

Assessment of Healthcare Personnel's Knowledge, Attitudes, and Practices in Biomedical Waste Management: A Cross-Sectional StudyAjay Krishna¹, Aishwarya Krishna², Shalini³, Ankit Krishna⁴¹Associate Professor & H.O.D, Department of Community Medicine (PSM), Patna Medical College, Bihar, India²PG-3, Department of Pathology, Patna Medical College, Bihar, India³Senior Lecturer, Department of Pedodontics and Preventive Dentistry, Teerthanker Mahaveer Dental College and Research Centre, Moradabad, Uttar Pradesh, India⁴PG Resident, Department of Periodontology, Armed Forces Medical College, Pune, Maharashtra, India

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Corresponding Author: Ajay Krishna

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Abstract:

Background: The waste generated during healthcare endeavors possesses a heightened propensity for infection and harm in comparison to all other forms of waste. Insufficient and unsuitable understanding of the proper management of healthcare waste can potentially result in severe health implications and exert a notable influence on the surrounding ecosystem. The primary objective of this study was to estimate the level of knowledge, attitude, and adherence to proper practices among healthcare professionals, including nurses, doctors, sanitary staff, and laboratory technicians, in relation to the management of biomedical waste.

Materials and Methods: The investigation was conducted as a cross-sectional study. The present study was conducted within the healthcare facilities of Patna city, specifically focusing on hospitals with a bed capacity exceeding 50. The medical personnel comprised of 70 physicians, 50 registered nurses, 68 laboratory technicians, and 60 members of the sanitary staff.

Results: The level of experience that healthcare professionals, such as nurses, laboratory technicians, and physicians, possess in the field of biomedical waste management is far higher than that of sanitary workers. The nurses and laboratory staff exhibited a higher level of understanding with regards to the color coding and waste segregation at the source, in comparison to the doctors. In relation to the practices concerning the management of biomedical waste, it was observed that the sanitary personnel exhibited a lack of knowledge and awareness across all aspects. Nevertheless, there was a notable paucity in injury reporting among all cohorts of healthcare practitioners.

Conclusion: The significance of training pertaining to biomedical waste management necessitates emphasis, as insufficiency in comprehensive understanding of biomedical waste management adversely affects the implementation of suitable waste disposal procedures.

Keywords: Biomedical waste management, medical professionals, hospital

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Introduction

Healthcare services, in their pursuit of enhancing health outcomes, inadvertently engender waste that may potentially give rise to health hazards. The generation of biomedical waste during healthcare activities is associated with a heightened risk of infection and injury in comparison to other forms of waste. Insufficient understanding regarding the management of healthcare waste can lead to significant health and environmental ramifications. India's annual production of hospital waste is estimated to be around 0.33 million tonnes, with a daily range of 0.5 to 2.0 kg per bed. The implementation of techniques that are both safe and reliable for the administration of biomedical waste

is of the utmost importance, regardless of the causal factors that may be responsible for it [1]. The implementation of efficient management practices is not solely confined to fulfilling legal mandates, but also encompasses a broader societal responsibility.

Despite the presence of regulatory measures such as the Biomedical Waste (Management and Handling) Rules, 1998 [2], the complete execution of these provisions continues to pose a formidable obstacle in addressing the repercussions associated with perilous and contagious medical refuse. Insufficient implementation of appropriate waste management practices, limited understanding regarding the potential health risks linked to biomedical waste,

insufficient allocation of financial and personnel resources, and suboptimal regulation of waste disposal are notable concerns within the realm of healthcare waste management [3]. The failure to adhere to appropriate waste management practices exacerbates the perilous consequences of these waste materials on both the populace and the ecosystem, thereby impacting patients, healthcare professionals (comprising physicians, nurses, and sanitation personnel), as well as the general public.

Despite the growing knowledge among healthcare professionals throughout the world regarding the risks and the proper management approaches, it is important to emphasize that India's level of awareness in this regard continues to be below ideal [4-6]. Sufficient comprehension regarding the potential health risks associated with hospital waste, appropriate methodologies and protocols for waste management, and the enforcement of precautionary measures are imperative for the secure elimination of perilous hospital waste and the safeguarding of the community against detrimental consequences.

The main objective of the research was to assess the level of knowledge, attitudes, and practices demonstrated by medical professionals, such as nurses, doctors, sanitation staff, and laboratory technicians, with regard to the management of biomedical waste. This evaluation was conducted in light of the context that was mentioned earlier.

