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ASSESSMENT OF KNOWLEDGE AND PRACTICE ABOUT BIOMEDICAL WASTE MANAGEMENT AND ASSOCIATED FACTORS AMONG HEALTH CARE PERSONNEL IN A PUBLIC HOSPITAL OF RAJASTHAN

Community Medicine

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ABSTRACT

Background: For proper disposal of biomedical waste, introduction of laws is only not sufficient but awareness among health care personnel and effective enforcement of existing BMW guidelines have primary importance. Lack of knowledge and practice on Bio-medical Waste Management has led to the hospitals becoming hub for spreading illness.

Objective: To assess knowledge and practice about biomedical waste management and associated factors among health care personnel in public hospital.

Material & Method: A hospital based cross sectional study was conducted in the January to March, 2019. Study participants included doctors, nurses, laboratory technicians and ward boys working in a public hospital who deal with biomedical waste and were selected randomly to make the sample size of 150. A pretested semi-structured questionnaire was used.

Result: Out of 150 participants, 75.3% and 54.7% Health Care Personnel have adequate knowledge and practice score respectively. Adequate knowledge was significantly associated with age, occupation, experience and previous training while adequate practice was significant associated with occupation and adequate knowledge.

Conclusion: Study highlighted the need of a comprehensive training for all the categories of health care personnel.

KEYWORDS

Biomedical Waste, Health Care personnel, Knowledge, Practice.

INTRODUCTION-

Over the years there have been tremendous advancements in Health care system. However it is ironic that health care settings which restore and maintain community health are also threatening their well-being as of poor waste management practices which spread infection in the environment and make the people ill.**[1]** The term "Bio-Medical Waste" has been defines as "any solid, fluid or liquid waste including the containers and any intermediate product, which is generated during the diagnosis, treatment, research activities or immunization of human beings or animal. It includes human tissues, body fluids, excreta, unused drugs, swabs, disposable syringes and sticky bandages etc." The doctors, nurses, technicians, sweepers, hospital visitors, patients, rag pickers and their relatives are exposed routinely to Bio- Medical Waste and are at more risk from the many fatal infections due to indiscriminate management.**[2]**

Taking cognizance of inappropriate BMW management, Ministry of Environment and Forests notified the 'BMW (management and handling) Rules, 1998' in July 1998. BMW Management Rules have thereafter undergone timely revisions to meet the prevailing needs. Till date, four amendments have been made in 2000, 2003 and 2011 with these latest guidelines coming into force from 28th March 2016. These rules are meant to improve the overall waste management of health care facilities in India.**[3,4]** However, the introduction of laws is not sufficient for proper disposal of 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**.[5]**

Nearly 3.2 million tons of medical waste is generated by hospitals alone each year. EPA estimates that 10 to 15 percent of all medical waste is potentially hazardous**.[6]**

Indiscriminate disposal of BMW and exposure to such waste poses a serious threat to the environment and to human health. BM waste requires specific treatment and management prior to its final disposal.**[7]** The absence of proper waste management, lack of awareness about the health hazards from BM waste, insufficient financial and human resources, and poor control of waste disposal are the most critical problems connected with health care waste**.[8]**

Although there is increased global awareness among health care professionals about hazards and also appropriate management techniques, the level of knowledge and practices in India has been found to be unsatisfactory.**[9-11]**

Therefore this study is planned to assess the knowledge and practice of biomedical waste management & associated factors among healthcare personnel in a public hospital.

MATERIAL AND METHOD-

This cross-sectional study was done at Mahatma Gandhi Government Hospital, Bhilwara, Rajasthan from January 2019 to March 2019. This study was carried out in 150 health care personnel including doctors, nurses, laboratory technician and ward boy. Study participants who were available during the data collection period and willing to take part in the study were included. A predesigned and pretested, self-administered questionnaire were used to collect the data. This questionnaire consisted of sociodemographic information and 21 questions. All questions of the questionnaire were close-ended. Knowledge Domain is consisted of 14 multiple-choice questions. Knowledge questions were scored either "1" or "0 for the correct and incorrect response, respectively. The total knowledge score for each study participant was computed, and the possible score could range from 0 to 14. Then, the overall knowledge score was computed by summation of total knowledge scores of all study participants. Finally, the mean score was calculated by dividing the overall knowledge score by the number of study participants. Knowledge scores below and above or equal to the mean score were assigned for inadequate and adequate knowledge, respectively. Practice domain is consisted of 7 multiple-choice questions. To obtain mean score of practice domain, calculation was done same as knowledge domain. Practice scores below and above or equal to the mean score were assigned for inadequate and adequate practice, respectively. Before administering the questionnaire the purpose of the study was explained. Informed consent was obtained from subjects. Anonymity of the participants was maintained. This study was approved by the ethical committee of the institution. The data was entered in excel sheet and analyzed. Appropriate statistical tests were used to found statistical significance.

