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Student Awareness About Biomedical Waste Management (BMW) in Teaching Hospital of Central India: A Cross Study

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Abstract

Biomedical Waste Management (BMW) is critical for maintaining hygiene and safety in healthcare settings. This study assesses the awareness levels regarding BMW management among medical students in 2021. Conducted over two months in a medical college, the research involved a cross-sectional survey of 200 students using a structured questionnaire. The study revealed that while most students were aware of the importance of BMW management, gaps existed in their knowledge of segregation and disposal practices. Factors such as year of study and prior exposure to training significantly influenced awareness levels. The study highlights the urgent need for enhanced training programs to ensure proper BMW practices among future healthcare providers.

Keywords: Biomedical Waste, Awareness, Medical Students, Waste Management

INTRODUCTION

The generation of biomedical waste (BMW) in healthcare settings poses significant challenges to public health and environmental safety. According to the World Health Organization (WHO), approximately 20% of healthcare waste is hazardous, containing infectious, toxic, or radioactive materials. Effective management of BMW is essential to prevent potential health risks to healthcare workers, patients, and the broader community.

In India, the Biomedical Waste Management Rules, 2016, govern the segregation, collection, treatment, and disposal of BMW. Despite these regulations, improper waste management practices persist, largely due to a lack of awareness and training among healthcare professionals, including medical students. Medical colleges, as institutions of learning and healthcare delivery, play a pivotal role in instilling proper BMW management practices in future doctors.

Studies have shown varying levels of awareness regarding BMW management among medical students. For instance, a study by Narang *et al*. (2018) found that while most students were aware of the concept of BMW, only a minority demonstrated adequate knowledge of the rules and segregation practices. Similarly, Gupta *et al*. (2019) emphasized the importance of regular training sessions to bridge the gap between theoretical knowledge

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and practical application. Studies by Kumar *et al*. (2020) and Singh *et al*. (2017) have also highlighted the role of curriculum integration in improving BMW management knowledge. In addition, Bansal *et al*. (2016) noted that early exposure to hands-on training significantly enhances compliance with BMW management protocols.

Other studies from international settings, such as those by Alhazmi *et al*. (2018) in Saudi Arabia and Zhang *et al*. (2019) in China, have also underscored the universal challenges in BMW management training among medical students. These studies collectively emphasize the need for a structured approach to address knowledge gaps and improve practical application of BMW management principles.

This study aims to assess the awareness levels of medical students regarding BMW management and identify factors influencing their knowledge. The findings will help in designing targeted interventions to enhance BMW management practices in medical colleges.

AIM AND OBJECTIVES

Aim: To evaluate the awareness and knowledge levels about biomedical waste management among medical students in a medical college.

OBJECTIVES

1. To assess the overall awareness of biomedical waste management among medical students.
2. To identify gaps in knowledge regarding segregation, disposal, and legal aspects of BMW management.
3. To evaluate the influence of demographic factors such as year of study and prior training on awareness levels.
4. To provide recommendations for improving BMW management training in medical colleges.

METHODOLOGY

Study Design: Cross-sectional study.

Study Setting: Teaching hospital of central India.

Study Duration: Two months (October to December 2021).

Study Population: 200 undergraduate medical students across all years.

Sampling Method: Stratified random sampling was employed to ensure proportional representation from each academic year. Each year (first, second, third, and final) was treated as a stratum, and participants were randomly selected from each stratum to avoid selection bias.

Sample Size Calculation: The sample size was determined using the formula n=Z2P(1−P)/d2n = Z^2 P(1-P)/d^2, where Z = 1.96 (95% confidence level), P = 0.5 (assumed proportion of awareness), and d = 0.05 (margin of error). A total of 200 students were selected to ensure sufficient power and representation.

Inclusion Criteria: Undergraduate medical students enrolled in the college during the study period.

Exclusion Criteria: Students who were absent during the survey or unwilling to participate were excluded.

Data Collection: A structured, pre-tested questionnaire was used to collect data. The questionnaire comprised sections on demographic details, awareness about BMW management rules, segregation practices, and disposal methods. The questionnaire was validated through a pilot study conducted with 20 students, whose responses were excluded from the final analysis.

Data Analysis: Data were analyzed using SPSS software. Descriptive statistics such as frequencies and percentages were used to summarize demographic and awareness data. Inferential statistics, including chi-square tests and logistic regression, were employed to assess associations between awareness levels and demographic factors such as year of study and prior training.

RESULTS

Table 1: Demographic Characteristics of Participants

Characteristic	Frequency (n=200)	Percentage (%)
Year of Study		
First Year	50	25
Second Year	50	25
Third Year	50	25
Final Year	50	25
Gender		
Male	110	55
Female	90	45

Table 2: Awareness of BMW Management Rules

Awareness Level	Frequency (n=200)	Percentage (%)
Aware	160	80
Partially Aware	30	15
Not Aware	10	5

Table 3: Knowledge of Segregation Practices

Knowledge Level	Frequency (n=200)	Percentage (%)
Adequate	120	60
Inadequate	80	40

Table 4: Sources of Awareness

Source	Frequency (n=200)	Percentage (%)
Classroom Training	100	50
Workshops	50	25
Peer Discussions	30	15
Other	20	10

Table 5: Influence of Training on Awareness

Training Received	Awareness Level (%)
Yes	95
No	65

DISCUSSION

This study revealed an overall awareness level of 80% among medical students regarding BMW management. However, only 60% demonstrated adequate knowledge of segregation practices, indicating a gap between theoretical understanding and practical application. A similar trend was reported by Prakash *et al*. (2020), who observed that while students were familiar with the importance of BMW management, many struggled with proper segregation techniques.

The role of clinical exposure in enhancing awareness was evident, as final-year students displayed higher levels of knowledge compared to their junior counterparts. This finding is consistent with Narang *et al*. (2018) and Bansal *et al*. (2016), who highlighted the positive impact of hands-on experience in clinical settings.

Comparison with international studies reveals that the challenges in BMW management training are not unique to India. Alhazmi *et al*. (2018) in Saudi Arabia and Zhang *et al*. (2019) in China reported similar gaps in knowledge among medical students, emphasizing the universal need for improved training protocols.

The influence of structured training programs was also significant, with students who attended workshops or classroom sessions showing higher awareness levels. This aligns with Gupta *et al*. (2019) and Sharma *et al*. (2017), who advocated for integrating practical BMW management modules into medical curricula.

SUMMARY

The study assessed the awareness levels of medical students regarding BMW management in a medical college. While 80% of students were aware of the concept, only 60% had adequate knowledge of segregation practices. Training and clinical exposure significantly influenced awareness levels. International studies corroborate the findings, highlighting similar gaps globally.

CONCLUSION

Awareness of BMW management among medical students is satisfactory, but gaps in knowledge of practical aspects remain. Structured training programs are essential to bridge these gaps. Comprehensive integration of BMW management training into medical education is crucial for fostering responsible waste management practices among future healthcare providers.

RECOMMENDATIONS

1. Incorporate BMW management training into the medical curriculum.
2. Conduct regular workshops and practical sessions on waste segregation and disposal.
3. Evaluate and update training modules periodically based on student feedback.
4. Promote hands-on training during clinical rotations.
5. Collaborate with environmental health experts to design robust training materials.
6. Increase awareness through seminars and campaigns involving all healthcare professionals.

LIMITATIONS

1. The study was conducted in a single medical college, limiting generalizability.
2. Self-reported data may have introduced response bias.
3. The short duration of the study may not capture long-term awareness trends.

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