Methodology

The cross-sectional study was led as a component of a broader evaluation on the administration of biomedical waste in healthcare facilities located in Patna city, specifically focusing on hospitals with a bed capacity exceeding 50.

The study encompassed a duration of 02 months and included healthcare personnel from diverse

departments within the hospital setting. The study encompassed a cohort of 280 healthcare professionals, yielding an impressive response rate of 92%. The study cohort comprised of 70 physicians, 50 registered nurses, 68 laboratory technicians, and 60 sanitation personnel.

All participants underwent interviews and observations to assess their adherence to biomedical waste management protocols.

Structured interviews and observations were led utilizing pre-established questionnaires and checklists. Stringent data quality control measures were implemented, encompassing meticulous scrutiny of logical coherence, strict adherence to skip patterns, and meticulous identification of absent values.

Following the data collection process, the acquired data underwent coding and were meticulously recorded into a relational database using Microsoft Access 2000. The interface for entering data was carefully built to ensure that referential integrity is maintained, that any instances of missing values are identified, and that acceptability requirements are adhered to. Any identified errors encountered during this process were expeditiously communicated back to the field for rectification.

Result

In the urban locality of Patna, a majority of healthcare facilities, encompassing both governmental and privately-owned establishments, as well as nursing homes, have adopted a shared private service provider for the purpose of healthcare waste collection, management, and disposal. Periodically, the aforementioned healthcare provider organizes educational sessions for healthcare personnel pertaining to the management of biomedical waste.

Table 1: Healthcare workers' attitudes and knowledge about biomedical waste management

Knowledge regarding biomedical waste	Doctors	Nurses	Laboratory technicians	Sanitary staff
Biomedical waste management rules	67	54	65	17
Color coding for waste containers	68	55	72	28
Segregation of waste at source	60	50	60	25
Disinfection of hospital waste before disposal	65	46	61	31
Transmission of disease through biomedical waste	60	54	58	18

Upon analysis of the gathered data, it was observed that healthcare professionals, including doctors, nurses, and laboratory technicians, exhibited a higher level of proficiency in the domain of biomedical waste management in comparison to the sanitary staff. Healthcare professionals, specifically nurses and lab technicians, exhibited a more comprehensive comprehension of color coding and the practice of segregating waste at its origin in contrast to physicians. Based on the data provided in

Table 1, it is evident that only a modest 26% of the sanitary personnel exhibited knowledge pertaining to the possible transmission of diseases via biomedical waste.

In relation to the current practices pertaining to the management of biomedical waste, it has been observed that the sanitary personnel exhibit a general lack of knowledge and understanding. Notably, there were no reported instances of injuries

among the sanitation personnel due to the improper disposal of waste. Nevertheless, the incidence of injury reporting was consistently low across various cohorts of healthcare professionals.

Discussion

The investigation employed a pre-established and pre-validated survey instrument, and a cross-sectional research design was implemented due to its utilization in previous investigations [4, 6, 7]. High levels of awareness regarding biomedical waste management regulations were observed among technically qualified individuals, including doctors, nurses, and laboratory personnel. However, the level of knowledge was observed to be comparatively lower among the sanitary staff, a trend that is consistent with the findings reported in previous studies [4, 8].

In a similar vein, the comprehension of color coding for containers and waste segregation, both of which are pivotal components of waste management, exhibited greater proficiency among personnel possessing technical qualifications as opposed to those with sanitary backgrounds. The lower knowledge level can be attributed to inadequate training opportunities and the relatively lower educational background of sanitary staff. It's crucial to provide training for both technical and non-technical staff to ensure proper biomedical waste management [4, 6].

In relation to the documentation of injuries resulting from the inadequate disposal of biomedical waste, the incidence was notably minimal among personnel of a technical nature, while it was entirely absent among personnel responsible for sanitation. In a study conducted by Stein *et al.* [9], it was observed that a mere 37% of healthcare professionals, including doctors and nurses, acknowledged having encountered a needle stick injury at some point in their professional careers. The underreporting of injuries may be attributed to a lack of awareness among medical practitioners and personnel, encompassing both technical and non-technical staff, regarding the existence of a structured mechanism for injury reporting. It is imperative that all healthcare establishments establish a formal system for reporting injuries.

Conclusion

Based on the findings, it is evident that the significance of training in the context of biomedical waste management cannot be overstated. Insufficient and incomplete understanding of biomedical waste management has a direct influence on the implementation of suitable waste disposal procedures.

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