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Impact of Structured Teaching Programme on Biomedical Waste Management

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Abstract: ***Improper handling and disposal of healthcare waste can pose grave risks to both human health and the environment. This study, conducted at a prominent academic hospital in Hyderabad, sought to assess the impact of structured teaching programme on biomedical waste management among hospital staff in pre and post-operative wards. Quasi experimental research design is employed for the study purpose where 30 participants were randomly selected from pre and post- operative wards. Findings indicated that the surveyed staff exhibited an average level of knowledge concerning biomedical waste management. However, the implementation of a targeted teaching program led to a notable improvement in post-test knowledge scores compared to pre-test scores, underscoring the effectiveness of such initiatives. Paired t-test gave a significant result indicating structured teaching programme has improved the knowledge level of staff on bio medical waste management. This study highlights the pressing necessity to equip hospital staff in pre and post-operative wards with up-to-date training on biomedical waste management. Enhanced awareness is crucial, as inadequate comprehension of proper waste disposal practices can undermine the overall quality of healthcare waste management, compromising patient safety and environmental integrity.***

Keywords: Biomedical waste, Hospital staff, Structured teaching programme, Pre & Post-Operative wards, Academic Hospital

1. Introduction

Biomedical waste encompasses all waste generated during the process of diagnosing, treating, or immunizing human beings, as well as research activities related to the production or testing of human anatomical waste, animal waste, microbiology and biotechnology waste, discarded medical equipment, sharps, unused medicines, cytotoxic drugs, solid and liquid waste, incineration residue, and chemical waste.

The waste generated within the realm of healthcare providers possesses a heightened potential for infection and injury, surpassing that of any other waste category. Hence, it is imperative to establish a secure and dependable approach for its management. Inadequate and improper handling of healthcare waste can lead to severe ramifications for public health and wield a substantial adverse impact on the environment. Effectively addressing healthcare waste management is thus an indispensable facet of safeguarding both environmental health and human well-being.

The responsible management of hospital waste assumes paramount importance, necessitating the collective efforts of healthcare professionals. Those working within these medical institutions shoulder the critical responsibility of safeguarding both their own well-being and the environment. They undertake stringent safety measures to minimize the risk of potential hazards, such as needle stick injuries and the improper disposal of chemicals. Rigorous training and heightened awareness campaigns equip healthcare workers with the knowledge and tools required to navigate the intricate landscape of waste management. Risk assessments guide decision-making processes, while proactive measures are taken to prevent and mitigate any potential adverse outcomes.

The hospital staff of pre and post-operative wards play crucial and indispensable role in effectively managing waste within healthcare facilities. They adhere diligently to safety protocols and universal precautions guidelines to mitigate the risk of needle stick injuries, chemical exposure, and contact with body fluids. Through comprehensive training and awareness programs, these professionals are equipped with the knowledge and skills needed to prevent incidents and ensure the safe disposal of waste.

2. Literature Survey

Diwan T et al (2023) aimed to evaluate the management of biomedical waste in a tertiary care hospital for which a sample of 105 healthcare workers were interviewed for the assessment, selected through simple random sampling, using a pre-designed semi-structured questionnaire. Among the healthcare workers surveyed, it was observed that medical staff exhibited a higher level of knowledge, a more positive attitude, and better practices related to biomedical waste management compared to paramedical professionals and non-medical workers.

Riyaz A. Shaik (2023) aimed to evaluate the awareness and understanding of health concerns related to biomedical waste disposal among a sample of 50 staff nurses at a tertiary hospital. A semi-structured questionnaire was employed during participant interviews, collecting data on demographic factors like age, religion, monthly family income, family type, marital status, prior exposure to biomedical waste

management education, and the sources of their knowledge. The results revealed that most participants had an adequate level of knowledge (82%), with a smaller proportion demonstrating moderate knowledge (18%). None of the nurses displayed inadequate knowledge in this area.

Chauhan A et al (2022) examines the impact of a structured teaching program on nursing students' knowledge concerning biomedical waste management. Quantitative research approach by applying pre experimental one group pre-test, post-test used for the study purpose. The post test score (15.5) was found to be significant than the pre test knowledge (11.1). Chi-square value also revealed that there is significance association between knowledge of students regarding bio-medical waste management and socio demographic variables.

To assess the knowledge and practices related to biomedical waste management, a descriptive study was conducted by Yadav R et al (2022) with 50 healthcare professionals at a tertiary care hospital in Lucknow. The results indicated that 70% of the participants possessed adequate knowledge, while 30% had moderate knowledge. None had inadequate knowledge. However, the study revealed variations in awareness and practices among different healthcare worker categories, emphasizing the need for comprehensive training programs on waste handling, segregation, transportation, storage, and final disposal to address this pressing issue effectively.

