Knowledge and Practice of Hospital Waste Management among Health Care Workers: A Sociological Study on Nintavur Base Hospital

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Abstract:

Medical care is vital for our life and health, but the waste generated from medical activities represents a real problem of living nature and human world. Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment Every day, relatively large amount of potentially infectious and hazardous waste are generated in hospitals and health care facilities around the world. This study conducted to identify the current practice of Health-care waste management of particular hospital of Ampara district in Sri Lanka. For this study, the base hospitals of the Ampara district was selected as a research population. In this research population, Nintavuer base Hospital was selected as a sample. The quantitative cross-sectional descriptive survey was used for the data collection. The top to the bottom staff of all units of the base hospital was involved in this data collection. This study concluded that the workers agreed that education on hospital waste management is very important. However most of the workers having lack proper and complete knowledge on Healthcare Waste Management impact to practice of appropriate waste disposals. Therefore, this study put forwards that all the staff should have knowledge and handling methods related to healthcare waste management in the future. For this, the health institution should provide proper knowledge to the health care workers.

Key words: **Knowledge, Practice, Hospital waste management, Health care workers.**

Introduction

Management of healthcare wastes is a major environmental issue in Srilanka (Kennady, 2018). WHO has been supporting to the developing country to reduce and manage their hospital waste from 1995. In Sri Lanka hospital, waste management practices are legalized under the Central Environment Authority. Hospital waste management is not only disposing the waste generated by the hospital but includes the method of transportation, storing, waste collection, waste handling and educating employees. Though healthcare services are responsible to manage

healthcare wastes they generate, most of them fail to do this efficiently, which results in environmental pollution through such wastes (Chanpika et al., 2015). Most of the waste management literature (Baveja, et. al.,2000 ; Cheng et.al., 2010; Lee et. al., 2004) indicate that the Waste management options need to be efficient, safe, and environmentally friendly to protect people from voluntary and accidental exposure to pollutants when collecting, handling, storing, transporting, treating, or disposing of waste. Hospital waste management has become a critical issue and increases the potential risk and damage to the environment (Kennady, 2018).

Indiscriminate disposal of Bio Medical Waste or hospital waste and exposure to such waste possess serious threat to environment and to human health, which requires specific treatment and management prior to its final disposal. Most of the article (Yong-Chul and others, 2005; Tsakona, 2017; Desta, 2017) deals with the basic issues as definition, categories, problems relating to biomedical waste, and procedure of handling and disposal method of hospital Waste management. It also intends to create awareness among the personnel involved in the health care unit. The remaining 10–25% of health-care waste is regarded as "hazardous" and may pose a variety of environmental and health risks (World health organization, 2018).

Each healthcare institution has been producing wastes daily. There are many way practiced in managing hospital wastes is observed. Improper management of hospital wastes giving birth as many socio economical and health issues to both public and health staff. Between 75% and 90% of the waste produced by health-care providers is non-risk or "general" health-care waste, 25% of health-care waste is regarded as hazardous and may create a variety of health risks . Approximately 1.35 kg/bed/day of waste is produced on average in the Pakistani hospitals, which produce about 250,000 tons of HCW per year. In Sri Lanka Colombo represents highest percentage of healthcare waste with 26.8% while Mannar and Killinochchi show least percentages with 0.3% (Ministry of Health, 2017). Proper segregation and waste disposal practice is needed to competent with international standards. This is leading to the safety of staff and public. Therefore, using proper color code and labeling is very important for waste segregation. As well as proper transportation, storage and need to improve our health care waste management system. To minimize the risks generated from improperly handed Heath care wastes.

A major issue related to current Bio-Medical waste management in many hospitals in Sri Lanka is that the implementation of Bio-Waste regulation is unsatisfactory as some hospitals are disposing of waste in a disorganized, improper and indiscriminate manner. Lack of segregation

practices, results in mixing of hospital wastes with general waste making the entire waste stream hazardous. Inappropriate segregation ultimately results in an incorrect method of waste disposal.

Inadequate Bio-Medical waste management thus will cause environmental pollution, unpleasant smell, growth and multiplication of vectors like insects, rodents and worms and may lead to the transmission of diseases like typhoid, cholera, hepatitis and AIDS through injuries from syringes and needles contaminated with human. Various communicable diseases, which spread through water, sweat, blood, body fluids and contaminated organs, are important to prevent. The Bio Medical Waste scattered in and around the hospitals invites flies, insects, rodents, cats and dogs that are responsible for the spread of communication disease like plague and rabies. Rag pickers in the hospital, sorting out the garbage are at a risk of getting tetanus and HIV infections. The recycling of disposable syringes, needles, IV sets and other article like glass bottles without proper sterilization are responsible for Hepatitis, HIV, and other viral diseases. It becomes primary responsibility of Health administrators to manage hospital waste in most safe and eco-friendly manner.

The problem of bio-medical waste disposal in the hospitals and other healthcare establishments has become an issue of increasing concern, prompting hospital administration to seek new ways of scientific, safe and cost effective management of the waste, and keeping their personnel informed about the advances in this area. The above all matters explains that the need for a proper hospital waste management system is of prime importance and is an essential component of quality assurance in hospitals.

PROBLEM STATEMENT

Each healthcare institution has been producing wastes daily. There are many way practiced in managing hospital wastes is observed. Improper management of hospital wastes giving birth as many socio economical and health issues to both public and health staff. The solid waste management report (2018) indicate that, between 75% and 90% of the waste produced by health-care providers is non-risk or "general" health-care waste, 25% of health-care waste is regarded as hazardous and may create a variety of health risks . Approximately 1.35 kg/bed/day of waste is produced on average in the Pakistani hospitals, which produce about 250,000 tons of HCW per year. In Sri Lanka Colombo represents highest percentage of healthcare waste

with 26.8% while Manner and Killinochchi show least percentages with 0.3%. These studies put forwards that the Proper segregation and waste disposal practice is needed to competent with international standards. This is leading to the safety of staff and public. Therefore, using proper color code and labeling is very important for waste segregation. As well as proper transportation, storage and treatment also to be practice as per the national guideline on HCWM. According to WHO we still need to improve our health care waste management system. To minimize the risks generated from improperly handed Heath care wastes. However, most of the literatures indicate that there are no proper system to follow in Srilanka hospitals to manage the waste. In this scenario, this study try to explore about, what are the knowledge and practices are following of the hospitals on the waste management among the health care workers.

OBJECTIVES

Based on the main research problem, this study puts forward the main objective as follows. The main objective is to identify the hospital waste management practice among the health care workers on use in the base hospital, Nintavur in the eastern province of Sri Lanka. To achieve the main objective, two sub-objectives have been put forward.

1. To identify the level of knowledge on health care waste management among health care workers at the base hospital in Nintavur in the eastern province, Sri Lanka.
2. To explore the standard of practice on health care waste management among health care workers at base hospital, in eastern province, Sri Lanka.

Research Questions

To achieve the above objectives, the following research questions were answered by this study.

1. What is the level of knowledge on health care waste management among health care workers at the base hospital, in Nintavur, eastern province, Sri Lanka?
2. What is the standard of practice on health care waste management among health care workers at the base hospital, in Nintavur?
3. What is the relationship between years of experience and standard of practice on health care waste management among health care workers at base hospital, in Nintavur?

CONCEPTUAL FRAMEWORK ON HOSPITAL WASTE MANAGEMENT

Health-care waste

The term health-care waste includes all the waste generated within health-care facilities, research centers and laboratories related to medical procedures. In addition, it includes the same types of waste originating from minor and scattered sources, including waste produced in the course of health care undertaken in the home (e.g. home dialysis, self-administration of insulin, recuperative care).Between 75% and 90% of the waste produced by health-care providers is comparable to domestic waste and usually called "non-hazardous" or "general health-care waste". It comes mostly from the administrative, kitchen and housekeeping functions at health-care facilities and may include packaging waste and waste generated during maintenance of health-care buildings. The remaining 10–25% of health-care waste is regarded as "hazardous" and may pose a variety of environmental and health risks –World health organization.

Health Care Waste Management (HCWM)

Health Care Waste Management means the management of waste generated by Health Care institutions using such techniques that will help to check the spread of diseases through.

Health care workers

A health professional, health practitioner or healthcare provider is an individual who provides preventive, curative, promotional or rehabilitative health care services in a systematic way to people, families or communities. Healthcare workers (HCWs) are at risk for exposure to serious, and sometimes deadly, diseases. Healthcare workers include physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, pharmacists, hospital volunteers, and administrative staff **(**CDC, 2016) According to WHO (2000) hospital waste contain a large range of micro-organism among which is hepatitis B virus (HBV) and hepatitis C virus (HCV) and HIV are the most significant pathogens. They also went forward to say that blood borne virus infections may follow sharp injury contamination of pre-existing skin lesions or splash maculation of the eyes of the mucous membranes. Ikelegbe & Ogeah (2003) stated that all work that seeks to minimize the healthy environment and impact of waste management. The problems to a large extent are also a case resource management. He said further that the lack of waste management is also a result of inappropriate design. The result of bad decision making either on the part of the institution responsible or the individuals within the society.

The Pakistan Hospital Waste Management (2005) stated that for effective management of hospital waste, it should be segregated, collected, transported, stored and disposed of in such a way that will not expose the health of workers and the general public to hazards. Samuel (2007) stated that the problem of improper hospital waste disposal and management in Nigeria in a study in Lagos shows that many workers are at risk from diseases associated with coming in contact with blood, fluid and other forms of hospital waste at work.

According to WHO (2000), all individuals exposed to hazardous health care waste are potentially at risk including those within health care establishments that generate hazardous waste and those outside these sources who either handle this waste or are exposed to it as a consequence of careless handling. Samuel (2007) observed that the major problems encountered in the management of clinical waste is with storage and the length of time it lays before being collected, absence of hospital guidelines on hospital waste disposal, inadequate personnel protective equipment and improper storage and transportation equipments and lack of safety inspection by environmental health personnel.

LHC Fact Sheet (2002) stated that many workers are at risk from diseases associated with all forms of hospital waste at work. It also stated that work is in place to ensure workers, patients or members of the public are not put at risk.

Patrick (2003) stated that Dioxin poisoning are due to poor and improper disposal or management of hospital waste and that it causes illness of varying degrees affecting the person, worst illness occurred in a five-year boy who suffered an inflammatory bleeding, requiring hospitalization and surgery.

METHODOLOGY

This study is a quantitative study. This method emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through questionnaires.

Descriptive study used here, the data obtained from cross-sectional survey. The study design referring to the survey that conducted in order to collect the data from the respondents. The cross sectional study design is chosen because the data collection were collected at a single point in a time, then no follow up procedure after the first time of the data collection. A cross-sectional survey collects data to make inferences about a population of interest at one point in time.

Base hospitals of Ampara district were chosen as the research population in this study. In these base hospitals, the Nintavur base hospital Nintavur was selected for the collection. The top to bottom staff and all groups were selected for the data collection. To collect the data, the non-probability method was to choose the quota-sampling technique used to select the staff from each category of each unit of Base Hospital Nintavur. The objective was to choose the participant multiple envelop method so a certain percentage of staff from each category of each unit were included.

Based on the Krejcie and Morgan (1970) formula, the sample was selected. There was 80 staff from the hospital was selected from each category for the experiment by envelope method, there were 77 of them only responded.

Data Analysis and Findings:

Knowledge of healthcare staff on hospital waste management

74 out of 77 participants (96.1%) are have trained on HCWM and 03 of 77 participants (3.9%) are not trained in HCWM.23 of 77 participants (29.9%) are very much interested on Waste management. Most of the participants (56) said there are five types of wastes available in the Hospital (72.7%),14 participants (18.2%) said there are 3 type of waste,5 participants (6.5%)said there are four type of waste available in the hospital, and two participants (2.6%) said they exactly don't know how many types of waste available. Table 4 shows the details below

Table 4.2: Knowledge on hospital waste management

Variable		Frequent	Percent	Mean
Do You Have Any Training On Waste Management?	Yes	74	96.1	1.4
	No	3	3.9	
Interest	Very Interest	23	29.9	1.7
	Interested	54	70.1	
Type Of Waste	3 Types	14	18.2	2.62
	4 Types	5	6.5	
	5 Types	56	72.7	
	Exactly No Idea	2	2.6	

Practices of hospital workers on hospital waste management

There are some variables concerned in this study as separate container, types of containers, label of containers, container lid, how to open the container, disposing people, regular

removing the waste, often, labeling before removal, tied before transport, check list for waste remove, is there supervisor, are waste mixed, what mixed mostly, local authority regular collection, close safe store for waste, tied before transport, methods of sharps and infected disposing, infected fluids disposing, pressurized containers, burning expired medications, burning plastics, disposing methods of pharmaceuticals or radioactive wastes, policy, needle prick registration, new staff orientation and finally about material supplies.

Table 4.3: Practices on waste management

Variable		Frequency	Percent	Mean
Separate Containers	Yes	64	83.1	1.17
	No	13	16.9	
Type of Containers	Three	4	5.2	4.78
	Four	12	15.6	
	Five	59	76.6	
	Six	1	1.3	
	No Idea	1	1.3	
Label of Containers	Labeled	75	97.4	1.3
	Not Labeled	2	2.6	1.01
Container Lid	Yes	76	98.7	
	No	1	1.3	
How to Open the Container	By Hand	74	96.1	1.04
	By Paddle Operation	3	3.9	
Who Disposing	Procedure	47	61	1.53
	Laborer	19	24.7	
	Anyone	11	14.3	
Regular Removing the Waste	Yes	46	59.7	1.4
	No	31	40.3	
How Often	Once	28	36.4	1.66
	Twice	47	61	
	Thrice	2	2.6	
Labeling Before Removal	Yes	73	94.8	1.05

	No	4	5.2	
Tied Before Transport	Yes	17	22.1	1.78
	No	60	77.9	
Check List for Waste Remove	Yes	76	98.7	1.01
	No	1	1.3	
Is There Supervisor	Yes	76	98.7	1.01
	No	1	1.33	
Are Waste Mixed	Yes	61	79.2	1.01
	No	16	20.8	
What Mixed Mostly	General +Infected	56	72.7	1.87
	General + Plastic	9	11.7	
	General + Glass	3	3.9	
	Infected + Glass	5	6.5	
	Many Mixed	4	5.2	
Local Authority Regular Collection	Yes	19	24.7	1.75
	No	58	75.3	
Close Safe Store for Waste	Yes	74	96.1	1.04
	No	3	3.9	

Tied Before Transport	Yes	7	9.1	1.91
	No	70	90.9	
		7	9.1	1.91
	Yes	70	90.9	
	No			

Available of Incinerator				
How Sharps & Infected Disposed		49	63.6	1.95
	Dumping	1	1.3	
	Incinerating	21	27.3	
	No Idea	6	7.8	
How Disposing Infected Fluids	Pour in to sink	74	96.1	1.04
	Pour in to Open Drain	3	3.9	
Burning _ Pressurized Containers	Yes	5	6.5	1.94
	No	72	93.5	
Burning Expired Medications	Yes	14	18.2	1.82
	No	63	81.8	
Burning Plastic	Yes	1	1.3	1.99
	No	76	98.7	
Disposal of Pharmaceutical	Simply General Method	39	50.6	1.49
	Special Method	38	49.4	
Disposal of Radio Active Waste	With General Waste	6	7.8	2.61
	Specially Designed Method	18	23.4	
	No Idea	53	68.8	
Hospital Have a policy	Yes	72	93.5	1.06
	No	5	6.5	
CEA Licensed	Yes	45	58.4	1.74
	No	7	9.1	
	No Idea	25	32.5	

Needle Prick Register	Yes	62	80.5	1.38
	No	1	1.3	
	No Idea	14	18.2	
Orientation for New Staff	Yes	12	15.6	1.84
	No	65	84.4	
Materials Supplied	Yes	70	90.9	1.18
	Not Adequate	7	9.1	

When it concern about separate containers, 83.1% of staff (mean 1.17) mentioned as "yes". There were four types of containers in the hospital. Majority responded as five and 1.3% percent responded as six and similar percentage had no idea about types of containers. 5 Seventy five percent of them had an idea regarding label of containers (mean was 1.3). But 2.6% of them did not label the containers. When it concerns container lid, majority of respondents had responded as "Yes". Seventy four of subjects responded the method of opening the container was by hand. But 3.9% of them were using paddle. Sixty one percent of subjects responded as procedure for waste disposing while less number of people responding as anyone. Majority (61%) mentioned waste disposing is done as two time per day. Also seventy three mentioned that labelling is done before disposing. According to the results, there are sixty subjects mentioned that collecting people do not do tied before transport. 98.7% mentioned that there was a checklist for waste disposing. Seventy-six people mentioned that there was a supervisor. Some people mentioned that there was waste mixing. It was sixty-one percent. Also 72.7% of them mentioned that general waste mostly mix with infected waste (mean is 1.87). However, 3.9% mentioned as general wastes mixed with glass. It was less number. In addition, majority mentioned that sharps and infected wastes dispose by burning. 96.1% responded as infected fluids were disposed into sink.

When it concerning the burning pressurized containers, 72 subjects mentioned as "no". When it is concerned about burning expired medications, 63 people mentioned as "no". 98.7% of people mentioned that plastics were not burned in the hospital. 39 people mentioned that pharmaceutical methods were disposing of by using simply general methods in the hospital. It was the majority's idea. But the majority (68.8%) had no idea regarding radioactive wastes disposing of. Policy for the waste disposing of is very important. 72% of the subjects mentioned that there is a policy regarding waste disposing of minimal number (6.5%) of people mentioned

as "no". Needle prick injuries can be seen commonly in hospitals. 80.5% of subjects had mentioned that there is a register for that. But the orientation regarding waste disposing of for new staff was not done according to 65 subjects' answer in this study. But twelve people only had the chance to be oriented regarding waste disposing.

Material supplying is satisfactory done according to the results of this study because the majority (90.9%) mentioned as "yes". But 9.1% mentioned that it is not adequate. Finally, a major issue coming to bright seventy participants (90.9%) says that there is not available an incinerator for treating infected wastes.

Smarakoon and others (2017) explain that the all aspects of HCWM in both hospitals need much improvement. Processes related to HCWM need to be regularized. Both institutions need provision of essential facilities. Knowledge gaps among nursing officers need to be bridged by educational programmes. Educational programmes need to focus on technical details specific to HCWM. Mechanisms to sustain the favorable attitudes and correct practices related to HCWM needs to be adopted.

According to Tudor et al. (2008), in order to decrease the amount of medical waste in healthcare, investing significant resource and financial efficiencies is not sufficient. Due to the many factors involved, there is a need to focus both on containment and logistics, as well as social factors for success. This study indicates that there are many factors that influence the management of waste among health care workers.

Relationship between knowledge and practice of hospital clinical waste management among health care workers

Table 4.4 shown that high knowledge with good practice 61 respondent (79.2%), whereby high knowledge with poor practice 14 respondents (18.2%). Low knowledge with good practice only two respondents (2.6%), whereby low knowledge with poor practice was nobody (0%). The above results explains that there are most of the workers have good practice to manage waste.

Table 4.4 Level of Knowledge and Practice Cross tabulation on Waste management				
Variables		Practice		Total
		Good	Poor	
High Knowledge	Count	61	14	75
	% within K1	81.3%	18.7%	100.0%
	% within P1	96.8%	100.0%	97.4%
	% of Total	79.2%	18.2%	97.4%
Low Knowledge	Count	2	0	2
	% within K1	100.0%	0.0%	100.0%
	% within P1	3.2%	0.0%	2.6%
	% of Total	2.6%	0.0%	2.6%
Total	Count	63	14	77
	% within K1	81.8%	18.2%	100.0%
	% within P1	100.0%	100.0%	100.0%
	% of Total	81.8%	18.2%	100.0%

4.2.3 Alternative Hypothesis

Alternative Hypothesis was rejected, as there is no significant relationship between levels of knowledge and practice on waste management among healthcare workers.

Table 4.5 Chi square cross tab tabulations on knowledge and practice

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.456[a]	1	.499	1.000	.667
Continuity Correction	.000	1	1.000		
Likelihood Ratio	.814	1	.367	1.000	.667
Fisher's Exact Test				1.000	.667
Linear-by-Linear Association	.450[c]	1	.502	1.000	.667
N of Valid Cases	77				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .36.

b. Computed only for a 2x2 table

c. The standardized statistic is -.671.

Table 4.5 shown that Fisher's exact test result is 1.000 > than p value 0.05.

This show that there is no significant relationship between levels of knowledge with practice on waste management among healthcare workers in Eastern Province Hospital, Sri Lanka.

Knowledge on hospital waste management

The knowledge of daily work activities was differing from category to another. It was 72.7% from all between the age group of 31-40 years. But the age group of more than fifty having lower knowledge. Seventy four percent of females were knowledgeable than males.

Muthani, Nyerere, and Ngugi (2106) mentioned that doctors and nurses are more aware of waste management and handling than others. In this study, when concerning about policies regarding waste management, all doctors had known about it. However, medical assistants who had educational qualifications with school pass out did not know (93.33%). All dental surgeons also knew than nurses. Less number of midwives, and medical assistants had idea about it.

Checklist for waste management is important. All of the subjects of this study knew about it (100%). But majority of nurses knew about regularly removing of wastes. But majority of

medical assistants had not known than nurses. No MLTs knew regarding this. Majority of doctors also knew. Most of nurses (n=19) know about waste disposing people than doctors (n=4).But consultants did not know about it. However, majority responded as producers who dispose waste.

According to Olyekale and Oyekale (2017), lack of knowledge of doctors and nurses concerning the importance of that separation is lower than other categories. In the question regarding the type of waste, the response rate of nurses was 86%.It was the majority and they mentioned as five types. Medical assistants' response rate was 63.33% (n=19). Ninety percent of doctors also mentioned as five. When concerning the results of this study, it also showed. Knowledge of doctors regarding separation of containers is higher than medical assistants. But it was also less than nurses (86.95%). Almost all categories mentioned as five not including paramedical. This showed that knowledge cause for proper waste management. Also concerning about the people who dispose waste, consultants did not know about it. However, majority of nurses (n=19) knew than doctors (n=4).

Practice of healthcare staff on hospital waste management

Table 4.4 shown that high knowledge with good practice 61 respondent (79.2%), whereby high knowledge with poor practice 14 respondents (18.2%).Low knowledge with good practice only two respondents (2.6%), whereby low knowledge with poor practice was nobody (0%). The above results are not so accurate because the data were collected by using close-ended questions 'yes and 'no only.

Relationship between Years of services towards practices on HCWM

Training and duration of work experience were not significantly associated with knowledge, attitude and practice scores, except for nurses with longer work experience. Who were more likely to have satisfied Knowledge, attitudes and practices of health-care (personnel towards waste disposal management at Ain Shams University Hospitals, Cairo S.A. Hakim, 1 A. Mohsen2 and I Bakr1 knowledge about waste disposal than less experienced nurses.

CONCLUSION

Healthcare waste management often ignored due to the lack of knowledge on the hazards it's possess to the environment and people inhabiting it. As a result of this healthcare institutions

don't taking at most care in managing of healthcare waste properly mainly due to prohibitive cost involve in it. Unlike formerly, the types of waste are now very clear, and the management methods now very clear too. There is a special program on waste management in this hospital.

Although it has been handled several methods for managing waste generated in this hospital, they cannot be said to have succeeded completely. Progressive changes in many good things that are in practice should be injected. Programs in the documents should be implemented. Therefore, there is no doubt that this institution will succeed in management of clinical waste when it comes to ensuring the following issues

Concluding from the results, the importance of training regarding hospital waste management is very important. Most of sharps items using in hospital settings should be discarded safely. Same time non availability of an incinerator is also giving a in completed HCWM, so an incinerator to be introduced to the system. Also having lack of proper and complete knowledge about Healthcare Waste Management impact on practice of appropriate waste disposals. Therefore, all the staff should have sharp knowledge and proper practice method regarding healthcare waste management. Policy which is available should noticed to all staff. Not only the staff but the patients and visitors also to be educated on the current waste management practice.

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