

**KNOWLEDGE AND PRACTICES OF DOCTORS AND NURSES ABOUT  
MANAGEMENT OF HEALTH CARE WASTE  
AT JOHANNESBURG HOSPITAL IN THE GAUTENG PROVINCE, SOUTH  
AFRICA**

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**A research report submitted to the Faculty of Health Sciences,  
University of the Witwatersrand, in partial fulfilment of the requirements for  
the degree of Master of Public Health**

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## **DECLARATION**

I, Tuduetso Ramokate declare that this research report is my own work. It is being submitted for the degree of Master of Public Health at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

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12<sup>th</sup> December, 2007

## **DEDICATION**

I dedicate this work to:

My husband Lets, for the kind understanding, support and encouragement rendered throughout the duration of my studies. I can never find words to thank you enough for your patience.

My children Boitshepo and Leatile; for being there for Mummy and always concerned that my “homework” is done! I will forever cherish those memories.

Lastly, I wish to convey a special thanks to my parents, for the person that I am; but above all for always being there to assist with the children. This could not have been possible without your support.

## **PRESENTATION ARISING FROM THIS STUDY**

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## **ABSTRACT**

**Introduction:** The Gauteng Province in South Africa is home to four large hospitals which generate enormous amounts of waste. However, no formal study has been done to assess the magnitude of this problem. Health care waste falls under a cluster of waste which is regarded as hazardous due to its composition and therefore ability to transmit disease. It has become an important type of waste mainly because of its ability to transmit HIV/AIDS, Hepatitis B and C among other infectious diseases. This study attempted to address the knowledge and practices of doctors and nurses, which are just some of the factors which influence health care waste management.

**Aims:** The main aim of this study was to evaluate the current knowledge and practices of doctors and nurses regarding the management of health care waste.

**Methods:** This was a descriptive cross sectional study. A self administered questionnaire was used to collect the data. A total sample of 128 doctors and nurses was drawn from the Johannesburg Hospital, an academic hospital in the Gauteng Province.

**Results:** Although there was overall lack of awareness about the existence of the international, national, provincial and local documents (Act, Regulation, Manual, Code of Practice and Policies) regulating health care waste management, the majority of the respondents (84%) knew about the existence of the Johannesburg Hospital's policy on waste management. Generally, knowledge of nursing staff was significantly higher than that of doctors. Although some good practices such as use of gloves were reported, there is generally a lack of knowledge about key documents regulating health care waste, particularly among the doctors.

**Conclusion:** This study was the first of its kind to be done at the Hospital. As the Hospital policy is more accepted and accessible to the health professionals than the other documents investigated in this study, it should be updated regularly to incorporate new changes. The Hospital should not only make that policy document more easily accessible and visible but also strive to reach doctors with training in

health care waste management. Continuous monitoring and evaluation is also necessary to ensure that policies and procedures are followed.

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## LIST OF ABBREVIATIONS

CDC	Centers for Disease Control And Prevention
DOH	Department of Health
GDOH	Gauteng Department of Health
HCWM	Health Care Waste Management
HIV	Human Immunodeficiency Virus
JHBH	Johannesburg Hospital
MDGs	Millennium Development Goals
NECA	National Environmental Conservation Act
NDOH	National Department of Health
WHO	World Health Organization

# CHAPTER 1

## INTRODUCTION

The purpose of this study was to investigate knowledge and practices of doctors and nurses in a large academic hospital in the Gauteng Province, about health care waste management.

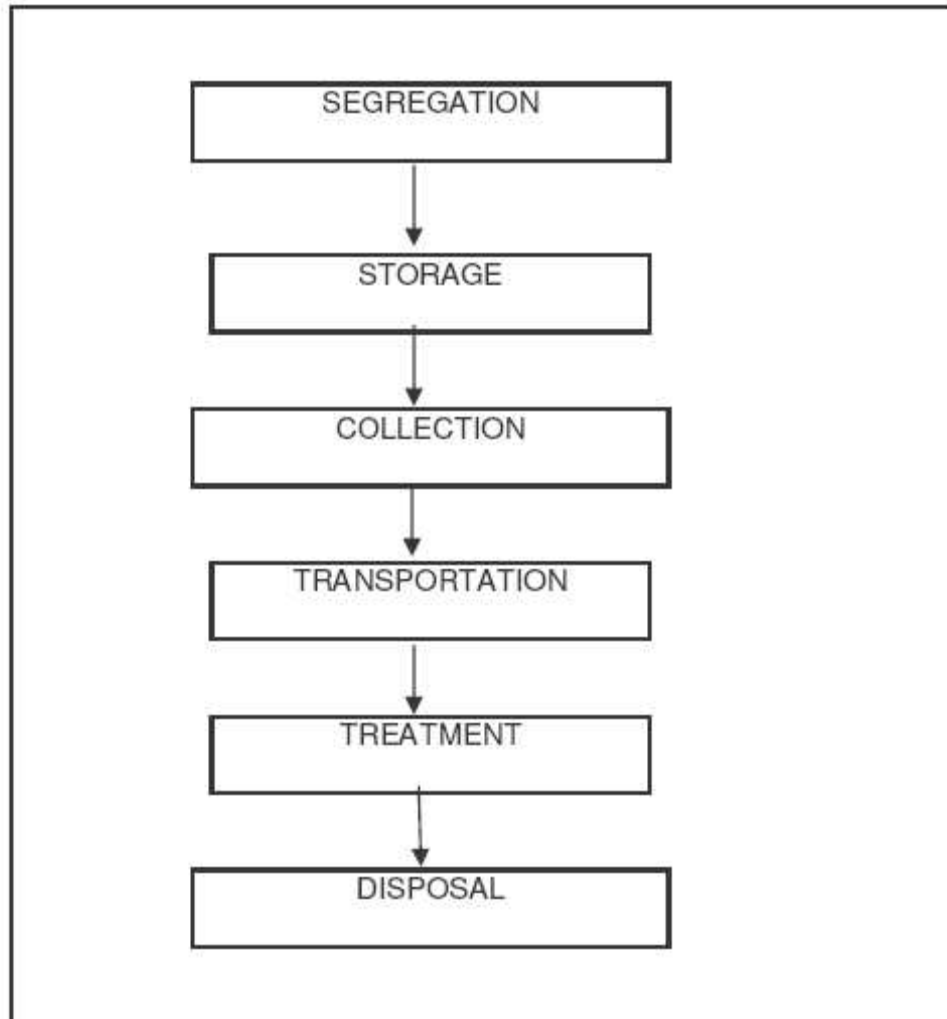
### 1.1 BACKGROUND

During the past two decades the world experienced a dramatic increase in the amount of hazardous waste generated. As a result, this period also witnessed a vigorous drive for sustainable development and increased awareness and concern for the environment (Ketlogetswe, Oladiran & Foster, 2004). The United Nations Environment Program (UNEP) argues in their International Sourcebook on Environmentally Sound Technologies for Municipal Solid Waste Management that among these wastes, health care waste is one of the most problematic types. The developing world such as South Africa, has had to grapple with managing this type of waste against the backdrop of competing priorities such as the HIV/AIDS pandemic. Incidentally, it is also the developing world that has been affected the most by the pandemic (UNAIDS, 2002). As a result of the high HIV/AIDS prevalence in this part of the world, there has been a considerable rise in hospital admissions and a high morbidity among the general population. Consequently there has also been a sharp increase in the amount of waste generated from both health facilities and households. According to the World Health Organization (WHO) between 10% and 25% of waste generated in health facilities is regarded hazardous due to its composition. The remaining 75% to 90% poses no risk of infection transmission, as it is comparable to domestic waste. This mainly comprises waste produced in the administration and housekeeping sections of the facilities (Pruś, Giroult & Rushbrook, 1999).

Health care waste is defined as a by product of health care that includes sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials . The WHO further classifies health care waste in two major categories (Pruśś, et al., 1999).

1. Health care general waste which is the proportion of health care waste that is not hazardous and is comparable to household waste.
2. Health care risk waste which is the proportion of health care waste that is likely to contain pathogenic organisms in sufficient quantities to cause disease. This waste is also commonly referred to as clinical waste or biomedical waste in certain quarters and falls under a general cluster known as hazardous waste. Health care risk waste is further classified into the various types according to specific composition:
  - a) Infectious waste refers to waste which is suspected to contain pathogens, such as excreta from infected patients, wound dressings, etc.
  - b) Pathological waste consists of tissues, body parts, human foetuses, blood and body fluids.
  - c) Sharps are a category of health care waste comprising of items which can cause cuts and injuries. These include needles, scalpels and broken glass. Sharps present a double risk because of their ability to infect wounds they cause if they are contaminated with pathogens.
  - d) Chemical waste contains residues of chemicals used in hospitals such as disinfectants and reagents used in laboratories.
  - e) Pharmaceutical waste contains remains of pharmaceutical products such as expired drugs.

The process of waste management comprises key stages which are all very important and interrelated. These include segregation, collection, storage, handling, transportation, treatment and disposal. Handling of waste takes place in all the stages and it is through handling that different groups get into direct contact with the waste (Figure 1.1).



**Figure 1.1 Process of Health Care Waste Management**

In the context of hospitals, segregation is a very important stage in the waste management process. Segregation refers to separation of waste into designated categories (Pruśś, et al., 1999). Waste segregation is emphasised as a means of ensuring that health care risk waste and health care general waste are separated and stored in appropriate containers. This enables those who handle the containers outside the hospital wards to identify and treat them appropriately (Pruśś, et al., 1999).



The WHO estimates that large urban based hospitals can produce up to two tons of waste each year. The Gauteng Province is home to four big hospitals, and therefore health care waste management presents a challenge not only to the Province but also to the individual hospitals in the Province. This study focused on one of these large academic hospitals, the Johannesburg Hospital.

## **1.2 STATEMENT OF THE PROBLEM**

Among other health workers in hospitals, doctors and nurses play a key role in the management of health care waste. They need to segregate the waste and store it in the correct bins at the point of generation. In order for them to fulfil this function efficiently, it is important that they have knowledge about the importance of segregation and how to distinguish the different containers and bins for the various types of health care waste.

