

## AWARENESS ABOUT BIOMEDICAL WASTE MANAGEMENT IN HEALTH CARE PERSONNEL

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### ABSTRACT

The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. It must be properly managed to protect the public in general, healthcare and sanitation workers, in specific who are regularly exposed to biomedical waste as an occupational hazard. Objective: To assess the level of awareness about biomedical waste and disposal practices. Methods: A descriptive cross-sectional study was conducted among 150 health care personnel (70 nurses, 40 medical laboratory technicians and 40 sanitary staff) of MIMS General Hospital, Nellimarla, Vizianagaram to assess their knowledge of biomedical waste management. Data was collected by a semi-structured proforma by interview technique with relevant questionnaire. Results: Medical laboratory technicians had a better knowledge than nurses regarding biomedical waste management. Sanitary staff had a very poor knowledge about it. Conclusion: Lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal. Thus it is concluded that there should be strict implementation of a waste management policy set up in the institute. Training and motivation must be given paramount importance to meet the current needs and standard of biomedical waste management.

**Key words:** Biomedical waste management, knowledge, medical laboratory technicians, nurses, sanitary staff.

### INTRODUCTION

Biomedical waste (BMW) means any solid and / or liquid waste including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research pertaining thereto or in the production or testing thereof. It is estimated that annually about 0.33 million tonnes of hospital waste is generated in India and the waste generation rate ranges from 0.5 to 2.0 kg per

bed per day.<sup>1</sup> At the site where it is generated, BMW is placed in specially labelled bags and containers for removal by BMW transporters. Other forms of waste should not be mixed with BMW as different rules apply to the treatment of different types of waste. The absence of proper waste management, lack of awareness about the health hazards from BMW, insufficient financial and human resources and poor control of waste disposal are the most critical problems connected with healthcare waste.<sup>2</sup> The major identified hazard is infection, because most of the persons receiving medical care in the hospital are suffering from communicable diseases.<sup>3</sup> Other hazards associated with poor waste management include injuries from sharps, risks associated with hazardous chemicals or drugs and disposables being repacked and sold without being washed. Waste piles also attract variety of disease vectors, including mosquitoes and flies.<sup>4</sup> If not handled in a proper way, BMW is a potent source of diseases like AIDS, Tuberculosis, Hepatitis and other bacterial diseases causing serious threats to human health. BMW collection and proper disposal has become a significant concern for both the medical and the general community. Since the implementation of the BMW management and handling rules (1998),<sup>5</sup> every concerned health personnel is expected to have proper knowledge, practice and capacity to guide others for waste collection, management and proper handling techniques. These rules apply to all those who generate, collect, receive, store, transport, treat, dispose or handle biomedical waste in any form.<sup>6</sup> The law envisages time schedule, BMW treatment facilities like incinerator, autoclave, microwave system for the treatment of waste or ensure requisite treatment of waste at a common waste treatment facility or any other waste treatment facility. Despite the statutory provision of BMW management, practice in Indian hospitals has not achieved the desired standard even after fourteen years of enforcement of the law. Although, there is an

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increased global awareness among health professionals about the hazards and also appropriate management techniques but the level of awareness in India is found to be unsatisfactory.<sup>7,8</sup> Nurses, medical laboratory technicians and sanitary staff are amongst those exposed to the BMW. Hence awareness is important to prevent themselves as well as the patients from its hazards.

#### MATERIALS AND METHODS

A descriptive cross-sectional study was conducted in 70 nurses and 40 medical laboratory technicians and 40 sanitary staff of MIMS General Hospital, Nellimarla, Vizianagaram. The data collection was done with the help of a semi-structured proforma by interview technique. The questionnaire included questions about awareness about BMW, its hazards, management and the colour coding of bags used for disposal. Answered questionnaire forms were collected and were analyzed by SPSS 15.0 (Statistical Package for Social Sciences) and results expressed in percentages. Chi square test and p-values were also calculated to indicate the level of significance.

#### RESULTS

Out of a total 150 health care personnel studied, 70 (46.7%) were nurses, 40 (26.7%) were medical laboratory technicians and 40 (26.7%) were sanitary staff. Table 1 summarizes general awareness regarding BMW management. BMW concept was known to 59 (84.3%) of nurses, 34 (85%) of medical laboratory technicians and 31 (77.5%) of sanitary staff ( $\chi^2=1.025$  at  $df=2$  and  $p$ -value=0.5989). Awareness about biohazard symbol was present in 4 (5.7%) of nurses whereas 32 (80%) of medical laboratory technicians and 26 (65%) of sanitary staff identified it correctly ( $\chi^2=70.53$  at  $df=2$  and  $p$ -value<0.0001).

