

**SOLID MEDICAL WASTE MANAGEMENT: THE CASE OF KWEKWE CITY IN
MIDLANDS PROVINCE, ZIMBABWE**

R. V. Mangizvo and R. Chinamasa
Open University of Zimbabwe

Abstract

The handling of medical wastes presents a number of environmental challenges in most of Zimbabwe's urban centers. Not much has been discussed on the issue, despite the disquiet the wastes cause. This paper explores the types and sources of medical wastes, their storage before collection, their collection, and disposal in the City of KweKwe. Interviews and observations were used to collect data. The study found that manpower, handling the medical waste, were not trained to do the job. Storage before collection for disposal was done in a haphazard manner. An open truck was being used to carry wastes for disposal. The disposal site was not appropriate for medical wastes, as its initial purpose was to handle condemned cattle carcasses from the abattoir. The incinerators at the disposal site were not functional and low heat sources were being used to burn wastes. Finally, this paper recommends sustainable management of medical wastes in the city so as to protect the environment.

Introduction

Medical waste management presents a number of environmental challenges in both the developed and developing countries (Taru & Kuvarega, 2005). According to von Schirnding (1999) hazardous wastes are widely dispersed in the environment and have accumulated over many decades. Medical waste is potentially hazardous and infections if handled carelessly. In the United States, for example, it is estimated that there are between 30,000 and 50,000 waste disposal sites, many being illegal or abandoned. World Health Organization (1988) argues that proper management of medical waste is a problem in most

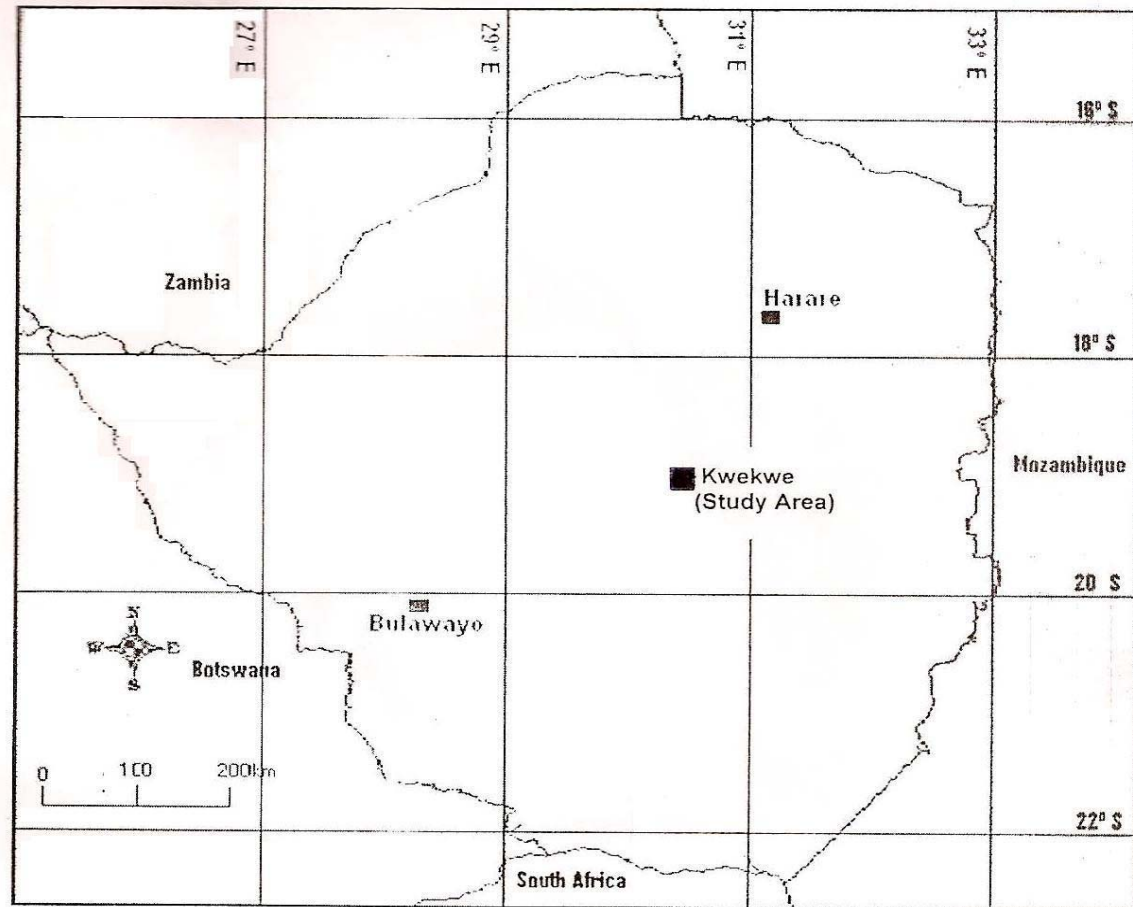
developing countries, especially in those countries where regular municipal solid waste is not managed adequately. Kamel (2000) observes that in Cairo, Egypt, hospital waste arrives at disposal sites mixed in with kitchen waste. This co-disposal method is undesirable as clinical wastes are hazardous. Appleton and Ali (2000) contend that less developed countries experience more problems of dealing with medical wastes because firstly, they do not have clear jurisdiction over special waste management; secondly, the resources to manage these wastes are scant; thirdly, the technology to manage special waste is seldom available. During the time this study was carried out, it was observed that in KweKwe City in the Midlands Province of Zimbabwe, medical wastes were being disposed of carelessly. This was being done in the ordinary waste dumps found on the outskirts of the city, as well as in dustbins. This motivated researchers to investigate the management and flow of medical waste in Kwekwe City. This study aimed to (a) trace the handling of medical waste from point of generation to final disposal, (b) identify different medical waste streams generated by different medical institutions in KweKwe, (c) identify potential hazards likely to occur due to poor handling of medical wastes, and (d) recommend better ways of handling medical wastes in the City of KweKwe.