If segregation does not take place properly, there are two scenarios which arise and have far reaching implications on public and environmental health.

- The first one is that health care risk waste gets mixed up with health care general waste. This results in a situation where the former ends up at landfills and other undesignated disposal sites thereby posing a risk of transmitting infections and causing injuries to scavengers, municipal workers, children and the general population.
- The other scenario is when health care general waste is subjected to special treatment to disinfect it such as incineration or autoclaving thereby imposing unnecessary costs on the health system. Infectious waste requires very expensive treatment before disposal. By all means it should only be infectious waste that is subjected to such treatment (Weir, 2002).

In South Africa, both the National and the Gauteng Provincial Government have invested a lot of resources in developing policies, legislation and codes of practice to address the problem of Health care waste in general. However, these have not quite made the desired impact in terms of translating into the correct waste management

practices. It is therefore imperative to investigate knowledge and practices of doctors and nurses with regard to health care waste management. These should give an insight of their perceptions regarding the subject so that appropriate interventions can be put in place.

### **1.3 AIMS AND OBJECTIVES OF THE STUDY**

#### **AIMS**

The aim of the study was to evaluate the current knowledge and practices by health care professionals at a large academic hospital in the Gauteng Province, in relation to management of health care waste.

#### **SPECIFIC OBJECTIVES**

1. To determine knowledge among doctors and nurses at an academic hospital in the Gauteng Province about:
  - a) The existing health care waste policies
  - b) The health risks associated with health care waste
  - c) The relationship between health care waste and the incidence of nosocomial infections
2. To describe the reported practices of doctors and nurses at this hospital in the Gauteng Province with regards to:
  - a) Waste segregation and safe handling
  - b) Waste storage
3. To describe the reported variations in waste generation among the different wards in the hospital

## **1.4 SUBSEQUENT CHAPTERS OF THE REPORT**

Thus far, in this report, the background to the research has been discussed and the objectives defined. The subsequent chapters will focus on:

Chapter two: Literature review.

The purpose of the literature review is to explain and discuss key concepts, as well as search for potential solutions to the research problem.

Chapter three: Research methodology

This chapter describes the research methodology used to conduct this study. The methods and techniques pertaining to this study are also dealt with in this chapter.

Chapter four: Presentation of results

This chapter contains the analysis of the findings from the study in terms of its aims and objectives.

Chapter five: Discussion

In this chapter, the findings of the reviewed literature are integrated with the results obtained from the analysis in order to address the aims and objectives of the study.

Chapter six: Conclusions and recommendations

This forms the final part of the report and draws conclusions from the research related to the study aims, makes recommendations and suggests areas for future research in the field of health care waste in the Johannesburg Hospital and other hospitals in the Province and the country at large.

## **CHAPTER 2**

### **LITERATURE REVIEW**

In this chapter, relevant reports on health care waste from the literature are reviewed. The literature related to health care waste management both at global and regional levels are discussed and these are compared with the South African perspective. In addition to published literature, information from various unpublished sources is also reviewed.

#### **2.1 INTRODUCTION**

A sustainable solution to health care waste management requires a thorough investigation of issues that may influence it, such as available policies and procedures, knowledge of health care workers about those policies as well as practices to implement those policies and procedures (Pruśś, et al., 1999). Although no study specifically investigated the knowledge and practices of doctors and nurses regarding the management of health care waste, the WHO has written a lot on health care waste management (WHO Fact Sheet no. 281, 2004). The media has also covered the subject a lot in the recent past, perhaps as a way of drawing public attention to the dangers posed by this kind of waste. In South Africa numerous newspaper reports have covered this subject. For example, the Sunday Times newspaper reported a story alerting the nation of “*a medical waste crisis*”. The newspaper further alluded to a shortage of waste treatment facilities such as incinerators. As a result of this shortage health care risk waste is transported for long distances across provinces in search of incinerators where it can be treated (Figure 2.1) (Sunday Times Newspaper, 2007).



**Figure 2.1 Problems associated with Health care waste in South Africa** (Sunday Times Newspaper, 2007)

In Sub Saharan Africa many countries are still collecting data to establish basic things like amount generated per bed per day; information that is very useful for planning purposes. For instance, in Botswana there is a clinical waste management policy which lays the ground for training of health workers on Health care waste management (Botswana Clinical Waste Management plan, 1998). Some countries such as South Africa have already developed regulations on Health care waste management in order to mitigate possible impact on the environment.

The Basel Convention on trans-boundary movement of hazardous waste has particularly provided a good basis for many countries to address issues that encompass Health care waste. Even though the convention does not specifically exist to regulate

this type of waste, health care waste management is very complex, hazardous and sometimes goes beyond the hospitals and even beyond borders (UNDP, 1997).

The Millennium Development Goals (MDGs) also provide a good basis for the United Nations member states, of which South Africa is one, to arouse public interest in environmental issues such as hazardous waste. Goal number seven urges member states to improve monitoring and compliance with environmental standards. The documents reviewed in this study are just a few of the standards set by the South African Government as well as the international community as a step towards realizing this goal. However, this can only happen if institutions such as the Johannesburg Hospital take it upon themselves to comply with the requirements of these documents (UNDP, 2003).

## **2.2 HEALTH EFFECTS OF HEALTH CARE WASTE**

The impact of health care waste on public health is two fold:

- Firstly it impacts adversely on human beings when they come into direct contact with infectious waste which harbours disease causing organisms and get exposed to different diseases, such as HIV, Hepatitis B and C and also when they get injured by sharps. These diseases affect a wide spectrum of groups in the society including scavengers and communities at large. There is also the risk of nosocomial/hospital acquired infections which affect doctors, nurses, other hospital workers and patients. Acquisition of nosocomial, as with other infections depends on interplay of host, pathogen and environment (Sobotová, Nosková & Voleková, 2006).
- Secondly, there is the negative impact on the environment which manifests itself in the form of air, water and soil pollution. The environment gets polluted for example, when health care risk waste is treated through the process of incineration. This process is especially associated with the production and emission of dioxins and furans. These are well known carcinogens and are produced as a result of incomplete combustion (Ketlogetswe et al., 2004). There

is also the risk of water and soil pollution when untreated waste gets disposed of indiscriminately, polluting water sources and the soil. Health care risk waste may also contain heavy metals such as mercury from broken thermometers and silver from the processing of x-ray films. The contamination of the environment by these pollutants may in turn have serious repercussions on the broader public health (Pruśś, et al., 1999).

This impact can be mitigated by maintaining high standards of hygiene in hospitals. The importance of hygiene in hospitals cannot be overemphasized enough. Perhaps it is as important as the care that is provided in the facilities (Sobotová et al., 2006). Of the health care waste generated in hospitals, the proportion that is deemed infectious seems small (10-25%). However, it contains pathogens in sufficient quantities or concentration that exposure could result in transmission of infectious diseases (Patil & Shekdar, 2001).

### **2.3 BURDEN OF HEALTH CARE WASTE**

The WHO estimates that worldwide, between eight to sixteen million Hepatitis B, 2.3 - 4.7 million Hepatitis C and 80 000 to 160 000 HIV/AIDS infections occur yearly from re-use of needles and syringes without sterilization. Most of these infections occur when improperly disposed of needles are accessed by various populations groups who do not understand the extent of the risk they pose. Approximately 16 billion injections are administered every year across the world, and not all of these are disposed of properly (Hutin, Hauri & Armstrong, 2000). The statistics on injection use were also corroborated by the WHO as they also made the same estimation regarding the number of injections administered across the world (WHO Fact sheet no. 253, 2000).

South Africa was among the countries studied in a worldwide review to estimate the regional use of injections worldwide. Although no specific data was provided, the country was in the group of countries which were doing relatively well in terms of injection use (Hutin et al., 2000).

The problems related to health care risk wastes are four folds, namely: over-use of injections, re-use of syringes and needles, misclassification of wastes and lastly improper disposal.

Vong, Perz, & Sok, et al., (2002), expressed a concern following a study conducted in Cambodia, that injections are overused as opposed to other means of administering treatment. They argued that the use of injections contributed to large quantities of health care waste, especially sharps whose production could be prevented simply by resorting to other means of administering treatment. The investigators found that there was not only an over use of injections, but that 13% of the used needles were not disposed of properly. Logez, Hutin, & Sonda, et al., (2005) also conducted a study in Burkina Faso and got similar findings. They recorded observing used needles which were not disposed of properly around 46 (88%) of the 52 of the facilities.

In Portland, Oregon (USA), Gilden, Scissors, & Reuler (1992), found in a study conducted in a 385 bed teaching hospital that over the last two decades there has been a shift from measures such as sterilization and repeated use of products. They observed an increased reliance on disposable products in hospitals and health care in general. They concluded that it is this trend, among other things that has resulted in excessively high volumes of health care waste being generated by hospitals. They also argued that this reliance was principally based on considerations of safety, convenience and cost but not the environment.

Weir, (2002) conducted a study at a Toronto children's hospital in Canada and found that health care waste comprised of other items that are not classified as health care waste. This misclassification is very costly since it is estimated that it is sixteen times more expensive to dispose of infectious waste than it is other regular waste. The investigator observed that the issue of the cost of health care waste management is often overlooked by Government facilities in particular.



In a study conducted by Taru & Kuvarega (2005), at Parirenyatwa Hospital in Harare, Zimbabwe, an overwhelming 98% of the employees interviewed reported that health care waste was not segregated and stored according to its composition. It was also observed that Health care risk waste and health care general waste were largely collected and stored together.

In South Africa, the Department of Agriculture land and Environment, conducted a case study on the management of health care waste in the Limpopo Province in 1997. They found that only 38% of the hospitals were using colour coded bags for the collection of health care risk waste. The study also found that 46% of the hospitals were using plastic containers that initially contained cleaning fluid to collect sharps. Three percent of the hospitals were found to be using cardboard boxes while one hospital was found to be using coca-cola cans for the same purpose (Department of Environmental Affairs, 2000).

