Bulletin of Pure and Applied Sciences
Zoology (Animal Science), Vol.43B, No.2S,
July-December 2024: P. 1457-1464

Print version ISSN 0970-0765
Online version ISSN 2320-3188

Original Research Article
Content Available online at: www.bpasjournals.com

EVALUATING WASTE MANAGEMENT PRACTICES IN SELECT CORPORATE HOSPITALS AND A WASTE TREATMENT FACILITY IN HYDERABAD: AN OBSERVATIONAL STUDY

[1]Dr. Purnima Narayan, [2]Dr A Sudhakar
[1]Assistant Professor, Symbiosis Institute of Health Sciences, Pune Email id: purnima.n999@gmail.com
[2]Director, Ashoka School of Business, Hyderabad
Email id: monakarthik@yahoo.com

ABSTRACT
Healthcare waste also known as hospital waste is the waste generated by healthcare facilities. This can be quite hazardous if not handled properly. This study investigates the waste management practices in two corporate hospitals and a common biomedical waste treatment facility in Hyderabad. This being an observational study, evaluates the compliance rate in these facilities through a checklist. Findings indicate varying levels of compliance across the studied facilities, with one hospital demonstrating high adherence to transportation and storage practices, while the other exhibited significant lapses in waste transportation. The common biomedical waste treatment facility showed good infrastructure and tracking system, however, record keeping needs to be improved. This indicates the need for enhanced training and stricter enforcement of biomedical waste management policies in healthcare facilities.
Keywords: Biomedical Waste, Waste Disposal, Waste Treatment Facility, Waste Treatment

INTRODUCTION
Effective management of hospital waste is a critical issue in public health. Corporate hospitals known for their large patient volumes and range of services, generate huge amounts of hospital waste. Similarly, waste treatment facilities play a pivotal role in the final processing and disposal of healthcare waste. Despite stringent guidelines by the government and pollution control board, adherence to these protocols varies among institutions. Proper adherence to treatment protocols in these institutions is crucial to ensure safe disposal of waste, thereby enhancing the overall environment and public health outcomes.

REVIEW OF LITERATURE
Suruchi Pandey et al. (2020) conducted a comparative study to understand the biomedical waste management practices followed in government and private hospitals of Pune City, Maharashtra. The results revealed that the private hospitals adhered to the practices at a much better rate than the government hospitals. The government hospitals did not have a separate department for biomedical waste management and no structured training programs were conducted. These government hospitals did not have a protocol to report needle stick injuries and post-exposure prophylaxis was also not in place. The healthcare staff despite of having awareness, did not follow practices in these hospitals
The biomedical waste generated during COVID-19 was highly infectious. This required strict

monitoring of the complete cycle if spreading needed to be controlled (**Manju Rawat Ranjan et al, 2020)**.

In a study carried out by **Adeoye Ao et. al** in **2018,** the waste management practices in various public hospitals, private hospitals, and referral hospitals in the Ogbomos area of Oyo State were assessed. The findings revealed several shortcomings in the existing waste management system. Notably, there was a lack of proper maintenance of records, inadequate segregation measures, absence of pre-treatment procedures, and a general lack of waste recycling efforts within these hospitals. The study emphasized the urgent requirement for stringent guidelines and improved compliance to address these deficiencies.

Priya Datta (2018) emphasizes that biomedical waste management is collective teamwork. It should include financial support from the government, infrastructure development, dedicated healthcare staff, tough legislature, and a strong regulatory body with continuous monitoring. Environment-friendly medical devices and biomedical waste disposal systems have to be developed for a greener environment. The right investment of resources and complete commitment can help in reducing the harmful effects of healthcare waste.

Ramesh Lakshmikanta et al. (2016) conducted a cross-sectional study on the dentists practicing in Bangalore City. The respondents were solo practitioners, group practitioners, and consultant dentists. Structured questionnaires were distributed to these respondents on three aspects-knowledge, awareness, and attitudes. The dentists had good knowledge and awareness of legislation, hazards associated with biomedical waste, and management of biomedical waste. Many dentists, despite of having awareness of segregation measures, did not practice it in their clinics.

