Evaluating Knowledge And Attitude Towards Biomedical Waste Among Medical Students In A Tertiary Care Teaching Hospital

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Abstract

Background: Biomedical waste (BMW) generated in our nation contains injections and hazardous materials. It is estimated that 10-25 % of the healthcare waste generated presents a chemical risk to the general population and healthcare workers associated with handling and disposal of waste. This study was conducted to assess knowledge of the segregation of BMW among medical students in a tertiary care teaching hospital in Chennai.

Methods-It is a cross-sectional study carried out among seventy-five participants of first, second, and third-year MBBS students in ESIC Medical College over six months. Data was collected using a structured self - administrated questionnaire to assess the knowledge of the segregation of BMW.

Results – Data compilation and analysis were done using software SPSS 23.0 version and chi-square. Proportion and percentage were also used to interpret the results. Second and third-year medical students had more adequate knowledge of BMW than the first year. The practice of segregation of BMW was statistically significant among the second-year than a third-year student with p< 0.001which may be due to the overburden of postgraduate entrance exam preparation in their carrier.

Conclusion.The first-year medical student according to competency-based medical education have early clinical exposure in their syllabus but inadequate knowledge regarding BMW. The attitude of third-year students regarding the segregation of BMW and color coding was good but inadequate in practice. BMW management should compulsorily be made part of the undergraduate curriculum by motivating the students with well-designed seminar programs and workshops thereby reducing health hazards and nosocomial infections.

Keywords: Segregation of Biomedical waste, medical students, color coding, Knowledge

Introduction

Bio-medical 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. Healthcare providers being the important professional who works as collaborators with the health care team have lots of responsibility in knowing the categories of hospital waste segregation and practices management. Therefore each health care professional should understand that proper disposal of hospital waste will help in the reduction of nosocomial infection. According to Sharma **1** et al Knowledge refers to the ability of medical students to understand biomedical waste management by responding to the structured questionnaire as devised by the

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investigators. India approximately generates 2 kg/bed/ day and this biomedical waste encompasses wastes like anatomical waste, cytotoxic wastes, and sharps, which when inadequately segregated could cause different kinds of deadly infectious diseases like Human immunodeficiency virus(HIV) and hepatitis B infections also cause disruptions in the environment, and adverse impact on ecological balance reported by Patil 2 AD et al. Adequate knowledge amongst the health care employees about the biomedical waste management rules and regulations, and their understanding of segregation, will help in the competent disposal of the waste in their respective organization

Methodology: This Cross-sectional study was conducted in a tertiary care teaching hospital among First Second and third-year MBBS students. The tool used for the study was a pre-designed, structured, and self-administrated questionnaire. Consent was obtained and confidentiality of the responses was assured. The investigator asked the students to respond to the tools and data was collected within a stipulated time. The questions on knowledge appraised the participant's knowledge of attributes related to the color coding and their implications, identification of biomedical hazard symbols, waste categories, and hospital policies for biomedical waste management This study is similar to a study of the attitude of health care workers by Mehta 7TK et al on biosafety. Data were analyzed using software SPSS 23.0 version and the Chi-square test was used to check the association of knowledge on segregation of BMW with demographic variables. Percentages (with 95% confidence intervals) and proportions were used to interpret the result. Descriptive statistics are prepared in mean +/_ SD for quantitative data. Interpret the level of knowledge was classified as inadequate knowledge (<50%) moderate knowledge (51-75%), and adequate knowledge (<75%). Knowledge Score The knowledge regarding general information about BMW was assessed, the mean score was highest in second-year students (10) followed by third (9.3) and least in the first year(7.5). This is found to be statistically significant and similar to the study of Joshi et al.8. Table1.

S.No	Demographic variable	Classification	Level of knowledge		Chi-square	Degrees of freedom	P-value
			Inadequate	Moderate			
1	Age	17-19years	40	15	0.337	1	0.562
		20-22 years	15	5			
2	Gender	Male	15	5	0.000	1	1.000
		Female	35	20			
3	Year of Study	Third year	8	17	4.242	2	0.120
		second year	5	20			
		First-year	15	10			

Chi-square test

The null hypothesis which was to be tested here was "The two attributes were independent".

Years of study and knowledge are independent.(Chi-square = 160.8, Degrees of freedom=10, p-value < 0.0001) Years of study and practice are independent.(Chi-square = 538.45, Degrees of freedom=15, p-value < 0.0001) .Table 1 shows female participants were more compared to males and the majority of the study participants had adequate knowledge about BMW management rules but only one-third knew regarding maximum time beyond which the waste cannot be stored in the hospital. This is similar to the findings of Kushwaha9

K **et** al study of BMW management among laboratory technicians.

Table2

S.No	Question	Response	Third (n-25)	Second (n-25)	First year (n-25)	p-value
SECTION – A Knowledge about Bio-Medical Waste						
1	Do you know about biomedical waste generation and legislation?	Yes	25(100.0)	24(100.0)	15 (80.0)	0.008
2	Biomedical waste (management and handling) rules were first proposed in India in which year?	1998	17(68.0)	15(60.0)	8(32.0)	0.026
3	According to biomedical waste (management and handling) rules, biomedical waste should not be stored beyond how many hours?	48 Hours	16(64.0)	10(40.0)	7(28.0)	0.033
4	Have you been fully vaccinated against hepatitis B?	Yes	22(88.0)	19(76.0)	21(84.0)	0.635
5	Can any plastic bag be used for waste disposal?	No	19(76.0)	13(44.0)	11(52.0)	0.058
6	Which of the following is a universally accepted symbol for biohazard?	Symbol	21(84.0)	17(68.0)	16(68.0)	0.340

Table2 clearly shows the majority of third-year students had good knowledge of BMW while only one-fourth of the first year were not aware of the universally accepted symbol for BMW. The other questions were well responded to by other participants. This is similar to Chowdary 10et al study on health workers. There is a need for a compulsory syllabus starting from the first year according to the competency-based medical curriculum.

SECTION – B Attitude Towards Bio-Medical Waste Management Table 3						
1	Do you agree that biomedical wastes should be segregated into different categories?	Agree	25(100.0)	25(100.0)	25(100.0)	NA
2	Do you feel that biomedical waste management should be made a part of the undergraduate curriculum?	Yes	25(100.0)	25(100.0)	24(96.0)	1.000
3	Do you think your knowledge regarding biomedical waste	Adequate	24(96.0)	18(72.0)	14(56.0)	0.005

	management is adequate?					
4	Do you think you require any further training in biomedical waste management?	Required	24(96.0)	21(84.0)	21(84.0)	0.327
5	Do you know how to segregate biomedical waste according to color coding?	Yes	25(100.0)	25(96.0)	20(80.0)	1.000

Table 3 shows that attitude-based questions were well responded to by the study participants. All the participants considered BMW management as teamwork where all the health professionals have an equal role and the majority 83% were willing to further training in BMW management under constant supervision by their experts. This result is similar to Das 11. P et al study future physicians.

SECTION – C Knowledge of segregation Table4

1	In which bin do you dispose of broken bottles/vials?	Blue	9(36.0	6(24.0)	13(52.0)	0.121
2	In which bin do you dispose of cotton gauze and other items contaminated by blood?	Yellow	11(44.0)	11(44.0)	14(56.0)	0.615
3	In which bin do you dispose of metallic sharp waste?	White	10(40.0)	2 (8.0)	7(28.0)	0.032
4	In which bin do you dispose of syringes?	Red	7(28.0)	10(40.0)	7(28.0)	0.575
5	How do you dispose of hazardous liquid waste?	Chemical treatment	25(100.0)	24(96.0)	25(100.0)	1.000
6	In which Bin do you dispose of papers?	Black	17 (68.0)	4. (16.0)	18(72.0)	<0.001

Table4 shows that the majority about 90% of participants felt that it is important to label biomedical waste. It was observed that second-year students were practicing segregation of BMW in clinical posting at their work site.85% of students rightly answered about discarding the syringes, and metallic sharp objects. This is following the study of problems in JK practitioners done by Yadav 12et al. About 90% of first-year students did not correctly practice discarding general waste in the right bin since they are new and need constant reinforcement and many workshops for improving their skills.

Comparison Of Mean Score Among The Student's Groups Table5

% Score	Students	N	Mean	Std.	#p-value	Multiple

	Groups in years			Deviation		Comparisons
Section A	third	25	74.00	15.82	<0.001	P: <0.001
	second	25	54.56	19.55		Q: 0.010
	first	25	60.28	12.29		R: 0.418
	Total	75	64.95	17.93		
Section B	third	25	70.67	16.16	<0.001	P: 0.076
	second	25	80.00	15.96		Q: 0.052
	first	25	60.67	12.62		R: <0.001
	Total	75	70.44	16.80		
Section C	third	25	90.67	10.84	<0.001	P: 0.001
	second	25	74.00	16.72		Q: <0.001
	first	25	72.67	19.32		R: 0.943
	Total	75	78.11	17.83		
OVERALL	third	25	72.92	7.62	<0.001	P: 0.013
	second	25	84.06	9.65		Q: <0.001
	first	25	66.04	6.25		R: 0.004

Discussion

The present cross-sectional study recognized certain inadequacies in the knowledge component amongst the different cadres of students, though greater than 50% of the study respondents, across cadres, demonstrated satisfactory or good knowledge and practices. This study revealed several lacunae in the knowledge and practice in the first year. This is similar to the study of Nath.13PA, Prashanthini, et al on staff nurses. Health professionals should understand that they are ethically responsible for the environment. A study conducted by Kumar 14PV, Kapate et al however showed no difference between undergraduate and postgraduate students the possible reason could be that as interests are overburdened with work and their mind is always over the tracking for postgraduate entrance exam which limited their aptitude and attitude. It was observed in the present study that attitude towards BMW management was better among second-year MBBS students followed by third years. Practice makes the man perfect an old English proverb always stand true in almost every circumstance of life but good practice makes a man very perfect. . Sekar15 et al also showed a similar result in their studies but Basu et al report different findings in their studies, the probable reason could be that there is no check on interns as to where they are disposing the biomedical waste. A good number of students were disposing or segregating general waste and used cotton swabs in the correct bin in our study and color-coded bins are very much useful in their work station. These findings were similar to the findings by Hassan16 et al . It was very fruitful to see that almost 97% of students were found to be immunized against Hepatitis B where the credit goes to government new rules and regulations for joining the professional courses.

Conclusion

This study showed overall the second and third years had average knowledge of the segregation of BMW. There is a need for regular training in BMW management from the first year since they have early clinical exposure to new competency-based medical curricula. Conducting training and promoting prices to undergraduates and postgraduates based on their performance in the proper handling of BMW can be

rewarding which will decrease the health hazard in the working environment. A replication of the present study can be conducted with large subjects in various health care settings.

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