## **2.4 HEALTH CARE WASTE POLICIES AND PROCEDURES**

Policies, laws and guidelines provide a legal framework for the protection of the environment and public health. There are various laws, guidelines and policies that have been developed over the years at different levels to protect the public against the adverse health effects of health care waste. They have been developed at the international, national and facility levels. If these laws are properly implemented the risks associated with health care waste can be significantly reduced. It is as a result of the laws, regulations and policies that there are colour coded bins and bags which are made of specific materials. However, for them to be effective, hospitals need to put in place proper structures to facilitate their implementation. These structures should include measures to ensure that health care professionals and other employees of the hospitals have sufficient knowledge, not only about the existence of such documents but also about their requirements. They would then be able to engage in practices that prevent infections and injuries within and outside the hospitals.

At the international level, several guidelines have been developed to deal with Health care waste. WHO has developed a manual to guide countries in the management of health care waste (Prúss, et al., 1999). The World Bank put in place a guidance note to complement the WHO efforts on health care waste management (World Bank, 2000). The Centers for Disease Control and Prevention (CDC) also rose to the challenge by developing guidelines to address the problem (United States Department of Health and Human Services, 1998).

In South Africa, at the national level, there have been a number of initiatives that the Government has embarked upon to address the problem of health care waste such as legislation which includes the Environment Conservation Act (1989) (South Africa, 1989). It was under this Act that the Gauteng Provincial Department of Environment developed the Gauteng Health Care Waste Management Regulations (2004), to regulate the operations of all stakeholders involved in the management of health care waste in the Province (Gauteng, 2004).

The purpose of coming up with the regulations is to provide a legislative framework that should guide and facilitate good management of health care waste. On the whole the regulations prohibit the management of health care waste in a manner that may present a risk to human and environmental health. They also require major generators such as academic hospitals to ensure all those whom in the course of their duty may come into contact with health care waste are aware not only of the regulations but also risks associated with contact with such waste. Section 6 (a) of the Gauteng Health Care Waste Management regulations requires major generators *“to take all reasonable measures to ensure that health care risk waste generated at its facility is stored, transported, treated and disposed of in strict compliance with the regulations”*. The regulations further oblige generators to ensure regular training of all employees focusing mainly on waste segregation, waste minimization, best infection control practices as well as increased environmental awareness.

The Gauteng Provincial Government has also put in place the Gauteng Health Care Waste Management Policy as well as the Code of Practice for Health Care Waste

(Gauteng Department of Health, 2001; Gauteng Department of Health, 2004). In addition, certain facilities including academic hospitals such as the Johannesburg Hospital have over the years benchmarked against international, national and provincial policies and guidelines to develop their own institutional policies. Some of the documents regulating health care waste management used at the academic hospital are listed in Table 2.1. Health professionals working in health facilities are expected to be familiar with these documents and use them in the process of managing health care waste.

**Table 2.1 List of HCW Management Acts and policies**

<b>Source</b>	<b>Document</b>
International	WHO Manual on safe Management of waste from health care activities
National	National Environment Conservation Act (1989)
Provincial	Gauteng Health Care Waste Management Policy
Provincial	Gauteng Health Care Waste Management Regulation
Provincial	Gauteng Department of Health Code of Practice for Health Care Waste Management
Local	Johannesburg hospital policy on waste management

## **2.5 KNOWLEDGE ABOUT HEALTH CARE WASTE MANAGEMENT**

Existence of health care waste management policy alone does not imply that the health professionals have adequate knowledge about them and more importantly that they would utilise that knowledge for best practice.

Internationally, Saini, Nagarajan & Sarma (2005) conducted a Knowledge, Attitudes and Practices (KAP) study in a 1600 bed tertiary teaching hospital in India. They observed a significant gap in the knowledge, attitude and practices of the doctors regarding health care waste disposal. This gap extended to their understanding of the subject of health

care waste management as a whole. The investigators found that there was apathy among professionals towards health care waste management. They concluded that this apathy could be attributed to the tabular vision of the professionals to a bias towards the curative aspects of the patients and an apparent loss of sight of the comprehensive health care service.

Kaiser, Eagan & Shaner (2001) also observed that there was a gap in the knowledge of the environmental impact of health care products and services among health care professionals. This gap was identified as a possible underlying factor in the behaviours such as apathy often displayed by doctors and nurses when dealing with environmental issues. They identified yet another gap in knowledge about the important link between environmental and human health. This knowledge and awareness was on such issues as the risk to the environment associated with improper management of health care waste. It was also on the risks that health care workers themselves are exposed to. The researchers argued that this underscores the need for increased understanding of the integral link between human health and environmental health among health care workers.

An experimental study, conducted in a 600 bed hospital also in India, showed how a sharps disposal model introduced following the enactment of the Bio-Medical Waste Rules in 1998 improved waste management practices. The study revealed that good waste management practices are difficult but not impossible (Chandra & Shishoo, 2001). As a result of the model there was a significant improvement of practices such as handling and disposal of sharps among health care professionals. The investigators concluded that with management commitment, doctors and nurses played a critical role by segregating health care waste at the point of generation. They also found that sharps and other forms of health care waste can be managed effectively and efficiently.

Among the many health care professional, nurses are reported to spend the most time with patients, thus increasing their risk of exposure to infections and injuries that are inherent in a hospital environment. The lack of adequate knowledge of the hazard

presented by health care waste can predispose them to even more infections and injuries (Tudor, Noonan & Jenkin, 2005).

A survey conducted in twenty nine health facilities in the Gauteng Province by the Department of Environment and Tourism in 2000, concluded that among other things there was a general lack of knowledge and awareness as well as considerable apathy among health workers regarding health care waste management. One of the reasons advanced by some respondents in the survey was that there was “no time” to deal with health care waste. It was also observed that after professional staff segregated the waste, the non professional staff who collected it emptied the segregated waste into the municipal waste stream. This practice was attributed to the lack of awareness by this group (Department of Environmental Affairs, 2000).

Continuous training of Hospital staff is an important way of ensuring that knowledge is enhanced among nurses and doctors in particular, about the management of health care waste. Health care waste is not only a reservoir of pathogenic organisms, it is also an important source of nosocomial or hospital acquired infections and hence a key component of the infection control programmes (Pruss et al., 1999). By building a strong knowledge base among health care workers, they will engage in practices that protect them, their patients, as well as the communities and the environment.

## **2.6 PRACTICES REGARDING HEALTH CARE WASTE**

Hospitals are important institutions where health is restored. Doing this entails specialized procedures by various health care professionals which generate large amounts of wastes. However, this is not strictly followed resulting in difficulty in managing health care waste.

The risk of infection and injury among health care professionals and other workers in the institutions is partly related to their practices in storage and handling of health care waste. In addition to the risks, communities outside the hospitals are also at risk of

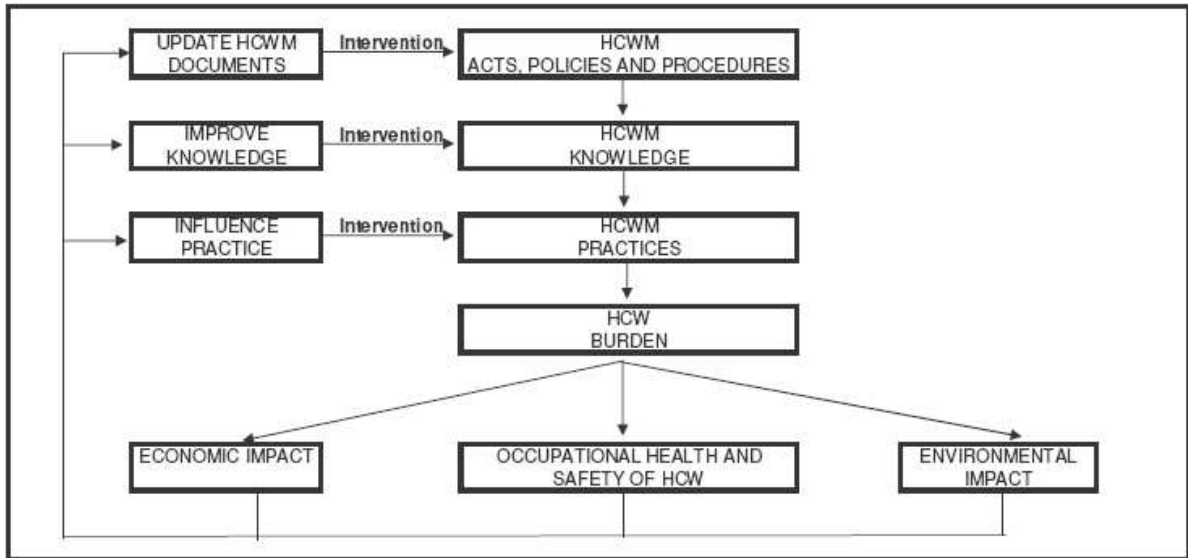
infections being transmitted as a result of contact with health care risk waste being mistakenly disposed of with general waste (Patil & Pokhrel, 2005).

A recent study in a tertiary institution In India showed that segregation and storage of health care waste is one of the major problems (Pandit, Tabish & Qadri, et al., 2007). Various other studies have found that in health care facilities all streams of waste are dumped together resulting in the waste ultimately getting disposed of with the general stream at landfills and other disposal sites (Taru, et al., 2005). This practice presents a risk of disease spreading among people who handle waste within the facilities as well as the scavenger population at disposal sites (WHO, 2000). Furthermore, it also exposes the community at large to infections, toxic effects as well as injuries. This exposure can be significantly reduced through good practices when handling and storing the waste by health care professionals in their execution of health care procedures.

Segregation also ensures that the various classes of health care risk waste are placed in their appropriate containers and treated accordingly. Failure to separate the various health care waste according to the risk they pose, results in a complex stream of waste which is very difficult to manage. Doctors and nurses in particular can play an important role in this process if they are adequately trained and they practice proper segregation of waste.

## **2.7 SUMMARY OF THE CHAPTER**

Management of health care waste is a complex issue which needs regular interaction among various levels of health care (international, national, provincial and local). Good practice in health care waste management depends on sound knowledge of various policy documents which in turn must be easily available, accessible and suitable to an institutional need. Interventions to improve health care waste management need involvement of all levels of health care (Figure 2.1).



**Figure 2.2 Schematic Diagram of Health Care Waste Management**

## **CHAPTER 3**

### **METHODOLOGY**

The methodology for this study was determined by its aims and objectives. In this chapter, the setting, scope and design of the study, and research tools are covered. Furthermore, the data collection, analysis and statistical testing methods are described.

