

# Evaluation of Solid Medical Waste Management at Public Health Center in Magetan – East Java Province

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**Abstract**—Public Health Center (PHC) is a technical implementation unit of the District Health Office / City who has responsibility for organizing health development in their working area. Public Health Center produces medical waste from treatment room, general clinic, dental clinic, laboratory, and pharmacy. These medical waste can cause injury and infection for everybody, especially the person who works with the medical waste. This research aimed to evaluate the management of solid medical waste at Public Health Centre in Magetan – East Java. This research is an observational descriptive study. The study was conducted in two inpatient public health centers with PONED in Magetan, namely Karangrejo and Maospati. The sample of each health center is 7 respondents consisting of public health center manager, nurse / midwifery, laboratory officer, pharmacist, two people sanitarian, and 1 janitor.

The results showed that from 17 variables were assessed in the management of solid medical waste for public health center Karangrejo obtain a score of 41,17% with a value scale enough. Public health center Maospati obtain a score of 35,29% with a value scale less. Public health center Karangrejo had seven variables that qualified. The variables were resources (quantity personnel, facilities, organization), the variable process of implementation (source of waste, waste minimization and sorting). While Public health center Maospati had 6 variables, namely variable resources (quantity of energy, organization), implementation of the process variable (source of waste, waste minimization, segregation and collection). This results indicate that some variables ratings do not meet the requirements, so the Health Department should conduct training / training management of solid medical waste, by inviting the head of the health center, medical personnel, sanitarian and cleaners (cleaning service). Beside that, they had to taking notes mop reports, complete SOP documents, and budgeting for facilities yet exist. Build commitment at the health center to dosorting well, building a temporary storage area representative, handed external transport stage to the stage of final disposal to a third party who has obtained permission

solid medical waste treatment from the Ministry of Environment.

**Keywords**—Evaluation, solid waste management, Public Health Center, Magetan.

## I. INTRODUCTION

Public Health Center (PHC) is a technical implementation unit of the District Health Office/City who has responsibility for organizing health development in their working area. Public Health Center as the unit that serves the public health sector also produces medical waste from the treatment room (for inpatient health centers), general clinic, a dental clinic, a mother and child clinic, laboratory and pharmacy (Pratiwi, 2013). PHC is divided into three categories, namely outpatient health centers, community health centers and clinics inpatient hospitalization with the Neonatal Basic Emergency Obstetric Care (PONED) (provincial health office of East Java, 2013).

The purpose of this study was to evaluate the management of solid medical waste in Public health center inpatient PONED in Magetan East Java Province. Research on the management of solid medical waste in health institutions (hospitals, health centers, dental clinics, laboratories, etc) and the impact on health workers many in developing countries, including Indonesia, but the evaluation refers to some regulations and guidelines, including solid medical waste management existing health centers especially inpatient health centers with basic emergency has never been done. Magetan is one of the areas that have health centers with basic emergency hospitalization. Solid medical waste for inpatient health centers PONED between 396-600 kg/year, with an average of 506.3 kg/year/health centers. The separation of medical waste are divided into two categories, namely sharps and infectious waste. Based on observations and interviews on environmental health staff Magetan Regency Health Office, the result that not all the attendant sorting out medical waste properly, they found medical waste mixed with domestic waste and infectious waste mixed with sharps waste. From the results of the

survey in Bangladesh stated that the composition of the waste generated from health facilities, 77.4% are non-medical waste, and 22.6% are medical waste. Where there were still mixing between medical and non medical waste, all waste will be classified as waste medical (Shareefdeen, 2012).

Some of the problems experienced by piskemas hospitalization with Poned in Magetan is not yet have the human resources specifically for the management of medical waste, lug waste of plastic bags with containers used color codes are not the same, combustion using an incinerator ever protests of citizens as black smoke and smells bad, and there are health complaints from collectors of waste that punctured sharps waste during waste collection.

