

**Awareness, Attitude and Practices of Biomedical Waste management among health care workers of private nursing homes in West Bengal**

<sup>1</sup>Prof. (Dr.) R.N. Rout, <sup>2</sup>Dr. Adrija Roy, <sup>3</sup>Dr. Parmeshwar Satpathy, <sup>4</sup>Dr. Sembagamutthu Sembiah  
<sup>5</sup>Dr. Debapi Roy

<sup>1</sup>Prof. (Dr.) R.N. Rout, Professor, Department of Community Medicine, Kalinga Institute of Medical Sciences  
Bhubaneswar, Odisha, India,

<sup>2</sup>Dr. Adrija Roy, Senior Resident, Department of Community and Family Medicine, All India Institute of Medical  
Sciences, Bhopal, Madhya Pradesh, India

<sup>3</sup>Dr. Parmeshwar Satpathy, Senior Resident, Department of Community and Family Medicine, All India Institute of  
Medical Sciences, Bhopal, Madhya Pradesh, India

<sup>4</sup>Dr. Sembagamutthu Sembiah, Senior Resident, Department of Community and Family Medicine, All India Institute of  
Medical Sciences, Bhopal, Madhya Pradesh, India

<sup>5</sup>Dr. Debapi Roy, Consultant Orthopaedic Surgeon, Kalyani, West Bengal, India

**Corresponding Author:** Dr. Adrija Roy, Senior Resident, Department of Community and Family Medicine, All India  
Institute of Medical Sciences, Bhopal, Madhya Pradesh, India

**Type of Publication:** Original Research Paper

**Conflicts of Interest:** Nil

**Abstract**

**Introduction:** According to Bio-Medical Waste (Management and Handling) Rules, of India Biomedical waste (BMW) includes waste generated during diagnosis, treatment or immunization of human beings or animals or research activities or in production or testing of biologicals. As health care workers are being constantly exposed to the hazardous wastes, the assessment of their awareness, attitude and practices are extremely necessary. The hospitals and tertiary care institutes have been explored but not smaller nursing homes. Therefore this study was undertaken to assess the awareness, attitude and practices of BMW management among the HCWs of private nursing homes.

**Methodology-Study Design:** Cross sectional study

**Study Setting:** Three Private Nursing Homes.

**Study Population:** Health Care Workers including Doctors (consultants, medical officers), Nursing Staff, Technicians, Sanitary Staff attending the Biomedical Waste management seminar who were employees of the respective nursing homes consisted of the study population.

**Sample size and Sampling Technique:** All the HCWs attending the BMW management seminar at the three nursing homes on the respective days who agreed to participate in the study were included.

**Results:** A total of 180 study participants were included in the study. Among them 68 (37.7%) were doctors, 70 (38.9%) were nurses, 19 (10.6%) were technicians, and 23 (12.8%) were sanitary staff. On assessing the

awareness of the study subjects on BMW management it was seen that 106 (58.9%) were adequately aware. 148 (82.2% ) has positive attitude and 97(53.9% ) participants had good practices regarding BMW management. A highly significant association between awareness of BMW management and age group, profession, marital status and years of experience in health care sector was established.

**Conclusion**

To improve overall knowledge and practices related to BMW management and its handling, strict implementation of Bio medical waste management rules should be enforced in each and every nursing home with equal importance being accorded to them as hospitals and tertiary care institutes. A proper and timely monitoring should be done. A compulsory training of staff of healthcare facilities from accredited training centers is equally necessary to bring about the desired changes.

**Keywords:** Biomedical waste management, healthcare workers, private nursing homes, awareness, attitude, practice, KAP study.