#### **3.1 SETTING OF THE STUDY**

The study was conducted at the Johannesburg Hospital, a designated central hospital situated in the Gauteng Province. The Hospital has an estimated capacity of 974 beds. It is a public facility and also the main teaching hospital for the University of the Witwatersrand, Faculty of Health Sciences. The Johannesburg Hospital is a large academic hospital which generates huge amounts of health care wastes. It is envisaged that the findings of the study could be extrapolated to hospitals of similar size. The researcher has chosen a large hospital as it is difficult to quantify the problems related to health care waste in smaller hospitals where smaller quantities of health care waste are generated and a central unit is usually responsible for managing that with little interactions from the health professionals working in the clinical wards.

The management of the Hospital has outsourced waste collection services to a private company. The Hospital has a Unit dedicated for infection control. Its mandate encompasses management of health care waste within the Hospital. Among other things, the Unit is responsible for conducting training for hospital staff. This training is offered upon first appointment and then conducted periodically to ensure continuity as well as impart new knowledge to employees of the Hospital as it becomes available. The members of this Unit also represent the Hospital in key committees on health care waste management at the provincial and national levels to ensure that the Hospital is compliant with national and provincial regulations. The researcher worked with this unit during the duration of the project.



## **3.2 SCOPE OF THE STUDY**

The study investigated the reported practices of doctors and nurses, regarding the segregation, handling, storing and disposal of waste. It also investigated their knowledge about selected documents regulating health care waste management as well as the health risks associated with it.

As the study was conducted in a large academic hospital its findings may not be applicable to smaller health facilities.

## **3.3 STUDY DESIGN**

The study design was a descriptive cross sectional study of the knowledge and practices of doctors and nurses, about health care waste management at the Johannesburg Hospital. At the time of the study, no intervention was done on the basis of this study.

### **3.3.1 STUDY POPULATION**

The study population were the doctors and nurses employed at the Johannesburg Hospital at the time of the study. It only focused on doctors and nurses because these professionals form the majority of the professional staff at the Hospital who deal with the waste at the point of generation.

### **3.3.2 SAMPLING**

The Heads of the Clinical and Nursing management Departments were addressed in a meeting and the objectives of the study were explained to them. They were then requested to provide staff lists of doctors and nurses in their departments. A random sample of doctors and nurses was selected.

No information was available about the knowledge of doctors and nurses about the policies in a Hospital setting. Therefore, the sample size was calculated using the following criteria (Epi-Info, 2005):

- Study Population (Total number of doctors and nurses): 2200
  - Total number of doctors: 660 (30%)
  - Total number of nurses: 1540 (70%)
- Assumptions:
  - Expected frequency (% of health care worker aware of the Health care waste policies): 50%
  - Worst acceptable results: 45%

The required sample size based on the above criteria was 125. However, in order to address the anticipated limitation of poor response rate, 150 questionnaires were distributed. The proportions of doctors to nurses in the sample were calculated based on the actual proportions in the Hospital (Nurses 105 and doctors 45).

### **3.4 DATA COLLECTION**

A self administered questionnaire, (Appendix A) was used to collect the data. It was written in English only because it was expected that all doctors and nurses were able to comprehend English. Participants were approached and invited to participate in the study. Upon completion questionnaires were then submitted to a central point where they were collected. Arrangements for follow up were made by the researcher.

#### **3.4.1 STRUCTURE OF THE QUESTIONNAIRE**

The self administered questionnaire comprised mainly of close ended questions and was used to collect the data on the following variables:

**Table 3.1 List of variables**

<b>Section</b>	<b>Variables</b>
1	Demographic information: profession, position and experience
2	Knowledge about the existence of policies and regulations on health care waste, their accessibility and availability
3	Practices regarding the segregation, safe handling and storage of health care waste.
4	Knowledge about diseases/infections transmitted through contact with health care waste.
5	Perceptions about transmission of nosocomial/hospital acquired infections.
6	Reported variations in waste generation among different wards in the hospital.
7	Adequacy of waste storage facilities in the wards and accessibility of any supplies that facilitate proper management of the waste.

### **3.4.2 VALIDITY AND RELIABILITY**

The researcher collected all the information and therefore there was no inter observer variability. The analysis of the results was based on the responses provided by the Health Care workers. The reported responses were not validated with actual practices of the respondents as this was not within the scope of this study.

### **3.5 PILOTING**

The questionnaire was piloted among 12 Public Health Medicine Registrars from the Wits School of Public Health. They were chosen because of their experience of working in large hospitals. Their suggestions were used to modify questionnaires to avoid ambiguous questions.

### 3.6 DATA ANALYSIS

Data was coded and captured using Microsoft Access. It was then exported to NCSS software where the relevant statistical tests were done. These are summarised in Table 3.2 below.

**Table 3.2 Indications for statistical tests**

<b>Characteristics</b>	<b>Tests</b>
Central tendency	Median
Spread	Inter-quartile range
Tests of association	
Two variables	Chi-square test

### 3.7 ETHICAL CONSIDERATION

This project was approved by the Committee for Research on Human Subjects (Medical) R14/49, (Appendix D) and the postgraduate committee (Appendix C). It was also authorised by the Chief Executive Officer of the Johannesburg Hospital. Names of respondents were not recorded anywhere in the questionnaire in order to ensure confidentiality. Participants were identified only with numbers. Informed consent was sought from the respondents.

## CHAPTER 4

### RESULTS

#### 4.1 SAMPLE SIZE

A total of 128 out of 150 questionnaires were completed by the study participants, translating to a response rate of 85%.

#### 4.2 DEMOGRAPHIC INFORMATION

The study participants comprised of nurses and doctors of different positions in the hospital, both junior and senior, who were willing to participate in the study. Of the 128 respondents, 95 (74%) were nurses while the remaining 33 (26%) were doctors, which is similar to proportions of the health professionals in the hospital (Table 4.1).

**Table 4.1 Profession of participants (n=128)**

<b>Doctor</b>		<b>Nurse</b>	
<b>Position</b>	<b>Number (%)</b>	<b>Position</b>	<b>Number (%)</b>
Consultant	7 (21%)	Unit Manager	16 (16%)
Principal medical Officer	4 (12%)	Area Manager	4 (4.2%)
Medical Officer	6 (18%)	Chief professional Nurse	24 (25%)
Registrar	11 (33%)	Senior Professional Nurse	7 (7%)
Intern	5 (15%)	Professional Nurse	15 (16%)
		Staff Nurse	16 (17%)
		Nursing Assistant	13 (14%)
<b>Total</b>	<b>33</b>	<b>Total</b>	<b>95</b>

### 4.3 KNOWLEDGE ABOUT EXISTENCE OF POLICIES

#### 4.3.1 WHO MANUAL ON SAFE MANAGEMENT OF WASTE FROM HEALTH CARE ACTIVITIES

A total of 58 participants (46%) reported that they knew about the existence of the WHO manual on safe management of health care waste. The remaining 69 participants (54%) reported that they did not know about the existence of such a manual. Among the nurses, it was 45 (47%) who knew about the existence of the manual. The remaining 49 (53%) reported that they did not know about the document. Among the doctors, only 13 (39%) knew about the manual while the remaining 20 (61%) did not know (Table 4.2).

A chi-square test showed that there was no statistically significant difference between the doctors and nurses about the knowledge of the manual ( $p = 0.40$ ).

**Table 4.2 Knowledge about existence of WHO manual (n=127)**

	Nurses Number (%)	Doctors Number (%)	Total
Known	45 (47%)	13 (39%)	58 (46%)
Unknown	49 (53%)	20 (61%)	69 (54%)
<b>Total</b>	<b>94</b>	<b>33</b>	<b>127</b>

#### 4.3.2 NATIONAL ENVIRONMENT CONSERVATION ACT (1989) OF SOUTH AFRICA (NECA)

The majority of the respondents (91, 71%) reported that they did not know about the existence of the NECA. The remaining 37 (29%) knew about the existence of the Act. Most of the doctors 23 (70%), reported that they did not know about the

existence of the Act. The majority of the nurses (68, 72%) also reported that they did not know about the existence of the Act (Table 4.3).

A chi-square test showed that there was no statistically significant difference regarding knowledge about the existence of the Act ( $p=0.83$ ).

**Table 4.3 Existence of National Environment Conservation Act (n=128)**

	Nurses Number (%)	Doctors Number (%)	<b>Total</b>
Known	27 (28%)	10 (30%)	37 (29%)
Unknown	68 (72%)	23 (70%)	91 (71%)
<b>Total</b>	<b>95</b>	<b>33</b>	<b>128</b>

#### **4.3.3 GAUTENG HEALTH CARE WASTE MANAGEMENT POLICY**

Of the 128 respondents, 76 (59%), reported that they did not know about the existence of Gauteng Health Care Waste Management Policy. The remaining 52 (41%) reported that they knew about the provincial policy.

Only 44 (46%), less than half of the nurses who responded, reported knowledge about the existence of the policy, compared to the 51 (54%) who reported knowledge about existence of the document.

The majority of the doctors 25 (76%), also reported that they did not know about the existence of this policy. The remaining eight (24%) reported that they knew about it (Table 4.4).

A chi-square test showed that nurses have significantly higher knowledge than doctors with respect to existence of the policy ( $p=0.03$ )

**Table 4.4 Gauteng Health Care Waste Management Policy (n = 128)**

	Nurses Number (%)	Doctors Number (%)	<b>Total</b>
Known	44 (46%)	8 (24%)	52 (41%)
Unknown	51 (54%)	25 (76%)	76 (59%)
<b>Total</b>	<b>95</b>	<b>33</b>	<b>128</b>

**4.3.4 GAUTENG HEALTH CARE WASTE MANAGEMENT REGULATIONS**

A total of 49 respondents (38%) reported that they knew about the existence of the Gauteng Health Care Waste Management Regulations. The majority of the respondents (79, 62%) reported that they had no knowledge of the regulations. Only eight (24%) of the doctors reported that they knew about the regulations compared to 41 (43%) of the nurses who reported that they knew about the existence of the regulations (Table 4.5).

