A STUDY OF KNOWLEDGE, ATTITUDE, AND PRACTICES REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG THE HEALTH CARE WORKERS AT A TERTIARY CARE TEACHING HOSPITAL OF WESTERN UTTAR PRADESH

Dr. Abhishek Mehta

MD (Microbiology), Associate Professor, Govt. Medical College, Datia (MP)

Article Info: Received 22 November 2019; Accepted 17 December 2019

DOI: <https://doi.org/10.32553/ijmbs.v3i12.786>

Corresponding author: Dr. Abhishek Mehta

Conflict of interest: No conflict of interest.

Place of study: KD Medical College, Hospital & Research Center, Mathura(UP).

Abstract

Background: The hazardous impact of biomedical waste on the community and environment is enhanced manifold if it is not managed effectively. Appropriate knowledge and awareness amongst the health care workers about the biomedical waste management, will help in minimizing health care associated infections.

Purpose: There are no such studies in this part of the country to identify the gaps / lacunae in knowledge, attitude & practices amongst health care workers, so that timely corrective measures could be instituted in the form of educational interventions.

Material & Methods: This Questionnaire based descriptive study was undertaken at a tertiary care teaching hospital of western Uttar Pradesh in March 2018 after obtaining clearance from Institutional ethics committee. A total of 85 subjects (30 Doctors, 30 Nurses, 25 Laboratory technicians) were administered pre structured pre-validated anonymous questionnaire. Mean scores of the Knowledge, Attitudes and practices of the three groups were compared by Anova test and the comparison between any two study groups done using unpaired t test and the significance level was set to 0.05.

Results: While comparing Knowledge, attitude and practices between Doctors & Nurses, though doctors scored higher in all 3 sections but the difference was statistically significant only in the Knowledge and Practice levels. While comparing KAP scores between Nurses & Lab.technicians, though nurses scored higher but a statistically significant difference was seen in the attitude levels only. There was a statistically significant difference in the scores of Doctors, Nurses & Lab. Technicians in all the three sections

Conclusion: Such studies help in detecting the gaps & lacunae in knowledge, attitude & practices amongst different categories of health care providers which could be addressed through targeted educational interventions at regular intervals. This would help in reducing the incidence of health hazards due to improper BMW management.

Keywords: Knowledge, Attitude, Practices, Doctors, Nurses, Laboratory technicians, Questionnaire, Biomedical waste management.

Introduction

As per Bio-Medical Waste (Management and Handling) Rules, 1998 "Bio-medical waste" (BMW) means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biologicals or in health camps^[1].

Existing data derived from a number of studies suggest that 85% of the waste generated in the hospitals is non-hazardous, 25% is hazardous out of which only 10% is infectious which is a potential health hazard to the health care workers and to the environment & the community at large. As per the

record about 0.33 million tons of hospital waste is generated in India and this waste is being generated at the rate ranging from 0.5 to 2 kg/bed/day. The hazardous impact of this waste on the community and environment is enhanced manifold if it is not managed effectively. Effective biomedical waste management is not only a legal necessity but also a social, professional and moral responsibility^[2,3].

Appropriate knowledge and awareness amongst the health care workers about the biomedical waste management, and proper understanding of the concepts of waste segregation and disposal will help in minimizing health care associated infections.

In the current global scenario, there is an increasing awareness amongst health care professionals about BMW management but on the contrary a number of studies from various parts of India are pointing towards significant gaps in knowledge and serious lacunae in attitudes and practices being still prevalent amongst different categories of health care providers which is a matter of grave concern^[3,4].

There are no such studies in this part of the country and this is need of the hour to explore gaps/lacunae in knowledge, attitude & practices amongst health care workers, so that timely corrective measures could be instituted in the form of educational interventions/training modules. With this background this Questionnaire based study was undertaken at a rural tertiary care teaching hospital of western Uttarpradesh with the main objective of assessing knowledge, attitude, and practices of health care workers regarding biomedical waste management.

Materials and Method^[5,6,7,8,9].

This Questionnaire based descriptive study was undertaken at a tertiary care teaching hospital of western Uttarpradesh in March 2018 on 85 Health care workers (HCW) after obtaining clearance from Institutional ethics committee. The purpose and nature of the study was explained to the study participants and only those who volunteered to participate were included in the study, after obtaining informed consent.

