Original Research Paper

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Assessment of Knowledge, Attitude, and Practices About Biomedical Waste Management among Dental Students and Dental Auxiliaries: An Institutional Study

Abstract:

Introduction: Health care is one of the fastest growing sectors in India. Biomedical wastes are generated from all levels of health care facilities and cause a serious threat to environment as well as people associated with it. Effective management of biomedical waste is not only a legal necessity but also a social responsibility.

Aim: To assess the knowledge, attitude and practice among dental students and auxiliaries working in tertiary care center.

Methods: A cross-sectional study was conducted among the dental students and dental auxiliaries of Dr.R.Ahmed Dental College & Hospital, Kolkata. A pre-validated andpre-tested structured closed ended questionnaire was given to them. Participants are instructed to tick their response in the questionnaire. The data was tabulated and interpretation will be done in percentages using SPSS.

Discussion: The importance of training regarding biomedical waste management cannot be overemphasized. This study will attempt to evaluate the same among the dental students and auxiliaries.

Key-words: bio medical waste, knowledge, attitude, practice, health care personnel

Introduction:

Over the past few decades there have been many advances in the field of health care. However, ironically the health care systems that restore and maintain the health in the community are also threatening their wellbeing. Hospital waste management is a burning issue today. The term biomedical waste is defined as any waste that is generated during diagnosis, treatment or immunization of humans or animals or in the research activities pertaining to or in the production or testing of biological and includes categories mentioned in schedule 1 of the Government of India's biomedical waste.[1] Almost 75-90% of the waste produced by hospitals is non-hazardous and it is estimated that remaining 10-25% carries a high potential for infection and injury.[2]

Biomedical waste is defined as the waste that is generated during the diagnosis, treatment or immunization of human beings or animals or during the research activities following the production or testing of biological products [1-3]

In India, the Ministry of Environment and Forests has promulgated the Biomedical Waste (Management and Handling) Rules 1998 for proper management of BM waste. These rules are meant to improve the overall waste management of health care facilities in India[1,2]. However, the introduction of laws is not sufficient for proper disposal of

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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. [3]

With the notification of the biomedical waste (BMW) rules, 1998, hospital waste management has been brought into focus in India. According to the rules, it is mandatory for the health care establishments to segregate, disinfect, and dispose their waste in an eco-friendly manner.[4]

The hospital hygiene and safety of health care workers and communities are ensured by the process of health care waste management (HCWM). One of the effective contributors of HCWM can be our health workers. Although their efforts may seem to be small, but each step builds a base of sound morals and rational that are necessary for the success of the whole community.[4]

Even though there is increased global awareness among health care professionals about threats and also suitable management techniques, in India, the level of awareness has been found to be unsatisfactory.[5] As there is no available information which describes the actual practice followed in handling these types of waste products in Himachal Pradesh at present, so this study aims to assess the knowledge, attitude, and practices among the dental health personnel's regarding BMW handling in the dental institutions.

Medical interns, who are just at the start of their medical career after completing graduation are exposed to various hazards like blood and blood products, injections etc. in various settings while conducting deliveries, assistance during surgery, collection of blood samples, immunization OPDs in the hospital. It is essential that they are fully aware of safe handling practices and related biomedical waste management. Even in their student life, they are exposed to similar hazards during their clinical postings in various subjects like gynecology, obstetrics, surgery, etc. thus making them vulnerable to infections.[6] Thus, knowledge of safe biomedical waste management practices is important and lack of this knowledge poses a occupational hazard for all health care professionals. The present study was done on interns as their clinical experience is less and they are at risk of various hazards from improper biomedical waste management practices So, with this background, this study was undertaken.