A chi-square test showed that there was no statistically significant difference between doctors and nurses in terms of knowledge about the existence of the regulations ( $p = 0.05$ )

**Table 4.5 Gauteng Health Care Waste Management Regulations (n = 128)**

	Nurses Number (%)	Doctors Number (%)	<b>Total</b>
Known	41 (43%)	8 (24%)	49 (38%)
Unknown	54 (57%)	25 (76%)	79 (62%)
<b>Total</b>	<b>95</b>	<b>33</b>	<b>128</b>



#### 4.3.5 GAUTENG DEPARTMENT OF HEALTH CODE OF PRACTICE FOR HEALTH CARE WASTE MANAGEMENT

A total of 37 (29%) respondents reported that they knew about the existence of the Gauteng Department of Health Code of Practice on Health Care Waste Management. The majority of the respondents (91, 71%) reported that they had no knowledge of the code of practice. Only 31 (32%) of the nurses reported that they knew about its existence. The remaining 64 (68%) did not know about its existence. With regards to doctors, only six (18%) knew about the existence of the code of practice, while the remaining 27 (82%) did not know about it (Table 4.6).

A chi-square test showed that there was no statistically significant difference between the two groups regarding knowledge about the existence of this document (p=0.11).

**Table 4.6 Gauteng Department of Health Code of Practice for Health Care Waste Management (n = 128)**

	Nurses Number (%)	Doctors Number (%)	<b>Total</b>
Known	31 (32%)	6 (18%)	37 (29%)
Unknown	64 (68%)	27 (82%)	91 (71%)
<b>Total</b>	<b>95</b>	<b>33</b>	<b>128</b>

#### 4.3.6 JOHANNESBURG HOSPITAL WASTE MANAGEMENT POLICY

The vast majority of the respondents (107, 84%) reported that they knew about the existence of this policy. Only 21 respondents, (16%) reported that they did not know there was a hospital policy on waste management. Ninety-two nurses (97%) who responded knew about the hospital policy. Only three (3%) reported

that they did not know about it. Among the doctors, 15 (45%) reported that they knew that there was a hospital policy on waste management, the remaining 18 (55%), reported they did not know about it.

More nurses were likely to know about the existence of the hospital policy than doctors. A chi-square test showed that there was a statistically significant difference between doctors and nurses in knowledge about the existence of this policy ( $p < 0.01$ ).

**Table 4.7 Johannesburg Hospital waste management policy (n = 128)**

	Nurses Number (%)	Doctors Number (%)	<b>Total</b>
Known	92 (97%)	15 (45%)	107 (84%)
Unknown	3 (3%)	18 (55%)	21 (16%)
<b>Total</b>	<b>95</b>	<b>33</b>	<b>128</b>

#### 4.4 ACQUIRING KNOWLEDGE ABOUT POLICIES

Respondents who reported knowledge about the existence of one or more policies were further requested to state how they acquired such knowledge. They were requested to tell if they acquired the knowledge on their own, through attending a seminar or course, or through any other means.

A total of 45 participants, reported they discovered the policies on their own. Out of these 27 (60%) were nurses, while 18 (40%) were doctors. Forty participants reported that they attended a seminar or course where they learnt about the existence of the documents. Out of these 39 (98%) were nurses, while only one was a doctor (2%). A total of 39 participants reported that they got to know about the documents through other means. 36 (92%) were nurses, while three (8%) were doctors.

An association was identified between knowledge about the existence of the hospital policy and position among the respondents. Respondents holding senior positions within the hospital, such as Area Managers, Unit Managers, Chief Professional nurses among nurses as well as Consultants and Principal Medical Officers among doctors, were likely to report knowledge about the existence of the policy than their junior colleagues ( $p < 0.001$ ).

There was no association between knowledge about these documents (except WHO manual,  $p = 0.02$ ) and the number of years spent working in both the health sector and the hospital by both doctors and nurses (Table 4.8).

**Table 4.8 Knowledge of documents by position and experience** (n = 128)

Documents	Position of Respondents		Working Experience	
	Nurse	Doctor	Health	JHBH
WHO Manual	0.60	0.06	0.02*	0.02*
NECA	0.62	0.39	0.39	0.40
Gauteng Province policy	0.12	0.05	0.10	0.11
Regulations	0.13	0.06	0.10	0.18
Code	0.12	0.02*	0.10	0.29
Hospital Policy	0.00*	0.00*	0.00*	0.00*

#### **4.5 ACCESS TO HEALTH CARE WASTE MANAGEMENT DOCUMENTS**

Asked if they had access to any of the documents they knew about (91, 71%) of the respondents reported that they did. The remaining 37 (29%) reported that they did not have access to any of these documents. The majority of the nurses 86 (91%), reported that they had access to some of the policies that they knew. Only nine (9%) reported that none of the documents was accessible to them.

On other hand, the majority of the doctors reported that they did not have access to any of the documents 28 (85%), while the remaining 5 (15%) reported having access to at least one policy (Table 4.9).

A chi-square test showed that there was a statistically significant difference between doctors and nurses regarding their access to policies, codes of practice, law and regulations on health care waste management ( $p < 0.001$ ).

**Table 4.9 Access to Health Care Waste Management Documents** (n = 128)

Access	Nurses Number (%)	Doctors Number (%)	<b>Total</b>
Yes	86 (91%)	5 (15%)	91 (71%)
No	9 (9%)	28 (85%)	37 (29%)
<b>Total</b>	<b>95</b>	<b>33</b>	<b>128</b>

#### **4.6 ASSOCIATION BETWEEN KNOWLEDGE AND ACCESS TO POLICIES**

The distribution of knowledge about where the individual documents (listed in Table 2.1) were kept varied among all respondents. This was irrespective of whether they reported knowledge about the existence of the document or not. Chi-square tests showed that there were significant associations between knowledge and access to the documents (Table 4.10). Therefore, the access to these documents plays an important role in creating knowledge about Health care waste management among health professionals.

**Table 4.10 Association between knowledge and access to Health Care Waste Management** (n = 128)

<b>Document</b>	<b>p value</b>
WHO Manual on safe Management of waste from health care activities	<0.001*
National Environment Conservation Act (1989)	<0.001*
Gauteng Health Care Waste Management Policy	<0.001*
Gauteng Health Care Waste Management Regulation	<0.001*
Gauteng Department of Health Code of Practice for Health Care Waste Management	<0.001*
Johannesburg hospital policy on waste management	<0.001*

#### **4.7 HANDLING, SEGREGATION, STORAGE AND DISPOSAL OF HEALTH CARE WASTE**

##### **4.7.1 DIFFERENTIAL TREATMENT BETWEEN HEALTH CARE RISK WASTE AND GENERAL WASTE**

The overwhelming majority of the respondents (115 90%) indicated that they treated health care risk waste differently from health care general waste. Only thirteen (10%) reported not treating health care risk waste differently (Table 4.11).

A chi-square test showed that there was no statistically significant difference between doctors and nurses with regards the way they treated health care risk waste ( $p=0.11$ ).

**Table 4.11 Differential treatment of health care risk waste and general waste (n = 128)**

	Doctors Number (%)	Nurses Number (%)	<b>Total</b>
Yes	32 (97%)	83 (87%)	115 (90%)
No	1 (3%)	12 (13%)	13 (10%)
<b>Total</b>	<b>33</b>	<b>95</b>	<b>128</b>

#### 4.7.2 RESPONSES ABOUT THE AVAILABILITY OF SEPARATE BINS

Respondents were asked to indicate if bins or storage containers for the different types of health care waste were always available in their wards. The vast majority (124, 97%) responded in the affirmative. Only a small proportion of the respondents, 4 (3%) reported that separate bins are not always available (Table 4.12).

A chi-square test showed that there was no statistically significant difference between doctors and nurses in relation to their knowledge about the availability of separate bins for the different types of health care risk waste in the wards ( $p = 0.26$ ).

**Table 4.12 Availability of separate bins for health care waste (n = 128)**

	Doctors Number (%)	Nurses Number (%)	<b>Total</b>
Yes	31 (94%)	93 (98%)	124 (97%)
No	2 (6%)	2 (2%)	4 (3%)
<b>Total</b>	<b>33</b>	<b>95</b>	<b>128</b>

### 4.7.3 USE OF SEPARATE BINS FOR STORAGE OF DIFFERENT TYPES OF HEALTH CARE WASTE

Respondents were asked if they knew how to distinguish the various types of bins provided in the wards for the storage of different types of health care waste. One hundred and twenty three (96%) reported that they did while the remaining five (4%) reported that they didn't (Table 4.13).

A chi-square test showed that there was no statically significant difference between doctors and nurses in knowledge about how to distinguish bins used for the storage of different types of health care waste ( $p=0.07$ )

**Table 4.13 Knowledge on how to distinguish separate bins (n = 128)**

	Doctors Number (%)	Nurses Number (%)	Total
Known	30 (91%)	93 (98%)	123 (96%)
Unknown	3 (9%)	2 (2%)	5 (4%)
<b>Total</b>	<b>33</b>	<b>95</b>	<b>128</b>

### 4.7.4 APPROPRIATE UTILIZATION OF HEALTH CARE WASTE BINS

The majority of the respondents reported that they used bins appropriately (123 96%). Only five (4%) of the respondents reported that they did not use bins appropriately (Table 4.14). However, a chi-square test showed that there was no statistically significant difference in terms of appropriate utilization of health care waste bins between doctors and nurses ( $p= 0.76$ ).

**Table 4.14 Appropriate utilization of health waste bins (n = 128)**

	Doctors Number (%)	Nurses Number (%)	<b>Total</b>
Yes	1 (3%)	4 (4%)	5 (4%)
No	32 (97%)	91 (96%)	123 (96%)
<b>Total</b>	<b>33</b>	<b>95</b>	<b>128</b>

#### 4.7.5 WASTE SEGREGATION

As with appropriate use of bins, most of the respondents, both doctors and nurses, reported that they segregated waste into general and health care risk waste (117, 91%). Only a small proportion (11, 9%) reported that they did not segregate waste (Table 4.15). This question was related to the previous one on appropriate utilization of health care waste bins. It was meant to ascertain whether respondents were applying their minds when answering. A chi-square test showed that there was also no statistically significant difference between doctors and nurses with respect to waste segregation ( $p = 0.18$ ).

