

## **A Study of the Waste Management Practices of Small Clinics, and Employee Knowledge.**

Usman Ghani Farooqi<sup>1\*</sup>, Muhammad Saleem<sup>1</sup>, Khalid Khan<sup>1</sup>, Muhammad Suhail Aziz<sup>1</sup>, Saqib Hussain<sup>1</sup>, Asim Bilal<sup>1</sup>

<sup>1</sup> *Baqai Institute of Health Management Sciences, Baqai Medical University, Karachi, Pakistan.*

\* Corresponding Author: Dr. Usman Ghani Farooqi, Baqai Institute of Health Management Sciences, Baqai Medical University, Karachi, Pakistan. (dr.usmanfarooqi@gmail.com, +92 345 2977573).

### **Abstract**

In Pakistan, thousands of small clinics generate distributed medical waste; nevertheless, unlike large hospitals, small clinic waste management is frequently neglected. This study was conducted on 35 small clinics in Karachi, Pakistan, with the objective of determining small clinics' waste management practises in comparison to level of knowledge. Overall, the rate of waste production was assessed to be 1.87 kg/clinic/day, while the rate of hazardous waste production was 0.68 kg/clinic/day and the rate of general waste production was 1.19 kg/clinic/day. The waste management practises of the assessed clinics were dismal; none of the clinics were fully adhering to the 2005 hospital waste management guidelines, and so improper segregation, storage, transportation, and disposal were frequently seen over the course of the study. The clinic employees held a low level of knowledge and awareness and received no training on waste management practises and regulations. Furthermore, there was a high rate of employee turnover. As a result, it was determined that active government involvement and financial support in giving training and auditing small clinics could contribute to the improvement of the condition. The present study's findings can play an important role in documenting evidence and assisting policymakers and governments in planning solid waste management for small clinics and other healthcare institutions.

**Keywords:** Health care waste, Small Clinics, Waste generation and Waste management.

### **Introduction**

Healthcare waste management will be among the most significant concerns facing the world in the twenty-first century. Mismanagement of healthcare waste endangers the nearby population and the environment [1]. A number of lethal infections, including hepatitis B, C, and the human immunodeficiency virus (HIV), have been transmitted due to the improper management of clinical waste, according to previous research [2]. Consequently, it is acceptable to assert that improper healthcare waste management poses a significant risk to human health.

This waste is produced in healthcare facilities during patient treatments, vaccinations, and diagnosis. In general, healthcare waste can be separated into two categories: general waste and infectious waste [3–5]. According to a 2013 World Health Organization (WHO) study, between 75% and 90% of waste from healthcare institutions is non-hazardous, while the remainder is infectious [6]. Moreover, due to the increased usage of innovative and high-tech techniques and safety concerns, disposable equipment is utilised more frequently in industrialised countries, resulting in the generation of an increasing amount of healthcare waste [7]. Developed nations have developed new technology, data management systems, and waste management regulations and policies that are easily implemented due to access to significant resources [8–10].

In multiple researches, inappropriate healthcare waste management practises in underdeveloped nations have been identified as a problem. Akter remarked in 2000, "In most underdeveloped nations, there is no appropriate waste management system in place" [11]. In underdeveloped nations, municipal garbage handlers are responsible for the management of healthcare waste without receiving specialist training or advice on how to handle such waste differently [12].

Large hospitals handle their waste in a safe manner to some level; nevertheless, as the majority of these significant hospitals are government-supported or private investors have formed them as large enterprises, they generate sufficient revenue for waste management. Despite this, there are hundreds of small clinics across cities that do not adhere to adequate waste management practises [13].

Pakistan is a rapidly expanding nation [14], and inadequate healthcare management in small clinics is no exception. The WHO published a report in 2017 stating that 60 to 70% of healthcare services in Pakistan are provided by the private sector [15]. There are small clinics in nearly every section of every metropolis, as well as in small towns and villages [16]. These clinics are owned on a full- or part-time basis by a single physician. Sharps, glass, body tissue, blood-tainted cotton swabs and bandages, as well as other types of infectious materials, comprise the majority of the waste generated by small clinics. To protect safety, nations around the world have enacted regulations for healthcare waste management methods [17].

This study was meant to examine the state of healthcare waste management in small clinics. It included many methodologies, including waste generation, waste management practises, and current staff knowledge and awareness. Karachi, a heavily populated big city in Pakistan, was assessed for its clinics. There have been a number of researches on the social, economic, and behavioural factors that motivate proper municipal trash management and major hospital waste management [18]. However, waste management in small clinics has remained entirely untouched.

