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Knowledge and practice of medical professionals of a selected urban hospital on hospital waste management

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Abstract
The study was conducted to assess the level of knowledge and practice of medical professionals in Shaheed Suhrawardy medical college hospital, Dhaka on hospital waste management. Total 105 respondents were interviewed. Mean age of the respondents was (38.10±10.857) years. About 72.4% was female and 89.5% of respondents were Muslim. Mean years of schooling of the respondents was (11.70±7.846) years and mean income of the respondents was (31914.29±25361.28) tk. About 36.19% was nurses, 28.57% of the respondents were doctors and 35.24% was cleaner. Mean professional experience of the respondents was (12.69±10.92) years. All the respondents had knowledge about hospital waste. About 99% of the respondents had knowledge about sharpe waste, pathological waste, liquid waste and general waste. About 99% respondents collected hospital waste in specific color container and 98.08% had knowledge about waste disposal. Near about 97.1% of the respondent's practices of waste disposal was dumping and 99% of them practices incineration as waste disposal. Among them, 92.7% respondents told that the best procedure of waste disposal is dumping. About 98.1% of the respondents had very good knowledge and (94.2%) of them had very good practices. All of the respondents told it was essential to have knowledge about waste disposal. About 45.1% of the respondents told that the source of information about waste disposal was advocacy and seminar, seminar and training. We found satisfactory knowledge and practices of hospital waste management among the study population. If this level of knowledge and practices are available in every hospital of Bangladesh, both patients and medical professionals will be safe from unwanted infections.

Keywords: hospital waste management, shaheed suhrawardy medical college

Introduction
Waste generation is one of the earliest activities attributable to human beings and a significant part of anthropological and archaeological documentation of past civilizations. From the waste generated from hunting and gathering to the more complex and sophisticated waste generation patterns of this new millennium. Waste generation and its disposal and management is a paramount issue in sustainability of the built environment and the future of the planet; particularly as the complex components create greater environmental pollutions and make waste disposal and management more difficult [1].

Hospital waste is often described as any residual matter, solid or liquid that is generated in the diagnosis, treatment or immunization of human beings or animals. Dental waste is considered as hospital waste; are dental materials that have been used and are no longer wanted for use and are therefore should be disposed in an appropriate way. It is of two types' liquid waste and solid waste. Dental healthcare service units generate wastes that can be classified into: hazardous waste, nonhazardous waste, Bio hazardous waste, sharps and pharmaceutical wastes [2].

Today's environment contends with global warming which studies in part say is attributable to poor management of both biodegradable and non-biodegradable solid waste. This is compounded by the astronomical increase in solid waste generation due to increase in population and urbanization. Even more critical in today's environment is waste disposal the current trends of ineffective and irresponsible disposal of solid waste pollute the environment and pose as health risks to the society [3]. Modern approaches to waste disposal only present a partials solution to the problem. These approaches include land filling, which comes with attendant problems of smell from the land fill which makes it an undesirable environmental scheme in the neighborhood. Incineration often involves burning of toxic combustible materials largely due to ignorance of the various stakeholders. An evaluation of the knowledge, attitudes beliefs and practices of the various stake holders in medical waste management is relevant in the assessment of Plateau State's viability as a sustainable city thirty five years after inception [4].

Medical wastes are of great importance due to its potential environmental hazards and public health risks. World Health Organization (WHO) has advocated medical wastes as special wastes and it is now commonly acknowledged that certain categories of medical wastes are among the most hazardous and potentially dangerous of all wastes arising in communities, as exposure to hazardous medical waste can result in disease or injury. The hazardous nature of medical wastes may be due to one or more of the following characteristics: it contains infectious agents, toxic or hazardous chemicals or pharmaceuticals, and sharps, and it is genotoxic and radioactive. Infectious medical wastes, particularly sharp ones, have been responsible for most of the accidents reported in literature. WHO estimated that, in 2000, injections with contaminated syringes caused 21 million

hepatitis B, 2 million hepatitis C and 260,000 HIV infections [5].

The health care sector comprise a diverse range of health care facilities which have a size assortment from large general and specialist hospitals to small municipal dispensaries and D-type centers. All these facilities are an integral part of our society with an endeavor to reduce health problems and to eliminate imminent jeopardy to people's health. In the course of curing health problems the health care sector produce huge amount of bio-medical waste which may be hazardous to all those who come in contact with this waste. Hazardous waste management is a concern for every health care organization. Health-care waste refers to all the waste generated by a health care establishment. It is estimated that 10-25% of health care waste is hazardous, with the potential for creating a variety of health problems. The waste produced in the course of healthcare activities carries a higher potential for infection than any other type of wastes [6].

