

Factors Affecting the Infectious Waste Management System on Practice Disposal Waste Among Health Workers in Bengkulu Hospital

Afriyanto	Somsak Pitaksanurat	Rittirong Junggoth	Noor Alis Setiyadi
Doctoral Student	Faculty of Public Health	Faculty of Public Health	Faculty of Health Science
Faculty of Public Health Khon Kaen University, Thailand	Khon Kaen University, Thailand	Khon Kaen University, Thailand	Muhammadiyah University, Surakarta

Abstract - Hospital activities restore health and save lives at the same time; however, they can generate infectious wastes to a human being or the environment. Infectious waste have to used specifically treatment for reduce waste. In most of hospital of Bengkulu Indonesia do not use an incinerator and then good of practice about disposal infectious is important to minimize the danger to humans and environment. To analyze association demographic social determinants, working status, knowledge and attitude with practice of disposal infectious waste among health personal in small hospital in Bengkulu Town. A cross sectional study and data were collected through a structured questionnaire. Bivariate and multivariate logistic regression analyses were computed. The total sample is 366 personal health including nurses 78.96%, midwives 8.20%, sanitation staff 0.27%, doctor 3.01%, pharmacist 1.09%, dentist 0.82%, administration staff 1.37%, nutrition officer 1.37%, supplier officer 1.09% and other occupation 3.83%. The multivariate analysis reported that practice disposal of infectious waste was associated significantly with working hour/day (Adjusted OR: 2.53,95% CI: 1.61 to 3.98) with p-value:<0.001, knowledge (Adjusted OR: 1.89,95% CI: 1.14 3.14) with p-value:<0.013 and attitude (Adjusted OR: 6.24,95% CI: 2.83 to 13.76) with p-value:<0.001. The Management of hospital must provide information about the dangers of infectious waste and also information about the steps of waste disposal as a whole from segregation to disposal, not just focus on segregation.

Keywords: infectious waste, hospital, Bengkulu

I. INTRODUCTION

The hospital is organization that is a public service and not direct at making a profit. In providing hospital services produces domestic and clinical waste that can pollute the environment. In particular, clinical waste requires special handling to mitigate potential negative impacts. Furthermore, the hospital activities occur about a conformed of place for patients, employees, visitors and the community. So, this condition is started of cycles infectious in hospital.

The hospital is not only a place of patient care but also can be a place of disease spread. Hospital waste may be dangerous to risk to patients but also to other health workers. Medical waste is very dangerous and then they need special care and management before the final disposal.

Developed countries and some developing countries have regulatory systems on medical waste depending on their own country's finances, regulations and political capacity as well. Some of these countries in Asia like Indonesia, Cambodia, and Myanmar for example, have general waste transfers and transport vehicles that are also used to

transfer health waste from the point of activities to the care and disposal facilities. Indonesia is the country with the most results from health-care waste across the country.²

The World Health Organization (WHO) assessed, around 75–90% of the waste created by medical clinics are general or non-hazardous wastes comparable to domestic wastes, while the staying 10–25% is viewed as hazardous and may impose risks due to infectious, pathological, chemical and radioactive materials or sharps.³ In most cases this proportion can be effect by proper segregation of waste streams; if the infectious component is mixed with the general waste stream, the entire mass becomes potentially infectious.⁴

A research in 2004 indicated that around half of the hospitals surveyed carried out waste separation. However, most of Health-Centers activities used to mix their waste at landfills along with domestic waste or burned them in their backyard. Generally overcoming hospital waste has been using incinerators as the most common medical waste handling technology. However, the specifications of their standard operating tools and procedures have not been good yet. The level of knowledge about hospital waste hazards is also very low at all levels of health facility personnel.⁵

Hospital waste contains microorganisms of pathogenic or chemical of harmful toxic relate about infection and can develop to the hospital environment, this cause of poor handling of contaminated materials and equipment, and the supplies and sustenance of inadequate facilities of sanitation. Hospital waste contains waste of pathological, kitchen, medical, non-medical, and radioactive waste. Outcome during routine patient care activities, operations and in high-risk units are medical waste, examples of these routine activities include body fluids, amputated

limbs, dirty clothes (clothing), needles and syringes used, bladder and blood products. This waste is very dangerous and leads to a high risk of bacterial infection, so relate about high risk to another patient, staff of hospital, and general of population (visitors and residents around the hospital) so, they need extra clear handling as high risk.

