

**ASSESSMENT OF MEDICAL WASTE MANAGEMENT IN HEALTH
FACILITIES: THE CASE OF MAKAMBAKO HEALTH CENTRE**

**ASSESSMENT OF MEDICAL WASTE MANAGEMENT IN HEALTH
FACILITIES: THE CASE OF MAKAMBAKO HEALTH CENTRE**

By

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**A Research Dissertation Submitted in Partial Fulfillment of the Requirement
for Master of Health System Management (MHSM)**

of Mzumbe University

2017

CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by Mzumbe University, a dissertation titled “Assessment of medical waste Management in Health Facilities” : A Case Study of Makambako Health Centre, Njombe District, Njombe, Tanzania” in partial fulfilment for the award of the degree of Master of Science in Health Systems Management of Mzumbe University.

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DECLARATION

I Nuru Mwakanyamale declare that this dissertation is my original work and that it has not been presented to any other University for a similar or any other degree award.

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DEDICATION

With gratitude to God I dedicate this work to my lovely parents MR&MRS Mida Mwakanyamale for their love, moral, prayers and financial support. I would like also to dedicate this work to my lovely young sister Abigail Mwakanyamale and my lovely young brother Jonathan Mwakanyamale for their continued encouragement. Peace of God is upon you.

ACRONYMS AND ABBREVIATIONS

WM	Waste Management
BMW	Bio-Medical Waste
MW	Medical wastes
HCW	Health Care Workers
PPE	Personal Protective Equipment
MHC	Makambako Health Centre
MWM	Medical Waste Management
HCWM	Health Care Waste Management
WHO	World Health Organization

ABSTRACT

INTRODUCTION: Healthcare wastes pose health problems to the people and affect environment in general. Since the WHO set rules and principles of handling medical wastes but in health facilities health workers lack awareness and knowledge on how to handle those medical wastes whereby there are no training sessions and seminars to them.

OBJECTIVES: The objectives of this study were to determine the practices of medical waste management at Makambako Health Centre, examining awareness to health workers and assessing the factors affecting adherence to the MWM at Makambako Health Centre (MHC) to avoid occurrence of health hazards to those interacted with those medical wastes including patients and environment around the area.

METHODS: The researcher made use of both primary and secondary data. The study also employed the use of cross section method to describe the BWM since it involve 60 of Health workers included in the study from Health facility using purposive sampling technique. A semi structured questionnaire and observational check list were used to collect data. Data were entered and analyzed using SPSS.

FINDINGS: The study has revealed the following key findings it indicates that generally level of awareness of health workers in government strategies to address medical waste was 65.4% and only 34.6% were not aware. Also 82.7% said the practices are satisfactory and 19.3% said the practices are not satisfactory since are encountering different challenges in the medical waste handling practices including getting injuries when handling wastes.

RECOMMENDATIONS: From the research findings study recommend that there is a need of having regular training programs to all workers in order to help them to know the risks associated with poor management of medical wastes also the notification of quantity of wastes generated to enable the proper allocation of resources in medical waste management.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Medical waste makes up a special type of waste because they include potentially damaging resources and the difficulty of ways of handling the wastes has happen to be one of important concern in developing countries (Manyele and Lyasenga, 2010). The management of waste in health care facilities has maintain to produce increasing public attention due to the health harms linked with the contact with the people to potentially dangerous wastes coming up from medical (Njiku, 2015; Kagonji and Manyele, 2016). In the process of provision of health care services, normally it is associated with the generation of different wastes. It has been revealed that the origin and amount of the waste produced as well as organization activities with regards to the methods of waste management are habitually poorly observed and recognized in a number of countries, despite the health harms caused by the inappropriate managing of the wastes (Farzadika *et al.*, 2009; WHO, 2005).

In developing countries particularly, the Sub Saharan Africa where many health concerns are competing for inadequate resources, the management of medical wastes has received less attention and the priority it deserves (Stringer *et al.*, 2010). Other scholars have reported that, realistic information on this significant aspect of medical management is insufficient and research on the public health implications of scarce management of medical wastes are few and limited in scope (Kaseva & Mbuligwe, 2005; Okot-Okumu and Nyenje, 2011). Studies in developing countries have demonstrated reliable records of the quantity and nature of medical wastes and the management methods used to dispose these wastes has remained a challenge. Among the practices that have been reported in many developing countries include plenty of medical waste that are deposited openly in waste dumps and neighbouring environments and from time to time together with nonhazardous solid waste (Manyele, and Lyasenga, 2010; Mgimba and Sanga, 2016).

In Tanzania, harmful and medical solid wastes are still managed and disposed as one with with domestic wastes. This makes a potential public health danger and an environmental burden (Manyele, and Lyasenga, 2010). The Ministry of Health (MoH) and the World Health Organization (WHO) carried out a survey in the year 2000 to find out the management of the syringes and needles used during immunization programs in Tanzania (Emmanuel *et al.*, 2008). This was followed by a similar survey on the management of all medical wastes types in 2001. From these two studies, it was established that medical facilities did not have the proper means of managing medical wastes (Emmanuel & Stringer, 2007). Following these studies, about 13 pilot small-scale incinerators were built in several areas in Tanzania. Following good performance of these pilot incinerators, it was recommended to expand the programme by building more incinerators in all referral hospitals and regional and district hospitals accompanied by training of the medical staff (Emmanuel & Stringer, 2007). Hospitals and medical units are supposed to safeguard the health of the community. However, medical wastes if not properly managed can pose an even greater threat than the original diseases themselves (Harhay *et al.*, 2009). This study aims to assess the current practices of medical waste in health centers and recommend the best practices considering the current technological realities.

1.2 Statement of the Research Problem

All medical waste management processes involve suitable arrangement and accomplishment by HCW of all levels (Kagonji and Manyele, 2016). Handling of medical waste depends on the knowledge and awareness of the health workers on the risks posed by different types of wastes. This includes awareness among health workers on the diseases that can be spreaded during managing medical waste. The health facilities in Tanzania are struggling to attain high values in medical waste handling, hard work of which are being hindered by finances restriction and inadequate abilities. Most researches on medical waste handling did not deals on lower rank particularly the health centers and dispensaries.

Selection of the lower level health center as the study part deals on the way that, there are some associated studies which have been carried previously in the high-level health facilities (regional and district hospitals) in Tanzania (Manyele *et al.*, 2003; Manyele, 2004; Manyele and Anicetus, 2006) but not in the lower level health facilities like Makambako health centre. In this case, this study is meant to investigate the waste handling performance in the lower level health facilities, and giving information that can be used for properly managing medical wastes in these facilities. This is due to the fact that improper managing and removal of medical waste create health hazards to health employees who may be directly exposed and to people close to the health facilities, mainly children and searchers who may turn out to be uncovered to infectious wastes and a advanced threat to diseases. Based on this backdrop, this study sets to explore the waste management performance at Makambako health center.

1.3 Research Objectives

1.3.1 General objective

The general objective of the study is to assess the waste management practices at Makambako health center.

1.3.2 Specific objectives

Specifically, the study was;

- i. To examine the awareness and knowledge on medical waste management among health care workers at MHC.
- ii. To review the current practices on medical waste management at MHC.
- iii. To identify the challenges affecting the adherence to the recommended medical waste management guidelines.

1.4 Research Questions

1.4.1 General question

What are the waste management practices at MHC?

1.4.2 Specific questions

- i. What is the health care workers' awareness on medical waste management?
- ii. What are the current practices on medical waste management at MHC?
- iii. What are the challenges affecting the adherence to the recommended waste Management guidelines?

