



**ASSESSMENT OF KNOWLEDGE, ATTITUDE & PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT BEFORE AND AFTER TRAINING AMONGST DIFFERENT HEALTH CARE PERSONNEL: A CROSS SECTIONAL STUDY**

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**ARTICLE INFO**

**Article History:**

Received 4<sup>th</sup> November, 2019

Received in revised form 25<sup>th</sup> December, 2019

Accepted 23<sup>rd</sup> January, 2020

Published online 28<sup>th</sup> February, 2020

**Key words:**

Biomedical waste (BMW), Questionnaire, knowledge, attitude and practice.

**ABSTRACT**

**Introduction:** Biomedical waste management (BMW) has recently emerged as an issue of major concern not only to hospitals, primary health-care centers and nursing home authorities but also to the environment. Hence, there is a need for awareness among the healthcare staff for effective management of BMW.

**Aim:** So to find out magnitude of seriousness regarding knowledge, attitude and practice amongst healthcare workers in our institute, we had conducted KAP(Knowledge, Attitude & Practice) questionnaire study amongst them before and after giving training session.

**Material and method:** A self design questionnaire based on BMW rules was prepared and were distributed to all participants.

**Result:** Overall the analysis of the questionnaire indicated that theoretical knowledge has increased significantly in terms of answering all questions and obtaining more marks in the post training session.

**Conclusion:** Based on our study we highly recommended- Strict implementation of BMW rules & Regular training for all employees which will help to ensure patient safety and control the health care associated infections to a lower extent.

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**INTRODUCTION**

Biomedical waste (BMW) is waste generated during diagnosis, treatment or immunization of human beings or animals or research activities or in production or testing of biologicals. (4) Rules have been notified in 1998 and updated in March 2016. It is estimated that annually about 0.33 million tons of hospital waste is generated in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day. It is also estimated that, 10-25% of the healthcare waste generated is hazardous & causes serious health problems.(10) Waste segregation is the essence of waste management and should be done at the source of generation of biomedical waste into color coded bags or containers. This is possible, once health care workers possessed correct knowledge, positive attitude and safe practices on waste segregation. Therefore it is very important for health care workers to master these domains on waste

segregation so that they can be able to segregate infectious from non-infectious wastes. (5) Knowledge means awareness or understanding of a circumstance or fact, gained through association or experience. Attitude means a settled way of thinking or feeling about something. Practice means the actual application or use of an idea, belief or method as opposed to theories related to it. (18)

After amendment of Biomedical Waste Management Rules, every concerned health personnel is expected to have proper knowledge, practice and capacity to guide others for waste collection and management, and proper handling techniques. Although there is an increased global awareness among health professionals about the waste hazards and proper management techniques but the level of awareness in India is still found to be unsatisfactory. (21) The present study is done to assess the knowledge, attitude and practices of health care personnel regarding biomedical waste management.

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## Aims and Objectives

The aim of this study was to explore the knowledge, practice and attitude and also to evaluate the impact of training regarding the biomedical waste management among the healthcare personnel working in a tertiary care centre.

## Objectives

1. To assess the knowledge about biomedical waste management among the study participants
2. To survey the attitude towards biomedical waste and its management among the study participants.
3. To identify the gaps in the practice of effective BMW management by the healthcare workers.
4. To analyze the improvement in knowledge, attitude and practice among participant after training and to put into practice essential protocols for training of HCWs in the field of BMW management.

## MATERIAL AND METHOD

The study was conducted in the department of microbiology at tertiary health care institute during a time period of 2 months.

The participants were divided into 4 groups (Residents, nurses, laboratory technicians and Housekeeping/class 4 staff) among the health care personnel and 30-40 participants in each group were included in the study.

Group I-Resident Doctors,

Group II-Nurses,

Group III- Laboratory Technicians,

Group IV- Housekeeping/class 4 staff.