Area of study

This research was carried out in the city of Kwekwe, which is located in the Midlands Province of Zimbabwe (Figure 1.) It is the second largest town in the province. It lies 213 km from Harare, the national capital, and 226 km from Bulawayo, the second largest city in the country. The city has 93,608 people, whilst KweKwe rural district has 159,469 as of the 2002 national census (CSO, 2002). The medical institutions are located in the central business

district of KweKwe City, as well as in the residential suburbs of Amaveni, Mbizo, and Msasa Park. The city has one government hospital, KweKwe General Hospital, which acts as a district referral hospital. It also caters for other districts, such as Gokwe North and Gokwe South. The city has one private hospital, known as Multi-Choice. There are a total of 6 clinics. Four of them are owned by the city council, whilst 2 are privately owned. A total of 9 private surgery centers are found in the city. All these centers generate different forms of medical wastes.

Figure 1: Map of Zimbabwe showing location of study area (Kwekwe City)



Research Methodology

The researchers used observation and interview methods to collect data on the management of the solid medical wastes in the city of KweKwe. The researchers made frequent visits to the general hospital and its wards, the private hospital and its wards, all of the surgery centers and clinics, as well as the incinerator for 3 weeks. The purpose of the visit was to observe the flow and handling of medical wastes.

Interviews to collect data on management of solid medical wastes were conducted with key informants in the different medical institutions. Key informants included the matrons, nurses in the wards at the hospitals, nurses working for the surgery centers and clinics under study, the cleaners at the hospitals, clinics and surgery centers, and the crew that ferried medical waste to the incinerator. Personnel from KweKwe city's health department were also interviewed. An interview guide was prepared for each one of them. The sample for the interviews was purposively selected. Only those individuals who were in contact with medical waste during the time of the study were deliberately selected.

Findings and Discussions

Manpower handling medical wastes: It was revealed through interviews that individuals involved in the management of medical wastes were not trained to do the tasks. Nurses at the hospitals, clinics, and surgery centers were not trained in handling wastes, although they tried their level best to be meticulous in dealing with the waste generated at their respective institutions. General hands were employed to clean and dispose of the waste. They did not have any form of training to deal with the waste, at times did not wear protective clothing when handling waste, and never attended any form of course on medical waste management.

Types and sources of wastes: The study revealed that there are various types of medical wastes that were generated by the different medical institutions in the city of KweKwe. These were observed to be in varying quantities. It was observed that the wastes were generated mainly in the diagnosis, treatment, and immunization of patients. The following categories of waste were identified: pathological and infectious wastes, sharps, pharmaceuticals, radioactive materials, and containers. Table 1 (below) gives a summary of the average weekly amounts of the different wastes that were generated by the different medical institutions in the city.

Table 1: Summary of Average Weekly Amounts of Medical Waste

Type Of Waste (kg)	Surgeries	Medical Laboratories	Council Clinics	Kwekwe General Hospital
Pathological	2.25	2.00	46.00	25.30
Infectious	5.75	15.00	24.00	28.30
Sharps	3.00	8.00	19.00	18.00
Pharmaceutical	0.23	0.10	2.92	1.00
Radioactive	0.07	0.00	0.00	5.00
Pressurized containers	0.75	0.00	3.40	6.99
High heavy metal content	0.00	0.00	0.24	0.17
Others (flowers paper, food left-overs, etc)	2.10	3.20	15.20	24.1

Source: Research Data 2007

The pathological wastes constituted human body parts removed during surgery or autopsy, tissues, and organs. The main source of this form of waste was the general hospital, which was involved in carrying out surgical operations and autopsies. Fetuses, placentas, and blood, which resulted due to stillbirths, were also identified at the general hospital. Since the general hospital is a referral centre it naturally recorded the highest number of operations and deliveries. It was revealed during interviews that Kwekwe General Hospital recorded an average of 13 deliveries per day, compared to council clinics, which recorded an average of 3

deliveries. Council clinics were second highest in generating pathological waste. This was because they handled delivery cases in their maternity wards and attended to some surgical problems. The laboratories and private clinics did not generate a lot of pathological waste, as they did not carry out any surgery or handled any delivery cases. It was revealed in the interviews that such cases were referred to the general hospital and council clinics, which had capacities to deal with them.

Infectious wastes were considered to be those that were associated with humans known to be infected with highly communicable diseases. These included wastes from surgeries and autopsy that were in contact with infectious agents, such as sponges, soiled dressings, cotton wool, surgical gloves, and swabs. Waste from isolation wards was treated as infectious. It was observed that since bandages and soiled dressings were moist, that probably contributed to their increased weight. The general hospital generated the largest quantities, especially from its surgical wards, where a lot of wounds were being dressed, and the theatre, where operations were carried out. Table 1 shows the council clinics were second after the general hospital. This was because they attended to a large number of people, since their fees were comparatively lower than those charged by private surgeries. The laboratories and private surgeries as observed from the table generated significant quantities of wastes, but not as much as the general hospital and council clinics. This could have resulted from the fact that they charged exorbitant fees, hence, attended to fewer patients.

Sharps constituted of hypodermic needles and syringes, intravenous needles and tubing, scalpels and lancets. Broken bottles and glass were included in this category. It was observed that the council clinics generated the largest quantity of sharps, followed by the

general hospitals. Interviews revealed that, by their nature, the clinics attended to outpatients more than any other institution. Most of these received shots; hence, a large number of needles were used in the process. As can be seen from Table 1, laboratories generated a significant amount of sharp waste. During interviews it was realized that laboratories used needles to draw blood from patients for various tests. Scalpels and lancets were generated mostly in the theatres. As can be observed from Table 1, other forms of waste were generated in smaller quantities compared to those discussed above. Pharmaceuticals consisted of expired drugs and their containers.

Drugs were generally in short supply in Zimbabwe at the time of the study; therefore, very few drugs reached their expiration. Radioactive wastes were only found at the general hospital and the private surgeries, as these were the only institutions dealing with X-rays during the time of the research. Pressurized containers were found to be air fresheners and aerosol containers. They were found mainly at the general hospital and the clinics, which were frequented by many patients. Heavy metal content wastes were mainly broken thermometers. These were found at the general hospital and clinics, as can be seen from Table 1. The other forms of waste, like food remains and flowers were generated in the wards. Visitors brought food and flowers to their sick relatives and ultimately these ended up as waste.

Storage of medical waste: Once the waste was generated in the wards, it was put into small cardboard boxes, which were placed at the bedside of each patient. During the study it was observed that, at times, some of the small boxes would get full and the waste would spill over. The waste from the wards was then emptied into larger plastic and polythene bags, which were kept in the corridors. They were then taken to a temporary storage site outside

the hospital awaiting collection to the incinerator. The site had several bins containing different types of waste. A lot of flies and rats were observed at the site. According to Greenberg (1971) and Pickford (1983), houseflies can fly a distance of up to 5 kilometres. This means the patients in the wards and the houses nearby were in danger, as flies are effective carriers of sanitation-related diseases.

Storage of waste in private surgery centers was better than at the general hospital. The surgeries had small metal bins with lids. These were found in the consultation rooms, as well as dispensaries. The waste was kept in these metal bins until the end of the day. Waste was emptied into larger bins, which acted as temporary storage till the council vehicle collected it. The bins were kept in the secured surgery premises, and no scavengers could access them.

The storage of sharps was not being done properly at the general hospital. They were stored in whatever container that was available. In some cases they were deposited into plastic bags and this endangered the health workers, as they were exposed to pricks and cuts. At the council clinics and private surgeries sharps were stored in containers with tight lids.

It was observed during the time of the research that waste was not being separated during storage. Pathological waste was mixed with sharps and infectious waste. In essence, different wastes should be separated at source. In all institutions under study, the bins were kept outside once they got full, waiting to be taken to the incinerator. It was the responsibility of the city council to collect and transport all medical waste from the different institutions. Occasionally the council experienced transport problems and failed to collect the waste. The staff interviewed at the general hospital acknowledged that scavengers had access to the waste. Storage of waste was not secure and it was revealed that once in a while

some pathogenic wastes, such as placentas and fetuses, were found strewn near the bins in the morning. Dogs and crows could have access to these thereby, endangering their health. In some cases collection of waste was delayed leading to the decomposition of body parts. This exposed the whole environment to health hazards.

