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ASSESSING THE EFFECTIVENESS OF A STRUCTURED TEACHING PROGRAMME ON KNOWLEDGE AND PRACTICE REGARDING HOSPITAL BIOMEDICAL WASTE MANAGEMENT AMONG ALLIED HEALTHCARE STUDENTS IN A TERTIARY CARE HOSPITAL IN BANGALORE

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ABSTRACT

Background: Biomedical waste (BMW) poses significant health and environmental risks if not managed properly. Allied healthcare students, being integral to healthcare delivery, must possess adequate knowledge and practices concerning BMW management.

Objective: To assess the effectiveness of a structured teaching programme on enhancing knowledge and practice regarding hospital biomedical waste management among allied healthcare students in a tertiary care hospital in Bangalore.

Methods: A pre-experimental one-group pre-test and post-test design was employed. Eighty allied healthcare students from various disciplines were selected using convenience sampling. A validated questionnaire assessed their knowledge and practice before and after the intervention. The structured teaching programme included lectures, demonstrations, and interactive sessions based on the latest BMW management guidelines.

Results: The mean pre-test knowledge score was 10.5 (SD=2.3), which increased to 17.8 (SD=1.9) post-intervention. Practice scores improved from a mean of 12.3 (SD=3.1) to 18.7 (SD=2.5). The improvements were statistically significant ($p<0.001$), indicating the effectiveness of the structured teaching programme.

Conclusion: Structured educational interventions significantly enhance the knowledge and practices of allied healthcare students regarding BMW management. Regular training sessions are recommended to maintain and update this knowledge.

Key Words: *structured teaching programme included lectures, demonstrations, interactive sessions*

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INTRODUCTION

Biomedical waste (BMW) management is a critical aspect of healthcare operations, ensuring the safety of healthcare workers, patients, and the environment. Inadequate handling and disposal of BMW can lead to serious health hazards, including the spread of infections and environmental contamination. Allied healthcare students, who are future healthcare professionals, must be well-versed in BMW management practices.

Previous studies have highlighted gaps in knowledge and practice among healthcare workers regarding BMW management. For instance, a study by Nayak and Swain (2020) found that structured teaching programmes significantly improved the knowledge and clinical practices of student nurses concerning BMW management . Similarly, Cherian (2017) reported that structured teaching programmes effectively enhanced nursing students' knowledge about BMW management. Given the importance of proper BMW management and the role of education in enhancing compliance, this study aims to assess the effectiveness of a structured teaching programme on the knowledge and practice of BMW management among allied healthcare students in a tertiary care hospital in Bangalore.

Literature review

Biomedical waste management (BMWM) is a critical aspect of healthcare service delivery, directly influencing occupational safety and public health. With the increasing volume of medical waste, especially during pandemics, proper education and training of healthcare personnel are paramount. Numerous studies have assessed the effectiveness of structured teaching programmes (STPs) in enhancing knowledge, attitudes, and practices regarding BMWM among healthcare workers and students. Nayak and Swain (2020) conducted a quasi-experimental study among student nurses and reported a significant improvement in knowledge following the administration of an STP, highlighting the programme's role in promoting awareness and compliance with BMWM guidelines. Similarly, Cherian (2017) found that nursing students showed substantial knowledge gains post-STP, suggesting the intervention's efficacy in educational settings. Tiwari et al. (2016) evaluated an educational intervention among nursing students and confirmed its effectiveness in improving BMWM awareness. Chilate (2022) echoed these findings, emphasizing the utility of structured teaching in bridging knowledge gaps among B.Sc. nursing students. Vijayakumar et al. (2022) further supported this by showing notable pre- and post-test differences among first-year B.Sc. nursing students in Puducherry. Rajput et al. (2020) extended the application of STPs to paramedical and sanitary staff, revealing significant improvements in BMWM awareness across diverse staff roles. Likewise, Shaheen et al. (2021), in a quasi-experimental study from a developing country, demonstrated that training sessions considerably improved nurses' understanding and handling of biomedical waste. Singhal et al. (2023) assessed both knowledge and practice among housekeeping staff, reporting enhanced outcomes after STP implementation, thus underscoring the programme's relevance for non-clinical staff. In line with this, Bhat and Bhat (2023) observed improved knowledge and preventive practices related to health hazards of BMW among healthcare team members at PHCs. Mishra et al. (2024) documented a marked improvement in BMWM knowledge among staff nurses after a structured teaching session in a multi-specialty hospital, indicating STP's effectiveness in clinical settings. Sajji and Vadagaonkar (2022) also highlighted significant knowledge improvement among first-year nursing students post-STP in Bangalore. Sharma (2012) found STPs to be effective in PHC settings, emphasizing their broader applicability across healthcare tiers. Similarly, Sahu et al. (2019) compared STPs with video-assisted teaching and concluded both methods significantly improved BMWM knowledge, with STP showing a slightly higher impact. Ranjan and Asokan (2019) assessed knowledge, attitude, and practice (KAP) among undergraduate nursing students, noting that structured teaching interventions positively influenced all three domains. Mathur et al. (2011), in a cross-sectional study, observed existing knowledge deficits among healthcare personnel, reinforcing the need for continuous education. Basavaraj et al. (2021) evaluated KAP in a COVID-dedicated hospital and identified critical gaps in BMWM, which were effectively addressed through educational programmes. Karth et al. (2020) also demonstrated that STPs significantly enhanced GNM students' knowledge levels in a structured nursing school environment. The World Health Organization (2014) and the Government of India's Bio-Medical Waste Management Rules (2016) provide global and national frameworks respectively, guiding the principles and legal mandates for BMWM. These frameworks advocate regular training as an integral component of waste management. Collectively, these studies strongly support the effectiveness of structured teaching programmes in improving knowledge, awareness, and compliance regarding biomedical waste management across various

