

Original research article

# Study on assessment of knowledge, attitude and practice of biomedical waste management among healthcare personal of a tertiary care hospital

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## Abstract

**Background-** Biomedical waste is a special category of waste, which carries potentially infectious or hazardous components. Inadequate and inappropriate knowledge of handling healthcare waste may have serious health consequences and a significant impact on the environment as well.

**Materials and methods:** A cross-sectional observational study was done at the Kamineni Institute of Medical Sciences, Narketpally. A validated questionnaire (Annexure 1) was distributed among 100 participants, stratified equally among five categories i.e. Doctors, Resident doctors, Nursing staff, Lab technicians, and Housekeeping staff. The questionnaire had four sections, the first section had questions to assess knowledge, the second session had questions to assess awareness, the third session has questions to assess attitude and the fourth section assessed the practices.

**Results:** The results of the data collected showed that 60% of Doctors had excellent knowledge and 20% of staff nurses had average or poor knowledge, 55% of lab Technicians have excellent awareness and 10% of Resident Doctors had average awareness, 90% housekeeping staff had excellent attitude while 10% resident doctors had average attitude, 75% of Resident Doctors had excellent practices while 15% Lab Technicians had average practices.

**Conclusion:** The attitude and practices of the healthcare workers are to be improved, with more emphasis on staff nurses, lab Technicians, and housekeeping staff. Constant awareness sessions regarding biomedical waste disposal and handling should be enforced.

**Keywords:** Biomedical waste management, healthcare personal, tertiary care hospital

## Introduction

Biomedical waste is defined as "any waste produced during the diagnosis, treatment, or immunization of humans and animals or research activities pertaining thereto or in the production or testing of biological or in health camps"<sup>[1]</sup>.

In the late 1970s, when medical wastes were found on the beaches on the east coast of the USA, it led to the enactment of the US Medical Waste Tracking Act (MWTA) in 1988<sup>[2]</sup>. In July 1998, under the Ministry of Environment and Forests, the first Biomedical Waste Management rules were notified by the Government of India.<sup>[3]</sup> In India, BMW problem was further compounded mainly by the presence of scavengers who sort out open, unprotected healthcare waste without wearing any protective gear, and secondly by reusing syringes without appropriate sterilization<sup>[4]</sup>. In 2009, around 240 people in Gujarat, India contracted hepatitis B following the reuse of unsterilized syringes<sup>[5]</sup>. This led to the fact that there is an urgent need to take action for strengthening the existing system capacity and increase the funding and commitment toward the safe disposal of BMW<sup>[6]</sup>. The BMW 1998 rules were modified in the following years-2000, 2003 and 201, 2016, with the latest amendments made in 2018.

The basic principle of good BMW practice is based on the concept of 3Rs, namely, reduce, recycle and reuse. The best BMW management methods (BMWM) aim at tackling waste at source rather than the "end of pipe approach"<sup>[7]</sup>.

India's exponentially growing healthcare needs are being tried to meet up with the advent of new hospitals. With this, the waste produced by hospitals and clinics has increased significantly over the past few years. India approximately generates 2 kg/bed/day and this biomedical waste encompasses wastes like anatomical waste, cytotoxic wastes, and sharps, which when inadequately segregated could cause different kinds of deadly infectious diseases like Human immunodeficiency virus (HIV) hepatitis C and B infections, etc., and also cause disruptions in the environment, and adverse impact on ecological balance<sup>[8]</sup>.

Lack of awareness about the health hazards related to healthcare waste, inadequate training in proper

waste management, absence of waste management and disposal systems, insufficient financial and human resources and the low priority given to the topic are the most common problems connected with healthcare waste<sup>[9]</sup>.

However, research on this critical issue has been very limited, and there is a grave need for information on this matter for planning and policy decisions in the future.

## **Aim**

This study aims to assess the extent of Knowledge, Attitude, and Practices among hospital personnel, regarding bio-medical waste and its management.

## **Objective**

1. To understand the importance of bio-medical waste and its proper handling and management.
2. To collect data about knowledge, attitude, and practices of biomedical waste management.
3. To examine the gap, understand the possible reasons for non-compliance/deviations/gaps (if any) and recommend suggestions to fill up these gaps in the most effective way.

## **Materials & Methods**

This is a Qualitative, Cross-sectional, Observational study, conducted at Kamineni Institute of Medical Sciences, Narketpally, which is a 1060 bedded tertiary care center with multiple specialties, 12 operation theatres, a Post-Operative Ward, Acute Medical Care Unit, Intensive Care Unit (ICU), Respiratory Intensive Care Unit (RICU), Paediatrics Intensive Care Unit (PICU), and Neonatal Intensive Care Unit (NICU), all having competent personnel. The study was conducted from December 2020 to OCT 2022.

## **Inclusion criteria**

- Must be working in KIMS for a minimum period of three months.
- Must be present on duty at the time of the study.

## **Exclusion criteria**

- Contract employees who were recruited temporarily for < 3 months.
- Who are not present at the time of the study.
- Unwilling staff.

Institutional ethical committee approval was taken before the start of the study. The participants were informed about the study before administering the questionnaire and were told that their participation would be voluntary. All the study participants were assured of confidentiality. A sample size of 100 hospital personnel was selected which included 20 doctors, 20 resident doctors, 20 nurses, 20 lab technicians, and 20 housekeeping staff. They were assessed for their knowledge, attitude, awareness and practice of biomedical waste disposal practice through a validated, pretested and structured questionnaire comprising of 4 sections.

- The first section consists of 7 questions, intended to assess the knowledge of the participants on biomedical waste management.
- The second section consists of 10 questions to assess the awareness of participants on biomedical waste management.
- The third section consists of 7 questions, intended to assess the attitude of the participants on biomedical waste management.
- The fourth section consists of 10 questions, out of which the first 5 questions have been considered for assessment as the next 5 questions are subjective and applicable only if the participant sustains a needle stick injury.

Therefore to create uniformity in assessment only the first 5 questions have been considered.

- Based on the number of right answers given in each section i.e. knowledge, awareness, attitude and practices, the samples have been analyzed using a scoring system and categorized as excellent (score = >5), good (score = 3-5) and average (score = <3).

**Scoring system**

	Knowledge Assessment (Q= 7)	Awareness Assessment (Q=10)	Attitude Assessment (Q=7)	Assess the Practices (Q=5)
Excellent	>5	>5	8	5
Good	3-5	3-5	4-7	4
Average	<3	<3	<4	<3

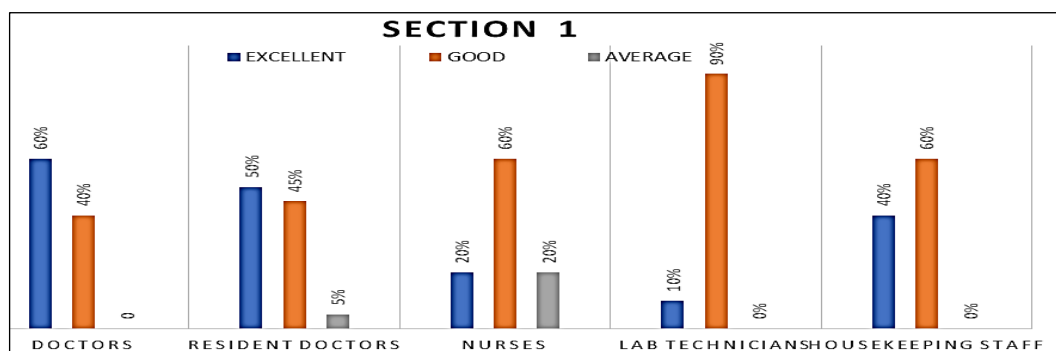
**Results**

- The majority of the study population belonged to the middle age group of 30- 40 years (46%). The next most age group observed was of 21-30 years (25%), followed by 41-50years (17%), and 51-60 years (12%).
- Females (58%) were more than males (48%). which could be attributed to all the nursing staff who participated in the study being females.

**Knowledge of participants on BWM**

- It was observed that the majority (60%) of Doctors, 50% of resident doctors, had excellent knowledge about BWM. While, the majority of nurses (60%), lab technicians (90%), and housekeeping staff (60%), had good knowledge about BMW. About 5% of resident doctors and 20% of nurses had average knowledge.