1.5 Significance of the Study

The significance of this research can be observed in diverse ways. First to the lower level health facilities which are encountering a wide variety of confronts in handling waste they produce, spanning from financial, scientific and administrative difficulties. The study was providing bases for the effective handling of wastes in health facilities to benefit the health facilities and service users. The findings providing the opportunity for the health facilities to develop specific ways of managing wastes in health facilities in a proper approach. It was also provide bases for supporting institutions in the provision of education concerning waste management in health facilities including health department in the local governments. The recommendations were useful to medical management stakeholders in the formation of effective measures to handle wastes and improved health service delivery. The findings can be used as reference material for policy maker in making decisions concerning waste management to the health facilities and it can contribute to the body of literature for the academicians and researchers.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definitions of Key Concepts

2.1.1 Medical waste management

Medical waste management (MWM) comprise all actions engaged in waste production, separation, carrying, storing, handling and ending by throwing away of all kinds of waste produced in the medical services, phases of which involve particular consideration. This will guarantee that input (finances, equipment and facilities), actions and output (safe workareas, healthy surroundings, health personnel) for the secure managing and removal of medical waste are in proper state (MOHSW, 2006).

2.1.2 Health facility

WHO (2006) defines health-care facilities to include hospitals, primary health-care centers, isolation camps, burn patient units, feeding centers and others. Health facilities can be categorized into higher and lower level facilities. Higher level facilities include district hospitals, designated hospitals and referral hospitals. Lower level facilities comprise health facilities, dispensaries, laboratories and special clinicssuch as eye clinics, HIV/Sexually Transmitted Diseases, Reproductive Child Health, and dental clinics.

2.1.3 Medical waste

According to the Tanzania Medical Waste Management Monitoring Plan, medical waste is defined as all the waste harmful or not, produced by health organizations through out medical actions, precautioary, curative and/or analytic (Manyele and Lyasenga, 2010). More purposely medical waste has a high possibility of transporting micro-organisms that can contaminate communities who are bared to it, as well as the society at large if it is not accurately disposed of (Mudzteba, 2014). In

this research, medical waste can be defined any solid waste produced in the analysis, treatment, or immunization of the people or animals, linked to research, production or testing of biologicals from all types of medical organizations, involving hospitals, clinics, dental or veterinary and medical laboratories.

2.2 Empirical Review

2.2.1 Awareness and Knowledge on Medical Waste Management

Different studies have been conducted in the area of medical waste management in diverse areas of the world and have led to the establishment of different rules and practices for the proper handling of the wastes in health facilities. Based on the best practices, there are well defined set of principles for managing medical wastes worldwide. However, the study by Njiru (2014) at Kenyatta National hospital in Nairobi revealed that negligence and inadequate training and consciousness in the implementation of these regulations cause to serious health and surroundings anxiety. Njiru (*ibid*) focused on assessing the level of awareness of medical waste management among the health care personnel, the practices of medical waste management and the factors associated with proper medical waste management. The findings shows that the level of knowledge and consciousness on medical waste handling was invariably different where most of the support staff did not have enough knowledge on proper ways of segregating the wastes. Thus, a gap was noted in terms of regular training on disposal of the wastes and it was not clear whether the workers in the support line staff had been trained on the medical waste management.

Lack of knowledge of managing the medical waste can have serious health cost and major effects on the surroundings as shown in the text (Mathur et al., 2011). Managing medical waste involve the use of PPE such as heavy gloves to avoid the cuts, pricks and heat, suggested masks to manage dust, smoke and powdered chemicals. Low level of understanding among HWs on the risks associated, burning medical waste in open air particularly plastic and packaging materials, putting in the ground medical waste without including prior-treatment (Hossain et al. (2011), cause

hazard not only to the workers operating in the health centre but also to the society around that part.

A storage space for medical wastes supposed to be selected within the health centre. The waste in bags or containers supposed to be lay up in a different parts, scope, or construction of a size suitable to the amount of medical waste generated. The storage supposed to be easily reachable by workers managing waste, difficult to get to animals, insects and birds, confined from the sun, not close to food store and food grounding areas (Haylamicheal et al., 2011).

It has to be well known that Nursing-assistants placed in those places are necessary to carry and fall off the waste to the storeroom or dumping positions. In some services medical waste is not composed on a standard basis and moved to a central storage space leads to gathering of medical waste in wards and other functioning accomodations (Kagonji and Manyele, 2016). The collection supposed to follow definite routes to decrease the channel of burdened carts through wards and other clean areas. Most of the carts are not complicated to load and unload, have sharp edges that break medical waste bags and containers and are not easy to clean.

2.2.2 Medical Waste Management Practices in Health Facilities

It has been widely documented in the medical practices that medical waste handling is a process that guarantee appropriate sanitation in the health organization and wellbeing of health facilities personnel and the society (hygiene Connection, 2002). According to Vishal et al. (2012), the process involves four key steps: Segregation in a variety of components, counting reusable and insecure storage in proper containers; carrying to waste handling and dumping places, treatment and removal removal. process Moreover, according to Mesfin et al. (2013),

In another study it was found that general practice of waste management include a well defined process. The study recognizing the medical waste management practices to involve handling, separation, damaging, disinfection, storing, transportation and ending by disposal. They suggested that these are fundamental procedures for

secured and scientific handling of medical waste in every institution. More emphasis has been given by Lakshmi and Kumar (2012) who argued that the means to reduction and efficient handling of medical waste is isolation (separation) and recognition of the waste. They propose that the most appropriate way of identifying the categories of medical waste is by sorting the waste into color coded plastic bags or containers. In this case, WHO suggests that hospitals should provide plastic bags and strong plastic containers for infectious waste such as empty containers of antiseptics used in the hospital (Matee and Manyele, 2016).

Also in another study it has been documented that among the good practices which need to be observed in handling wastes in health facilities include separation of the waste such as garbage and garden refuse and put them on the stream of domestic refuse (Yenesew et al., 2012). Moreover, sharps supposed to be composed in puncture proof containers. It has to be reminded that bags and containers for infectious waste required to be marked with Biohazard sign. Extremely infectious waste supposed to be sterilized by autoclaving and Cytotoxic wastes are to be collected in leak proof containers, clearly labeled as cytotoxic waste (*ibid*). Needles and syringes should be destroyed with the help of needle destroyer and syringe cutters provide at the point of production. On a palce gathering needs workers to secure the waste containers once they are three quarters full either by binding the neck or by closing the bag. The storage room supposed to be resistant and hard position with proper drainage. It should offer an easy contact to waste compilation vehicle (Suwarna and Ramesh, 2012). According to scientific principles, the communicable wastes in the tropical place can be reserved in a temporary storage space for 24 hours throughout the hot season and up to 48 hours in cooler seasons (MOHSW, 2006).

After collection, medical waste supposed to be transported within the health facility by using the wheeled trolleys, containers or carts that are not used for any other function. The trolleys have to be cleaned every day and placed to certain wards at the health centre. Offsite carrying vehicle supposed to be noticed with the name and address of carrier. Biohazard sign should be decorated and appropriate method for

securing the load during transport should be ensured. Such a vehicle supposed to be easily cleanable with rounded corners. Njiru (2015) proposed that carrying of medical waste on public infrastructures have to be approved out by qualified personnel in a proper vehicle with closed containers. All not reusable plastic supposed to be subjected to shredding before removing off to the vendor. Final handling of medical waste can be conducted by machinery like incineration, autoclave, hydroclave or microwave (Sharma, 2010).

The study by Kagonji and Manyele (2016) emphasized that endorsement of the proper managing and removal of medical waste is essential for public health. In this case, every member of the society supposed to have the right to be knowledgeable about probable health hazards. Moreover, Kagonji and Manyele (2016) noted that the objectives of public teachings on medical waste contain: avoidance of contact to medical waste and associated health hazards which might be intended in the case of scavengers or accidental as a result of insecure disposal techniques, formation of consciousness and foster accountability among patient and visitors in health facilities concerning sanitation and waste management. Emphasis should be put in informing the public about threats associated to medical waste focusing on people livelihood or working in close proximity to/or visiting medical institutions, family of patients treated at home, and searchers on waste in dumps (Sharma, 2010).