A total of 85 subjects (30 Doctors, 30 Nurses, 25 Laboratory technicians) participated in the study. A self administered pre structured pre-validated anonymous questionnaire was administered to each participant. Questionnaire was designed on the basis of relevant literature after extensive literature review and discussion with the subject experts. Questions were checked for their relevance, rationality, clarity and understandability before their final use in the survey.

Questionnaires does'nt reveal any personal identification details of participants and confidentiality was maintained throughout. Questionnaire consisted of a total 30 questions to be answered in 40minutes and divided in four parts:

- 1) Socio-demographic information (4 questions)
- 2) Assessment of Knowledge (10 questions)
- 3) Assessment of Attitudes/Perceptions (10 questions)

4) Assessment of Practices (6 questions)

Knowledge was assessed using 10 questions which included MCQs (Multiple Choice questions).

Attitude was assessed on the basis of 10 questions where the subjects have the choice to opine on a 1 to 5 point Likert scale ranging from Strongly Agree to Strongly Disagree.

Practices were assessed on the basis of 5 questions on a 1 to 5 point Likert scale ranging from Never to Always.

Assessment of Knowledge, attitudes and practices was done on the basis of a scoring system where 1 point was given for each correct response to Knowledge, positive attitude and appropriate practices wherein 0 was given for incorrect knowledge, negative attitude and puny practices. So, the range of KAP score was from 0-25.

Tabulation and compilation of data was done using Microsoft office Excel 2010 software. Appropriate statistical tools were used as per requirement. Pearson's Chi-square test was used to compare the percentages for each of the appropriate responses between the three study groups. p-value of 0.05 was considered as statistically significant.

Mean scores of the Knowledge, Attitudes and practices of the three groups were compared by Anova test and the comparison between any two study groups (Doctors Vs Nurses, Doctors Vs Lab. technicians and Nurses Vs Lab. Technicians) done using paired t test and the significance level was set to 0.05.

Results:

The mean age of the participants was 35.4yrs for doctors, 26.5 yrs. for nurses and 25.8 yrs. for Laboratory technicians. Out of 85 participants, 45 (53%) were males and 40 (47%) females. Majority of doctors (70%) had received training in Biomedical waste management followed by Nurses (40%) and Lab.technicians (32%).

Out of the 10 questions asked in Knowledge section, there was a statistically significant difference in the correct responses by the three groups for the questions pertaining to Definition, Categories, Storage, BMW Rules and Universal precautions while handling BMW.

Most of the participants were able to identify international biohazard sign and knew the hazards

associated with biomedical waste. Most of the doctors knew the correct definition of biomedical waste and were aware of Universal precautions to be followed while handling biomedical waste. Awareness level regarding biomedical waste rules was very low amongst participants with only 13% of participants able to answer correctly. Most of the participants were not able to answer the questions pertaining to biomedical waste management, Storage and treatment prior to disposal (Table-1)

Most of the participants while responding to the questions in Attitude section exhibited positive attitude except for the few questions. Statistically significant difference in the responses from the three groups was seen only in one item: "Proper Biomedical waste management is a major issue." In rest of the items the responses from the three groups followed similar pattern. Most of the participants esp. Paramedical staff admitted that they were lacking in the proper knowledge regarding biomedical waste management. Most of the participants from all three groups opined that biomedical waste management increases work burden on employees and financial burden on employers. While 60% of nurses felt that Safe Biomedical waste management is a team work and not the sole responsibility of hospital authority, 64% of lab technicians considered it to be the sole responsibility of the Hospital administration (Table-2).

Most of the participants from all three groups through their responses to the concerned items

admitted following universal precautions while dealing with BMW and following colour coding system for segregation of BMW at the point of generation. Most of the participants from all three groups admitted that they were not maintaining biomedical waste records properly. Regarding BMW treatment prior to disposal and ensuring proper storage facility, the practice levels was not found to be satisfactory amongst participants (Table-3).