Puneet Anand et al (2016) in their study specified low level of knowledge of sanitary staff is one main reason for nosocomial infections. To address this issue training programs for all health staff with a special focus on sanitary staff should be conducted at regular intervals.

In **2007, M. Tsakona** analyzed the waste management in a 600-bed hospital in Greece. The study specifically focused on analyzing the wastewater samples from the hospital for various parameters. The analysis revealed the presence of hazardous organic waste in the water, indicating a concerning issue. Consequently, the study emphasized the necessity of implementing a comprehensive waste management system to effectively address this problem.

SIGNIFICANCE OF THE STUDY

Hospitals play a critical role in biomedical waste management because they generate a significant amount of hazardous waste that must be handled, stored, and, disposed off properly to prevent harm to human health and the environment. Studying the role of hospitals and common biomedical waste treatment facility in biomedical waste management helps to identify areas for improvement and thereby minimize the risks associated with it. By implementing proper waste management practices, hospitals and CBWTFs can ensure that they are doing their part to minimize the impact of hazardous waste on our planet.

OBJECTIVES

1. To assess the rate of compliance of biomedical waste management practices in select hospitals of Hyderabad.

2. To verify the rate of adherence to biomedical waste disposal practices in the select CBWTF of Hyderabad.

RESEARCH METHODOLOGY

Type of Research

This is an observational study involving data collection through the use of checklists to evaluate the compliance rate.

Scope and Period of the Study

The study was conducted in two corporate hospitals in Hyderabad which are comparable in terms of bed capacity and services offered. It also includes a Common Biomedical Waste Treatment Facility, which is one of the four CBWTFs operating in Hyderabad. Data collection spanned March to August 2022.

Data Collection Tools

To ensure comprehensive data collection, two tailor-made checklists were used: one for the hospitals and one for the common biomedical waste treatment facility.

Hospital Checklist

A checklist containing 18 parameters related to biomedical waste such as 'Collection', 'Transportation', and 'Storage' was prepared and observed for compliance in different patient care areas such as Emergency, OT, ICU, and wards of hospitals. Each area was visited three times. The checklist was used to determine the presence or absence of a specific practice, hence a score of '1' was assigned for complete compliance and '0' for no compliance.

COLLECTION	YES	NO
1. Red coloured bin available in each area		
2. Yellow coloured bin available in each area		
3. Blue coloured bin available in each area		
4. PPC available in each area		
5. Biohazard symbol on bag		
6. Are the bins covered		
7. Adequate PPE available		
8. The bags are immediately replaced with new ones of same colour		

TRANSPORTATION	YES	NO
1. Dedicated trolleys for Biomedical Waste		
2. Predefined path for transportation		
3. Are the bins covered during transportation		

STORAGE		

	YES	NO
1. BMW storage room away from F & B, general stores		
2. Storage room under lock and key		
3. BMW not stored beyond 24 hours		
4. Calibrated equipment		
5. Barcodes on the covers		
6. BMW registers present		
7. Accidental spillage kits present		

In Hospital 1 the compliance rate for waste collection, transportation, and storage was 95.83%, 100%, and 100% respectively. In Hospital 2 the compliance rate for waste collection, transportation, and storage was 96%, 66.66%, and 85.7% respectively. Hospital 1 had an excellent compliance rate whereas Hospital 2 required improvement in all the aspects of hospital waste management.

CBWTF Checklist

A checklist containing 6 sections (Transportation, Tracking, Storage, Record Keeping and Reporting of Incidents, Infrastructure, Practices) and 26 parameters was prepared and observed for compliance. The processes here involve varying degrees of adherence to established standards, hence a score of '1' was assigned for complete compliance, '0' for no compliance, and '0.5' for partial compliance.

