

## **B3-Medical waste management Fas Yankes Bogor district health office in 2018**

**Jenni Ria Rajaguguk**

Faculty of Mechanical Engineering, Krisnadwipayana University, Jakarta

\* jenniria\_rajaguguk@yahoo.com

**Abstract.** Health service facility is a device and / or place used to carry out health service efforts in promotive, preventive, curative, and rehabilitative that carried out by the Central Government, Regional Government and / or the community. Based on the regulation of Indonesia Republic Number: 47 of 2016 concerning Health Service Facilities in article 4 that the types of Health Service Facilities as referred to in article 3 (Health Service Facilities provide health services in the form of individual health services; and / or public health services) consist of independent practice sites health workers, public health centers, clinics, hospitals, pharmacies, blood transfusion units, health laboratories, optics, medical services for legal purposes and traditional health care facilities. Likewise, based on PP No.47 of 2016 which is about the implementation of independent practices of health workers and traditional health service facilities. In this case the government gives the widest possible permits to health workers as long as they fulfill the requirements, Government and Private health facilities in Bogor Regency in 2016. It shows that there will be potential pollution of health facilities waste, if it is reviewed according to Minister of Health Regulation 1204 in of 2015, evaluating the condition of B3-Medical waste management from health facilities and providing policy for service health for managers of B3-Medical Waste in Health Facilities. And the research method is a theoretical research method with the aim of knowing and running the management of B3-Medical waste FasYanKes in Bogor. The results achieved are the process of managing B3-Medical waste from in 4 regions 42 Subdistricts and government hospitals and private hospitals, clinics and others more to management in Bogor district basically has the same process that is from the reduction / sorting of medical and non-medical waste, sorting , transporting waste to polling stations, processing and burial / stockpiling are stored at TPS until full, then the final process of solid medical treatment is carried out through combustion using an incinerator and overall the process of Medical-B3 waste management in Fasyankeas in Bogor Regency is not yet in accordance with the provisions, namely Environment and Forestry Candy Number: P.56 / MenLHK-Setjen / 2015, namely following the procedures and technical requirements for the Management of Hazardous and Toxic Waste from Health Care Facilities 2004. The problem is how to manage B3-Medical Waste according to Minister of Environment Regulation No. 56

### **1. Preliminary**

Health service facilities are a device and / or place used to carry out the health service efforts in promotive, preventive, curative, and rehabilitative, which are carried out by the Central Government, Regional Government and / or the community. Based on the Republic of Indonesia Government Regulation Number: 47 of 2016 concerning Health Service Facilities

in article 4 that the types of Health Service Facilities as referred to in article 3 (Health Service Facilities provide health services in the form of individual health services; and / or public health services) consist of independent practice sites Health workers, public health centers, clinics, hospitals, pharmacies, blood transfusion units, health laboratories, optics, medical service facilities for legal purposes and traditional health care facilities. Health care waste includes (1) waste originating from Health Service Facilities which is non-risky waste or general waste and resembles household waste (administrative activities, other operations (75-90%). (2) Waste that is considered dangerous and can cause various types of health impacts (10-25%), in the form of infectious waste, pathological waste, sharp objects, pharmaceutical waste, genotoxic waste (very dangerous and mutagenic, teratogenic, or carcinogenic) which often cause problems that complicated), chemical waste (organic and non-organic), waste containing heavy metals, pressurized packaging waste, radioactive waste

So that the population will be affected negatively (Population at Risk) B3 health facilities if not properly are Medical Officers, Patients, Fasyankes Support Staff, B3 Waste Management Officers and surrounding residents. Likewise, based on PP No.47 of 2016 which is about the implementation of independent practices of health workers and traditional health service facilities. In this case the government gives the broadest permits to health workers provided they meet the requirements. From the data in Bogor Regency, one of the Public Hospital and Puskesmas facilities and the RSUD has a volume of B3-Medical Waste Generation in 2016, as shown in table 1.

**Table 1.** Medical Solid Waste from Hospital District of Bogor in 2016

NO	MONTH	FASYANKES		TOTAL (Kg)
		PUSK (Kg)	RSUD (Kg)	
1	JANUARY	1148.5	13805.63	14954.13
2	FEBRUARY	1000.8	12539.16	13539.96
3	MARCH	763.46	11654.72	12418.18
4	APRIL	663.4	11808.83	12472.23
5	MAY	1035.7	11830.96	12866.66
6	JUNE	1500.9	13342.45	14843.35
7	JULY	1007.5	14779.55	15787.05
8	AUGUST	1050	15076.07	16126.07
9	SEPTEMBER	1459.2	15930.59	17389.79
10	OCTOBER	1039	16246.78	17285.78
11	NOVEMBER	1207	14669.68	15876.68
12	DECEMBER	1255.5	16768.46	18023.96
	TOTAL	13130.96	168452.9	181583.8

Solid medical volume (according to time, place and region) originating from RSUD in Bogor regency in 2016, Government and Private health facilities in Bogor Regency in 2016. Show that there will be potential pollution of health facilities if reviewed according to Minister of Health Regulation 1204 in 2004. The problem is how the management of B3-Medical Waste according to Minister of Environment Regulation No. 56 in 2015, evaluates

the condition of B3-Medical waste management from the health facility and provides a policy for the health service for B3-Medical Waste managers in Health Facilities. And the research method is a theoretical research method with the aim of knowing and running the management of B3-Medical waste FanYanKes in Bogor.

## **2. Literature Review**

### **2.1 B3-Waste and Factors Affecting Health**

Waste from various health service facilities both hospitals, clinics and health centers, will produce both liquid and solid waste. Hospital / puskesmas solid waste is better known as hospital waste. Solid waste is the result of industrial waste in the form of solids, sludge or slurry originating from a processing process (Daryanto, 1995). Regulation of the Minister of Health Number 1204 of 2004 concerning Environmental Health Requirements for Health Facilities, waste is all waste generated from activities in the form of solid, liquid, and gas. The Puskesmas System Model uses the Input, Process and Output component approaches or commonly abbreviated as IPO of the Puskesmas Program activities.

