Original Research Article

Evaluation of Biomedical Waste Management at Primary and Secondary Level of Healthcare Facility

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ABSTRACT

Background and Objective: Improper handling of biomedical waste possesses significant risk of infection due to pathogens like HIV, hepatitis B and C virus. Inorder to improve biomedical waste management, it is important to understand and evaluate the current practices in biomedical waste management, to identify the gaps and to address them. The present study had been taken up to assess the biomedical waste management.

Methods: The study employed multi-stage random sampling. Thus two CHCs and four PHCs were selected for the study. The study participants included the doctors, nurses, laboratory technicians and class IV workers. The study included details of various biosocial profiles, an observational checklist and other details regarding practice of biomedical waste management.

Results: The study included 18 doctors, 7 staff nurses, 3 laboratory technicians and 9 class IV workers. Only 19% of the participants had received training on BMW management and poor biomedical waste management was observed at the primary and community health centres.

Interpretation and Conclusion: Biomedical waste management practices were poor. Emphasis should be made on creating awareness among the healthcare personnel about biomedical waste management. Training and retraining on biomedical waste should be planed and implemented.

Keywords: Biomedical waste, BMW training, coloured bins, waste segregation

INTRODUCTION

Hospitals are one of the places which are frequented by people from every walk of life irrespective of age, gender, caste, race and religion. And with the ever increasing population in India and increasing health awareness the demand for healthcare need has increased significantly. Simultaneously the number of healthcare facilities has increased inorder to cater to the demands and needs of the people. Thereby increasing the quantum of hospital waste production.

According to the World health Organisation (WHO), high-income countries generate on an average upto 0.5kg of hazardous waste per hospital bed per day and low-income countries generate 0.2kg per hospital bed per day. [1] Healthcare waste is a potential source of pathogenic micro-organisms and requires appropriate safe and reliable handling. It is ironic that the healthcare facilities which are meant to restore and maintain the community health, are also a threat to their well-being if not managed properly. Despite the fact that current medical waste management practices vary from hospital to hospital, the problematic areas are similar for all healthcare units and at all stages of management. [2] The absence of proper waste management, lack of awareness about

the health hazards from biomedical waste, insufficient financial and human resources and proper control of waste disposal are the most critical problems connected with healthcare waste. [3]

Inorder to improve medical waste management, it is important to understand and evaluate the current practices in medical waste management, to identify the gaps and to address them. The present study had been taken up to assess the biomedical waste management at the primary and secondary healthcare facility and to recommend measures for improvement based on the findings of the study.

MATERIALS AND METHODS

The study is an observational cross sectional study. It was conducted from March 2016 to August 2016. The study employed multi-stage random sampling. The rural area of Lucknow district is divided into eight community health centres/blocks (CHC). From these, two community health centres were randomly selected and two primary health centres (PHC) from each selected CHC were selected by using simple random sampling method. Thus two CHCs and four PHCs were selected for the study. The study participants included the doctors, nurses, laboratory technicians and class IV workers. All the study participants at the CHCs and PHCs present during the visit were selected

for the study, so sampling size was not calculated. Total 37 healthcare personnel participated in the present study. It included 18 doctors, 7 staff nurses, 3 laboratory technicians and 9 class IV workers. Data was collected using pre-designed, semi-structured questionnaire from study participants by interviewing them after informed consent was taken. The questionnaire included 7 questions on waste segregation practices a score of 1 was given for correct practice and 0 for incorrect practice. A total score of ≤ 4 was considered as unsatisfactory practice and ≥ 5 was considered as satisfactory practice. The study included details of various biosocial variables like age, sex, educational status, work experience, an observational checklist and other details regarding practice of biomedical waste management. The data was compiled and analysed using SPSS Ver. 22 software.

RESULTS

The data presented in Table I shows the biosocial characteristics of the participants. Almost half (51.3%) are in the age group of 36 to 45 years. And among the participants 54% are male, 21.6% were postgraduates and 48.6% were graduates. Of the total, 48.6% were doctors, 19% nurses, 8.1% lab technicians and 24.3% class IV workers. And 46% had a work experience of less than 2years.

Table I: Biosocial characteristics of study participants

Characteristics		Healthcare Facility		Total N(%)
		PHC N(%)	CHC N(%)	
Age	< 25	-	-	-
	26-35	7(43.8)	7(33.3)	14(37.8)
	36-45	7(43.8)	12(57.1)	19(51.3)
	≥ 46	2(12.5)	2(9.5)	4(10.8)
Gender	Male	9(56.3)	11(52.4)	20(54)
	Female	7(43.8)	10(47.6)	17(46)
Educational Status	Postgraduate	3(18.8)	5(23.8)	8(21.6)
	Graduate	6(37.5)	11(52.4)	17(46)
	Intermediate and below	7(43.7)	5(23.8)	12(32.4)
Occupational status	Doctor	6 (37.5)	12 (57.1)	18(48.6)
	Staff nurse	4 (25)	3 (14.3)	7(19)
	Lab Technician	1 (6.3)	2 (9.6)	3(8.1)
	Class IV workers	5(31.2)	4(19)	9(24.3)
Work experience (years)	< 2	9(56.3)	8(38.1)	17(46)
	3 - 5	5(31.3)	5(23.8)	10(35.7)
	> 6	2(12.5)	8(38.1)	10(35.7)

Only 19% of the participants had received training on BMW management and 35.7 % showed satisfactory waste segregation practices. 64.8% and 78.3% had received HBV and injection TT respectively (Table II).

