

Hazardous Waste Handling At Hospital

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Abstract. The paper objective is to identify and analyze the matter of handling waste and chemical at the Hospital (especially in Indonesia). This Paper review and analyze the Undang-undang No.32/2009 dan Peraturan terkait Limbah B3, and KepMenkes RI No. 1204/Menkes/SK/X/2004 about Hospital Health Environment Requirements and the previous Literature. This paper method is descriptive-explorative using a quantitative qualitative data source from Airport Operator and Ministry concerned, public policy analysis and Forum Group Discussion (FGD). The results of this paper to encourage party to find the correct steps in managing waste and chemical at the Hospital in Indonesia and formulate it become one fix and applicable technical instruction for better handling of waste and chemical starting from Eka Hospital BSD as a pilot project of waste handling implementation in the near future. Benefit of the stake holder in airport to have the Standard Operating Procedure (SOP) as a assisting tool for implementing the integrated waste management while waiting the technical instruction from the hospital regulator.

Keywords: hospital; waste chemical management; SOP

Introduction

The important of this paper to analyze the handling waste and chemical at Hospital cause the “Hospital waste is considered dangerous because it may possess pathogenic agents and can cause undesirable effects on human health and the environment” (Askarian, Vakili, & Kabir, 2004) . “In the hospitals under study, there aren’t any training courses about hospital waste management and the hazards associated with them. The training courses that are provided are either ineffective or unsuitable. Performing extensive studies all over the country, compiling and enacting rules, establishing standards and providing effective personnel training are the main challenges for the concerned authorities and specialists in this field”(Askarian et al., 2004). “Public and private hospitals have waste management plans and waste management teams. Public hospitals were found to generate more waste than the private hospitals. One private hospital and the public hospitals segregate their waste into different categories” (Abor, 2013) “ identifying the waste type and then separating non-infectious or general waste from infectious waste. Both public and private hospitals have internal storage facilities for temporarily storing the waste before they are finally disposed off-site. On-site transportation in the public hospitals is done by using wheelbarrows, while covered bins with wheels are used to transport waste on-site in the private hospitals. In public and private hospitals, off-site transportation of the hospital waste is undertaken by Municipal Assemblies with the use of trucks. Both public and private hospitals employ standard methods for disposing of healthcare waste” (Abor, 2013). With rapid population growth and industrialization, disposal of hospital solid wastes, which include a wide range of infectious hazardous wastes pollutants, has become one of the main environmental issues. A limited number of studies related to the hospital solid waste management have been made, especially for the development of management schemes for hospital wastes” (Karamouz, Zahraie, Kerachian, Jaafarzadeh, & Mahjouri, 2007) “The other issues that need to be considered are a lack of appropriate protective equipment and lack of training and clear lines of responsibilities between the departments involved in hospital waste management. Effective medical waste management programs are multisectoral and require cooperation between all levels of implementation, from national and local governments to

hospital staff and private businesses” (Abd El-Salam, 2010) . “Medical establishments play important roles in different activities by the use of modern technology to restore and maintain community health through different departments in the establishment and its firm “ (Abd El-Salam, 2010). The waste of medical is the second most hazardous waste after radioactive waste. The improper management of medical waste (MW) can cause serious environmental problem either on the air, water and land pollutants. “The nature of pollutants can be classified as biological, chemical and radioactive disposal. the mere generation of MW and from the process handling, treatment and disposal” (Manyele & Anicetus, 2006). Treatment of Timely delivery of goods is very dependent on the condition of public infrastructure provided by the government of a country. As a result, the demands of efficiency in higher logistics activities, including the level of security quality, safety and service” (S, 2016) 2 elements of waste management by reducing it with *3R concept* Reduce-Recycle-Reuse, and *Handling* it with sorting out, collect, carry, and process it tills the end process which result positive affect. A new framework to develop a master plan for hospital solid waste management is introduced in this paper. Different criteria can be used for evaluating the pollution of existing hospital solid waste loads and the effectiveness of the management schemes. In order to rank the hospitals and determine the share of each hospital in the total hospital solid waste pollution load, a multiple criteria decision making technique, namely analytical hierarchy process (AHP), is used. In this framework a comprehensive set of direct, indirect, and supporting projects are proposed for hospital solid waste pollution control. The proposed methodology is evaluated using data from 40 hospitals in the province of Khuzestan. In this province, most of the hospital solid wastes are stored, disposed or burnt in open spaces. In some cases, these solid wastes (including infectious wastes) are disposed in landfills used for the disposal of domestic wastes, which can cause considerable environmental and health problems” (Karamouz et al., 2007)