1. The Input component includes all the resources, facilities and infrastructure that will be used in the health service (transformation) process in the Puskesmas, which consists of 6M + Time, the explanations are man, money, material, methods, markets, machine and time.
2. The Process Component includes the use of resources (6M + Time) that is carried out to produce quality service for the puskesmas, consisting of (a) Process performance of medical / paramedic and non-medical / paramedic staff Process of using materials and drugs and other supplies, (b) Process of using work procedures / public health services or Standard Operating Procedure (SOP) for medical and community health services, (c) Process of achieving patient services and meeting public health needs or Minimum Health Service Standards (SPM-Health) targets Populations are employed by Puskesmas, (d) Process of using medical equipment and equipment, (e) Process of revenue and budget use (budgeting) and (f) The process of utilizing the time or time needed in each use of Puskesmas resources.
3. The Output component includes service results or activity results that can be in the form of service coverage, procurement of goods and services, namely quality (quality) of basic health services by Puskesmas, both preventive - Promotions as public health services and curative-rehabilitative as medical financial services useless, not used or wasted which can be distinguished into medical and non-medical waste and categorized as sharp objects, infectious waste, cytotoxic and radioactive wastes that are harmful to health and the environment.

### **2.2 Stages of B3 Waste Management - Medical Facilities**

In waste management, it really takes care of all aspects, for example in terms of health, especially the surrounding environment, facilities that are used, health workers on duty in this matter and minimizing the risk of the spread of diseases and work accidents. In general, B3-medical waste management will have different implementation practices between health facilities, which generally consist of Sorting, Settlement, Transportation, Temporary Shelter and Destruction (Fattah, et al, 2007).

Reduction and Sorting is to avoid the use of materials containing hazardous and toxic materials if there are other choices, to do good house keeping for any material or material that

has the potential to cause health problems and / or pollution to the environment, segregate waste streams according to type, group, and / or waste characteristics, carry out good governance in the procurement of chemicals and pharmaceutical materials to avoid accumulation and expiration and to prevent and periodically maintain equipment on schedule.

B3 waste storage facilities for B3 waste and / or B3 waste landfill shall be no later than 90 (ninety) days, for B3 waste produced at 50 kg (fifty kilograms) per day or more; or 180 (one hundred and eighty) days, for B3 Waste produced less than 50 kg (fifty kilograms) per day for category 1 B3 Waste, since B3 Waste is produced.

Arrangements for the management of medical B3 waste according to LHK candy: P.56 / Menlhk-Setjen / 2015, The health requirements according to the Permenkes P.56 / Menlhk-Setjen / 2015 are eligible if the trash can is leak-proof and anti-stick, has a lid and is not easy to open, solid medical waste that will be used must be through sterilization, medical waste materials using labels (color of plastic bags / containers), and groups, color codes, symbols, packaging and management of medical waste from sources of Minister of Health 1204/2004 concerning health requirements hospital environment.

Transportation is divided into two, namely internal and external transportation. Internal transportation starts from the initial collection point to the disposal site or to the incinerator (on-site processing). In internal transportation the cart is usually used as a labeled one, and is regularly cleaned and the implementing officer is equipped with protective equipment and special work clothes. External transportation, namely transporting medical waste to off-site disposal. External transportation requires proper implementation procedures and must be followed by the officers involved.

Temporary Shelter (TPS) for this waste container that has strong properties, does not easily leak or mossy, avoid being torn or broken, have a lid and not overload. Shelter in medical waste management is in accordance with standardization of bags and containers such as by using various colored bags as stipulated in Minister of LHK Regulation Number: P.56 / Menlhk-Setjen / 2015 where the pockets are yellow with biohazard symbols for infectious waste, purple pockets with a cytotoxic symbol for cytotoxic waste, a red bag with a radioactive symbol for radioactive waste and a black bag with "domestic" writing.

Final Disposal Site (TPA) Most of the waste and the like is destroyed by incinerator or by using the sanitary landfill method. This method is used depending on specific factors that are in accordance with the institution, the applicable regulations, the environmental aspects that affect the community. An incinerator is a term used to describe all combustion systems, even if only one is commonly seen as effective. In this guideline the incinerator is used to explain the combustion process carried out in a double chamber incinerator which has a strict monitoring mechanism and control of combustion parameters. The storage period of B3-Medical Waste, especially for waste with infectious characteristics, sharp objects and pathologies is stored in the B3 Waste storage area before B3 waste transportation is carried out. Processing of B3 waste and / or landfilling of B3 waste no later than 2 days at a temperature of > 0°C or

### **2.3 B3 Waste Treatment Plant-Medical Facilities**

Based on the Minister of Education Decree Number: P.56 / Menlhk-Setjen / 2015 concerning procedures and Technical Requirements for the Management of B3 Waste from Health Facilities in Chapter 4, B3 Waste Management is in Article 17 paragraph 1 as follows: (1) B3 Waste Treatment as intended in Article 5 letter d carried out thermally by B3 Waste producers who have a B3 Waste Management Permit for B3 Waste Management activities; or

B3 Waste processor who has a B3 Waste Management Permit for B3 Waste Management activities. (2) Thermal treatment of B3 Waste as referred to in paragraph (1) letter a shall be carried out using gravity type and / or vacuum type autoclave equipment, microwave, radio frequency irradiation and / or (3) thermal B3 waste incinerator and treatment by B3 Waste Processing as referred to in paragraph (1) letter b can only be done using incinerator equipment. (4) B3 Waste Processors that carry out Thermal B3 Waste Treatment as referred to in paragraph (1) letter b must have cooperation with B3 Waste Producers. And the Incinerator type, as shown in table 2.