RESULTS-

Analysis of data showed that out of 150 study participants, 35.33% were males & 64.67% were females. 41.33% of study participants belonged to >35 years of age group. (**Table: 1**)

Table 1: Sociodemographic Details of Study Participants (N=150)

Sociodemographic Variable	Variable Category	Number (%)
1. Age	≤25 years	12 (8%)
	26–30 years	33 (22%)
	31–35 years	43 (28.67%)
	>35 years	62 (41.33%)

2. Sex	Male	53 (35.33%
	Female	97 (64.67%)
3. Occupation	Doctor	30 (20%)
	Nurses	72 (48%)
	Laboratory technician	25 (16.67%)
	Ward boy	23 (15.33%)
4. Work Experience	< 5 Years	27 (18%)
	5-10 Years	57 (38%)
	>10 Years	66 (44%)
5. Previous Training	Yes	78 (52%)
	No	72 (48%)

Knowledge of Study Participants- In this study, Health Care Personnel with adequate knowledge score were 113 (75.33%). Regarding knowledge on segregation of BMWs, 84 (56%), 98 (65.33%), 91 (60.67%) and 106 (70.67%) of the study participants were aware that human anatomical waste, sharp wastes, recyclable waste and general waste should be placed in yellow bag, white puncture proof container, red bag and black bag respectively. (Table:2)

Practice of Study Participants-In present study, 82 (54.67%) of the study participants obtain adequate practice score. 80 (53.33%) and 54 (36%) of the study participants have practice of using personal protective equipment and hand washing respectively while they were handling BMWs. 72 (48%) of participants follow color coding segregation of biomedical waste. Only 30.67% of HCPs were report injury while 56.67% of HCPs were received tetanus toxoid and hepatitis B Vaccines. (Table:3)

Table 2- Frequency of study participants for knowledge question

Knowledge Questions	Job Category				Total (N=150)
	Doctor (n=30)	Nurses (n=72)	LT (n=25)	Ward boy (n=23)	
Do you know about BMWM?	30 (25.9%)	62 (53.4%)	17 (14.6%)	7 (6.1%)	116 (77.3%)
Is there any health hazard associated with biomedical waste?	30 (21.5%)	69 (49.5%)	23 (16.8%)	17 (12.2%)	139 (92.7%)
Is there any existence of rules for Bio Medical Waste Management?	27 (27.5%)	53 (54.1%)	14 (14.3%)	4 (4.1%)	98 (65.3%)
Should BMW not be stored beyond…hrs?	12 (46.1%)	10 (38.5%)	4 (15.4%)	0 (0%)	26 (17.3%)
Is Color coding available for segregation of ?BMW	30 (24.6%)	65 (53.3%)	20 (16.4%)	7 (5.7%)	122 (81.3%)
Disposal of Anatomical waste (Human tissue, organs & body parts) into which color bag?	21 (25%)	47 (55.9%)	13 (15.6%)	3 (2.5%)	84 (56%)
Sharp objects have to be disposed of in which color bag?	25 (25.5%)	53 (54.1%)	15 (15.3%)	5 (5.1%)	98 (65.3%)
Recyclable objects (IV sets, catheters, gloves) have to be discarded in which colour of bag?	25 (27.4%)	50 (54.9%)	13 (14.3%)	3 (3.3%)	91 (60.7%)
General Waste has to be disposed in which color of bag?	27 (26.2%)	55 (51.8%)	17 (16.5%)	7 (6.6%)	106 (70.7%)
Should Infectious waste be sterilized before disposal?	25 (30.1%)	45 (54.2%)	10 (12.0%)	3 (3.7%)	83 (55.3%)
Does wearing PPE reduce the risk of infection?	30 (21.9%)	69 (50.4%)	23 (16.8%)	15(10.9%)	137 (91.3%)
Is vaccination of Hep B and TT necessary before handling BMW?	27 (27.8%)	50 (51.5%)	15 (15.5%)	5 (5.1%)	97 (64.7%)
Identify biohazard symbol?	25 (25.2%)	54 (54.5%)	13 (13.1%)	7(7.2%)	99 (66%)
Should infectious waste containers be labeled with a biohazard symbol?	24 (25%)	55 (57.3%)	13 (13.5%)	4 (4.2%)	96 (64%)

