

DOI: 10.53555/ks.v12i4.3154

To Investigate the Waste Management Practices in Different Dental Setups of Karachi

Usman Ghani Farooqi^{1*}, Fahad Ahmed Khan², Faizan Ahmed Farooqi³, Jamal Nasir⁴, Zeeshan Hussain⁵, Muneer Sadiq⁶, Muhammad Tanweer Khalid⁷, Sandra⁸

^{1,2,3,4,5,6,7,8}Baqai Institute of Health Management Sciences, Baqai Medical University, Karachi, Pakistan.

***Corresponding Author:** Dr. Usman Ghani Farooqi

Email Address: dr.usmanfarooqi@gmail.com

Abstract

Modern dentistry generates a lot of trash that could harm people and the environment. A descriptive cross-sectional study was conducted on dental surgery workers from several dental setups in Karachi. Total 90 staff from the selected facilities participated in the study. The data were collected using a systematic questionnaire and observation checklist. The survey asked about socio-demographic information and dental waste management knowledge and behaviour. Waste disposal was poorly understood, and methods did not follow global rules. All participants placed sharp waste in puncture-resistant containers; however 95.55% did not label clinical trash. Trash management education, monitoring, and awareness are critically needed.

Keywords: Dentistry, dental waste, dental setup, waste management, health practices.

Introduction

Internationally, there are difficulties in the management of health facility trash. Effective waste management is a major obstacle in various regions globally, with dental surgery waste being recognised as a serious environmental issue [1]. Wastes can be categorised into three main types: clinical, hazardous, or residential. Clinical waste encompasses materials that contain human or animal tissue, blood or body fluids, excretions, pharmaceutical products, swabs or dressings, syringes, needles, or any sharp tools [2]. Hazardous wastes, in contrast, are substances that pose a threat to living creatures or the environment, either on their own or through their components. Domestic wastes, on the other hand, is waste materials produced in a residential setting [3]. The management of oral health disorders has the potential to generate hazardous waste, such as dental amalgam, etchants, used X-ray developers and fixers, lead foil packages, and disinfectants, among other substances [4]. Amalgam, such as the one mentioned, contains mercury, which renders it harmful to both humans and the environment if not disposed of correctly [5]. Despite its declining usage, the impact of mercury on both the general population and the environment has raised worldwide apprehension [6]. Likewise, the incorrect disposal of sharp objects and other debris from dental procedures can expose clinical staff, patients, and their families to the risk of contracting infections such as hepatitis B and C, as well as HIV [7]. A prior study demonstrated that conventional dental practices generate 59 kg of trash per day, but specialised dental practices produce an average of 18 kg of waste per day. Out of the wastes that were produced, 34% had the potential to cause infection, and 12% were classified as toxic and chemical wastes [8].

The difficulties in managing health facility waste are especially apparent in developing nations [9]. Inadequate management, containment, conveyance, and ultimately, elimination of medical waste have resulted in a significant increase in health risks and environmental contamination [10,11]. The reasons for this might be related to difficulties in the legislative process, a lack of qualified personnel, and a general lack of awareness [12]. The scarcity of resources in poor nations exacerbates the challenge of effectively managing clinical waste according to established norms [10]. It is the duty of dental surgery workers to ensure that dental waste is properly treated in accordance with established rules. This includes the correct categorization, containment, conveyance, and ultimate elimination of waste [13]. This study aimed to investigate the practices of dental surgery staff at various facilities in Karachi with regards to dental waste management, in order to identify the challenges and potential areas for action.

Methods

This study was a descriptive cross-sectional investigation that included dental surgery personnel from several dental facilities in Karachi. The study included dentists, community oral health officials, registered dental surgical assistants, diploma nurses, and on-the-job training people who willingly agreed to participate. During each visit to a specific facility, workers who met the specific criteria were chosen one after another to participate in the study. An evaluation was conducted on the dental procedures performed at different dental facilities.