**Introduction:**

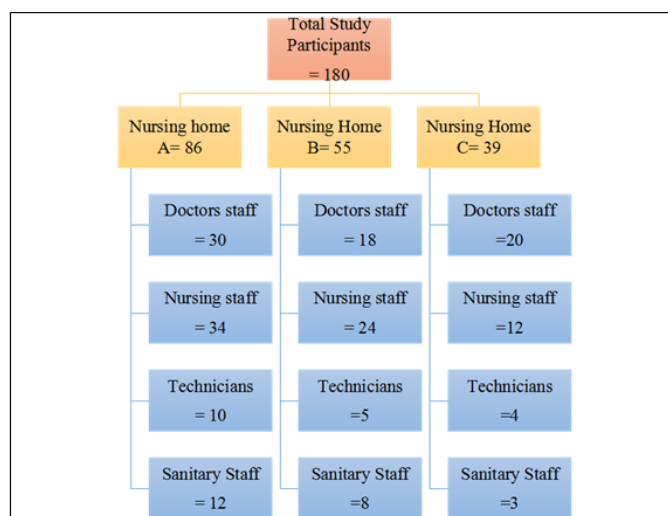
According to Bio-Medical Waste (Management and Handling) Rules, of India Biomedical waste (BMW) includes waste generated during diagnosis, treatment or immunization of human beings or animals or research activities or in production or testing of biologicals.(1) BMW handling rules have been notified in 1998 and updated in March 2016 and again further amended in 2018.

Due to the overwhelming increase in patient’s number in both public and private hospitals as well as nursing homes it has led to concomitant increase in amount of generated waste, which during the entire course of healthcare activities needs special consideration for its composition, quantity and their potential hazardous effect as compared

to waste of other places and thereby requires particular attention for its management. [2]

The World Health Organization (WHO) reports that , some of healthcare wastes are considered the most hazardous and are potentially dangerous to human health and pollute the environment .Infectious wastes, particularly, have been responsible for most of the health problems reported among exposed healthcare workers[1] (HCWs), patients, clients and the community for blood borne pathogens unless proper care is taken on healthcare waste management. [3,4,5,6]

As health care workers are being constantly exposed to the hazardous wastes , the assessment of their awareness, attitude and practices are extremely necessary. The hospitals and tertiary care institutes have been explored but not smaller nursing homes. Therefore this study was undertaken to assess the awareness, attitude and practices of BMW management among the HCWs of private nursing homes.



**Figure 1: Distribution of Study participants in each nursing home and their occupation.**

**Study tool:** A pre-designed, pretested, semi-structured, questionnaire was used to collect data. It included questions on their socio-demographic characteristics,

years of experience in their respective field and questions assessing their awareness, attitude and practices of biomedical waste management. After thorough literature review [7,8] the questions on BMW were framed. There were a total of thirteen questions on awareness, twelve questions on attitude and eleven questions to assess practices. A total of seven or more than seven correct or positive responses were considered to have adequate awareness, positive attitude and good practice of BMW management ; similarly the rest with less than seven correct or positive responses were categorized as having inadequate awareness, negative attitude and poor practice of BMW management.

**Data Collection:** Data was collected at a seminar setting in each of the nursing homes from the employees. A seminar on BMW management were held in all the three nursing homes and data was collected using a self-administered questionnaire before the seminar started. Assistance in filling of forms was provided if necessary. The questionnaire provided was in English and translated into Bengali and Hindi for better understanding of questions.

**Data Entry and Statistical Analysis:** Data was entered into MS Excel and EpiInfo software version 7.2. Data was represented using mean, standard deviation and proportions. For statistical analysis Chi- square test was applied wherever necessary and a P value of <0.05 was considered significant.

**Results and Discussion**

A total of 180 study participants were included in the study. Among them 68 (37.7%) were doctors, 70 (38.9% ) were nurses, 19 (10.6%) were technicians, and 23 (12.8%) were sanitary staff.

On assessing the awareness of the study subjects on BMW management it was seen that 106 (58.9%) were adequately aware. 148 (82.2% ) has positive attitude and 97(53.9% ) participants had good practices regarding BMW management. Table 1 shows the distribution of study participants according to their level of awareness, attitude and practices.