**Table 2. Incinerator Type**

1.	Incinerator brand	-
2.	Incinerator Capacity	300 kg/hour
3.	First combustion temperature	800°C-1.000°C
4.	Second combustion temperature	1.000°C -1.200°C
5	Volume of the first combustion chamber	12,5 m <sup>3</sup>
6.	Volume of the second combustion chamber	11,2 m <sup>3</sup>
7.	Emergency chimney height (from the ground)	15 m
8	Emergency chimney diameter	0,7 m
9	The height of the main chimney (from ground level)	30 m
10.	Main chimney diameter	0,6 m
11	Fuel	Solar
12	Feed System	Authomatic System ( <i>lift bucket</i> )
13	Air pollution control device	Cyclone/Water scrubber

### 3. Research Methodology

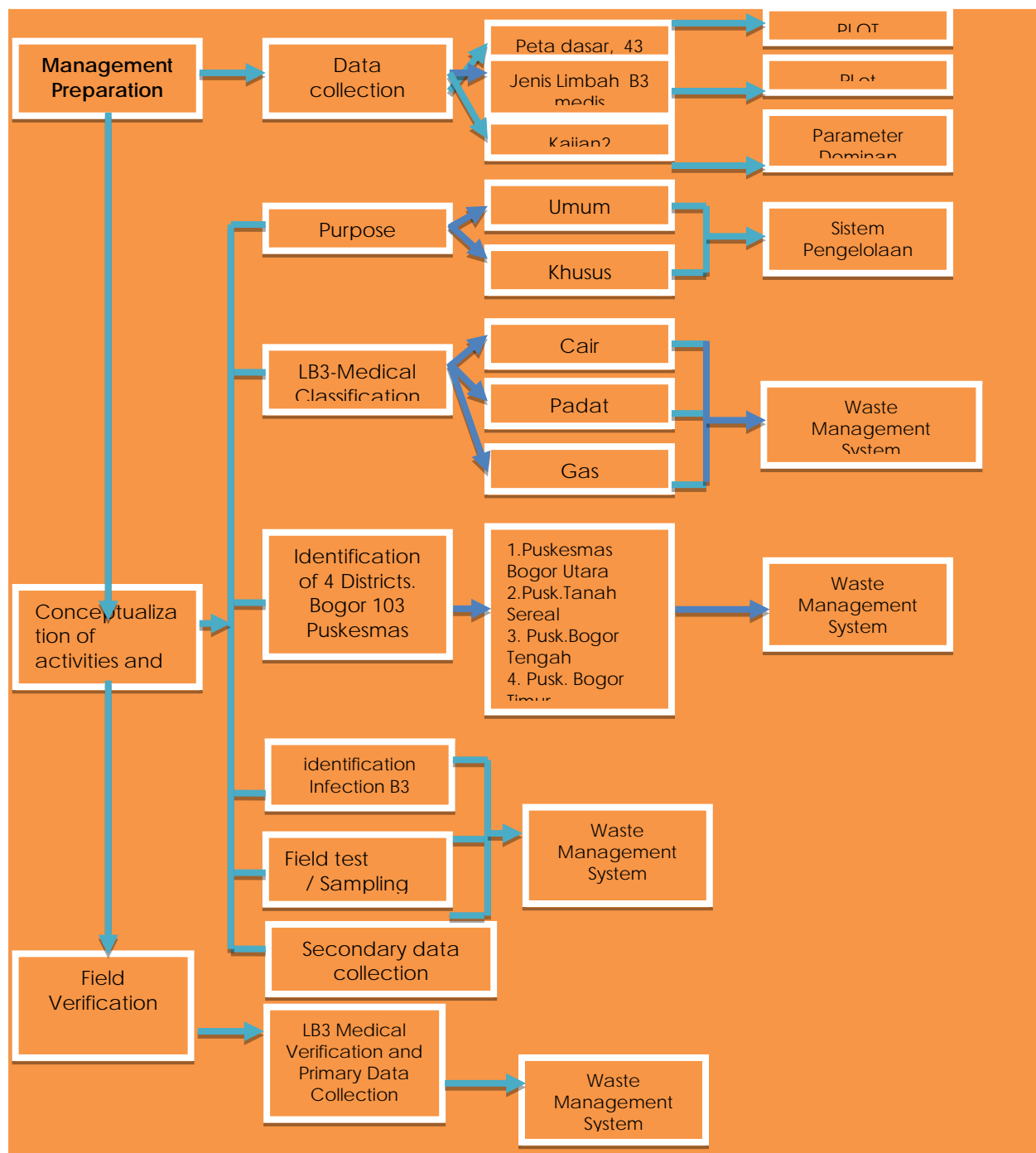
#### Activity Procedure

B3-Medical Waste Management activities in the Bogor District Health Office Location in 2018, the research procedure is shown in Figure 1.

In the preparation stage of B3 Waste Management for the Bogor District Health Office in 2018, as follows:

#### Primary and Secondary Data

Primary data is carried out as a result of measurements and composition, observations from the results of studies and observations of existing management conditions (Reduction/ sorting, storage, transportation, processing and burial.Distribution of waste producers) and this qualitative study using a case study design. The sampling technique uses purposive sampling. The research subjects were Head of P2PL Division of Bogor District Health Office (1 person), Head of Environmental Health Section (1 person), Bogor Health Cooperative Secretary (1 person), Head of Community Health Center (5 people), Community Health Center sanitation (5 people), Management waste in the Puskesmas (5 people). The instruments used are in-depth interview guides, voice recorders, check list guideline sheets, cameras. And Secondary data is data obtained through other parties, not directly obtained by researchers from the research subjects (documentation, the results of the meeting, and the study results).



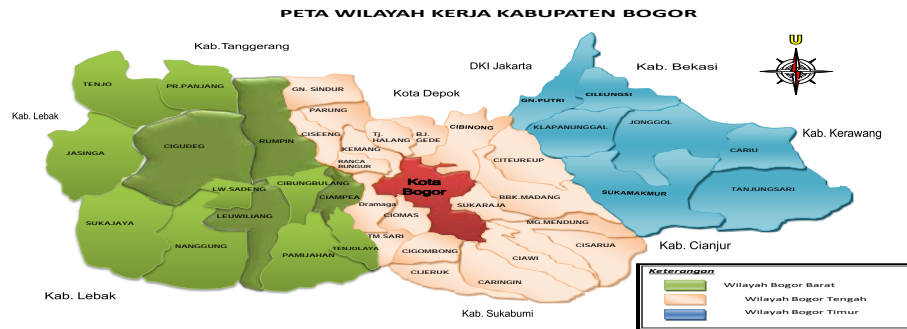
**Fig 1. B3-Medical Waste Management Preparation Research Procedure in Health Facilities**

### Pharmaceutical Product Packaging

B3-Medical waste materials which during the manufacture, processing, storage, use and disposal of waste can release dust particles, gases, fibers, radiation which can cause irritation, corrosive, poisoning, fire, explosion and other hazards that can cause health problems, disabilities, death and damage to property and the environment. Infectious waste is waste that is suspected of containing pathogenic material, for example laboratory culture, waste from

isolation rooms, cotton, materials or equipment touched by extra infected patients. Examples of infectious ingredients: medical waste, injection patient fluids, etc.