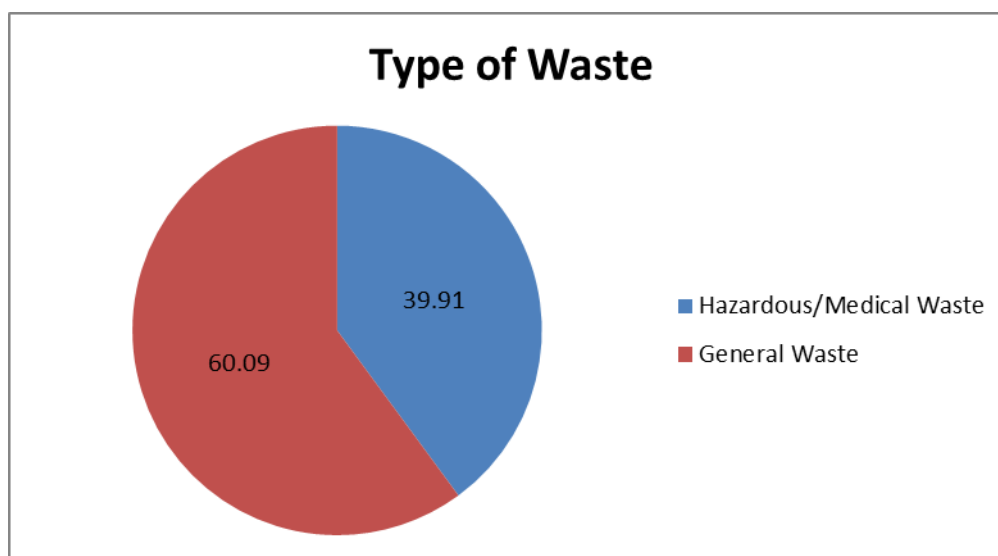
## **Material and Method**

The study was conducted in two phases. In first phase data collection was performed on waste generation. Assessing clinic staff's waste management knowledge and awareness was done in second phase. Phase 1 of the project began with a clinic-based survey in which quantitative data were collected from a selection of small clinics for an entire week in June 2021. The collected data consisted of a record of garbage generation. After separation, waste was physically measured to provide data on waste generation. Two main categories of garbage were recorded: hazardous waste and regular waste. Sharps, glass, plastic rubber, paper, contaminated dressings, swabs, and bandages were categorised as medical trash, whereas general waste included fruit peels, cigarette filters, matchsticks, empty juice packs and bottles, paper, and polyethylene bags. The personnel of the clinic were equipped with a digital measuring scale for seven consecutive days of daily waste measurement on-site. For phase 2, a qualitative survey consisting of a questionnaire was administered to employees employed at small clinics, often known as the compounder of the clinic. The purpose was to assess the depth of staff understanding of healthcare waste management.

Staff employees of small clinics were the only recipients of the questionnaire; doctors were excluded from the survey because they do not directly manage the clinics' waste. The poll was done only after receiving permission from the clinic's respective owners and/or managers. After gathering data through the questionnaire, MS Excel 2010 was used to tabulate and analyse the data in terms of percentages, and conclusions were derived from the results. Diverse graphs, such as bar charts, were also used to illustrate the situation effectively.

## Results

The rate of waste produced at clinics was calculated to be 1.87 kg per day per clinic. The daily medical waste production rate for all clinics was determined to be 0.68 kg per day per clinic, while the daily general waste generation rate was assessed to be 1.19 kg per day per clinic. The waste generation rate (WGR) was determined to be 39.91% hazardous waste and 60.09% general waste (Figure: 1).