Figure 1 shows awareness of nurses, medical laboratory technicians and sanitary staff about hazards like infection, injury, toxicity and radiation hazard. Knowledge regarding the potential risk of infections such as HIV, Tuberculosis, Hepatitis B through BMW and thus resulting in transmission of diseases was observed among 49 (70%) of nurses and 32 (80%) of medical laboratory technicians whereas 27 (67.5%) of sanitary staff were aware of the fact. Injury as a hazard was known to 20 (28.5%) of nurses, 30 (75%) of medical laboratory technicians and 24 (60%) of sanitary staff. 58 (82.9%) of nurses, 38 (95%) of medical laboratory technicians and 4

(10%) of sanitary staff were aware that BMW can lead to toxicity. Radiation hazard of BMW was known to 20 (28.6%) of nurses, 22 (55%) of medical laboratory technicians and 2 (5%) of sanitary staff.

Figure 2 illustrates knowledge of colour coding of bags specified for particular type of waste. 67 (95.7%) of nurses, 37 (92.5%) of medical laboratory technicians and 8 (20%) of sanitary staff were aware of the fact that material contaminated with blood and body fluids, plaster casts and solid linen should be discarded in red bags. Yellow bag coding for collection of human anatomical, microbiology waste and solid waste was known to 66 (94.3%) of nurses, 35 (87.5%) of medical laboratory technicians and 5 (12.5%) of sanitary staff. 58 (82.9%) of nurses, 32 (80%) of medical laboratory technicians and 3 (7.5%) of sanitary staff were aware of blue / white bags as puncture proof containers for waste sharps. Black bags specified for discarded medicines was known to 46 (65.7%) of nurses, 23 (57.5%) of medical laboratory technicians and 9 (22.5%) of sanitary staff.

Table 2 shows awareness about how waste sharps are discarded and disposal of used needle-syringe. 8 (11.4%) of nurses, 28 (70%) of medical laboratory technicians and 17 (42.5%) of sanitary staff were aware that waste sharps should be discarded in puncture proof containers ( $\chi^2=39.44$  at  $df=2$  and  $p$ -value<0.0001). Correct method of disposal of used needle-syringe was known to 28 (40%) of nurses, 36 (90%) of medical laboratory technicians and 13 (32.5%) of sanitary staff ( $\chi^2=33.22$  at  $df=2$  and  $p$ -value<0.0001).

Table 3 illustrates awareness of the study respondents about methods of disposal and maximum storage time after collection for BMW. 55 (78.6%) of nurses, 10 (25%) of medical laboratory technicians and 31 (77.5%) of sanitary staff were not aware about the correct methods of disposal of BMW ( $\chi^2=36.02$  at  $df=2$  and  $p$ -value<0.0001). Regarding awareness about maximum time for storage of BMW, 29 (41.4%) of nurses, 19 (47.5%) of medical laboratory technicians and 16 (40%) of sanitary staff know that BMW should be disposed off in less than 48 hours ( $\chi^2=0.54$  at  $df=2$  and  $p$ -value=0.7626). Knowledge about existence of law for BMW management was present in 10 (14.3%) of nurses, 13 (32.5%) of medical laboratory technicians and 5 (12.5%) of sanitary staff.

Table 1 General awareness regarding BMW management

Awareness parameter	Nurses (n=70)	Medical laboratory technicians (n=40)	Sanitary staff (n=40)	Chi-square value ( $\chi^2$ )	df	p-value
Biomedical waste concept				1.025	2	0.5989
Known	59 (84.3%)	34 (85%)	31 (77.5%)			
Concept Not known	11 (15.7%)	6 (15%)	9 (22.5%)			
Biohazard symbol identified				70.53	2	<0.0001
Yes	4 (5.7%)	32 (80%)	26 (65%)			
No	66 (94.3%)	8 (20%)	14 (30%)			

Table 2 Awareness about disposal of used needle-syringe

Awareness parameter	Nurses (n=70)	Medical Laboratory Technicians (n=40)	Sanitary staff (n=40)	Chi-square value ( $\chi^2$ )	df	p-value
Container for needle-syringe				39.44	2	<0.0001
puncture proof	8 (11.4%)	28 (70%)	17 (42.5%)			
Others	62 (88.6%)	12 (30%)	23 (57.5%)			
Used needle disposal method				33.22	2	<0.0001
Correct	28 (40%)	36 (90%)	13 (32.5%)			
Incorrect	42 (60%)	4 (10%)	27 (67.5%)			

Table 3 Awareness about disposal methods and maximum storage time for BMW

Awareness parameter	Nurses (n=70)	Medical laboratory technicians (n=40)	Sanitary staff (n=40)	Chi-square value ( $\chi^2$ )	df	p-value
Disposal methods				36.02	2	<0.0001
Correctly known	15 (21.4%)	30 (75%)	9 (22.5%)			
Not known	55 (78.6%)	10 (25%)	31 (77.5%)			
Max storage time				0.54	2	0.7626
<48 hours	29 (41.4%)	19 (47.5%)	16 (40%)			
>48 hours	41 (58.6%)	21 (52.5%)	24 (60%)			