Data were gathered with a meticulously designed questionnaire and an observation checklist. The utilisation of the observation checklist functioned as a method of triangulation in order to mitigate any potential bias. The survey consisted of inquiries about socio-demographic factors (age, gender, marital status, years of professional experience), as well as knowledge and practices related to the management of dental waste. The user's text inquires about the colour coding of clinic waste, the

primary components of spent X-ray fixers, the proper disposal methods for amalgam waste, blood-soaked gauze, and developed X-ray films. The assessment of the dental surgery was conducted using an observation checklist comprising ten specific items. These items included checking for color-coded bins, ensuring that the contents of the bins matched the colour code, verifying the proper disposal of infectious waste, confirming the presence of a sharps' container that is resistant to punctures, checking for appropriate labelling of waste containers, and ensuring the presence of an amalgam separator. The responses to the questionnaire were recorded and processed using Microsoft Excel, version 2010. Descriptive statistics were used for the analysis of the data, and they were presented in the form of frequencies and percentages.

Results

Sociodemographic data obtained from the first part of the questionnaire were: gender, age, profession, and professional time in practice. Most were female (67.77%), and 32.23% were male. Out of the responders, 48 individuals (53.33%) were into the age bracket of 18-28 years. The majority of the participants, specifically 42 individuals (46.66%), were Dentists. With regard to the time to practice in dental facilities, 56.66% of the professionals had over experience between 1 – 5 years, 14.44% had worked for 6 - 10 years, 11.11% had worked for 11 – 15 years, 10.00% had worked for 16 – 20 years and 7.77% had worked for more than 20 years (Table: 1).

Table: 1. Demographic and Social Profiles of Respondents

Variables	Categories	Respondents	Percentage
Gender	Male	29	32.23%
	Female	61	67.77%
Age	18-28 Years	48	53.33%
	29-39 Years	29	32.22%
	Above 40 Years	13	14.44%
Profession	Dentist	42	46.66%
	Dental Assistant	23	25.55%
	Nurses	16	17.77%
	Others	09	10.00%
Years of Practice	1 – 5 years	51	56.66%
	6 – 10 years	13	14.44%
	11 – 15 years	10	11.11%
	16 – 20 years	9	10.00%
	Above 20 years	7	7.77%

Approximately 76.66% of the participants demonstrated knowledge on the proper disposal of used sharps, but just 38.88% successfully identified the color-coding system for radioactive waste. In addition, only 32.22% of the participants were aware of the recommended procedure for disposing of amalgam and very few participants 22.22% were aware of disposing method of blood soaked gauze waste materials (Figure: 1).

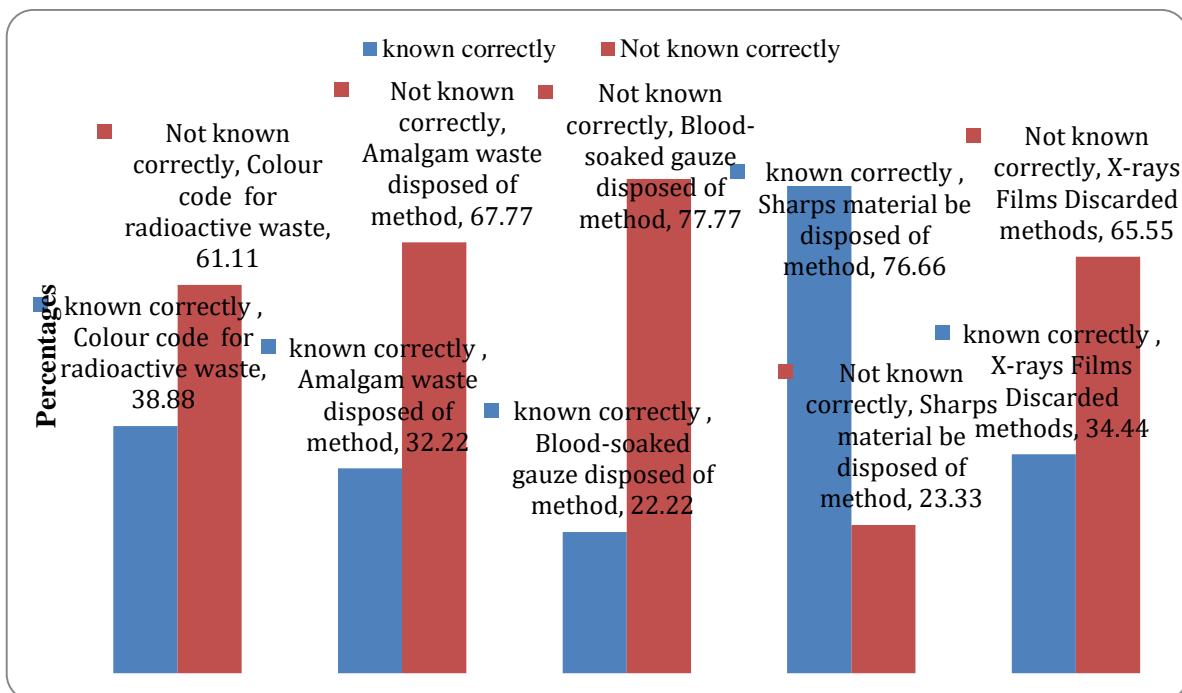


Figure:1. The level of awareness with dental waste management among the participants.