Medical waste collection: It was the responsibility of the city council to collect and dispose of all medical waste in the city of KweKwe. The waste was supposed to be collected daily. The situation on the ground was different; collection was erratic. Waste was, at times, collected once a week; sometimes it could take up to 2 weeks before it was collected. This was due to fuel shortages, as well as problems with vehicles. The medical waste workers revealed that, at times, the pathological waste was transported when it was already in an advanced state of decomposition, resulting in a nasty odor. A Mazda B1800 open truck was used to ferry waste to the incinerator, which was located at the municipal abattoir. The driver and his crew argued that the truck that was being used was not appropriate as some waste could easily fall off the truck. It was also gathered that the workers sat in the cabin, loaded with waste, thereby, exposing them to the infectious diseases.

Disposal of medical waste: All medical waste that was generated in the city of KweKwe was supposed to be disposed of at the general hospital. There were two incinerators at the general hospital, one for sharps and the other for pathological and infectious waste. Both incinerators were not functioning. They broke down and it has been difficult to resuscitate them due to foreign currency problems, as spare parts had to be imported. It became imperative, therefore, to take all the medical wastes to the council incinerator, which was at the council abattoir. The facility was used for burning carcasses of

condemned cattle, dead dogs, and cats from the city's suburbs. It was located about 20 meters from the abattoir.

The visits to the council incinerator revealed that it was not functional. At the time of the study, it had been out of order for two years. It was observed that medical wastes of various types were strewn around the incinerator. These included sharps, empty drug bottles, and soiled bandages. In essence, casual dumping was taking place at the site. No attempt had been made to cover the waste with soil. Council workers at the site revealed that their attempts to burn the waste, using cardboard paper, as they did not have firewood, had been futile. The amount of heat generated was not high enough and what was observed during the research, were piles of half-burnt wastes. Sharps, such as needles, require temperatures above 1000°C in order to reduce them to ash. Broken bottles, plastics, and sharps surrounded the incinerator. This exposed scavengers, who attempted to recover usable materials from the waste, to possible injuries.

The fact that the medical waste was being disposed of in the abattoir's premises exposed residents of KweKwe to health hazards. The beef that was being consumed in the city was from this abattoir. Flies were seen on the waste and these could easily come in contact with the meat in the abattoir. Dogs and cats frequented the premises as well, and these were in danger of being contaminated. Some dogs have a habit of taking whatever they pick elsewhere, to their residences. This again exposed residents to health hazards.

Conclusions

The management of medical waste in the city of KweKwe was poorly done at the time of the study. Wastes could be seen on casual dumps, in public waste bins, as well as the

domestic waste dumpsite. Waste was not being separated according to type. Medical waste is hazardous and infectious; hence its disposal must be done separately. The incinerators were not functional, and the council was using the incinerator at the abattoir, which is not proper. The disposal site at the incinerator was not fenced. This gave ready access to intruders, such as waste pickers and dogs, thereby exposing them to serious health hazards. Personnel dealing with the waste were observed to have a lackluster approach towards handling of waste, lacking any training in handling medical wastes. Medical wastes are a special type of wastes and as such, require special handling.

Recommendations

Having concluded that the management of medical wastes in the city of KweKwe was being poorly done, the study came up with a number of recommendations. These were made to mitigate the impacts of medical wastes on the environment. This would make the environment sustainable. It was recommended that:

- (i) Medical wastes should be separated at the source, during the temporary storage, collection, and at disposal.
- (ii) All sharps must be placed in puncture-resistant containers to reduce both occupational and general public risks they pose. Sharps are potentially infectious, and can also cause injuries through prick and stabs.
- (iii) The two incinerators at KweKwe General Hospital must be restored to full functionality and refurbished to increase their efficiency. The central government should provide foreign currency for the procurement of spare parts to make the incinerators functional. The facilities at the municipal abattoir must not be used

for disposal of medical wastes. These should be reserved to deal with beef related issues.

- (iv) Residues from the incinerator should be disposed of at special dumpsites, created for such purposes.
- (v) The storage and disposal facilities must be fenced off from scavengers, as materials to be recovered by waste pickers are dangerous and potentially infectious. This means scavenging for any items from medical waste should be controlled.
- (vi) Education of health-care workers and refuse workers, as well as the general public, about the proper disposal of medical waste, such as sharps, will facilitate their handling and management. This could be in form of in-house training and refresher courses. Trained manpower should, therefore, be engaged to deal with medical waste.
- (vii) Manpower dealing with handling of medical waste should be increased, especially at the incinerator, where different activities, such as loading, emptying, and guarding the premises require more than one person.

The above study showed that the management of solid medical wastes in the city of KweKwe in Zimbabwe was poor. Although this study was specifically on the city of KweKwe, the findings could be seen to reflect what is prevailing in most urban centers in the developing world. Hence, sustainable management of waste would go a long way in protecting individuals and the environment.

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