala Regency.

Based on the result of composition of solid waste of hazardous and poisonous material at Berangas Public Health Center, Semangat Dalam Public Health Center, Anjir Muara Public Health Center, Anjir Pasar Public Health Center and Mandastana Public Health Center, the first was infectious waste of nonsharp objects (gauze, cotton, tissue, handscoen and plastic bottle of TB patients) with the amount of composition of 65%. The second was infectious waste of sharp objects (syringe) with the amount of composition of 26%. The third was pharmaceutical poisonous (remnant of drug pack, expired drug, medicine bottle/reagent, ampoule and vial) with the amount of composition of 8%. The four wastes were from infusion bottles with the amount of composition of 1%.

According to the officer of medical waste/cleaning service at public health center, the volume of solid waste of hazardous and poisonous material produced was very influenced by the type of usage of health facilities for the illnesses of patients treated in public health center as well as immunization activities every once a week.

The more the number of patients suffering from the illness being treated at a public health center, the more the use of health facilities. So the volume of solid waste of hazardous and poisonous material generated would increase along with the rate of waste generation produced. From the description of the officer of medical waste/cleaning service it could be concluded that waste generation was influenced by several factors that was seen from the factors of health service level of public health center, average number of patient visit at public health center, type of disease handled by paramedics, and number of illness treated in public health center.

The wastes generated in this public health center were not as numerous and varied as hospital waste with a wide capacity and service. However, by looking at the small capacity of solid waste of hazardous and poisonous material of public health center produced in Barito Kuala Regency was not as many as hospitals with large service and capacities. However, medical waste had a risk of contracting viral infections in the blood (Pruss, 2005).

The management system of solid waste of hazardous and poisonous material in Public health centers of Barito Kuala Regency at the time of the existing condition:

1. The sorting process of medical solid waste. All waste bins owned by Public Health Centers in Barito Kuala Regency were distin-guished between medical waste and nonmedical waste. Plastic coating bags were always installed and replaced every day when the bins were emptied. Based on the observations, five Public Health Centers in Barito Kuala Regency did the sorting phase well.
2. The collecting and temporary storing processes of medical solid waste. Five Public Health Centers in Barito Kuala Regency did not have temporary storing place of hazardous and poisonous material.

The Public Health Centers collected first into a closed container, if the container was full then the solid waste of hazardous and poisonous material would be sent to the Public Health Center which had an incinerator tool to do the incineration. While Public Health Centers that had an incinerator tool stored solid waste of hazardous and poisonous material into a closed container made of antipuncture and antileaking material and then put it into the incinerator room. Hapsari, (2010) Further explained in the transport process by the officer concerning the carrying bag, that bags with color should be discarded if it contains 2/3 parts.

3. The transporting process of medical solid waste. From the results of field observation, transporting of solid waste of hazardous and poisonous material of Public health centers in Barito Kuala Regency was done by using a pick-up car and a private vehicle; all would be transported when the solid waste of hazardous and poisonous material was full. It should use a special transport vehicle, so it would not be contaminated with other objects and to avoid mixing with other materials. According to Chandra, (2007), used vehicles must be eligible in terms of ease of use and cleaning, besides that they should also be equipped with a leak collection tool.
4. The destruction /burning process of medical solid waste. At this stage the public health center did the destruction with insenaration of solid waste of hazardous and poisonous material by using an incinerator. 2 (two) Public Health Centers did the destruction/burning at Public Health Center itself that was Anjir Muara Public Health Center and Mandastana Public Health Center. While 3 (three) Public Health Centes namely Berangas Public Health Center, Semangat Dalam and Anjir Pasar Public Health Centers, did the destruction by sending solid waste of hazardous and poisonous material to Anjir Muara Public Health Center.

The solid waste of hazardous and poisonous material of Public Health Centers in Barito Kuala Regency was non sharp infectious, sharp infectious, pharmaceutical poisonous and infusion bottle burned with an incinerator at temperature of 800 - 1300°C with capacity of 80 kg with diesel fuel. The burning of solid waste of hazardous and poisonous material of Public Health Centers was adjusted to the Public Health Center budget for operational cost of incinerator. The process of inceneration was highly dependent on the budget funds from the Public Health Centers in Barito Kuala Regency.

Conclusion

Based on the results of research that has been implemented, it is obtained the following conclusions:

- a. The average of medical solid waste generation of Public Health Centers in Barito Kuala Regency was 0.040 Kg/day.
- b. The composition of medical solid waste of Public Health Centers in Barito Kuala Regency was infectious non-sharp waste (65%), sharp infectious waste (26%), pharmaceutical poisonous (8%), and infusion bottle (1%).
- c. In the temporary storing process, Public Health Centers in Barito Kuala Regency still did not have a special place for storing of solid waste of hazardous and poisonous material. While in the process of destruction/burning it was still less than the maximum and for infectious waste it should be destroyed no later than 2 (two) days.

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