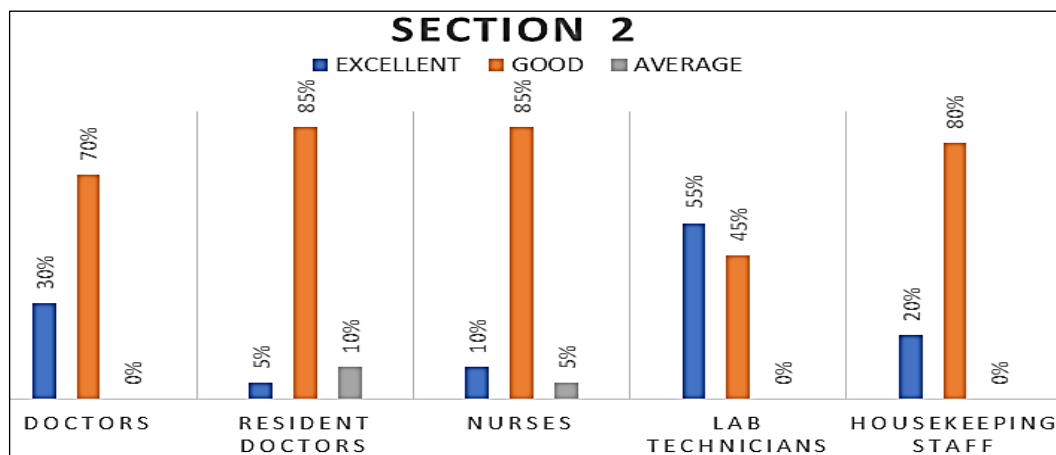
**Graphical Representation of Knowledge of Participants**



**Awareness of participants in BWM**

- The majority of doctors (70%), resident doctors (85%), staff nurses (85%), and housekeeping staff (80%) have good awareness.
- The majority of lab technicians (55%) had excellent awareness and 10% of resident doctors and 5% of nursing staff had average awareness.

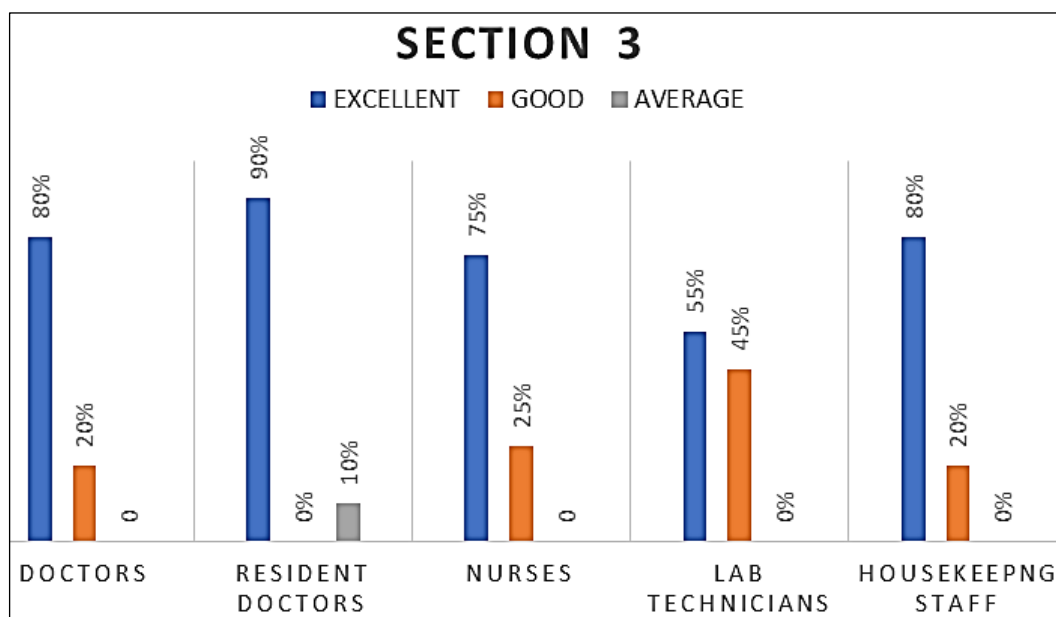
**Graphical representation of awareness of participants**



**Presentation of the attitude of participants**

- The majority of the hospital personnel (80% doctors, 90% resident doctors, 75% nurses, 55% of lab technicians and 80% of housekeeping staff) have excellent attitudes.

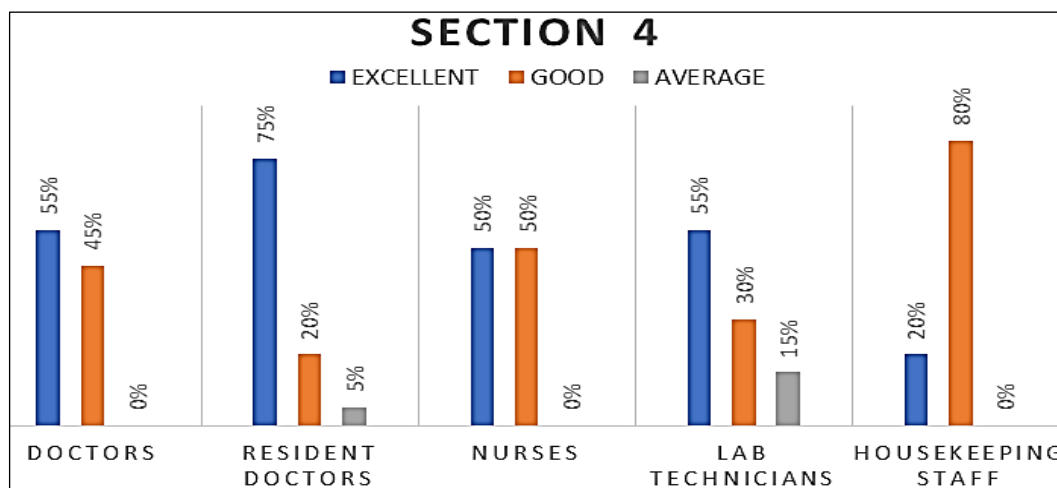
Graphical representation of the attitude of participants



Practices of BWM

- It was observed that the majority of doctors (55%), resident doctors (75%), 50%, and lab technicians (55%) have excellent practice of BWM. While the majority of housekeeping staff (80%) have good practice
- 50% of staff nurses had excellent practice, while 50% had good practice over BWM.

Graphical representation of practices of participants



Discussion

The present study was conducted among healthcare personnel of different level working at a tertiary care hospital. The study participants included doctors, residents, nursing staff, laboratory technicians, and housekeeping staff. A total of 100 healthcare personnel participated in the study. The majority of participants heard about BMW and its management rules and have received training for BMW management.

The knowledge, awareness, attitude, and practices were assessed through a questionnaire. Demographic data collected as per the questionnaires has been evaluated and compared with other studies.

In the present study, it has been observed that the majority age group is between 31 to 40 years of age which is similar to Sarika P Patil *et al.*<sup>[10]</sup> and Anand P *et al.*<sup>[11]</sup>. While Gajanan C *et al.*<sup>[12]</sup> have shown a majority age group between 26 to 30.

Knowledge

It has been observed in this study that, the majority (60%) of doctors have got excellent knowledge. In contrast to the present study, Mathur *et al.*<sup>[13]</sup> have observed that nursing staff (91%) have excellent

knowledge when compared to others.

Staff nurses have average knowledge of biomedical waste in our study, while Alok Sharma *et al.*<sup>[14]</sup>, Patil Sachin *et al.*<sup>[15]</sup> and Mathur *et al.*<sup>[13]</sup> observed that housekeeping staff have poor knowledge of BWM. This difference could be attributed to the regular and repeated training classes that are being conducted for our housekeeping staff in the hospital.

## Awareness

The present study shows that Lab technicians have excellent awareness about biomedical waste, which is in contrast with some previous studies like Alok Sharma *et al.*<sup>[14]</sup>, and Gupta V. *et al.*<sup>[16]</sup> in which Doctors have excellent awareness compared to others.

## Attitude

Both Resident doctors and Housekeeping staff have an excellent Attitude in our study. In contrast, Gajanan C *et al.*<sup>[12]</sup> observed that nursing staff have an excellent attitude when compared to others. A study by Mathur *et al.*<sup>[13]</sup> and another study by Anand P *et al.*<sup>[11]</sup> shows that Doctors have an excellent attitude towards biomedical waste attitude.

## Practices

The present study shows that Resident Doctors' practices in biomedical waste disposal are excellent. This is in contrast with another study conducted by Gajanan C *et al.*<sup>[12]</sup> which states that nursing staff practices are excellent. Another study by Mathur *et al.*<sup>[13]</sup> states that lab technicians' practices are excellent. Anand P *et al.*<sup>[11]</sup> conducted a study in which doctors' practices are excellent. Lab technicians have poor biomedical waste practices compared to other staff in the present study. Housekeeping staff has poor practices in two other studies conducted by Gajanan C *et al.*<sup>[12]</sup> and Mathur *et al.*<sup>[13]</sup> Mathur *et al.*<sup>[13]</sup> Observed that doctors, nurses, and laboratory technicians had better knowledge than sanitary staff, which is similar to our study. In our study staff nurses have excellent knowledge and awareness when compared to Lab technicians.

Class IV employees have good practice in BMW disposal when compared to nursing staff and lab technicians.

## Conclusion

In the present study, the attitude and practices of the healthcare workers are to be improved, with more emphasis on staff nurses and lab Technicians. Constant awareness sessions regarding biomedical waste disposal and handling should be enforced.

Improvement in the readiness to implement the knowledge attained through the training sessions should be acknowledged and applauded to create a sense of positive attitude towards doing it regularly.

Biomedical waste management is a continuous process, so the training sessions should be done regularly.

## Recommendation

- Regular rounds and monitoring by the housekeeping in charge and the administrators should be made mandatory to improve the efficiency of segregation at the point of source, as it is a continuous process.
- Regular training programs to reemphasize the importance of proper segregation at source should be carried out.
- The three 'R's of waste management Reduce, Reuse, and Recycle should be induced into practice.
- Improvement in the readiness to implement the knowledge attained through the training sessions should be acknowledged and applauded to create a sense of positive attitude towards doing it regularly.
- At the time of dealing with emergency cases, a person trained in biomedical waste management should be present at the bedside to passively observe the waste disposal and correct the HCP if necessary.

## Measures for waste minimization

As far as possible, the purchase of reusable items made of glass and metal should be encouraged.

- Select non-PVC plastic items.
- Adopt procedures and policies for proper management of waste generated, the mainstay of which is segregation to reduce the quantity of waste to be treated.
- Establish an effective and sound recycling policy for plastic recycling and get in touch with authorized manufacturers.

## References

1. Published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i)] Government of India, Ministry of Environment, Forest and climate change. Available from URL:

- <http://www.iwma.in/BMW%20Rules,%202016.pdf>
2. Chandrappa R, Das DB. Solid waste management: Principles and practice. Springer Science & Business Media; c2012 Jun.
  3. Bio-Medical Waste (Management and Handling), Rules. New Delhi: Government of India Publications. Ministry of Environment and Forests Notification; c1998. p. 276-84.
  4. World Health Organization, WHO. Guidelines for drinking-water quality. World Health Organization; c2004 Aug.
  5. Seetharam S. Hepatitis B outbreak in Gujarat: A wake-up call. *Indian J Med Ethics*, 2009 Jul, 6(3).
  6. Datta P, Mohi G, Chander J. Biomedical waste management in India: Critical appraisal. *Journal of laboratory physicians*. 2018 Jan;10(01):006-14.
  7. Chartier Y, editor. Safe management of wastes from health-care activities. World Health Organization; c2014.
  8. Rao D, Dhakshaini MR, Kurthukoti A, Doddawad VG. Biomedical waste management: A study on assessment of knowledge, attitude, and practices among health care professionals in a tertiary care teaching hospital. *Biomedical and Pharmacology Journal*. 2018 Sep;11(3):1737-43.
  9. <https://www.who.int/news-room/fact-sheets/detail/health-care-waste,2022jan12>
  10. Patil SP, Tambe MP, Patil PJ, Bhagwat VR. Awareness of healthcare workers regarding biomedical waste management (BMW) at tertiary care government hospital in Dhule (Maharashtra). *Natl. J Integr. Res Med*. 2013 Jul;4(4):74-9.
  11. Anand P, Jain R, Dhyani A. Knowledge, attitude and practice of biomedical waste management among health care personnel in a teaching institution in Haryana, India. *Int. J Res Med Sci*. 2016 Oct;4(10):4246-50.
  12. Soyam GC, Hiwarkar PA, Kawalkar UG, Soyam VC, Gupta VK. KAP study of bio-medical waste management among health care workers in Delhi. *Int. J Community Med Public Health*. 2017 Aug;4:3332-7.
  13. Mathur V, Dwivedi S, Hassan MA, Misra RP. Knowledge, attitude, and practices about biomedical waste management among healthcare personnel: A cross-sectional study. *Indian Journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*. 2011 Apr;36(2):143.
  14. Sharma A, Sharma V, Sharma S, Singh P. Awareness of biomedical waste management among health care personnel in Jaipur, India. *Oral Health Dent Manag*. 2013 Mar;12(1):32-40.
  15. Sachin P, Jagadish MM, Sanjay D, Patond S. Assessment of Knowledge, Attitude, and Practice of Healthcare Workers towards Management of Biomedical Waste: A Cross-Sectional Analytical Study. *Annals of the Romanian Society for Cell Biology*; c2021 Apr. p. 6866-73.
  16. Gupta V, Mohapatra D, Kumar V. Study to assess the knowledge, attitude, and practices of biomedical waste management among health care personnel at tertiary care hospital in Haryana. *Int. J Basic Appl. Med Sci*. 2015;5(2):102-7.