KNOWLEDGE, ATTITUDE AND PRACTICES OF SHARPS WASTE DISPOSAL BY DIABETIC PATIENTS IN HOME SETTINGS IN UMZINYATHI DISTRICT MUNICIPALITY.

Lihle Nomfundo Ziqubu

Dissertation submitted in fulfilment of the requirements for Masters of health sciences in the Department of Community Health Studies-Environmental Health in the Faculty of Health Sciences at the Durban University of Technology

Supervisor : Dr DG. Sokhela

Co-supervisor : Mr. S. Gabela

Date : November 2020

Declaration

This is to certify that the work is entirely my own and not that of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Durban University of Technology or to any other institution for assessment or for any other purpose.

10 November 2020

Signature of student Date

Approved for final submission

10 November 2020

Dr DG. Sokhela Date

RN, RM, D Nursing

10 November 2020

Mr. S.D. Gabela Date

Abstract

Background

Sharps waste is one of the categories of hazardous waste which must be properly managed. Sharps waste is hazardous and it should be disposed of in a proper manner. This waste has an ability to transmit diseases, as well as create a negative impact on the environment. The disposal of sharps waste generated in the community has been recognised as an area of public concern. There is a gap in proper disposal of sharps waste among diabetic patients in the home setting. Diabetic patients dispose of their sharps waste in different ways, but mainly in general waste. Umzinyathi District Municipality has semi-urban and rural areas with four sub-districts, namely, Nquthu, Endumeni, Umsinga and Umvoti. Umzinyathi District Mucipality has a substantial number of diabetic patients who are on insulin and who inject themselves at home. This study aims to describe the knowledge, attitude and practices on sharps waste disposal by diabetic patients at home.

Methodology

A quantitative, descriptive cross sectional study was used to investigate knowledge, attitude and practices on sharps waste disposal by diabetic patients at UMzinyathi District Municipality. A self-administered questionnaire was used to collect data. A convenience consecutive sampling was used to sample respondents. A total number of 308 insulin-dependent diabetic patients from selected health facilities of UMzinyathi District Municipality, filled in the questionnaires.

Results

A majority of respondents n=149 (48.4%) disposed of their sharps waste in a toilet, while n=92 (29.8%) disposed of their sharps waste in general waste. Amongst those who responded, the majority n=193 (62.3%) were not educated on disposal of sharps waste; they had moderate knowledge of proper disposal of sharps waste. Most of the respondents practiced improper disposal of sharps waste.

Conclusion

Generally, the majority of the respondents n=193 (62.3%) lacked knowledge of safe and effective disposal of sharps waste. They were not educated in this regard, which had a negative influence on how they disposed of sharps waste. There are serious concerns regarding current practices of sharps waste disposal by diabetic patients at home.

Key words: Sharps waste, diabetic patients, knowledge, attitude and practices, home settings

Dedication

I dedicate this work to the Lord; through Him, all things are possible. He made it possible for me to soldier on through difficult times until the completion of this work. I also dedicate this work to Qhawe, my pillar of strength, for always supporting and encouraging me throughout the duration of my research. Lastly, I dedicate this work to my family and friends, thank you for your support.

Acknowledgements

Dr Dudu Sokhela and Mr Sibusiso Gabela, my supervisors, I thank you for your guidance, encouragement and mentorship. I was privileged to work with you. Without you, I would have been unsuccessful. God bless you abundantly. I will forever be grateful.

To the Management of Umzinyathi Health District and Mpilenhle Medical Centre, thank you for allowing me to conduct my research in your health facilities.

Finally, the respondents who agreed to participate in my research voluntarily. Thank you so much for your contribution, without you, this would not have been possible.

I also pay tribute to Qhawe and my friends for always encouraging me.

TABLE OF CONTENTS

List of Figures

List of Tables

List of Appendices

Acronyms

Acronym	Full word/sentence
ANOVA	Analysis of Variance
EIA	Environmental Impact Assessment
HCW	Health Care Waste
IREC	Institutional Research Ethics Committee
KZN	KwaZulu Natal
NEMA	National Environmental Management Act
PHC	Primary Health Care
POP	Persistent Organic Pollutants
RHDC	Research and Higher Degree Committee
SANS	South African National Standards Authority
UK	United Kingdom
USA	United States of America
US. EPA	Unites States Environmental Protection Agency
WHO	World Health Organization

CHAPTER 1

OVERVIEW OF THE STUDY

1.1. INTRODUCTION AND BACKGROUND

Management of chronic diseases may require consistent blood tests and insulin injections. Thousands of used sharps and infectious waste is generated every day by diabetic people within their homes and requires proper disposal. The disposal of sharps waste generated in the community has been recognised as an area of public health and environmental health concern (Jansen, Kocks and Roberts 2017: 16). According to the World Health Organization (WHO 2018: 1), the total amount of waste generated by health-care activities (80%) is general waste and 20% is hazardous waste that can be infectious, toxic or radioactive. Sharps waste such as needles, syringes, disposable scalpels and blades represents 1% of the total waste, but sharps waste is the major source of disease transmission if not properly managed. Sharps waste disposed of in an improper manner in the community raises concerns as this waste can potentially place people at risk of injuries and infections from blood-borne pathogens such as HIV/AIDS and viral hepatitis (Sharif *et al.* 2018: 1).

A substantial amount of infectious waste generated from the domestic environment joins the municipal waste stream and ends up in the landfill site. Studies on proper sharps waste disposal have been conducted globally, but the greatest focus has been on sharps waste disposal in a clinical setting rather than in for a home setting. A multi-country study among diabetic patients showed that the proportion of various kinds of sharps waste disposed in municipal waste varied from 46.9% to 67.6% (Majumdar *et al.* 2015: 421). Specific containers were used to dispose of sharps waste in less than 10% of investigated cases only. It has been proven that globally, a vast number of diabetic patients are insulin dependent for diabetic management. Other diabetic patients do a have little knowledge of risks of improper disposal of sharps waste (Majumdar *et al.* 2015: 421). Legally, sharps waste must be disposed of in a sharps waste container; these containers are found in healthcare facilities only. In South Africa*,* Making Medical Injection Safer (South Africa. Department of Health 2006: 53) revealed that syringes and needles ended up in municipal landfill sites where municipal

workers and the public were exposed to infections. Lack of awareness of proper disposal of sharps waste is very high in these patients. Waste management policies and guidelines used by clinics do not cover the disposal of infectious waste at home or in the community by patients; they only cover management of infectious waste in the healthcare facility.

According to the WHO (2018: 1), sharps waste forms part of hazardous waste. Hazardous waste generated in health care facilities ranges from 10% to 25 % of the health care waste (KZN Provincial Department of Health 2013: 14). There is a universal principle which states that the “generator is responsible” for the management of their waste (Zikhathile and Atagana 2018b: 61). Health care facilities are legally accountable for their waste management practices based on this principle and have systems in place for proper waste management. These health care facilities have to comply with the ‘cradle to grave' system, meaning proper disposal of waste from the point of generation to the final disposal. There are key stages of cradle to grave in waste management that are all very important and interrelated. These stages are: segregation, collection, storage, transportation, treatment and disposal (KZN Provincial Department of Health 2013: 15). It is crucial to follow all these stages (Figure 1.1) when handling waste. Proper segregation at the point of generation, using the correct colour coded containers must be ensured, safe transportation must be provided, appropriate treatment and proper final disposal must be executed, using the environmentally sound systems for hazardous waste. Sharps waste is classified as category 4, disposed of in a yellow puncture-proof container; treatment and disposal are either by autoclaving or microwaving (KZN Provincial Department of Health 2013: 14). This ‘cradle to grave’ process is not practiced in the community due to the issues related to improper disposal of waste, one of the main issues being the lack of legislation regulating hazardous waste in the community.

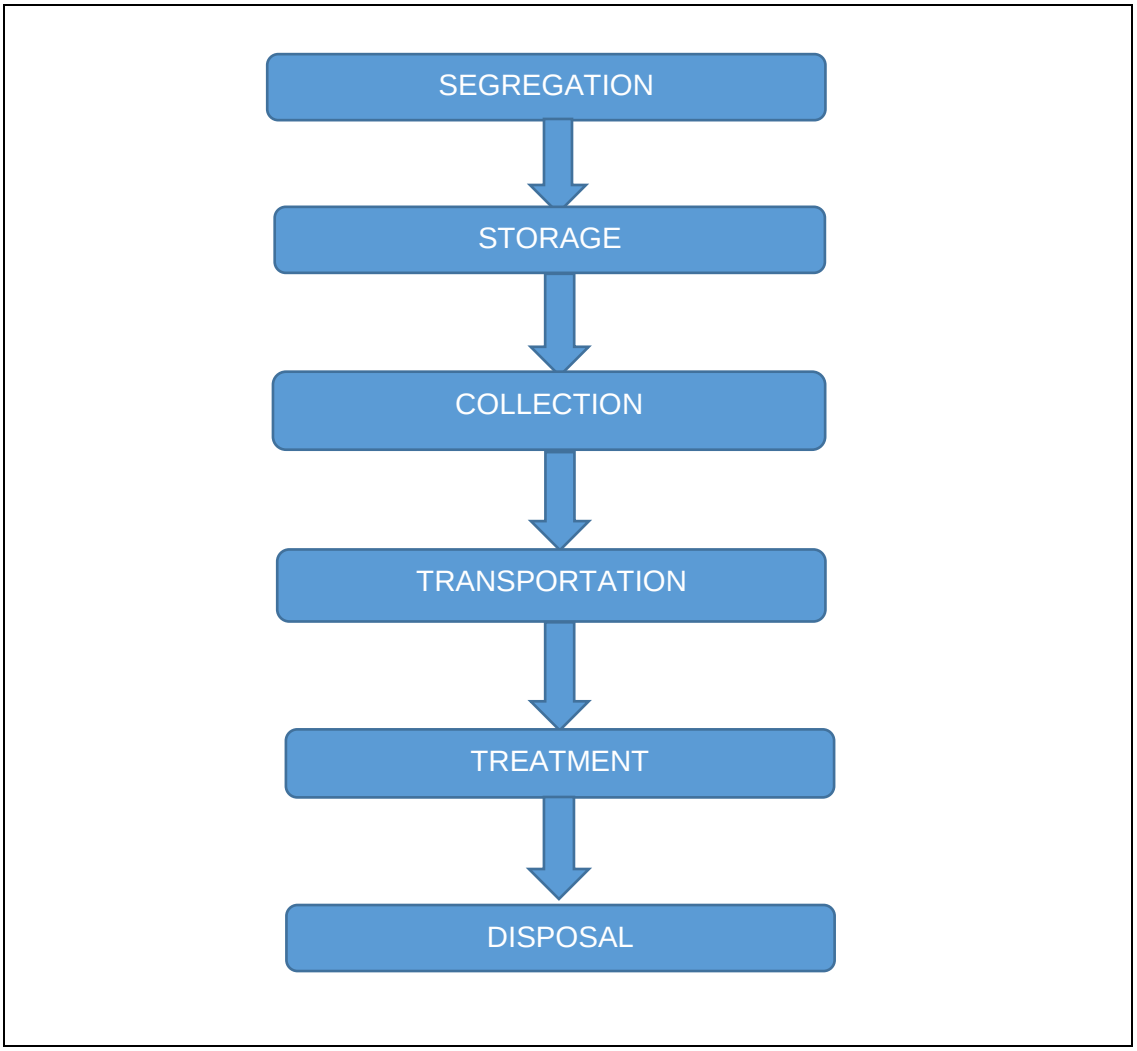

Figure 1.1: Stages of Health Care Waste Management

1.2. STATEMENT OF THE RESEARCH PROBLEM

Diabetes has been proven to affect many people in the world; 4 million South Africans are estimated to have diabetes and require the use of insulin to manage their condition (Govender and Ross 2012: 163). Sharps waste is hazardous and should be disposed of in a proper manner. There is a gap in proper disposal of sharps waste among diabetic patients in home settings. Sometimes sharps waste is found in the municipal waste or lying around on the ground. Improper disposal of sharps waste by diabetic patients at home has become a major problem worldwide (Quiwa and Jimeno 2014: 145). It was also recognised in the 2009 Health Care Waste Summit that sharps waste disposal is a problem in South Africa.

