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Original Research Article

SUBPAR AWARENESS AND PRACTICES IN BIOMEDICAL WASTE MANAGEMENT: STILL MILES TO ACHIEVE

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Abstract

Background: As the number of health care services in India rises, biomedical waste management has become an issue. All Health Care Workers (HCW) should know how to reduce environmental biohazards by properly disposing of biomedical waste and recycling the waste. The current study's objective was to assess the role of training on Biomedical Waste Management on awareness and practices among health care staff in Community Health Centres of Lucknow, Uttar Pradesh. **Materials and Methods:** A cross-sectional study was conducted among eighty health care workers (HCWs) from four Community health centres of Lucknow. Awareness and practices about Biomedical Waste Management was assessed among trained and non-trained HCWs. **Result:** A total of 80 respondents participated in the study. Majority of them i.e., 25(31.25%) were health technicians, 17 were fourth class workers,4 medical superintendents and 19 medical officers. A significant association was found between awareness (proper procedure, segregation and collection of BMWM) and practices (installation of incineration plant, maintenance of records and treatment of BMW before disposal) with training. **Conclusion:** Training on BMWM and Handling rules has a significant impact on awareness and practices of Health care workers. Proper BMWM is essential and thus all health facilities should focus on implementation of training programs which would improve the quality of BMWM and handling.

INTRODUCTION

The entire waste stream coming from a healthcare facility is known as health care waste. The term "bio-medical waste" (BMW) refers to any waste produced during the diagnosis, treatment, or immunization of humans or animals, as well as during related research activities, the production, or testing of biologicals.[1] This includes the categories listed in Schedule I of the BMWM (Biomedical Waste Management) and Handling Rules 1998.[2] In 2011, the gross daily creation of BMW in India was projected to be 4,05,702 kg, of which only 2,91,983 kg were disposed of, meaning that about 28% of the waste was left untreated.[3]

Unsatisfactory BMW management is said to exist in 18–64% of healthcare facilities worldwide; inadequate disposal, insufficient resources, and lack of awareness are among the predictions.[4] BMW is particularly dangerous because it contains a lot of hazardous materials in addition to producing pollution in the environment.[5] Many studies have shown that improper handling and disposal of hospital waste puts patients at risk for infections like hepatitis and HIV/AIDS as well as health workers who may be directly exposed to it. People, who live

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nearby, especially children and scavengers, may also be exposed to infectious wastes.[6,7]

For the hospitals to run well overall, hospital staff members' understanding of the BMW rules (2016) is crucial. Consequently, it is imperative that all medical facilities maintain their healthcare staff informed on the latest provisions of the BMWM and Handling (BMWM&H) guidelines of 2016. If this information is not known, the entire health system could be held accountable for the consequences of the subpar BMW disposal. BMW management will be enhanced by making arrangements for the providers to be informed about the various rules of the BMWM and Handling regulations.[8]

The present study has been conducted to assess the role of training in the awareness of BMWM among Health Care Wokers in Lucknow, Uttar Pradesh, India.

MATERIALS AND METHODS

Study design: Cross-sectional study.
Study settings: The study was conducted in Lucknow district of Uttar Pradesh. Lucknow is the capital of Uttar Pradesh and is situated 123 m above sea level. It is situated between 26.30 and 27.10 North Latitude and 80.10 and 80.30 East Longitude. As per 2011 census, Lucknow has a population of 4,588,455, out of which 33.79 % population lives in rural areas of villages.[9]
Study period: The study was conducted from January 2023 to July 2023.
Study population: All the healthcare workers working in the four Community Health Centres (CHC) in Lucknow district.
Methodology: There are total 9 Community Health Centres in Lucknow.9 Multistage sampling was done to select healthcare workers. In the first stage, four CHCs were selected randomly namely Chinhat, Bakshi ka Talab, Kakori, and Sarojini Nagar. In the second stage, all the health staff employed in these CHCs were included as participants after obtaining informed consent. All the healthcare workers were previously assigned to attend mandatory training sessions on BMWM organized by the nodal officer appointed by State Health Department. The HCWs who did not attend training due to absenteeism or being busy with some other hospital work during the training sessions were also included in the study.

A pre-tested and pre-validated questionnaire was used for the survey. To evaluate the consistency in question interpretation, a pilot research involving 20 participants was conducted to examine the face validity of the questionnaire. The questionnaire was divided into two categories. The first category included questions on awareness related to biomedical waste management and the second category had questions related to practices regarding BMWM. The word respondent and study participant were used interchangeably.

