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Research Article

Evaluation of Solid Medical Waste Management System of Puskesmas in Cianjur District

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Abstract

Background **:**Some of the waste produced by community health centers is hazardous waste and can pose a number of health and environmental risks if management is not in accordance with the requirements. This study aims to evaluate the conditions for managing solid medical waste in the Cianjur Regency community health center.
Methods **:** This type of research is a qualitative descriptive study.
Results : The results of the study show that the public health center with the HR condition is quite 90% and less 10%. Public health center with budget conditions in good category 73.3%, and quite 26.7%. Community health center with a condition of facilities and infrastructure of less than 50% category, and quite 50%. Community health centers with SOP conditions in the category of both 90%, and less than 10%. Public health center with conditions for sorting and storing good categories of 46.7%, and enough of 53.3%. all community health centers have sufficient conditions for collecting medical waste. Community health center with conditions for transporting medical categories of waste both 60%, enough 26.7%, and less 13.3%. Community health center with temporary storage conditions medical waste is quite 83.3%, and less 16.7%. a public health center whose medical waste management officers had experienced an accident of 13.3%, whose officers had never had an accident of 86.7%. ***Conclusion*** The conclusion of this study is that most public health center medical waste management is in accordance with the requirements, which are not yet appropriate are aspects of HR, facilities and infrastructure, sorting, use of PPE and Temporary Storage Places.

Keywords: Solid medical waste; puskesmas; evaluation

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Background

Public Health Center (Puskesmas) is an institution that is given the authority to carry out the first level of services in the health sector.[1] In the process of activities there is an interaction that allows the spread of disease if the environmental conditions at the health center where the interaction is not well maintained and not sanitary, the interaction is in the form of a meeting between patients suffering from the disease, health center officials who provide services, visitors, and the community around the location Puskesmas.[2]

Health service activities at the Puskesmas will produce waste as an unwanted residual activity, both in the form of solid waste, liquid waste, and gas waste. About 85% of the waste generated by health care providers is domestic waste and is usually called "harmless waste" or "public health service waste". The remaining 15% of health service waste is considered "hazardous waste" and can pose a number of health and environmental risks.[3]

According to the attachment to Government Regulation No. 101 of 2015 concerning Management of Hazardous and Toxic Waste, medical waste generated by hospitals and health care facilities such as Puskesmas is included in the category of hazardous and toxic waste (B3) with waste code A337-1, which includes B3 waste is clinical waste with infectious characteristics, expired pharmaceutical products, expired chemicals, B3 contaminated laboratory equipment, medical equipment containing heavy metals, mercury (Hg), cadmium (Cd), and the like, pharmaceutical product packaging and sludge wastewater treatment plants (IPAL).[4]

There are 45 health centers in Cianjur Regency, of which 37 are Outpatient Health Centers and 8 are Inpatient Health Centers.[5]

In the preliminary study, the results were obtained that the Puskesmas had carried out medical waste management, but the waste management carried out was felt to be not optimal. Where there are still problems both in terms of inputs, processes, and outputs.

The purpose of this study was to evaluate the condition of solid medical waste management in the Cianjur district health center.

Methods

This type of research is a descriptive study using qualitative analysis to determine the level of solid medical waste management in Cianjur District Health Center. Besides, it also uses quantitative analysis, to determine the condition of solid medical waste management in the Cianjur District Health Center as a whole.

The subjects of the study were the Head of the Community Health Center, sanitarians, janitors, and the Head of the Environmental Health, Occupational Health and Sports Section of the Cianjur District Health Office as the main informant. Then health workers such as doctors, nurses and midwives as supporting informants.

The object of research is an input variable consisting of human resources, budget, facilities and infrastructure and standard operating procedures. Process variables consisting of sorting and storing, collecting, transporting and storing temporarily. And the output variable is in the form of accident rates due to the management of solid medical waste at the Puskesmas.

