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Effect of in-house training of health care personnel on biomedical waste management in a tertiary care hospital, Warangal, Telangana, India

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ABSTRACT

Background: Every day, relatively large amount of potentially infectious and hazardous wastes is generated in the health-care hospitals and facilities around the world. Indiscriminate disposal and improper management of waste generated in health care facilities causes serious threat to environment and to human health that requires specific treatment and management prior to its final disposal.

Methods: Cross-sectional study was conducted among 241 health care personnel working at Mahatma Gandhi Memorial hospital, Warangal. Data was collected and pre and post analysis was done using a pre-validated self-administered questionnaire. Data was entered in MS Excel and analysed using SPSS 17 software.

Results: Among 241 respondents, 33.2% were sanitary staff, 35.3% are nursing staff and 31.5% are nursing students. Only 35.7% of participants has knowledge regarding the colour of the bag into which expired antibiotics are discarded and 45.2% of participants were aware of the colour of the bag in which IV bottles, gloves were discarded. Scoring for 10 was done in both pre and post-test and post test scores were found to be higher and there is significant increase in level of knowledge of biomedical waste management rules in study population in post-test analysis (p<0.001).

Conclusions: Training program on the waste management in the health sector has significant effect in increasing knowledge of the healthcare personnel.

Keywords: Biomedical waste management, Health care personnel, In-house training, Nursing fraternity

INTRODUCTION

Biomedical waste (BMW) is defined as "any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps, including the categories mentioned in schedule I appended to BMW rules 2016". 1

Health care facilities expansion, advancement of modern technologies, trend of using disposables has led to a high burden of health care-related wastes. From last three decades, BMW management is emerging as a serious threat to human health and safety, and many researchers have documented this as a priority area. BMW requires specific treatment and management prior to its final disposal. Of the total amount of waste generated by health-care activities, about 80% is general waste. The remaining 20% is considered hazardous material that may be infectious, toxic or radioactive. Hospital-acquired infections accounts 10% of all fatal/life-threatening diseases in the South-East Asia region and were identified

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as one of the indicators for the management of waste.⁴ Improper disposal of wastes may lead to the spread of serious and harmful diseases like AIDS, hepatitis B, hepatitis C, tuberculosis (TB) and other viral diseases among the healthcare personnel, waste handlers, patients and their visitors, and community where the waste is indiscriminately deposited.⁵

It is estimated that annually about 0.33 million tons of hospital waste is generated in India. The waste generation ranges from 0.5 to 2.0 kg per bed per day.⁶ The World Health Organization (WHO) reported a 50% re-use in India of syringes and needles that are meant for single use.⁷

The Ministry of Environment Forest and Climate change, Government of India notified the BMW Management rules, 2016 on 28th March, under the provisions of EPA, 1986. These rules fill up the gaps in the old rules to regulate the disposal of various categories of BMW. However, the introduction of laws is not sufficient for proper disposal of BM waste. The awareness of these laws among the general public as well as development of policies and enforcement that respect those laws are essential.⁸

Lack of awareness about the health hazards related to health-care waste, inadequate training in proper waste management, absence of waste management and disposal systems, insufficient financial and human resources and the low priority given to the topic are the most common problems connected with health-care waste. Therefore, the present study was conducted to assess level of awareness about BMW management among health care personnel in a tertiary care hospital and to evaluate the impact of 'In-House Education and Training session' on BMW management according to 2016 guidelines.

METHODS

Study design was interventional cross-sectional study was conducted in Mahatma Gandhi Memorial (MGM) Hospital, a tertiary care hospital in Warangal during August to November 2017. Study population in which the study participants were the housekeeping staff, nursing staff and nursing students who were assigned to various wards, ICUs in the hospital. Study sample was a total of 241 health personnel (Included 80 sanitary staff, 85 nurses, and 76 nursing students.).

Inclusion criteria

Inclusion criteria were who has given consent for the study, subjects who were present at the time of study.

Exclusion criteria

Subjects who were not present at the time of study were excluded.

Study tool

The existing level of awareness was assessed by conducting pre-test using a validated questionnaire in vernacular language with 10 questions. After pre-test the participants underwent an in- house training session in vernacular language regarding correct methods of segregation, transport and disposal of BMW by didactic lecture, mock demonstration followed by video show. Following the training session, a post test was conducted to know the effectiveness of the training session. Scoring was done by giving 1 point for each correct answer for all the 10 questions in both pre and post-tests. Those who scored 0 were termed as poor knowledge, between 1 to 5 as average knowledge and 6 to 10 as good knowledge.

Statistical analysis

Statistical analysis was carried out using Microsoft Excel and SPSS version 17. Pre- test and Post-test were done on 10 questions on knowledge of BMW management and p values less than 0.05 was considered as statistically significant.

Ethical clearance

Obtained from Institutional Ethical Committee of MGM Hospital, Warangal.

RESULTS

The study population consists of 241 respondents out of which 33.2% belongs to sanitary staff, 35.3% belongs to nursing staff and 31.5% belongs to nursing students. There were more number of female respondents (74.3%). Majority (34.8%) belongs to age group 31 to 40 years (Table 1).

Table 1: Distribution of demographic profile of the respondents (n=241).