* n (%) is the proportion of study participants who correctly answered each knowledge question.

Table 3- Frequency of study participants among each practice item question

Practice Questions	Job Category				Total (N=150)
	Doctor	Nurses	LT	Ward boy	
Are you using PPE while handling Biomedical waste?	27 (33.7%)	40 (50%)	8 (10%)	5 (6.3%)	80 (53.3%)
Are you practicing hand hygiene in before and after every activity?	15 (27.7%)	32 (59.2%)	5 (9.2%)	2 (3.8%)	54 (36%)
Are you using sharps destructor/sharp destroyer?	25 (27.7%)	45 (48.9%)	15 (16.3%)	7 (7.6%)	92 (61.3%)
Are you not recapping used needles?	27 (23.4%)	55 (47.8%)	21 (18.3%)	12 (10.5%)	115 (76.6%)
Are you practicing the segregation of BMW according to color coding.	18 (25%)	35 (48.6%)	12 (16.6%)	7 (9.7%)	72 (48%)
Are you report your injury?	12 (26.1%)	25 (54.3%)	7 (15.2%)	2 (4.4%)	46 (30.7%)
Are you received Tetanus toxoid and Hepatitis B Vaccines	25 (29.4%)	45 (52.9%)	10 (11.7%)	5 (5.9%)	85 (56.7%)

*n (%) is the proportion of study participants who correctly doing practice.

Table:4 Association of Knowledge of biomedical waste management with different socio-demographic variables

Sociodemographic Variable	Variable Category	Knowledge		Total (N=150)	Statistic
		AK (n=113)	IK (n=37)		
1. Age	≤25 years	7 (58.3%)	5 (41.7%)	12 (100%)	$\chi2$=13.544, df=3, P-Value= 0.005
	26–30 years	19 (57.6%)	14 (42.7%)	33 (100%)	
	31–35 years	34 (79.1%)	9 (20.9%)	43 (100%)	
	>35 years	53 (85.5%)	7 (14.5%)	62 (100%)	
2. Sex	Male	42 (79.2%)	11 (20.8%)	53 (100%)	$\chi2$=0.389, df=1, P-Value= 0.533
	Female	71 (73.2%)	26 (26.8%)	97 (100%)	
3. Occupation	Doctor	27 (90%)	3 (10%)	30 (100%)	$\chi2$=10.161, df=3, P-Value= 0.022
	Nurses	55 (76.4%)	17 (23.6%)	72 (100%)	
	Laboratory technician	19 (76%)	6 (24%)	25 (100%)	
	Ward boy & Class IV	12 (52.2%)	11 (47.8%)	23 (100%)	
4. Work Experience	< 5 Years	15 (55.5%)	12 (44.5%)	27 (100%)	$\chi2$=8.983, df=2, P-Value= 0.011
	5-10 Years	42 (73.7%)	15 (26.3%)	57 (100%)	
	>10 Years	56 (84.8%)	10 (15.2%)	66 (100%)	
5. Previous Training	Yes	71 (83.5%)	14 (16.5%)	85 (100%)	$\chi2$=6.110, df=1, P-Value= 0.013
	No	42 (64.6%)	23 (35.4%)	65 (100%)	
6. Practice Score	Adequate	74 (90.2%)	8 (9.8%)	82 (100%)	$\chi2$=19.908, df=1, P-Value= 0.000
	Inadequate	39 (57.3%)	29 (42.7%)	68 (100%)	

Table:5 Association of biomedical waste management practice with different socio-demographic variables

