

# Knowledge, awareness, attitude, and practice regarding biomedical waste management among health care workers in tertiary care setting

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## ABSTRACT

**Background:** Safe environment is the basic need of healthy life. Health care workers are at highest risk of obtaining infection from their professional environment. This risk can be reduced by giving adequate knowledge regarding biomedical waste (BMW) management. **Objectives:** The objectives of this study were to evaluate the level of knowledge, awareness, attitude, and practice about effective BMW management among laboratory technicians, staff nurses, and student nurses of a tertiary care setting of North India. **Materials and Methods:** This study was conducted in 134 paramedical staff of different departments of a tertiary care center. The study population included 64 nursing staff, 32 laboratory technicians, and 38 student nurses. A questionnaire containing 30 questions was given to them for filling. The questions were regarding knowledge, awareness, attitude, and practice about BMW management. One mark was given for each right answer. Percentage of right answers was calculated for each section and every category. **Results:** Among all health care personnel's, 62.5% of laboratory technicians had high level of knowledge and awareness, while among staff nurses and student nurses this percentage was 75% and 57.9%, respectively. Attitude toward BMW management was favorable among 68.75% of laboratory technicians, 81.25% of staff nurses, and 78.95% of student nurses. Among all candidates, 56.25% of laboratory technicians, 81.25% of staff nurses, and 52.63% of student nurses were practicing at good level according to guidelines. **Conclusion:** Of all health-care professional, staff nurses had highest level of knowledge, awareness, favorable attitude, and practice toward BMW management. Regular training sessions regarding separation, storage, transportation, and disposal of BMW should be conducted by administration.

**KEY WORDS:** Knowledge; Awareness; Attitude; Practice; Biomedical Waste; Health Care Workers

## INTRODUCTION

The term “biomedical waste (BMW)” is defined as any waste which is produced in diagnosis, treatment, or immunization of human being or animal or generated in any research activity related to production or testing of biological. It includes categories mentioned in schedule I of the Government of India's BMW (management and handling) rules 1998.<sup>1,2</sup>

Classification of BMW is done by the WHO into following categories: General waste, chemical waste, pathological waste, infectious, sharps, pharmaceutical waste, radioactive waste, and pressurized containers.

Environment safety is the basic requirement of this era and is a core factor for healthy life. Prevention of health hazards is possible up to a significant extent by following guidelines of BMW management. Paramedical staff of any hospital is most prone to get infection during different procedures due to lack of proper knowledge and awareness toward BMW management. There is increasing public awareness about adequate biomedical treatment, transportation, and ultimate disposal of BMW as it is not only infective but also highly toxic and with variable radioactivity. Many times BMW

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management is not maintained due to deficient technologies, inadequate training, and lack of proper financial support by concerned institution.<sup>[3]</sup>

It is estimated that 10% of total fatal or life-threatening diseases are contributed by hospital-acquired infections in the South East Asia region, and it is considered to be one of the important indicators for the management of waste.<sup>[4]</sup>

Due to inadequate BMW management, the ministry of environment and forest put forward the “BMW management rules” in 1998 according to which it is the duty of every “occupier,” i.e., a candidate who has the control over concerned institution must take necessary steps to confirm proper disposal and treatment of waste within 48 h of generation without imposing any adverse effect to human health and environment.

BMW is classified into following categories [Table 1]:<sup>[5]</sup>

It is estimated that in most of the health-care settings, the BMW generates is 1–2 kg/bed/day, out of which 10% is infectious waste such as human or animal tissues, dressings, soiled items, and laboratory samples. In case, if this infectious waste is not separated from noninfectious waste at the level of generation, whole of waste will be considered to be infectious.<sup>[6]</sup>

BMW forms about 1–2% of total municipal solid waste. Some of the wastes are potential threat to the human health and surroundings.<sup>[7]</sup>