While comparing Mean test scores of Doctors, Nurses & Lab. Technicians in all the three sections (Knowledge, attitude, Practice), statistically significant difference was seen in the scores in each section (Table-4).

While comparing Knowledge, attitude and practices between Doctors & Nurses, though doctors scored higher in all 3 sections but the difference was statistically significant only in the Knowledge and Practice levels but not in the attitude levels (Table-5).

Similar observations were recorded while comparing Knowledge, attitude & practices between Doctors & Lab. Technicians wherein doctors scored higher but the difference was statistically significant only in the Knowledge and practice levels but not in the attitude levels (Table-6).

While comparing KAP scores between Nurses & Lab.technicians, though nurses scored higher but a statistically significant difference was seen in the attitude levels only (Table-7).

Table 1: Knowledge of Health care workers regarding Biomedical Waste Management

S.No	Question/Item	Correct responses n (%)			
		Doctors (30)	Nurses (30)	Lab. tech. (25)	p-value
K1	Correct definition of BMW	28(93.33)	23(76.67)	16(64)	0.028*
K2	Different categories of BMW	18(60)	11(36.67)	17(68)	0.049*
K3	BMW Rules/regulations 2016	7 (23.33)	2(6.67)	2(8)	0.044*
K4	BMW Management system	7(23.33)	5(16.67)	5(20)	0.6
K5	Health hazards associated with BMW	29(96.67)	26(86.67)	22(88)	0.36
K6	Colour coding system of bags for BMW segregation	22(73.33)	19(63.3)	17(68)	0.71
K7	BMW treatment prior to disposal	13(43.33)	11(36.67)	6(24)	0.32
K8	Storage of BMW	17(56.67)	9(30)	6(24)	0.0253*
K9	International Biohazard sign	30(100)	25(83.3)	24(96)	NS
K10	Universal precautions while handling BMW	28(93.33)	22(73.3)	15(60)	0.013*

Significance calculated using Pearson's Chi-square test.

*p<0.05(Significant),

**p<0.001(Highly significant),

p>0.05(NS:Not significant)

Table 2: Attitude of Health care workers regarding Biomedical Waste Management

S.No	Question/Item	Positive Attitude n (%)			
		Doctors (30)	Nurses (30)	Lab. tech. (25)	p-value
A1	Biomedical waste management is compulsorily needed for health care delivery system	27 (90)	27(90)	20(80)	0.457
A2	Safe biomedical waste management is a team work not a hospital responsibility	14(46.67)	18(60)	09(36)	0.203
A3	BMW Management increases work burden for employees	10(33.33)	10(33.3)	04(16)	0.27
A4	BMW Management increases financial burden for employers	10(33.33)	11(36.67)	10(40)	0.877
A5	There should be strict implementation of Biomedical regulations	27 (90)	23(76.67)	18(72)	0.214
A6	Proper BMW Management is a major issue	24 (80)	20(66.67)	12(48)	0.044*
A7	Correct segregation of waste is of utmost importance for preventing infection transmission	22(73.33)	24(80)	15(60)	0.25
A8	Biomedical waste management must be incorporated in the course curriculum	24(80)	24(80)	17(68)	0.5
A9	I am having sufficient knowledge regarding BMW management	17(56.67)	12(40)	08(32)	0.1644
A10	Regular structured training sessions in BMW Management are necessary for HCWs.	25(83.33)	24(80)	17(68)	0.37

Significance calculated using Pearson's Chi-square test.

*p<0.05(Significant), **p<0.001(Highly significant), p>0.05(NS:Not significant)

Table 3: Practices of Health care workers regarding Biomedical Waste Management

S.No	Question/Item	Correct Practices n (%)			
		Doctors (30)	Nurses (30)	Lab. tech (25)	p-value
P1	Following Universal precautions while dealing with BMW	28(93.33)	24(80)	20(80)	0.264
P2	Following colour coding system for segregation of BMW at the point of generation	28(93.33)	23(76.67)	19(76)	0.146
P3	Following proper treatment/disinfection of BMW prior to disposal	16(53.33)	15(50)	15(60)	0.7
P4	Maintaining BMW Records properly	14(46.67)	08(26.67)	05(20)	0.3
P5	Ensuring the provision of proper storage facility for BMW	21(70)	16(53.33)	12(48)	0.52
P6	Ensuring that the BMW is being managed as per norms	19(63.33)	18(60)	14(56)	0.8

Significance calculated using Pearson's Chi-square test.

