Original Article

AWARENESS ABOUT BIOMEDICAL WASTE MANAGEMENT IN UNDERGRADUATE MEDICAL AND NURSING STUDENTS AT A TEACHING INSTITUTE IN VIZIANAGARAM, ANDHRA PRADESH

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ABSTRACT

Background: Bio-medical waste collection and proper disposal is a concern for both medical and general community. Medical and Nursing students during and after completing their studies are at potential risk for hazards due to biomedical waste. Thorough knowledge about the subject will decide their practices. Hence the study was limited only to awareness assessment.

Objective: To assess awareness in undergraduate medical and nursing students about biomedical waste, its hazards and management.

Methods: Data collection was done by a predesigned self administered questionnaire.

Results: MBBS students had a fairly better awareness regarding the subject than nursing students. Almost all study participants were aware about colour coding in segregation of biomedical waste. But when asked about which waste is to be put in which bag, correct response was given by almost half amongst them.

Conclusions: Practical implications related to the matter should be covered so that hazards of biomedical waste are avoided.

Key words: Biomedical waste, awareness, undergraduate, medical, nursing

INTRODUCTION

Biomedical waste (BMW) is the term applied to the waste generated during the diagnosis, treatment or immunisation of human beings or animals or in the research activities pertaining thereto or in the production or testing of biological including categories viz General waste, Pathological waste, Radioactive waste ,Chemical waste, Infectious waste, Sharps, Pharmaceutical waste, Pressurized containers.[1] It is estimated that 10-25% of health care waste; which refers to all the waste generated by a health care establishment, is hazardous, with the potential for creating a variety of health problems.[2]

Legal provisions [Biomedical Waste (management and handling) Rules 1998][1] exist to mitigate the impact of hazardous and infectious hospital waste on the community. But these provisions are yet to be fully implemented. The absence of proper waste management, lack of awareness about the health hazards from biomedical wastes, insufficient financial and human resources, and poor control of waste disposal are the most critical problems connected with healthcare waste. The hazardous impact of medical waste on the public and environment is enhanced manifold if adequate and appropriate handling of these wastes is not adopted.[3] Hence, Bio-medical waste collection and proper disposal has become a significant concern for both the medical and the general community.[4,5]

Various studies on awareness of Biomedical waste across the country reveal that the awareness among health professionals about the hazards and its appropriate management techniques is unsatisfactory.[3,5,6] Similar studies about the topic in the medical students[7]and nurses are few. The Medical and Nursing students during and after completing their studies are at potential risk for hazards due to Biomedical waste because of the contact with hospitals. Adequate knowledge about the health hazard of hospital waste and proper methods of handling is necessary to protect themselves, their patients as well as the community from various adverse effects of the hazardous waste. Considering all these aspects, this study was conducted with the main objective of assessing the awareness in the medical and nursing students about biomedical waste, its hazards and management.

METHODS

The study was conducted at the Maharajah's Institute of Medical Sciences, Vizianagaram, during December 2010. It included a survey in total 113 students i.e. 71 final M.B.B.S part 1 and 42 final year nursing students The type of study was descriptive cross sectional study. The data collection was done by a pretested, predesigned self administered questionnaire containing questions about awareness of Biomedical waste, its hazards, management, the colour coding for segregation and methods used for disposal. A brief talk was given to students about biomedical waste management and their doubts were solved after collecting the answered questionnaire forms. Data was analyzed on a computer using SPSS (Statistical Package for Social Sciences) version 15.0. Descriptive statistics like percentage, mean, and SD (standard deviation) were computed for data presentation. Chi-square test was used to compare frequencies at 95% confidence interval.

RESULTS

All the students were in the age 20 to 23 years. The students mean age was 21.04 years (SD = 1.06 years). Out of the 71 MBBS participants, 37 (52.11%) were males; and 34 (47.89%) females. All the nursing students were females. Most of the students had heard about biomedical waste. Out of total 113 study participants from both medical and nursing students, a healthy 74 (62.80%) were correct in describing the concept of biomedical waste. The other details about the general awareness on the subject are shown in Table 1.

Thirty-seven (52.11%) of medical students and 24(57.14%) of the nursing students which means, total 61(53.98% of 113) knew that the correct maximum storage time of biomedical waste is < 48 hours. The remaining 34 (47.89%) of medical students and 18 (42.86%) of nursing students did not know the correct maximum storage time for biomedical waste.