**Table 1: Distribution of study participants according to their level of awareness, attitude and practices (n=180).**

Awareness		Attitude		Practices	
Adequate (≥7 correct responses)	106 (58.9%)	Positive attitude (≥7 correct responses)	148 (82.2%)	Good Practices (≥6 correct responses)	97 (53.9%)
Inadequate (<7 correct responses)	74 (41.1%)	Negative attitude (<7 correct responses)	32 (17.8%)	Poor Practices (<6 correct responses)	83 (46.1%)

It was seen that majority [110(61.1%)] of the study participants were female. Also it was also found that 67(37.2%) belonged to the age group of 41-50. On applying chi square test , it has been found that there is a highly significant association between awareness of BMW management and age group, profession,marital status and years of experience in health care sector. Table 2 shows the distribution of study participants according to their socio-demographic characteristics and level of awareness. The overall adequate level of awareness among the technicians was found the highest, i.e., 84.2% of the technicians had adequate level of awareness. Among the doctors 75% had adequate level of awareness . Among the

nursing staff and sanitary workers the level of awareness was 45.7% and 30.4% only. Tables 3,4 and 5 shows the frequency of participants correctly or positively responding questions on awareness, attitude and practices of biomedical waste management.

Table 2: Distribution of Study Participants according to their socio-demographic characteristics and level of awareness.

Variables	Level of Awareness		Chi-square value/ P value
	Adequate N=106	Inadequate N=74	
<b>Age group</b>			
>30 (n=21)	12	9	$\chi^2 = 13.53$ <b>P=0.009</b>
31-40 (n=47)	32	15	
41-50 (n=67)	45	22	
51-60 (n=35)	15	20	
>60 (n=10)	2	8	
<b>Gender</b>			
Male (n=70)	40	30	$\chi^2 = 0.05$ P=0.82
Female (n=110)	66	44	
<b>Profession</b>			
Doctor ( n=68)	51	17	$\chi^2 = 25.03$ <b>P&lt;0.001</b>
Nursing Staff (n=70)	32	38	
Technician (n=19)	16	3	
Sanitary Staff (n=23)	7	16	
<b>Marital Status</b>			
Married (n=152)	84	68	$\chi^2 = 4.39$ <b>P&lt;0.001</b>
Unmarried /Divorced/Separated (n=28)	22	6	
<b>Years of experience in the health-care sector</b>			
<1-2 (n=18)	6	12	$\chi^2 = 29.65$ <b>P&lt;0.001</b>
3-4 (n=40)	29	11	
5-7 (n=62)	47	15	
7-10 (n=24)	14	10	
>10 (n=36)	10	26	

Table 3: Correct responses for questions on Awareness regarding biomedical waste (n=180)

Sr.No.	Questions on	Doctors (n=68)	Nursing Staff (n=70)	Technician s (n=19)	Sanitary Staff (n=23)	TOTAL (n=180)
1.	Awareness and year of first proposal of Biomedical rules	62 (91.18)	63(90)	17 (89.47)	3 (13.04)	145 (80.56)
2.	Objectives of biomedical waste management	51 (75.00)	47(67.14)	13 (68.42)	2 (8.70)	113 (62.78)
3.	Reason why Biomedical waste is more dangerous	60 (88.24)	55(78.57)	15 (78.95)	7 (30.43)	137 (76.11)
4.	Major risks associated with hospital waste handling	67 (98.53)	69(98.57)	15 (78.95)	10 (43.48)	161(89.44)
5.	Differentiate between infectious and non-infectious waste	61 (89.71)	55 78.57)	13 (68.42)	4 (17.39)	133 (73.89)
6.	% of general & healthcare waste generated by healthcare activities	50 (73.53)	41(58.57)	17 (89.47)	3 (13.04)	111 (61.67)
7.	Most important aspect of BMW waste management is segregation	47(69.12)	50 (71.43)	18 (94.74)	5 (21.74)	120 (66.67)
8.	Identification of symbol used for biohazard	63(92.65)	29(41.43)	18 (94.74)	2 (17.39)	112 (62.22)
9.	Maximum storage time limit for untreated waste	31(45.59)	22(71.43)	14 (73.68)	5 (21.74)	72 (40.00)
10.	Colour coded bag treated by incineration	40(58.82)	29(41.43)	15 (78.95)	4 (17.39)	88 (48.89)
11.	Colour coded bag not requiring pre-treatment	39(57.35)	24(34.29)	16 (84.21)	5 (21.74)	84 (46.67)
12.	After exposure Post Exposure Prophylaxis should ideally be taken within: a)2 hours* b)4 hours c)24 hours d) It can be taken anytime	29 (42.65)	28 40.00)	17 (89.47)	11 (47.83)	85 (47.22)

13.	Whom to report in case of needle stick injury	65(95.59)	67(95.71)	18 (94.74)	12(52.17)	162(90.00)
-----	---	-----------	-----------	------------	-----------	------------

Table 4: **Positive responses for questions on Attitude regarding biomedical waste (n=180)**

Sr.No.	Questions on	Doctors (n=68)	Nursing Staff (n=70)	Technicians (n=19)	Sanitary Staff (n=23)	TOTAL (n=180)
1.	Applicability of biomedical waste rules to participants	60(88.24)	61(87.14)	19(100.00)	20(86.96)	160(88.89)
2.	Perception of their knowledge regarding BMW management	37(54.41)	40(57.14)	17(89.47)	12(52.17)	106(58.89)
3.	Training regarding biomedical waste management	37(54.41)	40(57.14)	17(89.47)	22(95.65)	116(64.44)
4.	BMW management should compulsorily be made a part of curriculum	68(100.00)	69(98.57)	19(100.00)	23(100.00)	179(99.44)
5.	Willingness to attend programmes that enhance and upgrade knowledge on BMW management	66(97.06)	67(95.71)	19(100.00)	20(86.96)	172(95.56)
6.	Do you feel that colour coding of bins should be strictly implemented for successful BMW management?	63(92.65)	62(88.57)	18(94.74)	13(56.52)	156(86.67)
7.	Importance of labeling biomedical waste bag	65(95.59)	67(95.71)	19(100.00)	18(78.26)	169(93.89)

8.	Need of separate vehicle to transport biomedical waste	64(94.12)	62(88.57)	17(89.47)	17(73.91)	160(88.89)
9.	Waste management is a team work	66(97.06)	65(92.86)	16(84.21)	13(56.52)	160(88.89)
10.	Tie up with authorized company required for proper disposal of BMW	51(75.00)	52(74.29)	14(73.68)	13(56.52)	130(72.22)
11.	Frequency of health check-ups and training for healthcare workers	50(73.53)	63(90.00)	16(84.21)	21(91.30)	150(83.33)
12.	Safe management of BMW is a financial burden to the setup	62(91.18)	64(91.43)	16(84.21)	21(91.30)	163(90.56)

Table 5: Correct responses for questions on Practice regarding biomedical waste (n=180)

Sr.No.	Questions on	Doctors (n=68)	Nursing Staff (n=70)	Technicians (n=19)	Sanitary Staff (n=23)	TOTAL (n=180)
1.	Site of segregation of the waste was at the point of generation.	63(92.65)	63(90.00)	19(100.0)	20(86.96)	165(91.67)
2.	Availability of all colour coded bins for biomedical waste	42(61.76)	58(82.86)	17(89.47)	12(52.17)	129(71.67)
3.	Procedure followed to discard used gloves	35(51.47)	41(58.57)	16(84.21)	8(34.78)	100(55.56)
4.	Procedure followed to dispose needles	59(86.76)	50(71.43)	19(100.00)	7(30.43)	135(75.00)
5.	Colour coded bin used to dispose soiled dressings	57(83.82)	49(70.00)	17(89.47)	2(8.70)	125(69.44)

6.	Colour coded bin used to dispose intravenous infusion sets	59 (86.76)	62(88.57)	17(89.47)	5(21.74)	143(79.44)
7.	Details on the label on bags for transportation of BMW	39(57.35)	35(50.00)	13(68.42)	2(8.70)	89(49.44)
8.	Amount of waste to be filled in waste bag	17(25.00)	21(30.00)	11(57.89)	3(13.04)	52(28.89)
9.	Mode of transportation of biomedical waste in hospital	24(35.29)	29(41.43)	13(68.42)	2(8.70)	68(37.78)
10.	Availability of incinerator facility in hospital	39(57.35)	50(71.43)	15(78.95)	12(52.17)	116(64.44)
11.	Procedure to manage the blood spillage on the floor	41(60.29)	53(75.71)	18(94.74)	18(78.26)	130(72.22)