Patients in the private sector are provided with small sharps waste containers to use at home for disposal of their sharps waste, but patients in the public sector are not provided with these containers for home use. Patients do not take their used needles back to the clinic, rather they dispose of them in the toilet, or in general waste. Those who stay in rural areas where their waste is not collected by the municipality, dispose of their sharps waste with general waste. Patients, family members, reclaimers and municipal employees who work in waste management are at risk of needle stick injuries. Plastic containers with sharps waste can burst open when compressed in waste trucks. Municipal waste recycling vehicles experience problems where contents of waste collected may be dumped into conveyor belts at recycling facilities. Workers' gloves no match for needles and needle stick injuries on the job can be costly to the employer and the employee. It is enshrined in the South Africa. Department of Justice. Constitution of South Africa (1996: 26) that everyone has a right to an environment that is safe and not harmful to their health and well-being. Considering the gaps that have been identified in the studies previously discussed, this study was conducted with the aim of answering the following question: What is the knowledge, attitude and current practice of sharps waste disposal in the home setting?

1.3. AIMS AND OBJECTIVES OF THE STUDY

1.3.1. AIM

The aim of the study was to describe knowledge, attitude and practices on sharps waste disposal by diabetic patients at their homes in UMzinyathi District Municipality.

1.3.2. OBJECTIVES

The objectives to achieve the above aim of the study were to:

- Determine knowledge of diabetic patients on proper disposal of sharps waste at home.
- Determine the attitude and practices of diabetic patients and their families on proper disposal of sharps waste.
- Determine if diabetic patients were trained on disposal of sharps waste.

1.4. SCOPE OF THE STUDY

The study focuses on knowledge, attitude and practices of the disposal of sharps waste at home by the diabetic patients in Umzinyathi District Municipality. It further probes whether any form of training on proper disposal of sharps waste was given to the diabetic patients by health care workers. These patients attended the four public health care facilities and one private health care facility for consultations. The attitudes and practices of patients towards proper disposal of sharps waste at home were also interrogated.

1.5. ORGANISATION OF THE REPORT

Chapter 1: Overview of the study

The background of the study, problem statement and scope of the study have been previously discussed. Aim and objectives of the study were described.

Chapter 2: Literature review

This entails information on what has been proven in other countries, current practices and understanding of sharps waste disposal.

Chapter 3: Research methodology

This chapter describes the research methodology used to conduct this study. Techniques and methods of the study are also discussed.

Chapter 4: Presentation of Results

In this chapter, findings of the collected data are analysed with regards to the aim and objectives of the study.

Chapter 5: Discussions of Results

This chapter contains the descriptive analysis of results obtained from the findings in order to answer the question of the study.

Chapter 6: Recommendations and Conclusion

This chapter forms the final part of the report and draws conclusions from the research in relation to the study aim. Recommendations for the improvement of challenges in the field of sharps waste disposal in the community are also presented.

CHAPTER 2
LITERATURE REVIEW

2.1. INTRODUCTION

A literature review is comprised of scholarly articles, survey books and any other sources relevant to the particular issue, area of research or theory. It provides a description, summary and critical evaluation of the work related to the research problem that is being investigated. The literature review assists the researcher in clarifying his or her perspective on the research that has occurred in the area of interest. It also gives an idea of the context of the research to the reader and it illustrates where the gaps are in the literature. The literature review gives a clear idea as to why the researcher is conducting the study (Aldous, Rheeder and Esterhuizen 2013: 9).

The number of diabetic patients on insulin injections has been increasing, and that creates a high contribution to the waste stream of diabetic products globally. It has been proven in many studies conducted in different countries worldwide that most diabetic patients who inject insulin at home dispose of their sharps waste in an improper manner, mostly in domestic waste (Quiwa and Jimeno 2014: 145; Gold 2011: 849; Govender and Ross 2012: 163 and Musselman *et al.* 2010: 2). It is imperative to develop sustainable plans to address the issue of sharps waste disposal in the community, especially by diabetic patients. According to Gold (2011: 849), it is estimated that 7.5 billion sharps syringes and needles are used by diabetic patients every year. Disposal of sharps waste from healthcare facilities is extensively regulated but the disposal of sharps waste generated in communities is not regulated and yet it pose a public health concern (Jansen, Kocks and Roberts 2017: 16).

According to World Health Organization (WHO 2018: 5), sharps waste is one of the health care wastes. WHO defines health care waste as all waste that is generated by health care facilities, research facilities and laboratories (Hangula 2016: 28). It also includes waste from minor sources such as homes where waste is generated in the course of health care activities. Health care waste is divided into two categories,

namely, hazardous and non-hazardous waste. Hazardous waste is defined as waste that contains pathogens that can cause harm to the people and to the environment (du Toit and Bodenstein 2014: 14). Hazardous waste comprises of all infectious, sharps, chemical, genotoxic, pharmaceutical, pathological and radioactive waste (du Toit and Bodenstein 2014: 14). Non-hazardous waste is defined as waste that does not contain pathogens that can cause harm to the people and the environment. Non-hazardous waste is comprised of all general waste which includes papers, empty cans, boxes and plastics. The categories of health care waste are explained in Table 2.1 below.

Table 2.1: Categories of health care waste (hazardous and non-hazardous waste)

Waste Category	Description and examples
1. Hazardous waste	
Infectious waste	Waste suspected to contain pathogens such as laboratory cultures, waste from isolation wards, swabs, materials that have been in contact with body fluids like dressings, bandages, gloves, masks, gowns, drapes
Sharps waste	This is the waste that consists of used and unused sharps such as needles, infusion sets, clinical glasses, blades, scalpels, syringes.
Chemical waste	This is waste containing chemical substances like laboratory reagents, film developer, disinfectants that are expired or no longer needed, solvents, waste including a high content of batteries, broken thermometers, blood pressure gauges, heavy metals, gas cylinders, gas cartridges, aerosol cans.
Genotoxic waste	Waste containing substances with genotoxic properties, for example, waste containing cytostatic drugs (often used in cancer therapy) and genotoxic chemicals fall into this category.
Pharmaceutical waste	This is described as waste containing pharmaceuticals, for example, pharmaceuticals that are expired or no longer needed; items that are expired or no longer needed, items contaminated by or containing pharmaceuticals (bottles, boxes).
Pathological waste	Human tissues or fluids such as body parts, blood and other body fluids, as well as foetuses, fall into this category.
Radioactive waste	This waste is described as waste containing radioactive substances like unused liquids from radiotherapy or laboratory research, contaminated glassware, packages, or absorbent paper; urine or excreta from patients treated or tested with unsealed
2. Non-hazardous waste	
General/Municipal waste	All waste that does not pose a chemical, biological, physiological or physical hazard, for example; papers, cardboards, plastics, discarded wood, metal, glass and textile.

Globally, the World Health Organisation (2018: 5) manual on health care waste management from the health care facility is the main policy that governs the disposal of health care waste. While there is no global policy that focuses specifically on the management of health care waste in the community, some countries have recommendations. Other legislative frameworks in health care waste management are International Conventions, which are the agreements between different countries relevant to practices regarding environmental health and pollution (Health Advance Institute 2015: 26). These conventions are the Basel Convention (1992) and the Stockholm Convention (1989), which also focus on management of health care waste from the health care facilities.

The process of health care waste handling begins with the generator and ends at the landfill site. This process is referred to as the 'cradle to grave' approach. The first and the most important step of the 'cradle to grave' approach is the segregation and containerization of health care waste. The generator must segregate waste from the point of generation and containerizes it to minimise the risk of contamination and pollution to the environment and to human health. Health care risk waste is segregated according to the risk factors involved and the type of treatment required for the category of waste (Health Advance Institute 2015: 46). Universal colour-coded containers are utilised for segregation of health care waste (Figures 2.1, 2.2 and 2.3). Sharps waste is segregated into a yellow rigid puncture- resistant container marked 'SHARPS' with the biohazard symbol. Sharps waste must be treated and disposed of in a secured landfill site.

Figure 2.1: Sharps waste buckets.

Figure 2.2: Sharps waste containers and stands

Figure 2.3: Daniels sharps container with the instructions.

2.2. HOW DIABETIC PATIENTS DISPOSE OF SHARPS WASTE

A multi-country study among diabetic patients showed that the proportion of various kinds of sharps waste embedded in disposed municipal waste varied from 46.9% to 67.6% (Majumdar *et al*. 2015: 420). Research shows that in less than 10% of cases specific containers are used to dispose of sharps waste. Even in some of the developed countries the statistics have shown improper disposal practices among diabetic patients, with percentages as high as 80%-90%. The results of the study conducted in United Kingdom revealed that about 2.5 million sharps waste was generated yearly by diabetic patients at home in the South Staffordshire Health District. The study proved that diabetic patients practice improper disposal of sharps waste. More than half of diabetic patients disposed of their sharps waste either loose

or in household containers. Diabetic patients also dispose of their sharps waste by burning it. It was also proven that in Indiana, sharps waste is disposed improperly in municipal waste.

A study conducted in New Delhi ascertained that 84.1% diabetic patients disposed of their sharps waste straight into the municipal bins (Majumdar *et al*. 2015: 421). The same researchers reported that 71% of diabetic patients disposed of at least seven needles per week and 89% of these patients disposed of at least seven lancets per week into municipal bins. In Pakistan, the disposal of used injection devices into the municipal waste by diabetic patients is very common (Ishtiaq *et al*. 2012: 183). Diabetic patients disposed of syringes (92%), pens (75%) and lancets (91%) via municipal waste. Few diabetic patients reported using a sharps disposal box to dispose of used injection devices. In the study conducted by Atukorala *et al*. (2018: 3) in Sri Lanka, it was found that diabetic patients dispose of their waste in an improper manner. Statistics revealed that 41.7% dispose of their sharps waste in household waste, 20% reported that they burn their sharps waste and the others dispose of their waste in the toilet. In another study conducted by Sharif *et al*. (2018: 1), similar observations were noted. They identified that diabetic patients dispose of their sharps waste in household waste and some flush the materials down the toilet. Musselman *et al*. (2010: 2) conducted a study in French speaking countries (France, Belgium, Luxemburg, Switzerland and Tunisia) and found that 72.6% patients inject insulin at home for the management of diabetes. In these French speaking countries, 49.6% of the patients dispose of their sharps waste directly in the municipal waste bin; 37% place the sharps within a container, then dispose of the container in the municipal waste bin; 7% used a specific container which is taken to the hospital or pharmacy when it is full and 6.4% used other ways to dispose of their sharps waste like burning or keeping the items at home (Musselman *et al*. 2010: 3). In a study conducted in New Jersey, of 44 diabetic patients, 86 % were found to dispose of their waste improperly and 7 % flushed their sharps waste down the toilet (Markkanen *et al*. 2015: 10). According to Sonmez, Nazik and Andi (2018: 735) diabetic patients in Turkey dispose of their sharps waste in general waste. In Albertina, Canada, 21% of the patients first place their sharps waste in a container, then dispose of it in the municipal waste; 79% of the diabetic patients disposed of their sharps waste directly into the municipal waste or burn their sharps waste.