**Figure: 1. Waste generation in small clinics.**

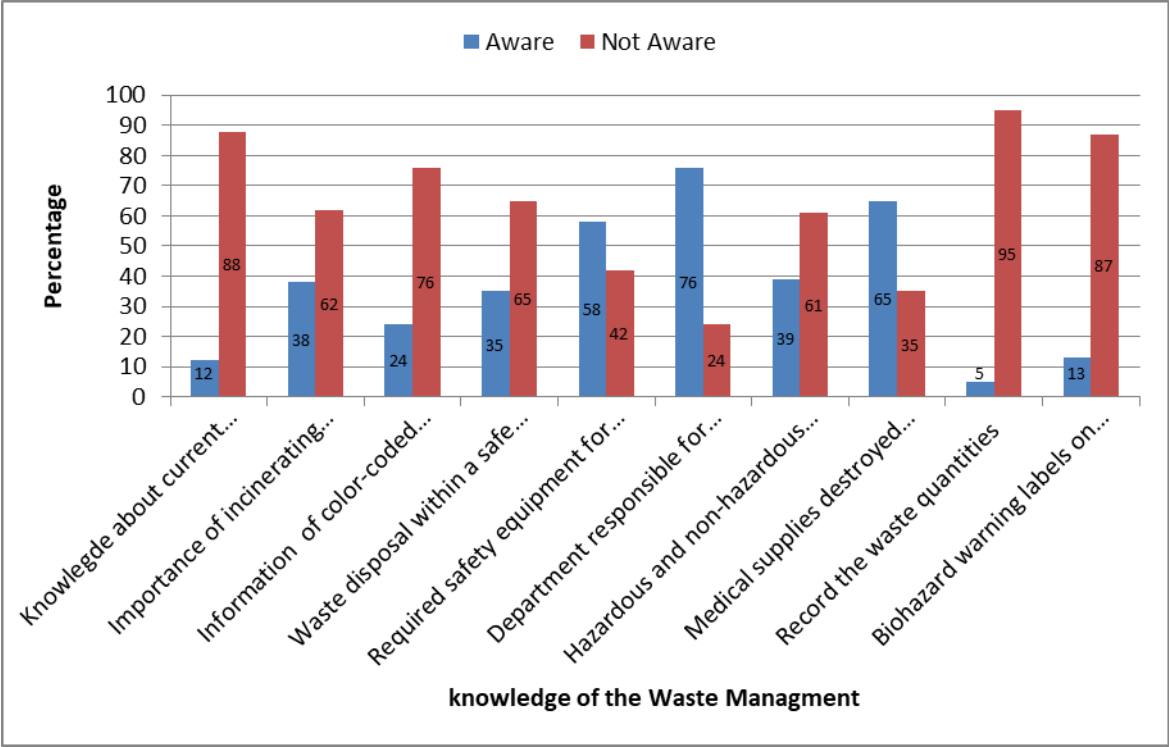
A 10-question questionnaire was utilised to collect data regarding the knowledge and awareness of clinic employees regarding clinical waste management. Only 12% of the polled staff members were able to correctly answer the first question, which inquired whether or not the staffs was aware of the current guidelines for healthcare waste management (HWM) in the country. The second question attempted to determine whether staff members were aware of the importance of incinerating medical waste; however, only 38% of respondents provided the right response (Figure: 2).

The third question attempted to collect information regarding awareness of color-coded garbage bags. Only 24% of staff workers from clinics polled was able to accurately identify this, indicating that the majority were clueless. The purpose of the fourth question was to determine if the clinic staffs was aware of the need of disposing of waste within a safe time frame. According to the data collected, only 35% of employees were aware of the need of waste disposal within a safe timeframe, which is a relatively low level of knowledge (Figure: 2).

The questions with the highest percentage of correct responses were number six (which government department is responsible for healthcare waste), number eight (clinic staff were aware that some of the used medical supplies needed to be destroyed prior to disposal, as such items include syringes and other sharps), and number five (check whether staff members were aware of the required safety equipment for handling waste) with 76%, 65%, and 58%, respectively (Figure: 2).

Only 39% staff known about hazardous and non Hazardous separation of the waste. Clinics had the lowest percentage of awareness regarding waste data records; only 5% of the personnel were aware that they were required to retain waste generation statistics. The final question received the second-lowest percentage of right responses, with only 13%, this question concerned biohazard warning

labels on garbage containers (Figure: 2).



**Figure: 2. Small Clinics Staff knowledge and practices regarding waste management, segregation, and disposal.**

**Discussion**

This study concludes that the waste management practises of small clinics require immediate attention from government agencies and locals. Multiple viewpoints on small clinics have been researched in order to comprehend the existing condition, which can aid in the resolution of associated concerns. Similar to hospitals, small clinics generate healthcare waste; however, the hazardous waste generation rate included 39.91% of the total waste generation rate, which more than the hazardous waste generation rate of major hospitals [18]. According to the World Health Organization, large hospitals in developing nations create between 10 and 2% hazardous waste [1]. However, garbage from Small clinics included more dangerous materials than waste from large hospitals.