Materials &Methodology

This is a cross-sectional questionnaire-based study conducted in Dr. R.Ahmed Dental college& Hospital, Kolkata. The study was carried out for a period of 4 months from December 2024 to march 2025.It was carried out among179 participants, the undergraduates (3rd year and 4th year students), internsand dental auxiliaries. A structured closed-ended questionnaire adapted from a cross-sectional study done byKanika Khubchandani.[7] Before administering the questionnaire, the purpose of the study was explained to all participants. Anonymity of all participants was maintained. Informed consent was also obtained from them. Ethical clearance for the study was taken by the Institutional Ethical Committee, Dr. R. Ahmed Dental College & Hospital. Data collected from questionnaires was entered into an Excel sheet and subsequently analyzed using Statistical Package for Social Sciences (SPSS) version 23.0. Statistical analysis was done using Microsoft Excel Epi Info version 7 software.

Results:

A total of 179 students, among which 96female and 83malesparticipated in this survey, with a mean age of 20 ± 3 years.

Responses to questions on the knowledge domain are presented in [Table 1]. More than half of the participants believed that all health-care wastes were hazardous. About 93.3% of the respondents reported that they received no training on biomedical waste management and 51.4% were not aware of any legislations governing biomedical waste handling (UG: 73.6%, DA: 61.7%, and Interns: 76.6%).

Table 1: Comparison of knowledge among the participants

Knowledge questions	Response	Designation		
		Undergraduate students=105 (%)	Interns=45 (%)	Dental A =29(%)
Are all health-care wastes hazardous?	Yes	56 (53.3)	23 (51.1)	17 (58.6)
	No	49 (46.7)	22 (48.9)	12 (41.4)
Biomedical Waste Management Rules are applicable to dentists?	Yes	91 (86.7)	44 (97.8)	27 (93.1)
	No	14 (13.3)	01 (2.2)	2 (6.9)
Have you had any training in biomedical waste management?	Yes	11 (10.5)	01(2.2)	00 (0)
	No	94 (89.5)	44 (97.8)	29 (100)
Do you know about BM waste generation and disposal legislation?	Yes	67 (63.8)	10 (22.2)	10 (34.5)
	No	38 (36.2)	35 (77.8)	19 (65.5)
Are you aware of the agencies authorized by government to collect waste from hospital/clinical set up	Yes	28 (26.7)	41(91.1)	10(34.5)
	No	77(73.3)	04(8.9)	19(65.5)
The approximate proportion of infectious waste among total waste generated from a health-care facility is (%)	Correct	47(44.8)	31(66.7)	00(0)
	Incorrect/do not know	58(55.2)	14(33.3)	29 (100)

Attitude of participants toward proper biomedical waste management is given in [Table 2]. While almost all respondents (93.9 %) believed that biomedical waste should be segregated into different categories, 77.1 % opined that they have inadequate knowledge regarding biomedical waste management. 80.4% of respondents across all groups felt that they require additional training in this waste management. 86.6% felt that labeling of BMW is of utmost importance.

Table 2: Comparison of Attitude among the Study Participants

Knowledge questions	Response	Designation		
		Undergraduate students (%)	Interns (%)	Dental Auxiliaries (%)
Do you agree that biomedical wastes should be segregated into different categories?	**Yes**	102(97.1)	44(97.8)	22(75.9)
	No	03(2.9)	01(2.2)	07(24.1)
Do you think your knowledge regarding biomedical waste management is adequate?	**Yes**	19(18.1)	11(24.4)	11(37.9)
	No	86 (81.9)	34(75.6)	18(62.1)
Do you think it is important to know about BM waste generation, hazards, and legislation?	**Yes**	88(83.8)	42(93.3)	18(62.1)
	No	17(16.2)	03(6.7)	11(37.9)
Do you think that the college should organize separate classes or a continuing dental education program about BM waste management?	**Yes**	81(77.1)	38(82.2)	25(86.2)
	No	24(22.9)	7(17.8)	04(13.8)
Do you think that infectious waste should be sterilized before shredding and disposal?	**Yes**	58(55.2)	35(77.8)	19(65.5)
	No	40(38.1)	04(8.9)	08(27.6)
	No comments	7(6.7)	06(13.3)	02(6.9)
Do you think that labeling the container before filling it with waste is of clinical significance?	**Correct**	89(84.8)	37(82.2)	29(100)
	Incorrect/do not know	15(14.3)	7(15.6)	0
	No comments	1 (0.9)	01(2.2)	0

Among the practice questions [Table 3], 76% of the participants felt that institute should not have tied up with waste management companies . 74.3% of the participants responded incorrectly on sharp disposals. 84.9% of the participants do not know about discardation of used developer and fixer solution .70.94% of the participants followed color coding for biomedical waste management / segregation.