Confidentiality of participants was be strictly maintained

They were subjected to a short training session regarding the Biomedical Waste management. The training included the information about biomedical waste handling, disposal methods & waste management. To study the impact of training session, the participants were also subjected to the questionnaire before and after the session. Predesigned questionnaires are prepared for data collection based on BMW guidelines. It consisted of the series of questions related to the knowledge, attitude and practice regarding Biomedical Waste and its management. The questionnaire was delivered in interview form to the class 4 workers, in simple language that they could comprehend. The percentage was calculated from the number of participants who answered correctly. Study Population: Health Care Providers of tertiary care hospital.

**Inclusion Criteria:** 1) All Health Care Providers (HCP) consenting for study.

**Exclusion Criteria:** 1) All Health Care Providers (HCP) not consenting for study.

**Study Type:** Cross sectional study.

**Sample Size:** Non-Repetitive (120-160) samples in form of questionnaires from Health Care Providers (HCP).

**Study Time:** 2 months.

All data was maintained in Microsoft office Excel. All statistical analysis were carried out using Excel and Appropriate Statistical tools was applied wherever required. Informed Written Consent had taken from the patient before doing the required investigations. Ethical clearance was obtained from Institutional Ethical Committee (IEC).

## OBSERVATION AND RESULTS

Biomedical waste management is a key for successful infection control in a hospital and for safety of patients as well as doctors. Keeping this thing in mind, biomedical waste management training was carried out in Tertiary care hospital Chhattisgarh Medical College. The participants was divided into 4 groups (Residents, nurses, laboratory technicians and Housekeeping/class 4 staff) among the health care personnel and 30-40 participants in each group were included in the study. Total 160 study participant, were subjected to questionnaire for assessing their knowledge, attitude and practicing methods regarding biomedical waste management before as well as after training program. Table 1,2 & 3 shows knowledge attitude and practice amongst the participant before and after training. Whereas table 4,5 & 6 shows overall score amongst the participants before and after training. It was observed that the score had been drastically improved after training especially amongst housekeeping staff which is statistically significant.

## DISCUSSION

The knowledge of participants for biomedical waste management was assessed. 76.25 % of the participants were heard about biomedical waste rules before training session. Of which score amongst the doctor were 87.5% .Singh G.P *et al* (2014) have found in their study that 83.3% of the doctors had knowledge about „what biomedical waste is“. whereas 90% were aware regarding biomedical waste rules in a study conducted by Kulkarani VL *et al* (2017). After training session, all of the participant responded correctly in this study. Before training, 86 % of the study participant had knowledge about biohazard symbol by Kulkarani VL *et al* (2017). whereas in our study amongst total participants only 73.12% were aware. But 95% of technician were aware about biomedical waste symbol which is highest amongst all participants.it is may be due to regular training given to them while working in the labs. Chudasama RK *et al* (2013) in their study have found that 87.5% of the participants were aware of the biohazard symbol. Most of the respondents have responded correctly after the training. Correct knowledge regarding the maximum time limit for biomedical waste storage was found to be 35.23% in the participants by Mehta TK *et al* (2018) .which is slightly lower than our study. However Study done by Sanjeev *et al* (2014) showed better awareness in about 60% of the participants. After training in our study the score has been increased upto 87.5% . however lower score reported by study done by Das SK *et al*(2016), which showed that only 7% of healthcare workers were aware about it. Storage of biomedical waste should be emphasized in future training programs. Detailed discussion should be done when one can keep biomedical waste for more than 48 hours, procedure for approval from authority and various treatment options for waste. Das SK *et al* (2016)

Attitude of all HCWs was highly positive towards Biomedical waste Management (BMWM). Similar level of positive attitude was found in another study conducted by Soyam GC *et al* (2017) and Nirupama N *et al* (2010). While compare to technicians and the housekeeping workers, nursing personnel have statistically significant attitude .This could be due to Nurses at our hospital received regular training and know gravity of problem of bio-medical waste management.