In section 16 of the HWM guidelines for 2005, which consists of eight points regarding the segregation of healthcare waste, it is clearly stated that hazardous waste must be separated at the place of creation by the generator. Nonetheless, it was noticed that waste segregation was not implemented by the majority of these clinics; throughout the period of data collection, staff members were specifically ordered to segregate and quantify the garbage. The personnel were unaware of any color-coding or labelling system.

According to our study it was discovered that waste was not disposed of in a timely manner; at some clinics, waste remained in the same containers for days. According to regulation section 19, point 4, waste must not be stored for more than twenty hours. According to earlier research [2], timely removal of trash bags is a crucial aspect of waste management. In numerous clinics where waste was stored for an extended period of time, waste was also observed to be dispersed close to the waste bins. Section 18 of the 2005 HWM Regulations contains five subsections regarding waste

transportation regulations. Numerous prior researches on large hospitals have indicated that waste transportation practises vary; some institutions partially adhere to the laws, while others do not [18]. Unlike large hospitals, these minor clinics had zero waste transfer facilities; no transportation arrangements were identified for any of these clinics.

Section 20 of the HWM rulebook contains eleven subsections detailing the waste disposal procedure. Numerous prior studies have documented similar and more advanced hazardous waste disposal techniques, such as incineration, steam sterilisation, microwave sanitation, dry and chemical disinfection, and many more [19], but the majority of small clinics were found to be disregarding them. Observations indicate that not all small clinics employed the same waste management practises, as some deposited their waste directly into the closest municipal waste pile, whereas a considerable number of clinics conducted unsorted open burning close to the clinic. Some of the debris, including plastic, glass, and sharps, has also been observed to be sold to individual waste buyers or taken by scavengers. Previous investigations have indicated that unlawful recycling of medical waste occurs in some underdeveloped nations [20]. Using medical waste to create drinking straws, lollipop sticks, and toys poses a clear and present danger to the health of children [21]. During the course of the investigation, all of these harmful waste management practises were detected in clinics that were surveyed.

The country is currently governed by the HWM regulations of 2005, and all healthcare facilities are required to comply. However, implementation in small clinics is equivalent to zero. This lack of execution is attributable to the fact that only a Small percentage of the hired employees are aware of these standards.

Multiple staff members were found to be aware that infectious materials must be destroyed to prevent the spread of viruses. However, a vast majority of the clinic employees lacked knowledge concerning the cremation of medical waste.

To avoid misuse and injury, garbage should be collected in predetermined, color-coded waste bags, as required by healthcare waste management standards. This color-coding enables the waste handler to work more effectively and decreases the likelihood of error. This lack of awareness may be due to the absence of color-coded trash bags, as none of the clinics in our survey were found to have these specific bags for waste storage. Consequently, it is possible that staff members did not pay attention to this piece of information.

A small number of clinic employees were aware of the notices on the containers, but none were found to be following the instructions because there were no acceptable waste containers available within the clinics. The majority of clinics did not spend any money on waste management since they did not generate enough garbage. During the survey, it was discovered that none of the clinics kept records of their trash generation, which is a crucial component of waste management, particularly for waste as delicate as medical waste, which directly affects human health.

A shallow level of knowledge and awareness is found among clinics staff members about waste management practice and rules and handling with respect to our previous study regarding the knowledge about handing and disposing of waste management and recycling in large hospitals, which may be possible due to the training on waste management in hospitals [22].

## Conclusion

This type of research is insufficient to comprehend the whole condition. There is an urgent need for research: technologically and strategically, to control the continuously deteriorating status of

healthcare waste worldwide, particularly in emerging nations. For resource-constrained nations to manage their healthcare waste, cost-effective and efficient waste management methods should be designed: segregated storage, safe transit, and proper disposal. Costs and risks can be reduced with the use of newly developed technology and management systems.

Overall, the waste management practises of the clinics surveyed were appalling; no clinics met the standard criterion for waste management practise. In addition, none of the clinics complied with HWM guidelines 2005; consequently, improper segregation, storage, transportation, and disposal were frequently seen during the course of the investigation. In addition, there is a lack of information and awareness among clinic staff about waste management practises and regulations. These small clinics' inadequate waste management practises are primarily attributable to the ignorance of government institutions.