**Table 1:** Categories and disposal of BMW management

Category	Type of waste	Treatment of disposal
1	Human anatomical waste	Deep burial/incineration
2	Animal waste	Deep burial/incineration
3	Microbiological and biotechnological waste	Autoclaving/incineration/microwaving
4	Sharp waste	Autoclaving/disinfection/microwaving/shredding
5	Cytotoxic drugs and discarded medicines	Incineration/destruction and disposal in landfills
6	Soiled waste	Autoclaving/incineration/microwaving
7	Solid waste	Autoclaving/disinfection/microwaving/shredding and mutilation
8	Liquid waste	Chemical disinfection
9	Ash	Disposal in municipal landfills
10	Chemical waste	Chemical treatment and disposal into drain or landfills

BMW: Biomedical waste

Epidemiological studies indicate that infection with the bloodborne pathogens, particularly HIV and hepatitis B and C virus is considered an occupational risk for health care workers. Clinical laboratory technicians and nurses are the most vulnerable group.<sup>[8]</sup> It has been proved that chances of getting infection from infected needle stick injury are about 30% for hepatitis B, 1.8% for hepatitis C, and 0.3% for HIV.<sup>[9]</sup> Preventing injuries from sharps and needle sticks are considered a part of routine practices among health care workers. Any object that is able to cut the skin considered as “sharp.” “Sharps” include needles, lancets, cutters, blade, scissors, metal wire, retractors, pins, staples, clamps, and glass items.

Appropriate management of BMW is one of the highly troublesome problems of the era and one of the important social responsibilities. It is teamwork not a responsibility of single category of persons. The scenario of knowledge, favorable attitude, and practice regarding effective BMW management in India is still lacking.<sup>[10-12]</sup>

## Objective

The objective of the study was to determine the knowledge, awareness, attitude, and practice regarding the BMW management among health care workers in tertiary care setting in North India.

## MATERIALS AND METHODS

A questionnaire was designed and distributed to 134 paramedical staff members. The study population was 64 nursing staff, 32 laboratory technicians, and 38 student nurses from different departments of a Tertiary Health Center, Lucknow, Uttar Pradesh, India.

The study was approved by ethical committee, and written consent was obtained from every participant before starting the study.

A well-structured questionnaire consists of 30 questions regarding the knowledge about the health hazards, color coding for separation, storage, personal protective devices, prophylactic vaccination, treatment, disposal, and rules of BMW management were designed. Questions were in multiple choices format with one right answer for which was allotted a score of “one” for each right answer and “zero” for unanswered or wrongly answered question. Total attainable score was 30. Questions were divided into three sections: First was regarding knowledge and awareness, the second was regarding attitude toward BMW management, and the third was to assess practice of appropriate BMW management among paramedicals.

The percentages of appropriate answers were obtained for each section and each participant.

**Section 1: Assessment of Knowledge/Awareness of BMW Management**

To assess the level of practice among health-care professionals, 12 questions were framed. Those who answered >9 questions according to guidelines were labeled as high level of knowledge and awareness candidates. Those who answered 7–9 according to guidelines were grouped into medium level of knowledge and awareness candidates and those with ≤6 were candidates with low level of knowledge and awareness.

**Section 2: Attitude toward BMW Management**

To assess attitude toward BMW management, 6 questions were framed. Those who answered >5 questions showing positive attitude were grouped in favorable and those who <5 were grouped into unfavorable.

**Section 3: Practice of BMW Management**

To assess the level of practice among health-care professionals, 12 questions were framed. Those who answered >9 questions according to guidelines were labeled as good practice candidates. Those who answered 7–9 according to guidelines were grouped into moderate practice candidates and those with ≤6 were poor practice candidates.

**RESULTS**

A total number of 134 paramedical candidates from different departments were assessed for their knowledge, awareness, attitude, and practice BMW management. Among these candidates, 64 nursing staff members, 32 laboratory technicians, and 38 student nurses participated in the study.

**Level of Knowledge/Awareness of BMW Management**

To assess the level of knowledge/awareness among health-care professionals, 12 questions were framed. 62.5% of

laboratory technicians had high level of knowledge and awareness, while among staff nurses and student nurses this percentage was 75% and 57.9%, respectively. On the other hand, 25% of laboratory technicians, 18.75% of staff nurses, and 26.32% of student nurses were with medium level of knowledge and awareness [Table 2].

Knowledge and awareness were highest among staff nurses followed by laboratory technicians and student nurses.