This should be a very serious concern for all of us because the hospital is at the center of all kinds of diseases present in human kind, or the allocation of affliction and sources, because it is always occupied, used, and visited by man.

The total number of medical waste created in Indonesia is around 225 tons per day and the average /patient/bed/day of production waste 0.68 kg/bed/day.⁶

National rules/policies about medical waste which must be obeyed by the hospital in Indonesia are: Decree number of Health Minister 1204, 2004, on Hospital Environmental Health Requirement; and Minister of Environment and Forestry Regulation number P.56 year 2015 on Technical Guideline and Requirement of Hazardous Health-care Waste Management, Regulation number 101, 2014, on Hazardous Waste Management; Regulation number 74, 2001, on Management of Hazardous Substances.

Generally of Hospitals in Indonesia remains mix general and medicals wastes, putting hospital communities and general public at a high risk of health-acquired infections and waste related diseases. Combining with inadequate of collection facilities including color-coded plastic lids and containers, the implementation of safe Health Care Waste Management was constrained. Since the practices of waste segregation at the point of produces is of importance as it is the core phase of good Waste Management Hierarchy, so very important as to develop sustainable Health Care Waste Management.⁷

Poor segregation of Infectious Waste Management System can result in additional costs related to Infectious Waste Management System disposal and poses various environmental and public health threats⁸. However, proper segregation of Infectious Waste Management System should result in a clean solid waste stream which can be easily, safely and cost-effectively managed through recycling, composting and landfilling. The volume of waste in the overall Infectious Waste Management System stream could be reduced by as much as 60% through careful segregation of items⁹. In this regard, understanding the underlying factors associated with HCW segregation behaviors is a vital step towards developing interventions to improve the waste management system.

The wrong actions and less of knowledge on the management of handling waste infection will be result to happen of nosocomial infection. Furthermore, several studies have concluded that the advent of pathogenic bacteria in various types of general waste, clinically sharp waste and another waste. The results of research show that clinical solid waste contains various types of nosocomial and practical bacterial pathogens like *Staphylococcus aureus* and *Pseudomonas aeruginosa*.¹⁰

Medical waste should be handled properly, including infectious, pathological, sharp, pharmaceutical, genotoxic, chemical wastes, heavy-duty heavy wastes, pressurized containers and radioactive waste. Good system of waste management can reduce incidence of healthcare workers. The system can reduce the incidence of injection of syringes and nosocomial infections also. It is crucial to create a condition of safe working good atmosphere for health workers.¹¹

General hospital in Indonesia can be categorized into four Class: Class A, B, C

and D, especially Class C Hospital should have the facility and ability of minimum 4 Basic Specialties and 4 Specialties of Medical Support. Patient beds minimum of 100 beds. Hospital categorization is based on several aspects such as types of services, equipment, human resources, and infrastructures or buildings. The hospital's infrastructure and buildings should meet the environmental and building structure requirements. Infrastructure and buildings of hospital also should meet the requirements of hospital's infrastructure and building reliability as well.¹²

The population of Bengkulu province in 2015 is 1,874,944 million people, consists of 10 residences have 23 hospitals that do not perform hospital standard medical waste management. (Indonesia Health Profile, 2015).¹³ All of hospitals do not use incinerators to process of reduce infectious of waste.

This study included three hospitals in the city of Bengkulu with hospital types C including public and private hospital to know about factor Influencing Practices Infectious Waste Management System among health personal at small hospital of Bengkulu town, Indonesia.

II. METHODS

This studied design with cross sectional study, collect general data for descriptive and after that researcher will conduct with quantitative method and calculated, to know about Practice Infectious Waste Management System (segregation to transportation process) of Socio Demographic factors (age and education attainment), Working Status (occupation, position, work experience, working day/week, working hour/day, average personal income), Management system infectious waste, Knowledge of disposal infectious waste and Attitude infectious waste of health personal at small hospital of Bengkulu town, Indonesia. The

methods included questionnaire adopted by government policy in Indonesia.

The sample in this study was taken as many as 366 respondents from type C hospitals in the city of Bengkulu.

125 respondents from government hospitals and 241 respondents were taken from 2 private hospitals in the city of Bengkulu. The type of dependent variable is a dichotomous outcome and the statistics that use to answer the research question is multiple logistic regressions and the sample size is estimate base on the multiple logistic regressions formula (Hsieh, Bloch, & Larsen, 1998) and is calculate by software STATA version 14.

III. RESULT

The condition of hospitals in the city of Bengkulu, the hospital actually has an incinerator to destroy infectious waste but the incinerator is not functioned. Because of the high cost and the process is too complicated and the hospital does not have time to renew environmental documents due to the hospital accreditation process which requires a lot of time. So, that the management of hospital choose to cooperate with another company to eliminating hospital infectious waste.

Table 1. Characteristic of Health Personals Respondents

Characteristics	Number	Percent
1. Age (years)		
< 25	8	2.19
25 - 34	54	14.75
35 – 44	272	74.32
≥ 45	32	8.74
Mean (±SD)		37.25 (±5.88)
Median (min : max)		37 (23:56)
2. Education		
Certificate / Diploma	213	58.20
Bachelor degree	139	37.98
Master Degree	5	1.37

Others	9	2.46
3. Occupation		
Nurse	289	78.96
Midwife	30	8.20
Sanitarian officer	1	0.27
Doctor	11	3.01
Pharmacist	4	1.09
Dentist	3	0.82
Administrative staff	5	1.37
Nutrition officer	5	1.37
Supplier officer	4	1.09
Other	14	3.83
4. Position		
Head/ deputy head of unit	26	7.10
Permanent staff	174	47.54
Temporary staff	159	43.44
Other	7	1.91
5. Work Experience (Years)		
< 10	285	77.87
10 – 19	70	19.13
≥ 20	11	3.01
6. Working days/week		
< 6	55	15.03
≥ 6	311	84.97
7. Working hours/day		
< 8	183	50.00
≥ 8	183	50.00
8. Income (IDR)		
< 2.000.000	163	44.54
≥ 2.000.000	203	55.46
Mean (±SD)	2.189.071 (±718.133)	
Median (min : max)	2.000.000 (1.500.000:5.000.000)	

From table 1 it can be seen that the most respondents were aged 35-44 years old 272 respondents (74.32%), educated diploma 213 respondents (58.20%), worked as nurses 289 (78.96%), permanent staff 174 respondents (47.54%), working experience < 10 years 285 respondents (77.87%), working ≥ 6 days / week 311 (84.97%) and income ≥2.000.000,- rupiahs per month 203 respondents (55.46%).

Table 2. Associated with others factor used simple logistic regression.

Independent Variable	% Poor Practice	OR	P
Age			
< 35	30.66	1	0.0474
≥ 35	44.08	1.78	
Education			
Bachelor & Master Degree	38.89	1	0.3619
High school & Diploma	43.6	1.21	
Occupation			0.6382
Nurse	41.18	1	
Midwife & Other	44.16	1.12	
Position			0.5791
Permanent staff	40.50	1	
Temporary staff & Other	43.37	0.88	
Work Experience (Years)			0.0203
≥ 10 years	38.60	1	
< 10 years	53.09	1.80	
Working day/week			0.2370
≥ 6	40.51	1	
< 6	49.09	1.41	
Working hour/day			0.0001
≤ 8	31.15	1	
> 8	52.46	2.43	
Income			0.9763
≥ 2,000,000 rupiah	41.72	1	
< 2,000,000 rupiah	41.87	0.99	
Management system			0.8481
Good (≥16 scores)	40.68	1	
Not good (<16 scores)	42.02	0.94	
Knowledge			0.0024
High (12 - 20 scores)	30.00	1	
Low (0 - 11 scores)	46.88	2.05	

Independent Variable	% Poor Practice	OR	P
scores)			
Attitude			0.0001
Positive (≥72 scores)	37.04	1	
Negative and neutral (<72 scores)	78.57	6.23	

Table 3. Odds ratios for each category of factors on disposal waste infectious waste on multiple logistic regressions

Independent Variable	% Poor Practice	Adj OR	P
Working hour/day			0.0001
≤ 8	31.15	1	
> 8	52.46	2.53	
Knowledge			0.013
High (12 - 20 scores)	30.00	1	
Low (0 - 11 scores)	46.88	1.89	
Attitude			0.0001
Positive (≥72 scores)	37.04	1	
Negative and neutral (<72 scores)	78.57	6.24	

On table 3 reported that the multivariate analysis reported working hour/day (Adjusted OR: 2.53, 95% CI: 1.61 to 3.98) with p-value: <0.001, knowledge (Adjusted OR: 1.89, 95% CI: 1.14 to 3.14) with p-value: <0.013 and attitude (Adjusted OR: 6.24, 95% CI: 2.83 to 13.76) with p-value: <0.001.

Practice of infectious waste consist of 13 questions, the scores were categorizing into three groups. In this study whereas practices not good was 42.06% (CI 0.36 to 0.46). The questionnaire of practice

of infectious including practice segregation, collection and storage and transportation process. Activity disposal no focus in this research, because disposal collaborate with another company.

The questionnaire for practice segregation: segregate infectious waste at the source of generation itself in color coded containers, practice to ensure that the color coded bag has infectious symbol, label and bar coded label, practice wash the bins with detergent or soap and water periodically, practice separate infectious waste with general waste, practice separate yellow colored bag with Cytotoxic symbol for disposal vials, ampoules, gloves, IV sets etc. contaminated with cytotoxic drugs.

Collection and storage phase practice: collect needles / syringes with fixed needles in white colored containers, practice collect empty glass vials or empty glass ampoules in cardboard boxes and handover the box to biomedical waste treatment facilities, practice filling infectious garbage bags (yellow) only 2/3 parts for easy binding, practice provide wearing gloves and masks when handling trash and release immediately when not in use and throw in yellow plastic bag.

Transportation phase practice: to closes immediately when sharps box is filled 2/3 parts do properly so as not to open easily on the inside transportation, practice to used special waste transport lane hospital.

Knowledge of disposal infectious waste in hospital was refers of Government Regulation Indonesia number 101, 2014 and Health Minister Decree number 1204, 2004 has 20 questions. Knowledge questionnaire consist of 20 questions, the scores were categorizing into three groups.

Result of questionnaire of knowledge on process segregation showed 94.81% respondent know about process separate of infectious waste, 92.90% used personal protect equipment and washing

hand, 7.38% respondent just know that handling infectious waste process only segregation and transportation, 46.72% separated and inserted into a yellow plastic bag and used labeled, 87.70% they know about segregate with different type of waste before thrown into the bin. Knowledge on process collection and storage showed 78.14% they know that waste in closed container in the hospital to prevents diseases, 73.22% using a plastic coating bag on a trash bin for reduce odor, 77.05% put big container far away from patient rooms, 53.83% they know that storage of infectious wastes no more than 1 week, and 63.11% respondents know that collect and storage of infection waste with other garbage must separate different container. Knowledge on process treatment indicated 12.02% respondents know that treatment process after storage process, 67.21% respondent know process hydro clave and autoclave, 66.39% they know incineration process and sterilization process. Transportation process indicated 81.15% respondent know transport must use special trolleys or special vehicles, 61.75% transport using special lanes, 48.63% respondent know transport activities cannot be use every 3 days, 66.94% transportation of waste done after the treatment process and 37.32% transport process out of the hospital should be completed with documents memorandum of understanding.

