Original Article

Exploring the Effective Management of Medical Waste of BIRDEM General Hospital

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Abstract

Background: *Medical waste can be generated in hospitals or clinics where diagnosis and treatment are conducted. The management of these wastes are of public concern and health threats are associated with such wastes. The study assessed to explore the current situation of medical waste management and level of awareness related to impact of medical waste and its management among the different levels of professionals.*

Methods: *A descriptive cross-sectional study was done and data were collected from September 2012 to December 2012 at BIRDEM General Hospital. Data were collected by simple random sampling method and semi-structured questionnaire were used in this study. The questionnaire included socio-demographic information, source of hospital waste, description of hospital waste, segregation of waste and assessment of medical waste management system. The questionnaires were interviewed to the doctors, nurses, paramedical staff and cleaners who were related to waste management practices.*

Results: *A total of 186 participants were interviewed in this study. The mean and SD of age was 37.9 ± 10.4 years and the age range from 22 to 65 years respectively. The male and female subjects were 28.0% and 72.0% respectively. Of the total participants, doctors, nurses, paramedical staff and cleaners were 15.1%, 55.4%, 12.9% and 16.7% respectively. To assess the perception of the respondents about hospital waste management, the nurses (100.0%) and cleaners (100.0%) were found in a better position to follow color-coding system (CCS) and to use of protective bags while segregating primary waste, while doctors (21.4%) and paramedical staff's (29.2%) practice were not encouraging. However, in terms of constituents of medical waste doctors and paramedical staff's perception was better than the nurses and cleaners. Doctors (92.9%), nurses (96.1%) and paramedical staff (95.8%) were very comfortable about the present color coding system than compared with cleaners (74.2%), although the doctors are less compliant to follow the color-coding system (78.6% compliant) in practice. A substantial proportion of the doctors (71.4%) sometimes put waste in wrong bins as opposed to 51.5% nurses and 33.3% paramedical staff. Few of the respondents would consider the waste if some medical waste is accidentally put to the general waste bin, 85.7% of the doctors, 95.1% nurses, 66.7% paramedical staff and 100% cleaners told that they would consider the waste as medical waste. Nurse's perception was also better compared to other occupants in sealing waste-bin for disposal. In view of improving the existing waste management system, most of the respondents of different categories were in favor on waste management system. Majority of the respondents think that there should be designated person (97.8%) or rules (97.8%) or monitoring (96.8%) at the administrative level for organizing and managing of waste collection, handling, storage and disposal of waste who will follow a definite rule during all these processes.*

Conclusion: *The study observed that there is lack of knowledge affiliate and practice among the doctors, nurses, paramedical staff and cleaners in segregating hospital waste at the primary source of collection. However, nurses and cleaners were more aware than the doctors and paramedical staff in terms of practice of segregating primary waste. The study also found that perception of waste management was better in doctors and paramedical staff than compared with cleaners and other staffs. To improve the waste management system, it is needed to make policy and regulation guidelines to well-organized system of collecting and treating waste in the hospital.*

Key words: *Medical Waste, Management, Effective.*

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Introduction

Medical waste management has become a critical issue as it makes potential health risks and damage to the environment.[1] It is also of greater importance due to its potential environmental hazards and public health risks globally[2] as well as Bangladesh. Poor conduct and inappropriate management and disposal methods exercised during handling and disposal of medical waste is an increasing significant health hazards and environmental pollution due to spreading infection.[3-5] It is a common observation in mega cities of Bangladesh that poor scavengers, women and children collect some of the medical wastes such as syringe-needles, saline bags, blood bags etc.[6]

Hospitals generate millions of tons of waste each year. In the past, many hospitals simply dumped all waste streams together, from reception-area trash to operating-room waste, and burned them in incinerators which is still common practice in many countries. Yet medical waste incineration is a leading source of dioxin, mercury, lead and other dangerous pollutants that threaten human health and the environment. Some more hospitals and clinics in the developing world discard medical waste with regular trash and risk the spread of diseases among scavenger populations. Discarded needles and syringes may result in the spread of blood borne pathogens such as (human immunodeficiency virus) HIV and hepatitis. Others burn their waste in open fields or in small incinerators without pollution control, exposing communities to toxic byproducts and potentially dangerous ash. As health program is expanding, the problem of medical waste treatment and disposals become critical.