Only 5.55% respondent sorted their clinic waste into bins that were color-coded. Additionally, all participants store their sharp waste in containers that are resistant to punctures. 91.11% participants disposed of blood-soaked gauze along with other debris from the clinic. The vast majority of participants, specifically 86 individuals (95.55%), failed to properly label their clinical waste. Additionally, a significant proportion of participants 68 individuals (75.55%), admitted to disposing of spent X-ray fixers by dumping them along with other waste. Only 3.33% of the 90 respondents were aware of any record-keeping practices at their facilities related to clinical waste activities (Figure: 2).

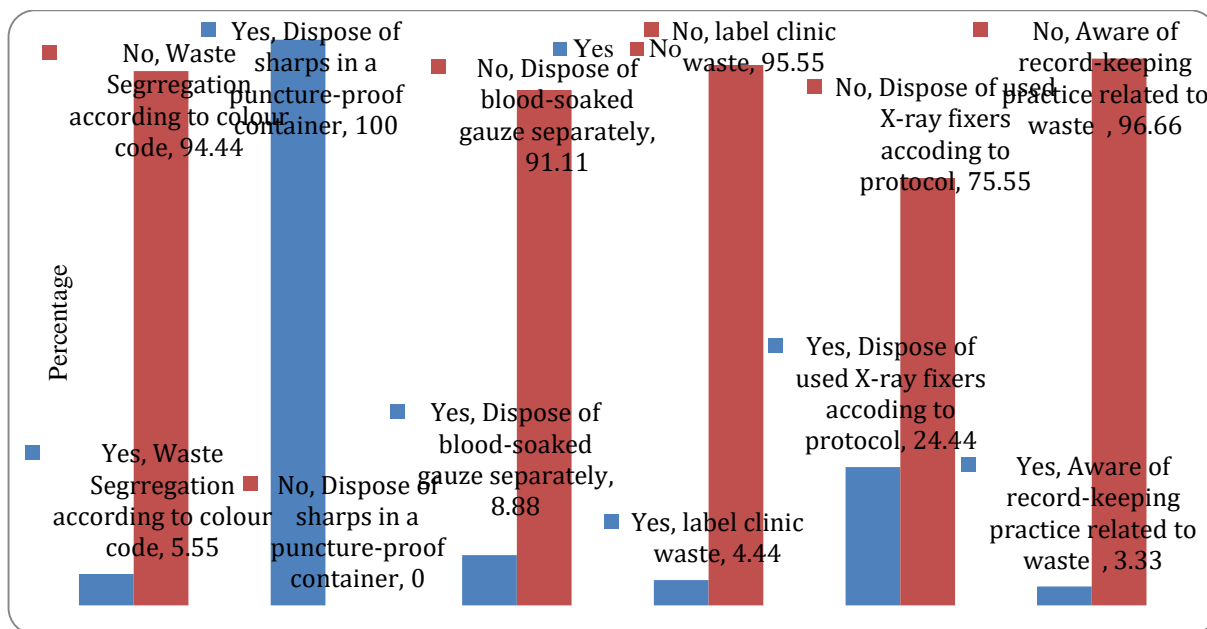


Figure 2. Frequency of dental waste management techniques among survey participants.