TRANSPORTATION

Parameters	Yes	No	Partially Yes
1. All the waste collection vans closed vans	✓		
2. Biohazard symbol on vehicles	✓		
3. Separate cabins for different types of waste			✓
4. Inner surface of the vehicle is smooth with minimum joints		✓	
5. The vehicles have a provision of opening on the rear as well as sides for easy loading and unloading			✓
6. Vehicles registered with PCB	✓		
7. Dedicated vehicles for COVID waste collection	✓		

TRACKING

Parameters	Yes	No	Partially Yes
1.Installation of GPS device in vehicles	✓		
2. Barcode labeling and tracking system	✓		
3. Registered with COVID19BMW App	✓		

STORAGE

Parameters	Yes	No	Partially Yes
1. Separate compartments for storage of color-coded waste	✓		
2. Space adequate for storage of waste		✓	
3. Collected waste disposed of within 48 hours	✓		
4. The flooring and walls of the storage room are smooth and with minimum joints		✓	

RECORD KEEPING and REPORTING OF INCIDENTS

Parameters	Yes	No	Partially Yes
1. Registers of categorical waste	✓		
2. Logbook for each piece of equipment	✓		
3. Needle Stick Injury reporting			✓
4. Reporting fire accidents	✓		
5. Reporting spillages			✓
6. Reporting accidents during handling			✓

INFRASTRUCTURE

Parameters	Yes	No	Partially Yes
1. Power backup	✓		
2. First aid	✓		

3. Firefighting system	✓		
4. Emergency alarm	✓		

PRACTICES

Parameters	Yes	No	Partially Yes
1. Temperatures of primary and secondary chambers of the incinerator are maintained	✓		
2. After sterilization the glass containers are washed and rinsed			✓

In the "*Transportation*" section, 7 parameters were included, out of which 4 parameters showed complete compliance, 2 parameters showed partial compliance and 1 parameter showed no compliance. Hence the calculated compliance rate for this section is 71.4%. In the "*Tracking"* section, 3 parameters were included. All three parameters showed complete compliance resulting in a score of 100%. In the *"Storage"* section, out of 4 parameters 2 parameters showed complete compliance, while 2 parameters showed no compliance. The calculated compliance rate for this section is 50 %. The "*Record Keeping and Reporting of Incidents*" section has 6 parameters in it, 3 parameters showing complete compliance and 3 showing partial compliance resulting in a compliance rate of 75%. The section "*Infrastructure*" has 4 parameters in it and all show complete compliance, resulting in a 100 % compliance rate. The "*Practices*" section has 2 parameters, out of which one shows complete compliance and the other shows partial compliance. Hence the calculated compliance score for this section is 75%. From the above, it is clear that the 'Tracking' and 'Infrastructure' section are fully complying with the guidelines, whereas the 'Storage' aspect needs to be improved as the compliance is only 50%. 'Transportation', 'Record Keeping', and 'practices' show satisfactory compliance, but still, there is scope for improvement.

MAJOR FINDINGS

1. An attempt was made to check the compliance rate for different aspects of waste management. Hospital- 1 showed compliance of 95.83%, 100%, and 100% for waste collection, transportation, and storage respectively. Hospital-2 showed a compliance of 96%, 66.66%, and 85.7% for these three sections respectively. Hospital 1 showed better practices than Hospital 2 in all aspects of biomedical waste management. The reasons can be variations in the level of resources available, the attitude and beliefs of staff towards waste management, and the extent to which the hospital prioritizes sustainability and environmental concerns.
2. Hospital -2 is good at waste collection practices, but is not good at transportation and storage aspects. This may increase the risk of exposure to hazardous waste for patients, staff, and the community. Proper transportation and storage practices are important to prevent accidental exposure to hazardous material, as well as the chances of contamination and hospital-acquired infections.

3. An analysis of the CBWTF checklist reveals the inner surface of the transportation vehicles and waste storage rooms were not smooth enough leading to water retention, accumulation of dust and microorganisms.
4. Only a few transportation vehicles had the provision of an opening on the rear side for easy loading and unloading of waste.
5. Needle stick injury is a serious issue as it can lead to infections, hence all the NSIs should be reported immediately. However, at the CBWTF only a few NSIs were reported.