The research instrument used was an interview guide and an observation checklist table to gather information about the management of solid medical waste in the Puskesmas and other information that supports the management of solid medical waste in the Puskesmas of Cianjur Regency. Then the data is analyzed by comparing the data from interviews and observations with medical waste management standards that have been set so that it can be known whether or not there is a problem in the waste management system in Cianjur District health center, then the reason why the

problem occurs can also be known from the results of monitoring medical waste management in Cianjur district health center and can determine recommendations for solutions to overcome them.

Results

General Description

The process of managing medical waste contained in the Cianjur District Health Center includes the process of reducing, sorting and storing, collecting, transporting, and temporary storage. As for other waste management processes such as treatment, burial, and landfill, they are not managed by themselves but are left to a third party.

Puskesmas in Cianjur Regency works with PT. New Environmental Management Partners (MTLB) as a transporter, with the mechanism of PT. MTLB directly picks up waste to each Puskesmas in Cianjur Regency, even though the collection period is still once a month.

Waste generation in Cianjur Regency for outpatient Puskesmas is 29.94 kg/day of infectious medical waste, 31.16 kg/day of sharp medical waste and 98.38 non-medical waste. For inpatient health centers is 29.54 kg/day of infectious medical waste, 10.25 kg/day of sharp medical waste and 75.23 non-medical waste.

Table 1. Waste generation in Cianjur district health center

No	Description	Outpatient Puskesmas			Inpatient Puskesmas		
		Infection Medical Waste (Kg)	Sharp Medical Waste (Kg)	Non-Medical Waste (Kg)	Infection Medical Waste (Kg)	Sharp Medical Waste (Kg)	Non-Medical Waste (Kg)
1	Day 1	18,75	18,45	60,00	12,6	6,5	48,5
2	Day 2	23,95	23,55	70,00	16,5	13	60,5
3	Day 3	27,55	26,65	85,50	25	11,5	70
4	Day 4	29,20	31,60	98,00	28	8	77
5	Day 5	33,50	35,05	107,00	31,5	8,5	79,5
6	Day 6	36,25	39,65	116,90	38	8,5	86
7	Day 7	34,65	35,55	125,10	42,7	12,5	89
8	Day 8	35,65	38,75	124,50	42	13,5	92
Total		239,50	249,25	787,00	236,30	82,00	602,50
Average in district		29,94	31,16	98,38	29,54	10,25	75,31
Average per Puskesmas		1,20	1,25	3,94	5,91	2,05	15,06

Human Resources

The management of Puskesmas medical waste is carried out by the Environmental Health Program Holder and the cleaning staff of the Puskesmas with the assistance of all officers in the waste generation unit. The holder of the environmental health program acts as the

person in charge of management, the janitor acts as a waste mover and transporter, and officers from all waste-producing units act as waste sorters and collectors.

Based on table 2 it can be seen that the Puskesmas in Cianjur Regency still lack sanitarians as the person in charge of managing medical waste.

Table. 2. Distribution of Latest Education Qualifications of Environmental Health Programs Holders in Cianjur District Health Center

Last Education	Frequency	Percentage (%)
Sanitarian	17	56.7
Nurse	8	26.7
Midwifery	4	13.4
Dental Nurse	1	3.4
Total	30	100.0

Based on table 3 it can be seen that the majority of janitorial education is elementary.The person responsible for managing medical waste and cleaning staff has never attended technical training on Puskesmas medical waste management to increase their competence

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Table 3. Distribution of Latest Education Qualifications of Janitors in Cianjur District Health Center

Last Education	Frequency	Percentage (%)
High school	20	32.3
Junior high school	16	25.8
Elementary school	26	41.9
Total	62	100

Puskesmas that have a sufficient human resource condition are 27 Puskesmas (90%), less 3 Puskesmas (10%) and none have a good category.

The Budget

Most puskesmas already have sufficient budgets for medical waste management. Puskesmas with a good budget category were 22 puskesmas (73.3%) and those with a sufficient budget category were 8 puskesmas (26.7%).

Facilities and Infrastructure

Of the 30 puskesmas that became the study sample, 15 puskesmas had fewer facilities and infrastructure categories (50%) and the remaining 15 puskesmas had adequate facilities and infrastructure categories (50%). Inadequate facilities and infrastructure, especially in the provision of yellow bags and the number of trash bins.