Around the world, Health Care without Harm is working to minimize the amount and toxicity of waste generated by the health care sector, to ensure the proper management and segregation of medical waste, and to eliminate the dangerous practice of incineration by promoting and implementing alternatives.[7]

An adaptation of the current guidelines on the disposal of hospital wastes, as well as improvements in internal safety and hygiene, must be part of an overall plan of hospital waste management that establishes the procedures to follow. This should be done through properly coordinating internal and external services, as well as defining responsibilities in each of the management phases. The main objective of this study is to protect the health of health care personnel, patients, visitors and the general public both in the hospital and beyond.

Methods

A descriptive cross-sectional study was done and data were collected from September 2012 to December 2012 at BIRDEM General Hospital. Data were collected by simple random sampling method and semi-structured questionnaire were used in this study. The questionnaire included socio-demographic information, source of hospital waste, description of hospital waste, segregation of waste and assessment of medical waste management system. The questionnaires were interviewed to the doctors, nurses, paramedical staff and cleaners who were related to waste management practices in this hospital and who were willing to participate in the study.

Statistical Analysis

The variables were summarized by their frequency with percentage and also by their Mean ± SD. All statistical tests were considered statistically significant at 5% level of significance. Statistical Package for Social Sciences (SPSS) version 20.0 was used.

Results

Total 186 participants were interviewed in this study. Of them, the male and female participants were 72% and 28% respectively. The age range of participants was 22 to 65 years and mean age (± SD) was 37.9 ± 10.4. About 0.5% of the total study subjects was illiterate and rest of them were literate (primary=7.0%, below Secondary School Certificate =14%, Secondary School Certificate =28.5, Higher School Certificate = 27.4% and graduate and above 22.6%). Of the total participants, more than 55% were nurses, 15.1% doctors, 12.9% paramedical staffs and 16.7% were cleaners [shown in Table I].

Table II shows that distribution of respondents of different levels of profession by their practice about collection and primary segregation of waste. The nurses (100.0%) and cleaners (100.0%) invariably followed the color-coding system (CCS) while segregating primary waste, whereas 78.6% doctors and 70.8% paramedical staff's followed the CCS. Majority of nurses (96.1%) and cleaners (83.9%) used protective bags in the primary source of waste collection, but only 21.4% of doctors and 29.2% of paramedical staff practiced the same. In response to a question whether "medical waste is segregated inside the hospital", 89.3% of the doctors and 99% of nurses 100% paramedical staffs and 100% cleaners told it is done so. In response to another question whether they use separate bags during waste transportation in hospital, most of the doctors (78.6%), nurses (86.4%), paramedical staffs (75.0%) and cleaners (96.8%) told that they did so. About role of Infection Control Committee for

segregation of the infectious waste, 78.6% of doctors, 79.6% of nurses, 83.3% paramedical staff and 93.5% cleaners told that, committee have had role.

Table I. Socio-demographic characteristics of the study subjects

Variables		Frequency	Percentage
Age:	< 30	60	32.3
	30-40	38	20.4
	40-50	54	29.0
	≥50	34	18.3
Total		186	100
Level of	Illiterate	1	0.5
Education:	Primary	13	7.0
	Bellow SSC	26	14.0
	SSC	53	28.5
	HSC	51	27.4
	Graduate	42	22.6
Total		186	100
Gender:	Male	134	28.0
	Female	52	72.0
Total		186	100
Professional	Doctor	28	15.1
Status:	Nurse	103	55.4
	Paramedical	24	12.9
	Cleaner	31	16.7
Total		186	100