### Map of Bogor Regency Work Area, see Figure 2. Below



**Figure 2.**Map of Bogor Regency Work Area

Based on the map of the working area in Bogor Regency which consists of 42 Subdistricts with 103 Puskesmas, the category of hazards for B3-Medical waste in health facilities is listed No. 37. B3-Medical Waste from general specific waste sources from hospital activities is coded A337-1, A337-2, A337-3, A337-4, A337-5, B337-1 and A337-2 with hazard categories 1 and 2 .

### Field Test / Sampling with Secondary Data Collection

Data / documents regarding the management of B3-Medical waste in health facilities in the Bogor district and several regulations for the analysis of B3-Medical Waste Management as follows:

1. Law Number 4 of 1984 concerning Outbreaks of Infectious Diseases.
2. Law Number 23 of 1992 concerning Infectious Diseases.
3. Law Number 44 of 2009 concerning Hospitals
4. Law No. 18 of 2008 concerning Waste Management
5. Government Regulation Number 40 of 1991 concerning Prevention of Outbreaks of Communicable Diseases.
6. Regulation of the Minister of Health of the Republic of Indonesia Number 1204 concerning 2004 concerning Hospital Environmental Health Requirements.
7. Regulation of the Minister of Health of the Republic of Indonesia Number 9 of 2014 concerning Clinics
8. Minister of Health Regulation Number 9 of 2014 concerning Clinics.
9. Decree of the Minister of Health Number 1493 concerning Use of Medical Gas at Health Service Facilities.
10. RI Minister of Environment and Forestry Regulation Number P.56 of 2015 concerning Procedures and Technical Requirements for the Management of Hazardous and Toxic Waste from Health Care Facilities.
11. RI Government Regulation Number 47 of 2016 concerning Health Service Facilities
12. RI Government Regulation Number 66 of 2014 concerning Environmental Health.

### 13. Government Regulation Number 18 of 1999 concerning Management of Hazardous and Toxic Materials

#### **Medical B3 Waste Verification and Primary Data Collection**

Verifying the Location of B3-Medical Waste Pollutant Locations This activity phase aims to compare the location of B3-Medical waste pollutant sources obtained between secondary data and data in the field, and then records the base of B3-medical waste pollutant sources according to their area. The presence of new B3-Medical waste pollutants, changes in the location of waste water disposal activities, or the cessation of operations of an activity are examples of changes that affect the list of B3-medical waste pollutant sources that have been identified. And collect Primary Data. Primary data collection is an activity of collecting data and information at the location level of the activity (field). Primary data collection for the management of B3-Medical waste transportation / health centers / health centers is carried out by measuring the quality of B3-Medical waste health facilities by testing samples of infectious medical B3-waste. Then the rate of B3-Medical waste was also measured to determine the amount of medical B3 waste that was disposed of. The collection of primary data for the management of B3-Medical waste transportation facilities is done by distributing questionnaires and interviews, location surveys, and if possible a field test, which aims to obtain data on specific quantities (factors) released into the environment, such as testing waste samples B3- Medical and transportation management systems that are suitable are used in the Bogor location.

#### **Initial Data Collection Method**

The initial data collection will be used as a basic reference in carrying out the work of "Medical B3 Waste Management of Bogor District Health Office in 2018" based on the Ministry of Environment and Forestry Number: P.56 / MenLHK-Setjen / 2015 obtained from relevant agencies through an institutional survey. The type of data, data source, and purpose of its use in the initial data collection in preparation for medical B3 waste management activities as presented in Table 6.

#### **Making Geographic Information Systems**

Making maps on work activities "B3-Medical Waste Management Medical Facilities in Bogor Regency Health Office in 2018" aims to present data and results of analysis "Management of B3-Medical Waste Transport Fasankes Bogor District Health Office. Mapmaking process begins with selecting data, data tabulation, and grouping data according to mapping requirements, the data from the secondary and primary surveys are then arranged in a tabular form which will become the database load. The complete stage in making maps (GIS) is (1) Procurement of basic maps, collection of maps in the form of a map of the earth, maps, and images of aerial photographs, which are still raster (image / image). If a digital map is available, it is necessary to pay attention to the suitability of the scale and accuracy of digitizing data which will later be used in the GIS application. (2) Digitizing Maps, digitizing maps is the process of converting from analog maps to digital maps by using digitizing tables or by way of onscreen digitizing (digitized directly on a computer screen) to form a raster digital maps through a scanning process. (3) Editing and Checkplot, editing is done as an effort to rectify sightings and polygons of digital maps and the substance or content of each sector of spatial planning, topography, and appropriateness of writing in mapping. Checkplot is an attempt to correct the results of digital conversion and editing on the previous map. (4)



Standardization, map depth resolution needs to be determined according to GIS mapping requirements. Standardization of mapping needs to be done so that maps can be used as references for other map processing, especially in this scope of work.

#### 4. Discussion

##### B3-Medical Waste Management Analysis in Health Facilities

Management of medical waste according to the Ministry of Environment and Forestry Number: P.56 / MenLHK-Setjen / 2015, technical procedures and requirements for LB3 Management from Fanyaskes can be described as follows: flow of the process of managing solid medical waste in health facilities, namely from the start of waste disposal, must have been done in a separate place. Apart from being separated between infectious and non-infectious waste (domestic waste). Each room must be provided with a trash bin made of strong material, quite light, rust resistant, waterproof and easy to clean and equipped with plastic bags as follows: (1) infectious waste using a yellow plastic bag. (2) sharp objects and needles are accommodated in special containers such as bottles. And (3) domestic waste uses black plastic bag, separate between wet and dry waste.