**Degree of Attitude toward BMW Management**

To assess attitude toward BMW management, 6 questions were framed. Among all health-care personnel’s, 68.75% of laboratory technicians, 81.25% of staff nurses, and 78.95% of student nurses were having favorable attitude toward BMW management. Again, staff nurses were having highest degree of attitude toward effective BMW management [Table 3].

**Level of Practice of Biomedical Management of BMW Management**

To assess the level of practice among health-care professionals, 12 questions were framed. Among all candidates, 56.25% of laboratory technicians, 81.25% of staff nurses, and 52.63% of student nurses were practicing at good level according to guidelines while 31.25% of laboratory technicians, 12.5% of staff nurses, and 26.32% of student nurses were groups into moderate practice candidates. Again, the level of practice regarding appropriate BMW management was better among staff nurses in comparison to laboratory technicians and student nurses [Table 4].

**DISCUSSION**

In the present study, it was found that knowledge, awareness, attitude, and practice were satisfactory among staff nurses in contrast to other two categories. The reason behind such

**Table 2:** Level of knowledge/awareness of BMW management

Health-care personals	Total number	Scoring criteria level of knowledge/awareness		
		High (%)	Medium (%)	Low (%)
Laboratory technicians	32	20 (62.5)	8 (25)	4 (12.5)
Staff nurses	64	48 (75)	12 (18.75)	4 (6.25)
Student nurses	38	22 (57.9)	10 (26.32)	6 (15.79)

BMW: Biomedical waste

**Table 3:** Degree of attitude toward BMW management

Health-care personnel’s	Total number	Scoring criteria (degree of attitude)	
		Favorable (%)	Unfavorable (%)
Laboratory technicians	32	22 (68.75)	10 (31.25)
Staff nurses	64	52 (81.25)	12 (18.75)
Student nurses	38	30 (78.95)	8 (21.05)

BMW: Biomedical waste

**Table 4:** Level of practice of biomedical waste management

Health-care personnel's	Total number	Scoring criteria level of practice		
		Good (%)	Moderate (%)	Poor (%)
Laboratory technicians	32	18 (56.25)	10 (31.25)	4 (12.5)
Staff nurses	64	52 (81.25)	8 (12.5)	4 (6.25)
Student nurses	38	20 (52.63)	10 (26.32)	8 (21.05)

BMW: Biomedical waste

discrepancy may be periodic classes were being arranged for nurses regarding BMW management. Laboratory technicians and student nurses could have attended very few classes and some of them were new admissions.

BMW management is an important issue for not only medical colleges, hospitals, clinics, and nursing homes but also by environment and law forcing agencies, media, and public.<sup>[13]</sup> Awareness regarding effective BMW management is poor among various classes of health care workers.<sup>[14]</sup> Another study conducted in Bhopal reported that only 54.5% of nurses were aware of the existence of BMW management and handling rules 1998 (2012).<sup>[15]</sup> Similar study conducted in tertiary care setting in Punjab reported adequate disposal of infected potential waste and sharps awareness observed well among around >90% of nurses and technicians, whereas only 50% of sweepers answered satisfactorily.<sup>[16]</sup>

For the storage and disposal of waste, awareness of color coding is very important. It should be followed at every level, either be doctors, paramedical staff, or fourth class employee. Mixing of waste creates a big problem for staff and also management for safe disposal. Regular, periodic, and training programs need to be conducted by administration to improve the practices and knowledge at all steps of health-care delivery. At the same time, adequate resources to be provided to health-care personnel to work efficiently.

### Limitations of the Study

This present study was carried out among paramedical staff such as nurses and laboratory personnel only. Similar study must be conducted involving doctors and non-technical persons.

### CONCLUSION

It can be concluded from the present study that knowledge and awareness about BMW generation hazards, legislation, and management among health-care professional in tertiary care center, North India, were not satisfactory as per need. There are several literatures which suggest that it is a widespread problem in many health-care centers of India as well as other countries. Regular education, training and monitoring regarding handling, segregation, transport, storage, and disposal of BMW are highly recommended not

only to nurses but also to all health care workers at all levels to save the surroundings as well as human beings.

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