**Table 1** Knowledge amongst participant before and after training

Sn	Question	residents		P value	nurses		P value	L technician ab		P-value	House keeping		P value
		before	after		before	after		before	after		before	after	
1	Have you heard about Biomedical Waste rules?	35 (87.5)	40 (100)	0.023	36 (90)	40 (100)	0.043	31 (77.5)	40 (100)	0.00	20 (50)	35 (87.5)	0.0005
2	Do you know different colour coded Bags of Biomedical Waste?	32 (80)	40 (100)	0.003	34 (85)	40 (100)	0.01	27 (67.5)	36 (90)	0.01	32 (80)	37 (92.5)	0.10
3	Do you aware of Biohazard symbol?	30 (75)	35 (87.5)	0.15	28 (70)	39 (97.5)	0.001	38 (95)	40 (100)	0.15	21 (52.5)	32 (80)	0.01
4	Do you know up to which level the Bag has to be filled?	15 (37.5)	35 (87.5)	0.000	21 (52.5)	33 (82.5)	0.005	22 (55)	40 (100)	0.00	06 (15)	25 (62.5)	0.0000
5	Do you know Personal Protective Equipment?	35 (87.5)	40 (100)	0.02	33 (82.5)	40 (100)	0.007	29 (72.5)	37 (92.5)	0.02	22 (55)	34 (85)	0.004
6	Are all healthcare waste hazardous?	32 (80)	38 (95)	0.04	34 (85)	39 (97.5)	0.05	25 (62.5)	36 (90)	0.00	15 (37.5)	36 (90)	0.0000
7	Do you know about diseases Transmitted by Biomedical Waste?	40 (100)	40 (100)		37 (92.5)	40 (100)	0.08	34 (85)	40 (100)	0.01	24 (60)	38 (95)	0.0003
8	Do you have any idea about the Maximum time up to which Biomedical Waste can be keep in hospital premises?	15 (37.5)	35 (87.5)	0.000	16 (40)	34 (85)	0.000	27 (67.5)	33 (82.5)	0.12	10 (25)	38 (95)	0.0000
9	Can any plastic bag be used for waste disposal?	30 (75)	40 (100)	0.001	36 (90)	40 (100)	0.04	34 (85)	40 (100)	0.01	26 (65)	40 (100)	0.0001

**Table 2** Attitude amongst participant before and after training

Question	residents		P value	nurses		P value	Lab technician		P value	House keeping		P value
	before	after		before	after		before	after		before	after	
1 Do you feel that there is a need of such awareness program about BMW Management?	30 (75)	40 (100)	0.001	33 (82.5)	40 (100)	0.007	28 (70)	40 (100)	0.00	15 (37.5)	40 (100)	0.0000
2 Do you think that it will increase financial burden on hospital management?	32 (80)	40 (100)	0.003	30 (75)	38 (95)	0.01	35 (87.5)	40 (100)	0.02	28 (70)	40 (100)	0.0003
3 Do you think that BMW Management is an extra burden on work?	34 (85)	40 (100)	0.01	33 (82.5)	37 (92.5)	0.18	31 (77.5)	40 (100)	0.00	27 (67.5)	38 (95)	0.002
4 Do you think your knowledge regarding BMW Management is adequate?	32 (80)	38 (95)	0.04	36 (90)	40 (100)	0.04	32 (80)	40 (100)	0.00	15 (37.5)	34 (85)	0.0000
5 Do you dispose all kinds of waste into general garbage?	35 (87.5)	40 (100)	0.02	37 (92.5)	40 (100)	0.08	40 (100)	40 (100)		28 (70)	40 (100)	0.0003
6 Do you think that safe disposal of BMW is necessary?	38 (95)	40 (100)	0.1	38 (95)	40 (100)	0.1	40 (100)	40 (100)		23 (57.5)	40 (100)	0.0000
7 Do you feel that BMW plan will be helpful for patients attending healthcare setting as well as the community?	35 (87.5)	40 (100)	0.02	32 (80)	40 (100)	0.003	35 (87.5)	40 (100)	0.02	30 (75)	40 (100)	0.001
8 Do you feel that it is a team work?	36 (90)	40 (100)	0.04	38 (95)	40 (100)	0.1	28 (70)	35 (87.5)	0.05	31 (77.5)	40 (100)	0.002