2.2.3 Challenges in medical waste management

Mismanagement of healthcare waste cause health threat to human beings and the surroundings by polluting the air, soil and water resources. Health centers and healthcare units are expecting to safeguard the health of the society. However, health care wastes, if not appropriate handling can cause greater threats than the original diseases themselves found in health care waste (Abah and Ohimain, 2011). The existing disposal way applied by the various health care facilities, which is dumping and burning medical wastes in open grounds causes health hazards to patients and people living closer to health care facilities (Kuroiwa et al., 2008). For instance, when medical waste burnt, dioxin is a mainly air impurity of concern from

chlorinated polymer as accounted by the World Health Organization. (Ogbonna *et al.*, 2012).

Hazardous health care wastes causes probable threats of injury or contamination to all linked person such as medical staffs, doctors, nurses, sanitary staff and health care maintenance workers, patients getting treatment in health care facilities as well as their visitors and relatives. In addition workers who support services associated to the hospitals such as laundries, waste managing, transportation services and workers in waste disposal facilities have great risk of infection compared to other health professions. Furthermore scavengers and general public especially children who play with items scavenged from open waste dumps, are all at risk (HPCSA, 2008).

2.3 Synthesis and Literature Gap

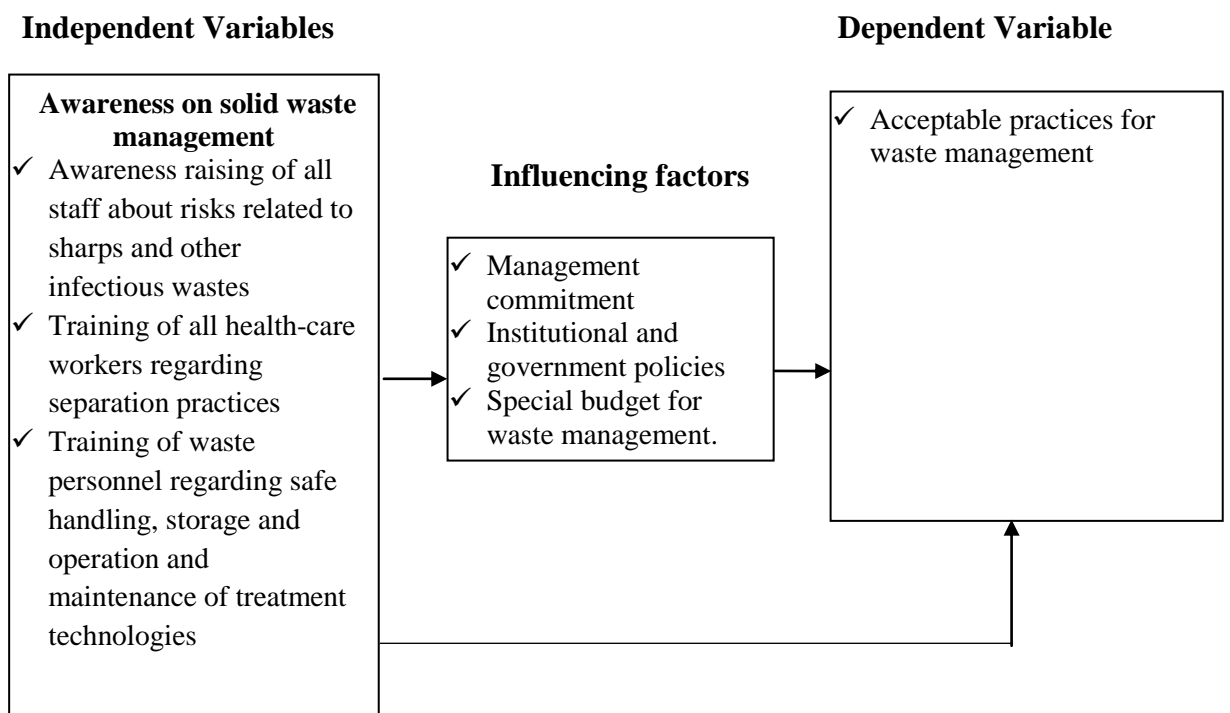
The literature review has revealed different issues regarding medical waste management. In this regard it can be asserted that the proper management of medical wastes requires the attention of different actors including the workers in the health facility and waste collectors. From the literature, it can be affirmed that, environmentally sound management involve severely controlling the storage, transfer, treatment, reuse, reprocess, recovery and ending removal of wastes. It has to be well known that, mainly waste produced in the medical facilities can be treated as regular municipal solid waste excluding for a varying portion needing special consideration such as sharps, pathological wastes, and other potentially infectious wastes, pharmaceutical, biological and hazardous chemical wastes, together identified as “Special medical wastes” moreover involve proper packaging, storage, transportation and disposal. It has been revealed that the deficient of segregation among dangerous and non-hazardous waste, an deficiency of principles and rules related to the gathering of waste from the health facilities and the on-site transport to a temporary storage places, a deficient of appropriate waste treatment, disposal of waste, inadequate guidance of employees, unsatisfactory personal protective equipment (PPE) and be deficient in understanding concerning the appropriate application to such tools are among the challenges highlighted in the text are important issues leads to poor medical waste handling. From this literature review,

this study sets to explore the medical waste management activities at lower level health facilities in Makambako health centre since most of the studies have concentrated in higher level health facilities notably district and referral levels.

2.4 Conceptual Framework

The conceptual framework of this study provides a situation in which health care services produces different types of wastes which need to be properly handled to avoid side effects to the environment and community at large (Figure 1).

Figure2.1 Conceptual framework



Source: Researcher’s construct (2016)

In case of the study area i.e. Makambako health center, the unit of analysis is the health facility where different workers from different departments use facilities which at the end produce waste which need to be either recycled or destructed. Thus, independent variable include the analysis of the awareness on medical waste management among hospital personnel and the current activities on medical waste management at Makambako health centre are the corner stone for the undertaking of this study. Likely, the independent variables also include the assessment of the

factors affecting the adherence to the recommended medical waste management practices is part and parcel of the indicators to be included in the analysis. The dependent variable include the best practices by looking at the quality of waste handling facilities, waste destruction facilities and recycling. Moreover, health and hygienic working environment in the facilities as part of the best practices keenly observed and recommendation drawn as shown in Figure 1.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter discussed the literature review of this study. This chapter discusses the methodology deployed towards assessing the evidence of the study phenomenon. It covers the study area description, research design, sampling and sampling type. Likely, it presents data collection techniques, tools and administration, data analysis and interpretation techniques deployed.

3.1 Research Design

Research design is an overall plan that guides the entire process to which research question shall be answered and includes data collection procedures as well as data analysis (Saunders, Lewis and Thornhill, 2009). According to Yin (2003), a research design is the logical sequence that connects the empirical data of the research questions to its conclusions. He clarified that a research design is a plan that guides the investigator in the process of collecting, analyzing and interpreting data. He argues on different types of research designs, namely surveys, experiments, archival, case study, cross-sectional and longitudinal designs. The choice of a certain research design depends on the type of research questions, investigator's control over actual behavioural events and degree of focus on contemporary events (Yin, 2003).

In this study, a cross-sectional research design was applied on the basis that, the design is widely used in descriptive studies and data can be collected using different methods at one point of time (specific period of time), to look at the prevalence of a problem in a given population. The advantage of a cross-sectional design is that it allocate researchers to compare unlike variables at the same time (Saunders *et al.*, 2009). Thus, applying this design helped to gather data on the waste management practices in the study area.

3.2 Description of the Study Area

The study was conducted at Makambako Health Centre in Makambako town council in Njombe district. The town is one of the 6 Councils in Njombe Region and there are 8 wards, 21 Villages and 9 streets. The Council has both characteristics of rural and urban areas. According to the Population and Housing Census of 2012, the council had a population of 93,827 residents, among them, 44,031 are male and 49,796 are female. The average household size was 4.2 which is below the National average of 4.8 persons per household. The council was selected because it is among the councils with primary health facilities which requires the attention of the research to evidence the case for medical waste management practices. There are 12 health facilities, out of those, there is one health centre, and 11 are village dispensaries (Vyagusa, 2013).