**II. RESEARCH METHODS**

This study was an observational descriptive study to evaluate the formative solid medical waste management in Public health center Magetan. Formative evaluation was conducted in order to improve ongoing activities and based on the daily activities, weeks, months, or years, or a relatively short time (Supriyanto and Damayanti, 2006). Benefits of formative evaluation to provide feedback to the Head of Public health center and staff on medical waste management as well as the obstacles faced.

The study was conducted in two inpatient health centers with Poned Magetan, namely health centers and health centers Karangrejo Maospati. The research subject will be taken by purposive sampling. Large sample of each health center is is 7 respondents consisting of 1 Head Health Center, 1 nurse / midwife 1 laboratory officers, one pharmacist, two people sanitarian and 1 janitor.

**III. RESULTS AND DISCUSSION**

PHC Karangrejo a health center with basic emergency care with the number of beds 14 TT, 2 and 5 ponkesdes pustu. The working area covers 13 villages / wards, with an area of 15.2 km<sup>2</sup>, a population of 23 597 people. In 2014 the number of visits 35 665 visits, 717 inpatients and 33.2% BOR. While Public health center Maospati a health center with basic emergency care with the number of beds 14 TT, 2 and 5 ponkesdes pustu. The working area covers eight villages / wards, with an area of 13.26 km<sup>2</sup>, a population of 25 869 people. In 2014 the number of visits 35 663 visits, 628 inpatients and 33.2% BOR.

To realize the implementation of solid medical waste management in health centers the adequacy, resources need to be supported, among others, human resources (quantity and training), costs, facilities, SOP, organizing, reporting and record keeping.

*Table 1 Data and Information Related Resources About Medical Solid Waste Management on Inpatient Health Center Poned Magetan 2015*

No	Variable	Inpatient Public health center with Poned			
		Karangrejo	√	Maospati	√
Quantity of Human resources					
1	quotation results	“ ... Workers who specializes in medical waste there are 3 people janitor .... “ (S, 54 years old)		“...The amount is sufficient, the cleanliness of your own personnel who handle medical waste and non-medical .... “ (E, 56 years old)	
	Observation results	The number of workers in charge: 2, operational staff: 3 people	√	The number of workers in charge: 2, operational personnel: 2	√
Training of Human resources					
2.	quotation results	“ ... No one has ever received training, but in March invited socialization PPI team building health centers, hospitals Soedono invited by Madiun ... “ (S, 54 years old)		“ ... Never before has there training ... “ (E, 56 years old)	
	Observation results	Noone follows the training of solid medical waste management	-	Noone follows the training of solid medical waste management	-
Budget					
3.	quotation results	“ ... There is no specific budget, all departments satisfied... “		“...budget we seek from health centers, none of the agencies, the carriage until the end of the department,	