In Southern Ghana, Udofia, Gulis and Fobil (2017: 4) conducted a study on disposal practices of sharps waste in households. The findings were that most of the diabetic patients disposed of their sharps waste in municipal bins. Some of the patients put their sharps waste in containers, then disposed of them in municipal waste; others disposed of their sharps waste directly in municipal waste. In Mauritius, an average of 84.2% of sharps waste is disposed of in municipal waste (Subratty and Nathire 2005: 45). In this same country, it was found that 89.5% of syringes are disposed of in municipal bins, 6.3% are burnt and 4.2% are disposed of in other ways like returning the waste to the pharmacy or inserting it into a hard bottle before disposing of it into municipal waste; 78.8% of lancets are disposed of in municipal bins, 1.2% are flushed down the toilet, 5.9% burnt and 14.1% inserted into a hard bottle before combining it with municipal waste.

In the study conducted in the country of Guyana in South America, it was once again found that diabetic patients practice improper disposal of sharps waste in their homes (Furth, Anderson and Krishendat 2010: 4). Of the diabetic patients interviewed pertaining to the disposal of sharps waste at home, 56 % reported that they dispose of their sharps waste in the municipal waste (Furth, Anderson and Krishendat 2010: 4). Other patients reported that they either burn their sharps waste in the waste pit at home, throw it in the river or throw it in the toilet. Govender and Ross (2012: 163) stated in their study conducted in Wentworth Hospital that the 2009 Health Care Waste Summit recognised the problems with sharps waste disposal in South Africa. They also argue that the safe the disposal of sharps waste generated by insulin-dependent diabetic patients is not only a problem in South Africa; other studies show that Atlanta in the United States of America ,as well as in European countries have highlighted the problem of improper sharps waste disposal practices by diabetic patients at home.

Diabetic patients and other patients with chronic illnesses need support with taking their medication and the disposal of their medical waste including sharps waste at their homes. The Department of Health introduced the programmes of Community Home-Based Carers to assist the patients recuperating at home with on-going assistance (Ndayizigamiye, Hangula and Akintola 2017: 282). In the studies that have been conducted by several authors, it was found that Community Home-Based Carers do not dispose of the generated waste in a proper manner (Zikathile and Atagana 2018a: 2; Ndayizigamiye, Hangula and Akintola 2017: 282 and Kang`ethe 2008: 189). The

sharps waste is disposed of in general waste which poses a risk to the patients, their families and to the environment.

2.3. RISK FACTORS OF IMPROPER DISPOSAL OF SHARPS WASTE

2.3.1. NEEDLE STICK INJURIES

Improper sharps waste disposal poses risks to human health and the environment. It also poses risks of occupational exposures like needle stick injuries to waste handlers. Globally, 5.2 million people die every year due to diseases caused by improper management of health care waste (Hangula 2016: 157). A 2005 review of diabetic limb surgeries at Veterans Affairs hospital in Ohio revealed that nearly 3.5% of amputations could be associated with accidental needle stick injuries caused by diabetic patients cutting the end of the needle to make it safer, only to have those needle tips fall on the floor and later lodge themselves in the foot, setting the stage for later amputation (Costello and Parikh 2013: 868). There have also been reported cases of accidental needle stick injuries transmitting communicable diseases such as hepatitis B and C in the Ohio community.

2.3.2. DISEASES

According to Ishtiaq *et al*. (2012: 183) Pakistan is experiencing a high burden of diabetes, hepatitis B and C. Patients dispose of contaminated sharps waste improperly and this waste ends up in the landfill site. Improper waste disposal practices put waste handlers, family members and waste-pickers searching for valuables for recycling, at risk of various blood-borne diseases. Ishtiaq *et al.* (2012: 184) found that in Albertina, Canada, at least 14% of municipal waste workers sustained needle stick injuries from sharps waste in residential waste.

In the study conducted in Indiana, Lamm and Adams (2007: 48) state that in very rare cases, diseases such as tuberculosis, syphilis, herpes, malaria, toxoplasmosis, diphtheria, and blast mycosis have been transmitted through needle stick injuries. Plastic containers with sharps can burst open when compressed in waste trucks. Municipal waste recycling has also experienced problems with contents of waste collection vehicles being dumped into conveyor belts at recycling facilities.

Furthermore, workers' gloves no match for needles and needle stick injuries on the job can be costly to the employer and the employee.

2.4. BARRIERS TO PROPER DISPOSAL OF SHARPS BY DIABETIC PATIENTS

2.4.1. LACK OF KNOWLEDGE OR POOR HEALTH EDUCATION

Knowledge of proper waste disposal, diseases that can be acquired through poor waste management and other risk factors that occur through poor waste management must be disseminated to the community, especially to diabetic patients. Lack of education regarding how and where sharps waste must be disposed and lack of proper advice by the doctors and nurses are the most serious barriers to proper disposal of sharps waste by diabetic patients at home. It was found that even in developed countries, diabetic patients did not perceive insulin pen needles and lancets to require proper disposal methods (Majumdar *et al*. 2015: 420).

In the New Delhi, only 14.1% of diabetic patients received health education on proper disposal of sharps waste from their healthcare givers and 85.9% of the patients never received health education at all (Majumdar *et al.* 2015: 423). Healthcare givers in India either lack time or are unsure of what and how to educate patients; compounding the problem is a shortage of diabetes educators. Atukorala *et al*. (2018: 4) found in their study, which they conducted in Sri Lanka that 93% of the diabetic patients reported that they had never received any education on how to dispose of their sharps waste. In the United Arab Emirates, it was found that 56.7% of the diabetic patients reported to have received health education on proper disposal of sharps waste and the rest of the patients were never given health education. In Pakistan, approximately half (49.7%) of the patients who participated in the study said that they had received education from their healthcare givers about the disposal of used sharps. Those that said they had received the education were less likely to dispose of used sharps in municipal waste. In Ohio, it was found that diabetic patients are not educated regarding the proper disposal practices of their used diabetic supplies such as lancets and needles (Costello and Parikh 2013: 868). According to Sonmez, Nazik and Andi (2018: 735) patients with diabetes and the community at large lack awareness on dangers of improper disposal of healthcare risk waste.

The improper disposal practices identified give cause for concern, as they prove a lack of motivation or that advice is either given incorrectly, ignored, or misunderstood by diabetic patients. In the study conducted at Wentworth hospital in South Africa, only a few patients who collected their diabetic treatment from the hospital were educated on proper methods for disposal of sharps waste. Those who said they did not receive any education on proper disposal of sharps were disposing of sharps waste in an improper manner (Govender and Ross 2012: 164). In another study conducted in Ethekwini Municipality, however, it was found that home carer and community members were trained on segregation of waste in general but they were not trained on proper segregation of health care waste according to the risk posed (Hangula 2016: 172). Lack of health education on proper disposal health care waste segregation of waste such as sharps waste, poses risks to family members, home carers, municipal waste collectors and the community at large. Hangula (2016: 174) found that the lack of appropriate storage containers left patients with no choice but to store their health care waste in their yards thus making it accessible to children and waste-pickers. Appropriate education, awareness, knowledge and motivation on sharps disposal is the most important influential factor in proper sharps waste disposal methods and the management thereof.

2.4.2. POLICIES AND GUIDELINES

Laws, policies and guidelines on waste management govern and give direction on the proper execution of disposal of waste. To ensure good governance, compliance and improved health care waste management practices across the countries, various policies have been developed internationally, nationally and at local government levels. It is wise for all developed and developing countries to formulate and implement laws on proper waste management, especially regarding the disposal of sharps waste by diabetic patients in order to enforce compliance. Lack of policies or guidelines on proper disposal of sharps waste by diabetic patients are a major contributing factor to unsafe practices of disposal of sharps waste at homes.

Some developed countries like the United States of America (USA) have separated laws and rules guiding the disposal of sharps by citizens of each state (Majumdar *et al*. 2015: 420). This kind of policy initiative has had a fair success in ensuring proper

sharps waste disposal practices by citizens, as an uncertainty and lack of standardisation between laws of various states creates a problem. The United States Environmental Protection Agency's (U.S. EPA) current guidelines which call for the drop-off at collection sites, municipal hazardous waste centres, residential special waste pick-up services, syringe exchange programmes, mail-back services or home destruction devices are a noteworthy change from the previous guidelines, which suggested that citizens put needles in a plastic container or coffee can, write "do not recycle" and throw the container in the municipal waste (Lamm and Adams 2007: 50). According to Bouhanick, Hadjadj and Weekers (2000: 289), there is a law in France which states that everybody who produces waste material is responsible for its disposal. Diabetic patients were concerned about this law. One of their concerns was that they do not have proper containers for the disposal of sharps waste. In New Jersey, there are no federal regulations or consensus standards that direct the patients on how and where to dispose of their sharps waste (Markkanen *et al*. 2015: 10). There are no approved existing guidelines which assist patients on how to choose a sharps container to use at home for the disposal of sharps waste.

According to Olowokure, Duggal and Armitage (2003: 120), current guidelines of Diabetes United Kingdom (UK) recommend the use of hard plastic containers as receptacles for sharps waste. When the container is full, it is sealed and disposed of in municipal waste. In another study conducted in the UK, the legal framework is not clear on disposal of sharps waste in the community (Blerkharn 2008: 38). Sonmez, Nazik and Andi (2018: 733) revealed that in Turkey there is no regulation which specifically regulates the health care risk waste generated from homes. The study conducted by Atukorala *et al.* (2018: 2) discovered that in Sri Lanka, there are no policies or regulations controlling the management of sharps waste in the households. In Mauritius, there is no policy on sharps waste disposal for the patients, let alone the national policy on infectious waste management. The study conducted in Southern Ghana proved that there is no policy that specifically addresses the disposal of household medical waste (Udofia, Gulis and Fobil 2017: 8).

In South Africa disposal of sharps waste is covered in some of the legislations but there is no stand-alone policy for disposal of sharps waste by diabetic patients or by the community. Hangula (2016: 57) asserts that after the democratic elections the new Constitution, which aimed at providing South African citizens with equal access to

services, was drafted and promulgated in the year 1996. The South African Constitution of 1996 brought change to local government administration, removed disparities in service delivery and also integrated the segregation of societies (Hangula 2016: 57). A list of regulation documents used in South Africa to regulate health care waste, is disclosed in Table 2.2 below. Health care workers employed in health care facilities are required to be cognisant of these documents and maintain compliance regarding the process of health care waste management. The Constitution of South Africa states that everyone has a right to an environment that is not harmful to their health and well-being. The National Environmental Management Act of 1998 states that the duty of care principle requires the generator of waste, under all circumstances, to carry responsibility of the ultimate fate of the generated waste. Waste generator has to manage their waste in a proper manner from the point of generation to the point of disposal.

The South African Metabolic and Endocrine Guidelines (SEMDSA) and the South Africa Standard Treatment Guidelines (STG) should also give clear guidance on the safe disposal sharps waste. The need for development of uniform international guidelines on the disposal of sharps for diabetic patients at home and in countries to develop their national guidelines, is very crucial for the management of sharps waste. The World Health Organization recommends proper segregation of waste from the point of generation, and proper storage to be carried out in a manner that does not pose a risk to the health of the people and the environment. The Constitution of the Republic of South Africa gives the local government the responsibility of management of services, including waste storage, waste removal and waste dumps. In South Africa all municipalities are obliged by the Municipal Systems Act 32 of 2000 to provide waste management services to homes in the community.