Bio-medical waste collection and proper disposal has become a significant concern for both the medical and the general community. Since the implementation of the biomedical Waste Management Rules 1998, every concerned health personnel is expected to have proper knowledge, practice and capacity to guide others for waste collection and management, and proper handling techniques [7]. (Pinto *et al*, 2014). Dental offices generate a number of hazardous wastes that can be detrimental to the environment if not properly managed. This includes sharps, used disposable items, infectious wastes (blood-soaked cotton, gauze etc.), mercury containing waste (mercury, amalgam scrap), lead containing waste (lead foil packets, lead aprons) and chemical waste (such as spent film developers, fixers and disinfectants). Studies have shown that waste water from dental offices typically contains elevated concentrations of metals such as mercury, silver, copper, tin and zinc. Sources of these metals include placement and removal of amalgam fillings (mercury, silver, copper, tin and zinc) and disposal of the spent X-ray fixer solution [8].

The biomedical waste management and handling rules have been notified in 1998. The rules were amended twice in 2000, primarily to address administrative matters. The rule makes it mandatory for the health care establishments to segregate, disinfect and dispose their waste in an ecofriendly manner. An important pre-requisite and key to successful waste management program is segregation which is the separation of different types of waste as per treatment and disposal option. Segregation and collection of various categories of waste should be done at the source, in separate containers so that each category is treated in a suitable manner to render it harmless. For waste management to be effective, the waste should be managed at every step, from acquisition to disposal [9].

India is the first country that has made constitutional provisions for protection and improvement of the environment. Majority of waste (75-90%) produced by the healthcare providers is non-risk or general and it is estimated that the remaining (1025%) of healthcare waste is regarded as hazardous the potential for creating a variety of health problems. The management of health care waste in India is 'bleak'. In India biomedical waste generated from health care facilities are generally not segregated and disposed in municipal bins located either inside or outside the facility premises. The most common problems associated with health care wastes are the absence of waste management, lack of awareness about their health hazards, insufficient financial and human resources for proper management and poor control of waste disposal.6 Therefore, conducted a study to assess the knowledge, attitude and practices regarding biomedical waste management of hospital nursing staff and to help the authorities to develop the strategy for improving the situation in future [10].

Materials & Methods

A descriptive cross sectional study was done at Shaheed Suhrawardy medical college hospital, Dhaka from September, 2016 to December, 2016. Inclusion criteria those who gave consent and participated to fill up questionnaires and the medical professionals those who were currently attending at the study hospital. The sample size of the study was 105 and purposive sampling technique was used. Data collection technique was face to face interview. Data was analyzed by using the software SPSS 16.0 version and excel. And data was presented in tables, graphs, charts and bars.

Results

A total number of 105 respondents were interviewed. Mean age of the respondents were (38.10±10.857) years.

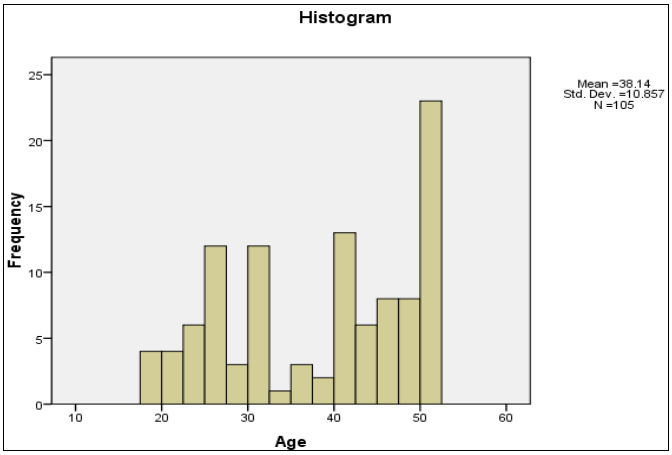

Fig 1: Distribution of the respondents according to Age

Among the respondents 72.4% were female in the contest 27.6% were male. About 89.5% of respondents were Muslim while only 1% was Buddhist. Regarding the study 9.5% respondents were Hindu.

Table 1: Distribution of the respondents according to Sex & Religion (n=105)

Sex	Number	Percentage
Male	29	27.6
Female	76	72.4
Religion		
Muslim	94	89.5
Hinduism	10	9.5
Buddhism	1	1

In the study, years of schooling of the respondents were (11.70±7.846) years and mean income of the respondents were (31914.29±25361.28) tk. Majority of the respondents

(36.19%) were nurses in the contest 28.57% of the respondents were doctors. About 35.24% respondents were cleaner.

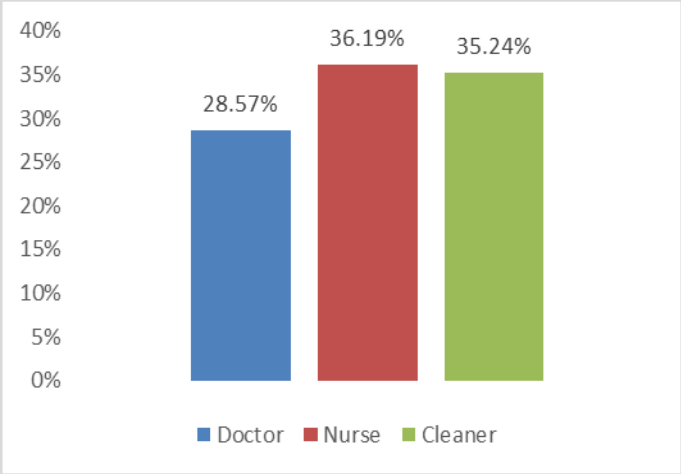

Fig 2: Distribution of the respondents according to occupation

The study investigated the marital status of the respondents. About 93.7% of the respondents were married in the contest 6.7% of them were unmarried.

Table 2: Distribution of the respondents according to marital status (n=105)

Marital Status	Number	Percentage
Married	98	93.3
Unmarried	7	6.7

Among the respondents, professional experience was (12.69±10.92) years. All the respondents had knowledge about waste of the hospital. About 99% of the respondents had knowledge about Sharpe waste and 99% of the respondents had knowledge about pathological waste. Near about 99% of the respondents had knowledge about liquid waste and also 99% of the respondents had knowledge about general waste.

Table 3: Distribution of the respondents according to knowledge about different types of waste (n=105)

Types of waste	Number	Percentage
Sharpe waste	103	99
Pathological waste	103	99
Liquid waste	103	99
General waste	103	99

Near about all the respondents (99%) collected hospital waste in specific color container while 1% of them collected hospital waste in specific place. About 97.1% of the respondents knew about specific color of container in the contest of that only 2.9% of them didn't know about specific color of container.

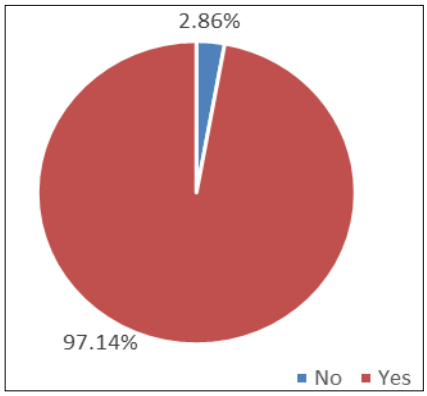

Fig 3: Distribution of the respondents according to knowledge of different types of color container

About 97.1% of the respondents knew that infected dressing and POP casts are put on red color container while 2.9% of them didn't know this. Most of the respondents (98.1%) knew that radioactive waste is put on yellow color container in the contest of that only 1.9% of them didn't know. In the study (98.1%) the respondents knew that general waste are put on black color container in the contest of that only 1.9% of them didn't know. About (98.1%) the respondents knew that Risk Waste without sharps waste is put on blue color container in the contest of that only 1.9% of them didn't know. Near about all the respondents (98.1%) knew that Chemicals like Mercury & Cadmium waste are put on green color container in the contest of that only 1.9% of them didn't know this.

Table 4: Distribution of the respondents according to practice of different types of container for waste collection (n=105)

Types of container	Number	Percentage
Red color container	100	97.1
Yellow color container	102	98.1
Black color container	102	98.1
Blue color container	102	98.1
Green color container	102	98.1

About 98.08% of the respondents had knowledge about waste disposal while 1.92% of them didn't have had knowledge about waste disposal.

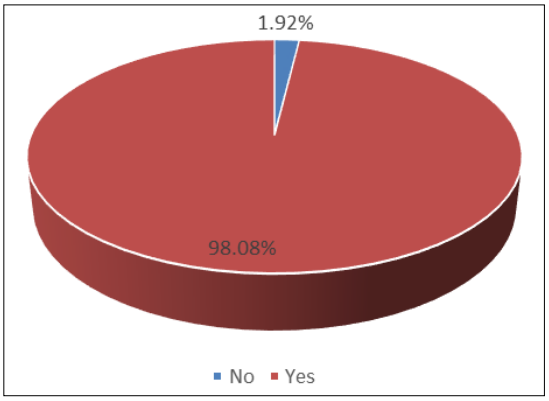

Fig 4: Distribution of the respondents according to knowledge about waste disposal

Regarding the study 97.1% of the respondent's practices of waste disposal dumping while 2.9% of them didn't practice dumping. About 99% of them practices of waste disposal incineration in the contest of that 1% of them didn't practice of waste disposal of incineration. About 31.4% of them like burning while 68.6% of them didn't like burning. Most of the respondents (97.1%) of them

Table 5: Distribution of the respondents according to practice of waste disposal (n=105)

Procedure of waste disposal	Number	Percentage
Dumping	100	97.1
Incineration	102	99
Burning	32	31.4
Breaking into small part	100	97.1

About 68.8% of the respondents told the best procedure of waste disposal is burning in the contest of that 31.2% of them told the best procedure of waste disposal is not burning. Among them, 92.7% respondents overviewed that the best procedure of waste disposal is dumping while 7.3% of them overviewed that dumping is not best procedure of waste disposal. About 77.1% respondents overviewed that the best procedure of waste disposal is incineration while 16.5% of them overviewed that incineration is not best procedure of waste disposal. About all the respondents (99%) told that waste disposal practices were available in their hospital while 1% of them told that waste disposal practices were not available in their hospital.

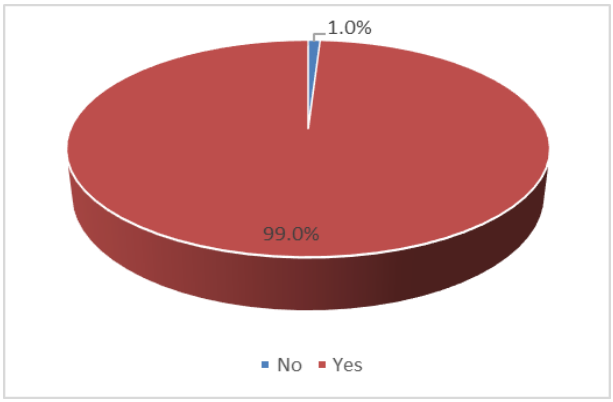

Fig 5: Distribution of the respondents according to practice of waste disposal

Regarding the study, a total number of 17 questions were selected for knowledge. About 98.1% of the respondents had very good knowledge while 1.9% had poor knowledge as per operational definition.

Fig 6: Distribution of the respondents according to level of knowledge about hospital waste

In the study 7 questions were selected for practices Most of the respondents (94.2%) of them had very good practices in the contest 1.9% of them had good practice. Among the respondents only 3.8% of them had poor practices.

Table 6: Distribution of the respondents according to level of practices of hospital waste (n=105)

Level of practices	Number	Percentage
Very good practices	99	94.2
Good practices	2	1.9
Poor practices	4	3.8

About 98.1% of the respondents didn't participant in hospital waste disposal while only 1.9% of them participant in hospital waste disposal. All of the respondents told it is essential to have knowledge all health workers about waste disposal. About 45.1% of the respondents told the source of information about waste disposal is advocacy and seminar in the contest of that 6.86% of them told the source of information is advocacy, seminar and training. About one third (31.37%) of the respondents told the source of information is seminar while 16.67% of them told the source of information is advocacy.

Discussion

The discussion obtained from the analysis conducted on the data that were collected using self-administered questionnaire as well as in view of the objectives to assess the level of knowledge and practices of health workers on hospital waste management. Knowledge of health care workers on waste segregation was required for them to be able to properly segregate all types of wastes and to reduce spread of infections. This prerequisite serves to benefit the health care workers, patients, visitors and the community. It also reduces costs and unnecessary spending. In absence of any knowledge, improper waste segregation may occur.

According to Infection Prevention Control Guidelines, health care workers should be trained so that they can acquire proper knowledge on waste segregation [11].

Training is important as it impart knowledge, gives information and instils insight into HCWs. The literature sources advocate for importance of proper waste segregation. This can make a real difference in improving health hazard. The studies on segregation of medical waste into infectious waste and non-infectious waste in South Africa and Egypt revealed a major policy implementation gap between the national government and the hospitals and some staffs were not aware of biomedical waste (BMW) legislation [12].

Medical wastes definitions and classifications taken by various countries directly affect their management [13]. For instances, Portuguese legislation settles the following four groups of medical wastes:(i) Group I – wastes similar to municipal wastes; (ii) Group II – nonhazardous medical wastes that do not require specific treatment and can be considered similar to municipal wastes; (iii) Group III – medical wastes with, or suspicious biological hazard that must be pre-treated before elimination as municipal wastes or, otherwise must be incinerated; (iv) Group IV – specific medical wastes with compulsory incineration. In Portugal, in 2005, the production of medical wastes was approximately 54,000 t. Algarve region, in the south of Portugal, contributed with 1.6% of the total production, which corresponded to the region that contributed with the lowest medical wastes production in Portugal. Data from the governmental health institutions in Portugal (DGS, 2006) demonstrated that between years 1999 – 2005, there was an increase in medical wastes production, especially after 2002, as well as an increase of hazardous wastes production compared to non-hazardous wastes, both in Portugal and Algarve [14-15].

In this study, a total number of 105 respondents were interviewed. Mean age of the respondents were (38.10±10.857) years. Among the respondents 72.4% were female and 89.5% of respondents were Muslim. Years of schooling of the respondents were (11.70±7.846) years and mean income of the respondents were (31914.29±25361.28) tk. Majority of the respondents (36.19%) were nurses. Among the respondents, professional experience was (12.69±10.92) years. All the respondents had knowledge about waste of the hospital. About 99% of the respondents had knowledge about Sharpe waste and 99% of the respondents had knowledge about pathological waste. Near about 99% of the respondents had knowledge about liquid waste and also 99% of the respondents had knowledge about general waste. Near about all the respondents (99%) collected hospital waste in specific color container. About 97.1% of the respondents knew about specific color of container. About 97.1% of the respondents knew that infected dressing and POP casts are put on red color container. Most of the respondents (98.1%) knew that radioactive waste is put on yellow color container. In the study (98.1%) the respondents knew that general waste is put on black color container. About (98.1%) the respondents knew that Risk Waste without sharps waste are put on blue color container. Near about all the respondents (98.1%) knew that Chemicals like Mercury & Cadmium waste are put on green color container. About 98.08% of the respondents had knowledge about waste disposal while. Regarding the study 97.1% of the respondents were practices of waste disposal dumping. About 99% of them practices of waste disposal incineration. About 31.4% of them like burning. About 68.8% of the respondents told the best procedure of waste disposal is burning in the contest of that 31.2% of them told the best procedure of waste disposal is not burning. Among them, 92.7% respondents overviewed that the best procedure of waste disposal is dumping. About 77.1% respondents overviewed that the best procedure of waste disposal is incineration. About all the respondents (99%) told that waste disposal practices were available in their hospital. Most of the respondents (94.2%) of them had very good practices. About 98.1% of the respondents didn't participant in hospital waste disposal while only. All of the respondents told it is essential to have knowledge all health workers about waste disposal. About 45.1% of the respondents told the source of information about waste disposal is advocacy and seminar, seminar and training.

A study done in Botswana and Nepal concurred that as the demand for more healthcare facilities increases, there is also an increase on waste generation from these facilities. This situation requires an organized system of healthcare waste management to curb public health risks as well as occupational hazards among healthcare workers as a result of poor waste management. In this study, we found satisfactory knowledge and practices of hospital waste management among the study population.

Conclusions

The knowledge and practices of the medical waste management varied among different categories of health workers and were found to be satisfactory. For effective implementation of biomedical waste management practices in the hospitals periodical sensitization and continuous advocacy, seminar and training program is mandatory to improve the biomedical waste knowledge and practices among health workers especially focusing at the lower level staffs. Periodical in service education is the solution to the proper bio-medical waste management. It equips health care providers with essential knowledge, skill and attitude for the protection of self from the infectious or noninfectious waste while working in the health centers. It also helps the health care providers to protect the community from hazardous waste. Care givers and support personnel, housekeepers and transport personnel must have periodic educational updates on bio-medical waste management. The study concluded that regular orientation and re-orientation training programs should be organized for all hospital staff and strict implementation of guidelines of biomedical waste management that includes waste segregation, to protect themselves and hospital visitors. If this level of knowledge and practices will be available in every hospital of Bangladesh then both patients and medical professionals will be safe from unwanted infections.

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