	Variables	Frequency (%)		
Gender	Males	62 (25.7)		
Gender	Females	179 (74.3)		
Age in years	<30	53 (22)		
	31-40	84 (34.8)		
	41-50	72 (29.9)		
	51-60	32 (13.3)		
Wardin a	Sanitary staff	80 (33.2)		
Working status	Nursing staff	85 (35.3)		
status	Nursing students	76 (31.5)		

Majority of health personnel (63.9%) were aware about the year when the BMW rules were proposed but very few (36.5%) were aware about latest guidelines. 46.9% subjects were aware that the waste should not be stored more than 48 hours and 48.5% were aware about the percentage of non-infectious waste. Authors found only 51% of participants has

adequate knowledge regarding the categories of segregation of BMW according to latest guidelines.

In present study only 35.7% of participants has adequate knowledge regarding the colour of the bag into which expired antibiotics are discarded and only 45.2% of

participants were aware of the colour of the bag in which IV bottles, gloves were discarded. Only 40.2% subjects know that sharps like scalpels should be discarded into puncture proof container and 39.4% of subjects were aware of colour of the bag into which blood-soaked linen and beddings were discarded (Table 2).

Table 2: Knowledge of health care personnel regarding BMW management (n=241).

Question	Number of Health care personnel answered correctly (%)		
BMW management and handling rules was first proposed in?	154 (63.9)		
The latest guidelines for BMW management rules was proposed in?	88 (36.5)		
According to BMW management and handling rules, waste should not be stored for more than?	113 (46.9)		
Percentage of non-infectious waste?	117 (48.5)		
Into how many categories is BMW segregated according to latest guidelines?	123 (51)		
Which of the following is the symbol for biohazard?	153 (63.5)		
Expired antibiotics are to be discarded in which bag?	86 (35.7)		
IV bottles, gloves are discarded in which bag?	109 (45.2)		
Sharps like scalpels are discarded into?	97 (40.2)		
Linen and beddings soaked in blood or other body fluids were discarded in?	95 (39.4)		

Table 3: Pre and post-test performance of the heath care personnel (n=241).

	Sanitary staff (n=80)		Nursing staff (n=85)		Nursing students (n=76)	
Score	Pre-test (%)	Post-test (%)	Pre-test (%)	Post-test (%)	Pre-test (%)	Post-test (%)
0	10 (12.5)	0	5 (5.9)	0	6 (7.9)	0
1-5	45 (56.2)	11 (13.8)	17 (20)	1 (1.2)	27 (35.5)	8 (10.5)
6-10	25 (31.3)	69 (86.2)	63 (74.1)	84 (98.8)	43 (56.6)	68 (89.5)
	p<0.001		p<0.001		p<0.001	

Out of a total score of 10, in sanitary workers, it was seen that 12.5% of them has scored 0 and only 31.3% has scored between 6-10. The post-test showed that no participant has scored 0 and 86.2% of them scored between 6-10. Similarly, 5.9% and 7.9% of nursing staff and nursing students scored 0 in pre-test. It was observed that in post-test 98.8% of nursing staff and 89.5% of nursing students scored between 6-10. This reflects the participant's knowledge of BMW management before and after the training has been increased (Table 3).

Wilcoxon signed rank test was done, which showed that there is significant increase in level of knowledge of BMW management rules in study population in post-test analysis (p<0.001).

DISCUSSION

Wastes produced by the health institutions constitute health risk for all the living beings and the environment. Appropriate knowledge, positive attitude and proper practices among healthcare workers are essential for the adequate management of BMW in healthcare facilities. Information levels and awareness of health workers on

BMW are important in waste management. In the present study knowledge and practice of waste disposal practices of sanitary staff, nursing staff and nursing students were assessed, and the pre-test and post-test scores were evaluated. Out of a total score of 10, in pre-test it was seen many sanitary workers (12.5%), has scored 0 when compared to nursing staff (5.9%) and nursing students (5.9%). The post-test showed no participant has scored less than 0 and 86.2% of sanitary workers, 98.8% of nursing staff and 89.5% of nursing students scored between 6 to 10. Wilcoxon signed rank test was done which showed p<0.0001, this reflects that the participant's knowledge on BMW management before and after the training has been increased. Similar findings were seen in the study conducted by Sujitha Elan Seralathan et al in her study 14 participants who scored 0 during the pre-test showed a significant improvement with their post-test scores ranging from 7 to 10 and the scores of health managers have been increased after in house training session. 10

This study revealed Knowledge about BMW management rules among nursing staff and nursing students was high but low among the sanitary workers. This was similar to findings of vanesh mathur where the knowledge about BMW management rules among technically qualified personnel like the doctors, nurses and laboratory staff was high when compared with sanitary staff.¹¹ In other study by Mohd Shafee, nurses had better knowledge than technical and housekeeping staff.¹²

CONCLUSION

The study revealed lack of knowledge in different tiers of healthcare personnel which adversely affects their practice. Training program on the subject of waste management in the health sector has significant effect in increasing knowledge of the healthcare personnel. Preparation of an effective plan for BMW management, periodic training program for health personnel and supervision by institutions provide important contribution to waste management.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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