		(S, 54 years old)		from the general fund that is in us ... each unit delivered to the treasurer, and has become a routine requirement, lysol of duty, chlorine GFK, teeth often wear, for example lain2 ER, till date there is no problem, the quantity is less, ideally trash should wear injek, for us it's a gradual, long ya been fulfilled. About the damage're not together, while it is quite... ” (E, 56 years old)	
	Observation results	Intern budgeting of Public health center	-	Intern budgeting of Public health center	-
<b>Infrastructure</b>					
4.	quotation results	“...incinerator was there ....” (S, 54 years old)		“...to the problem of whether or not enough, PHC strives to meet.....” (E, 56 years old)	
	Observation results	Of the 18 items required, there is a trolley that is not covered.	-	Of the 18 items required, there are four items that do not exist	-
<b>SOP</b>					
5.	quotation results	Hasil Kuotasi : “...there was SOP processing medical waste, stored by sanitarian ... ” (S, 54 years old)		Hasil Kuotasi : “... we've been there SOP, through time, we serahi control and prevention of infectious diseases at the health center, a new activity for us, stages of socialization, no organizational structure, no responsible person, but this is something new for us, and we are in transition to implement the PPI at the primary care level ..” (E, 56 years old)	
	Observation results	1. SOP hand washing. 2. SOP med-waste treatment 3. SOP decontamination, cleaning and sterilization 4. SOP safety injection	-	1. SOP hand washing. 2. SOP medical waste treatment	-
<b>Organizing</b>					
6.	quotation results	“...After the socialization of medical waste management we put the PPI, but no details of the activities carried out....” (S, 54 years old)		“...there SKnya and organizational structure, which has not been the implementation of activities, in July we discussed at the time by chance minlok sanitation workers ....” (dr E, 56 years old, Public health center Maospati manager)	
	Observation results	There was PPI Team and organization decision letter	√	There was PPI Team and organization decision letter	√
<b>Recording reports</b>					
7.	quotation results	Hasil Kuotasi : “...does not exist, or may be asked direct sanitariannya ....” (S, 54 years old)		“...if the record does not exist as far nuwun sewu it yes ... Mr. D that mature later, the agency model scales, do not see the numbers how many, an important sign...” “...when the war until today sanitarians responsible for the management of medical waste operationally, Mr. D, indirectly conveyed indirectly to friends in the sub unit, but has not formally been.. “...later submitted to teman2 how tupoksinya, commitment, we got through it. Unofficially informal, we are already carrying out that activity, how formalized only ...” (E, 56 years old)	
	Observation	Not having a solid medical waste	-	Not having a solid medical waste generation records,	-

results	generation records, records clerk accidents due to solid medical waste, and note the type and weight of medical waste is transported out PHC		records clerk accidents due to solid medical waste, and note the type and weight of medical waste is transported out public health center	
$\Sigma$	3		2	
(%)	42,85%		28,57%	
Scale	Enough		Less	

Based on the data and information on the quantity of power related to the management of solid medical waste in Public health center inpatient PONED, which is to force the person in charge of more than 2 people, and operational personnel are also more than 2 people in every health center, and all of them in the category of qualified. The training which have been followed by a health worker related to the management of solid medical waste had never been there, and all of them in the category not qualified.

The costs related to the management of solid medical waste in three types of health centers, it can be concluded that no budget sourced from the budget for the operational management of solid medical waste in health centers. For the operational management of solid medical waste in health centers (plastic containers, bins, containers, trolley) using funds from other sources, and in the category not qualified.

Based on the data and information on measures concerning the management of solid medical waste in health centers PONED hospitalization, it can be concluded that for this type of inpatient health centers, Karangrejo and Maospati have no means complete. The SOP of solid medical waste, it can be concluded that for

this type of inpatient health centers, health centers Karangrejo in the category qualified, while PHC Maospati, categorized as ineligible. The organization related to the management of solid medical waste Public health center inpatient PONED, it can be concluded that for PHC inpatient PONED is qualified. There is decision letter and Team Organizational Structure PPI for each PHC.

The recording reports related to the management of solid medical waste in Public health center inpatient PONED everything is not eligible, because they do not have a record generation of solid medical waste generated health centers every day, the case records of accidents attendant result of solid medical waste and records the type and weight of waste that are transported to a medical clinic. In the form of an oral report to the Head of Public health center practiced by most health centers. From 7 variables measured, there was one health center that has enough value scale, namely PHC Karangrejo with a score of 42.85%. And the scale of less value, namely PHC Maospati with a score of 28.57%. The sources of solid medical waste in health centers can come from all room.