A study conducted by Gupta M & Chhabra A. (2016) gives insights on the knowledge, attitudes and practices of healthcare professionals in the context of biomedical waste management. The authors conducted before and after interventional study on 150 participants. Planned teaching and audiovisual presentation applied for assessment. Their findings revealed that senior doctors' and junior doctors' knowledge of biomedical waste management is significant when compared to nursing and sanitary staff.

3. Methodology

Objectives of Research

- To assess the knowledge of biomedical waste management among the staff of pre and post -operative wards of the teaching hospital by conducting a pre- test.
- To conduct a structured teaching programme among hospital staff of pre and post- operative wards on biomedical waste management.
- To assess the knowledge of biomedical waste management among hospital staff of pre and post -operative wards after structured teaching programme by post-test.

Research Design: The study is conducted in an academic hospital in Hyderabad. Quasi experimental design with one group pre-test and post-test design is used for the study purpose. Pre-test and post-test design used to test the knowledge of staff working in pre and post-operative wards, before and after intervention of independent variable.

Sampling Technique: Purposive sampling technique was adopted for the present study.

Population: Population consists of hospital staff of pre and post-operative wards of academic hospital in Hyderabad.

Sample : The sample for the present study consists of 30 staff members working in pre and post-operative wards of the study hospital, at the time of data collection.

Criteria for sample selection

Inclusive criteria:

- Hospital staff working in pre and post-operative wards of the study hospital and available during study time.
- Hospital staff of pre and post-operative wards, willing to participate in the study.

Exclusive criteria:

- The study excludes the lift workers, lab technicians and staff working in departments other than pre and post-operative wards.

Data Collection: Primary data is collected through a structured questionnaire administered to the staff before and after introduction of the independent variable. Questionnaire is designed based on Likert five point rating scale. Check list is also used for observing biomedical waste management practices of hospital staff.

Structured questionnaire consisted two parts: part A & part B. Part A had demographic data. Part B consisted 4 sections. Section A with17 questions, relating to introduction of bio-medical waste management. Section B had 13 questions, related to concepts and standards of bio-medical waste management. Section C had 13 questions relating to treatment and safety practices on bio-medical waste management and section D consisted of 7 items, related to role of health care personnel on bio-medical waste management.

The structured teaching plan consisted of various aspects on Bio-medical waste management like introduction, concepts and standards, treatment and safety practices and role of health care personnel in bio-medical waste management.

The teaching plan was organized in sequence and in continuity. Teaching plan was prepared with a view to enhance the knowledge of hospital staff working in pre and post-operative wards with respect to Bio-medical waste management.

The study was conducted in the academic hospital in Hyderabad. Data of pretest was analyzed and structured teaching programme was administered to the hospital staff of pre and post -operative wards. Post -test was given 4 days after structured teaching programme.

Variables of the study: The following variables are considered for the study purpose:

Independent variable: Independent variable is 'structured teaching programme' on biomedical waste management.

Dependent variable: Dependent variable is 'knowledge' of pre and post- operative ward staff on biomedical waste management.

Extraneous variables: The extraneous variables which could influence the knowledge of the hospital staff of pre and post- operative wards include age, religion, basic education, duration of experience and any previous exposure to bio medical waste management.

Pre-test and Post-test

In this study a total sample of 30 is considered as one group, pretested for 'knowledge' on bio medical waste management, and the knowledge score is measured. After pretest, the independent variable is introduced to the complete sample of 30, irrespective of the measured score of pre- test. The dependent variable 'knowledge' is tested, before and after intervention with an independent variable, that is 'structured teaching programme'. The effectiveness of the independent variables is tested with that of the post-test after 10 days.

Results & Discussion

Descriptive statistics like frequencies, percentages, mean, variance and inferential statistical method of paired t-test is applied to understand, if there is any significant impact of structured teaching programme on knowledge levels of pre and post-operative wards staff. Excel Analysis tool pack is used for the analysis purpose.

Table 1: Pre and post- operative wards staff distribution as per education

Education	Frequency	Percentage of employees
MBBS	5	16
B.Sc Nursing	15	50
BPT	1	4
ANM,GNM	3	10
Intermediate	3	10
10^{TH} Class	3	10
Any other	0	0

From table 1 it is very clear that 50% of them are having B.Sc nursing degree, 16% MBBS doctors followed by ANM, GNM, Intermediate and 10^{th} class category of 10% each.

Table 2: Pre and post-operative wards staff distribution according to years of experience

Years of experience	Frequency	Percentage of employees
2-3 years	1	3.3
3-5 years	14	46.7
6 years & above	15	50.0

Table 2 indicates that 50 % of the employees are having more than 6 years of experience. There is 46.7% in 3-7 years experienced staff and only 3.3 % staff between 2-3 years. It is very much evident from the table that the organization has 96.7% of staff with more than 2 years experience.