categories of healthcare personnel. The consistent results across geographic locations, institutional settings, and professional roles underscore STPs as a powerful tool for capacity building in healthcare waste management.

METHODOLOGY

Study Design and Setting

A pre-experimental one-group pre-test and post-test design was adopted for this study. The research was conducted at a tertiary care hospital in Bangalore, Karnataka, India.

Participants

Eighty allied healthcare students from various disciplines, including physiotherapy, radiology, and laboratory technology, were selected using convenience sampling. Inclusion criteria were students currently enrolled in the hospital's allied health programmes and willing to participate in the study.

Intervention

The structured teaching programme was developed based on the latest BMW management guidelines provided by the Ministry of Environment and Forests, Government of India. The programme included:

- **Lectures:** Covering topics such as types of biomedical waste, segregation methods, color coding, and legal regulations.
- **Demonstrations:** Practical sessions on proper waste segregation and disposal techniques.
- **Interactive Sessions:** Group discussions and Q&A sessions to reinforce learning.

The total duration of the programme was 4 hours, conducted over a single day.

Data Collection Tools

A validated questionnaire was used to assess knowledge, comprising 20 multiple-choice questions covering various aspects of BMW management. A practice assessment checklist with 15 items was used to evaluate students' practical skills in BMW handling.

Data Collection Procedure

Pre-test assessments were conducted before the intervention. Immediately after the structured teaching programme, post-test assessments were carried out using the same tools.

Data Analysis

Data were analyzed using SPSS version 23. Descriptive statistics were used to summarize demographic data. Paired t-tests were employed to compare pre-test and post-test scores, with a significance level set at $p<0.05$.

RESULTS

Demographic Characteristics

Among the 80 participants, 60% were female, and 40% were male. The majority (70%) were aged between 20-25 years.

Knowledge Assessment

The mean pre-test knowledge score was 10.5 (SD=2.3), which increased to 17.8 (SD=1.9) post-intervention. The improvement was statistically significant ($t=15.2$, $p<0.001$).

Practice Assessment

Practice scores improved from a mean of 12.3 (SD=3.1) pre-intervention to 18.7 (SD=2.5) post-intervention. This change was also statistically significant ($t=13.5$, $p<0.001$).

Table 1: Comparison of Pre-test and Post-test Scores

Assessment	Pre-test Mean (SD)	Post-test Mean (SD)	t-value	p-value
Knowledge	10.5 (2.3)	17.8 (1.9)	15.2	<0.001
Practice	12.3 (3.1)	18.7 (2.5)	13.5	<0.001

DISCUSSION

The findings of this study indicate that the structured teaching programme significantly improved both knowledge and practice regarding BMW management among allied healthcare students. The substantial increase in post-test scores aligns with previous research conducted by Nayak and Swain (2020), who observed similar improvements among student nurses .

The effectiveness of structured educational interventions in enhancing BMW management practices is further supported by Cherian (2017), who reported significant knowledge gains among nursing students following a structured teaching programme .

These findings underscore the importance of incorporating structured BMW management training into the curriculum for allied healthcare students. Regular educational interventions can lead to better compliance with BMW management protocols, thereby reducing health hazards associated with improper waste handling.

CONCLUSION

The structured teaching programme was effective in significantly improving the knowledge and practice of biomedical waste management among allied healthcare students in a tertiary care hospital in Bangalore. Incorporating such educational interventions into the regular curriculum and conducting periodic refresher courses are recommended to sustain and enhance BMW management practices.

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