Table 2 Categories, Examples, and Space Producing Solid Medical Waste in Inpatient Health Center PONED in Magetan 2015

No	Waste Category	Example Waste	Space Producer
1.	Infectious waste	All were exposed to fluids, blood from patient	All wards
2.	Pathological waste	The placenta, tissue, blood, body fluids	ER, PONEK Space, Space KIA, wards, Poli Gigi
3.	Sharps waste	Needle, vial breaks, transfusion equipment devices, pipette rupture	Treatment rooms including immunizations and lab space
4.	Pharmacology waste	Ampoules of drugs, expired drugs	dispensary
5.	Genotoxic waste	-	-
6.	Chemical waste	Chemical material	Laboratory
7.	Waste high levels of heavy metals	Yes	Yes
8.	Pressurized container waste	Aerosol cans, oxygen cylinders former	ER, ward
9.	Radioactive waste	-	-

Based on the data in table 2 of the health centers do not generate waste cytotoxic (genotoxic), and radioactive waste. In June 2015 the measurement of solid medical waste generation in Inpatient Health Center Poned, can

be informed that the health center with basic emergency hospitalization, health centers Karangrejo produce solid medical waste generation of 1.33 kg / day and Public health center Maospati 1.51 kg / day.

Table 3 Data and Information Related Resources About Medical Solid Waste Management on Inpatient Health Center Poned Magetan 2015

No	Variable	Inpatient Public health center with Poned			
		Karangrejo	√	Maospati	√
Medical Solid Waste Sorting					
1.	quotation results	"... the syringe is inserted safety box, segregated infectious sign yellow basket, bottle infused set apart, on-demand services ..." "... friends already know their garbage must be separated according to its kind..." (S, 54 years old)		"... Already separated from the room, trash covered, on-demand services, vials, syringes, syringe set apart, infusion bottles ...." "... we have a transit depot while at the back, Mr. T is not active for sorting, eg ER friends already split from the room, but yes not that far ..." "... each the responsibility of the service unit, so masing2 should know about sorting it..." "... Already separated from the room, trash covered, on-demand services, vials, syringes, syringe set apart, infusion bottles ...." (E, 56 years old)	
	Observation results	1. Segregation of solid medical waste in health centers Karangrejo done at the time medical services took place, on each unit of service. 2. Sharps are put in safety box, 3. Infectious waste put into containers / bins medical yellow color, with a red plastic bag. 4. Waste ampoules of drugs, from the room space medicine, laboratory put into containers / bins medical yellow color with a plastic bag in red / black. 5. The infusion bottle is inserted into black plastic bags. 6. Based on the observations they found sharps waste mixed with gauze / bandage (infectious waste).	√	1. Segregation of solid medical waste in health centers Maospati done starting from the source 2. Sharps (needles, lancet, broken ampoules), vial and syringe, use a trash can tread in gray with a white plastic bag. 3. Infectious waste (gauze, bandages, blood, urine, faeces, sputum), pharmaceutical waste (residual former drug ED / damaged, infusion bottles, former waste reagents) and pathological waste container / container used made of fiberglass yellow / red Safety box for sharps waste. 4. The results of the field observations, the container / container for solid medical waste is not all the rooms are yellow, with red plastic bags. Medical waste was found mixed with non-medical waste, so it needs to be re-sorting.	√
Solid medical waste collection					
2	quotation results	"...collected from each service unit, inpatient near Police also deposited ..."		"...so in principle we only collect duties, and we prefer to passive, active duty take"	