*p<0.05(Significant), **p<0.001(Highly significant), p>0.05(NS:Not significant)

Table 4: Comparison of Mean KAP Scores of Doctors, Nurses and Laboratory technicians

	Mean Scores $\pm$ SD			F-static	p-value
	Doctors(30)	Nurses(30)	Lab. technicians(25)		
Knowledge	6.6 $\pm$ 1.75	5.267 $\pm$ 1.98	5.16 $\pm$ 1.67	5.64	0.005*
Attitude	6.7 $\pm$ 2.184	6.43 $\pm$ 2.22	5.12 $\pm$ 2.22	3.89	0.024*
Practice	4.2 $\pm$ 1.3	3.467 $\pm$ 1.008	3.4 $\pm$ 1.12	4.31	0.0166*

Significance calculated using one way Anova test.

*p<0.05(Significant), **p<0.001(Highly significant), p>0.05(NS:Not significant)

Table 5: Comparison of Knowledge, Attitude & Practices between Doctors & Nurses

	Mean KAP scores $\pm$ SD		df	t-value	p-value
	Doctors	Nurses			
Knowledge	6.6 $\pm$ 1.75	5.267 $\pm$ 1.98	58	2.763	0.007
Attitude	6.7 $\pm$ 2.184	6.43 $\pm$ 2.22		0.475	0.6367
Practice	4.2 $\pm$ 1.3	3.467 $\pm$ 1.008		2.441	0.0177

Significance calculated using unpaired t-test.

*p<0.05(Significant), **p<0.001(Highly significant), p>0.05(NS: Not significant)

Table 6: Comparison of Knowledge, Attitude & Practices between Doctors & Lab. technicians

	Mean KAP scores $\pm$ SD		df	t-value	p-value
	Doctors(30)	Lab. tech.(25)			
Knowledge	6.6 $\pm$ 1.75	5.16 $\pm$ 1.67	53	2.763	0.007
Attitude	6.7 $\pm$ 2.184	5.12 $\pm$ 2.22		0.475	0.6367
Practice	4.2 $\pm$ 1.3	3.4 $\pm$ 1.12		2.441	0.0177

Significance calculated using unpaired t-test.

*p<0.05(Significant), **p<0.001(Highly significant), p>0.05(NS:Not significant)

Table 7: Comparison of Knowledge, Attitude & Practices between Nurses & Lab. technicians

	Mean KAP scores $\pm$ SD		df	t-value	p-value
	Nurses(30)	Lab.tech.(25)			
Knowledge	5.267 $\pm$ 1.98	5.16 $\pm$ 1.67	53	0.214	0.83
Attitude	6.43 $\pm$ 2.22	5.12 $\pm$ 2.22		2.18	0.0338
Practice	3.467 $\pm$ 1.008	3.4 $\pm$ 1.12		0.2334	0.8164

Significance calculated using unpaired t-test.

*p<0.05(Significant), **p<0.001(Highly significant), p>0.05(NS: Not significant)

Discussion:

In our setup, majority of doctors (70%) had received training in biomedical waste management followed by Nurses (40%) and Lab. technicians (32%).

The effect of training as well as the educational background of respondents, on the knowledge, attitude & practices regarding BMW management is clearly evident from our study.

The professionals with higher educational level have better in depth knowledge. This finding is in accordance with the studies conducted by Hakim S et al 2014, Yadavannavar M et al 2010, Saini et al 2005^[6,7,8].

The doctors had scored higher than nurses as well as lab. Technicians in all the three sections. This finding is in accordance with the studies conducted by Kumar R et al 2018, Galimany MJ et al 2015, Tenglikar PV et al 2012, Mathur V et al 2011, Kurray et al 2008, Deo D et al 2006, Saini et al 2005^[8,9,10,11,12,13,14].

So, the doctors can play a key role by motivating the paramedical staff to follow the optimal BMW management practices (Singh A et al 2013)^[15].