Attitude of infectious waste consist of 18 questions. The scores were categorizing into three groups. Result of questionnaire of attitude of infectious waste showed that 73.50% very agree that they must care about infectious of waste process, 57.92% very agree that Putting infectious wastes into containers is the responsibility of everybody, 48.36 % very disagree that Practice of infectious waste management is not priority, 67.49% very agree that washing of hands with disinfectant and wearing gloves must do it, 69.95% very

agree that container of infectious waste have to labels specified, 71.58% very agree that Infectious waste and domestic waste cannot mix together, 70.77% very agree that infectious waste should be ascertained proper sorting and safe packing, 71.04% very agree that the medical waste container must be leak-proof, anti-puncture and not easy to open, 66.39% very agree that the process of treatment of infectious waste before disposal is important, 65.30% very agree that infectious waste will be a risk for health and the environment, 64.48% that very agree that needles and syringes should separate when inserted into a specified infectious waste disposal container, 71.04% very agree that infectious waste should not be removed at the site disposal, 68.85% very disagree that incinerator must operate every day, 68.58% very agree that transportation of infectious waste have to regularly, 69.67% very agree that infectious waste transportation in the hospital has to use special lanes, 70.77% very agree that hospital has to special trolleys or special vehicles for transport of infectious waste, 71.04% very agree that containers have be closed and its placement should not be close to the reach of the patient or the food preparation site and 69.95% very agree that every hospital have an incinerator to reduce effect of infectious waste.

IV. DISCUSSION

Cheng et al. (2009) noticed that, regardless the medical waste introducing itself as a comparatively little segment of the total community waste; it turns into a significant issue worldwide in its administration. There has been a dramatic increase in the quantity of waste that was generated in the last two decades across the world. There was an expanded concern and attention to nature among the network and

practical advancement turned into a significant idea.

Healthcare is a high risk sector because of the high incidence of work related injuries and diseases due to inadequate or lack of compliance with standard waste management protocols and safety measures against occupational hazards¹⁵

The results of the study showed that personal health who works more than 8 hours per day to perform practices that are not good in managing waste infection is higher than those who work for 8 hours, this is possible because the implementation of work for more than 8 hours makes them unable to focus on the implementation waste management activities, they only focus on their work.

In the present studies, it was seen that higher the level of not great practice respondents were weakest in knowledge, followed by negative neutral attitudes. This trend was also, maintained within the different cadres of workers. This shows that though the attitude of the most of respondents was favorable towards infectious waste management, and they are capable of the right practice, their overall performance in this regard could be marred by their lack of knowledge. This seems to be a logical argument as it plausibly seems that better knowledge can enhance attitudes and lead to better practices as well.¹⁶

This study showed that many respondents have not good practices but they have good knowledge and favorable knowledge, in fact they know and support to take infectious waste management practices as a whole. At present, they only carry out segregation and collection storage of waste actions while transportation and disposal are carried out by other companies.

In this study whereas practices not good was 42.06%, it is means respondent use good practice less than 50%. In line with the findings with present study the

research in Pakistan found that out of 275 including doctors, nurses, paramedics and sanitary workers were interviewed that only 28% had good practice following the proper guidelines and WHO rules, > 35 years old 36% and high school and diploma (51.6%)¹⁷ Furthermore, the practice of officers in the management of medical waste carried out in hospital of Kebumen Indonesia, it was found that (22.2%) had poor practice while respondents who had good practices obtained results (77.8%).¹⁸

V. CONCLUSION

There are in association of working hour/day, knowledge and attitudes of personal health hospitals to management infection practices in small hospitals in Bengkulu City.

It is recommended that hospital management socialize not only to the segregation process but also to socialize the storage process to disposal

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