The examination of the surgeries conducted revealed 96.66% stored their generated waste in bins that have only single color-coded bin available. Out of the total, 36 of them (41.11%) were properly labelled. Additionally, it was discovered that the contents of the bins did not correspond to the designated colour coding of the bins across all operations (Figure: 3)

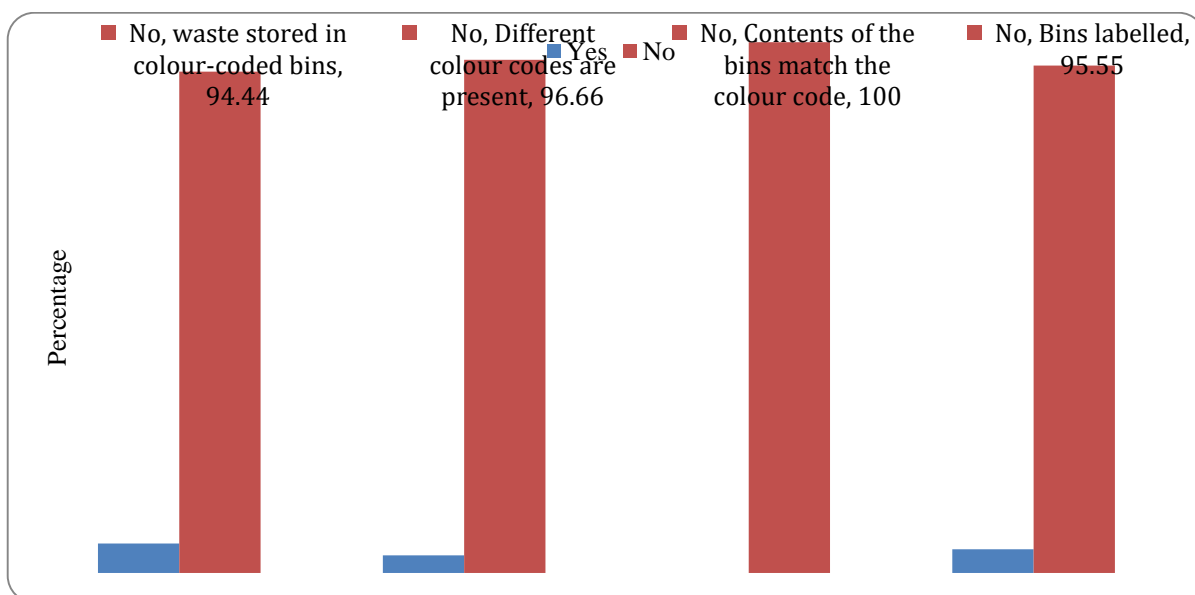


Figure 3. Analyse waste management practices in dental surgeries

Discussion

There was a lack of satisfactory understanding of waste disposal, and the methods did not generally adhere to worldwide recommendations and the rules set by the Ministry of Health. According to this study, only 16.66% of the participants provided correct answers to questions on the colour coding of clinic trash. In this particular field, research conducted in India revealed a percentage of 48%, as shown in study [14]. The Ministry of Health (MOH) Policy on clinic waste management mandates the use of puncture-proof containers for storing sharps. These containers must be properly marked and display the biohazard symbol. Properly handling sharps in accordance with approved guidelines safeguards dental surgery personnel from puncture injuries that may result in the spread of infections. This investigation demonstrated that every participant strictly followed

these criteria. An analogous observation was derived from the checklist evaluation. Once the temporary storage materials for amalgam are filled, it is advisable to contact a licensed amalgam waste carrier to arrange for the recycling or disposal of the waste amalgam. It is important to avoid disposing of waste amalgam in the garbage, washing it down the drain, or placing it in sharps containers [13]. This study discovered an inadequate procedure regarding the disposal of amalgam. A study conducted in India found that 79% of the participants disposed of their amalgam garbage along with ordinary rubbish, while 13% of them disposed of it in other improper manners [14]. A research conducted in Palestine revealed that more than 80% of the amalgam waste produced was improperly disposed of in either clinic rubbish or drains [3]. Lead foil packets refer to the residual waste generated during the process of capturing traditional X-ray images. All the facilities that provided X-ray services disposed of them along with the rest of the clinical trash, according to this study. If the lead is disposed of in landfills, it has the potential to leach into the soil and groundwater, resulting in environmental contamination. Manufacturers should be responsible for recycling or disposing of lead waste [13]. Exposure to elevated amounts of lead can increase the likelihood of experiencing reproductive problems, nerve defects, malignancies, hypertension, kidney function impairment, and immunological impairments [15]. Similarly, a research conducted in Iran revealed that 78% of the facilities examined disposed of lead foil packets as part of their regular garbage [16].