Table III shows the respondents opinion about different constituents of medical waste. Majority of doctors thought that chemicals (100%), radioactive materials (100%) and body fluids (100%), pharmaceuticals (96.4%), dressing's cotton and plasters (60.7), pressurized containers (64.3%), unused medicines (78.6%) are medical wastes. Nurse's opinion, chemicals (61.2%), radioactive materials (61.2%) and body fluids (99%), pharmaceuticals (63.1%), dressings cotton and plasters (98.1%), pressurized containers (60.2%), unused medicines (66%) and kitchen wastes from the hospital (61.2%) are medical waste. Almost all of the paramedical staffs thought chemicals (79.2%), radioactive materials (79.2), body fluids(100%), pharmaceuticals (79.2%), pressurized containers (75.0%), unused medicines (79.2%) as medical waste. Cleaners thought dressings cotton and plasters (100%) and body fluids (100%) as medical waste. 74.2% cleaner thought kitchen wastes from the hospital are medical waste.

Table IV represents the respondent's opinion about segregation of waste and existing color coding system (CCS) of waste bin. Most of the paramedical staffs (95.8%) nurses (96.1%) and doctors (92.9%) were very satisfied with present CCS of waste-bins, where as 74.2% of cleaners had the same feeling. 44.7% nurses, 41.7% of paramedical staff, 41.9% of the cleaners, and only 7.1% doctors never put waste in wrong bins. Most of the doctors (71.4%), 51.5% nurses, 33.3% paramedical staffs and 32.3% of cleaners sometimes

Table II. Distribution of respondents by their source of hospital waste

Source of hospital waste		Doctorn(%)	Nursen (%)	Paramedicaln (%)	Cleanern (%)
Followed CCS in the primary	Yes	22 (78.6)	103 (100)	17 (70.8)	31
segregation of waste:	No	6 (21.4)	0 (0.0)	7 (29.2)	(100.0)0 (0.0)
Used protective bags in the					
primary source of waste	Yes	6 (21.4)	99 (96.1)	7 (29.2)	26 (83.9)
collection:	No	22 (78.6)	4 (3.9)	17 (70.8)	5 (12.1)
Medical waste segregated inside	Yes	25 (89.3)	102 (99.0)	24 (100.0)	31 (100.0)
the hospital:	No	3 (10.7)	1 (1.0)	0 (0.0)	0 (0.0)
Used separate bags during	Yes	22 (78.6)	89 (86.4)	18 (75.0)	30 (96.8)
waste transportation in hospital:	No	6 (21.4)	14 (14.6)	6 (25.0)	1 (3.2)
Roll of ICC for segregation the	Yes	22 (78.6)	82 (79.6)	20 (83.3)	29 (93.5)
infectious waste:	No	6 (21.4)	21 (20.4)	4 (16.7)	2 (6.5)
Total		28 (100)	103 (100)	24 (100)	31 (100.0)

put waste in wrong bins. Majority of the doctors (96.4%), nurses (97.1%), paramedical staff (91.7%) and cleaners (77.4%) told that very high risk is associated with medical waste going into wrong bin. In a tag question how the respondents would consider the waste if some medical waste is accidentally put to the general waste bin, 85.7% of the doctors, 95.1% nurses, 66.7% paramedical staff and 100% cleaners told that they would consider the waste as medical waste. In an another question when medical waste disposal bin (yellow bin)

Table III. Assessment of appropriate waste categories of constituents by respondents

Constituents of medical	Doctor	Nurse	Paramedical	Cleaner
waste	n (%)	n (%)	n(%)	n (%)
Paper, cartons, boxes	3 (10.7)	14 (13.6)	10 (41.7)	18 (58.1)
Dressings cotton, plasters	17 (60.7)	101 (98.1)	17 (70.8)	31 (100)
Chemicals	28 (100)	63 (61.2)	19 (79.2)	19 (61.3)
Radioactive materials	28 (100)	63(61.2)	19 (79.2)	20 (64.5)
Pharmaceuticals	27 (96.4)	65 (63.1)	24 (100)	18 (58.1)
Body fluids	28 (100)	102 (99.0)	24 (100)	31 (100)
Pressurized containers	18 (64.3)	62 (60.2)	18 (75.0)	19 (61.3)
Kitchen wastes from the hospital	3 (10.7)	63(61.2)	13 (54.2)	23 (74.2)
Unused medicines	22 (78.6)	68 (66.0)	19 (79.2)	20 (64.5)