Standard Operating Procedures

Puskesmas in Cianjur Regency already have Standard Operating Procedures (SOPs) and most have carried out SOP socialization to all puskesmas staff, including cleaning staff. There are 27 puskesmas (90%) in the good SOP condition category and 3 puskesmas (10%) in the poor category.

Sorting and Cultivation

In general, the Puskesmas in Cianjur Regency has conducted a waste sorting process, the sorting process is carried out by grouping waste into three groups, namely infectious medical waste, sharps waste, and

non-medical waste, this grouping is carried out by each officer in the unit services that are sources of waste generation. Also, the Puskesmas labels the waste container in the form of writing and infectious symbols on the medical waste container. Waste containers used for infectious medical waste and non-medical waste are containers made of strong, quite lightweight, rustproof, waterproof, and have a smooth surface on the inside, these containers are also equipped with plastic bags, yellow bags for medical waste and black bags for non-medical waste, while for Puskesmas sharps waste use a safety box.

In fact, there are still errors in the aspects of sorting and compartmenting, which is still found in the negligence of officers in sorting according to the waste category. So that medical waste is still found mixed into non-medical bins or vice versa.

Puskesmas that have good medical waste management and sorting conditions are 14 puskesmas (46.7%), 16 puskesmas (53.3%) have enough categories, and no puskesmas is in the poor category.

Collection

In general, the process of collecting medical waste at the Cianjur District Health Center starts by collecting it every day. Then the janitor took a bag containing the waste from each room. After the bag is taken the officer immediately installs a new plastic bag in the trash and is collected by the officer in the trolley to be transported to a temporary shelter (TPS).

The results of observations on aspects of waste collection show that Puskesmas that do not collect waste every day are 1 puskesmas (3.3%), all Puskesmas do not complete waste bags with symbols and labels according to the waste category, all puskesmas have replaced bags after being collected with new bags, all the puskesmas has provided new bags in each waste-producing unit.

All Puskesmas have adequate medical waste collection conditions (100%) and there are no puskesmas in the poor category.

Transportation

The process of transporting waste at the Community Health Center in Cianjur Regency is as follows: after collecting, the janitor immediately transports medical waste to a temporary shelter (TPS), at the time of transportation there are still some things that are not in accordance with the requirements, such as the waste transport officer does not use PPE in full for reasons not accustomed to, transport routes that are still united with the patient / general line, waste transport equipment is not disinfected every day.

The results of observations on the aspects of transporting waste in Cianjur District Health Center are Puskesmas that do not have standard waste transportation equipment as many as 10 Puskesmas (33.3%), Puskesmas that do not disinfect transport equipment every day as many as 8 Puskesmas (26.7%), Puskesmas with waste transport personnel not using complete PPE as many as 5 puskesmas (16.7%), puskesmas not using safe transportation routes as many as 3 puskesmas (10%).

There were 18 puskesmas (60%) in the category of medical waste transportation in good category, 8 in the category of puskesmas (26.7%), and 3 in the less category (10%).

Temporary storage

After the waste is transported from each waste generating unit, the waste is then stored in a Temporary Shelter (TPS). The condition of the temporary shelters (TPS) that exist at each Puskesmas is very alarming, the building seems to be careless without

regard to the building requirements of temporary medical waste shelters (TPS), even some who do not have special buildings, and are kept in public warehouses, buildings also not equipped with supporting facilities such as cold storage to store infectious medical waste, sink, water faucets, emergency countermeasures. Also, when storing, the waste packaging is not equipped with a label. Medical waste is stored for a long time in a temporary shelter (TPS) until there is transportation from a third party, during the storage process the waste is stored without any prior treatment being given.

There were 25 Puskesmas (83.3%) in the temporary storage condition for medical waste, 5 in the Puskesmas (16.7%) in the less category, and no Puskesmas in the good category.

Accident incident

The results showed that for the occurrence of occupational accidents rarely occur only minor physical injuries such as being pricked by syringes and ampoules during the transportation process. Health checks have not been carried out periodically to officers managing solid medical waste. Health checks are carried out if there are complaints from officers on their initiative.