## Reference

1. Chartier, Y. ed., 2014. Safe management of wastes from health-care activities. World Health Organization.
2. Prüss-Üstün, A., 1999. Safe management of wastes from health-care activities. World Health Organization.
3. Abd El-Salam, M.M., 2010. Hospital waste management in El-Beheira governorate, Egypt. *Journal of environmental management*, 91(3), pp.618-629.
4. Patwary, M.A., O'Hare, W.T. and Sarker, M.H., 2011. Assessment of occupational and environmental safety associated with medical waste disposal in developing countries: a qualitative approach. *Safety science*, 49(8-9), pp.1200-1207.
5. Hossain, M.S., Santhanam, A., Norulaini, N.N. and Omar, A.M., 2011. Clinical solid waste management practices and its impact on human health and environment—A review. *Waste management*, 31(4), pp.754-766.
6. Yves Chartier, J., Pieper, U., Prüss, A.E.A. 2013. Safe Management of Wastes from Health Care Activities; World Health Organization: Geneva, Switzerland.
7. Manga, V.E., Forton, O.T., Mofor, L.A. and Woodard, R., 2011. Health care waste management in Cameroon: A case study from the Southwestern Region. *Resources, Conservation and Recycling*, 57, pp.108-116.
8. Blenkharn, J.I., 2006. Lowering standards of clinical waste management: do the hazardous waste regulations conflict with the CDC's universal/standard precautions?. *Journal of Hospital Infection*, 62(4), pp.467-472.
9. Iqbal, S.T.Z. and Razzaq, S., 2017. Novel healthcare solution for smart hospitals: a qualitative review. *Biomed. Lett*, 3, pp.99-106.
10. Tudor, T.L., Noonan, C.L. and Jenkin, L.E.T., 2005. Healthcare waste management: a case study from the National Health Service in Cornwall, United Kingdom. *Waste management*, 25(6), pp.606-615.
11. Windfeld, E.S. and Brooks, M.S.L., 2015. Medical waste management—A review. *Journal of environmental management*, 163, pp.98-108.
12. Khan, B.A., Cheng, L., Khan, A.A. and Ahmed, H., 2019. Unsafe small clinics practices causing new HIV outbreaks in Pakistan. *J. Hosp. Infect.*
13. Nemathaga, F., Maringa, S. and Chimuka, L., 2008. Hospital solid waste management practices in Limpopo Province, South Africa: A case study of two hospitals. *Waste management*, 28(7), pp.1236-1245.
14. Haider, M.N.U.H., Hussain, N., Tahir, A., Iqbal, A., Kugelman, M., Nishtar, S., Farrukh, C., Jawad, C., Mohammad, A., Siddiqui, T. 2014. Pakistan's Runaway Urbanization: What Can Be Done? In Asia Program; Woodrow Wilson International Center for Scholars: Washington, DC, USA.

15. World Health Organization, 2012. WHO country cooperation strategy, Sri Lanka, 2012-2017.
16. Khan, B.A., Khan, A.A., Ali, M. and Cheng, L., 2019. Greenhouse gas emission from small clinics solid waste management scenarios in an urban area of an underdeveloping country: A life cycle perspective. *Journal of the Air & Waste Management Association*, 69(7), pp.823-833.
17. Marinković, N., Vitale, K., Holcer, N.J., Džakula, A. and Pavić, T., 2008. Management of hazardous medical waste in Croatia. *Waste management*, 28(6), pp.1049-1056.
18. Ali, M., Wang, W. and Chaudhry, N., 2016. Management of wastes from hospitals: A case study in Pakistan. *Waste Management & Research*, 34(1), pp.87-90.
19. Ali, M., Wang, W. and Chaudhry, N., 2016. Application of life cycle assessment for hospital solid waste management: A case study. *Journal of the Air & Waste Management Association*, 66(10), pp.1012-1018.
20. Caniato, M., Tudor, T.L., Vaccari, M. 2016. Assessment of health-care waste management in a humanitarian crisis: A case study of the Gaza Strip. *Waste Management*. 58, 386–396.
21. Jaffery, S. Medical Waste Illegally Sold off from Pakistan Hospital. Available online: <https://www.bbc.com/news/av/world-asia-22130292/medical-waste-illegally-sold-o-from-pakistan-hospital>.
22. Farooqi, U.G., Shahbaz, N., Khan, F.A., Aleem, S.A., Ali, M. and Kaleem, U., 2022. Investigating Healthcare Waste Regulation: Employees' Knowledge, Perceptions and Practices with Regard to Recycling. *Annals of the Romanian Society for Cell Biology*, 26(01), pp.1189-1195.