After separating the waste according to the type of waste in a separate place then collected and transported to the TPS, then the final waste management is carried out. The management of solid waste is distinguished, wherein infectious waste must be destroyed in the incinerator, while domestic waste can be buried, burned or transported to the Final Disposal Site (TPA). Based on the results of the study, from the map of the Bogor Regency work area. Data from several Health Service Facilities in Bogor Regency found 42 sub-districts with 103 Puskesmas. Then, taken to represent health facilities in northern Bogor, Fasyankes Puskesmas Tanah serial, Bogor Tengah and East Bogor health facilities, there are types of health service facilities consisting of independent practice sites for health workers (specialists, dr, drg, midwives, etc.), Community Health Centers (Puskesmas), Clinics, Hospitals, Pharmacies, Blood Transfusion Units, Health Laboratories, Optics and medical service facilities for legal purposes and traditional health care facilities (Batra). Based on Table 4.

**Table 4.**Health facilities with some waste production

No	Activity	Waste Production
1	Care	Syringes, IV tubes, gauze, catheters, gloves, masks Medicine packs / bottles, etc.
2	Surgery	Syringes, IV tubes, gauze, catheters, gloves, masks, packs / medicine bottles, scalpels, body tissues and blood bags
3	Laboratory	Syringes, sputum pots, urine / faeces pots, reagents, chemicals, glass slides
4	Polyclinic	Syringes, IV tubes, gauze, catheters, gloves, masks, packs / bottles of medicine, etc.
5	Pharmacy	Dos, plastic / glass medicine bottles, plastic wrap, paper, expired medicine, remaining medicine
6	Radiology	Carrige films, films, gloves, paper, plastic.
7	IGD	Carrige films, films, gloves, paper, plastic.
8	Kitchen	The rest of food ingredients (vegetables, meat, bones, feathers, etc.), food scraps, paper, plastic wrap
9	Landry	Plastic bags
10	Office	The rest of food ingredients (vegetables, meat, bones, feathers, meat,

		bones, feathers, etc.), food scraps, paper, plastic wrap
11	KM/WC	Bandages, soap, toothpaste

And some regulations for the analysis of B3-Medical Waste Management are as follows:

- Law No. 23 of 1992 concerning HEALTH (Article 22 environmental health is held to realize the quality of a healthy environment)
- Decree of the Minister of Health of the Republic of Indonesia No. 876 / MENKES / SK / VIII / 2001 concerning Technical Guidelines for Analysis of Environmental Health Impacts
- Decree of the Minister of Health of the Republic of Indonesia No. 1204 / MENKES / SK / X / 2004 concerning Hospital Environmental Health Requirements
- Decree of the Minister of Health of the Republic of Indonesia No. 661 / MENKES / SK / VIII / 2004 concerning the Working Group on the Management of the Impact of Medical Waste on Health Care Facilities
- Presidential Regulation No. 7 of 2005 concerning the 2005-2009 National Long-Term Development Plan (Healthy Environment Program)
- LHK Regulation, Number: 56/2015 concerning Procedures and Technical Requirements for B3 Waste Management from Health Service Facilities.

Based on several regulations above, this can be assessed from the process of managing medical waste carried out in solid and liquid form, the type of solid medical waste produced consists of waste sharp objects namely objects or tools that have sharp angles, sides, edges or protruding parts which can cut and pierce the skin such as syringes, intra-venous equipment, pasteur pipettes, broken glass, and scalpels, Infectious waste is waste related to patients who need isolation of infectious diseases and laboratory waste related to microbiological examination of polyclinics and treatment rooms isolation of infectious diseases, Waste tissue of the body which includes organs, limbs, blood and body fluids, usually produced from the time of surgery , Toxic waste is material that is contaminated by toxic drugs during sparks, transportation and therapeutic actions and Chemical Waste, namely waste generated from the use of chemicals, laboratories and sterilization processes. From B3- Medical waste, there are many diseases that attack surrounding humans from mild to severe, both those that are in direct contact with waste and those that breathe polluted air. Diseases that may arise due to contaminated medical waste include diarrhea, worms, skin, anthrax, meningitis, AIDs, dengue fever, to hepatitis. For the environment, medical waste can pollute sources of clean water, disturbance or damage to plants and animals. It is because of the compounds of nitrates (acids, bases and salts), chemicals, disinfectants, metals and phosphorus.

### **Analysis of Disposing Behavior in Health Facilities in Bogor Regency**

According to the Minister of Environment and Forestry of the Republic of Indonesia Number: P.56 / MenLHK-Setjen / 2015 in Chapter 3 concerning the reduction and sorting of B3 Waste Article 6 paragraph 1 are (1) B3 Waste reduction and sorting as referred to in Article 5 letter a must be carried out by Producing B3 Waste. (2) Reduction of B3 Waste as referred to in paragraph (1) shall be carried out by means of, inter alia: a. avoid the use of material containing hazardous and toxic substances if there are other choices; b. conduct good governance of any material or material that has the potential to cause health problems and / or pollution to the environment; c. conduct good governance in the procurement of chemicals and pharmaceutical materials to avoid accumulation and expiration; and D.

prevent and periodic maintenance of equipment on schedule. According to the Indonesian Minister of Environment and Forestry No. 56 / LHK / 2015, what is meant by medical waste for health facilities is all waste produced from health facilities in solid and liquid forms?. Hospital / puskesmas officers must be able to carry out that every solid waste must be separated, between infectious and non-infectious waste. Every room must be provided with a trash bin made of strong material, quite light, rust resistant, waterproof and easy to clean and equipped with a plastic bag. Officers dispose of medical waste separately because sometimes they also dispose of non-medical waste in the trash for medical waste. This is done when the non-medical waste bin is full. If you get a warning from a sanitation officer, but have not been heeded, if you only provide one trash can in each unit, it is very ineffective. Need to know Health care waste consisting of liquid waste and solid waste has the potential to cause exposure that can lead to illness or injury (Pruss. A,2005).