Puskesmas where medical waste management officers had experienced accidents as many as 4 puskesmas (13.3%), Puskesmas whose officials had never had an accident as many as 26 puskesmas (86.7%).

Discussion

Human Resources

When viewed from the HR aspect, the results of the study show that there are 3 puskesmas (10%) that have a lack of human resource category, 27 puskesmas (90%) who have enough categories, and no puskesmas that has a good HR category.

There are 15 puskesmas (50%) that do not have sanitarians, according to the standards of the officer responsible for managing medical waste must have at least a graduate of Environmental Health Diploma III and have attended training on Puskesmas medical waste management. Then, 41.9% of janitors only have attended a primary school education, the quality of janitors must be at least junior high school graduates plus special training. Also, the Puskesmas cleaning staff has never attended special training on Puskesmas medical waste management, the officers only receive directions from the person in charge of managing the Puskesmas medical waste management.

The number and quality of human resources that are still lacking in some health centers due to the lack of human resource planning for waste management, so that only using existing personnel This causes waste management is not optimal in accordance with established standards.

The quality of human resources can affect the quality of a service as Raymond's (2015) study concluded that the Quality of Human Resources has a positive and significant effect on the Quality of Services around 84%, so that the better human resources the better the quality of service.[6] Yulianti's research (2015) also concluded that human resource competence influences the level of service quality.[7]

The number and quality of human resources that are still lacking in some puskesmas due to the lack of human resource planning for waste management, so that it only uses existing personnel. This causes the management of waste is not optimal by established standards.

Therefore, there needs to be improvement and improvement of HR planning which is carried out in an integrated and comprehensive manner. Especially with the provision of minimum sanitary officers in environmental health for all Puskesmas that do not yet have sanitarian officers, and the

provision of simple applicative training that is easy to understand and carry out by Puskesmas cleaning workers who are in education the majority are only primary school graduates.

The Budget

The results showed that there were 8 puskesmas in the moderate category (26.7%), 22 puskesmas in the good category (73.3%). Unfortunately, the adequacy of the budget only covers the budget for the cost of eradicating medical waste by the third, not yet accommodating the need for the cost of facilities and infrastructure for medical waste management.

To optimize medical waste management, the Puskesmas must provide a budget that is adjusted to the Puskesmas waste management needs, unfortunately in the process of implementing the proposed budget is minimized so that there is still a budget requirement that is not met. Whereas at present the Puskesmas has a large enough budget that can meet the medical waste management budgetary needs, understanding and support from the Puskesmas head is very necessary. Also, medical waste management is one of the criteria for evaluating the accreditation of Puskesmas that must be met by each Puskesmas.

Amiruddin's research results (2012) concluded that the better availability of the existing budget and the more implementation of budget availability in public services, it will make a significant contribution to the performance of apparatus services with the magnitude of influence of 23.05%.[8]

For waste management, the Puskesmas must have a separate budget to meet applicable regulatory standards and regulations so that the budget is not used for other purposes outside of waste management. So if the budget for waste management is separate, the allocation of funds will be clearer and more detailed so that all needs for waste management can be met properly. Therefore, there needs to be improvements and improvements in budget planning that are carried out in an integrated and comprehensive manner.

Facilities and Infrastructure

The results showed that 15 Puskesmas had fewer facilities and infrastructure categories (50%) and the rest had adequate facilities and infrastructure categories (50%). Inadequate aspects include the provision of yellow bags for infectious waste so that conditions often occur where yellow plastic bags are not available and replaced with black bags. The number of rubbish bins is also insufficient for each room in the Puskesmas.

The problem of facilities and infrastructure is caused by the perception that the completeness of facilities and infrastructure is only one of the requirements to fulfill accreditation. When the accreditation assessment process has been completed, the condition of facilities and infrastructure will no longer be a serious concern and not carried out optimally.