Table IV. Distribution of respondents by their opinion about segregation of waste

Segregation of Waste	Doctorn (%)	Nurse n (%)	Paramedical n (%)	Cleaner n (%)
Opinion about present of color coding system of waste bins:				
Very Comfortable	26 (92.9)	99 (96.1)	23 (95.8)	23 (74.2)
Less Comfortable	1 (3.6)	1 (1.0)	0 (0.0)	3 (9.7)
Uncomfortable	1 (3.6)	0 (0.0)	0 (0.0)	2 (6.4)
Neutral	0 (0.0)	3 (2.9)	1(4.2)	3 (9.7)
Putting waste in wrong bins:				
Not all	2 (7.1)	46 (44.7)	10 (41.7)	13 (41.9)
Frequently	2 (3.6)	2 (1.9)	2 (8.3)	6 (19.4)
Quite often	5 (17.9)	2 (1.9)	4 (16.7)	2 (6.5)
Sometimes	20 (71.4)	53 (51.5)	8 (33.3)	10 (32.3)
Risk involved in medical waste going into a wrong bin:				
Very high risk	27 (96.4)	100(97.1)	22 (91.7)	24 (77.4)
Low risk	1 (3.6)	3 (2.9)	2 (8.3)	4 (12.9)
Not at all risky	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.2)
Don't know	0 (0.0)	0 (0.0)	0 (0.0)	2 (6.5)
Inform when put waste in wrong bin:				
Yes	6 (21.4)	97(94.2)	11(45.8)	23 (74.2)
No	22 (78.6)	6 (5.8)	13 (54.2)	8 (25.8)
Consideration of waste:				
General waste	4 (14.3)	5 (4.9)	8 (33.3)	0 (0.0)
Medical waste	24 (85.7)	98 (95.1)	16 (66.7)	31 (100.0)
Medical waste disposal bin (yellow bin) generally sealed:				
Once it is ½ full	6 (22.2)	11(10.7)	12 (50.0)	7 (22.6)
Once it is ¾ full	14(51.9)	91(88.3)	10 (41.7)	18 (58.1)
Once it is completely full	7 (25.9)	1 (1.0)	2 (8.3)	6 (19.3)
Total	28 (100)	103(100)	24 (100)	31 (100)

Table V. Distribution of respondents by factors related to waste management system

Factor related to waste management system	Doctor n (%)	Nurse n (%)	Paramedical n (%)	Cleaner n (%)
Formal training about waste management:	7(25.0)	56(54.4)	3(12.5)	23(74.2)
Special department handling waste management:	22(78.6)	102 (90.0)	19(79.2)	29(93.5)
Designation of person responsible for waste management:	28 (100)	103(100)	24(100)	27(87.1)
Follow rule for waste transportation	26 (92.9)	103(100)	24 (100)	29(93.5)
Monitoring the waste management activities:	24 (85.7)	102 (99.0)	24(100)	30(96.8)
Total	28 (100)	103(100)	24 (100)	31 (100)

is generally sealed, 50.0% paramedical staff, 22.6% cleaner, 22.2% doctors and only 10.7% nurses held the view that yellow bin was generally sealed once it is ½ full. While 88.3% nurses, 58.1% cleaners, 51.9% doctors and 41.7% paramedical staff thought, yellow bin was generally sealed once it is ¾ full. Very few of the respondents thought yellow bin was usually sealed once it was completely full or they did not have any idea about it.