Sociodemographic Variable	Variable Category	Practice		Total (N=150)	Statistic
		AP(n=82)	IP (n=68)		
1.Age	≤25 years	5 (41.7%)	7 (58.3%)	12 (100%)	$\chi2$=2.786, df=3, P-Value= 0.579
	26–30 years	15 (45.5%)	18 (54.5%)	33 (100%)	
	31–35 years	25 (58.1%)	18 (41.9%)	43 (100%)	
	>35 years	37 (59.7%)	25 (40.3%)	62 (100%)	
2.Sex	Male	30 (56.6%)	23 (43.4%)	53 (100%)	$\chi2$=0.033, df=1, P-Value= 0.857
	Female	52 (53.6%)	45 (46.4%)	97 (100%)	
3.Occupaton	Doctor	22 (73.3%)	8 (26.7%)	30 (100%)	$\chi2$=14.743, df=3, P-Value= 0.003
	Nurses	42 (58.3%)	30 (41.7%)	72 (100%)	
	Laboratory technician	13 (52%)	12 (48%)	25 (100%)	
	Ward boy	5 (21.7%)	18 (78.3%)	23 (100%)	
4.Work Experience	< 5 Years	12 (44.4%)	15 (55.6%)	27 (100%)	$\chi2$=1.414, df=2, P-Value= 0.493
	5-10 Years	32 (56.1%)	25 (43.9%)	57 (100%)	
	>10 Years	38 (57.6%)	28 (42.4%)	66 (100%)	
5.Previous Training	Yes	52 (61.2%)	33 (38.8%)	85 (100%)	$\chi2$=2.775, df=1, P-Value= 0.096
	No	30 (46.2%)	35 (53.8%)	65 (100%)	
6.Knowledge Score	Adequate	74 (65.5%)	39 (34.5%)	113(100%)	$\chi2$=19.908, df=1, P-Value= 0.000
	Inadequate	8 (21.6%)	29 (78.4%)	37 (100%)	

Present study showed that adequate knowledge was increased with increasing age (more in >35 years age group) & experience (more in >10yrs experience), male gender, doctors occupation and previous trained study participants. Out of these factors, age group, occupation, experience and previous training were found statistically significant.
In relation to practice present study revealed that adequate practice was increased with increasing age (more in >35 years age group) & experience (more in >10yrs experience), male gender, doctors occupation, previous trained and adequately knowledge study participant but statistically significant association was found with occupation and knowledge

DISCUSSION-

The major sources of BMW generation are govt. hospitals and private hospitals, primary health centres, medical colleges and veterinary colleges and animal research centres.[**12]**

Adequate knowledge is vital for appropriate BMWM practice. The present study concluded that 75.33% of the study participants had adequate knowledge score but only 54.67 % of subjects had adequate practice score. This result showed that there is a large gap between knowledge and practice regarding BMW management. Reasons for this may be workload, ignorance, non-availability of all colour bins, no strict actions against those who do not follow the rules. A study by Rafiq MM et al showed that among nursing staff overall knowledge regarding BMW was 80% but only 70% practiced better waste handling similar to this study**.[13]** Study conducted in Sri Lanka which showed that 45% and 74.8% of study participants had adequate knowledge and adequate practice score respectively which are incongruent to present study**.[14]** Other study conducted in Ethiopia showed that only 31.5% subjects had adequate practice score. **[15]**

Present study showed that adequate knowledge and adequate practice of study participants was increased with increasing age and experience, male gender, doctor's occupation and previous training. This may be due to that by increasing age and experience increases commitment and responsibility leading to better practices. As training is also increase knowledge leading to better practices. Study conducted by Nanjaiah in Mysore also found similar result in relation to age and experience**.[16]**

Present study revealed that knowledge and practice were least in ward boys among all health care personnel regarding handling of biomedical waste. Similar result found by Malini et al**.[17]** and by Bansal M et.al**.[18]** Among practices present study showed that only 61.33% and 53.33% are using sharp destructor for needles and personal protective measures at their work place which is lesser than study conducted by indupalli AS et al in Khaja Banda Nawaz Institute of Medical Sciences, Hospital Kalburgi**.[19]**

Conclusion and Recommendation: Lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal. Only the introduction of laws is insufficient for proper disposal of BM waste. So study recommended that biomedical waste management rules should be strictly implemented. Health-care waste workers should be trained before starting work handling waste, and then on a routine basis to update their knowledge on BMW management. Training should include awareness rising about the potential hazards from waste, the purpose of immunization, safe waste-handling procedures, reporting of exposures and injuries, preventing infection following an exposure with PEP, and the use of PPE. The need for more research and accurate data to provide an evidence-base for future decision-making is highlighted.