The results of Ristiani's study concluded that health service infrastructure had a moderate effect on patient satisfaction but significantly influenced patient satisfaction. It is possible that although a health care institution has been equipped with adequate infrastructure, but if it is not functioned as fully as possible to serve patients, it will be less able to provide satisfaction to patients. The complete and functioning infrastructure that is properly functioning will significantly support the achievement of patient satisfaction.[9]

For this reason, all Puskesmas must include the facilities and infrastructure for Puskesmas medical waste management in the Puskesmas budget planning. This must

continue to be done not only when the accreditation assessment will be conducted.

Standard Operating Procedures

The results showed that for the category of SOP conditions in the management of medical waste at the Puskesmas, 3 puskesmas had a less category (10%), 27 puskesmas had a good category (90%). Most of the Puskesmas in Cianjur Regency already have Standard Operating Procedures for handling medical waste. This is because all the Puskesmas in Cianjur are accredited. In one of the accreditation assessments is the existence of standard operating procedures for medical waste management. The lack of Puskesmas is because Puskesmas has not yet implemented the standard operational procedures for managing medical waste to all its employees.

Nugraheni (2017) research results show that there are positive and significant influences between standard operating procedures (SOP) and supervision on performance partially, there is a positive and significant influence between standard operating procedures (SOP) and combined supervision on performance.[10] Therefore, routine socialization regarding SOP for the medical waste management needs to be carried out and monitoring the implementation of SOP by the person responsible for managing medical waste to all Puskesmas employees in Cianjur Regency.

Sorting and Cultivation

The results showed that for the category of conditions for sorting aspects of medical waste management the health center is 16 health centers have enough categories (53.3%), 14 health centers have good categories (46.7%), and not health centers that have fewer categories. This shows that the process of sorting solid medical waste in Cianjur district health centers was largely following LHK Regulation No. 56 of 2015 concerning Procedures and Technical Requirements for the Management of Hazardous and Toxic Waste in Health Care Facilities.[11]

Some errors that still occur in some health centers include: in the labeling of the container there is a label that has been removed, the label of an infectious medical waste container is only given writing without being equipped with an infectious symbol. The study also found several health centers that do not use yellow bags to collect infectious medical waste and are replaced with black or red bags. Also, negligence from officers in sorting was still found following the waste category, such as the discovery of medical waste which was mixed into non-medical waste bins, or vice versa.

The problem of sorting and sorting is caused by the perception of only trying to fulfill all the requirements for sorting, when an accreditation assessment is conducted, when the accreditation assessment process is complete, the condition of sorting is no longer a serious concern and is not carried out optimally.

Sorting is one of the most important steps to measure the success of waste management. Given the fact that only about 10-25% of hazardous waste, management and disposal costs can be greatly reduced if proper separation is done. Hazardous separation from non-hazardous waste also reduces the risk of transmission of workers handling the waste.

Collection

The results showed that for the category of collection conditions for the management of medical waste at the Puskesmas, all Puskesmas had a sufficient category (100%) and there were no Puskesmas that had a lacking category. This shows that the process of sorting solid medical waste in Cianjur district health

centers was largely following LHK Regulation No. 56 of 2015 concerning Procedures and Technical Requirements for the Management of Hazardous and Toxic Waste in Health Care Facilities.[11]

Transportation

The results showed that the category of transportation conditions in the management of medical waste management at Puskesmas was 4 puskesmas which had fewer categories (13.3%), 8 puskesmas had enough categories (26.7%), and 18 puskesmas that had a good category (60%). This shows that the process of sorting solid medical waste in Cianjur district health centers was largely following LHK Regulation No. 56 of 2015 concerning Procedures and Technical Requirements for the Management of Hazardous and Toxic Waste in Health Care Facilities.

Some of the errors that still occur in some Puskesmas are waste transport officers who do not use PPE in full for reasons not accustomed, transportation routes are still united with the patient / public line, waste transport equipment is not disinfected every day. The problem of using PPE is almost the same as the problem of sorting where officers use PPE in full only when an accreditation assessment is carried out, if the accreditation assessment process has been completed, then the officer does not use PPE completely again.