The students were instructed to enlist the hazards of biomedical waste. 66 (92.96%) of MBBS students and 31 (73.81%) of nursing students were aware about infectious hazards of biomedical waste Injury as a hazard was known to 24 (33.80%) of MBBS and 8 (19.05%) of nursing students. 49 (69.01%) of MBBS and 10 (23.81%) of nursing students knew that toxicity can result due to biomedical waste and 32

(45.07%) of MBBS and 8 (19.04%) of nursing students were aware about the radiation hazards of biomedical waste.

Table 1: General Awareness Regarding Biomedical Waste

Awareness parameter	MBBS (n=71)	Nursing (n=42)	Total (n=113)	χ2 value	df	P
Biomedical waste concept						
Known	68 (95.8)	6 (14.3)	74 (65.47)	77.53	1	<0.0001
Concept not known	3(4.2)	36 (85.7)	39 (34.53)			
Biohazard symbol identified						
Yes	69 (97.18)	2 (4.76)	71 (62.83)	96.52	1	<0.0001
No	2 (2.82)	40 (95.24)	42 (37.17)			
Disposal methods for all biomedical waste categories						
Correctly known	64 (90.14)	8 (19.05)	72 (63.72)	57.69	1	<0.0001
Not known	7 (9.86)	34 (80.95)	41 (36.28)			

(Figure in parenthesis indicate percentage)

Table 2 illustrates the awareness about various infectious such as HIV, Hepatitis B, Tuberculosis that can result due to improper handling of biomedical waste. The awareness about HIV, Hepatitis b and other infections such as acute diarrhoeal diseases as a hazard due to biomedical waste was significantly more in MBBS students.

Table 2: Awareness about infections

Infection	MBBS (n=71)	Nursing (n=42)	Total (n=113)	χ2	df	P
HIV						
Known	56 (78.87)	5 (11.90)	61 (54)	47.64	1	<0.0001
Not known	15 (21.13)	37 (88.10)	52 (46)			
Hepatitis B						
Known	61 (85.91)	6 (14.29)	67 (59)	56.09	1	<0.0001
Not known	10 (14.09)	36 (85.71)	46 (41)			
Tuberculosis						
Known	26 (36.60)	18 (42.86)	44 (39)	0.43	1	0.51
Not known	45(63.40)	24 (57.14)	69 (61)			
Others						
Known	41 (57.74)	15 (35.71)	56 (50)	5.12	1	0.0236
Not known	10 (42.26)	27 (64.29)	57(50)			

(Figure in parenthesis indicate percentage)

The biomedical waste management includes colour coding in the form of red, black, yellow and blue or white. Table 3 is showing the awareness regarding such colour coding to be used during segregation of biomedical waste.

Table 3: Awareness about colour coding for segregation of biomedical waste

Colour coding	Awareness in student (%)		
	MBBS (n=71)	Nursing (n=42)	Total (n=113)
Red	68 (95.78)	41 (97.61)	109 (96)
Yellow	68 (95.78)	41 (97.61)	109 (96)
Blue/White	62 (87.32)	12 (28.58)	74 (65)
Black	48 (67.61)	10 (23.81)	58 (51)

Different categories of biomedical waste should be collected in the specified containers/ bags at the site of generation itself. Hence the study participants were asked regarding the containers/bags for human anatomical waste, sharps, discarded medicines and infectious dressings. The collection of human anatomical waste in a plastic yellow bag was correctly known to 42 (59.19%) of MBBS students and 14 (33.33%) of nursing students. The correct awareness regarding black plastic bag for discarded medicines was present in 43 (60.56%) of MBBS and only 9 (21.42%) of nursing students. Infectious dressings should be collected in red plastic bag. This fact was known correctly to 24 (33.80%) of MBBS students and 19

(45.2%) of nursing students. The colour of container for waste sharps as white or blue was correctly known to 35 (49.29%) of MBBS and 13 (30.95%) of nursing students.

Used needles should be collected in a puncture proof container after burning their tips in a needle burner. Table 4 shows these details of awareness about disposal of used needles.

Knowledge about the existence of biomedical waste management and handling rule was present in 25 (35.21%) of MBBS students. None of the nursing students knew about it.

Table 4: Awareness about disposal of sharps and needles

Awareness parameter	MBBS (n=71)	Nursing (n=42)	Total (n=113)	$\chi 2$ value	df	P
Use of puncture proof container for needles						
Known	54 (76.06)	16 (38)	70 (61.95)	**16.13**	**1**	**<0.001**
Not known	17 (23.94)	26(62)	43 (38.05)			
Used needle disposal method						
Correct	52(73.24)	25 (59.52)	77 (68.14)	**13.6**	**1**	**<0.001**
Incorrect	19 (26.76)	17 (40.48)	36 (31.86)			

(Figure in parenthesis indicate percentage)

DISCUSSION

The awareness of MBBS and nursing students about biomedical waste management was assessed in this study. MBBS and nursing students are not involved directly in the biomedical waste management. After completion of the courses both the study groups handle biomedical waste and a thorough knowledge about the subject will decide their practices. Hence the study was limited only to awareness assessment. The observations from the MBBS and nursing students were compared. Data analysis revealed that except for few parameters the MBBS students had a fairly better awareness regarding the subject than the nursing students. The students from both the groups could describe about biomedical waste. Maximum MBBS students were correct about the concept of biomedical waste, whereas the same was limited to only one-eighth of the nursing students. Thus exact concept and the definition was better in the MBBS students and it was found to be statistically highly significant (chi square =77.53 at df=1, p<0.0001). Identification of the biohazard symbol could be done correctly by statistically highly significant number of MBBS students (chi square=96.52 at df=1, p<0.0001) as compared to only by few nursing students. Similarly awareness about the methods for disposal of BMW was also significantly higher in MBBS students (chi square =57.69 at df=1, p<0.0001). More than half of the students from both the groups were aware about maximum storage time for biomedical waste. There was no difference in their knowledge about it (chi square =0.9049 at df=1, p=0.3415). The literature search did not reveal any study in the nursing students about awareness of biomedical waste management. However similar study in Andhra Pradesh by Janavi et al[7] in MBBS students also reported that MBBS students had a good knowledge about BMW. This might be result of greater emphasis on the topic in the study curriculum.

Majority of the MBBS and nursing students were aware about the hazards of biomedical waste. Almost all of the MBBS and three-fourths of nursing students were aware about the infection causing potential of biomedical waste. The awareness about hazards like injury, toxicity and radiation hazards was present in more than half of the MBBS students. This knowledge was limited to less than one-fourth in nursing students.

More than three-fourths of both the groups were aware that HIV infection can be caused due to improper handling of biomedical waste. More than three-fourth of MBBS students were aware that Hepatitis B is a hazard of biomedical waste. Only less than one-fourth of nursing students were aware about Hepatitis B as a hazard of biomedical waste. The awareness about other infections such as Gastrointestinal, respiratory and skin infections due to biomedical waste was present only in nearly half of the students from both groups.

Almost all of the study participants were well aware about the colour coding in segregation of biomedical waste except that less than one-fourth of nursing students were aware about blue/white and black bags. But when asked

about which waste is to be put in which bag, the correct response was given by almost half amongst them. Janavi et al [7] reported almost nil response in this regard.

The knowledge regarding use of puncture proof container for collection of used needle was significantly more in MBBS than in nursing students (chi square =16.13 at df=1, p=0.00005907). Use of needle destroyer was known to significantly higher number of MBBS students than nursing students (chi square =13.6 at df=1, p=0.0002261).

The study has certain limitations due to its cross sectional type. Only the awareness regarding biomedical waste could be assessed in the present study as the study participants do not actually handle the biomedical waste directly.

CONCLUSION

Overall awareness about biomedical waste was more in the M.B.B.S students. Both M.B.B.S & nursing students had a good awareness about the meaning of biomedical waste. Both the groups were aware about the colour coding of bags for the disposal of biomedical waste. However the lack of awareness about exact colour coding of different categories of biomedical waste, maximum storage time and rules/legislations related to biomedical waste management is a matter of concern. Strict supervision and surveillance should be followed in day-to-day hospital waste management activities. Importance of biomedical waste management should be stressed during the study curriculum of medical as well as nursing students. Practical implications related to the matter should also be covered so that the students can avoid the hazards of biomedical waste.

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