TABLE 2.2: List of HCW Management Regulations in South Africa

Name of regulation	The controlling authority
Stockholm Convention, 1989	United Nations
Basel Convention, 1992	United Nations
WHO HCW Management manual, 1999	World Health Organisation
Constitution of South Africa, 1996	Republic of South Africa
The National Environmental Management Act, 1998	Department of Environmental Affairs
The National Waste Management Act, 2008	Department of Environmental Affairs
The Occupational Health and Safety Act, 1995	Department of Labour
The National Health Act, 2003	Republic of South Africa
South African National Standards, SANS 254	Republic of South Africa
Hazardous Substances Act, 1973	Republic of South Africa
The National Waste Management Strategy, 2011	Department of Environmental Affairs
Draft Health Care Risk Waste Management Regulations, 2008	Department of Environmental Affairs
The Western Cape Management Draft Bill, 2004	Western Cape Provincial Government
Gauteng Integrated Strategy and Action Plans for Sustainable Health Care Risk Waste, 2004	Gauteng Provincial Government
KwaZulu Natal Health Care Risk Waste Management Policy Draft, 2013	KwaZulu Natal Provincial Government

2.5. BACKGROUND TO THE DEVELOPMENT OF HEALTH CARE WASTE MANAGEMENT POLICIES IN SOUTH AFRICA

2.5.1. THE STOCKHOLM CONVENTION

This is a global treaty designed to protect human health and the environment from persistent organic pollutants (POPs) (Health Advanced Institute 2015: 27). These pollutants are non-biodegradable as they remain intact in the environment for long periods. South Africa is one of the 178 countries affiliated to the Stockholm Convention. These countries are required to take measures to eliminate or minimise the production, use and release of persistent organic pollutants including dioxins and furans. Medical waste incinerators have the potential for comparatively high formation and release of dioxins and furans. Priority consideration should be given to alternative technologies that avoid formation of dioxins and furans. South Africa uses incinerators for treatment of medical waste.

2.5.2. THE BASEL CONVENTION

The Basel Convention represents the new norms, rules and procedures in the law governing the movements and disposal of hazardous waste at international as well as national levels (Health Advance Institute 2015: 28). South Africa is one of the countries participating in the convention. The main objectives of this convention were to reduce transboundary movements of hazardous waste and other wastes to a minimum consistent with environmentally sound management; to treat and dispose of hazardous wastes and other wastes as close as possible to their source of generation with an environmentally sound management, and minimise the generation of hazardous waste and other waste in terms of both quantity and potential hazard.

2.5.3. THE WHO HEALTH CARE WASTE MANAGEMENT MANUAL 1999

This is an instruction manual used globally to guide the management of health care waste. It was developed to protect the public from infections that could arise due to improper management of health care waste. The recommendations of the manual are safe, efficient, sustainable and culturally acceptable methods of treatment and suitable

disposal of health care waste within and outside the health care facilities (Hangula, 2016: 53). The manual defines and categorises health care waste as hazardous and non-hazardous waste. Hazardous waste includes all infectious, sharps, pharmaceutical, pathological, chemical, genotoxic and radioactive waste. Non-hazardous waste is general or municipal waste, this type of waste does not pose any harm to the people and to the environment. According to Hangula (2016: 53) the manual also obligates countries to develop and implement their own national legislations on health care waste management. The manual emphasizes that proper health care waste management involves segregation, storage, transportation, treatment and disposal. The mixing of health care waste is prohibited in the manual; health care waste must be segregated at the point of generation (Hangula, 2016: 53).

2.5.4. THE SOUTH AFRICAN CONSTITUTION ACT 108 OF 1996

Section 24 of The South African Constitution states that every person has a right to a safe and clean environment which poses no harm to their well-being. Schedule 4 of The South African Constitution states that it is the responsibility of the government at the national level to provide health services and protect the environment (South Africa. Department of Justice 1996: 136). It is stated in schedule 5 (B) of The Constitution that it is the responsibility of the local government to govern and pass by-laws regarding air pollution issues, municipal health services, refuse removals, refuse dumps and solid waste disposal among others. The government departments that play a role in ensuring that health care waste is properly managed are Department of Health, Department of Environmental Affairs and Tourism, Department of Labour and Department of Agriculture and Land Affairs.

2.5.5. THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT 107 OF 1998

This Act was developed to give legislative effect to the White Paper on the National Environmental Policy for the country and it is the framework for protection of the environment. Chapter 1, 2(1) mandates all the organs of the state to work in collaboration to ensure that the environment is protected through establishing guidelines for decision making in relation to the issues affecting the environment, and

by establishing institutions that will implement and monitor compliance with the developed principles. Section 2 of NEMA provides two principals: (1) in any environmental initiative, people must be protected and their interest must be served equitably, (2) any development must be socially, environmentally and economically sustainable. The Act also states that the polluter must take measures to prevent such pollution. All relevant organs of state are required by the Act to develop environmental implementation plans. Chapter 5 of the Act provides legislation on environmental impact assessment (EIA) through developing of tools and systems to manage the impact of activities on the environment.

2.5.6. THE NATIONAL HEALTH ACT 61 0F 2003

The Act gives power to the Minister of Health to formulate regulations related to medical waste. According to the Act, provinces, municipalities and health districts are compelled to address health policy questions and deliver quality health care services including municipal health services which include waste management. It also compels public and private professionals to cooperate with each other and share responsibility within the context of national, provincial and district health. Health care waste management is important to protect the health of communities and the environment. The Act also incorporates the Regulations Relating to Health Care Waste Management in Health Establishments, R375 of 2014. These regulations state that all health establishments must manage waste in accordance with these regulations norms and standards relating to environmental health. The regulations enforce compliance with the environmental principles by all health establishments, public and private. The regulations govern the handling, storage, collection, transportation, treatment and disposal of health care waste. Health establishments must manage waste in a manner that does not pose a risk to the human health and environment.

2.5.7. THE OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

This Act regulates all health and safety matters as well as provides the information, training for employees and stipulates duties of those who might be exposed to health risks. The Act also provides information regarding risk assessments, medical

surveillance, the provision of protective clothing, and sets regulations on establishment and functions of an occupational health and safety committee. These regulations are relevant to the municipalities because their waste management employees are exposed to risks when waste is improperly disposed of.

2.5.8. THE SOUTH AFRICAN NATIONAL STANDARDS 10248 OF 2004

The South African National Standards Authority developed the codes SANS 10248 of 2004 as a regulation on health care waste at a national level. The definition of health care waste in these guidelines is in line with the WHO manual on health care waste management. The guidelines cover the cradle to grave concepts at all stages of waste management. The standards require the proper classification, segregation, storage, transportation, treatment and disposal of health care waste as prescribed by the WHO manual on health care waste management. All minor generators are responsible for managing their own waste and patients must be health educated on proper disposal of health care waste. All guidelines applicable to minor generators are applicable to major generators. In the SANS 10248 of 2004, section 11: 1.2 the minor generators are prohibited to use municipal waste collection services provided by the local authority to dispose of any health care waste that may pose harm to the people and the environment. The standards state that the minor generators may provide justification for hiring their own private waste disposal company. Without such justifications, they must make arrangements to deliver the waste to the local health care facility. All health care waste transported to the facilities must be stored in locked leak-proof containers (South African Bureau of Standards 2004: 36).

2.5.9. THE WESTERN CAPE MANAGEMENT DRAFT BILL OF 2004

This bill was developed to address all illegal dumping of health care waste in the Western Cape Province. The bill Western Cape Management Draft Bill is in line with the WHO manual regarding the safe management of health care waste because it provides the effective handling, storage, collection, transportation, treatment and disposal of health care waste by all waste generators in the province. The provincial

minister is obligated by the bill to conduct audits of health care waste generators to ensure compliance (Western Cape Provincial Government 2004: 10).

2.5.10. THE GAUTENG HEALTH CARE WASTE MANAGEMENT REGULATIONS 2004

The regulations apply to all health care waste generators and health care waste service providers in the Gauteng province. The regulations provide the definitions, classification of all health care waste and classification of all health care waste generators. It also outlines the responsibilities of health care waste generators; emphasises the need for proper segregation, storage and transportation of health care waste and highlights the importance of waste handlers wearing protective clothing which is consistent with the stipulations provided by WHO. Private homes are classified as minor generators of health care waste in the regulation and the municipality is obligated to provide a safe collection for all health care waste generated in homes (Gauteng Provincial Government 2004: 17).

2.5.11. THE NATIONAL WASTE MANAGEMENT STRATEGTY OF 2011

The purpose of the National Waste Management Strategy is to achieve the objectives of the National Environmental Management: Waste Act 59 of 2008. The National Waste Management Strategy provides the plan to address the challenges faced by South Africa in waste management. As stated in the strategy (South Africa. The National Waste Management Strategy 2011: 47) is structured around eight goals. These goals are as follows:

Goal 1: Promote minimisation, re-use, recycling and recovery of waste.

This goal focuses on implementation of the waste management hierarchy with the aim of diverting waste from the landfill.

Goal 2: Ensure the effective and efficient delivery of waste services.

The aim of this goal is to promote access to basic level of waste services for all and integrates the waste management hierarchy into waste services, including separation at the source.

Goal 3: Grow the contribution of the waste sector to the green economy.

Emphasis is placed on the social and economic impact of waste management, and situates the waste strategy within the green economy approach.

Goal 4: Ensure people are aware of the impact of waste on their health, well-being and the environment.

This goal seeks to involve communities and people as participants in implementing the new approach to waste management.

Goal 5: Achieve integrated waste management planning.

The fifth goal creates a mechanism for integrated, transparent and systematic planning of waste management activities at each level of government.

Goal 6: Ensure sound budgeting and financial management for waste services.

Mechanisms are provided to establish a sustainable financial basis for providing waste services.

Goal 7: Provide measures to remediate contaminated land.

The aim of this goal is to address the massive backlog of public and privately owned contaminate land.

Goal 8: Establish effective compliance with and enforcement of the Waste Act.

Finally, Goal 8 ensures that everyone adheres to the regulatory requirements for waste management, and builds a culture for compliance.

The municipalities have to implement these goals and provide waste management services to their communities, including the rural communities. In South Africa the evidence of poor waste management proves that awareness of the impact of waste on health, well-being and the environment is very uneven in different communities (South Africa. Department of Environmental Affairs 2011: 28).

2.5.12. THE KWAZULU NATAL HEALTH CARE RISK WASTE MANAGEMENT POLICY DRAFT OF 2013

The draft policy provides guidelines on the safe management of health care waste from the point of generation to the point of final disposal. The policy draft aims to protect the health of the people and the environment of KwaZulu-Natal. The draft policy applies to the public health care facilities and all health care risk waste services

provided that are contracted to the Department of Health (KZN Provincial Department of Health 2013:12).

2.6. PROGRAMMES AND AWARENESSES

Having programmes in the communities to assist diabetic patients with disposal of sharps waste can play a major role in the proper disposal of these hazardous materials. Many patients may be willing to practice safe and proper waste disposal, but due to financial implications and lack of knowledge, they fail to comply with regulations stipulating proper disposal of waste. The formulation of support groups and programmes on proper disposal are needed in the communities have been proven to be successful in other countries (Costello and Parikh 2013: 869).

In Ohio a Safe Disposal programme was established in 2010; this programme provides free disposal services for diabetic patients (Costello and Parikh 2013: 869). In this programme patients bring in their used sharps to be safely disposed of properly when they return for their follow-up medical appointments. Since then it has sustained an improvement in proper sharps disposal. The Health Department in Indiana used government grants to purchase sharps containers for distribution, free of charge to diabetic patients in Boune County (Lamm and Parikh 2007: 49). When the container reached its capacity, the patient returned it to the health department where it was appropriately disposed of. A significant drop in needle stick injuries suffered by municipal waste handlers was noted since the introduction of the programme (Lamm and Parikh 2007: 49). It was proven that the establishment of the programme assists in minimisation of needle stick injuries, thus providing a safer working environment for waste handlers. This practice also assisted in allaying concerns around poor sharps disposal, a practice that should be adopted globally.