Harlan's research results (2014) regarding Factors Associated with PPE Usage Behavior in Surabaya PHC Puskesmas Laboratory Officers concluded that the majority (60%) of respondents had poor PPE usage behavior while the other 40% had good PPE usage behavior.[12] According to Perwitasari (2006) based on the use of PPE, more than 40% of officers in several laboratories (IGD, hematology, and children) Cipto Mangunkusumo Jakarta General Hospital are at high risk of being infected with dangerous diseases.[13]

Problems with transporting waste occur due to the lack of orderliness of officers in protecting themselves and the lack of attention from the person in charge of waste management regarding the safety of Puskesmas waste management officers. Therefore it is necessary to curb the use of PPE by increasing monitoring by the person in charge of waste management.

Storage

The results showed that the category of storage conditions for the management of medical waste health centers is 5 health centers have fewer categories (16.7%), 25 health centers have enough categories (83.3%), and not health centers that have good categories. This shows that the process of sorting solid medical waste at the Cianjur District Health Center was largely not following LHK Regulation No. 56 of 2015 concerning Procedures and Technical Requirements for the Management of Hazardous and Toxic Waste in Health Care Facilities.

Aspects that have not met the requirements include the condition of temporary shelters (TPS) that exist at each Puskesmas is very alarming, the buildings seem carelessly without regard to the requirements of the building of temporary shelters (TPS) medical waste, even some who do not have special buildings, and stored in a public warehouse, the building is also not equipped with supporting facilities such as cold storage to store infectious medical waste, sink, water faucets, emergency response equipment. Also at the time of storage, waste packaging is not equipped with a label. Medical waste is stored for a long time in a temporary shelter (TPS) until there is transportation from a third party,

during the storage process the waste is stored without any prior treatment being given.

These results are similar to Pertiwi research (2017) where B3 waste storage in temporary shelters (TPS) exceeds the maximum storage limit resulting in the accumulation of B3 waste in temporary shelters (TPS) and cleanliness of temporary shelters (TPS) is not maintained.[14]

The problem of temporary storage of medical waste that is caused by the perception of health centers that only try to meet all the requirements, when an accreditation assessment will be carried out, when the accreditation assessment process is complete, the condition of sorting is no longer a serious concern and is not implemented optimally.

To overcome this, it is better to increase the amount of waste management budget to meet the facilities following established standards and increase the frequency of monitoring of waste management by the person responsible for managing medical waste. This must continue to be done not only when the accreditation assessment will be conducted.

Health Disruption or Accident Due to Medical Waste Management

The results showed that the output aspect of medical waste management in Cianjur District Health Center is the Puskesmas where the medical waste management officer has experienced accidents as many as 4 Puskesmas (13.3%), Puskesmas whose officers have never had an accident as many as 26 Puskesmas (86.7%). In terms of work accidents rarely occur in Cianjur district health centers. Sometimes minor physical injuries occur such as being pricked by syringes and ampoules during the transport process.

Health checks have not been carried out periodically to officers managing solid medical waste. Health checks are carried out if there are complaints from officers on their initiative. In 2004 the WHO had also reported that in the United States there had been a case of Hepatitis B virus (HVB) infection among medical personnel and health service facility waste management personnel, which resulted from sharp objects injuries, as many as 162-321 cases. WHO has also examined the occurrence of 8 cases of Human Immunodeficiency Virus (HIV) infection in France which afflicts health workers, 2 of which are medical waste management workers.[15]

Therefore it is necessary to carry out routine health checks and administering hepatitis and tetanus immunizations to medical waste management officers.

Conclusion

The condition of the input aspects of solid medical waste management in Cianjur District health centers 20% of the health centers have good categories, 73.3% of health centers have enough categories and 6.7% of health centers have fewer categories. The thing that is still lacking is the aspect of the quality of human resources managers and aspects of facilities and infrastructure.

The condition of aspects of the process of managing solid medical waste in Cianjur District Health Center 23.3% Puskesmas have a good category, 76.7% Puskesmas have enough categories and none of them has a less category. What is lacking is that waste is often mixed at the time of sorting, transport of waste by officials without using PPE in full and conditions of temporary storage of waste.

The condition of output aspects of solid medical waste management in Puskesmas Cianjur Regency 100% Puskesmas has good categories.

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