**Table 4.15 Waste segregation (n = 128)**

	Doctors Number (%)	Nurses Number (%)	<b>Total</b>
Yes	32 (97%)	85 (89%)	117 (91%)
No	1 (3%)	10 (11%)	11 (9%)
<b>Total</b>	<b>33</b>	<b>95</b>	<b>128</b>

#### 4.7.6 USE OF GLOVES WHEN HANDLING HEALTH CARE WASTE

Respondents were asked whether they always use gloves when they handle health care waste. Almost all of them reported that they always do (122, 95%).



only a few (6, 5%) of the respondents reported that they did not (Table 4.16). A chi-square test showed that there was no statistically significant difference between doctors and nurses regarding the use of gloves ( $p = 0.16$ ).

**Table 4.16 Use of gloves** (n = 128)

	Doctors Number (%)	Nurses Number (%)	Total
Yes	3 (9%)	3 (3%)	6 (5%)
No	30 (91%)	92 (97%)	122 (95%)
<b>Total</b>	<b>33</b>	<b>95</b>	<b>128</b>

#### **4.8 AWARENESS ABOUT DISEASES TRANSMITTED THROUGH HEALTH CARE WASTE**

Respondents were asked questions about whether or not they agreed with the linkages particularly between health care waste and the transmission of HIV, Hepatitis B and C.

##### **4.8.1 HIV TRANSMISSION**

A total of 71 (55%) participants reported that they strongly agreed, while 35 (27%) reported that they agreed that HIV/AIDS can be acquired through contact with infectious waste. Six (5%) reported that they were not sure while the remaining (16, 13%) either disagreed or strongly disagreed.

A chi-square test showed that there was no statistically significant difference between doctors and nurses regarding awareness that HIV/AIDS can be transmitted through health care risk waste ( $p = 0.35$ ).

#### **4.8.2 HEPATITIS B TRANSMISSION**

As with the question relating to HIV/AIDS, the majority of the participants either strongly agreed or agreed that Hepatitis B may be acquired through contact with infectious waste (113, 88%). A few of the respondents were not sure (6, 5%), and the remaining (9, 7%) also a relatively very small proportion of the participants, either disagreed or strongly disagreed.

A chi-square test showed that there was no statistically significant difference between doctors and nurses in knowledge about Hepatitis B being transmitted through contact with health care risk waste ( $p = 0.35$ ).

#### **4.8.3 HEPATITIS C TRANSMISSION**

Ninety seven (76%) of the participants either strongly agreed or agreed that Hepatitis C may be acquired through contact with infectious health care waste. Eighteen (14%) of the respondents were not sure while the remaining (13, 10%), either disagreed or strongly disagreed that Hepatitis C can be transmitted through Health care risk waste.

A chi-square test showed that there was also no statistically significant difference between doctors and nurse in knowledge about the transmission of Hepatitis C through health care risk waste ( $p = 0.05$ )

#### **4.9 PERCEPTIONS ABOUT HEALTH CARE WASTE AND TRANSMISSION OF NOSOCOMIAL [HOSPITAL ACQUIRED] INFECTIONS**

Participants were asked several questions to find out their perceptions about whether health care risk waste can transmit hospital acquired infections

#### **4.9.1 TRANSMISSION OF INFECTIONS AMONG HEALTH WORKERS**

One hundred and seven (84%) of the respondents strongly agreed that if health care risk waste is not properly managed it can transmit infections among health workers while 20 (16%) agreed. Only one respondent (a nurse) strongly disagreed.

A chi-square test showed that there was no statistically significant difference between doctors and nurses in knowledge about health care risk waste and the transmission of infections among health care workers ( $p = 0.67$ ).

#### **4.9.2 TRANSMISSION OF INFECTIONS AMONG OTHER HOSPITAL WORKERS**

The vast majority of the respondents (124, 97%) either strongly agreed or agreed that improperly managed health care waste may lead to the transmission of infections among other hospital workers. The remaining four (3%) did not agree. This question was based on the fact that other hospital workers, besides doctors and nurses also are at risk of acquiring infections due to direct contact with health care risk waste.

A chi-square test showed that there was no statistically significant difference in knowledge between doctors and nurses about the transmission of infections among other hospital workers ( $p = 0.79$ ).

#### **4.9.3 TRANSMISSION OF INFECTIONS AMONG PATIENTS**

One hundred and twenty four (97%) of the respondents generally agreed that improperly managed waste can transmit infections among patients. However, there were a few respondents who did not agree that health care waste that is not managed properly could present any risk of disease transmission among

patients (2, 1.5%). The remaining (2, 1.5%) were not sure. There was also no statistically significant difference between the two professions in knowledge about this issue ( $p = 0.54$ ).

#### **4.10 VARIATION OF HEALTH CARE WASTE GENERATION**

Participants were asked to provide an estimated number of bins filled in their wards per day. They were further requested to provide an estimated number of bins collected from their wards.

Although no significant statistical difference was found about health care waste collection among the different wards ( $p = 0.22$ ), the difference became significant after adjusting for the profession of the participants ( $p = 0.01$ ). Nurses were more likely to know this information than doctor.

#### **4.11 AVAILABILITY OF HEALTH CARE WASTE STORAGE CONTAINERS IN THE WARDS**

The vast majority of the respondents reported that their ward had never gone without health care waste bins including sharps containers. Only a very small proportion reported experiencing their wards going without bins. Their responses showed that there is a significant difference among various wards in terms of supply of health care waste storage containers ( $p = 0.01$ ).

#### **4.12 KNOWLEDGE ABOUT WHERE DOCUMENTS ARE KEPT**

The participants were asked to state where each of the documents mentioned in Table 2.1 were kept. It was either they did not know or they provided a place where they thought they were kept. A wide variety of places were provided for each of the documents. Of all the documents the majority of the participants

knew where the Hospital policy was kept, compared to other documents 116 (90%). The results are summarised in table 4.17 below.

**Table 4.17 Where documents are kept (n= 128)**

	International Policy	National Policy	Provincial Policy	Provincial Regulation	Provincial code	Hospital Policy
Yes	62	54	62	62	60	116
No	66	74	66	66	68	12
<b>Total</b>	<b>128</b>	<b>128</b>	<b>128</b>	<b>128</b>	<b>128</b>	<b>128</b>

## **CHAPTER 5**

### **DISCUSSION**

In this chapter, the results obtained from the analysis of the data are discussed and compared with those from other published studies.

#### **5.1 INTRODUCTION**

This study was the first attempt to investigate the subject of health care waste specifically as it applies to the Johannesburg Hospital. As mentioned in the limitations of the study, there were only a few published literature based on similar analysis. A significant proportion of the information reviewed was not published but rather available as official documents and reports of the Department of Health, the Department of Environment and Tourism and the WHO. The documents investigated in this study were selected after their extensive review and the selection was based on their content, requirements and relevance to the subject.

The findings documented in this report are based on the reported knowledge and practices about health care waste management by the respondents. The findings are also based on the respondents' reported knowledge about the existence of selected official documents listed in Table 2.1. The data was collected using an anonymous self administered questionnaire in an effort to minimise self reporting bias. The 128 participants who responded in the study were selected randomly and therefore it is expected that they represented the doctors and nurses employed at the Johannesburg Hospital.

## **5.2 KNOWLEDGE ABOUT DOCUMENTS REGULATING HEALTH CARE WASTE MANAGEMENT**

Policies, Acts, regulations and codes of practice contain information that justifies their formulation and they emphasise the importance of the issue they regulate. It is therefore absolutely important that the people who implement them are familiar with their contents and requirements so that they can use them regularly as a point of reference.

In a case study conducted by Patil et al (2005), in a hospital in India it was found that the pockets of non compliance with statutory requirements were due to a lack of enforcement. In this study participants were asked to state how they acquired knowledge about existence of the documents they were asked about and to also state if they had access to them. There was a consistent statistical difference between doctors and nurses in terms of how the knowledge was acquired. Initiatives by the hospital such as seminars and workshops to create awareness did not seem to reach enough doctors. They were more likely to report finding the documents on their own than nurses ( $p < 0.001$ ).

Generally there was a low level of awareness about documents regulating health care waste and by extension the environment, among the respondents. Only 58 (46%), knew about the existence of the WHO manual, 37 (28%) reported knowledge about the existence of the NECA (1989), another 52 (41%) knew about the existence of the Gauteng Health care waste management policy. The Gauteng Health Care Waste management Regulations were known by only 49 (38%) of the respondents, while the Gauteng Department of health code of practice was known by only 37 (29%) of the respondents. This finding was consistent with one made by Kaiser et al (2001) in a study in the United States. He observed a gap on awareness of environmental issues in general by hospital workers. He even argued that this gap negatively affects and influences the

choice of materials used in hospitals as when decisions are made to purchase no consideration is made about when the materials ultimately becomes waste.

Among both groups (doctors and nurses), the Johannesburg Hospital policy on waste management was particularly well known with 107 (84%) of the respondents reporting knowledge about its existence. However, there were statistical differences between the two groups in terms of knowledge about two documents, namely: the Gauteng Health care waste management policy and the Johannesburg Hospital Waste Management Policy ( $p = 0.02$  and  $p < 0.001$ ) respectively.

As the Johannesburg Hospital Policy document is more accepted and available to health professionals, the Hospital management should endeavour to regularly update this document incorporating all the other relevant international, national and provincial document and make it more accessible to all health care workers in the Hospital.

Those who reported knowing where these documents were kept suggested a wide array of places where they believed they were kept. These included places both within and outside the Hospital such as:

- Outside the Hospital: Department of Health, Department of Environment and Tourism as well as the internet;
- Within the hospital: The infection control unit and the Administration departments were suggested. The results on knowledge about where the various policies were kept were an aggregate of the reported places. Therefore, as long as a respondent mentioned a place where they believed a certain document was kept, it was recorded that they knew where that particular document was kept.