Raising the awareness to diabetic patients and the community at large is crucial. Health care workers are expected to impart health education proper disposal of sharps waste to patients. Patients have to understand the negative impact improper disposal of sharps waste can have on their lives, their families, the community and on the environment. In the United States of America, patients in two states, namely, California and Massachusetts, received health education on the proper disposal of sharps waste at home (Markkanen *et al*. 2015:7). Diabetic patients were taught to use rigid puncture-

resistant containers like laundry detergent bottles, to dispose of their sharps waste at home.

In France, Belgium, Luxemburg, Switzerland and Tunisia research found that most physicians were aware of the problems of improper disposal of sharps waste at home. Only 16.7 % of the physicians educated diabetic patients on proper disposal of sharps waste to the diabetic patients (Bouhanick, Hadjadi and Weekers 2000: 291), while only 18.3 % of diabetic patients enquired about proper disposal of sharps waste at home. Furth, Anderson and Krishendat (2010: 6) stated in their study that nurses and pharmacists in Guyana imparted health education regarding proper disposal of sharps waste at home to the diabetic patients. The results of the interviewed diabetic patients proved that informing patients of proper disposal methods of sharps waste was effective. The 95 % of diabetic patients who received health education on proper disposal of sharps waste were practicing it at home (Furth, Anderson and Krishendat 2010: 6). In Guyana, patients were provided with sharps waste disposal containers; 100 % of interviewed patients reported to have received information on how to utilise the sharps waste disposal container.

2.6.1. PROGRAMMES ON HOME GENERATED SHARPS

2.6.1.1. DROP-OFF CONTAINER COLLECTION

In this programme, patients took their containers filled with sharps to health centres, pharmacies, community organisations, police and fire stations and infectious waste facilities. The advantages of this programme are that used sharps are separated from municipal waste, disposed of in a suitable manner and patients can utilise empty household containers, which are convenient and cost effective. The disadvantages are that travelling might be an inconvenience for diabetic patients, they may fear of losing anonymity, and strict compliance to local regulations and standards may be a problem for collection sites. Markkanen *et al*. (2015: 10) informs that disposal of sharps waste in household waste was banned in California in 2008 and in Massachusetts in 2012. The Massachusetts Department of Health established 295 sites where patients could drop off their sharps waste (Markkanen *et al.* 2015: 10). These sites included hospitals, clinics, pharmacies and HIV centres. The Guyana Ministry of Health in South America

put in place the important measures for the provision of disposal sharps containers to the diabetic patients (Furth, Anderson and Krishendat 2010: 2). The diabetic patients return the containers to the health facilities when they are full. These measures helped the country to increase the effective disposal of sharps waste at home and to minimize the risk of exposure to needle stick injuries in the community, along with other negative impacts associated with the improper disposal of sharps waste (Furth, Anderson and Krishendat 2010: 2).

2.6.1.2. HOUSEHOLD HAZARDOUS WASTE COLLECTION SITES

This programme is usually embedded in municipalities where patients dispose of sharps in sharp collection bins. The advantages of this programme are that used sharps are separated from municipal waste, sharps are disposed of in an appropriate manner and patients can use empty household containers. The disadvantages are that it is inconvenient for diabetic patients to travel considerable distances for the containers, they fear a breach of confidentiality and anonymity, and strict compliance to local regulations and standards may be a problem for collection sites. In a study conducted in the United Kingdom, it was found that some of the local authorities provided collection services for the community (Blerkharn 2008: 39). Some community members had concerns about the waste security and safe management of sharps waste. Patients were instructed to place their sharps waste outside in the morning or the night before the collection day.

2.6.1.3. RESIDENTIAL SPECIAL WASTE PICK UP SERVICES

Diabetic patients placed special sharp containing containers to be picked up by trained sharp waste handlers. Services had either regular pick up schedules or expected the patient to call. Advantages of this programme were that it was more economically viable in the long run and there was more control over the programme. The disadvantages were that there was a need for staff training and start-up costs were high.

2.6.1.4. MAIL BACK PROGRAMMES

Used sharps were mailed to collection sites in a special container. The advantages were that it could be utilised for individual use and for community level use; privacy

was protected and it was also suitable for rural communities and remote areas. Disadvantages of this system were logistics, travel requirements and the cost of mailing that may be high for some patients.

2.6.1.5. SYRINGE EXCHANGE PROGRAMMES

This method is usually run by community organisations who exchange used syringes for new syringes. The advantage of this system was that it was found to be cost-effective. The fact that the program may have to face regulatory restrictions and local community opposition could be seen as a disadvantage

2.6.1.6. HOME NEEDLE DESTRUCTION DEVICES

After destroying the needle by clipping, melting or burning through a special device, patients threw the syringe into the municipal waste. The advantages were that it was convenient for the patients, and low costing. The disadvantage was that it may put waste handlers and waste recyclers at risk of needle stick injuries.

2.6.1.7. MOBILE HEALTH SYSTEM

Chronic illnesses have increased globally with diabetes being one of the fastest growing diseases. Patients who were on insulin injection for their medical care generate waste at home. The increase of chronic illnesses had shown the need for home-based care interventions (Ndayizigaminye, Hangula and Akintola 2017: 282). Home-based care programmes provided the ongoing assistance to patients with chronic illnesses such as diabetes and hypertension. South Africa is one of the countries which has home-based care programmes. Ethekwini Municipality has home-based care programmes where home-based care givers visit patients in their homes to provide nursing care activities. In the study conducted in Ethekwini Municipality, South Africa, health care risk waste generated in homes was mixed with municipal waste, and either illegally dumped on open land, openly burnt and buried in yards in the communities (Ndayizigaminye, Hangula and Akintola 2017: 282). Ndayizigaminye, Hangula and Akintola (2017: 283) conducted a study in Ethekwini Municipality on the proposed mobile technology that could be used to contribute towards safe health care waste management practices at home. The researchers suggested that the proposed

mobile health system would also address issues like lack of adequate training of proper disposal of health care waste, lack of a monitoring system by the municipality for health care waste management in the home setting and in the Department of Health and a lack of motivation to adhere to legislation governing disposal of health care waste (Ndayizigaminye, Hangula and Akintola 2017: 283).

The mobile health system will comprise of three data sets. The first data set will be for patient's records; the second data set will be for the home carer and the third data set will be for health care waste disposal practices by the home-based care giver (Ndayizigaminye, Hangula and Akintola 2017: 284). These records will assist in identifying the types and amount of health care waste generated and also assist in tracking the disposal of health care waste.

2.6.1.8. BRING BACK TO THE HEALTH FACILITY

In Japan, the government noticed that there was an increase in the number of patients who self-inject at home. Their waste ended up in domestic waste. In order to prevent this from happening, the government established a system where all patients would bring back their health care risk waste to the health facilities (Sonmez, Nazik and Andi 2018: 735).

2.7. HEALTHCARE RISK WASTE GENERATED BY PATIENTS WITH OTHER CHRONIC ILLINESSES AT HOME

Globally, there had been an increase in chronic illnesses such as HIV/AIDS, Tuberculosis and Hypertension. This global increase in chronic illnesses become a burden on the Health sector (Zikhathile and Atagana 2018a: 1). In most developing countries including South Africa, many people are unemployed and they rely public health care facilities. In order to try to minimise the burden faced by the healthcare facilities, the World Health Organization promoted the community home-based care programmes (Hangula and Akintola 2017: 2). In this study, Hangula and Akintola (2017: 2) stated that in the sub-Saharan Africa, the critical elements of providing primary health care services to the communities were community home-based care organisations. Community home-based care organisations are crucial in the delivering

of primary health care services to the communities because they are part of the communities and they understand the populations better.

According to Zikhathile and Atagana (2018a: 2), services provided by Community Care Givers were nursing care, physical care, patient supports, domestic chores and psychological care. Health care risk is generated when nursing care activities are performed. In South Africa, community home-based care is regulated by the Home and Community-Based Care Policy which was developed in 2001 (Hangula and Akintoa 2017: 2). This policy does not mention how to manage the healthcare risk waste generated at home by the Community Care Givers. In the study conducted by Zikhathile and Atagana (2018a: 2), it was stated that in South Africa healthcare risk waste generated by Community Care Givers was disposed of as general waste. Another study conducted by Ndayizigaminye, Hangula and Akintola (2017: 282) revealed that healthcare risk waste generated by Community Care Givers was burnt openly and buried in the yards or illegally dumped on open lands. This improper management of healthcare risk waste at homes poses a risk to the health of the patients, the Community Care Givers, the families of the patients and the community at large.

WHO stated in the global policy for healthcare risk waste management that the healthcare provider is responsible to equip patients with relevant health education on the management of healthcare waste at home when they are sent to recuperate in their homes (Ndayizigamiye, Hangula and Akintola 2017: 283). In developed countries, things were done differently when it came to the management of health care risk waste at homes (Zikhathile and Atagana 2018a: 2). In the United Kingdom, the principle of Duty of care for waste generator was very important, waste generator managed waste from point of generation to the point of disposal. Community Care Givers were responsible for the proper management of the healthcare risk waste generated when providing the nursing care. In Japan and the United Kingdom, it was found that healthcare risk waste generated by community care givers was collected by designated contractors or taken to the health facility by Community Care Givers using the approved waste containers (Zikhathile and Atagana 2018a: 3).

2.8. MANAGEMENT OF HEALTHCARE RISK WASTE GENERATED BY COMMUNITY CARE GIVERS

WHO defines healthcare waste as all waste that is generated in health care facilities, laboratories, pharmacies, research centres and all other areas that have activities where medical duties are performed. This also includes healthcare waste generated in minor and scattered sources including homes (Hangula and Akintola 2017: 2). Community Care Givers must be provided with the home-based care kits by the Department of Health. These home-based care kits include protective equipment and waste disposal containers. In the studies conducted in South Africa and in Botswana, it was proven that community care givers are not provided with the home-based care kits (Ndayizigamiye and Hangula 2017: 282). This led to the improper disposal of healthcare risk waste by Community Care Givers when they were performing nursing care activities. According to Kang'ethe (2008: 190) in Botswana, Community Care Givers were provided with few or no home-based care kits. In this study, it was found that some of the Community Care Givers compromised by re-using the kits or buying the home-based care kits from pharmacies in order to perform their nursing care duties.

In the study conducted in South Africa by Zikhathile and Atagana (2018a: 13) it was found that, only 10% of the Community Care Givers managed the generated healthcare risk waste properly. These Community Care Givers took the generated healthcare risk waste to the nearest health facility. Hangula and Akintola (2017: 4) also found in their study conducted in Durban, that most of the community home-based carers did not manage their waste properly. According to Zikhathile and Atagana (2018b: 64), health care risk waste generated when Community Care Givers perform their duties, was disposed of according to their discretion not according to the legislation. In Botswana, 73% of the Community Care Givers managed the generated health care risk waste improperly. In all these studies, it was found that Community Care Givers did not practice proper management of health care risk waste. Some burnt their waste; some disposed of the waste in the pit latrines; some disposed it of in general waste and some illegally dumped the waste in the open land. In their study conducted in Turkey, Sonmez, Nazik and Andi (2018: 735) asserted that the majority of Community Care Givers do not manage the health care risk waste generated in the proper manner. The Community Care Givers indicated that they dispose of the health

care risk waste in the bins for general waste. Only 12.1% reported that they took the waste to the nearest health facility.

2.9. CHALLENGES FACED BY COMMUNITY CARE GIVERS

2.9.1. TRAINING

Community care givers provide critical healthcare services to patients who are chronically ill and to those who are recuperating in their homes. These Community Care Givers play a vital role in the communities therefore It is of vital importance that Community Care Givers receive proper training before the commencement of their duties. On-going training is very important. Community Care Givers must be also trained on the universal Standard Precautions recommended by World Health Organization for Infection Control and Prevention (World Health Organisation 2007: 4) because they practice nursing care activities in the community. One of the Standard Precautions is to ensure proper waste disposal. In Durban, a study conducted by Akintola and Hangula (2014: 386) revealed that in most community home-based organisations, some of the Community Care Givers were given a once-off training and others were not trained at all. Other Community Care Givers felt that the once-off training was not enough. In another study, conducted by Zikhathile and Atagana (2018a: 4) in Umlazi, Durban, it was found that only 55 Community Care Givers reported to be trained on healthcare risk waste management and others were never trained. In a similar study conducted in Botswana, 73% of Community Care Givers were trained on waste management.

2.9.2. WASTE SEGREGATION AND TRANSPORTATION

According to the World Health Organisation, health care waste must be segregated from point of generation up to its final stage of disposal. Health care risk waste has the potential to cause environmental health and safety risks that is why it is crucial to segregate the hazardous material from the point of generation and dispose it of in the appropriate manner. Sharps waste and infectious waste are types of healthcare risk waste. When Community Care Givers perform their nursing care duties, sharps and other types of infectious waste including glove; bandages and cotton wool are

generated. Universal colour coded containers are used for disposing of healthcare risk waste. Infectious waste must be disposed of in a red plastic bag and sharps waste must be disposed of in a yellow puncture-proof container.

In the studies conducted in Durban by Akintola and Hangula (2014: 386) and Zikhathile and Atagana (2018a: 14), it was observed that community care givers were sometimes not provided with the home-based care kits. These home-based care kits are supposed to include red plastic bags for disposal of infectious waste. Community Care Givers reported that these home-based care kits are never enough, which is the reason why they end up disposing of the waste generated in an improper manner. According to the study which was conducted in Durban on the Community Home-based Organisations, the Community Care Givers were provided with black plastic bags to disposed of the generated healthcare risk waste (Akintola and Hangula 2014: 387). This practice is not in line with the recommendations made by the WHO and the South African National Standards.

Ndayizigayime, Hangula and Akintola (2017: 282) found that other community home-based carers had to travel long distances with the generated waste to the nearest health facility. This had resulted in Community Care Givers illegally dumping waste in open lands or mixing it with general waste. Akintola and Hangula (2014: 390) also determined that attitudes of the communities and the stigma around carrying the red bag in the community is also a challenge, which leads to improper disposal of waste generated. A study conducted by Sonmez, Nazik and Andi (2018: 734) in Turkey found that 31% of Community Care Givers were trained on proper management of health care risk waste. A similar study conducted by Kang'ethe (2008:189) in Botswana disclosed that there was a stigma attached to carrying waste to the nearest health facility. This discouraged Community Care Givers from giving the help to the needy patients and also led them to practice improper management of the healthcare risk waste generated.

2.10. CONCLUSION

The disposal of sharps waste into the municipal waste by diabetic patients at home has been found to be globally problematic. The studies showed that diabetic patients lack knowledge and motivation regarding the proper disposal of sharps waste.

Therefore, health education of diabetic patients and the community at large around proper disposal of sharps waste practices, could help in enhancing the safe disposal of the waste generated at homes. Many countries do not have policies or guidelines on disposal of sharps waste by diabetic patients at home. Formulation and implementation of policies and guidelines is crucial, and it can assist in enforcing compliance on sharps waste disposal. Programmes started by the government and community organisations in other countries, have been shown to play a major role in raising awareness and improving proper disposal of sharps waste. These programmes can be adopted and standardised worldwide to minimise the burden of needle stick injuries and diseases acquired through improper disposal of sharps waste. Studies proved that in most cases, training on proper management of waste in the Community Care Givers is not given. Community Care Givers must be trained on waste management, this will equip them with knowledge and will also capacitate them to train the patients and their families on the proper management of waste.

CHAPTER 3

METHODOLOGY

3.1. INTRODUCTION

In this chapter the methodology of the study is discussed. The methodology was determined by the aim and objectives. The study setting, study design, research method tools, data collection, data analysis and statistical testing methods are discussed.

3.2. STUDY DESIGN

A quantitative, descriptive cross-sectional survey design was used to investigate knowledge, attitude and practices on sharps waste disposal by diabetic patients at UMzinyathi District Municipality. This type of study design was reliable and objective, and assisted the researcher to answer the question being asked. The results of this study design were used to generalise the whole study population.

3.3 STUDY SETTING

The study was conducted in five selected Primary Health Care (PHC) facilities in UMzinyathi District Municipality, KwaZulu-Natal (KZN), a province in South Africa. UMzinyathi District Municipality is one of the eleven district municipalities of KZN. The district is located in the north-central area of KZN with a population of 554 882 people, the majority of whom are Zulu speaking. UMzinyathi District Municipality covers an area of 807 square kilometres of which 93% is rural and 7% is urban. According to the figures shown in the report the district consists of an indigent society, 88% of the population is uninsured and they rely on the Public Health Services for health care (Umzinyathi District Municipality 2014: 25). This District Municipality is divided into four sub-districts, namely, Endumeni, Nquthu, Umsinga and Umvoti. Health services are provided by the Provincial Department of Health. The District has four (4) hospitals; one (1) Community Health Centre (CHC), 50 PHC facilities and twelve mobile units.

3.4. SCOPE OF THE STUDY

The study focuses on knowledge, attitude and practices of the disposal of sharps waste at home by the diabetic patients in Umzinyathi District Municipality. It further probes whether any form of training on proper disposal of sharps waste was given to the diabetic patients by health care workers. These patients attended the four public health care facilities and one private health care facility for consultations. The attitudes and practices of patients towards proper disposal of sharps waste at home were also investigated.

3.5. STUDY POPULATION

The targeted population refers to the entire group of individuals, from which the researcher will generalize the conclusions (Kobus 2016: 163). The study population was diabetic patients from the age of 12 years upwards who were on insulin and were consulting in five selected health care facilities in Umzinyathi District Municipality. These diabetic patients attended health care facilities for their chronic medication collection and monitoring of their diabetes.

3.6. SAMPLING AND SAMPLING TECHNIQUE

The aim of sampling is to select the representative sample from the population, so that the results can be generalized back to the population. A sample is the subset of the population consisting of a predetermined number of randomly selected sampling units from the targeted population (Kobus 2016: 164). The respondents attending the selected health facilities were coded and sampled as C1; C2; C3; C4 and C5. The selected health care facilities were sampled because of the high number of diabetic patients on insulin in the last three months. The head count of the coded health facilities was C1=59, C2=560, C3=532, C4=365 and C5=38. The researcher sampled 20% of this headcount in each health facility to represent the general population. The sample was as follows; C1=11, C2=112, C3=106, C4=73 and C5=7. A convenience consecutive sampling was used to sample the respondents present on the day of data collection in the facility. The sample size represented the total population. The total number of the sample size was 309 diabetic patients on insulin injections; this sample

was used to obtain the results that were generalised for the targeted population. The consecutive sampling was used because it included all respondents meeting the criteria of the selected inclusion on data collection days until the required sample was achieved. Respondents were sampled when they left the consultation room for diabetic patients in the health care facility on that day.

Table 3.1: Selected Facilities, Population and Sample size

FACILITY	POPULATION	SAMPLE
C1	59	11
C2	560	112
C3	532	106
C4	365	73
C5	38	7
Total	1554	309

3.7. INCLUSION CRITERIA

- Diabetic patients who were on insulin injections at home.
- Diabetic patients from 12years of age and above.
- Diabetic patients who were attending the selected health care facilities in UMzinyathi District Municipality

3.8. EXCLUSION CRITERIA

- All diabetic patients who were not on insulin injection.
- All diabetic patients below the age of 12 years.

3.9. DATA COLLECTION INSTRUMENT

The data collection instrument utilised had been previously used in the study conducted in Wentworth Hospital to explore sharps disposal practices among diabetic patients using insulin. Permission was obtained from the authors for the researchers

to modify and use the tool (Appendix 5). The data collection instrument consisted of four sections as follows; Section A had five questions, which focused on the demographic data such as age, gender, race, residential area and the level of education. Section B contained nine questions investigating how long had respondents been diagnosed with diabetes mellitus, and the times they injected themselves with insulin. Section C had eight questions focusing on attitude and practices on sharps waste disposal at home. Section D contained nine questions focusing on knowledge regarding disposal of sharps waste at home. Questions were both open and close-ended; this allowed respondents to express themselves freely without the constraints of only close ended questions. Filter questions ensured that respondents answered the relevant question. The format of the questions was in statements with tick boxes categories. Respondents ticked in the boxes and explained further in other questions. The questionnaire used was translated from English to IsiZulu by a qualified person who has a degree in Education. It was then translated back to English by another qualified person with a degree in Education to ensure that meaning was not lost in translation.

3.10. PILOT STUDY

The questionnaire was piloted with 30 diabetic respondents who were on insulin injection. The pilot study was conducted at Entembisweni Clinic. Piloting was done a month before the main study. Data collected from the pilot study was captured and analysed using latest version of SPSS. No amendments were made to the questionnaire, the respondents understood the questions. Data collected from the respondents who participated in pilot study, was not included in the results of the main study.

3.11. DATA COLLECTION

The researcher approached the respondents in the queue while they were waiting for consultation. Service delivery was not compromised, no respondents were asked to leave the queue to participate in the study. The researcher explained the purpose of the study to the respondents. Respondents were given a letter of information

(Appendix 3a and 3b) explaining the purpose of the study. After reading and understanding the information consent forms (Appendix 3a and 3b) the researcher waited for respondents to exit the consulting room to hand them consent forms. This was done so that the health care worker did not know which patient had agreed to participate in the study.

3.12. DATA COLLECTION METHOD

After signing the consent, a self-administered questionnaire was used to collect data (Appendix 4a and 4b). A quiet and private consultation room was procured for respondents to fill-in the questionnaire after they had been seen by the doctor or nurse.

The researcher collected the completed questionnaires from the respondents outside the designated consultation room as soon as they completed them. Respondents who could not write were assisted by the researcher who filled in the questionnaire with the verbal responses from the respondents.

3.13. VALIDITY

Validity is the degree to which a study accurately assesses the specific concept that the researcher wants to measure (Kobus 2016: 182). The researcher used consecutive sampling to select the respondents that were in the facility on the day of data collection. The questionnaire was piloted to test its validity and feasibility. The validity of the questionnaire was maintained by ensuring that all respondents were given the same questionnaire to answer. This assisted the researcher to identify that the questionnaire was comprehensive enough to collect all the information needed to address the purpose and goals of the study. The questionnaire was translated into IsiZulu to accommodate those who did not understand English. The researcher used content validity to assess the questionnaire.

Content validity assisted in assessing that the questionnaire covered the representative sample of the main objectives measured. This was measured by checking the items in the data collection tool against the research objectives, to determine whether they measured all components of the study. The respondents

answered the questions in order to determine whether the questionnaire was appropriate for the targeted population.

3.14. RELIABILITY

Reliability is the degree of consistency or repeatability of an instrument (Kobus 2016: 189). The consistency of the questionnaire assists in measuring what it is supposed to measure in the main study. The questionnaire was piloted and it was found that it appropriately measured the issues it was supposed to measure. The researcher was able to determine that the questionnaire accurately measures the variables of interest.

3.15. DATA CAPTURING AND ANALYSIS

The collected raw data was coded and captured into the Microsoft Excel spreadsheet. SPSS version 25. Descriptive statistics, frequency and cross tabulation were used sto analyse data. Inferential statistical method such as Analysis of Variance (ANOVA), Chi-square and Fisher's exact test for categorical data, were utilised to test scores. Tables and graphs were used to display analysed data.