**Table 3** Practice amongst participant before and after training

Sn	Question	residents		P value	nurses		P value	Lab technician		P value	House keeping		P value
		before	after		before	after		before	after		before	after	
1	Do you dispose Biomedical Waste in specified colour coded bags?	22 (55)	35 (87.5)	0.001	28 (70)	38 (95)	0.004	27 (67.5)	40 (100)	0.00	20 (50)	35 (87.5)	0.000
2	Are you using Personal Protective Equipment while handling Biomedical Waste?	18 (45)	34 (85)	0.000	30 (75)	40 (100)	0.001	33 (82.5)	40 (100)	0.00	16 (40)	32 (80)	0.000
3	Are you practicing handwash in between every activity?	21 (52.5)	35 (87.5)	0.001	30 (75)	40 (100)	0.001	30 (75)	40 (100)	0.00	19 (47.5)	38 (95)	0.000
4	Are you practicing disposal of sharps in puncture proof bags and container?	19 (47.5)	38 (95)	0.000	27 (67.5)	39 (97.5)	0.0007	31 (77.5)	40 (100)	0.00	21 (52.5)	39 (97.5)	0.000
5	Are you practicing recapping of used needles?	30 (75)	40 (100)	0.001	25 (62.5)	40 (100)	0.0000	32 (80)	40 (100)	0.00	25 (62.5)	37 (92.5)	0.001
6	Are you immunised for hepatitis-B infection?	35 (87.5)	40 (100)	0.02	31 (77.5)	40 (100)	0.002	25 (62.5)	38 (95)	0.00	13 (32.5)	25 (62.5)	0.008
7	Are you practicing segregation of infectious and non-infectious waste?	24 (60)	38 (95)	0.000	24 (60)	38 (95)	0.0003	30 (75)	40 (100)	0.00	23 (57.5)	36 (90)	0.001
8	In case of blood spillage how much concentration of sodium Hydrochloride can be used?	30 (75)	40 (100)	0.001	26 (65)	35 (87.5)	0.02	32 (80)	40 (100)	0.00	0 (0)	25 (62.5)	0.000
9	Where do you dispose cotton gauze piece contaminated with blood?	32 (80)	40 (100)	0.003	35 (87.5)	40 (100)	0.02	36 (90)	40 (100)	0.04	25 (62.5)	40 (100)	0.000
10	Where do you dispose expired/discarded medicine?	25 (62.5)	38 (95)	0.000	28 (70)	34 (85)	0.11	20 (50)	35 (87.5)	0.00	15 (37.5)	38 (95)	0.000
11	Where do you dispose mask and caps?	28 (70)	37 (92.5)	0.01	32 (80)	40 (100)	0.003	32 (80)	40 (100)	0.00	22 (55)	33 (82.5)	0.009
	Where do you dispose gloves?	30 (75)	40 (100)	0.001	30 (75)	40 (100)	0.001	32 (80)	40 (100)	0.00	25 (62.5)	40 (100)	0.000
12	Where do you dispose disposable plastic waste?	32 (80)	40 (100)	0.003	35 (87.5)	40 (100)	0.02	33 (82.5)	40 (100)	0.00	15 (37.5)	34 (85)	0.000

**Table 4** Knowledge amongst all participant before and after training

Knowledge (Que no)	Before training	After training
1	122(76.25%)	155(96.87%)
2	125(78.12%)	153(95.62%)
3	117(73.12%)	146(91.25%)
4	64(40%)	133(83.12%)
5	119(74.37%)	151(94.37%)
6	106(66.25%)	149(93.12%)
7	135(84.37%)	158(98.75%)
8	68(42.5%)	140(87.5%)
9	126(78.75%)	160(100%)