### **5.3 HEALTH RISKS ASSOCIATED WITH HEALTH CARE WASTE**

There is a growing body of knowledge which suggests that HIV/AIDS, Hepatitis B and C are just some of the diseases feared to be transmissible through contact with health care waste (WHO Fact sheet no. 281, 2004). Nurses and doctors as well as other health care professionals and hospital employees in general, need to know this so that they can deal with the waste with the full knowledge of the hazards to public health it presents (Pruss et al., 1999).

In this study, the majority of both doctors and nurses reported that they agreed that HIV/AIDS, Hepatitis B and C can be transmitted through contact with health care waste. There were no statistically significant differences between the two groups about the transmission of these infections.

Hospital acquired infections are an important aspect of hygiene in hospitals. Poor hygiene, including poor handling and storage of health care waste coupled with inadequate protection is believed to contribute to transmission of nosocomial infections (Sobotová et al., 2006). In this study most of the participants agreed that nosocomial infections may be acquired through contact with infectious health care waste.

### **5.4 PRACTICES REGARDING MANAGEMENT OF HEALTH CARE WASTE**

Handling, segregation, storage and disposal of waste are some of the important practices in the process of waste management (Pruss et al., 1999). Therefore respondents were asked general questions regarding their practices with respect to these steps of the waste management process.

Proper storage of waste in the ward takes place when waste is placed in the appropriate bins while awaiting collection. It follows segregation whereby waste is separated according to composition. These practices are preceded by the knowledge that some types of health care waste present a hazard to human and

environmental health. The majority of participants in this study (117, 91%), reported that they segregated waste. This was not a surprising finding at all. Patil et al (2005) found similar results in a case study in a hospital in India. In that study, the staff interviewed explained that they feared possible injuries that could arise not only to them but to other population groups as well.

In this study it was found that there were pockets of nurses and doctors who reported not segregating waste. Although the proportions may seem small 11 (9%), this explains why health care waste is always difficult to manage. Taru et al (2005), reported observing mixed waste in a Zimbabwean hospital, suggesting that segregation was not practiced. This finding was also made by Weir, (2002) in a children's hospital in Canada. The WHO acknowledges this as a problem and argues that the human element is as important as technology in waste management.

Respondents were asked whether they treated health care risk waste differently from health care general waste. This question was asked in order to get an impression about their outlook on health care waste. There was also a small proportion who reported that they did not treat health care risk waste any differently 12 (10%).

Protective clothing plays an important role of reducing exposure. Gloves are just one of the forms of protective gear that is used to prevent direct contact with health care waste in order to reduce the risk of infection. An overwhelming majority of the respondents (122, 95%) reported that they always used gloves. This is therefore a very encouraging finding.

On the whole the findings regarding knowledge about various health risks such as its ability to transmit nosocomial infections, HIV/AIDS, Hepatitis B and C are encouraging.

## **CHAPTER 6**

### **CONCLUSIONS AND RECOMMENDATIONS**

In this chapter, the results are assessed in relation to the aims of the study, so that appropriate conclusions can be made. The limitations of the study are also articulated. Appropriate recommendations are made within the context of the findings of the study. These recommendations focus on the improvement of health care waste management in the Johannesburg Hospital. Finally, suggestions for further research are presented.

#### **6.1 CONCLUSIONS RELATED TO THE AIMS OF THE STUDY**

This was a cross sectional descriptive study, and therefore it looked at rather broad issues pertaining to the subject of health care waste. More qualitative studies need to be done which will entail making observations in the hospital, which will either corroborate or dispel the practices reported by the doctors and nurses.

##### **6.1.1 CURRENT KNOWLEDGE OF DOCTORS AND NURSES ABOUT THE EXISTENCE OF POLICIES ON HEALTH CARE WASTE MANAGEMENT**

According to the findings of this study, it is concluded that there is a lack of awareness about the existence of key policies, Acts, regulations and codes, which regulate health care waste management among doctors and nurses. They not only do not know about the existence of these documents, they do not have access to them. This therefore suggests that they also do not know about the requirements of these documents, and yet some of them are statutory.

As a result, they miss an opportunity to read key information usually contained in the documents, especially the rationale for regulating waste as well as its impact on the environment and public health, the cost to the national economy,

to the province and the hospital. They also miss out on formation on the risk faced by communities, individuals, patients as a result of poor health care waste management

It can also be concluded that doctors do not pay much attention to issues of waste management compared to nurses. Most doctors reported that they did not have any idea how many bins of waste are filled in their wards or how often they are collected. The majority of those who responded also stated that they knew about the existence of the hospital policy on waste management but they did not have access to it even though most of them reported that they knew where it was kept.

#### **6.1.2 DESCRIPTION OF PRACTICES OF DOCTORS AND NURSES WITH REGARDS TO THE MANAGEMENT OF HEALTH CARE WASTE**

Despite the low awareness of the existence of policies regulating the waste among doctors, it is concluded that doctors and nurses engage in good practices.

These include measures to protect themselves from direct contact with hazardous waste. The vast majority reported that they used gloves. Waste segregation is also widely practiced by both doctors and nurses. This is an encouraging finding indeed.

However, they may be engaging in good practices out of the obvious fear of infection as other studies have found elsewhere.

#### **6.1.3 AWARENESS ABOUT INFECTIONS TRANSMITTED BY HEALTH CARE WASTE**

It is a conclusion of this study that doctors and nurses know about the risks associated with improper management of health care waste. The vast majority

of both doctors and nurses strongly agreed that HIV/AIDS, Hepatitis B and C, can be transmitted through contact with health care waste.

#### **6.1.4 PERCEPTIONS ABOUT TRANSMISSION OF NOSOCOMIAL INFECTIONS BY HEALTH CARE WASTE**

Based on the findings of this study, it is concluded that doctors and nurses agree that health care waste does contribute in the transmission of nosocomial infections. The overwhelming majority of both professions strongly agreed that health care waste presents the risk of infection transmission not only among health professions but also among other hospital workers as well as patients.

#### **6.1.5 KNOWLEDGE ABOUT PATTERNS OF HEALTH CARE WASTE GENERATIONS**

It is concluded that there is general apathy among doctors towards waste management in the wards and therefore in the hospital. The majority of doctors reported that the nursing staff in the wards was responsible for supplies relating to storage of the waste in the wards.

### **6.2 LIMITATIONS OF THE STUDY**

The following limitations were experienced in conducting this study:

1. This subject is hardly researched and therefore, the literature is very scanty.
2. The information obtained was reported by the participants and therefore it may not necessarily reflect the true picture of what happens at the facility.

### **6.3 RECOMMENDATIONS**

The recommendations made below were based on the findings from this study. Some of the points have been taken directly from suggestions or requests made by the staff, while others have been determined based on the analysis of the

data by the researcher. The suggestions and recommendations of the supervisor were also considered. Potential topics of research have also been suggested.

### **6.3.1 JOHANNESBURG HOSPITAL WASTE MANAGEMENT POLICY**

The Hospital management should endeavour to regularly update this document incorporating all the other relevant international, national and provincial document and make it more accessible to all health care workers in the Hospital.

### **6.3.2 AVAILABILITY OF HEALTH CARE WASTE MANAGEMENT POLICIES**

The different documents which were investigated in this study contain very important information on the subject of waste management. They are also inter-related in terms of their content. It is therefore imperative and in the best interest of the hospital to invest in sufficient copies and place them in strategic places where the hospital staff can access them easily such as the hospital website. Furthermore, hospital employees should be encouraged to read them. This is notwithstanding the good waste management practices reported by the respondents.

### **6.3.3 THE NEED TO TARGET DOCTORS**

There is clear evidence that initiatives by the hospital to include doctors in seminars on waste management are not very successful. This is a very important group and it is therefore recommended that the infection control unit devises means by which doctors can attend seminars on waste management. The strategy used by infection control to create awareness on health care waste needs to be evaluated in order to ensure that enough interest is generated among doctors on the subject of health care waste. This strategy should also be applied to emphasise waste segregation.

## **6.4 FURTHER RESEARCH**

The following areas of research are necessary, as the findings would both assist health workers and the hospital in the management of health care waste:

- There is need to conduct a similar study, using a qualitative method where participants can be engaged in the form of interviews and focused group discussions.
- There is need to conduct research targeting other population groups which were not targeted in this study within the hospital.
- Actual cost of Health care waste management in the hospital

## **6.5 CONCLUSION**

This study was the first of its kind to be done at the Hospital. Although some good practices such as use of gloves were reported, there is generally a lack of knowledge about key documents regulating health care waste, particularly among the doctors. The hospital should make these policies more easily accessible and visible and strive to reach doctors with training in health care waste management. Monitoring and evaluation on a continuous basis is also necessary to check if those policies and procedures are being followed.

The findings from study will be presented to the hospital management and it is hope that they will be utilised.