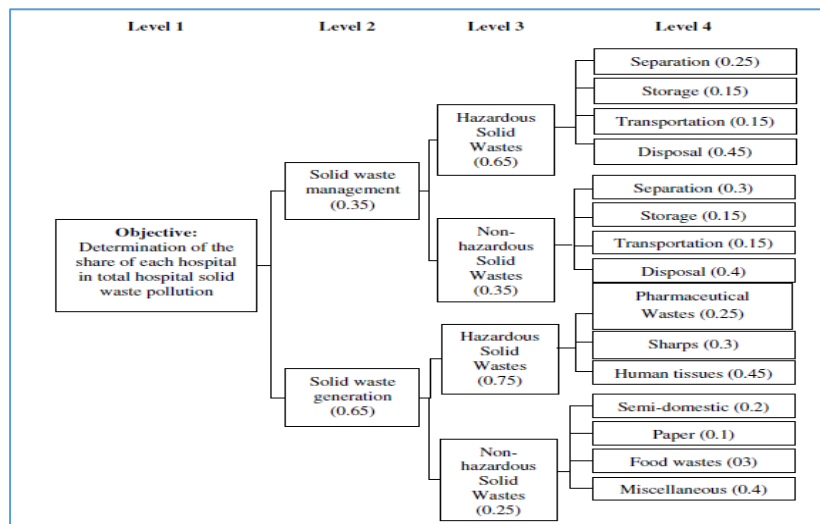


Figure 1. Proposed hierarchy structure of indicators and their relative weights (numbers in the parentheses) for ranking of hospitals based on their solid waste generation and management. (Karamouz et al., 2007)

West Java Bapedalda research collaborated with the Indonesian Ministry of Health, as well as the World Health Organization (WHO) during 1998 to 1999. Separately, the former Chairperson of the West Java Environmental Forum (Walhi), Ikhwan Fauzi said, infectious waste volumes in some hospitals even exceeded the found Bapedalda. This infectious waste is more commonly found in several public hospitals, which maintain poor environmental care (Pristiyanto. D, 2000). From all hospital waste in West Java, around 10 to 15 percent of them are infectious waste containing heavy metals, including mercury (Hg). The other 40 percent are

organic waste derived from food and food waste, both from patients and family patients and nutritional kitchens. Furthermore, the remainder is inorganic waste in the form of used infusion and plastic bottles. In Indonesia alone, the processing of medical waste is still not handled seriously, both in small towns and big cities in Indonesia. The lack of socialization by the government and related agencies regarding the effects of carelessly disposing of medical waste and investor interest in processing hospital waste is a major problem. One proof, according to the results of a survey in 2003 of 107 hospitals in Jakarta, only 10 hospitals had incinerators. (Suara Pembaharuan, October 20, 2003) Of course this is very alarming, especially the number and type of disease is increasing every year, as well as the waste produced

Based on Master plan of the hospital above, the government prepared the supporting infrastructure of this waste management The waste management to manage the solid waste management and solid waste generation to integrated with the infrastructure. From the matter above the government or the hospital need to analyze the specific issue against the public policy and socialize the Ministerial decree as the sub regulation of the Indonesian laws of the legal standing in managing the activity of waste management. The Minister standardize the decree based on the reference of concerning minister, either transportation, environment and Health to find the solution to waste & chemical management. Limit The scope review only on one Hospital in Jakarta as the capital city of Indonesia as well as main gateway.

Method

Participant

The Method to explain the stages of waste handling at Hospitals. The stages of processing medical waste include: Separation; Storage; Transportation; Handling; and Disposal

Apparatus

This paper based on study of literature review and collection of secondary data from Hospital and from the experts' sharing of the waste management from each side point of view at the socialization continue with forum group discussion (FGD).

Procedures

Through the extensive literature review, we identified the overview of the current waste management in Hospitals as per figure 1 below:

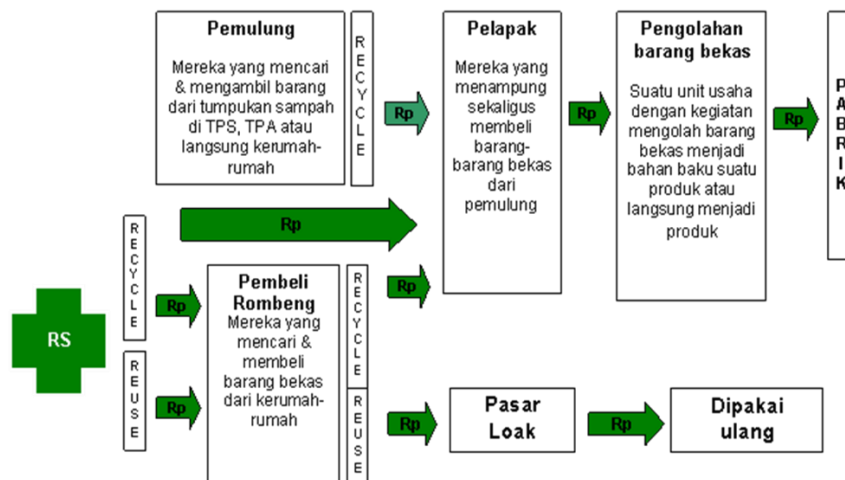


Figure 1. Alternative Scheme for Reuse & Recycle Medical Waste.

About The Utilization of Incinerator, The criteria determined by the World Health Organization (WHO) which are as follows: Effective waste reduction; The location is far from the population area; The existence of a waste separation system; Good design; Waste burning reaches a temperature of 1000 degrees; Exhaust emissions meet quality standards; Regular / periodic treatment; There are Staff and Management Training. Bapedal Decree No. 03 of 1995. The regulation regulates the quality of incinerators and emissions issued. Incinerators that are allowed to be used as a destroyer of B3 waste must have high combustion efficiency and high efficiency of destruction / destruction. DRE Quality Standard for Incinerator as per figure 2.

No	Parameter	Baku Mutu DRE
1.	POHCs	99.99%
2.	Polychlorinated biphenil (PCBs)	99.9999%
3.	Polychlorinated dibenzofuran (PCDFs)	99.9999%
4.	Polychlorinated dibenzo-p-dioksin	99.9999%

Figure 2. DRE quality standard for incinerator.

Besides, through the extensive literature review in this paper, it provides a solid background of challenges in developing sustainable waste management. In addition, we conduct the exploratory interviews from six industry practitioners. The aim of conducting exploratory interview for this paper is to determine the readily of collection data via extensive literature review and to know that the Hospitals and stake holders face the current challenges.

Discussion and Results

The public policy based on the waste management philosophy till become the sustainable development, and need to adjust the policy with the Indonesian Law (UU) no. 18/year 2008. from one-way economy as end of pipe solution to circular economy, that is the philosophy of waste management towards sustainable development.

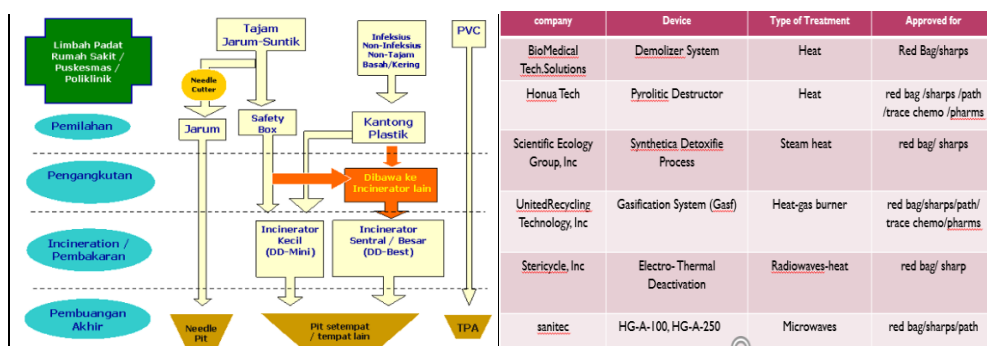


Figure 3. Medical Waste Processing Scheme with Maxpell Incinerator & Alternative Medical Waste Treatment Technologies Approved by the California Department of Public Health

The content of the Law has adopted some international regulation, such as ISO 14001 and GHS, and once countries have consistent and appropriate information on the chemicals they import or produce in their own countries, They will establish a comprehensive manner for the infrastructure to control chemical exposures and protect people and the environment. 1st