**Table 5** Practice amongst all participant before and after training

Practice (Que no)	Before training	After training
1	97(60.62%)	148(92.5%)
2	97(60.62%)	146(91.25%)
3	100(62.5%)	153(95.62%)
4	98(61.25%)	156(97.5%)
5	112(70%)	157(98.12%)
6	104(65%)	143(89.37%)
7	101(63.12%)	152(95%)
8	88(55%)	140(87.5%)
9	128(80%)	160(100%)
10	88(55%)	145(90.62%)
11	114(71.25%)	150(93.75%)
12	117(73.12%)	160(100%)
13	115(71.87%)	154(96.25%)

**Table 6** Attitude amongst all participant before and after training

Attitude(Que no)	Before training	After training
1	106(66.25%)	160(100%)
2	125(78.12%)	158(98.75%)
3	125(78.12%)	155(96.87%)
4	115(71.87%)	152(95%)
5	140(87.5%)	160(100%)
6	139(86.87%)	160(100%)
7	132(82.5%)	160(100%)
8	133(83.12%)	155(96.87%)

In our study, 66.2 % of the participants strongly felt that there is need of such awareness programs. This rate has gone up to 100 % after training session. In another study revealed that most of the healthcare centres had unsatisfactory practices with regard to waste management. Globally, 16 84% of the hospitals did not stick to norms. This might be due to lack of awareness, inadequate resources and inappropriate disposal practices.(7)

Malini A *et al* (2015) shows that, 44.4 % of the doctors agrees that, this is an extra burden of work which is much lower as compared to our study. All the healthcare workers in study done by Malini *et al* and Soyam GC *et al* were agreed upon

that biomedical waste management is team work. while in our study 83.12% participants were agreed upon it's a team work before training which became 100% after training session.

Regarding BMWM practices, it was found that the nursing staff & technicians practiced BMW management better than the resident doctors & housekeeping staff and difference was statistically significant. This is similar to the finding of Saini *et al* (2005). But It is different from the findings of Malini *et al* (2015) who in their study reported that majority of the doctors followed correct practices followed by nursing staff, lab technicians and lastly class IV employees. Practices of PPE wearing while handling BMW by nursing staff were (75%), where almost three fourth (72%) nursing staff took precautions while handling waste in study done by Saini S *et al* (2005).

An important pre-requisite and key step for successful biomedical waste management is segregation of the waste at the point of generation into color coded bags and bins. Practice regarding disposal of biomedical waste in specified color coded bags was found to be 60.62% of participants before training. Which is closed to the study done by Soyam GC *et al*. The study showed that nearly less than 50% house keeping staff had not received any kind of training in BMW management. We conduct training programme once in a year for the residents lab technician and nursing staff emphasizing on standard precautions and BMW management. Housekeeping staff were not included in the programme. This study has helped us in identifying this gap and the necessity for training them as the KAP score has drastically increased after conducting training. This study has also made us realize that such training programmes should be conducted regularly and make it compulsory for all the HCWs to attend.

## CONCLUSION

Our institute is a premier tertiary level Institute in Chhattisgarh India. Therefore, the current status of employee's awareness regarding BMW management will help the authorities to develop the strategy for improving the situation in future. Overall Knowledge, attitude and practice regarding BMW management improved after training programme. In our study we found that the housekeeping staff needs rigorous training for the implementation of the Bio-medical waste management. The lower level of awareness about hospital waste handling may have direct impact on overall process of safe disposal of biomedical waste. To avoid this, Strict supervision and surveillance should be adopted to follow the golden rule/thumb rule i.e. segregation at the point of generation Therefore Intensive training and orientation programs at regular time interval for all the staff with special importance to the new comers are highly recommended.

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**How to cite this article:**

Sudipta Pal *et al* (2020) 'Assessment of Knowledge, Attitude & Practice Regarding Biomedical Waste Management Before And After Training Amongst Different Health Care Personnel: A Cross Sectional Study', *International Journal of Current Advanced Research*, 09(02), pp. 21377-21382. DOI: <http://dx.doi.org/10.24327/ijcar.2020.21382.4200>

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