Table II: Practices of study participants in relation to bio-medical waste management

Questions	Healthcare Facility		Total N (%)
	PHC N (%)	CHC N (%)	
Received training on BMW management	4(25)	3(14.3)	7(19)
Hepatitis-B vaccination	9(53.3)	15(71.4)	24(64.8)
Injection TT	10(62.5)	19(90.5)	29(78.3)
Satisfactory Segregation practices	5(31.3)	5(23.8)	10(35.7)

Observation at the healthcare centers showed poor biomedical waste management. Waste segregation at the point of generation was satisfactory in most of the primary health centers. Availability of colored bins was inadequate as the bins were not present according to necessity. Bin for general waste was present in all the primary health centers and rests of the bins were not available in most of the primary health centers. In majority of the primary health centers the bins were not placed at the point of waste generation. The condition of the available bins in most of the centers were clean, leak proof and not covered A functional hub cutter/needle destroyer was present at only one primary health center and waste weight record keeping was also maintained at only one primary health center. And none of the primary health centers had posters of healthcare waste management displayed.

At the community health centres there was inadequate availability of coloured bins and the bins were not located at the point of generation. The available bins at both the community health centres were clean, leak proof but not covered. A functional hub cutter/needle destroyer was available and waste weight record keeping was maintained in both the community health centres. Posters on colour coded segregation were displayed at both the community health centres. Even though colour coded bins were available the waste content was not as per the biomedical waste management rules and in some bins mixing between infectious and non-infectious wastes was observed (Table III).

Table III: Observation of biomedical waste management

Observation	PHC				CHC	
	1	2	3	4	1	2
Segregation*	Satisfactory	Satisfactory	Poor	Satisfactory	Satisfactory	Satisfactory
Availability of color coded bins	Inadequate	Inadequate	Inadequate	Inadequate	Inadequate	Inadequate
Correct placement of bins	Yes	No	No	No	No	No
Condition of bins	Clean, Leak proof Not Covered	Unclean Not leak proof Not covered	Unclean, Leak proof Not Covered	Clean, Leak proof Not Covered	Clean, Leak proof Not Covered	Clean, Leak proof Not Covered
Functional Hub cutter	Available	Unavailable	Unavailable	Unavailable	Available	Available
Waste weight record keeping	Available	Unavailable	Unavailable	Unavailable	Available	Available
Posters displayed	No	No	No	No	Yes	Yes

*[12]**Good- No mixing of wastes**
Satisfactory- No mixing of infectious and non-infectious wastes
Poor- Mixing of infectious and non-infectious waste

DISCUSSION

In this study only 19% of the HCWs at the primary and community health centre had received training on BMW management. Similar findings in a study by Sanjeev R *et al.* [4] in dental colleges showed that only 16% had received training on biomedical waste management. Kini S *et al.* [5] in their study showed that many had not undergone any formal training on biomedical waste management. Chudasama R.K. *et al.* [6] in their study showed that only 28.5% resident and intern doctors, and 25.9% sanitary staff had received training for BMW. In this study 64.8% and 78.3% had received HBV and injection TT vaccination respectively. Similar findings were seen in a study by Wicker S *et al.* [7] showed that number of HBV vaccinated HCWs average of vaccinated persons was

563(78.2%). In another study by Makadia J.S. *et al*. [8] about 90% students were vaccinated for tetanus toxoid (TT) and 58% of MBBS students, 52% BDS students, 60% nursing students, and 39% MLT students were vaccinated for hepatitis B.

As observed in the primary and community health centres, there was poor biomedical waste management. At most of the centres there were no rules or regulations for biomedical waste management. There was inadequate availability of color coded bins for different types of wastes and poor waste management practices was observed. Similar findings were found in a study by Kumar R *et al.* [9] wherein results showed that all of the hospitals did not have HCWM rules and regulations in place and practice of HCWM was not their priority. In a study by Muluken A *et al.* [10] from observational checklists revealed that all surveyed HCFs didn't have appropriate and adequate color coded containers and plastic bags for healthcare wastes collection. Pullishery F *et al.* [11] found that there was no effective method of segregation, collection, transportation, and disposal system in most of the health care settings.

CONCLUSION

Only a few of the HCWs had received training on biomedical waste management. Biomedical waste management practices were poor. Emphasis should be made on creating awareness among the healthcare personnel about biomedical waste management. Training and retraining on biomedical waste should be planed and implemented. All healthcare personnel should be vaccinated against tetanus and Hepatitis-B.

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