A Study on Hospital Waste Management Practices Among Healthcare Employees

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***Abstract*—Biomedical waste management is a critical aspect of healthcare services, as improper handling can cause serious health and environmental risks. This study assessed the knowledge, attitudes, and practices of healthcare workers regarding biomedical waste management among 120 hospital employees using a structured questionnaire and observation. Key areas included waste segregation, color coding, use of personal protective equipment (PPE), and disposal methods.Results showed that most participants had adequate knowledge and positive attitudes. A majority recognized the importance of proper waste segregation in reducing pollution and maintaining hygiene. Most had received training and felt confident in handling biomedical waste. However, there was a need for periodic refresher training and increased awareness.In conclusion, continuous training, supervision, and effective policy implementation are essential for safe waste management.**

I. INTRODUCTION

Hospitals play a vital role in maintaining public health but generate significant amounts of hazardous waste, including infectious materials, sharps, chemicals, and pharmaceuticals. Improper handling of such waste poses serious risks to healthcare workers, patients, the community, and the environment. Therefore, effective biomedical waste management is essential to ensure safety, hygiene, and environmental protection.Biomedical waste management involves proper segregation, collection, transportation, treatment, and disposal in accordance with established guidelines. Healthcare workers—including doctors, nurses, laboratory staff, and housekeeping personnel—are key to implementing these practices, and their knowledge and compliance directly affect outcomes.Despite existing regulations, challenges such as inadequate training, improper segregation, and non-compliance persist. This study aims to assess the knowledge and practices of hospital employees regarding biomedical waste management to identify gaps and improve safety and efficiency.

II. REVIEW OF LITERATURE

Das, S.K. and Romy Biswas, R.B., 2016.
Biomedical waste management is a critical component of hospital infection control and environmental safety. A cross-sectional study conducted among 198 healthcare workers in a tertiary care hospital assessed their knowledge and practices related to biomedical waste management. Although all participants were aware of biomedical waste management, only a very small proportion had received formal training. Knowledge regarding color-coded segregation and correct disposal of sharps was found to be inadequate. While most healthcare workers reported using personal protective equipment, observational findings revealed improper practices such as reuse of syringes and inconsistent segregation of waste. The study highlighted significant gaps between knowledge and actual practices, emphasizing the need for regular training programs and strict enforcement of biomedical waste management guidelines to improve compliance among healthcare providers.Das, S.K. and Romy Biswas, R.B., 2016. Awareness and practice of biomedical waste management among healthcare providers in a Tertiary Care Hospital of West Bengal, India.
Al-Khatib, I. A. (2025).
A study conducted at a charitable hospital in Palestine

assessed hospital waste generation, characterization, and management practices. The hospital generated an average of 3.8 kg of solid waste per bed per day, with 1.38 kg being medical waste. The study revealed peak waste generation times and highlighted significant deficiencies in waste management practices, including inadequate segregation, improper disposal of medical waste alongside general waste, insufficient collection and storage methods, and limited financial and human resources. These findings underscore the importance of proper segregation, resource allocation, and adherence to World Health Organization guidelines for effective hospital waste management.Al-Khatib, I. A. (2025). Hospital waste management and generation in a Palestinian charitable hospital. Arabian Journal for Science and Engineering, 50(3), 1871-1883.

P Akkajit, H Romin, M Assawadithalerd (2020).
A cross-sectional study conducted among healthcare workers in various clinics in Phuket, Thailand assessed knowledge, attitudes, and practices related to medical waste management. The study reported high levels of knowledge, positive attitudes, and good practices among respondents, with more than half having received prior training. Significant positive correlations were observed between knowledge, attitude, and practice, indicating that improved awareness translated into better waste management behavior. Work experience was identified as an important factor influencing proper practices. Despite favorable findings, the study emphasized the need for effective waste collection and transfer systems by local authorities to minimize environmental pollution and occupational health risks.c. Assessment of knowledge, attitude, and practice in respect of medical waste management among healthcare workers in clinics. Journal of environmental and public health, 2020(1), 8745472

III. RESEARCH METHODOLOGY AND DESIGN

Restatement of the problem
Purpose of the research was to study the hospital waste management practices among healthcare employees.

Research objectives

- To study the awareness of employees about waste segregation and color-coding system.
- To examine the attitude of hospital staff toward safe waste management practices.
- To identify the practices followed by employees in the collection, storage, and disposal of hospital waste.
- To assess the training and awareness programs provided to employees on waste management.

Hypothesis
Let H0 be that no significant difference between factors considering while segregation and color coding based on designation.

Let H1 be that There is a significant difference between factors considering whiles segregation and color coding based on designation.

III. RESEARCH DESIGN

Research design is created on the basis of research objectives that include descriptive research, exploratory and causal. Exploratory research is unstructured and is undertaken when a situation is vague, new and very little is known about the same and makes use technique like secondary resource analysis, case study method, expert opinion method, observation in depth interview and focus groups. Causal research establishes between two variables and in order to make this relationship, experiments need to be carried out.

1. Data source: Primary research
2. Tools: Questionnaire, Survey method
3. Analysis:To analyse the factors that the training impact on waste management practices

IV. RESEARCH METHODOLGY

This paper makes use of descriptive research. Descriptive research aims to accurately and systematically describe a population, situation, or phenomenon. Descriptive research was undertaken to give a detailed profile of the population under study to find out about the reasons as employees come across regular training which impact waste management practices.
4.Data Analysis
ANNOVA Analysis of segregation and color coding based on designation of the respondent.
NULL HYPOTHESIS (H0): There is no significant difference between factors considering while

segregation and color coding based on designation.