Table 3: Pre and post-operative wards staff distribution as per exposure to bio medical waste management

Exposure to bio medical waste management	Frequency	Percentage of employees
Yes	19	63.3
No	11	36.7

From table 3 we can observe that 63.3% had exposure to bio medical waste management and 36.7% are not exposed to bio medical waste management.

Table 4: Pre and post-operative wards staff distribution as per knowledge on bio medical waste management in pre and post test

Level of knowledge	Pre- test		Post-test	
	Frequency	Percentage of employees	Frequency	Percentage of employees
Below average (<50%)	14	46.7	0	0.0
Average (50 % -75 %)	16	53.3	7	23.3
Above average (>75 %)	0	0.0	23	76.7

As per table 4, percentages of employees having below average and average score for level of knowledge during pre test are 46.7% and 53.3% respectively. No employee is found to have above average score in pre-test. Dramatic score change observed in post test where 76.7% scored above average and 23.3 average. From these figures we can easily conclude that employees performed better in post-test, but to statistically prove the significance, paired t- test is done in table 5.

Paired t- test:

Data is analyzed by applying paired t-test to understand the following hypothesis:

H_0: There is no significant difference in mean pre-test and post-test knowledge scores of employees on biomedical waste management.

H_1: There is significant difference in mean pre-test and post-test knowledge scores of employees on biomedical waste management.

Table 5: Paired t-test score for pre-test and post-test

	Variable 1	*Variable 2*
Mean	6.633333333	8.9
Variance	2.654022989	1.058621
Observations	30	30
Hypothesized Mean Difference	0	
df	29	
t Stat	-7.389137198	
P(T<=t) one-tail	1.92371E-08	
t Critical one-tail	1.699127027	

P(T<=t) two-tail	0.00000003847	
t Critical two-tail	2.045229642	

From table 5 it is very much evident that P value is less than the significant value 0.05. Hence the null hypothesis is not accepted. We can conclude that there is significant difference in pre-test and post-test knowledge scores of employees on biomedical waste management. Hence it is proved that the structured teaching programme has improved the knowledge level of staff on bio medical waste management.

4. Findings

- The study revealed that 50% of the staff participated in the study are having B.Sc nursing degree, 16% MBBS doctors followed by ANM,GNM, Intermediate and 10th class category of 10% each.
- It is also observed that organization has 96.7% of staff with more than 2 years of experience
- The study pointed to the fact that 63.3% had exposure to bio medical waste management and 36.7% are not exposed to bio medical waste management.
- When tested for knowledge scores, percentages of employees having below average and average score for level of knowledge during pre test are 46.7% and 53.3% respectively. No employee is found to have above average score in pre-test. Dramatic score change observed in post test where 76.7% scored above average and 23.3 average.
- The mean post test percentage scores in all areas that is introduction, concepts and standards, treatment & safety practices and role of health care personnel is found to be high.
- The t-test which was computed between pretest and post-test knowledge scores indicated the actual gain in the knowledge. Hence it was concluded that structured teaching programme was effective as teaching method to improve knowledge

5. Conclusion

Ensuring proper waste disposal practices is of paramount importance, not only for the effective management of waste but also for safeguarding the well-being of healthcare professionals. Doctors, healthcare workers, paramedical staff, and hospital personnel in both pre and post-operative wards, alongside lab technicians and nurses, play pivotal roles as care providers. Their expertise in biomedical waste management is essential, as it contributes significantly to disease prevention.

By imparting knowledge and skills through education, these healthcare providers equip themselves, their clients, and the community at large with the tools to combat infectious diseases. Paired t-test result proved that there is significant difference in pre-test and post-test knowledge scores of employees on biomedical waste management. Hence it is evident that the structured teaching programme has improved the knowledge level of staff on bio medical waste management. Structured training programmes have to be conducted at regular intervals to increase the awareness of hospital staff on bio medical waste management. This approach extends beyond healthcare facilities, as it influences clients and their families, fostering a culture of responsible waste disposal. This collective effort acts as a shield against the perils of improper waste disposal, leading to a healthier, disease-free environment for all.

A pivotal aspect of waste management involves segregating and preparing waste for disposal using specially color-coded bins. These bins are designated for distinct categories, such as human anatomical waste, animal waste, plastic bottles, sharps, solid waste, needles, syringes, and bandages. By meticulously following safety precautions and accurately utilizing color-coded bins, the hospital staff minimizes potential hazards and promotes an environment conducive to hygiene and safety. In essence, the dedication and vigilance of the medical professionals working in pre and post-operative wards play a vital role in safeguarding the well-being of patients, staff, and the community at large by ensuring the responsible management of waste within hospital premises.

6. Limitations

1) The study did not use any control group.
2) The study was limited to pre and post operative wards only.

7. Future Scope

The study can further be extended to all the departments of the hospital to understand the impact of structured teaching programme on the bio medical waste management.

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Author Profile

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