Table 3: Comparison of Practice among the participants

Knowledge questions	Response	Designation		
		Undergraduate students (%)	Interns (%)	Dental Auxiliaries (%)
Does your institute have a tie up with waste management companies?	**Yes**	18(17.1)	5 (8.8)	20 (69)
	No/Do not know	87 (82.9)	40 (91.2)	9 (31)
Where do you dispose waste sharps?	**Correct**	31 (29.5)	1(2.2)	14 (48.3)
	Incorrect/ Do not know	74 (70.5)	44 (97.8)	15 (51.7)
How do you discard the used developer or fixer solution?	**Yes**	17 (16.2)	2 (4.4)	8 (27.6)
	No/ Do not know	88 (83.8)	43 (95.6)	21 (72.4)
How do you dispose the hazardous liquid waste?	**Correct**	50 (47.6)	18 (40)	25 (86.2)
	Incorrect/do not know	55 (52.4)	27 (60)	4 (13.8)
Do you follow color coding for BM waste?	Yes	71 (67.6)	32 (71.1)	24(82.8)
	No/Do not know	07 (6.7)	4 (8.9)	2 (6.9)
	sometimes	27(25.7)	9 (20)	3 (10.3)

Discussion:

The present study was conducted among health care personnel of different level working at tertiarycare hospital. The study participants included dental auxiliaries, Final year dental(4th year)& interns. Total 179 health care personnel participated in the study. Majority participants heard about the BMW and its management rule but less than half of the study participants have actually received training for BMW management.

In this present study, only 48.6% of the study participants were aware of the legislations governing BMW management in India. This was very poor compared to other similar studies,[8,9,10,11] the highest being reported as 94.6% and 98.6% by Amol *et al*.[12] and Khatri *et al*.,[13] respectively.

Around 6.7% of the participants reported to have received training on how to handle BMW appropriately which is less than the study by Divya *et al*.[14] where only 8.1% of doctors have been trained.

Only 44.1% study participants in this study had knowledge about the local agencies handling BMW in the state, the percentage being lower as compared to 79.5% and 85.7% found by Lakshmikantha *et al*.[10] and Amol *et al*.,[12] respectively. One of the reasons for this observation could be due to the fact that the institution where the study was carried out has their own BMW disposal system.[15]

Around 93.9 % of the participants agreed that biomedical waste should be segregated into different categories. The observations were consistent with most studies discussed earlier[9,12,14,16] However, Raghuwar *et al*.[9] found in his study that a large number of the respondents (63.7%) were unaware of different categories of biomedical waste. Majority believed that waste management is a team effort and about 24.4% felt that it is extra work on the part of the institution.

Almost 62.6% of the participants felt that infectious wastes need to be sterilized before final disposal, which was higher than that reported by Amol *et al*.12] (52.7%). &less to Kanika Khubchandani*et al* study. Just as segregating wastes are important, equally so is the labeling of containers into which they are separated. Similar was the opinion of 91.7% of participants in the current study and also of 86% of participants in the study by Kulkarni *et al*.[18]. Around 80.4% of students thought that they required further training on

biomedical waste management which is shown in many studies[10, -12,14] showing a positive attitude toward a healthier and safer environment. In addition to a lecture on BMW management which is usually the norm, especially in dental schools, training should be augmented by visits to a BMW treatment facility to enable students appreciate the importance of proper segregation of waste. Overall, attitude questions showed a favorable response.