		Mr. S (cleaning service) is responsible ... ” (S, 54 years old)		... ” (E, 56 years old)	
	Observation results	1. The frequency of collection every day, <1x24 hours 2. Means of using an open trolley, container yellow, no special track 3. Custom schedule no 4. APD officer Incomplete, only gloves and masks	-	1. The frequency of collection Every day, <1x24 hours 2. The means used by way of carry, container yellow, no special track 3. There is a schedule containing the date and the janitor on duty 4. APD officers complete, long underwear, boots, masks, gloves	√
	Solid medical waste temporary storage				
	quotation results	“... We provide a place, its location next to the incinerator, and always locked, sanitarian and Mr. M (Cleaning Service) could enter... ” (S, 54 years old)		“... There in the back, but the full, because of the Department has been no decision, so ya..ditumpuk just behind ... ” (E, 56 years old)	
3	Observation results	1. Building TPS Permanent, flood free, adequate ventilation, only interested can enter 2. Means TPS Container insufficient, placed in plastic bags and plastic bags 3. Frequency of cleaning TPS Rarely do 4. Old solid medical waste storage> 2x 24 hours 5. Disinfection of containers that have been used are not done	√	1. Building TPS Semi permanent, most medical waste is placed outside (open space) location behind building health centers 2. Means TPS Container insufficient, placed in plastic bags and plastic bags 3. Frequency Cleaning TPS No dilakuk 4. Old solid medical waste storage> 2x 24 hours 5. Disinfection of containers that have been used Not done	-
	Solid medical waste transportation				
	quotation results	“...burn it right here, so stay ngangkut just behind ... ” ( S, 54 years old)		“...Transportation is handled by the Department, we just prepare just ... ” (E, 56 years old)	
4	Observation results	1. Means of transporting not available 2. Documents transporting Not available 3. How packaging plastic bags / plastic bags double, safety box 4. How pelabelanTidak no labeling, except for safety box 5. Frequency transporting> 2x24 hours	-	1. Means of transporting Not available 2. Documents transporting Not available 3. How packaging plastic bags / plastic bags double, safety box 4. How labeling No labeling unless safety box 5. Frequency transporting> 2x24 hours	-
	Solid medical waste processing				
	quotation results	“...there is an incinerator, for which need to be disinfected are disinfected ... ” (S, 54 years old)		“...outline public health center collect waste in accordance with the instructions, according to procedure, at a given time taken by health authorities to be destroyed through an incinerator... ” (E, 56 years old)	
5	Observation results	1. Thermal Processing Incinerator (not operating) 2. Processing of chemical disinfection	√	1. Thermal Processing Incinerator (not operating), open burning 2. Processing of chemical disinfection	-

		3. No mechanical processing 4. No carry out biological treatment		3. No mechanical processing 4. No biological Processing	
6	Solid medical waste final disposal				
	quotation results	<i>There is no quotation results</i>		<i>There is no quotation results</i>	
	Observation results	1. Pathological waste disposed of to landfill Specialty 2. Residues sharps waste disposed of to landfill Specialty 3. Residues pharmacological and infectious waste disposed of to landfill Specialty 4. Residue chemical waste dumped into landfill Specialty	√	1. Pathological waste disposed of to landfill Specialty 2. Residues sharps waste disposed of to landfill Specialty 3. Residues pharmacological and infectious waste disposed of to landfill Specialty 4. Residue chemical waste dumped into landfill Specialty	√
	Σ	4		3	
	(%)	50,0%		37,5%	
	Scale	Enough		Less	

Table 4 Observations on TPS and TPA Medical Solid Waste Management in the Inpatient Health Center PONED Magetan 2015

No	Variable	Inpatient Public health center with PONED			
		Karangrejo	√	Maospati	√
1	Conditions in temporary storage	1. The temporary storage only contain medical waste alone 2. Medical waste already separated each category 3. neat, piled in a temporary storage place	-	1. Found mixed with non-medical waste 2. Found gauze / bandage mixed with syringes and ampoules ex 3. Not neat, piled up, there is still a syringe was found strewn outside	-
2	Conditions in final disposal	Sanitary landfill	√	PHC Maospati perform partial burning of the solid medical waste mixed with non-medical waste every three days, because the combustion is not perfect, then at Landfill still found a hose infusion, infusion bottles, and packaging drugs.	-
	Σ		1		0
	(%)	50%		0%	
	Scale	Enough		Very Less	

From Table 4 obtained information from two measured variables, which have considerable value scale, namely Public health center inpatient PONED (PHC Karangrejo) For one more health centers have very less value scale, namely Public health center inpatient PONED (PHC Maospati) score of 0.00%,

Table 5 offers a recapitulation of components resources, processes and results management of solid medical waste in health centers Magetan regency in 2015, include:

components resources consist of human resources (quantity personnel, training), costs, facilities, SOP, organizing, recording and reporting. Component management process consists of: the source of medical waste, waste minimization, waste segregation, waste collection, temporary storage, transportation, treatment and disposal. Components include the management of the condition results in polling stations and at the landfill.