This exploratory study clearly indicates a noticeable requirement for education, monitoring, and empowerment in waste control within the oral healthcare delivery system. It is imperative to make coordinated and determined efforts to implement the recommended standards and standard practices. Comprehensive instruction on dental waste management and its related environmental contamination should be included in the training of dental surgeons, nurses, and other allied professionals. In addition, it is important for training and professional development programmes to consistently prioritise waste management methods. As awareness and knowledge increase, administrators and managers may have a big duty to create a conducive work environment equipped with the appropriate resources. Healthcare leaders and Dentists must guarantee that comprehensive training is given to all staff at the beginning of their employment and to all contract workers [17].

Conclusion

The staff at the facilities demonstrated a limited understanding and compliance with dental waste management rules. It is necessary to establish a conducive environment to encourage compliance with dental waste management rules.

Reference

- 1 Muhamedagic, B., Muhamedagic, L., & Masic, I. (2009). Dental office waste—public health and ecological risk. *Materia socio-medica*, 21(1), 35.
- 2 Allen, R. (2014). Disposing of clinical and dental waste. *BDJ Team*, 1, 14038.
- 3 Darwish, R. O., & Al-Khatib, I. A. (2006). Evaluation of dental waste management in two cities in Palestine. *Eastern Mediterranean health journal*, 12(2), S217–S222.
- 4 Wiafe, S., Nooni, I. K., Nlasia, M. S., Diaba, S. K., & Fianko, S. K. (2015). Assessing clinical solid waste management strategies in Sunyani Municipality, Ghana—Evidence from three healthcare facilities. *Int J Environ Pollut Res*, 3(3), 32–52.
- 5 de Souza, J. P., Nozawa, S. R., & Honda, R. T. (2012). Improper waste disposal of silver-mercury amalgam. *Bulletin of environmental contamination and toxicology*, 88(5), 797–801.
- 6 Northeast Natural Resource Center of the National Wildlife Federation and The Vermont State Dental Society. The Environmentally Responsible Dental Office: A Guide to Proper Waste Management in Dental Offices. 1999. Accessed Oct 11, 2022.
- 7 Kohn, W. G., Harte, J. A., Malvitz, D. M., Collins, A. S., Cleveland, J. L., Eklund, K. J., & Centers for Disease Control and Prevention (2004). Guidelines for infection control in dental health care settings-2003. *Journal of the American Dental Association (1939)*, 135(1), 33–47.
- 8 Koolivand, A., Gholami-Borujeni, F., & Nourmoradi, H. (2015). Investigation on the characteristics and management of dental waste in Urmia, Iran. *Journal of Material Cycles and Waste Management*, 17, 553–559.
- 9 Patwary, M. A., O'Hare, W. T., & 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), 1200–1207.
- 10 Hossain, M. S., Santhanam, A., Norulaini, N. N., & Omar, A. M. (2011). Clinical solid waste management practices and its impact on human health and environment—A review. *Waste management*, 31(4), 754–766.
- 11 Muluken, A., Haimanot, G., & Mesafint, M. (2013). Healthcare waste management practices among healthcare workers in healthcare facilities of Gondar town, Northwest Ethiopia. *Health Science Journal*, 7(3), 315–326.
- 12 Khatib, I. (2014). Problems of management of medical solid waste at primary health care centres in the Palestinian Territory and their remedial measures. *Eastern Mediterranean Health Journal*, 19(3).
- 13 Naik, R., Sureshchandra, B., Hegde, S., Damda, A., & Malik, M. (2011). Best management practices for hazardous dental waste disposal. *Endodontology*, 23(2), 108–113.
- 14 Arora, R., Agrawal, A., Singh, D., & Reddy, J. (2014). Management of dental waste in private clinics in Chhattisgarh state, India—A cross sectional study. *J Dent Med Sci*, 13(1), 53–6.
- 15 Agarwal, B., Singh, S. V., Bhansali, S., & Agarwal, S. (2012). Waste management in dental office. *Indian Journal of Community Medicine*, 37(3), 201–202.
- 16 Zazouli, M. A., Rostami, E., & Barafraشتهpour, M. (2014). Assessment of dental waste production rate and management in Sari, Iran. *Journal of Advances in Environmental Health Research*, 2(2), 120–125.
- 17 Govan, P. (2014). Waste management in dental practice: communication. *South African Dental Journal*, 69(4), 178–181.