Figure 1 Awareness about hazards of BMW

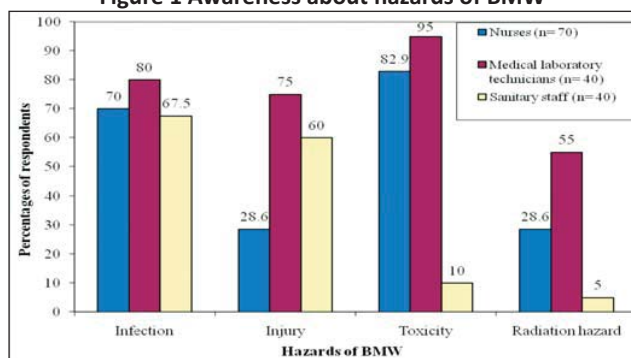
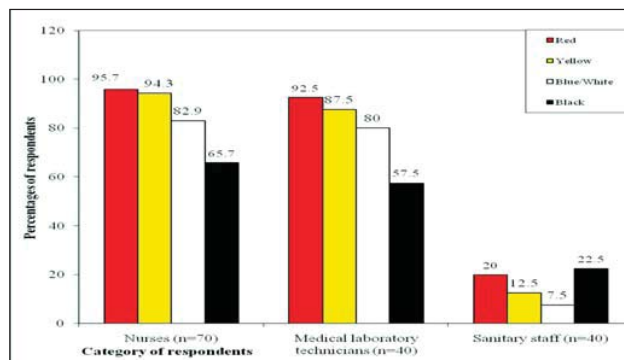


Figure 2 Awareness about colour coding of bags for collection of BMW



## DISCUSSION

The participants involved in this study were assessed of their knowledge about BMW management. Analysis of data revealed that on almost all counts, medical laboratory technicians had better knowledge than nurses and sanitary staff regarding BMW management. This could be explained on the basis of the fact that medical laboratory technicians handle all categories of BMW more often.

More than three fourth from each group were aware of the concept of BMW. Awareness about biohazard symbol was more in medical laboratory technicians as compared to nurses and sanitary staff and it was found to be statistically highly significant ( $p < 0.0001$ ).

Majority of the nurses and medical laboratory technicians were quite aware about hazards whereas sanitary staff was least aware about the hazards. Pandit NB et al.<sup>9</sup> in their study observed that awareness of the auxiliary health personnel about risk associated with BMW was poor. Infections as a hazard of BMW was known to 49 (70%) of nurses, 32 (80%) of medical laboratory technicians and 27 (67.8%) of sanitary staff. Vanesh Madhur et al.<sup>10</sup> reported in their study that 91.6% of nurses, 75.6% of laboratory technicians and 21.7% of sanitary staff were aware of transmission of diseases through BMW.

On an average, awareness regarding the colour coding of the bags in BMW management (i.e. red, yellow, blue or white and black) and waste segregation at source was found to be better among nurses and medical laboratory technicians as compared to sanitary staff. These findings were supported by studies done by various

researchers.<sup>10,11</sup> The awareness about container for used needle-syringe was more in the medical laboratory technicians and this was statistically highly significant ( $p < 0.0001$ ). Disposal of waste sharps and correct method of disposal of used needle-syringe was known to a lesser number of nurses and sanitary staff when compared to medical laboratory technicians, which was highly significant statistically ( $p < 0.0001$ ). Greater number of medical laboratory technicians were aware about correct disposal methods of BMW when compared to nurses and sanitary staff, which was also statistically highly significant ( $p < 0.0001$ ).

Regarding awareness about the storage time after collection for BMW, medical laboratory technicians had a better knowledge. Less than half of the medical laboratory technicians and only less than one-fifth of the nurses and the sanitary staff were aware about the BMW management and handling rules (1998). This may be attributed to the fact that paramount importance is never given to the regulations in our country.

It is suggested that strict supervision and surveillance should be followed in day-to-day hospital waste management activities. Steps should be taken for regular training of nurses, medical laboratory technicians and sanitary staff and a system of monitoring should also be evolved. Training should definitely include awareness of different categories of waste and potential hazard, waste minimization, reduction in use of disposables, segregation policy, proper and safe handling of sharps, use of protective gear, colour coding of bags, appropriate treatment of waste, management of spills and accidents, and occupational health.

### CONCLUSION

Overall awareness about BMW was more in the medical laboratory technicians. Both nurses and medical laboratory technicians had a good awareness about the meaning of BMW and were aware about the colour coding of bags for the disposal of BMW. Sanitary staff had relatively less understanding on the subject, but had high attitude and more practical habits. The lack of awareness among nurses and sanitary staff about exact disposal methods for different categories of BMW makes them more prone for the hazards. Further, lack of awareness about maximum storage time and rules/legislations

related to BMW management is also a matter of concern. Practical implications related to the matter should also be covered so that health care personnel can avoid the hazards of BMW. The importance of intensive training programs at regular time interval for all the staff regarding BMW needs emphasis.

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