Mathew SS et al 2011 found that knowledge of the existence of biomedical waste management rules was better among doctors than paramedical staff, but that knowledge of the practical aspects of biomedical waste management was better among paramedical staff^[16].

In contrast to it in a study by Sehgal RK et al 2015 the doctors were least exposed to such training programmes though most of the HCWs attended training sessions on BMW management. But the effect of training was more so on the attitude levels of the respondents with the doctors scoring least^[17].

In a study by Sachan R et al 2012, doctors had exhibited higher attitude levels than paramedical staff regarding waste collection, segregation and disposal. In similar studies by Madhukumar S et al 2012 and Shafee M et al 2010, nurses exhibited

better attitude levels than lab.technicians.These findings are in accordance with our study^[18,19,20].

A targeted educational intervention not only imparts knowledge increases awareness and keeps them updated about Biomedical waste management but it would also translate in a behavioural change of attitudes and practices to the optimal levels (Suchitra et al 2007)^[21].

Assessing the factors affecting compliance to the safe practices provide a chance to address any gaps in knowledge and practices and help in formulating strategy and necessary interventions for minimizing the risk of health hazards like hospital acquired infections or other environmental problems due to improper waste management. HCW if poorly managed may pose risk to health care workers, waste handlers, patients, and the entire community.

Lalita et al. 2011 in her study has shown a need to improve the knowledge about waste management to protect the environment from the negative impact of waste and recommended a need based training program for students and professionals^[22].

In a study by Akulume M et al wherein Azjen's theory of planned behavior (TPB) was applied to prove how the perceived behavioural control through attitude can be translated into practices. Azjens theory is one of the most preferred model for explaining human behaviors but also helps in designing intervention strategies for bringing a change in attitude^[23].

A number of studies by Kumar R et al 2018,Tenglikar PV et al 2012, Deo D et al 2006, Saini et al 2005 have reported that the knowledge level of respondents was reflected in their attitudes^[8,9,11,14].

A positive correlation between knowledge and practice of the participants as observed in our study means that workers would be able to effectively follow the BMW Management guidelines in their practices if their knowledge level is optimal. This correlation between knowledge and practices regarding BMW management was also reported by Wai et al. 2005 & Grodzinska et al. 2002^[24,25].

Like other studies(Kumar R et al 2018, Galimany MJ et al 2015, Tenglikar PV et al 2012, Mathur V et al 2011),in our study the nurses, who take up most of the direct patient handling related tasks exhibited lower KAP levels as compared to doctors. It is a matter of concern as they are exposed to the contaminated tissues and items and could be a major

source of transmission of hospital-acquired infections^[8,9,10,11,12,13,14]..

In our study most of the participants esp. Paramedical staff admitted that they were lacking in the proper knowledge regarding biomedical waste management. Majority of respondents from all 3 groups opined that BMW management must be incorporated in the course curriculum and structured training sessions in BMW Management should be conducted regularly.

This stresses upon the need for framing written institutional guidelines and designing well structured training modules not only for medicos but also for paramedics who are the direct health care providers^[21].

One of the important limitations of this study is the practice assessment by using self administered questionnaires. Although self-reporting may be the simplest, easiest way and less time consuming but it always carries a risk of respondent bias who will try to report better practice than what is actually done.

Declared practices may or may not reflect actual practices - only direct observation can confirm improvement of actual practices. So, further studies are suggested involving Checklist based onsite assessment through direct observation to analyse the impact of educational interventions on the actual practices of the study subjects. Further small sample size in the study makes it difficult to generalize the findings.

Inspite of these limitations, this study is still a good starting point for more extensive research in near future with the broad aim of improving our health care delivery system.

Further studies on larger scale should be conducted to detect the gaps and lacunae in the Knowledge, attitude and practice levels and to find out the causative factors behind this and how these could be addressed for the overall improvement in BMW management practices.

So, it was suggested that intensive training sessions has to be conducted regularly for all health care providers including sanitary staff which will help in better retention of knowledge and instilling a positive attitude towards biomedical waste management by repetitive reinforcement. It would also translate in a behavioural change of attitudes and practices that

would help in reducing the incidence of health hazards due to improper BMW management.

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