3.3 Sampling Procedures

3.3.1 Sample frame

Sampling can be defined as the process of choosing few (a sample) from a bigger group (the sampling population) to be the basis for approximating or forecasting the study phenomenon (Kumar, 2005). The sampling frame is a catalogue of all the members of a population from which a sample may be drawn (Mugenda and Mugenda, 1999). The target population for this study comprised of workers at Makambako health centre. The facility has a total of 70 workers that formed the sample frame for the study.

3.3.2 Sample size

In determining the sample size, the basic rule is "the larger the sample, the better" (Leedy, 1984) subject of course to timeframe, cost and human resource constraints. The sample size of the study population was considered to study a representative population to have an in-depth insight of the study phenomena which depicted the reality to provide lessons of experience to others for learning. From the sample frame, sample size calculated using Slovic's formula. The study considered a

sample size of 60 respondents from the sample frame. The sample size included the workers in medical facilities.

$$n = N / (1 + Ne^2)$$

n = required sample size

N = Sample frame

e = Sampling error of the confidence level corresponding to 95% confidence level

$$n = 70(1 + 70 * 0.05^2)$$

$$n = 60$$

3.3.3 Sampling technique

The study makes use of purposive sampling techniques. This sampling technique is useful and help to reach targeted sample quickly in the study was applied to choose the workers in the health facility to get the required respondents who interacted more with medical wastes.

3.4 Data Collection

3.4.1 Types of data

In this study, two types of data used which are primary data and secondary data.

3.4.2 Sources of data

Data for the study was collected from primary and secondary sources. Primary data was solicited through administration of questionnaires to the respondents. Secondary sources included the review of annual reports of the health facility and waste management standards.

3.4.3 Data collection techniques

i) Questionnaires

To assess the evidence of the study variables, a questionnaire was deployed for data collection. Questionnaire comprised of closed and open ended questions and was administered to the employees of the health facility. The advantages of using

questionnaire include the ability to collect lot of data within a short time. Moreover, it served time, since respondents spent short time to complete the questionnaires as compared to other methods like focused group discussion and interviews.

ii) Documentary review

In the process of data collection, various documents were reviewed to supplement the primary data. These documents included district health annual reports, health policy and previous interventions in the areas of medical waste management. The advantages of using this tool include access to reliable sources.

iii) Key informant interview

This method deployed the interview guide to solicit information from the health workers at the health facility. Both structured and unstructured interview were used. This method helped to get in-depth information from the informants in specific variables.

iv) Observation

Observation involving soughting information by the way of own direct observation and environment scanning without involving respondents and is useful as it is accuracy since do not relying on what respondents say. There were waste management tools and equipments observed in health facility like presence of plastic containers.

3.5 Validity and Reliability of Data

3.5 Data Triangulation, Validity and Reliability

Mugenda and Mugenda (1999) define data triangulation as multiple data collection techniques designed to measure a single concept or construct. According to Fredricks (2006) data are triangulated to help answering research questions set, enhancing validity in cross-sectional studies and to reach conclusions on the most effective interventions and innovations that can be implemented. To ensure triangulation, this study deployed a multiple data collection techniques and tools which confirmed the study. These techniques include interviews administered through questionnaires and semi-structured interviews.

Reliability is the degree to which an assessment tool produces stable and consistent results. Validity refers to how well a test measures what it is supposed to measure. To ensure reliability, prior to data collection exercise, questionnaires were prepared based on the objectives of the study using a simple, understandable language and subjected to the review by supervisor.

3.6 Data Analysis

Data analysis was done using quantitative and qualitative approaches. The analysis of quantitative data deployed descriptive statistics where frequency and percentages was computed regarding their awareness on medical waste management practices, factors affecting the adherence to the recommended practices. The analysis was carried out with the aid of Statistical Package for Social Sciences (SPSS) version 20. Moreover, qualitative analysis will use interpretive and reflexive approach. Interpretive method includes interpreting participant's responses and reflexive approach includes putting the views of the researcher on the data created.

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents research findings, its analysis and discussion about the assessment of medical waste management. Discussion of findings is based on the data obtained through: questionnaire and interview. The analysis is based on the variables under the specific objectives and 87% of the responses from 60 questionnaires administered. The chapter is therefore divided into four sections in which the first section is about socio-demographic characteristics of the respondents, second section answers the research questions about the knowledge and awareness on medical waste management, third section is centred on determining the current practices on medical waste management at Makambako health centre. The fourth section is about the factors affecting the adherence to the recommended medical waste management.

4.2 Socio-demographic Characteristics of Respondents

This section describes the socio-economic characteristics of the respondents and it provides an understanding of who were involved in the study.

4.2.1 Sex of respondents

In this case, the study covered a total sample size of 52 health workers at Makambako health Centre. Distribution by gender indicated that Female employees were the majority 34(65.4%) and the males constituted 18(34.6%) as far as occupation nurses were the majority with 8(15.4%) followed by doctors with 6(11.5%) and finally sanitary staff with 4(7.7%). Among doctors the greatest percentages were males 6(11.5%) while female were only 4(7.7%). The trend changed in nurses' males whereby they were only 8(15.4%) and females were 26(50%) and in the profession of sanitary staff males was 4(7.7%) the same trend with females who were 4(7.7%). Since nurses were the one who have more interaction with biomedical waste management than other employees in their daily

work activities and also females has high range in the hospital than male. The findings in Table 1 provides more details regarding gender and respondents' professions.

Table 4.1 : Distribution of respondents according to gender and profession (n=52)

Sex		Respondents' Profession			
		Doctor	Nurse	Sanitary staff	Total
Male	Count	6	8	4	18
	%	11.5	15.4	7.7	34.6
Female	Count	4	26	4	34
	%	7.7	50	7.7	65.4
Total	Count	10	34	8	52
	%	18.2	65.4	15.4	100

Source: Field survey data (2017)

4.2.2 The education level of respondents.

The reason as to why it was necessary to include socio-economic characteristics like education levels is based on the fact that there are clear differences in opinion between respondents with a different educational level. Other scholars had argued that when polling respondents regarding their educational level, it is significant to keep in mind that the school system is not similar in every country. In practice, it is even hardly the same in two countries. So, depending on which country(ies) you are reviewing in and how specific you would like to be, you can employ a more/less specific categorisation. In the case of Tanzania, the categorization commonly used is based on the formal schooling system that ranges from primary school level to the postgraduate level.

The results in table 2 revealed that majority of staff were having diploma level of education with a total of 22(42.3%) whereby nurses were 17(32.7%), sanitary staff were 5(9.6%) however the study findings indicated that there were no doctors holding diploma level of education. The study findings indicated that employees with secondary education were 17(32.7%) and 9(17.3%) had bachelor education. The study also revealed that 3(5.8%) were having advanced diploma level of education while only one (1) employee equivalent to 1(1.9%) was having master education.

These results indicate that; since most respondents were having diploma education hence it indicate the extent to which that education had a significant influence on the awareness of health care personnel on medical waste management. On average diploma/higher diploma holders were more knowledgeable of better WM practices and standards. Refer to table 2 below for details.

Table 4.2: Distribution of respondents by education and profession (n=52)

Level of education achieved		Profession			
		Doctor	Nurse	Sanitary staff	Total
Masters	Count	0	1	0	1
	%	0.0	1.9	0.0	1.9
Bachelor	Count	5	3	1	9
	%	9.6	5.8	1.9	17.3
Advanced diploma	Count	3	0	0	3
	%	5.8	0.0	0.0	5.8
Diploma	Count	0	17	5	22
	%	0.0	32.7	9.6	42.3
Secondary education	Count	1	13	3	17
	%	1.9	25.0	5.8	32.7
Total	Count	9	34	9	52
	%	17.3	65.4	17.3	100.0

Source: Field survey data (2017)

4.2.3 Respondents' work experience

Understanding the practices in medical waste management requires gathering views and from workers with varied experiences. In this regard, the survey covered respondents with experience ranging from one month to above five years of working at the centre. This led to capturing information with a considerable degree of variation and come up with a clear analysis on the trends of the practices and make a good recommendations. In this regard, the findings presented in table 3 show that majority of respondents equal to 42(80.8%) are permanent employees with experience of 1-2 years and only 1(1.9%) respondent was a volunteer. Details provided in table 3 below.