To improve the existing waste management system, different levels of professions put forward different opinion. About them, 25% of doctors, 54.4% nurses, 12.5% paramedical staff and 74.2% cleaner thought that formal training need for waste management system. However, majority of the respondents, 78.6% doctors, 99% nurses, 79.2% paramedical staff and 93.7% cleaners gure opinion that it is necessary to make special department to handle waste management activity. In response to another question whether there should be any designated person(s) at the administrative level for organizing and management of waste collection handling, storage and disposal, almost all staffs agreed to the proposal. Most of the respondents of all categories agreed that a definite rule should be followed while transporting medical waste. Respondents of all categories, 85.7% doctor, 99% nurses, 100% paramedical staff and 96.8% cleaners were in favor of regular motoring of waste disposal activity [shown in Table V].

Discussion

The present study was aimed to exploring the management of hospital waste in BIRDEM Hospital so that barriers to efficient management could be identified in order to improving practice in the future. Doctors, nurses, paramedical staff and cleaners were interviewed for their perception and practice about current waste management system.

The nurses (100%) and cleaners (100%) invariably were in a better position to follow color-coding system (CCS) and to use of protective bags while segregating primary waste, while doctors (78.6%) and paramedical staff's (70.8%) practice were not appreciable in this regard. The study showed that doctors and paramedical staffs have lack proficiency in practicing the proper waste bin color-coding and the use of protective bags at their work place. Doctors and paramedical staffs need to be aware about the color coding system and use of protective bags in hospital.

The study also found that doctors (92.9%), nurses (96.1%) and paramedical staffs (95.8%) were very comfortable about the present color-coding system than compared with cleaners (74.2%). A substantial proportion of the doctors (71.4%) sometimes put waste in wrong bins as opposed to 51.5% nurses, 33.3%

paramedical staffs and 32.3% cleaners. This leaves scope for motivation program. The study also found that risk is involved with medical waste going into the wrong bin, majority of all categories of respondents told that very high risk is associated with such practice.

Medical waste in general waste bags is dangerous because less precaution is taken for the latter's transportation and disposal leading to exposure to infection in the hospital and community. This improper practice may also lead to increased cost of waste management because medical waste is generally disposed of by incineration. The study also observed that the respondents would consider the waste if some medical waste is accidentally put to the general waste bin, most of them told that they would consider the waste as medical. Nurses perception were also better compared to other occupants as to when a medical waste-bin should be sealed for disposal. Nearly 88% of the nurses told that a medical waste-bin (yellow-bin) should be sealed off once it is 3/4th full.

Although, in terms of constituents of medical waste doctors and paramedical staff's perception was better than the nurses and cleaners. The study revealed that the paper, cartons, boxes and kitchen wastes from the hospital are the constituents which made the confusions among the nurses and cleaners. Paper, cartons, boxes and kitchen wastes from the hospital are the general waste, but the perception wasn't clear among the nurses and cleaners. About 63% of the hospital personnel's considered pressurized containers as medical waste and remaining 37% don't consider it as medical waste. The pressurized containers should not be considered as medical waste to be incinerated and hence these results are a matter of concern. Hence it is necessary to improved the existing waste management system.

To improving the existing waste management system, majority of the respondents think that there should be designated person(s) at the administrative level for organizing and managing of waste collection, handling, storage and disposal of waste who will follow a definite rule during all these processes. Usually ward workers are assigned to handle hospital waste in the ward and to transport it to a storage site. Their knowledge in medical waste has to be improved as well by training programme. Some studies suggested that such trainings are very important to improve the waste handling practices of the staff in hospital environment.[9,10]. Another study has reported that healthcare waste management must need regular information and reinforcing messages on the management of infections waste.[11] Medical waste management leads to a reduction in volume, weight and risk of infection and organic compound of the waste.[12] There are no clear policy/guideline for managing medical waste management at our country as well as our hospital level.

Conclusion

The study observed that there is lack of knowledge affiliate and practice among the doctors, nurses, paramedical staff and cleaners in segregating hospital waste at the primary source of collection. However, nurses and cleaners were more aware than the doctors and paramedical staff in terms of practice of segregating primary waste. The study also found that perception of waste management was better in doctors and paramedical staff than compared with cleaners and other staffs. To improve the existing system, the study suggests that the health policy makers and hospital authorities must organize regular training program to manage effective waste management system in the hospital.

Conflict of interest: Nothing to declare.

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