3.16. ETHICAL CONSIDERATIONS

3.16.1. ETHICAL APPROVAL

The study was reviewed by the Research and Higher Degrees Committee (RHDC) of the Faculty of Health Sciences at Durban University of Technology (DUT). Ethical approval was sought and obtained from the Institutional Research Ethics Committee (IREC), and was allocated the clearance number IREC143/18 (Appendix 1a).

3.16.2. GATEKEEPERS PERMISSION

Ethical approval was sought and obtained from the KZN Provincial Department of Health Research Ethics Committee (Appendix 2c). Permission to conduct the study was sought and obtained from UMzinyathi District Health Manager (Appendix 1a) and

Mpilenhle Medical Centre Manager (Appendix 2e). The Hospital Managers were informed by the UMzinyathi District Health Managers about the study that was going to be conducted. The Hospital Managers in turn, informed the Operational Managers of the selected health care facilities.

3.16.3. INFORMATION LETTER AND INFORMED CONSENT

The respondents were given a letter of information which explained the purpose of the study and the consent form to sign prior to them responding to the questionnaire (Appendix 4a and 4b). The information letter and consent form (Appendix 3a and 3b) were written in both English and IsiZulu. The researcher verbally explained the purpose of the study and the consent form to the respondents.

3.16.4. CONFIDENTIALITY

Confidentiality was maintained throughout the study, the names of the respondents were only known by the researcher. Codes were allocated to the respondents to identify them. Consent forms were not linked to questionnaires. Participation was voluntary; respondents could withdraw from the study at any time. They were not compromised in any way.

3.16.5. SAFE KEEPING AND DISPOSAL OF RAW DATA

Material will be kept under lock and key for five years and will thereafter be shredded and disposed of by the researcher. Electronic copies will be kept in a file with a password only known by the researcher. Electronic data will be physically crushed and deleted then sent to the recycling company for final treatment and disposal of e-waste.

3.17. CONCLUSION

This chapter outlined how the research methodology was conducted. The setting and scope of the study were explained in detail. The method chosen for the research, selected technique, aim and objectives of the study were discussed in this chapter.

Study population, sample size and the procedure used in collecting data were also discussed. The chapter also focused on the inclusion, exclusion and limitations of the study. Lastly, the ethical considerations were discussed in detail.

CHAPTER 4

PRESENTATION OF RESULTS

4.1. INTRODUCTION

This chapter presents results from data obtained through a questionnaire administered to diabetic patients in five facilities within UMzinyathi District Municipality in KwaZulu-Natal, South Africa. Data collected from respondents was analysed using SPSS (version 25®) in relation to the objectives of the study.

The objectives of the study were to:

- Determine knowledge of diabetic patients regarding the proper disposal of sharps waste at home.
- Determine the attitude and practices of diabetic patients and their families towards proper disposal of sharps waste.
- Determine if diabetic patients were trained on disposal of sharps waste.

4.2. BIOGRAPHICAL DATA

In this section, results of the biographical data of respondents are presented.

4.2.1. FACILITY AND GENDER

The gender of respondents per facility are given in Table 4.1. C5 had the highest proportion of respondents. Overall, more females were represented n=184 (59.7%), with males represented by n=124 (40.3%) of the respondents. The facility which had the highest female respondents n=69 (22.4%) was C2 and the highest male respondents n=48 (15.6%) were from C3. The Fisher exact test failed to show any sustantial differences of patients' gender per facilities represented (P>0.05).

Table 4.1: Gender of the respondents per their facility

		GENDER		Total
		Male	Female	
Facility	C1	n=3 (1.0%)	n=8 (2.6%)	n=11 (3.6%)
	C2	n=43 (14.3%)	n=69 (22.4%)	n=112 (36.4%)
	C3	n=48 (15.6%)	n=57 (18.5%)	n=105 (34.1%)
	C4	n=26 (8.4%)	n=47 (15.3%)	n=73 (23.7%)
	C5	n=4 (1.3%)	n=3 (1.0%)	n=7 (2.3%)
Total		n=124 (40.3%)	n=184 (59.7%)	n=308 (100.0%)

Fisher's exact test=0.452

4.2.2. AGE

The age of respondents per facility is shown in Table 4.2. It was found that C4 had the youngest patient, 13 years old while C3 had the oldest patient, 83 years old. Overall, the minimum age of respondents was 13 and the maximum age was 83 years, while the average mean age was 53.03±16.5.

Table 4.2: Respondents age information by facility

Facility	N	Minimum	Maximum	Mean	Std. Deviation
C1	11	32	74	54.45	12.177
C2	112	16	81	52.29	16.063
C3	105	15	83	54.98	17.492
C4	73	13	80	51.45	15.635
C5	7	19	81	49.86	22.770
Total	308	13	83	53.03	16.481

4.2.3. RACE

The Fisher's exact test indicates that a substantial majority n=301 (97.7%) of respondents were Africans ($p<0.05$) (Table 4.3). Majority of respondents in all facilities were Black South Africans n=301 (97.7%).

Table 4.3: Respondents race per facility

		Race			Total
		African	Indian	Coloured	
Facility	C1	n=7 (2.3%)	n=2 (0.6%)	n=2 (0.6%)	n=11 (3.6%)
	C2	n=112 (36.4%)	n=0 (0.0%)	n=0 (0.0%)	n=112 (36.4%)
	C3	n=105 (34.1%)	n=0 (0.0%)	n=0 (0.0%)	n=105 (34.1%)
	C4	n=70 (22.7%)	n=3 (1.0%)	n=0 (0.0%)	n=73 (23.7%)
	C5	n=7 (2.3%)	n=0 (0.0%)	n=0 (0.0%)	n=7 (2.3%)
Total		n=301 (97.7%)	n=5 (1.6%)	n=2 (0.6%)	n=308 100.0%)

Fisher's exact test=0.000

4.2.4. EDUCATIONAL LEVEL

The educational level of the respondents from each of the respective facilities are described in Table 4.4. Overall, respondents with a secondary level of education was n=120 (39.0%), which constituted a substantial majority ($p<0.05$), and the least number of respondents had tertiary level education n=51 (16.6%).

Table 4.4: Level of education of respondents per facilities

		Level of education				Total
		No formal schooling	Primary school	Secondary school	Tertiary education	
Facility	C1	n=1 (0.3%)	n=1 (0.3%)	n=8 (2.6%)	n=1 (0.3%)	n=11 (3.6%)
	C2	n=21(6.8%)	n=31(10.1%)	n=45 (14.6)	n=15 (4.9%)	n=112 (36.4%)
	C3	n=22 (7.1%)	n=28 (9.1%)	n=40 (13.0%)	n=15 (4.9%)	n=105 (34.1%)
	C4	n=23 (7.5%)	n=10 (3.2%)	n=24 (7.8%)	n=16 (5.2%)	n=73 (23.7%)
	C5	n=0 (0.0%)	n=0 (0.0%)	n=3 (1.0%)	n=4 (1.3%)	n=7 (2.3%)
Total		n=67 (21.8%)	n=70 (22.7%)	n=120 (39.0%)	n=51 (16.6%)	n=308 (100.0%)

Chi-square test=0.009

4.3. DIABETES MELLITUS DIAGNOSIS AND USAGE OF INSULIN

This section details the diagnosis of diabetes mellitus and the usage of insulin.

4.3.1. AGE AT DIAGNOSIS OF DIABETES MELLITUS

The ages at which respondents were first diagnosed with diabetes mellitus are shown in Table 4.5. For the respondents visiting C1, the minimum reported age at diagnosis was 27 years old and the maximum was 65 years, with a mean age of 42.55±11.5 years old. For C2, the minimum reported age at diagnosis was 1 year old and the maximum of 71 years with the mean age of 37.68±12.0 years old. In the venue of C3, the minimum reported age at diagnosis was 10 and the maximum age of 67 years with a mean age of 39.07±13.8. For C4, the minimum reported age at diagnosis was 1 year and the maximum age of 61 years with a mean age of 36.43±13.1. At C5, the minimum reported age was 14 and the maximum was 59 years with a mean age of 36±15.4.

Drawing from the above data, it can be gathered that C4 had the youngest first time diabetes mellitus diagnosis, whilst C2 accommodated the oldest. It is worth stating that few of the respondents n=20 (6.5%) did not disclose the age at which they were first diagnosed.

Table 4.5: Respondents minimum and maximum age at diabetes mellitus diagnosis

Facility	N	Minimum	Maximum	Mean	Std. Deviation
C1	11	27	65	42.55	11.510
C2	106	8months	71	37.68	11.984
C3	96	10	67	39.07	13.761
C4	68	6months	61	36.43	13.074
C5	7	14	59	36.00	15.362
Total	288	1	71	37.99	12.906

4.3.2. DURATION OF LIVING WITH DIABETES MELLITUS

Table 4.6 describes the duration that respondents have been diagnosed and lived with diabetes mellitus. It was found that respondents visiting C4 had the shortest duration (6 months) of living with diabetes mellitus whilst respondents visiting the C3 had the longest duration (85 years). It is worth stating that a few of the respondents n=20 (6.5%) did not disclose the duration of living with diabetes mellitus

Table 4.6: Duration of living with diabetes mellitus per facilities

Facility	N	Minimum	Maximum	Mean	Std. Deviation
C1	11	24 months	43	15.73	12.893
C2	106	8 months	43	12.94	10.898
C3	96	12 months	85	15.40	14.241
C4	68	6 months	38	12.54	9.413
C5	7	48 months	33	14.00	12.028
Total	288	6months	85	13.80	11.905

4.3.3. INSULIN INJECTION METHOD

As shown in 4.7, a substantial number n= 157 (51.0%) of the respondents across the five facilities used syringes and needles to inject themselves ($p<0.05$). At facilities, it was found that more n=9 (2.9%) of respondents that visits C1, and C2 n=87 (28.2%) made use of syringe and needle type of insulin. In contrast, majority of respondents from C3 n=70 (22.7%), C4 n=47 (15.3%), and C5 n=7 (2.3%) preferred the pen set type.

Table 4.7: Type of insulin set used by respondents per their facilities

		Type of insulin set used		Total
		Syringe and needle	Pen set	
Facility	C1	n=9 (2.9%)	n=2 (0.6%)	n=11 (3.6%)
	C2	n=87 (28.2%)	n=25 (8.1%)	n=112 (36.4%)
	C3	n=35 (11.4%)	n=70 (22.7%)	n=105 (34.1%)
	C4	n=26 (8.4%)	n=47 (15.3%)	n=73 (23.7%)
	C5	n=0 (0.0%)	n=7 (2.3%)	n=7 (2.3%)
Total		n=157 (51.0%)	n=151 (49.0%)	n=308 (100.0%)

Fisher's exact test=0.000

4.3.4. DURATION OF INSULIN USE

Table 4.8 indicates the duration of insulin use by respondents per facility that they visited. Overall, the minimum reported duration of insulin usage was 6 months while the maximum duration was 38 years. The respondent with the minimum duration of insulin usage of 6 months was from C4 and the respondent with the maximum duration of insulin usage of 38 years was from C2. The n=12 (3.8%) respondents did not disclose the duration of insulin use.

Table 4.8: Duration of insulin use by respondents per their facilities

Facility	N	Minimum	Maximum	Mean	Std. Deviation
C1	11	12months	15	7.82	4.557
C2	109	8 months	38	7.90	7.505
C3	101	12 months	21	5.63	3.924
C4	68	6months	32	7.25	6.603
C5	7	12 months	23	8.86	6.730
Total	296	6months	38	7.00	6.217

4.3.5. RELATIONSHIP BETWEEN THE DURATION RESPONDENTS LIVED WITH DIABETES MELLITUS AND INSULIN USAGE

From the above section, it can be assumed that the overall duration the respondents had lived with diabetes mellitus were comparable with their usage of insulin. As indicated by the paired sample test in Table 4.9, the mean value measured for the duration that the respondents had lived with diabetes mellitus was sustantially higher than that found for insulin use to control blood sugar ($p<0.05$). This notwithstanding, the duration of the respondents who have lived with diabetes mellitus correlates strongly with their use of insulin ($r=0.570$; $p<0.05$). It is worth stating that a few of the respondents n=20 (6.5%) refused to disclose the duration of living with diabetes mellitus and the duration of insulin usage, while others did not remember the durations.