Table 4.3: Respondents experience and tenure at the health centre (n=52)

Current job		Time worked in the institution				
		1-12 months	1-2 years	3-4 years	5 years and above	Total
Permanent	Count	1	17	11	13	42
	%	1.9	32.7	21.2	25.0	80.8
Specific Contract	Count	0	2	0	0	2
	%	0.0	3.8	0.0	0.0	3.8
Trainee/Intern	Count	7	0	0	0	7
	%	13.5	0.0	0.0	0.0	13.5
Volunteer	Count	1	0	0	0	1
	%	1.9	0.0	0.0	0.0	1.9
Total	Count	9	19	11	10	52
	%	17.3	36.5	21.2	25.0	100.0

Source: Field survey data (2017)

4.2.4 Distribution of respondents based on departments and gender

Results shows evidently that, the total number of the respondents in all departments were female 34(65.4%) and other departments which respondents specified like OPD, maternity and others counts 32(61.5%) and the last department in trend was rehabilitative services which counts 1(1.9%).This indicates that among all departments those specified departments were the one more active and interact more with medical wastes by conducting operations, chemical wastes, bloods and generates different types of wastes and are familiar with it.

Table 4.4: Distribution of respondents according to departments (n=52)

Department		Gender		
		Male	Female	Total
Accident and emergency	Count	3	3	6
	%	5.8	5.8	11.5
General surgery	Count	4	3	7
	%	7.7	5.8	13.5
Rehabilitative Services	Count	1	0	1
	%	1.9	0.0	1.9
Dental	Count	2	4	6
	%	3.8	7.7	11.5
Any other (specify)	Count	8	24	32
	%	15.4	46.2	61.5
Total	Count	18	34	52
	%	34.6	65.4	100.0

Source: Field survey data (2017)

4.3 Awareness and Knowledge on Medical Waste Management

Medical waste can be produced in health centers, clinics and areas where analysis and treatment are practised. The handling of these wastes is an matter of great concern and significance inobservation of possible public health threats linked with those wastes. The study evaluate the medical waste management activities at Makambako health centre in relation to the established standards.

4.3.1 Awareness on government strategies to address medical wastes

The findings shows that the majority of the respondents from various departments were aware concerning different strategies which Government takes to ensure MW managed well since counts 34(65.4%) and only 18(34.6%) said they do not know Government strategies to address MW so this proves that HW observed governments efforts at MHC and those strategies are through providing protectivre working gears like heavy boots, hand wash facility to avoid harzadous health effects exposed by medical wastes.

Table 4.5: Awareness on government strategies to address medical waste (n=52)

Department	Government strategies to address biomedical waste management			
		Yes	No	Total
Accident and emergency	Count	4	2	6
	%	7.7	3.8	11.5
General surgery	Count	5	2	7
	%	9.6	3.8	13.5
Rehabilitative Services	Count	0	1	1
	%	0.0	1.9	1.9
Dental	Count	5	1	6
	%	9.6	1.9	11.5
Support staff	Count	20	12	32
	%	38.5	23.1	61.5
Total	Count	34	18	52
	%	65.4	34.6	100.0

Source: Field survey data (2017)

From the findings it can be asserted that majority of the staff are aware of the government strategies to manage medical wastes. Some of this strategies were stipulated in the government action plan to control medical waste which stipulates the roles of the health facilities (MHSW, 2009):

- i. Make certain that monitoring tools (Checklists and Questionnaires) are concluded at each point in the HCW stream (generation, storage, transportation and disposal)
- ii. Maintain a HCW movement log/register at each point of HCW stream
- iii. Collect completed HCW tools and summarize them on a weekly basis and submit to district HCWM Committee/Officer
- iv. Identify gaps/weaknesses in HCWM process and advise facility management on a daily basis on outstanding problems
- v. Conduct/organize monthly meetings with all personnel manning points in the HCW stream and prepare quarterly reports.
- vi. Practice proper segregation, collection, storage, treatment and disposal of Healthcare waste

vii. Order and procure working equipments for HCWM

viii. Monitor and supervise daily HCWM activities

It has been recommended that the first principal of MWM is waste reduction, which means reducing the amount and toxicity of waste at the basis. This comprises of eliminating substances that create threat in the medical waste managing with those that do not. It has been recommended from the best practices that, reducing the amount of waste (by good housekeeping) and waste assessment (characterization, planning and education) are the best methods for MWM. The key players for useful medical waste reduction are producers and customers of medical facilities (pharmaceuticals, equipment, packaging, etc.).

Following this best practices, another standard of suitable MWM combine waste segregation and recycling of useful materials. It have to be noted that pathological and/or infectious waste is a small portion of the total hospital waste volume (Manyele, 2015), where as the waste paper, cardboard and food remains involve the large portion. The later is in some way related to the patient concern and can be easily managed. It has to be noted that, through waste separation, helpful resources can be recovered out of the uncontaminated portion, e.g., cardboard, paper, glass, plastics, cans, bottles, etc. However, as mentioned earlier, recovery of useful material requires well-planned waste management programs. For effecient waste separation and recycling, the hospital administration request to focus on the non-patient waste part. Moreover, the performs in this method are the decision-makers when it comes to procurement of containers, waste carriers, and categorization.

4.3.2 Awareness of formal accident and injury reporting system

Increase in awareness on medical waste management has been improved by the government effort as documented by Manyele (2015) who asserted that, currently, proper waste management techniques for MW are being promoted in Tanzania, especially during the training sessions for employees going for onjob training and related workshops. The results indicate that the majority of respondents equivalent to 35(67.3%) lack awareness concerning the formal accident and injury system while

and 17(32.6%) were having awareness of the formal accident and injury reporting system. This indicates that Makambako health centre do not provide frequent training programs to HW to enable them to be aware with procedures to report when they get accident and injuries. Refer to table 6 below;

Table 4.6: Awareness of accident and injury reporting system (n=52).

Department		Awareness of any formal accident and injury reporting system		
		Yes	No	Total
Accident and emergency	Count	4	2	6
	%	7.7	3.8	11.5
General surgery	Count	1	6	7
	%	1.9	11.5	13.5
Rehabilitative Services	Count	1	0	1
	%	1.9	0.0	1.9
Dental	Count	2	4	6
	%	3.8	7.7	11.5
Support staff	Count	9	23	32
	%	17.3	44.2	61.5
Total	Count	17	35	52
	%	32.6	67.3	100.0

Source: Field survey data (2017)

This findings aligns with the challenges put forth by the Ministry of Labour, employment and youth development in Tanzania when it was establishing the national policy on occupational health in 2009. The challenges the policy anticipated to address included; the level of occupational health and safety awareness among employees, employers and society was very low. Over more, knowledge and skills among providers and staff at workplaces was grossly insufficient. There was a deficiency of occupational health skills together in public and private sector. In addition, there had been little investment in the education and training of health representatives, which impacts negatively on occupational health performance. Likely, the health facilities were understaffed and unable to attract or retain suitable skilled and experienced personnel in health system management. The policy recognized that there are significant skills deficits in both public and private sector. It was then emphasized that if the nation wants to effectively reduce occupational accidents and diseases, there is a need to increase human resources and skills level,

both in enforcement agencies as well as within all levels of the workforce in health facilities.

4.3.3 Staff training on medical waste management

Providing training to health facilities workers' is an important step to ensure medical waste management. In this case, respondents were required to indicate whether they have been trained on the handling of medical wastes. Interestingly 51.9% of the respondents indicated that they haven't been properly trained on this area. Among the participants who need to be highly trained include the Nurses and midwives as one suppose this cadre to engage a large part throughout training because they are openly concerned in the waste production positions (wards, theatres). It is essential that training also covers this important cadre, with importance on separation and packaging at the particular production positions without much attention to the incineration. Another cadre which is important as recommended by Manyele and Anicetus (2008) is the pharmacist this is based on the packaging materials that leads to waste production from the pharmacy, there are also expired drugs entering the MW stream. Pharmacists need to learn more on the proper activities on waste reduction like good house maintainance, inventory tracking and ways of staying planned. Such lessons can be involved in the on job training programs.

The findings indicated in table 7 reveals that the majority of the respondents were not trained on ways of handling MW since the government do not provide experts to conduct those training programs like once per year or twice to HW ensuring MW are well observed. The findings indicate that 27(51.9%) of respondents did not attend any kind of training while 25(48.1%) respondents attended training. Details provided in table 7 below.

Table 4.7: Training on medical waste management (n=52)

Department		Training on medical waste management by the hospital		
		Yes	No	Total
Accident and emergency	Count	4	2	6
	%	7.7	3.8	11.5
General surgery	Count	3	4	7
	%	5.8	7.7	13.5
Rehabilitative Services	Count	0	1	1
	%	0.0	1.9	1.9
Dental	Count	3	3	6
	%	5.8	5.8	11.5
Support staff	Count	15	17	32
	%	28.8	32.7	61.5
Total	Count	25	27	52
	%	48.1	51.9	100.0

Source: Field survey data (2017)

4.4 Current Practices on MWM at Makambako Health Centre

This section provides a discussion on the different practices conducted at MHC on medical wastes management practices. It explain several methods of waste produced at the health centre, availability of containers for handling wastes and treatment techniques. On site visit at the Makambako health centre revealed that currently sharp waste management is poor and unsafe to the environment. Sharp wastes are disposed and burned in a pithole or open burning which produce toxic gases from plastic which contribute in air pollution. Also sharp waste mixed with other waste such as paper and remained food particles and discarded in open space of the surrounding hospital compound.

4.4.1 Types of wastes generated at Makambako health centre

Waste produced by health centres involves sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and other materials. In many countries, the disposal of used injection tools and reuse of infected syringes and needles pose a serious public health threat. Therefore, a comprehensive health care waste management system is an integral part of good immunization safety practices (WHO,

2000). Doctors, nurses, technicians, washermans, sweepers, hospital visitors, patients, rag pickers and their relatives are exposed routinely to health care waste and are at more risk from the many fatal infections due to improper management (Yadav, 2001).

The findings revealed that most of wastes generated are infectious wastes which involve contaminated sharps with patients' blood and secretions followed by chemical wastes which considered being hazardous wastes. So at Makambako health centre the amount of wastes generated depends on different factors like types of health services provided, number of beds, economic, social and cultural status of the patients and the general condition where the hospital situated. Where by wastes which generated more are infectious wastes since if will not be properly handled can lead to contamination of diseases to patients and even health workers. Table 8 below explains.

Table 4.8: Respondents perception on wastes generated (n=52).

Department	Types of wastes generated mainly at Makambako health centre					
	Infectious wastes	Anatomical wastes	Sharp wastes	Chemical wastes	Papers/Food stuffs	Total
Accident and emergency	Cou nt 3	0	1	1	1	6
	% 5.8	0.0	1.9	1.9	1.9	11.5
General surgery	Cou nt 3	2	1	1	0	7
	% 5.8	3.8	1.9	1.9	0.0	13.5
Rehabilitative Services	Cou nt 0	0	0	0	1	1
	% 0.0	0.0	0.0	0.0	1.9	1.9
Dental	Cou nt 2	0	3	0	1	6
	% 3.8	0.0	5.8	0.0	1.9	11.5
Support staff	Cou nt 9	6	7	7	3	32
	% 17.3	11.5	13.5	13.5	5.8	61.5
Total	Cou nt 17	8	12	9	6	52
	% 32.7	15.4	23.1	17.3	11.5	100.0

Source: Field survey data (2017)

Generally, in Tanzania Mainland treatment techniques for hospital waste are still poor. This problem has been documented even by other researchers like Manyele (2004) who asserted that there are no proper methods of treating sharp waste. Moreover, the study conducted in Baquba teaching hospital revealed that; medical waste is not specified enough or anxiety. There is no safe method of medical waste managing and deficient of required supplies and facilities to hospital workers who take care of medical waste. Also lack of knowledge among health workers and a lack of coordination among different ministries in handling care waste hinder safe handling of hospital waste. Furthermore, high level of knowledge of hospital staff on sharps waste as ingredients of medical waste was, due to the familiarity of health workers with syringes and needles accidents that happen as a result of sharps injury.

4.4.2 Availability of containers for handling medical wastes in departments

The managing, gathering, and removal of infected sharps waste create one of the most occupational risk facing health care employees worldwide because of the frequency of needle stick injuries and the possible spread of blood borne pathogens. Accepted performance criteria for sharps containers include puncture resistance, rigidity, durability, leak resistance on the sides and bottom, ability to be closed, and functionality under all normal conditions during their use at health care facilities (NRMU, 2002). Improper management of medical waste exposes the medical staff, waste handling, worker, environment and the surrounding communities to infection, toxic effects and injuries, this condition pose a serious health problem in most of developing countries.

The findings in table 9 shows that in different departments there are containers for handling medical wastes since most respondents counts 51(98.1%) prove the availability of plastic containers and only 1(1.9%) said there are few containers for handling medical wastes .The majority was in support staff department was 32(61.5%) and rehabilitative services counts 1(1.9%). The results revealed that support staff department are aware more awareness on handling medical wastes and reduced the occurrence of injuries and avoiding risks which result from random disposal of biomedical wastes however WHO advised the use of heavy plastics for

handling medical wastes so Makambako health centre are doing good in this. Refer to table 9 below.

Table 4.9: Availability of waste collection containers (n=52)

Department		Availability of plastic containers for medical waste		
		Yes	No	Total
Accident and emergency	Count	6	0	6
	%	11.5	0.0	11.5
General surgery	Count	7	0	7
	%	13.5	0.0	13.5
Rehabilitative Services	Count	1	0	1
	%	1.9	0.0	1.9
Dental	Count	5	1	6
	%	9.6	1.9	11.5
Support staff	Count	32	0	32
	%	61.5	0.0	61.5
Total	Count	51	1	52
	%	98.1	1.9	100.0

Source: Field survey data (2017)

4.4.3 Waste handling practices

Hospital waste including sharps waste which involves syringes, needles, cannula, guide wires, broken glassware, scalpel, blades have the highest chance of disease transmission. Almost 85% of sharp injuries are caused between their usage and its disposal and more than 20% of those handle them encounter stick injuries. The emphasis should be on safe handling, rather than on the various treatment and disposal options. The medical staff concerned in waste managing have to be given all personal safety measures such as caps, masks, gum boots and gloves. They have also be vaccinated for tetanus and hepatitis B and follow up health assessment with record maintenance concerning their health status (Yadav, 2001).

The findings revealed that the majority were support staff counts 27(51.9%) and the few were accident and emergency department counts 2(3.8%) which makes total of 43(82.7%) who said yes there is specific area for biomedical waste disposal and

9(17.3%) said no. Since there have a well protected but poorly sanitized temporary storage area.

Table 4.10: Area for handling wastes (n=52)

Department		There is specific area for biomedical waste disposal		
		Yes	No	Total
Accident and emergency	Count	2	4	6
	%	3.8	7.7	11.5
General surgery	Count	7	0	7
	%	13.5	0.0	13.5
Rehabilitative Services	Count	1	0	1
	%	1.9	0.0	1.9
Dental	Count	6	0	6
	%	11.5	0.0	11.5
Support staff	Count	27	5	32
	%	51.9	9.6	61.5
Total	Count	43	9	52
	%	82.7	17.3	100.0

Source: Field survey data (2017)

4.4.4 Condition of waste storage facility.

It was important to assess the condition of waste storage facilities and during interviews with the health workers it was revealed that the facilities were somehow big enough and ventilated. The findings show that the majority were support staff counts 32(61.5%). Makambako health centre have waste storage facility which has in good state whereby has incinerator with a capacity to hold <200kgs of waste also there are containers in various department for disposal of medical wastes and those wastes transported from different wards to the temporary storage area. Table 11 below shows details.

Table 4.11: Condition of waste storage facilities. (n=52)

Department	Condition of waste storage facilities			
		Big enough	Well ventilated	Total
Accident and emergency	Count	5	1	6
	%	9.6	1.9	11.5
General surgery	Count	3	4	7
	%	5.8	7.7	13.5
Rehabilitative Services	Count	0	1	1
	%	0.0	1.9	1.9
Dental	Count	3	3	6
	%	5.8	5.8	11.5
Support staff	Count	14	18	32
	%	26.9	34.6	61.5
Total	Count	25	27	52
	%	48.1	51.9	100.0

Source: Field survey data (2017)

4.4.5 Schedule for medical waste collection

The findings with regard to schedule of waste collection as presented in Table 12, revealed that majority was support staffs which were 32(61.5%) since the schedule was daily routine 46(88.5%) and 6(11.5%) respondents said there was weekly schedule for waste collection. There by medical wastes generated in the health centre collected on daily basis and carried to a temporary storage area and this reduces the exposure to diseases and is a good indicator that there is hygiene for the staff and patients in general. Refer to table 12 below.

Table 4.12: Schedule for waste collection. (n=52)

Department	Schedule for waste collection			
		Weekly	Daily	Total
Accident and emergency	Count	3	3	6
	%	5.8	5.8	11.5
General surgery	Count	0	7	7
	%	0.0	13.5	13.5
Rehabilitative Services	Count	0	1	1
	%	0.0	1.9	1.9
Dental	Count	1	5	6
	%	1.9	9.6	11.5
Support staff	Count	2	30	32
	%	3.8	57.7	61.5
Total	Count	6	46	52
	%	11.5	88.5	100.0

Source: Field survey data (2017)

4.4.6 Occurrence of injuries during medical waste collection.

The findings shows that majority of employees constituting 32(61.5%) do not get injuries during medical waste collection while 20(38.5%) gets injuries during waste collection. Generally these results prove that, the staffs in work for handling waste in health centre apply protective equipment including overall gown, protective boots and gloves however, equipment are not sufficient and some of those who use protective gears fail to understand appropriate ways of using them hence getting injuries during medical waste collection. Refer table 13 below;

Table 4.13: Injuries during waste collection. (n=52)

Department		Any injuries during waste collection		
		Yes	No	Total
Accident and emergency	Count	4	2	6
	%	7.7	3.8	11.5
General surgery	Count	2	5	7
	%	3.8	9.6	13.5
Rehabilitative Services	Count	0	1	1
	%	0.0	1.9	1.9
Dental	Count	3	3	6
	%	5.8	5.8	11.5
Support staff	Count	11	21	32
	%	21.2	40.4	61.5
Total	Count	20	32	52
	%	38.5	61.5	100.0

Source: Field survey data (2017)

4.5 Challenges Affecting Medical Waste Management

Medical waste management in developing countries, including Tanzania face number of challenges. From the study findings, the challenges observed can be categorized into three broad areas; Institutional and government policies, Management commitment and low budget and Inadequate expertise (Table 14). The findings revealed that institutional and government policies have high level of effect as indicated by 62.5% of the respondents, followed by management commitment and lastly expertise.

Table 4.14: Challenges related to waste management practices (n=52).

Challenges	Level of effect to waste management		
	High	Moderate	Low
	10 (62.5%)	4(25%)	2(12.5%)
Institutional and government policies	6(37.5%)	8(50%)	2(12.5%)
Management commitment and low budget	2(12.5%)	10(62.5%)	4(25%)
Inadequate expertise			

Source: Field survey data (2017)

All health workers asked during interviews mentioned that; lack of planning and monitoring of health care waste, lack of budget, training, materials and equipment

(safety box) and incinerator are the barriers that hinder safe managing and disposal of sharp waste at the hospital. Furthermore, lack of motivation of health workers, inadequate number of health care workers, and lack of infection prevention officer and negligence of some of health workers, hinders safe handling of sharp waste at the hospital.

This study has revealed that barriers, that hinder safe handling and disposal of medical waste are deficient in planning, monitoring of health care wastes and lack of budget for smooth running of hospital activity. Furthermore, lack of training, lack of material and equipment, lack of incinerator, negligence, inadequate number of staffs and lack of motivation of worker in doing their daily routine work are barriers. Moreover, Geronnimo and Sarez (2005) insisted the importance of developing information material for the employee and patient in form of poster. Handout and hospital waste manual is a constant remainder for all health personnel involved in sharp waste management. On the other hand, Hagstrom (2006) observed that inadequate horizontal and vertical communication among medical staffs, resistance to change and time constrain are barriers to proper management of sharp medical waste.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter the important points emerged from the results of the study findings are summarized. It covers conclusion and recommendations of the study results also includes the areas for further studies which intend to widen knowledge gap is discussed.

5.2 Summary

This study focused on the assessment of medical waste management at Makambako health centre. Whereby it involve specific objectives 1. Examining the health care personnel awareness on medical waste management 2. Examining the current practices of medical waste management at Makambako health centre 3. Assessing the factors affecting the adherence to the recommended medical waste management. Also making observation of problems health workers and hospital in general encounters when managing the medical wastes and giving out recommendations.

All waste produced at health care facilities in the past was considered as harmful and was burned up before disposal. Today though, waste generated at health facilities is removed out and disposed of according to the threats it creates.

The rationale of this research was to assess medical waste management at Makambako health centre. In assessing waste management the researcher was guided by the specific objectives which are Examining the health care workers awareness on medical waste management, examining the current practices of medical waste management at Makambako health centre, assessing the factors affecting the adherence to the recommended medical waste management, also making observation of problems health workers and hospital in general encounters when managing the medical wastes and giving out recommendations.

The study design was observational, descriptive and cross-sectional. Cross sectional research design was implemented; simple random sampling was used to select 60 respondents who were the workers in the medical facility. Questionnaires were

provided to the respondents and observation was carried out for the collection of data as well as interview was carried out. Furthermore Secondary data obtained from hospital documents, published and unpublished documents, internet and articles.

Findings indicate that Medical waste management at Makambako Health centre is in good condition to some extent as evidenced by high Awareness on government strategies to address medical waste where by 65.4% of the respondents seemed to be aware of this and only 34.6% were not aware. This can further more be evidenced by the Availability of plastic containers for medical waste as 98.1% of the respondents said yes to the availability of plastic containers for medical wastes. Availability of the specific area for biomedical waste disposal, and good Condition of waste storage facilities, where 82.7% of the respondents said there is a specific area for biomedical waste disposal and 48.1% and 59% of the respondents said the storage facilities were big enough and well ventilated respectively. With all these evidences it can be summed up that to some extent the waste management at Makambako Health Centre is good.

On the other hand there are problems which have showed some weakness in medical wastage storage at the centre. It can be seen that the awareness and knowledge on medical waste management is low for example as in regard to staff training on medical waste management only 48.1% of the respondents attended training while 51.9% which is more than half of the respondents did not attend training on medical waste management. In addition to that is the fact that at the research shows that at Makambako health centre they do not separate wastes according to their types, this hinders proper waste management at the centre as without separation of wastes it may be risk to those handling the wastes, for example the kind of wastes generated at Makambako Health centre are infectious wastes which makes 32.7% of all the wastes generated at the centre and these kind of wastes are dangerous and hazardous.

The handling of medical waste is of great concern. There should be cooperation between the government, top management of the centre, patients and all other users of the health centre. If all these parts play their role in medical waste management then Makambako Health centre will safe from the problems that may be the result of

poor waste management. This cooperation can be done through regular training sessions and seminars on medical waste management for the healthcare personnel, provision of enough and standard protective equipment for their staffs to minimize occurrence of injuries, as well as establishment of the department dealing with waste management which will be having the supervisor who will be in charge of all purpose services and has waste management as part of his job programme.

5.3 Conclusion

From the results of the study the following conclusions are drawn;

5.3.1 Awareness and knowledge on medical waste management

Assessment of the awareness and knowledge on medical waste management has been put into three views namely, awareness on government strategies to address medical waste, awareness of formal accident and injury reporting system as well as Staff training on medical waste management . The findings indicated that 65.4% of the respondents were aware with government strategies to address medical waste and the remaining 34.6% are not aware.