### **Analysis of Solid Medical Sorting in Health Facilities**

According to the Indonesian Minister of Environment and Forestry No. 56 / LHK / 2015 in paragraph (3) Sorting of B3 Waste as referred to in paragraph (1) is carried out by means of, such as: a. separate B3 Waste based on type, group and / or characteristics of B3 Waste; and b. accommodate B3 Waste according to the B3 Waste group. (4) The procedure for reducing and sorting B3 Waste as referred to in paragraph (2) and paragraph (3) is listed in Appendix I which is an integral part of this Ministerial Regulation. And to facilitate the introduction of this type of waste is by using a coded bag (generally with a colored code). Color codes are black bags for domestic waste or ordinary household waste, yellow bags for all types of waste to be burned or infectious waste (Adisasmito,2009).

The sorting of medical waste should be carried out from the beginning, since from each service room, the separation of medical waste from the room is the first step to minimize the contamination of non-medical waste. Waste sorting is carried out when medical services take place; this sorting is in each service unit. So in each service unit, it is important to sort out medical waste to reduce risk factors for transmission.

A cleaning service for sorting is only done for infusion bottles and vaccine bottles because later they will be resold, the rest goes straight to the incinerator's house to wait full. Likewise, solid medical waste is not only burned, but such as infusion bottles, vaccine bottles, and used boxes are collected separately for sale to outsiders. Another thing in Fasyankes has been sorting out the types of medical waste at the time of garbage disposal, so just take it in a medical waste bin. But for infusion bottles, vaccine bottles and used cardboard, they are sold back to collectors.

The trash cans are labeled with writing on duct tape coated with medical and non-medical waste. Medical waste sorting begins at the time of medical services, in each health service unit. Besides the color separation, medical waste uses a red plastic bag, while the black bag is used for non-medical waste. For places where medical waste is closed, non-medical waste sites have no labels and are open. As a reference, segregation of medical waste must be done because medical waste is harmful to health. Whereas the non-medical waste area has no label and is open. Since the beginning of disposal, waste generated from activities Health care facilities have been disposed of separately, medical waste is disposed of in waste, medical and non-medical waste disposed of in non-medical waste areas. Sometimes there are still visible medical officers dumping other types of garbage in medical bins.

Fasyankes has a sort of medical and non-medical waste place without labeling, without the color difference of the trash can, so it is sorted manually by the cleaning service officer.

Medical facilities for medical and non-medical waste with labeling, without the difference in color of garbage bags, while Fasyankes has labeled the place of waste or the color difference of plastic bags making it easier to sort. Separation of waste does not yet fully meet the standards, because it has not used plastic bags with different colors, which shows where the plastic must be transported for incineration or discarded (Pruss, 2005).

According to No.56 / LHK / 2015 Sharp objects and needles that have to be put into special containers such as bottles, but still exist in the Bogor District Medical Faculty who do this. Actually the placement of medical waste using plastic bags does not meet health standards, medical waste containers must be made of materials that are strong, lightweight, rust resistant, waterproof, and the inner surface is smooth. In addition, medical waste that has plastic bags still allows leakage and will increase the risk of contamination (Aris, 2008).

### **Analysis of the Process of Collecting and Transporting Solid Medical Waste in Health Facilities**

The next process is the collection of solid medical waste collected in each service unit, in a closed place. Collection of medical waste is carried out every day by cleaning services officers. After solid medical waste is collected, then transfer to temporary storage facilities is carried out by cleaning service officers every day, manually not using special containers and not through special lines. The storage process before the final management of solid medical waste is carried out differently. The transfer and transportation of medical waste is carried out every day, manually not using special containers and not through special lines. Transfer and transportation of medical waste is from the collection point to the temporary storage area. Temporary storage / collection of medical waste at polling stations for 3-4 days. Solid medical waste produced from the medical service facilities of each Puskesmas ranges from 3 kg to 3.5 kg, because health facilities not only provide outpatient facilities, but also provide inpatient facilities. The process of temporarily storing medical waste in health facilities. The volume of solid medical waste produced from health facilities every day is 5 kg. Accredited facilities are usually crowded with patients every day, because they provide outpatient and inpatient facilities.

Transportation should be used by a stroller and cleaned regularly and the implementing officer is equipped with protective equipment and special work clothes, transportation of medical waste to an off-site disposal site requires proper implementation procedures and must be obeyed by the officers involved. The procedure includes meeting local transport regulations, which are transported in special containers, must be strong and not leaky (Hapsari, 2010). It is further explained in the process of transportation by the officer regarding the bag being carried, that the bag with color must be removed if it contains 2/3 parts. Then tied the top and clearly labeled and the bag must be transported by holding the neck, so that if carried away from the body, and placed in certain places to be collected Pruss (2005: 67). Part of the process of transporting and transporting medical waste in the district health facility in Bogor using a manual method, meaning that it is taken away with the container using the hands of the clerk, to the transfer.

This can be seen from the results of studies and observations as explained below: several health centers in Bogor, solid medical waste after manually sorted, then taken to the incinerator's house to wait to be burned. Temporary storage is carried out for a minimum of 6 months, and storage is carried out sometimes which still has not been arranged neatly. There are still used syringes scattered around the incinerator's house.

Every day medical and non-medical waste is disposed of into a Temporary Disposal Site (TPS) located in the backyard of the Community Health Center while waiting for the burning process. Sometimes solid medical waste is transported by cleaning service personnel and then taken to be put into barrels the size of this temporary storage is carried out within 3-4 days to await the final handling process. Non-medical waste is transported every day by the DPU to be transported to the Final Disposal Site (TPA).