Our study showed that on assessing the awareness of the study subjects on BMW management it was seen that even though a majority of the participants had positive attitude, their knowledge and practices level were not adequate. These results were similar to other studies. [2,3,7,8]. Knowledge about biomedical waste management rules among the technically qualified personnel like the doctors, nurses, and laboratory technician were better but it was low among the sanitary staff. These results were similar to the findings from the studies conducted by Joseph et al,[9] Mathur et al.[10] and Chowdhary A. et al.[3] It has been found in our study that there is a highly significant association between awareness of BMW management and age group, profession, marital status and years of experience in health care sector.

The limitation of the study is that since the study sample size is less it cannot be exactly generalized in the form of results to the entire population. The sample size therefore be increased in future studies with involvement of multiple investigators in different institutions at different locations. Also as it was a cross sectional study a causal association could not be established.

**Conclusion**

To improve overall knowledge and practices related to BMW management and its handling strict implementation of Bio medical waste management rules should be enforced in each and every nursing home with equal importance as hospitals. A proper and timely monitoring should be done. A compulsory training of staff of healthcare facilities from accredited training centers is equally necessary to bring about the desired changes. These training sessions should be a continuous process depending upon the patient input in different health

facilities and regular update should be added as and when new rules and recommendations are provided by the government. Encouragements such as prizes and consolations as positive reinforcement mechanisms can be strongly effective in motivating and educating the staff for proper BMW handling. Our study emphasizes the importance of biomedical waste management practices in our hospitals and reinforce the need for training in BMW management for all cadres of health care workers in both continuous (for overall) and as per need manners(for individuals).

**Acknowledgement:** The authors would like to acknowledge all the employees of the nursing home for their active participation in the study and involving themselves in the biomedical waste management seminar. We are also thankful to the nursing home authorities for allowing us to serve them and helping in smooth functioning of the event.

#### **References**

1. Park K, Everett J. Park's Textbook of Preventive and social Medicine. 23rd ed. Bhanot;
2. Rajpal S, Garg SK, Bano T, Singh G. Biomedical waste management awareness in public and private hospitals in a district of North India. 2018;5(4):1499–502.
3. Chowdhary A. Study of knowledge, behaviour and practice of biomedical waste among health personnel. Int J Community Med Public Health 2018;5:3330-44.
4. Johannessen LM, Dijkman M, Bartone C, Hanrahan D, Boyer MG, Chandra C. Health Care Waste Management Guidance Note. Washington DC: World Bank; 2000.
5. Sawalem M, Selic E, Herbell JD. Hospital waste management in Libya: A case study. Waste Management 2009;29(4):1370-5.
6. Pruss AGE, Rushbrook P. Safer management of wastes from health care activities. Geneva: World Health Organization; 1999
7. Mehta TK, Shah PD, Tiwari KD. A Knowledge , Attitude and Practice Study of Biomedical Waste Management and Bio-safety among Healthcare Workers in a Tertiary Care Government Hospital in Western India. 2018;9(5):327–33.
8. Das S, Biswas R. Awareness and practice of biomedical waste management among healthcare providers in a Tertiary Care Hospital of West Bengal, India. Int J Med Public Heal [Internet]. 2016;6(1):19. Available from: <http://ijmedph.org/article/183>
9. Joseph J, Krishnan C.G. A;Hospital waste management in the union territory of Pondicherry.- An exploration 2004. Available at [www.pon.nic.in/citizen/science/ppccnew/joe.pdf](http://www.pon.nic.in/citizen/science/ppccnew/joe.pdf). Accessed on 3 January 2018.
10. Mathur V, Dwivedi S, Hassan MA, and Misra RP, Knowledge, Attitude, and Practices about Biomedical Waste Management among Healthcare Personnel: A Cross-sectional Study. Ind J Comm Med. 2011;36(2):143–5.