The findings shows that 67.3% of the respondents are not aware of the formal accident and injury reporting system where as 32.6% are aware of the formal accident and injury reporting system. Low awareness of the formal accident and injury reporting system is associated with lack of training and seminars to the HW concerning reporting system.

The findings indicate that staff who were not provided with training on medical waste management where 51.9% of the total respondents while and 48.1% of the total respondents were provided with the training. Lack of training to the HW is because of the absence of the training experts and less government emphasis on training programs on medical waste Management.

However; it is revealed that training is essential in order to increase the awareness and knowledge on medical waste management, so the government through the top

management of the centre should provide the training to the HW. Also awareness can be increased through putting posters and announcements about ways of medical waste management and its importance on the walls around the centre's environments this will be a reminder to the HW.

5.3.2 Current practices on medical waste management at Makambako health centre

Assessment of the current practices on medical waste management at Makambako Health Centre has been divided into three issues namely wastes generated at Makambako health centre, availability of containers for handling medical wastes in departments, and waste handling practices.

The findings shows that 32.7% of the wastes generated at Makambako health Centre are infectious wastes, 15.4% are anatomical wastes, 23.1% are sharp wastes, 17.3% are chemical wastes, and 11.5% are paper food stuffs. Generation of these wastes is affected by kinds of health services offered, number of beds, economic, social and cultural conditions of the patient and the general state where the hospital situated.

The findings shows that 98.1% of the respondents agreed that there are available containers for handling medical wastes in departments while 1.9% of the respondents said that they do not have containers for handling medical wastes in departments. Availability of the containers is essential for the hospital as it will reduce the occurrence of injuries and avoiding risks due to random disposal of biomedical wastes in addition to that it is in concurrence with the WHO as it advices the use of heavy plastics for handling medical wastes.

To determine handling practices, four factors were considered namely area for handling wastes, condition of waste storage facilities, schedule for waste collection, and injuries during waste collection. The study findings indicate that 82.7% of the respondents agreed on the availability of the specific area for handling wastes where as 19.3% of the respondents responded negatively on the availability of the specific area for handling wastes. On the condition of waste storage facilities 48.1% of the respondents showed that their storage facilities are big enough and 51.9% are well

ventilated. Schedule for waste collection, 11.5% of the respondents showed that the schedule was based on weekly collection of wastes; where as 88.5% of the respondents showed that the schedule was based on daily collection of medical wastes. The fact that the schedule for waste collection is daily is positive to the centre as this reduces the exposure to diseases and is a good indicator that there is hygiene for the staff and patients in general. The results from the study shows that 38.5% of the respondents get injuries during waste collection while 61.5% of the respondents said they do not get injuries during waste collection. Generally it imply that the staffs inwork for managing waste in health centre employ the protective equipment together with overall gown and protective boots and gloves though the equipment are not sufficient and suitable also staffs are lacking knowledge and understanding of the proper usage of equipment and benefits of using protective equipment and effects of not using them.

Based on the research findings it can be concluded that, infectious wastes are generated in high quantity compared to other wastes so they need to be carefully and properly handled in order to avoid any infections to those handling them, this has to go hand in hand with the availability of enough and reliable containers for handling medical wastes as well as good waste handling practices which includes the availability of the specific area for handling wastes, good condition of waste storage facilities, and proper schedule for waste collection.

5.4 Recommendations

Based on the study results and conclusion drawn, the following recommendations were developed;

1. There is a need of health care personnel to be aware of the government medical waste management plan and handling procedures and implementing them. Since the awareness of HW can helps to educate patients and visitors of health facility hence better management of medical wastes.

2. Regular training programs and education to all employees to ensure the proper medical waste management practices. Since proper and frequent training develop awareness to health, safety and environmental issues also it is important as it helps health workers to be familiar with the risks linked with poor management of medical wastes.
3. It is recommended that there is a need to separate wastes according to their types and identification of them by using symbols, like sharps needles separated from infectious and chemical wastes. Also ways for proper treatment of wastes to avoid side effects to the environment and community at large should be adopted.
4. It is important to notify the quantity of wastes generated in the hospital in each unit where by helps in the allocation of resources in medical wastes management.

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APPENDICES

APPENDIX A: QUESTIONNAIRE FOR HEALTH CARE WORKERS

The following questionnaire is intended to collect information aimed at finding out factors affecting waste management in health care centre. Please respond to each question as honestly as possible. Your answers will be completely confidential.

I. Date of interview

ii. Questionnaire No

SECTION 1. – Respondent Profile

Please tick () the appropriate choice

Assessment of the awareness and knowledge on medical waste management among health care personnel at Makambako health centre.

Q1. Gender

a) Male ()

b) Female ()

Q2. What is your profession?

a) Doctor ()

b) Nurse ()

c) Sanitary staff ()

Q3. Which department in the hospital do you operate?

a) Accident and emergency ()

b) General surgery ()

c) Rehabilitative Services ()

d) Dental ()

e) Any other ()

Q4. What is your current job status?

a)Permanent ()

b) Contract ()

c) Trainee/Intern ()

d) Volunteer ()

Q5. How long have you worked in this particular institution?

a)1-6 months ()

- b) 1-2 years ()
- c) 3-4 years ()
- d) 5 years and above ()

Q6. What is the highest level of education you have achieved so far?

- a) Masters ()
- b) Bachelor ()
- c) Higher Diploma ()
- d) Diploma ()
- e) Other ()

Q7. What types of wastes do you mainly generate in this hospital?

- a) Infectious wastes (Blood and body fluids) ()
- b) Anatomical wastes (Human tissues, body parts, foetus etc) ()
- c) Sharp wastes ()
- d) Chemical wastes (e.g. solvents, reagents) ()
- e) Papers/Food stuffs ()
- f) Others (Please specify) ()

Q8. Do you have containers for biomedical wastes generated?

- a) Yes ()
- b) No ()

Q9. What type of containers do you use to dispose the above wastes?

- a) Plastic ()
- b) Metallic ()
- c) Any other (Please specify).....

Q10. Which disease do you know are a potential for transmission through biomedical waste handling?

- a) HIV/AIDS ()
- b) Hepatitis ()
- c) Don't know ()
- d) Other (Please specify).....

Q11. Do you know of any strategic plan by the Government addressing biomedical waste management?

a)Yes ()

b) No ()

SECTION 2.

Current Practices on Medical waste management at Makambako health centre.

Q12. Is there a temporary storage large enough to handle the waste generated?

a)Yes ()

b) No ()

Q13.Does the waste handler weigh and keep record of the waste generated?

a) Yes ()

b) No ()

Q14. Is there a hand washing facility?

a)Yes ()

b) No ()

Q15. Is there specific area for health care waste disposal?

a)Yes ()

b) No ()

Q14. If Yes in Q13 above what is the condition of waste storage facility?

a)Big enough ()

b) Well ventilated ()

Q15. Do you have a routine schedule for the collection of biomedical waste?

a) Yes ()

b) No ()

Q16. If, Yes in question above how often?

a) Daily ()

b) Weekly ()

c) Monthly ()

SECTION 3

Factors affecting the adherence to the recommended medical waste management

Q17. What are the three (3) limitations you face in your interaction with biomedical wastes?

i.....

ii.

iii.....

Q18. Have you ever had any injuries while handling biomedical waste?

a) Yes ()

b) No ()

Q19. Are you aware of any formal accident and injury reporting system?

a) Yes ()

b) No ()

Q20. Have you had any training on biomedical waste management by this hospital?

a) Yes ()

b) No ()

Q21. If yes, how many times? Mention.....

APPENDIX B

Interview guided questions to key informants.

1. What are the strategies undertaken by the management to ensure safe handling of medical wastes?
2. Does the health centre provide training to employees on waste management?
3. What strategies does the health centre use to train employees on medical wastes?
4. How do you handle medical wastes in daily activities?
5. What challenges do you face in management of medical waste?
6. How can the challenges be solved?
7. Is there anything else you would like to share concerning medical waste management?