In practice, 50% of the participants routinely segregate waste, which is in very less than a study by Pawar *et al*.[19] where 93.8% did so. The practice of BMW management showed variation between the studies. Many studies[9,12,20] reported lesser values of practice of waste segregation and in a study by Raghuwar *et al*.[17]

About 44% of participants correctly disposed cotton, gauze, and other items contaminated by blood into yellow bags which was lesser than as followed by 70.8% of health professionals reported by Pawar *et al*.[19] and more than many other studies.[12,17,21] In the study by Bansal *et al*.[,22] only 16% of the doctors practiced the same.

In dental settings, proper disposal of waste sharps such as infected needles are particularly essential to avoid needlestick injuries and acquiring infections such as hepatitis and HIV. Correct disposal of such waste into puncture proof containers was practiced by 25.7% of respondents in this study, Similar was the finding in many other studies[9,18,19] except in the study by Amol *et al*.[12] where comparatively a higher number of 72.3% disposed waste sharps correctly.

Majority of the respondents discarded the used developer and fixer solution inappropriately and it is less than Sood *et al*.[16] who documented a response of 34%. In the present study, only 15.1% dispose it correctly which is highly alarming as if mixed it turns into hazardous liquid waste

In the present study, interns fared better in correct disposal of wastes followed by dental students and dental auxiliaries. Overall, most studies conducted all over the country show a positive attitude toward BMW management but there were deficiencies in knowledge and practice. Similar observations were made by Tanuja *et al*.[23] who conducted a study in Nepal where 82% are well aware of the segregation of waste and color coding, however, they lack knowledge about the rules laid down by the government and practice regarding the same. One of the limitations of this study was that it was limited to a single institution.

Conclusion:

Our study revealed that although students demonstrated a highly positive attitude toward biomedical waste (BMW) management and recognized the importance of proper handling of hazardous waste, there remains considerable scope for improvement in their knowledge and practices.

A subgroup analysis showed that postgraduates and house surgeons performed better in overall knowledge and practice scores compared to undergraduates. This finding underscores the crucial role of advanced education and clinical exposure in enhancing awareness and adherence to safe BMW management protocols.

Therefore, educational institutions should strengthen training initiatives by incorporating structured teaching modules, hands-on demonstrations, and mandatory visits to biomedical waste treatment facilities. Furthermore, strict enforcement of BMW management guidelines from the early clinical years is essential to cultivate responsible practices among future healthcare professionals.

References:

1. Kanchi P. Knowledge, Attitude, Practice, regarding Hospital Waste management among nurses and interns of Tertiary care hospitals of Navi Mumbai. SJAMS. 2017:5(2C):526-30. Safe management of waste from Health care activities. Geneva WHO, 1999.
2. Government of India, Ministry of Environment and Forests. Bio-Medical Waste (Management and Handling) Rules. Gazette of India. 1998 (27 Jul). Available from: http://envfor.nic.in/legis/hsm/biomed.html
3. Government of India, Ministry of Health and Family Welfare (MoHFW). National Guidelines on Hospital Waste Management Based upon the Bio-Medical Waste (Management and Handling) Rules, 1998. New Delhi: MoHFW; 2002.
4. Summers J. Asset disposal: Follow company policies or follow the law? Journal of Healthcare Materiel Management. 1991; 9: 54-56.
5. Sharma S. Awareness about bio-medical waste management among health care personnel of some important medical centers in Agra. Int J Environ Sci Dev 2010; 1:251-5.

6. Sharma A, Sharma V, Sharma S, Singh P. Awareness of biomedical waste management among health care personnel in Jaipur, India. Oral Health Dent Manag 2013; 12:32-40.
7. Kanika Khubchandani, Kaviya DeviM, Subhathraa Gunasekaran, Sravan Kumar Yeturu, Venkitachalam Ramanarayanan .Knowledge, attitude, and practices of biomedical waste management among clinical dental students.J Pharm Bioallied Sci.2024 Jun 7;16(Suppl 3): S2271–S2274. doi: 10.4103/jpbs.jpbs_189_2
8. Kumar DM. Knowledge, awareness and attitude regarding biomedical waste management among medical students in a tertiary health care centre: A cross sectional study. *Indian J Res*. 2017; 6:611-3[Google Scholar]
9. Manchanda K. Knowledge, attitude, and practices about biomedical waste management among dental healthcare personnel in dental colleges in Himachal Pradesh: A cross-sectional study. *SRM J Res Dent Sci*. 2015; 6:166-9 [CrossRef] [Google Scholar]
10. Lakshmikantha R. To assess the knowledge, level of awareness, and attitude on biomedical waste management among practicing dentists in Bengaluru city: A cross-sectional study. *CHRISMED J Health Res*. 2016; 3:161.
[Google Scholar]
11. Khandewal V, Khandewal S, Thakur JS. Health care waste disposal among private dentist in an Indian city: It's time to act. *Int J Infect Control*. 2013;9:5.[CrossRef] [Google Scholar]
12. Jamkhande A, Bulani M, Hiremutt D, Godbole A, Rawlani D, Bhadani H. Knowledge, attitude, and practice about dental waste management among dentists in Pune-a questionnaire study. *Int J Sci Study*. 2019;6:7.[Google Scholar]
13. Reddy M, Khatri J, Kokil N, Agrawal R, Khatri M. Knowledge and practice adopted by dental practitioners and dental auxiliaries regarding biomedical waste management in Pune. *J Dent Res Sci Dev*. 2014;1:34.[CrossRef] [Google Scholar]
14. Rao D, Dhakshaini MR, Kurthukoti A, Doddawad VG. Biomedical waste management: A study on assessment of knowledge, attitude and practices among health care professionals in a tertiary care teaching hospital. *Biomed Pharmacol J*. 2018;11:1737-43.[CrossRef] [Google Scholar]
15. Sanjeev R, Kuruvilla S, Subramaniam R, Prashant PS, Gopalakrishnan M. Knowledge, attitude, and practices about biomedical waste management among dental healthcare personnel in dental colleges in Kothamangalam: A cross-sectional study. *Health Sci*. 2014;13:1-12. [Google Scholar]
16. Sood AG, Sood A. Dental perspective on biomedical waste and mercury management: A knowledge, attitude, and practice survey. *Indian J Dent Res*. 2011;22:371-5.[CrossRef] [PubMed] [Google Scholar]
17. Singh RD, Jurel SK, Tripathi S, Agrawal KK, Kumari R. Mercury and other biomedical waste management practices among dental practitioners in India. *J Biomed Biotechnol*. 2014;2014: e272750.
18. Kulkarni SS, Sushanth VH, Prashant GM, Imranulla M, Vivek HP, da Costa FD. Current knowledge, attitude and practices of dental residents towards biomedical waste management: A cross sectional study. *J Glob Oral Health*. 2019; 2:23-8. [CrossRef] [Google Scholar]
19. Pawar PA, Patil TS. Knowledge, practice and attitude of dental care waste management among private dental practitioners in Latur city. *Int Dent J Stud Res*. 2016; 5:80-4.[Google Scholar][Google Scholar]
20. Fisher J, Varenne B, Narvaez D, Vickers C. The Minamata convention and the phase down of dental amalgam. *Bull World Health Organ*. 2018; 96:436-8.
[CrossRef] [PubMed] [Google Scholar]
21. Imchen T, Kumari R, Singh JV, Srivastava K, Singh A. Study of biomedical waste management among healthcare personnel at a Tertiary hospital in Lucknow district. *Int J Community Med Public Health*. 2017; 4:1483-7. [CrossRef] [Google Scholar]
22. Bansal M, Vashisth S, Gupta N. Knowledge, awareness and practices of dental care waste management among private dental practitioners in Tricity (Chandigarh, Panchkula and Mohali) *J Int Soc Prev Community Dent*. 2013; 3:72-6
23. Singh T, Ghimire TR, Agrawal SK. Awareness of biomedical waste management in dental students in different dental colleges in Nepal. *Biomed Res Int*. 2018; 2018:1742326. [CrossRef] [PubMed]