Collection of medical waste should be completely separated between medical and non-medical waste, including the separation and collection of medical waste based on characteristics. Collection of medical waste from health facilities is still in a separate condition between medical and non-medical waste. Among other things, at polling stations before final handling, they are still mixed with non-medical waste. The prolonged storage process results in messy, irregular and more dangerous storage areas that can cause infection. Infectious waste can contain a variety of pathogenic micro-organisms. Pathogens can enter the human body through several pathways: As a result of punctures, abrasions, or sores on the skin, through mucous membranes, through breathing and through ingestion.

Sharp objects not only can cause scratches or punctured wounds but can also infect wounds if they are contaminated with pathogens. Because of this double risk (injury and disease transmission), sharp objects are included in a very dangerous group of waste. The main concern that arises is that infections are transmitted through transportation which can cause the entry of agents that cause disease, such as viral infections in the blood (Pruss. A, 2005).

### **Final Treatment Analysis of Solid Medical Waste in Health Facilities**

If the waste at the polling station is full, there are several health centers that carry out final handling or destruction without using an incinerator. Fasyankes (Some Puskesmas / Hospitals) also use incinerators, but it is done after 6 months of collection due to fuel efficiency reasons. There is also doing the remaining combustion ash back into the ground (Landfill) and for non-medical waste transported by the DPU to the landfill. The final process of the final handling of medical waste in the Puskesmas in general is not in accordance with the Ministry of Environment and Forestry Number: P.56 / MenLHK-Secretariat / 2015 concerning the procedures and requirements for environmental management of hospitals and differentiated solid waste management, where for infectious waste it must be destroyed in the incinerator, while non-medical waste can be buried, burned or transported to the Final Disposal Site (TPA).

Medical waste produced by health facilities has a negative impact on living things and the surrounding environment, because the disposal of medical waste is collected and then burned with incinerator or ordinary combustion. Medical waste that is burned in the place of burning waste or will cause or cause air pollution, smoke from burning medical waste can be inhaled by patients, families of patients, and health workers who work in health facilities or by people who live around the health facility. In addition, medical waste is burned not necessarily immediately destroyed, then the waste will be left and collected or accumulated in the soil which can cause the soil around the incinerator or health facilities to be barren, or an unpleasant odor. Moreover, incinerators or incinerators near chemical substances from medical waste such as fertile land make the kitchen to cook food for patients or people's homes around Fasyankes, of course this will disturb.

In addition, combustion carried out by health facilities with incinerators or ordinary combustion is incomplete combustion, because infectious waste is not destroyed. Incomplete combustion will produce combustion ash which has a high level of heavy metals because the ash contains chemical and metal elements so that sublimation does not occur. Based on

laboratory tests on the ash from combustion medical waste shows the high content of heavy metals in the ash from combustion. In combustion using an incinerator, the gas content of NO<sub>2</sub>, CO<sub>2</sub>, SO<sub>2</sub>, CO<sub>2</sub> and Pb in ambient air is predominantly derived from combustion of diesel fuel which is used as feeder fuel in burning medical waste. NO<sub>2</sub> gas has toxic properties. The concentration of NO<sub>2</sub> between 50-100 ppm can cause pneumonia, a concentration of 150-200 ppm can cause compression of bronchioli (bronchiolitis fibrosis obliterans) so that it can cause people to die within 3-5 weeks after exposure (Aris, 2008).

### **Operation Process Constraints of the Incinerator**

*The incinerator* provided by the Health Office is only capable of accommodating and burning solid medical waste with a capacity of 10 kg. When it first gets an incinerator, the incinerator is only used a number of times then it is not used. At that time the incinerator was not used for several reasons, as follows: (1) Electricity and fuel costs, because all of the Puskesmas funds themselves had no operational costs. The Health Office only builds but there is no confirmation at all with the head of the puskesmas, (2) Sometimes it is used, namely when there is a lot of medical waste. Since being given an incinerator until now the puskesmas has never been given training in how to use an incinerator, (3) Existing incinerators only turn infectious medical waste into non-infectious medical waste, not destroy it. Besides being constrained by funds to operate an incinerator, since being given an incinerator until now the puskesmas has never been given training on how to use an incinerator, and another obstacle is that officers who use incinerators, namely cleaning or cleaning services, have never been trained even though there is an incinerator Standard Operational Procedure (SOP). Training is only done at the time the unit is given by the contractor, not from the Health Office

### **Analysis of Work Accidents in the Last Management of Solid Medical Waste in Health Facilities**

The sanitation officer Fasyankes did not admit that there had been a work accident because cleaning service officers always used personal protective equipment such as gloves, shoes and masks. According to the sanitation officer, when the garbage is still put together then it is burned in a ground hole, often with needle sticks. There is no treatment from Fasyankes and the cleaning service officer treats the wound himself. The cleaning service officer explained that the cleaning service staff had been punctured when the final management process of solid medical waste, although cleaning service officers always used gloves and shoes too.

The use of personal protective equipment has been regulated in Law No.1 of 1970 concerning work safety, specifically articles 9, 12 and 14, which regulate the provision and use of personal protective equipment in the workplace, both for employers and for workers. Based on the results of the study for health facilities, the cleaning service staff had experienced a needle stick and a health facility was responsible for taking medication.

### **Handling of Solid B3-Medical Waste Management Process in Health Facilities with Environment and Forestry Candy Number: P.56 / MenLHK-Setjen / 2015**

Management of B3-Medical waste according to Kepmenkes No.56 / LHK / 2015 there are some that are not carried out, which are not carried out or not obeyed by some health facilities in Bogor Regency, West Java. Labeling of bins between medical and non-medical waste is only partially carried out by health facilities and does not do labeling. Separation of medical and non-medical waste according to the provisions must be separated by using

different colors of plastic bags namely yellow plastic bags for infectious waste and black plastic bags for non-medical waste and separate between wet and dry waste, health facilities separating medical waste from red bags and non-medical waste with a black bag color.

The separation of sharp objects and needles (inserted in a bottle) is also not done in other health centers. Collection of waste at temporary collection sites is carried out by the majority by health facilities. Furthermore, the final process of managing solid medical waste in health facilities according to the provisions must use an incinerator that has the capacity to destroy infectious waste, not all health facilities do it. Separation of solid medical waste based on the provisions must still be carried out until the final management is carried out by the facility between medical and non-medical waste burned together in the same place. Medical waste should be destroyed by an incinerator, while non-medical waste is burned or buried separately or dumped into landfill. It is evident that good medical waste management is said to not be in accordance with the applicable provisions, namely provisions in the management of medical waste according to the Ministry of Environment and Forestry Number: P.56 / MenLHK-Setjen / 2015.

Solid waste management from medical and medical support activities will be carried out according to the instructions of the Ministry of Health as outlined in the hospital clinical waste management guidelines and hospital sanitation from the Indonesian Ministry of Health handling medical waste such as gauze pads, cotton, plaster, bandages, sanitary napkins, catheter hoses, blood transfusion hoses, intravenous tubes, body tissue / surgery pieces, and all objects that contaminate the patient's body fluids are collected in a yellow plastic bag. Then this medical waste is transported to TPS in infectious medical waste capacity of 8 m<sup>3</sup> with dimensions of width 2 m in length 2 m and 2 m. Handling infectious solid waste such as syringes, intravenous needles, wing needles, syringes, abbocaths, ampules, vials, bisturi and all objects that are sharp or can be injured can be collected in a special place that is yellow. Then this infectious waste is transported to TPS of infectious medical waste. Whereas the handling of medical liquid waste such as the residual infusion fluid, the remaining laboratory samples and the remaining chemical solutions are collected in jerry cans and then transported to TPS of infectious medical waste.

Management of medical, infectious and B3 waste from hospitals in Bogor district will be cooperated with third parties that have the permission of the Indonesian Ministry of Environment and Forestry. Based on Minister of Health Decree No.1204 of 2004 hospital medical waste is waste in which consists of infectious waste, pathological waste, sharps waste, pharmaceutical waste, cytotoxic waste, chemical waste, radioactive waste, pressurized kointaner waste and waste with heavy metal content tall one. Medical solid waste produced is collected by type of container which has been determined in the Minister of Health Decree No.1204 of 2004.

Non-medical waste generated by hospital activities is estimated to depend on the type and amount as follows: (1) Used oil from the use of a 20 liter / year generator set, (2) Used light bulbs, batteries, printer cartridges, used monitors, printer ink, cleaners floors, glass cleaners, insect and mouse cleaners, paint, thinner, etc. amounting to 0.6 m<sup>3</sup> / day. sludge generated from hospital waste water treatment processes generally includes LB3 categories of 2.3 m<sup>3</sup> / day.

Handling of this waste needs to be separated from other domestic wastes. In the hospital, there will also be a B3 (Non-Medical TPS LB3) shelter with an estimated capacity of 6 m<sup>3</sup>, used ink cartridges, used lamps, perfume bottles or anti-insect bottles with a type of plaster and closed brick construction with a dimension of 1.5 m, length 2 m and height 2 m. The

determination of this polling station will be cleared out of permission to the DPM-TPS of the Bogor Regency City. B3 waste management is then cooperated with third parties who have obtained permission from the Indonesian Ministry of Environment and Forestry with the transportation period 4 days. Estimated types and amount of hospital waste as follows: (1) Types of infectious medical waste such as syringes, intravenous needles, pipettes, sanitary napkins, plaster, cotton at 0.086 m<sup>3</sup> / day. (2) Non-infectious medical waste such as ampules, infusion sets and spuiuit wraps of 0.8 m<sup>3</sup> / day. And (3) Infectious liquid wastes such as large volumes, infusion solutions, etc. are 0.0025 m<sup>3</sup> / day.

## **5. Conclusion**

Based on primary data, secondary data and the results of studies for B3-medical waste management activities in Bogor Regency Health Facilities and guided according to the Environment and Forestry Candy Number: P.56 / MenLHK-Setjen / 2015, and others. Then some conclusions can be drawn as follows: (1) The process of managing B3-Medical waste from 4 regions 42 Subdistricts and public and private hospitals, clinics and others is more in management in Bogor district basically has the same process, namely from waste reduction / sorting medical and non-medical, sorting, transporting waste to TPS, processing and burial / stockpiling stored at TPS until full, then the final process of solid medical treatment is carried out, namely through combustion using an incinerator. (2) Overall, the process of managing B3-Medical waste in Fasyankeas in Bogor Regency has not been in accordance with the provisions, namely the Ministry of Environment and Forestry Number: P.56 / MenLHK-Setjen / 2015, namely following the procedures and technical requirements for the Management of Hazardous and Toxic Waste from Service Facilities Health and following Government Regulation No. 101 of 2014 concerning Management of Hazardous and Toxic Waste (PP101/2014). (3) The current condition, the management of B3-Medical Waste in Fanyaskes is indicated to be responsible for the waste processing producer because it must be able to determine the amount of health facilities and the amount of waste, B3 waste storage, storage and function permits, transporters, waste processors, compliance with regulations (report ) and type / type of contract and implementation mechanism, so that the settlement is addressed to the service provider, namely the number of service providers and types of services, type / type of contract and mechanism of implementation and evaluation. (4) Standardize B3 medical waste starting from the process, procurement, storage, use and disposal of Medical-B3 waste and establish an SOP policy regarding the handling, management, transportation, storage and disposal of Medicinal B3 waste according to the standards of Health Facilities. (5) For Fasyankes in Bogor Regency is to provide two types of bins (medical and non-medical waste) in each puskesmas service unit, provide temporary shelter or depots before being carried out to insenarators, labeling trash bins, namely waste labels medical and non-medical waste, providing different color crackle bags for trash bins, for example red for medical waste and black for non-medical waste, carrying out separate separations for medical waste of sharp objects and needles, for example put into glass bottles, arranging well the medical waste to be stockpiled , so as not to scatter and endanger and provide personal protective equipment for cleaning services, namely breathing masks, rubber gloves and boots. and suggested to the Bogor District Health Office to supervise, supervise and supervise health facilities in the Bogor Regency regarding B3-medical waste management in health facilities. And To Related Parties when providing incinerator assistance to Fasyankes so that their conformity is reviewed and reconsidered regarding operational costs, incinerator capacity and training (training) to officers who operate the incinerator



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