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## GLOSSARY OF TERMS

1. **Health care waste** - a by product of health care that includes sharps, non- sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials
2. **Infectious waste** - waste which is suspected to contain pathogens.
3. **Nosocomial infections** – “An infection originating in a medical facility e.g., occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. Includes infections acquired in the hospital and but appearing after discharge; it also includes such infections among staff” (Last, 1995).
4. **Pathological waste** - waste consisting of tissues, body parts, human fetuses, blood and body fluids.
5. **Sharps** - a category of health care waste comprising of items which can cause cuts and injuries. These include needles, scalpels and broken glass.
6. **Segregation** – For the purpose of this study refers to doctors and nurses

## **APPENDICES**



## **APPENDIX A - QUESTIONNAIRE**



**KNOWLEDGE AND PRACTICES OF DOCTORS AND NURSES AT A LARGE ACADEMIC HOSPITAL IN THE GAUTENG PROVINCE ABOUT MANAGEMENT OF HEALTH CARE WASTE**

*It is important that we get correct answers. Please think carefully before you answer questions.*

STUDY NO 

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DATE 

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**Section 1: Demographics**

1.	What is your profession? [Tick the appropriate box]	<i>Doctor</i>	<i>Nurse</i>
		<input type="checkbox"/>	<input type="checkbox"/>
2.	What is your position in the hospital?		
3	How long have you worked in the Health Sector?	Years	Months
		<input type="text"/>	<input type="text"/>
4.	How long have you been working at this particular Hospital?	Years	Months
		<input type="text"/>	<input type="text"/>
5	Please provide the name/number of the ward/section where you are currently working:		

**Section 2: Awareness about existence of regulations/ policies**

6.	Do you know about the existence of any of the following regulations/policy on health care waste management? [Put an X in appropriate box]	<b>Yes</b>	<b>No</b>
	a) WHO Manual on safe management of waste from health care activities	<input type="checkbox"/>	<input type="checkbox"/>
	b) National Environment Conservation Act	<input type="checkbox"/>	<input type="checkbox"/>
	c) Gauteng Health Care Waste Management Policy	<input type="checkbox"/>	<input type="checkbox"/>
	d) Gauteng Health Care Waste Management Regulations	<input type="checkbox"/>	<input type="checkbox"/>
	e) Gauteng Department of Health Code of Practice for Health Care Waste Management	<input type="checkbox"/>	<input type="checkbox"/>
	f) Your Hospital Waste Management Policy	<input type="checkbox"/>	<input type="checkbox"/>

7.	If your answer to any of the sub-questions in <b>question 6</b> was yes, how did you get to know about them <b>[Please put an X in appropriate box]</b>		
	a) Discovered them on my own		
	b) Attended a workshop/Seminar/Course		
c) Other means ( Please provide details)			
		Yes	No
8.	Do you have access to the regulations/policy?		
9. Where are the policy/ regulations kept? <i>[Please state for each policy]</i>			
	a) WHO Manual on safe management of waste from health care activities		
	b) National Environment Conservation Act		
	c) Gauteng Health Care Waste Management Policy		
	d) Gauteng Health Care Waste Management Regulations		
	e) Gauteng Department of Health Code of Practice for Health Care Waste Management		
	f) Your hospital Waste Management Policy		

**Section 3: Practices related with safe handling, disposal of Health Care waste**

<i>Please answer YES or NO for the following questions by putting an X in appropriate box</i>			
10.	I do not treat health care waste differently from general waste	YES	NO
11.	There are always separate bins for health care waste in the ward/section	YES	NO
12.	I do not know how to distinguish the different types of health care waste bins	YES	NO
13.	I do not use the provided health care waste bins to dispose of it	YES	NO
14.	I do not segregate waste in to general and health care waste	YES	NO
15.	I do not use gloves, when handling health care waste	YES	NO

**Section 4: Awareness about diseases/infections transmitted through health care waste**

	<i>Please answer following questions by putting an X in appropriate box</i>	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
16.	HIV/AIDS may be acquired through contact with infectious waste					
17.	Hepatitis B may be transmitted through health care waste					
18.	Hepatitis C may be transmitted through health care waste					
19.	Health care waste does not transmit any diseases/infections					
20.	If there are any other infections/diseases; other than the ones mentioned above Please list them.					

**Section 5: Perception about health care waste and nosocomial (hospital acquired) infections**

	<i>Please answer the following questions by putting an X in appropriate box</i>	Strongly Agree	Agree	Not sure	Disagree	Strongly disagree
21.	Improperly managed health care waste may cause infections among health workers					
22.	Improperly managed health care waste may cause infections among other hospital workers					
23.	Improperly managed health care waste may cause infections among patients					

**Section 6: Variations of health care waste generation**

*Please answer the following questions by putting an X in appropriate box*

24.	On average how many bins of health care waste does your ward fill a day?	1	2	3	other	Do not know
24a.	If other, please specify					
25.	How often are health care waste containers/bins collected from your ward/section?	Hourly	Daily	Weekly	Other	Do not know
25a	<b>IF OTHERS</b> please specify the number					
26.	When is more health care waste produced in your ward/section?	During the day	At night	During the week	During weekends	Do not know
26a	<b>IF OTHERS</b> please specify the number					

**Section 7: Storage of health care waste in wards/hospital sections**

<i>Please answer by way of putting an x in the appropriate box</i>		Yes	No
27.	Has your ward/section gone without any type of health care waste containers/bins in the past six months?		
28.	Has your ward/section gone without sharps containers in the past six months?		
29.	When you need supplies necessary for health care waste management, who do you ask? [Please state]		

**THANK YOU FOR YOUR PARTICIPATION**

## **APPENDIX B**

### **INFORMATION SHEET AND CONSENT FORM**

## **INFORMATION LEAFLET AND INFORMED CONSENT**

*Each* participant ***must receive, read and understand this document***  
**before** any study-related procedure

**STUDY NUMBER:**

**STUDY TITLE:** KNOWLEDGE AND PRACTICES OF DOCTORS AND  
NURSES AT THE JOHANNESBURG HOSPITAL ABOUT  
MANAGEMENT OF HEALTH CARE WASTE

**SPONSOR:** GOVERNMENT OF BOTSWANA

**INVESTIGATOR:** TUDUETSO RAMOKATE

**INSTITUTION:** SCHOOL OF PUBLIC HEALTH, FACULTY OF HEALTH  
SCIENCES, UNIVERSITY OF THE WITWATERSRAND

**DAYTIME AND AFTER HOURS TELEPHONE NUMBER:** 0738693446

## **INTRODUCTION:**

You are *invited* to consider participating in a research study. Your participation in this study is entirely voluntary.

1. Before agreeing to participate, it is important that you read and understand the following explanation of the purpose of the study, the study procedures, benefits, risks, discomforts, and precautions as well as the alternative procedures that are available to you, and your right to withdraw from the study at any time.

This information leaflet is to help you to decide if you would like to participate. You should fully understand what is involved before you agree to take part in this study.

2. If you have any questions, do not hesitate to ask me.
3. You should not agree to take part unless you are satisfied about all the procedures involved.
4. If you decide to take part in this study, you will be asked to sign this document to confirm that you understand the study. You will be given a copy to keep.

## **5. PURPOSE OF THE STUDY:**

- The purpose of this study is to evaluate the current knowledge and practices of doctors and nurses regarding the management of health care waste

## **6. LENGTH OF THE STUDY AND NUMBER OF PARTICIPANTS:**

- The study will be performed in Johannesburg Hospital
- Approximately 92 participants will participate in this study within the hospital.
- The total amount of time required for your participation in this study will be a maximum of one hour.
- You will be given a questionnaire and please return the completed questionnaire within one week

## **7. RISKS:**

- There are no risks which are anticipated as result of participating in this study. The hospital management assured that no punitive measures will be taken against you based on the information you provide

## **8. BENEFITS:**

- Your participation in this study will contribute a lot in generating information that will be used to prevent infections transmitted by untreated health care waste

## **9. RIGHTS AS A PARTICIPANT IN THIS STUDY:**

- Your participation in this study is entirely voluntary and you can decline to participate, or stop at any time, without stating any reason.

## **10. Withdrawal:**

- Your withdrawal will not affect your employment at the hospital.

- I may withdraw you from the study if it is considered to be in your best interest. If you do not follow the guidelines of the study and the regulations of the study facility, you may be withdrawn from the study at any time.

#### **11. ETHICAL APPROVAL:**

- This study protocol has been submitted to the University of the Witwatersrand, Human Research Ethics Committee (HREC) and written approval has been granted by that committee.
- This study is sponsored by The Government of Botswana

#### **12. SOURCE OF ADDITIONAL INFORMATION**

- The 24-hour telephone number through which you can reach me or another authorised person, is 0738693446
- If you want any information regarding your rights as a research participant, or complaints regarding this research study, you may contact Prof. Cleaton-Jones, Chairperson of the University of the Witwatersrand, Human Research Ethics Committee (HREC), which is an independent committee established to help protect the rights of research participants at (011) 717 2229.

- For research information you can contact Tduetso Ramokate at **0738693446**

#### **13. CONFIDENTIALITY:**

- All information obtained during the course of this study, including personal data and research data will be kept strictly confidential. Only codes will be used so that anonymity can be maintained. Data that may be reported in scientific journals will not include any information that identifies you as a participant in this study.
- This information will be reviewed by authorised representatives of the Wits School of Public Health.
- Any information uncovered regarding the management of health care waste at the Johannesburg Hospital as a result of your participation in this study will be held in strict confidence. You will be informed of any finding of importance to management of health care waste but this information will not be disclosed to any third party in addition to the ones mentioned above without your written permission.





**TRANSLATOR / OTHER PERSON EXPLAINING INFORMED  
CONSENT..... (DESIGNATION):**

---

**Printed Name      Signature      Date and Time**

**WITNESS (If applicable):**

---

**Printed Name      Signature      Date and Time**

**APPENDIX C**  
**POST-GRADUATE APPROVAL**



Faculty of Health Sciences  
Medical School, 7 York Road, Parktown, 2193  
Fax: (011) 717-2119  
Tel: (011) 717-2075/6

Reference: Mrs Alison Mclean  
E-mail: mcleanam@health.wits.ac.za  
14 May 2007  
Person No: 0617008P  
PAG

Mrs T Ramokate  
P O Box 202276  
Gaborone  
0000  
Botswana

Dear Mrs Ramokate

**Master of Public Health (Health Policy and Management): Approval of Title**

We have pleasure in advising that your proposal entitled "*Knowledge and practices of doctors and nurses at an academic hospital in the Gauteng Province about management of health care waste*" has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

A handwritten signature in black ink, appearing to read 'S. Benn'.

Mrs Sandra Benn  
Faculty Registrar  
Faculty of Health Sciences

**APPENDIX D**  
**ETHICS CLEARANCE CERTIFICATE**

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

R14/49 Ramokate

CLEARANCE CERTIFICATE

PROTOCOL NUMBER M070112

PROJECT

Knowledge and Practices of Doctors and Nurses at the Johannesburg Hospital about the Management of HealthCare Waste

INVESTIGATORS

Mrs T Ramokate

DEPARTMENT

School of Public Health

DATE CONSIDERED

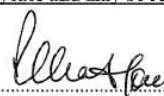
07.01.26

DECISION OF THE COMMITTEE\*

APPROVED UNCONDITIONALLY

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 07.02.22

CHAIRPERSON   
(Professors PE Cleaton-Jones, A Dhali, M Vorster, C Feldman, A Woodiwiss)

\*Guidelines for written 'informed consent' attached where applicable

cc: Supervisor : Dr D Basu

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.  
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES