Characteristics and Factors Associated with Medical Waste (2019).pdf

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Characteristics and Factors Associated with Medical Waste Management Behaviour in Private Dental Health Services in Pekanbaru City, Indonesia

Oktavia Dewi[1*], Sukendi Sukendi[2], Yusni S Ikhwan[2], Elda Nazrianti[3]

[1]*Department of Public Health, Hangtuah Institute of Health Science, Pekanbaru, Indonesia;* [2]*Department of Environmental Science, Postgraduate Programme, University of Riau, Pekanbaru, Indonesia;* [3]*Department of Medical Education, Faculty of Medicine, University of Riau, Pekanbaru, Indonesia*

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Correspondence: Oktavia Dewi. Department of Public Health, Hangtuah Institute of Health Science, Pekanbaru, Indonesia. E-mail: dewitavia@yahoo.com

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Abstract

BACKGROUND: Medical waste is a problem when its amount is accumulated as well as the way the private dental healthcare still manages improperly.

AIM: This study aims to define types and the number of medical wastes, also to analyse behaviour toward waste management and its associated factors.

MATERIAL AND METHODS: The research used a quantitative analytic approach and cross-sectional design with 149 private dental practice populations in total. There were 60 dentists obtained using systematic random sampling in Pekanbaru. Data processed by conducting summation medical waste and counting the percentage of behaviour's variables. Data collected within 20 days were processed with dental waste laboratory tests and chi-square analysis.

RESULTS: The result showed that dental, medical wastes average was 0.3 ± 0.07 kg/day which is 69% infectious, 27% toxic, and 4% radioactive. Overall results showed associated factors related to waste management behaviour were knowledge, training attainment, availability of facilities, and the use of personal protective equipment.

CONCLUSION: The numbers of medical waste from dental health services in Pekanbaru were still low. More than half the Dentist had poor behaviour in dental, medical waste management. It is recommended to the dental profession organisation to cooperate with City Health Office to hold management training on medical waste in dental health care to educate and raise dentists' awareness to be able to manage the waste of dental health services properly and by the regulations.

Introduction

According to Environmental Protection Agency, medical waste is all of the residual material generated by health care facilities, such as hospitals, clinics, blood banks, dental practices, veterinary clinics, and medical and laboratory research facilities. Dental practice was one of the health-care facilities that generating as medical waste. Every year, the number of dentists were increased, based on data from the Indonesian Medical Council, the total of dentists in 2018 are 31,630 dentists and 3,786 dentist specialist [1].

Study of 80's Individual Dental Health Care Services in Bandung showed that the numbers of medical waste were reached 142.77 gram per dental practices per day. These wastes consist of 80.45% infectious and potentially infectious waste, 14.25% non-infectious waste, and 5.3% other residual waste. The average waste density of private dental health services is 83.076 kg/m [2].

The waste problem becomes complicated due to health practitioners waste management commitment has not been well established and the

existence of public misperception about medical waste. Health practitioners are still not conducting medical waste management efforts according to the regulations. As stated by Haironah, the reaction of health workers in handling medical waste at the Ulin Banjarmasin Regional General Hospital is still below the standard (61.58% knowledge, 67.31% attitude and 67.30% action) [3]. In Indonesia, the rules applied based on the regulation of The Minister of Health No.1204/2004 and The Minister of Environmental regulation No.56/2017 about The System of Medical Waste Management in Health Services [4].

The result of Khanderwal's study in India, there were 80% dentists who agreed with waste management, while the rest was no response, the ones sorting waste before disposal were only 34% while directly disposing to general waste container were 42% [5]. As many as 68% are unwilling to implement waste management properly due to financial reasons. Nearly 14% of dentists were not aware of various waste categories, and 12% were unaware of the colour coding used to sort out the waste. About 26% of dentists made the mistake of removing sharp objects and dental tissue, and 32% did not dispose of expired drugs properly [6]. This may be caused by several factors that influence the behaviour of waste management on dentists and the other dental officers. Medical waste management on private dental healthcare consists of sorting medical waste based on the label of the type of waste (infectious, toxic and hazardous materials), a collection of storage, transportation, management, and disposal of medical waste [7]. According to Lawrence Green's Theory, behaviour influenced by a variety of factors such predisposing factors (knowledge, attitude), enabling factors (funds, waste collected instrument, personal protective equipment) and reinforcing factor (waste management training) [8].

According to data from Indonesian Dentist Organization (PDGI), the total of dentists in Pekanbaru City is 427 and 306 of it have their dental healthcare practices which are 149 of it are running their private practice [9]. In the early stage, the researcher conducted a survey for 15 dentists in Pekanbaru. It's showed that 11 dentists were managed the wastes without sorting between medical and domestic wastes. And there's only one dentist who delivers infectious wastes to the hospital to be destroyed by the incinerator. Based on this survey, this is then done by this study.

This study aims to define types and the numbers of medical wastes and analyse factors associated with the behaviour of medical waste management in personal dental health services in Pekanbaru.

Methods

This study was a quantitative analytic study with a cross-sectional design. All dentists (149 dentists) with personal practices were selected as populations in this research. Based on a survey in 15's dental practices, it's showed the numbers and types of wastes for 20 days. Data analysis have calculated the average of medical wastes and the percentage of medical wastes based on types such infectious wastes, toxic wastes, and radioactive wastes.

The factors and behaviour of waste management data were conducted with interviewed and observations in selected 60's dentists by systematic random sampling. The questionnaire was delivered to respondents consists of 15 items for knowledge, 9 items for attitude, and 4 items for practices. Every questionnaire was verified by validity and reliability tests. There's also questions related funds, facilities availability, training and personal protective equipment. All of the data were coded and analysed. The results were calculated based on sums and percentages of variables with SPSS vers.21 software and chi-square analysis with the level significance of p-value less than 0.05

Results

There were 60 respondents, consists of 16.7% male (n = 10) and most of them were woman 83.3% (n = 50). Around 76.7% (n = 46%) already had dental practices later than 5 years with the average ages 41-45 years old with 28.3%. The details showed in Table 1.

Table 1: Characteristic's Respondent

No	Characteristic's Respondent	Total (n = 60)	Percentage	95% CI	
				Min	Max
1	Age (years)				
	25 – 30	4	6.7	0.054	0.079
	31 – 35	10	16.7	0.155	0.178
	36 – 40	13	21.6	0.204	0.328
	41 – 45	17	28.3	0.270	
	46 – 50	11	18.3	0.172	0.194
	51 – 55	3	5	0.043	0.057
	56 – 60	2	3.4	0.028	0.040
2	Sex				
	Male	10	16.7	0.155	0.178
	Female	50	83.3		
3	Medical Wastes Management				
	Training	52	86.7	0.863	0.871
	Never	8	13.3	0.010	0.0163
	Ever				
4	Personal Protective Equipment				
	No	10	16.7	0.155	0.178
	Yes	50	83.3	0.828	0.838
5	Funds Availability				
	No	50	83.3	0.828	0.838
	Yes	10	16.7	0.155	0.178
6	Availability of Waste				
	Management Facilities	34	56.7	0.557	0.577
	No or Inadequate	26	43.3	0.427	0.439
	Yes and Adequate				

The total of medical wastes obtained was 4.62 kg/day with the average of medical wastes generated of each dentist was 0.3 kg ± 0.07 kilogram per day. Based on types of dental, medical wastes were such infectious waste 69%, toxic waste 27%, and radioactive waste 4%. The comparison of medical waste based on its percentages is explained in Figure 1 below.

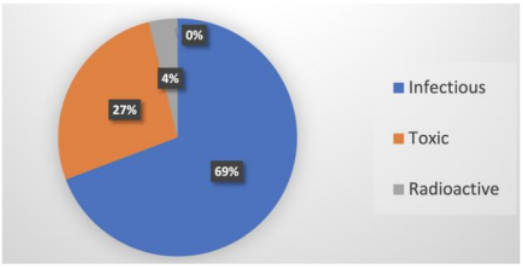

Figure 1: Percentage of Personal Dental Medical Waste Types on Health Services in Pekanbaru

Respondent's knowledge of wastes management was calculated based on the correct scores of 15 items question if the answer more than 75% were corrected then concluded in the high category. On the other hand, if the answer less than 75% categorised low. The results showed that the percentage of high wastes management's knowledge equal with the low knowledge at 50%

Respondent's attitude of waste management was calculated with the correct scores of 9 items question if the answer more than 75% were corrected then concluded in agree category. On the other hand, the answer less than 75% categorised disagree. The results showed that the percentage of the respondent's attitude was agreed about wastes management were 98% (n = 59). In the other 1.7% (n = 1) respondents were disagree.

Table 2: The percentage of knowledge, attitudes and the act of waste management medical in Pekanbaru

No	Variables	Frequency (n – 60)	Percentage
1	Knowledge		
	less	30	50
	good	30	50
2	Attitude		
	disagree with medical wastes management	1	1,7
	agree with medical wastes management	59	98,3
	agree with the medical waste management		
3	The practice of Wastes Management		
	a. Shorting		
	Yes	32	53,3
	No	28	46,7
	b. Storing		
	< 24 jam	36	60
	≥ 24 jam	14	40
	c. Transporting/Disposal		
	Deliver to incinerator	19	31,7
	Disposal to final storage	36	60
	Buried	3	5
	Burning	2	3,3

Factors related to Medical Wastes Management's Behavior.

Respondents practice of wastes management consists of sorting, store, and transport/destroyed. The categorical for practice divided into correct and incorrect practice based on wastes management regulations of Ministry of Health and Environmental. The appropriate action includes sorting infectious wastes, toxic and radioactive materials, waste storage less than 24 hours to hospital or centre of health services for incinerated the wastes to destroyed. The results showed that there were 31.7% (n = 19) were appropriate and the others 68.3% (n = 41) were inappropriate with the medical wastes regulation. The percentage of knowledge, attitude, and practice are explained in Table 2.

Table 3 showed that variables which strongly influence the behaviour of medical wastes management. Behaviours are influenced by 3 factors such as predisposing factors (knowledge, attitude), enabling factors (funds, wastes collected equipment, personal protective equipment), and reinforcing factors (wastes management training). The results showed that factors which significantly related were knowledge, training, and personal protective equipment, and the availability of wastes management facilities.

Table 3: Factors that influence the behaviour of personal dental, medical wastes management in Pekanbaru

Factors	Wastes Management Behavior				
	Inappropriate	Appropriate	Total	P value	POR (95% CI)
Knowledge					
Less	26 (86.7%)	4 (13.1%)	30 (100%)	0.006	6.5 (1.8-23.2)
Good	15 (50 %)	15 (50%)	30 (100%)		
Attitude					
Disagree	1 (100%)	0	1 (100%)	1.00	-
Agree	40 (67.6%)	19 (31.7%)	59 (100%)		
Participate in Training					
Never	40 (76.9%)	12 (23.1%)	52 (100%)	0.001	23.3 (2.6-208.9)
Ever	1 (12.5%)	7 (87.5%)	8 (100%)		
Personal Protective Equipment	10 (100%)	0	10 (100%)	0.023	1.61 (1.29-2.004)
No or Inadequate	31 (62%)	19 (38%)	50 (100%)		
Yes and Adequate					
Funds Availability					
Not available	39 (78%)	11 (22%)	50 (100%)	1.001	14.18 (2.83-76.6)
Available	2 (20%)	8 (80%)	10 (100%)		
Facilities availability					
Not available	34 (100%)	0	34 (100%)	<0.001	3.71 (1.97-6.99)
Available	7 (26.9%)	19 (73.1%)	26 (100%)		

Discussion

Most personal dental health services in Pekanbaru were operated by women who have a length of employment over five years. The numbers of women dentists were four times higher because of many people interested in studying in the faculty of dentistry. Women dominate it because the dentist is a feminism occupation. There have been increased numbers of women dentist in Brazil and many countries around the world [10]. The mechanism of behaviour to chooses work related different between men and women, and a tendency to take care of others is partaking of women than in men. Men tend to select dentistry as a possibility of good business, while women get it to base their decisions on the

relations of with others and be emphatic and more able to communicate with a patient. They appear to be less in a hurry and are willing to discuss disease and worry their patients with that which is care and human than a dentist man.

Medical waste produced by dentists in Pekanbaru is still under the average of produced waste in Mumbai India is about 0,5-1,0 pounds per day [11]. This number is still higher than Wulandari's study with the average of licensed personal dental healthcare services in Bandung was about 0.14 pounds each practice dentist every day [2]. This means a personal dentist still produce medical waste in a considerable amount.

Based on its types, personal dental health services generated wool or cotton and infectious gauze contaminated with blood and saliva, toxic wastes as dental acrylic gypsum and radioactive material such amalgam as teeth fillings and unplugged amalgam. Based on Kooviland's study, the most potential infectious waste products are paper towels (gauze) contaminated with blood (3.88 kg), toxic film waste of x-ray blast (2.75 kg) and the most chemical waste is dental printing materials (3.99 kg) [12].

Disposal of infectious medical wastes if other domestic mixed with rubbish have caused them to be contaminated so that there is a selection process the transmission of disease, the material also can cause pollution on the ground. This means that dental, medical waste health services containing the germs of a disease, a toxin and hazardous materials (mercury) can insult the environmental, health, and social economic if they are not being managed correctly.

The results of the descriptive analysis study show that the knowledge of a dentist to all information waste management is equal. The results are higher than Machandra's study that only 42.5% a dentist who has of good knowledge about waste management [13]. Dentist's attitude who agreed to personal dentist medical in health services is very dominant compared with a dentist who disagrees to do waste management. This is indicated from Sanjev's study that 90% dentist agrees with the encoding colour on the receptacle collection waste [14]. The act of dentists to manage are experiencing high levels that have not been by the regulations that had determined by the government in Indonesia. Sorting waste based on its kind still has not been carried out. Waste storage is still done more than 24 hours. The extermination of waste is experiencing high levels of in a conventional manner that is thrown on the trash domestic, bury and burn the waste.

The Lawrence Green's theory, behaviour influenced by 3 factors namely predisposing (knowledge, attitude), enabling (funds, a waste collector, personal protective equipment) and reinforcing factor (training waste management). Knowledge has a signature to manage the action; this is possible because for knowledge is the basis of a person to make decisions and take action right or wrong. And so attitude, attitude is an unobserved directly that uncertain realised be an action. To realise the attitude to be the kind of the act of they are also required to some factors enabling as well as reinforcing factors [8]. In this study, there was not an effect of attitude toward waste management behaviour, although there is some approval without the availability of fund and facilities, then an appropriate behaviour of waste management will not be possible.

In this study, enabling factors like the associated waste management and personal protective equipment significantly affect behaviour manage the appropriate regulations. While enabling factor in the form of funds are not affect behaviour significantly. Supplementary equipment to waste management commonly used by dentists in Pekanbaru including the trash domestic are black, a box for storage waste sharp as needles, scalpel and sewing needles. Personal protective equipment commonly used by dentist and the dental hygienist is gloves, goggles and a mask.

Reinforcing factors such as training management waste ever followed by dentists are still few (13.3) per cent with another 86.7 per cent dentist in Pekanbaru gone after said there is no waste management training. According to Notoatmodjo, there are factors related to increasing training employees that have capability or skill occupying a job or a particular task. Training in general stress to psychomotor ability, although based on knowledge and attitudes. The purpose of training medical management waste is that health workers have sufficient knowledge and skills in the management of waste, and possible environmental health care facilities, safety and security for the officers and the community. Based on the data, that a dentist who had followed the training is a dentist who works at the Centre of Health Services and Hospitals as civil servants. They can attend the program for Training programs done by the City Health Department and Provinces.

Availability of facilities such as a labelled rubbish container, covered and secured trash cans made of tough and easy to clean material, safety boxes to stored sharp, hazardous, and toxic materials were all significantly associated (OR = 3.2; p-value = 0.0; CI 95% {1.97 – 6.99}). This means the respondents who did not have facilities that meet the requirements were 3.7 times more likely not manage the wastes properly compared to the ones who have the facilities. This is in line with Rahno's study that the availability of waste management facilities was associated with its management behavior, therefore, maintaining environmental health would not a priority to develop better healthcare if it's facilities were unavailable and not adequate [15].

In conclusion, the numbers of medical waste from dental health services in Pekanbaru were still low. In the future, if dental, medical wastes are not well managed, it will be a potential risk for raising health problems and environmental health risk. Especially, in health, most of the medical wastes are potentially infectious, toxic, and radioactive. More than half the Dentist had poor behaviour in dental, medical waste management because most of them didn't follow the Indonesian regulation of waste management well. This behaviour was affected by knowledge, training, facilities availability, medical wastes management materials, and personal protective equipment.

It is recommended to all dentists specifically on the private dental health services of Pekanbaru to reduce their medical wastes and to use safe and environmental-friendly materials and tools for dental and oral care. It is also suggested to not only sorting out between medical and non-medical wastes and storing waste on a suitable container but also disposing of it according to applicable provisions and professional organisations. The latter must be in collaboration with Pekanbaru City Health Office to conduct training on medical waste management especially for dentists in private dental health care services. Those are all important efforts to improve the behaviour of better waste management on dental practices.

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