Conflict of Interest: Nil

REFERENCES-

1. Joseph J. and Krishnan, A. Hospital waste management in the union territory of Pondicherry – An exploration 2004.
2. Yadav M. Hospital waste - a major problem; Ind. J of Comm. Med. 2001;8(4):277.
3. Ministry of Environment and Forests, Notification N. S.O.630 (E). Biomedical Waste (Management and Handling) Rules, 1998. The Gazette of India, Extraordinary, Part II, Section 3(ii), Dated 27th July, 1998. p. 10-20, 460.
4. Ministry of Environment, Forest and Climate Change, Notification. The Gazette of India, Extraordinary, Part II, Section 3(I). Available from: http://www.iwma.in/BMW%20Rules,%202016.pdf. [Last accessed on 2016 Mar 28].
5. Summers J. Asset disposal: Follow company policies or follow the law? Journal of Healthcare Materiel Management. 1991; 9: 54-56.
6. EPA Tracking Program for Medical Waste Starts Today. EPA press release - March 13, 1989.
7. Palwankar PV. Singh A. Safety and measures for auxiliary staff associated with hospital waste disposal. Ind. J. of Dent. Sci. 2012; 4: 104-106.
8. World Health Organization (WHO). Safe Management of Bio-Medical Sharps Waste in India: A Report on Alternative Treatment and Non-Burn Disposal Practices. New Delhi: WHO Regional Office for South-East Asia; 2005.
9. Pandit NB. Mehta HK. Kartha GP. Choudhary SK. Management of bio-medical waste; Awareness and practices in a district of Gujarat. Ind. J. of Pub. Health. 2005; 49: 245-247.
10. Rao PH. Report: Hospital waste management-awareness and practices: A study of three states in India. Waste Manage and Res. 2008; 26: 297-303.
11. Kishore J. Goel P. Sagar B. Joshi TK. Awareness about biomedical waste management and infection control among dentists of a teaching hospital in New Delhi. Ind. J. of Dental Res. 2000; 11: 157-161.
12. Mathur P, Patan S, Shobhawat AS. Need of biomedical waste management system in hospitals - An emerging issue - A review. Curr. World Environ 2012; 7(1): 117-24.
13. Rafiq MM et al. Knowledge, attitude and Practices about Biomedical Waste management among Nursing Professionals of SKIMS Medical College Hospital Bemina-A Cross Sectional study.IOSR Journal of Nursing and Health Science. Volume 1, Issue 5 (Jul – Aug 2013), PP 47-48
14. M. A. Samarakoon and N. S. Gunawardena, "An evaluation of healthcare waste management in base hospitals of Colombo district," Journal of the College of Community Physicians of Sri Lanka, vol. 16, no. 2, pp. 15–20, 2011
15. M. Azage, G. Haimanot, and M. Mesafint, "Healthcare waste management practices among healthcare workers in healthcare facilities of Gondar town, northwest Ethiopia," Health Science Journal, vol. 7, pp. 15–26, 2013
16. Nanjaiah R, Lakshmana KM, Suresha. Gap between Knowledge and Practice in Bio-Medical Waste Management in a Tertiary Care Centre. Natl J Community Med 2017; 8(7):401-405
17. Malini A. Eshwar B. Knowledge, Attitude and Practice of Bio-medical waste management among health care personnel in a tertiary care hospital in Puducherry. Inter. J. of Bio-medical Res. 2015; 6(03): 172-176
18. Bansal M, Mishra A, Gautam P, Changulani R, Srivastava D, Gour N. Biomedical waste management: awareness and practices in a district of Madhya Pradesh. Natl J Commun Med. 2011;2(3):452–6.
19. Indupalli AS, Motakpalli K, Giri PA, Bendigiri NA. Knowledge, Attitude & Practices regarding Biomedical Waste Management amongst Nursing Staff of Khaja Banda Nawaz Institute of Medical Sciences, Kalburgi, Karnataka. Ntl J of Community Med 2015; 6(4):562- 565