ALTERNATIVE HYPOTHESIS (H1): There is a significant difference between factors considering whiles segregation and color coding based on designation.

		Sum of Squares	df	Sig.
Separate different categories of waste	Between Groups	.156	4	.532
	Within Groups	5.539	113	
	Total	5.695	117	
Different color coding waste bins	Between Groups	.156	4	.532
	Within Groups	5.539	113	
	Total	5.695	117	
Waste segregation reduction	Between Groups	.846	4	.262
	Within Groups	17.934	113	
	Total	18.780	117	
Waste segregation responsibility	Between Groups	.448	4	.133
	Within Groups	7.010	113	
	Total	7.458	117	

INTERPRETATION

Since the significance (p-values) for all factors—separate different categories of waste (0.532), different color coding of waste bins (0.532), waste segregation reduction (0.262), and waste segregation responsibility (0.133)—are greater than the standard level of significance (0.05), the null hypothesis is accepted.

This indicates that there is no significant difference in respondents' perceptions regarding waste segregation practices based on the grouping variable. In other words, respondents across all groups exhibit similar views and behaviors in terms of separating waste, using color-coded bins, reducing waste through segregation, and taking responsibility for waste management.

ANOVA Analysis of Disposal method Based on Years of experience

NULL HYPOTHESIS (H0):

There is no significant difference in Disposal method Based on Years of experience

ALTERNATIVE HYPOTHESIS (H1):

There is a significant difference in Disposal method Based on Years of experience.

TABLE: ANOVA RESULTS FOR DISPOSAL METHOD

		Sum of Squares	df	Sig.
ppe facilities provided	Between Groups	.445	3	.317
	Within Groups	14.345	115	
	Total	14.790	118	
maximum disposal time	Between Groups	2.077	3	.027
	Within Groups	25.083	115	
	Total	27.160	118	
Disposal of cytotoxic drugs	Between Groups	1.143	3	.054
	Within Groups	16.705	115	
	Total	17.849	118	
Aware of HIV/AIDS transmitted	Between Groups	1.873	3	.083
	Within Groups	31.539	115	

	Total	33.412	118	
Neccessary of PPE handling	Between Groups	1.129	3	.011
	Within Groups	11.224	115	
	Total	12.353	118	
Disinfection of bio medical waste	Between Groups	2.077	3	.027
	Within Groups	25.083	115	
	Total	27.160	118	

INTERPRETATION

Since the significance (p-values) for PPE facilities provided (0.317), disposal of cytotoxic drugs (0.054), and awareness of HIV/AIDS transmission (0.083) are greater than the standard level of significance (0.05), the null hypothesis is accepted for these factors. This indicates that there is no significant difference among the groups in terms of perceptions regarding PPE availability, cytotoxic drug disposal, and awareness of HIV/AIDS transmission.

However, the p-values for maximum disposal time (0.027), necessity of PPE handling (0.011), and disinfection of biomedical waste (0.027) are less than 0.05, indicating that the null hypothesis is rejected for these variables. This suggests that there is a statistically significant difference among the groups with respect to maximum disposal time, the necessity of PPE handling, and disinfection practices.

Overall, the results reveal that while respondents show similar perceptions in some areas of biomedical waste management, significant differences exist in critical operational aspects such as disposal time, PPE necessity, and disinfection practices.

CORRELATION

NULL HYPOTHESIS(H0): There is no relationship difference between achieving a waste collected regularly and received regular training.

ALTERNATIVE HYPOTHESIS(H1): There is a relationship difference between achieving a waste collected regularly and received regular training.

CORRELATIONS

Correlations			
		Waste collected regularly	Received regular training
Waste collected regularly	Pearson Correlation	1	.331**
	Sig. (2-tailed)		.000
	N	119	119
Received regular training	Pearson Correlation	.331**	1
	Sig. (2-tailed)	.000	
	N	119	119
**. Correlation is significant at the 0.01 level (2-tailed).			

INTERPRETATION

The correlation analysis shows that the Pearson correlation value is 0.331 and the significance value (p = 0.000) is less than the significance level of 0.05. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. There is a significant positive relationship between waste collected regularly and receiving regular training. This indicates that regular training helps improve the regular collection of waste

V. CONCLUSION

The present study assessed the knowledge, attitudes, and practices of healthcare workers regarding biomedical waste management among 120 respondents. The findings revealed that most participants had a good level of awareness about

important aspects of biomedical waste management, including waste segregation, color coding of waste bins, safe disposal methods, and the importance of using personal protective equipment (PPE). A large proportion of respondents strongly agreed that proper waste segregation reduces environmental pollution, improves hygiene, and enhances the quality of healthcare services.

The study also found that the majority of healthcare workers received regular training and felt confident in handling biomedical waste after training sessions. Additionally, many respondents expressed the need for refresher training and more awareness programs to further strengthen their knowledge and practices.

Based on these findings, it can be concluded that although healthcare workers demonstrate good knowledge and positive attitudes toward biomedical waste management, continuous training, proper supervision, and strict implementation of waste management guidelines are necessary to maintain and further improve safe waste handling practices in healthcare settings. Effective biomedical waste management is essential for protecting healthcare workers, patients, the community, and the environment.

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