

Original Research Article

A cross-sectional study on knowledge, attitude and practice of biomedical waste management among nursing officers in Government General Hospital, Mahabubabad

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ABSTRACT

Background: Biomedical waste management (BMWM) is an important component of hospital infection control, occupational safety and environmental protection. Nursing officers play a key role in segregation and safe disposal of biomedical waste. Aim was to assess the knowledge, attitude and practice regarding BMWM among nursing officers in Government General Hospital, Mahabubabad.

Methods: A cross-sectional study was conducted over 15 days among 100 nursing officers selected by simple random sampling. Data were collected using a self-administered structured questionnaire comprising 10 knowledge, 5 attitude and 6 practice questions. Knowledge was categorized as low (0-6), moderate (7-8) and high (9-10); attitude as favourable or unfavourable; and practice as good or poor. Data were summarized using descriptive statistics.

Results: High knowledge was observed in 84% of participants, moderate knowledge in 15% and low knowledge in 1%. A favourable attitude was observed in 93.4%, while 85.1% demonstrated good practice. Only 51% reported ensuring that biomedical waste containers were not overfilled.

Conclusions: The study demonstrated high knowledge, a favourable attitude and generally good BMWM practice among nursing officers, with specific practice gaps that can be addressed through periodic training and monitoring.

Keywords: Biomedical waste management, Hospital infection control, Cross-sectional study

INTRODUCTION

Biomedical waste comprises waste generated during the diagnosis, treatment or immunization of patients and during related health-care activities.¹ Improper handling of such waste can expose health-care workers, patients, waste handlers and the community to sharps injuries, infection, chemical hazards and environmental contamination.^{2,3}

In India, the BMWM rules, 2016 provide the regulatory framework for segregation, collection, storage, transport, treatment and disposal of biomedical waste. Segregation

at the point of generation and the use of appropriate colour-coded containers are central to safe waste handling because mixing infectious waste with general waste unnecessarily increases the quantity requiring specialized treatment.

Nursing officers are directly involved in bedside care and routinely handle materials that become biomedical waste, placing them in a key operational position for implementing safe segregation and disposal practices.^{3,4} Studies conducted in different health-care settings have shown considerable variation in knowledge, attitude and practice regarding BMWM, indicating that awareness does not always translate uniformly into safe practice.⁵⁻⁸

Regular training and reinforcement have therefore been emphasized as important measures for sustaining compliance and protecting both staff and patients.^{3,9,10}

Against this background, assessment of the knowledge, attitude and practice of nursing officers in Government General Hospital, Mahabubabad was undertaken to identify existing strengths and specific gaps that may guide focused training and monitoring.

Aim

The study aimed to assess the knowledge, attitude and practice of BMWM among nursing officers in Government General Hospital, Mahabubabad.

Objectives

Objectives were the primary objective was to assess the knowledge, attitude and practice of nursing officers and to describe the current BMWM practices in Government General Hospital, Mahabubabad and further objective was to identify areas in which education and training could strengthen proper BMWM among nursing officers.

METHODS

Study design, setting and period

This cross-sectional study was conducted at Government General Hospital, Mahabubabad over a period of 15 days, from 29 December 2025 to 12 January 2026.

Study population and sample size

The study population comprised nursing officers working in Government General Hospital, Mahabubabad. A total of 109 responses were received; for the purpose of the study, 100 responses were considered for analysis.

Sampling method

Participants were selected using simple random sampling.

Study tool and data-collection procedure

Data were collected using a self-administered structured questionnaire developed in English with reference to previous studies on BMWM.⁵⁻⁸ A period of approximately 15-20 minutes was provided to each participant to complete the questionnaire.

Questionnaire domains and scoring

The questionnaire included 10 knowledge questions, 5 attitude questions and 6 practice questions. Knowledge items were multiple-choice questions with one correct response, whereas attitude and practice items were predominantly closed-ended Yes/No questions. Correct or desirable responses were scored as 1 and incorrect or

undesirable responses as 0. Knowledge scores were categorized as low (0-6), moderate (7-8) and high (9-10). Attitude was categorized as favourable or unfavourable, and practice as good or poor.

Data analysis

Data were entered and analysed using Microsoft excel 2024. Descriptive statistics, including simple ratios, frequencies and proportions, were used to summarize the findings.

Inclusion criteria

Nursing officers employed in various departments of Government General Hospital, Mahabubabad who provided informed consent were eligible to participate in the study.

Exclusion criteria

Nursing officers who were unavailable during the study period or who did not provide informed consent were excluded.

Ethical considerations

Ethical approval for the study was obtained from the institutional ethics committee (IEC/GMC-MHBD/2025/11), and participation was based on informed consent.

RESULTS

A total of 100 nursing officers working in Government General Hospital, Mahabubabad were included in the analysis. Most participants were women, were aged 25-50 years, had B.Sc. Nursing qualifications and had seven years or less of work experience.

Knowledge on BMWM

Overall, 84% of nursing officers had high knowledge scores, 15% had moderate knowledge scores and 1% had low knowledge scores (Figure 1). Question-wise correct responses ranged from 84% to 99% (Table 1).

Attitude towards BMWM

A favourable attitude towards BMWM was observed in 93.4% of participants, while 6.6% had an unfavourable attitude.

All participants agreed that segregation at the point of generation is the responsibility of every staff member. In addition, 98% recognized that improper BMWM increases the risk of hospital-acquired infections and 98% supported regular training to improve compliance. Twenty-two percent perceived BMWM as adding extra workload to routine nursing duties (Figure 2).

Practice of BMWM

Overall, 85.1% of nursing officers were categorized as having good BMWM practice, while 14.9% were categorized as having poor practice. All participants reported segregation of biomedical waste at the point of

generation and use of colour-coded bags. Immediate reporting of needle-stick injury was reported by 97%, use of personal protective equipment by 90% and avoidance of needle recapping by 75%. Only 51% reported ensuring that biomedical waste containers were not overfilled (Figure 3).

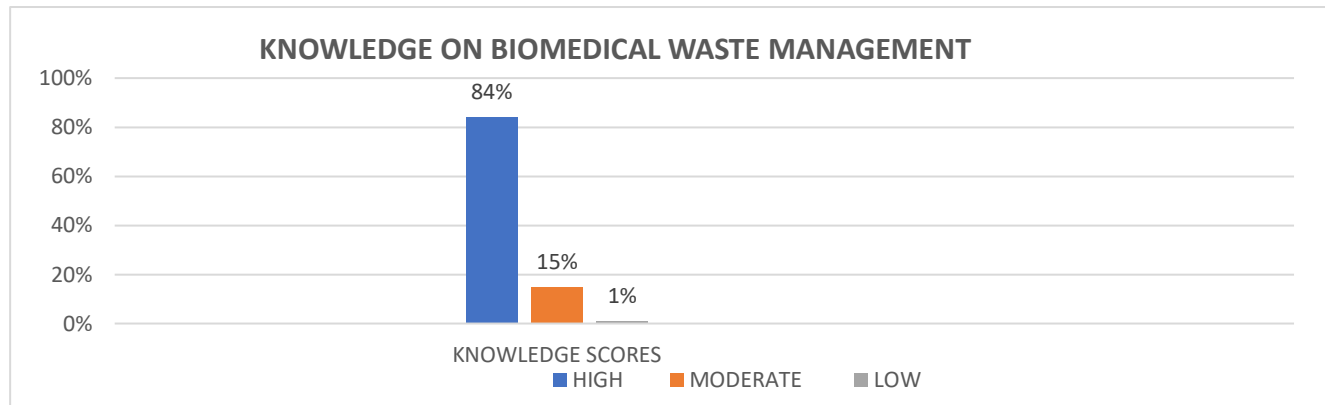


Figure 1: Categorization of knowledge scores of BMWM among nursing officers, (n=100).

Table 1: Knowledge about BMWM among nursing officers, (n=100).

Questions on knowledge	Correct responses (%)	Wrong responses (%)
Biomedical waste is defined as	99	1
The primary objective of BMWM is	96	4
Which color coded bag is used for human anatomical waste	98	2
Used syringe without a needle should be disposed of in	85	15
Broken glassware and discarded medicine vials are disposed of in	84	16
Soiled waste such as cotton, gauze and dressing should be discarded in	95	5
Needle should be	91	9
The ideal container for sharp disposal is	96	4
Biohazard symbol is	90	10
Case of needle stick injury, the first step is	95	5

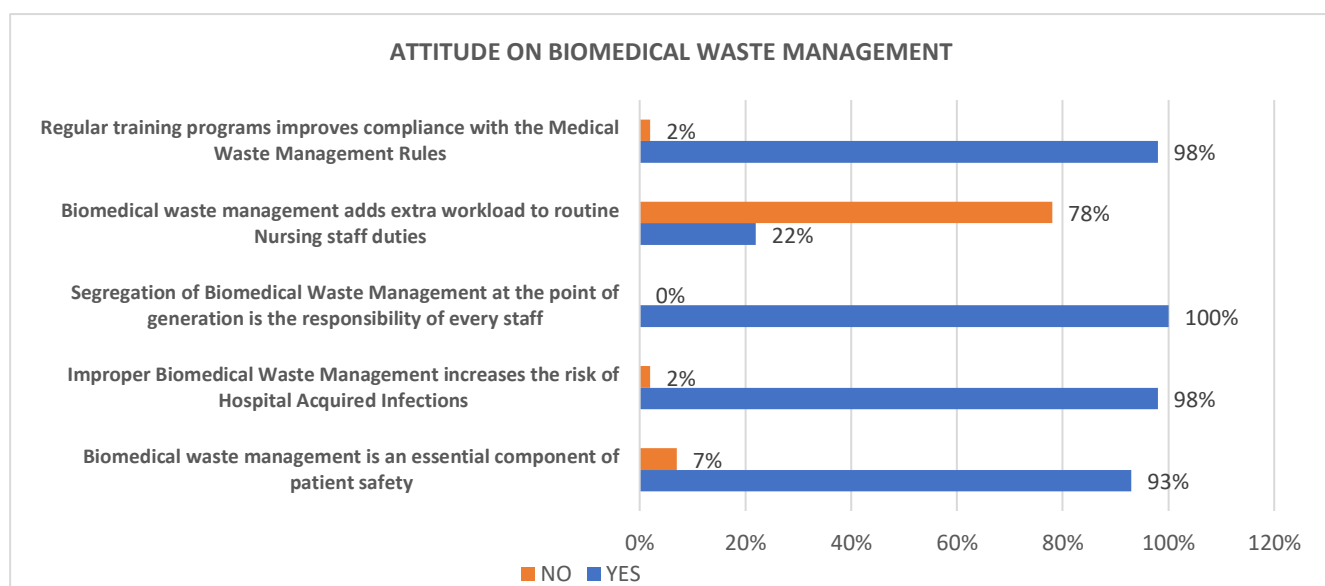


Figure 2: Attitude towards BMWM among nursing officers, (n=100).

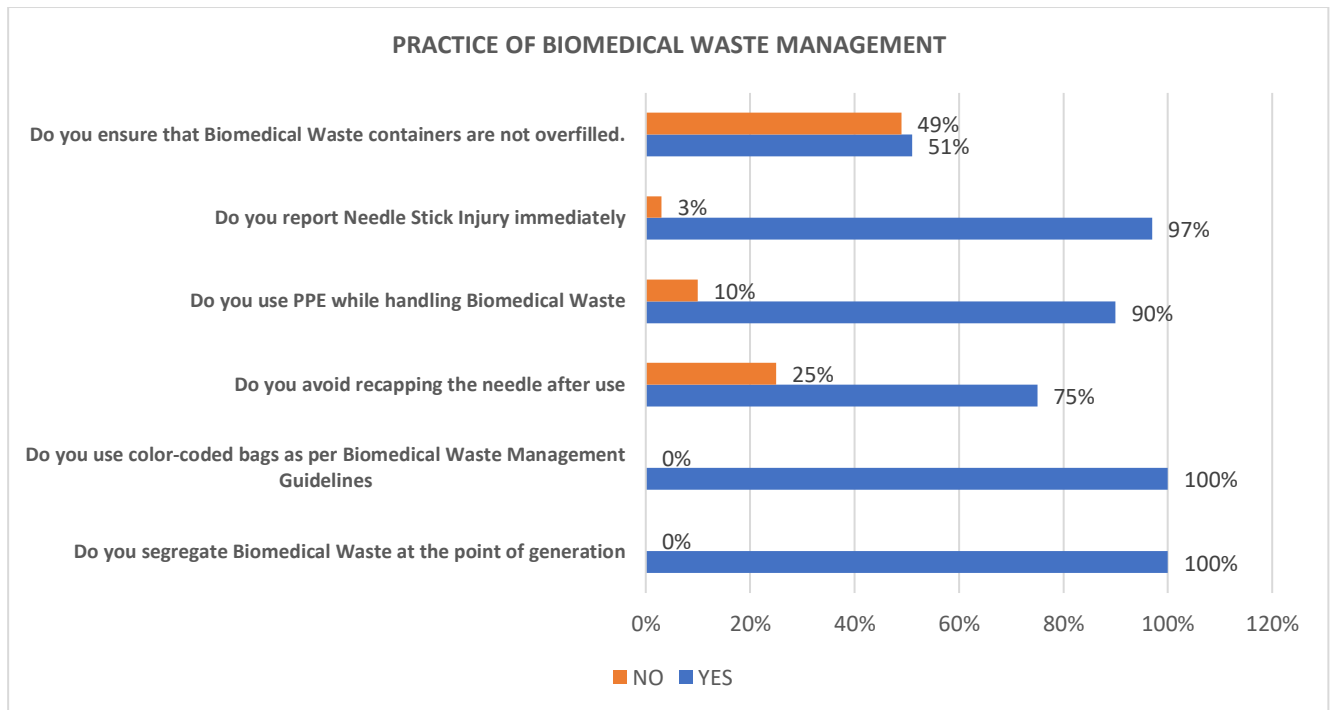


Figure 3: Practice of BMWM among nursing officers, (n=100).

DISCUSSION

The present study demonstrated a high overall level of knowledge, with 84% of nursing officers in the high category, 15% in the moderate category and only 1% in the low category. This proportion of high knowledge was greater than that reported by Krishnamurthy et al who found high knowledge in 24% and moderate knowledge in 63.3% of nurses.³ Prashanth et al also reported lower proportions in the higher knowledge categories, with 13% scoring excellent and 47% having average-to-good knowledge.⁸

A favourable attitude was observed in 93.4% of participants. Comparable positive attitudes towards BMWM have been reported by Malini and Eshwar and by Anand et al.^{9,10} In contrast, Mane et al reported that more than half of the staff nurses in their study perceived BMWM as an extra burden.¹¹ In the present study, 78% did not perceive BMWM as adding extra workload, suggesting broad acceptance of waste-management responsibilities as part of routine patient care.

Good practice was observed in 85.1% of participants, which was higher than the 60% reported by Haider et al and the 73.3% reported by Mathur et al.^{4,6} Despite this favourable overall finding, specific procedural gaps remained: only 75% reported avoiding needle recapping and only 51% ensured that waste containers were not overfilled. Safe sharps handling, appropriate filling of waste containers, use of personal protective equipment and segregation at source are core components of safe BMWM.^{12,13}

The overall pattern suggests a strong baseline for BMWM, but the remaining procedural gaps show that knowledge and favourable attitudes do not always translate into uniform practice. Periodic hands-on training and routine supervisory feedback may help reinforce consistent compliance.^{3,12,13}

Limitations

Because the data-collection tool was a self-administered questionnaire, the findings may be affected by social desirability and self-reporting bias. The study was conducted in a single multispeciality hospital; therefore, the findings may not be generalizable to nursing officers working in other health-care settings.

CONCLUSION

The study found high knowledge, a favourable attitude and generally good BMWM practice among nursing officers in Government General Hospital, Mahabubabad. Nevertheless, gaps in avoidance of needle recapping and prevention of overfilling of waste containers indicate areas requiring focused reinforcement. Periodic practical training and routine monitoring may help sustain knowledge and improve consistency of safe waste-management practices.

Recommendations

The hospital should ensure adequate infrastructure and manpower for BMWM, uninterrupted availability of correctly labelled colour-coded bins and personal protective equipment, and periodic training of nursing

officers and other personnel involved in waste handling. Regular monitoring and feedback should focus particularly on safe sharps practices and prevention of overfilling of biomedical waste containers.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee IEC/GMC-MHBD/2025/11

REFERENCES

1. Pinto VN, Joshi SM, Velankar DH, Mankar MJ, Bakshi H, Nalgundwar A. A comparative study of knowledge and attitudes regarding biomedical waste (BMW) management with a preliminary intervention. *Int J Med Public Health*. 2014;4:91-95.
2. Srivastava JN. Hospital Waste Management project at Command Hospital, Air Force, Bangalore. National Seminar on Hospital Waste Management: A report. 2000.
3. Krishnamurthy Y, Anandabaskar N, Venugopal V, Vimal M, Shanthi M. Predictors of biomedical waste management practices among staff nurses of a tertiary care teaching hospital in India. *J Educ Health Promot*. 2024;13:78.
4. Haider S, Kumari S, Kashyap V, Sunderam S, Singh SB. A study on knowledge and practice regarding biomedical waste management among staff nurses and nursing students of Rajendra Institute of Medical Sciences, Ranchi. *Indian J Community Health*. 2015;27(1):135-8.
5. Chudasama RK, Rangoonwala M, Sheth A, Misra SK, Kadri AM, Patel UV. Biomedical Waste Management: A study of knowledge, attitude and practice among health care personnel at tertiary care hospital in Rajkot. *J Res Med Dent Sci*. 2013;1(1):17-22.
6. Mathur V, Dwivedi S, Hassan MA, Misra RP. Knowledge, attitude, and practices about biomedical waste management among healthcare personnel: A cross-sectional study. *Indian J Community Med*. 2011;36(2):143-5.
7. Uddin MN, Islam MR, Yesmin K. Knowledge on hospital waste management among senior staff nurses working in a selected medical college hospital of Bangladesh. *J Waste Manag*. 2014;2014:573069.
8. Prashanth VK, Jadhav HC, Dodamani AS, Dodamani GA, Vishwakarma AP. Assessment of knowledge, attitude, and practices regarding awareness of biomedical waste management among health care personnel: A cross-sectional survey. *J Oral Health Community Dent*. 2015;11(1):8-12.
9. Malini A, Eshwar B. Knowledge, attitude and practice of biomedical waste management among health care personnel in a tertiary care hospital in Puducherry. *Int J Biomed Res*. 2015;6(3):172-6.
10. 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;4(10):4246-50.
11. Mane V, Nimbannavar SM, Yuvaraj BY. Knowledge, attitude and practices on biomedical waste and its management among health care workers at a tertiary care hospital in Koppal, Karnataka, India. *Int J Community Med Public Health*. 2016;3(10):2953-7.
12. Ministry of Environment, Forest and Climate Change, Government of India. Bio-Medical Waste Management Rules, 2016. Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i). G.S.R. 343(E). 2016;28.
13. Chartier Y, Emmanuel J, Pieper U, Prüss A, Rushbrook P, Stringer R, et al. Safe management of wastes from health-care activities. 2nd ed. Geneva: World Health Organization. 2014.

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