analysis improves on existing studies of ISO 14001 efficacy by expanding the sample size and by controlling for potential endogeneity problems between facilities'. "In this study we show that ISO 14001 has the potential, when used under the right circumstances, to improve sustainability across the supply chain. In other words, it is a tool for sustainability" (Curkovic & Sroufe, 2011). "At this level, tools such as Life-Cycle Assessment (LCA) can be used to support the implementation of sustainability goals, and ISO 14001 could be used to guide the process over the long term" (MacDonald, 2005). Given the reality of the extensive global trade in chemicals, and the need to develop national programs to ensure their safe use, transport and disposal, it was recognized that an internationally-harmonized approach to classification and labelling would provide the foundation for such programs (United Nations, 2015). In general, it is very challenging to assess whether a particular country has successfully implemented GHS as the GHS covers all chemicals. The absence of international or national tools has impeded the justification for measuring implementation of GHS, as it is indeed difficult to measure "implementation" of GHS (Ta, Jonai, Mokhtar, & Peterson, 2009). From the perspective of government policy, the progress in the management of hazardous substances and waste resulted from: The intensification of enforcement of the Environmental Quality Act of 1974; The preparation of a code of practice for hazardous waste management; The institution of environmentally sound management of toxic chemicals, and The enhancement of chemical safety, especially relating to banned and severely restricted chemical (Ujang, 2000). In field also doesn't have special facility to manage hazardous waste (B3) that can be used by people, there is no officer in charge and no availability of hazardous waste processing facility in public level can cause the hazardous waste mixed with domestic waste, the entry for hazardous waste inside TPA can create heavier pollution (Setiyono, 2001).

Group A Medical Waste management, Surgical dressings and other medical waste are accommodated in medical waste storage tanks, equipped with a tightly sealed plastic bag if the contents are full, a maximum of 1 day is transported, destroyed by the incinerator. The procedure used is approved by the Head of the JJJ, the Head of the Sanitation Department and the Health Service; All body jar, placenta etc. are accommodated in a medical bag in the right bag to be destroyed with an incinerator. Group B Medical Waste Management. Syringe, needle, and cartridge should be discarded; This trash should be placed in a sharp object hold that when fully loaded (or with a maximum interval of not more than 1 week) should be tied and accommodated in a medical waste bin before being transported and destroyed with incinerator. Group C Medical Waste Management. Disposal of medical waste from chemical, hematology, blood transfusion, microbiology, histology and post partum units and similar units (experimental animals) is made in infection prevention codes in clinical labs and post mortem rooms and other publications. Group D Medical Waste Management, More items or partially used new medical products should be returned to the officer in charge of the Hospital Pharmacy department. Group E Medical Waste Management. Infected lab equipment destroyed with incinerators and incinerators operated under the supervision of the Hospital sanitation department

, The Hospital Management should create the modeling of waste management refer to Indonesian Law Number : UU 18/2008 and its sub law of Ministerial Decree of Communication of The Republic Indonesia Number: PM 54 year 2017. The other national law also support this waste management is Indonesian Law UU 23 /1992 about Healthy (Indonesia, 1992) 5th part of health of environment Chapter 22, consist of five verses (1) Health of environment is held to have health environment quality, (2) Health of environment implement at public area, housing, work environment, and other environment, (3) Health of environment cover water and air purification, safe the solid, aqueous and gas waste, radiation and sound effect, disease vector control, and healthy or other safety, (4) Every place or public service area must maintain and increase health environment based on the standard and requirement, (5) The Provision about arranging the health environment has been explained on verses (1) to (4) has been legalized on Government regulation (PP).

Discussion

Poor management of hospital waste can be caused by several things, including: Waste management is not yet a requirement for hospital accreditation the regulation of the process of solid waste packaging issued by the Department of Health in 1992 was also largely not carried out properly. Before being handled medical waste and non-medical waste must be separated first to avoid mixing between medical and non-medical waste. RS waste treatment is carried out in various ways. What is preferred is sterilization, namely in the form of a reduction (reduce) in volume, reuse using sterilization first, recycling (recycle), and processing (treatment). Sterilization can also be done with an incinerator. However, the ash from the incinerator can also be dangerous so further management is necessary. In the management of solid waste, hospitals are required to sort waste and store it in plastic bags that differ according to the characteristics of the waste.

Medical / Clinical Waste Disposal Policy. The hospital should establish clear standard regulations for handling, storing, transporting and disposing of medical / clinical waste The porta must be adapted to local conditions and need to be followed by training in accordance with the categories and functions of the existing personnel.

Handling and Disposal Training. All officers who work in the place of medical waste producers (store's and collectors) must receive information and training in their management and use of PPE ; 1) Check whether the bag has been closed; - Just handle the bag with the neck; - know the procedure for dealing with spills; - ensure that the bag binding does not break during the process; 2) The officer responsible for transportation needs to guarantee that: - collectors, drivers and other officers are aware of the dangers; - master standard procedures if there is a spill

It is necessary to determine an officer who is responsible for the implementation and for the development of the hospital sanitation program

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