SUGGESTIONS

1. The hospitals should implement a system for monitoring the waste management process, including waste generation, segregation, transportation, storage, and disposal. This will help identify areas where improvements can be made and ensure that the hospital is complying with regulations and standards.
2. The hospital should upgrade existing storage facilities to prevent spills and contamination. The hospital should also invest in bins and trolleys, to ensure that waste is transported safely and efficiently.
3. The Hospital should introduce bar-coded bags at the earliest to ensure safe disposal of biomedical waste.
4. Clear and visible signage should be placed in each department indicating the location of bins and the categorization of waste for placement in respective bins. The signage should be bilingual.
5. CBWTFs can use smooth surface coatings to ensure that the inner surface of transportation vehicles and waste storage rooms are smooth and non-porous. This can help to prevent the retention of microorganisms and make cleaning and disinfection more effective.
6. CBWTFs should provide training to the staff on the importance of reporting all accidents and NSIs. The reporting process should be simple, clear, and easily accessible to the staff.

CONCLUSION

The observational study conducted in two corporate hospitals and a common biomedical waste treatment facility has provided valuable insights into the compliance levels of biomedical waste management practices. Based on the observations, several targeted suggestions were provided to address the identified gaps. These suggestions include a focus on strengthening training programs for healthcare workers, improving infrastructure, and adapting advanced technological solutions to streamline the process. Additionally, fostering a culture of compliance through continuous monitoring and feedback mechanisms was emphasized.

UTILITY OF THE STUDY

The study could help in identifying the potential non-compliance and areas of improvement. This can help in developing targeted interventions that might involve investing in training programs, upgrading infrastructure, or implementing new techniques to improve waste management practices. By improving compliance, the environmental footprint of healthcare

facilities can be reduced through proper handling and disposal.

SCOPE FOR FURTHER RESEARCH

Further studies following this observational study on biomedical waste management and disposal compliance in hospitals and common biomedical treatment facilities can explore several avenues to deepen understanding and address any gaps identified. Conducting a longitudinal study to track compliance levels over an extended period can provide insights into trends and patterns in waste management practices. This can also help in assessing the effectiveness of intervention programs implemented. Complementing this observational study with qualitative research methods such as surveys can help in understanding the perspectives of healthcare workers, administrators, and other stakeholders.

REFERENCES

1. Adeoye, A. O., Akande, E. A., & Lateef, A. (2018). Impacts of hospital waste management on the health and environment of Ogbomoso area, Oyo state. *Hos Pal Med Int Jnl*, *2*(6), 386-389.
2. Tsakona, M., Anagnostopoulou, E., & Gidarakos, E. (2007). Hospital waste management and toxicity evaluation: a case study. *Waste management*, *27*(7), 912-920.
3. Datta,P., Kaur, G., Chander, J., (2018), "Biomedical waste management in India: Critical Appraisal", *Journal of Laboratory Physicians*, Volume 10, Issue 1
4. Lakshmikantha, R., Kanyadara, J., Bullappa, D., Vanishree, N., Prasad, K. K., Naveen, N., & Anushri, M. (2016). To assess the knowledge, level of awareness, and attitude on biomedical waste management among practicing dentists in Bengaluru city: A cross-sectional study. *CHRISMED Journal of Health and Research*, *3*(3), 161.
5. Pandey, S., Divekar, R., Singh, A., & Sainath, S. (2020). Bio-medical waste management processes and practices adopted by select hospitals in Pune. *Operations and Supply Chain Management: An International Journal*, *13*(1), 31-47.
6. Ranjan, M. R., Tripathi, A., & Sharma, G. (2020). Medical Waste Generation During COVID-19 (SARS-CoV-2) Pandemic and its Management: an Indian perspective. *Asian Journal of Environment & Ecology*, *13*(1), 10-15.
7. Anand, Puneet; Jain, Rakhi; Dhyani, Anuj.(2016) Knowledge, Attitude and Practice of Biomedical Waste Management Among Health care Staff in a Teaching Institution in Haryana, India. *International Journal of Research in Medical Sciences*, 4(10), p. 4246-4250.