Table 5 Recapitulation component resources, processes and outcomes of solid medical waste management in Public health center Magetan 2015

No	Variable	Inpatient Public health center with PONED
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		Karangrejo	Maospati
1	Human Resources - Quantity Power	√	√
2	Human Resources - Training	-	-
3	Cost	-	-
4	Infrastructure	√	-
5	Operating Standard Procedures	-	-
6	organizing	√	√
7	recording reporting	-	-
8	sources of waste	√	√
9	Minimisation	√	√
10	sorting	√	√
11	Collection	-	√
12	Temporary storage	-	-
13	transport	-	-
14	Processing	-	-
15	Landfill	-	-
16	Conditions in temporary storage	-	-
17	Landfill	√	-
	Σ	7	6
	(%)	41,17%	35,29%
	Scale	Enough	Less

From table 5 it is known that from 17 variables assessed at Public health center Karangrejo, there are seven

variables that qualify, the variable resources (quantity personnel, facilities, organization), the variable process of implementation (source of waste, waste minimization and sorting), variable results (condition TPA) so as to obtain a score of 41.17% with a scale sufficient value. While Public health center Maospati meet 6 variables, namely variable resources (quantity of energy, organization), implementation of the process variable (source of waste, waste minimization, segregation and collection), so as to obtain a score of 35.29% with a scale of less value.

The results of this study indicate that some variables ratings do not meet the requirements, so the Health Department should conduct training / training management of solid medical waste, by inviting the head of the health center, medical personnel, sanitarian and cleaners (cleaning service) with the following notes.

1. The training participants disseminate the results of training for all health worker.
2. Make planning the details of the implementation of existing PPI team.
3. Conduct a situation analysis of medical waste in health centers about the type of waste produced, waste generation and waste production point, adequacy of facilities management, available resources, waste minimization activities Practice, Practice sorting by officers, practice waste collection (including waste transportation procedures, waste

processing procedures, and procedures for disinfection and sterilization).

4. Identify the results of the analysis of the situation, identify the problem, noting the important points. For example, by making the mapping of waste containing titik2 waste production and transportation routes.
5. Make a plan of follow-up ranging from needed resources, materials, budget, etc. The methods used.
6. Build the commitment of all the officers involved in the management of solid medical waste including defining targets to be achieved.

In addition to training programs, the Department of Health should also take into account the financing by identifying the need for the operational management of solid medical waste in health centers could be budgeted through the budget / APBN 2016 and planning budget for the operational management of solid medical waste in health centers. Improvements to the facilities is to identify the shortcomings of solid medical waste management facilities start up phase minimizing the collection and completing facilities, particularly for the trolley, the construction of temporary shelters and containers for collection points.

Sanitarian also need to make a recording of reporting of medical waste management solid based Guidelines for Management of Medical Waste Sharp at the Center for Public Health, Directorate General of Disease Control and Environmental Health in 2012 as well as the monitoring of the management of solid medical waste in health centers by the Head of Public health center and DHO

Magetan. Waste is separated based alternative waste treatment, waste bins in yellow, for waste to be put into an incinerator. Trash red to solid medical waste incinerator that will put / autoclave, safety box for sharps waste. Yellow trash for waste to be dumped into an incinerator, for example pathological waste, microbiological waste. Red bins place for waste that can be processed without any treatment incineration, for example: plastic contaminated infusion, injection tools, catheter, gloves, urine bags, cotton, bandages etc. Medical Color bins have the same color with the color of the plastic bags that are inside, have clear labels, and the same color for each category of waste through the processing stage. While at this stage of waste collection, it is necessary disinfection of all containers that have been used with chlorine 5%, and collecting waste a maximum of 1x24 hours

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