Statistical analysis: Descriptive statistics of categorical variables was presented as percentages. The analysis was done using Statistical Package for the Social Sciences version 23(SPSS-23). The Chi-square test was used to find the presence of association and odds ratio was calculated to find the strength of the association. Two sided P value less than 0.05 was considered statistically significant.
Ethical approval: Ethical clearance was obtained from the institution before conducting the study. Informed consent was obtained from the participants.

RESULTS

[Table 1] shows the distribution of study participants according to their socio-demographic characteristics. Study participants were divided into four groups according to their age, maximum of the participants i.e. 41.25 percent belonged to the 33- 40 years of age group and the minimum i.e. 12.5 percent belonged to the age group of 49-56 years. The majority i.e. 88.75 percent of the study participants were Hindus, and 70 percent of the participants belonged to the reserved category. The majority i.e. 36.25 percent of the study participants were graduates and 11.25 percent were educated till high school. Almost half of the study participants had a monthly income of 1000-2900 and 23.75 percent of the study participants had a monthly income of more than or equal to 50000.

A total of 80 respondents participated in the present study. Among them, the majority i.e. 25 were health technicians and 17 were fourth class workers. There were 4 medical superintendents and 19 medical officers who participated in the present study.

[Table 2] shows the association of the awareness of study participants regarding BMWM with their training status. Among a total of 80 respondents who participated in the study, 25(31.25%) were trained for bio-medical waste management and the rest 55(68.75%) were not trained. Among 25 study participants who were trained, 23(92%) knew about categories of BMWM and 30(54.54%) non-trained participants didn't know about the categories. There was 9.5 times more awareness about the categories for BMWM among the trained participants as compared to non-trained participants and the difference was found to be statistically significant. There were 20(80%) respondents among trained and 24(43.63%) non-trained knew about the process of segregation of BMW, there was 5.2 times more awareness among the trained about the same and the difference was found to be statistically significant. On interviewing about adopting a proper procedure for the collection of BMW, 22(88%) among trained and 35(63.63%) among non-trained participants knew about the same. There was 4.2 times more awareness about proper procedure for the collection of BMW among trained participants than in non-trained participants and the difference was found to

be statistically significant between the two groups. All the 25(100%) trained participants knew that BMW is harmful to humans and environment and that BMW waste is to be stored as per the classification.

[Table 3] shows the association of study participants' practices in their hospital regarding BMWM with their training status. There were 19(76%) trained and 45(81.81%) non-trained respondents who were compliant with BMWM&H rules in their hospitals out of total 25 and 55 respondents respectively. According to 5 trained and 1 non-trained respondent, an incineration plant was installed in their hospital. There were 13.5 times more chances of having an incineration plant installed in their hospital among trained participants than in non-trained participants and the difference was found to be statistically significant. Out of total, 24(96%) trained and 28(50.90%) non-trained respondents were maintaining records related to BMW disposal and there were 23 times more chances of record maintenance practices among trained participants and the difference was found to be highly significant. There were 19(76%) respondents among trained and 8(14.54%) non-trained were practicing the treatment of biomedical waste before disposal. The chance of practicing the treatment of biomedical waste before disposal was almost 19 times higher among trained participants.

Table 1: Distribution of study participants according to socio-demographic characteristics

	Socio-Demographic Variables	Number (N=80)	Percentage
1.	Age (Years)		
	25-32	12	15.00
	33-40	33	41.25
	41-48	25	31.25
	49-56	10	12.50
2.	Religion		
	Hindu	71	88.75
	Muslim	09	11.25
3.	Social Class		
	Unreserved	24	30.00
	Reserved	56	70.00
4.	Education		
	Junior High School	08	10.00
	High School	09	11.25
	Intermediate	23	28.75
	Graduation	29	36.25
	Post-Graduation	11	13.75
5.	Monthly Income (Thousands)		
	10-29	39	48.75
	30-49	22	27.50
	≥ 50	19	23.75

Table 2: Association of study participants' awareness regarding BMWM with training status.

S.N	Awareness regarding BMWM	Training received(%)(n=25)	Training not received (%) (n=55)	Total(%)	OR(CI)	P value
1.	Categories of BMW	23(92%)	30(54.54%)	53(66.25%)	9.58(2.256-39.785)	0.002
2.	Importance of adopting proper procedures for BMWM	21(84%)	51(92.72%)	72(90%)	0.412(0.102-1.655)	0.421
3.	Segregation after the collection of BMW.	20(80%)	24(43.63%)	44(55%)	5.167(1.738-15.202)	0.002
4.	Collection of BMW	22(88%)	35(63.63%)	57(71.25%)	4.19(1.176-14.669)	0.049
5.	Storage of BMW	25(100%)	54(98.18%)	79(98.75%)	-	-
6.	Disposal of BMW is different from domestic waste	19 (76%)	50 (90.90%)	69 (86.25%)	0.317 (0.091-1.103)	0.073
7.	Harmful effects of BMW	25(100%)	54(98.18%)	79(98.75%)	-	-
8.	Legal provisions for BMWM	22(88%)	46(83.63%)	68(85%)	1.435(0.376-5.367)	0.866

Table 3: Association of study participants' practices in their hospital regarding BMWM with training status.

S.N	Practices regarding BMW	Training received (n= 25)	Training not received (n=55)	Total (n=80)	OR (CI)	P value
1.	Compliance with BMWM&H in their hospitals	19 (76%)	45 (81.81%)	64 (80%)	0.704 (0.230-2.134)	0.546
2.	Installation of incineration plant in their hospitals	05 (20%)	1 (1.82%)	06 (7.5%)	13.5 (1.920-91.406)	0.016
3.	Maintaining records related to BMW disposal	24 (96%)	28 (50.90%)	52 (65%)	23.143 (3.663-141.931)	0.000
4.	Treatment of BMW before disposal	19 (76%)	8 (14.54%)	27 (33.75%)	18.604 (5.795-59.685)	0.000
5.	Proper procedure for the BMWM	18	32	50	1.848	0.237

No.	Parameter				
		(72%)	(58.18%)	(62.5%)	(0.675-5.024)	
6.	Proper storage & transportation of BMW	18 (72%)	43 (78.18%)	61 (76.25%)	0.718 (0.248-2.059)	0.547
7.	Proper treatment & disposal of BMW	19 (76%)	32 (58.18%)	51 (63.75%)	2.276 (0.803-6.394)	0.124

DISCUSSION

Health professionals' training on BMWM are quite important while managing and controlling BMWs. In the present study, 31.25% of the healthcare workers had received training and 68.75% had not received any training. Another study showed that of 273 study participants, majority (54%) of them have not received any training pertaining to BMW.[10]

Singh et at in their study showed a significant difference in knowledge before and after the training was received amongst the health care workers.[11] Results similar to present study was also found by Shivashankarappa et al in which training was shown to have a positive impact on the knowledge and awareness of BMWM.[12] Adequate training is a fundamental and essential requirement for the proper segregation and handling of BMW.[13]

Sarota et al emphasized on the role of training in BMWM and showed that, of the total 171 subjects, following training, there was a statistically significant rise in knowledge regarding the origin of biomedical waste in the hospital setup (P<0.001). With training, the respondents' recognition of various biowaste categories also significantly increased (P<0.001). The training sessions led to a considerable increase in awareness regarding the proper disposal of biological waste in color-coded containers (P<0.001). The knowledge of how to dispose off biological waste increased significantly after training (P<0.001).[14]

Krishnan KU et al in a study conducted among healthcare workers found that awareness on all parameters was significantly better after training for all the participants (P= 0.001).[15] In terms of the handling and disposal of medical waste, Verma et al revealed improvements in practices following service provider training.[16] The present study has also shown statistically significant differences in many parameters of awareness and practices among trained in comparison to non- trained healthcare workers.

CONCLUSION

Despite progress in certain areas, there remains a significant gap between existing practices and the requisite standards for effective biomedical waste management. This deficiency poses severe risks to public health, environmental integrity, and the overall well-being of communities.

Healthcare facilities must prioritize staff training and awareness programs to instill best practices for waste segregation, handling, and disposal. Ultimately, achieving optimal biomedical waste management requires collective commitment, concerted efforts, and sustained engagement from all stakeholders. As we acknowledge the progress made thus far, we must remain vigilant and proactive in pursuing safer and more sustainable practices. Only through continuous improvement and unwavering dedication we can bridge the gap and pave the way towards a healthier and cleaner future for generations to come.

Limitations of the study

The sample size is small and thus it is not a clear representation of all HCWs of Lucknow. The quality assurance of training could not be commented upon.

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International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN (O): 2687-5365; ISSN (P): 2753-6556

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International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN (O): 2687-5365; ISSN (P): 2753-6556