Table 4.9: Paired sample test of diabetes mellitus lived and Insulin usage

		Mean	N	Std. Deviation	Std. Error Mean	Correlation	P value	T-test
Pair 1	Diabetes mellitus Diagnosis	13.80	288	11.905	0.701	0.570	p<.0005	0.000
	Insulin usage	7.10	288	6.267	0.369			

4.3.6. DAILY INSULIN ADMINISTERED

The majority of respondents n=281 (91.2%) administered insulin twice daily and those who administered the medication themselves were n=284 (92.2%) (Table 4.10). For other respondents insulin was administered by family members (Table 4.11).

Table 4.10: Daily insulin administered by respondents themselves

Number of times	Frequency	Percent
1	6	1.9
2	281	91.2
3	18	5.8
4	3	1.0
Total	308	100.0

Table 4.11: Insulin administrator

Insulin administered by		Frequency	Percent
Person responsible	Self	284	92.2
	Daughter	10	3.2
	Granddaughter	4	1.3
	Mother	3	1.0
	Wife	3	1.0
	Sister	2	.6
	Son	1	.3
	Grandson	1	.3
	Total	308	100.0

4.4. INSULIN NEEDLES

This section reports on the type of insulin needles used, frequency of usage and disposal techniques.

4.4.1. DISPOSER OF INSULIN NEEDLES

Since insulin is often administered with needles or pen set, it was easy to ascertain who is involved in disposing this sharp waste after use. It was found that while the majority n=285 (91.3%) of respondents disposed of the needles and or pen set themselves, few, however, had other family members such as a son or daughter n=1 (0.3%) dispose of these for them (Table 4.12).

Table 4.12: Person responsible for disposing insulin needles/pen set

		Frequency	Percent
Person responsible	myself	285	92.5
	daughter	10	.2
	granddaughter	4	1.3
	mother	3	1.0
	wife	3	1.0
	sister	2	.6
	son	1	.3
	Total	308	100.0

4.4.2. NUMBER OF INSULIN NEEDLES ISSUED MONTHLY PER FACILITY

The ANOVA test, mean, and standard deviation of the insulin needles issued monthly to the respondents per the facilities visited are given in Table 4.13. The ANOVA test indicates that there was a substantial difference in the number of needles issued per facilities ($p<0.01$). It was evident that C3 respondents had the highest mean number 29.2±3.1 of needles issued each month while C1 had the lowest mean number (16.5±7.8). The majority of participants n=292(94.8%) indicated how many needles were issued, while a few n=16(5.1%) indicated that they did not remember the exact number of needles issued.

In terms of the maximum and minimum numbers of needles issued each month, C4 issued the lowest (5) while the same clinic and C5 issued the highest number (60), respectively.

Table 4.13: ANOVA test on the number needles issued monthly per facilities

Facilities	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	P value
					Lower Bound	Upper Bound			
C1	10	16.50	7.835	2.478	10.90	22.10	10	30	p<0.0005
C2	101	22.38	7.635	.760	20.87	23.88	10	30	
C3	103	29.17	3.139	.309	28.56	29.79	15	30	
C4	71	20.49	10.227	1.214	18.07	22.91	5	60	
C5	7	22.86	17.762	6.713	6.43	39.28	10	60	
Total	292	24.13	8.508	.498	23.15	25.11	5	60	

4.4.3. NUMBER OF INSULIN LANCETS ISSUED MONTHLY PER FACILITY

The ANOVA test, mean, and standard deviation of the insulin lancets issued monthly to the respondents per the facilities visited are given in Table 4.14. The ANOVA test indicates that there was a substantial difference in the number of lancets issued per facilities ($p<0.05$). It was found that C5 respondents had the highest mean number (17.43±15.7). Interestingly, no lancets were issued for respondents visiting C1, C2, and C3. The maximum numbers of lancets issued each month n=50 in C4 was the highest number of lancets issued.

Table 4.14: ANOVA test on the number lancet issued monthly per facilities

Facilities	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	P value
					Lower Bound	Upper Bound			
C1	11	.00	.000	.000	.00	.00	0	0	0.005
C2	112	.00	.000	.000	.00	.00	0	0	
C3	105	.00	.000	.000	.00	.00	0	0	
C4	73	10.01	14.047	1.644	6.74	13.29	0	50	
C5	7	17.43	15.693	5.932	2.91	31.94	0	30	
Total	308	2.77	8.612	.491	1.80	3.74	0	50	

p>0.01

4.4.4. ASSESSING THE REUSING OF NEEDLES

The number of times the respondents from the five facilities reuse their needles before changing it are given in Table 15. The substantial number of n=151 (49.0%) acknowledge reusing their needles twice before changing it. Without giving any specific figures, data also indicated that a few patients reused their needles many times. Some respondents were not sure of the number of times they reused their needles.

Table 4.15: Number of times needles are reused before changing

Respondents Reusing one needle before changing it		Frequency	Percent
Number of times	1	4	1.3
	2	151	49.0
	3	65	21.1
	3 to 4	4	1.3
	3 to 5	2	.6
	4	43	14.0
	4 to 5	6	1.9
	4 to 6	1	.3
	5	17	5.5
	5 to 6	1	.3
	6	7	2.3
	many times	2	.6
	not sure	5	1.6
	Total	308	100.0

4.4.5. ASSESSING REUSING OF LANCETS

The number of times lancets are reused before changing is given in Table 4.16. Amongst the respondents who use lancets, it was found that a small number of respondents n=17 (5.5%) reused the lancets just once before changing. The majority of the respondents n=274 (89.0%), indicated that they do not reuse lancets.

Table 4.16: Number of times lancets were reused

		N	Percent
Number of time lancets are re-use	0	274	89.0
	1	17	5.5
	2	7	2.3
	3	4	1.3
	4	1	.3
	5	4	1.3
	6	1	.3
	TOTAL	308	100.0

4.5. PRACTICE OF INSULIN NEEDLE/LANCET DISPOSAL

Given the fear of cross-infection in the handling of sharps waste, the disposal of used insulin needles or lancets may be a source of concern if not handled correctly. This section therefore explores the practices of insulin needles or lancets disposal by the respondents.

4.5.1. METHOD OF DISPOSING INSULIN NEEDLE/LANCET

This section deals with the method of disposing used needles/lancets by the respondents, based on the facilities visited.

Table 4.17: Method of disposing for all facilities

Method of disposing	C1	C2	C3	C4	C5	Frequency	Percent
Directly into the general waste bin	6	43	13	26	4	92	29.8
Puncture resistant container thrown into the dustbin	2	0	0	4	0	6	1.9
Puncture container then take to the clinic	0	0	0	2	0	2	0.6
Put in plastic then thrown in general waste	1	0	0	1	1	3	0.9
Sewage system/toilet	2	48	70	28	1	149	48.3
Burnt	0	16	18	11	0	45	14.6
Buried	0	3	2	0	0	5	1.6
Juice bottle/2 litre coke bottle	0	2	0	0	0	2	0.6
Thrown in the river	0	2	0	0	0	0	0.6
Burnt then throw in the toilet	0	0	0	2	1	3	0.9
Wrapped in with paper then thrown in general waste	0	0	0	1	0	1	0.3

From the above section, it can be assumed that the majority n=92 (29.8%) of the respondents from the five facilities disposed of their used insulin needles/lancets directly into general waste bin, while other respondents disposed of the sharps in a sewage system/toilet n=149 (48.4%) without any form of protective measures. This is highly concerning and reflects poor practices of sharps waste disposal. This pronouncement can be further supported by a few participants who claim to use special containers to handle the used needles/lancets. It was found that even after

placing in the items in a special container, which is either a puncture proof container or 2 litre bottle, the majority n=8 (2.5%) still throw the container in the general waste.

4.6. KNOWLEDGE OF SHARPS WASTE PROBLEM

Given the above poor sharps waste disposal practice amongst the diabetes mellitus patients, it becomes necessary to measure their knowledge on the improper disposal of sharps waste. The following question was asked to elicit a response from the respondents: “Do you believe that improper sharp waste disposal is a serious problem?” As shown in Table 4.18, the majority n=248 (81.0%) believed that improper sharp waste is a serious problem, while a few n=58 (19.0%) did not consider it a problem.

Table 4.18: Responses to improper sharp waste as a serious problem

		Frequency	Percent
Do you believe that improper sharp waste disposal is a serious problem?	Yes	248	81.0
	No	58	19.0
	Total	306	100.0
	Missing System	2	
Total		**308**	

Similarly, the majority n=279 (90.6%) of the respondents agreed that it is necessary to separate sharps waste from general waste (Table 4.19).

Table 4.19: Responses to improper sharp waste as a serious problem

		Number of Respondents	Percent
Is it necessary to separate sharps waste from general waste?	Yes	279	90.6
	No	29	9.4
	Total	308	100.0

4.6.1. KNOWLEDGE OF HEALTH RISKS ASSOCIATED WITH SHARPS WASTE

From the above, it is appropriate to assume that the majority of the respondents had some knowledge of the importance of proper handling of sharp waste. This section aimed to gauge the respondents' knowledge of the health risk associated with sharp waste. As described in Table 4.20, the majority n=237 (76.9%) of the respondents across the five facilities indicated that contracting diseases was the common risk associated with sharp waste.

Table 4.20: Respondents' perceptions on the risk associated with sharp waste

		Number of respondents	Percent
Risks associated with sharp waste		2	.6
	Children play with needles	13	4.2
	Someone could get hurt	3	0.9
	Diseases	240	77.9
	Getting injured	6	1.9
	Not aware of any	44	14.2
	Total	308	100.0

When further asked whether they have been accidentally pricked by their own insulin needles after it was thrown away, a majority n=250 (81.2%) indicated that they had not, while a few n=58 (18.7%) indicated that they had. Furthermore, given that majority of the respondents acknowledge that sharps waste is are linked to contracting diseases. The question that followed was to ascertain whether anyone in their home (other than the respondents) had been accidentally pricked by their insulin needles after it was thrown away. It was observed that a majority n=269(84.4%) indicated that

they had not ben pricked while a few n=48 (14.2%) indicated that someone other than themselves has been pricked by the sharp needle waste that was thrown away after use.

Amongst the few n=48 (14.2%) who acknowledged that someone in their home had been accidentally pricked by one of their used insulin needles after it had been thrown away, it was crucial to know whether the incident had prompted the respondents to change how they disposed of their sharp needles. More respondents n=27 (53.3%) indicated that they were not motivated to change their method of sharps disposal, while n=19 (46.7%) indicated that it had prompted them to make changes. Among the respondents n=19 (46.7%) that were motivated to change their behaviour as to how they dispose of sharp waste needles, n=6 (35.6%) stated that they would now throw the waste in the toilet, followed by those n=5 (26.3%) who indicated that they would put the needles in a plastic bag. Respondents reported that they changed the way they disposed their needles after it had pricked them or family members in order to avoid the incident reoccurring.

4.7. TRAINING AND EDUCATIONAL PROGRAMME ON SHARPS WASTE DISPOSAL

From the section above, it is obvious that although the majority of respondents are very aware of the health risks associated with sharp needle waste, there is, however, poor sharp waste disposal practice amongst the majority of the respondents. As a consequence of this, some of the participants n=48 (15.5%) have had others pricked by their waste needles after throwing them away. Given this scenario, it was crucial to know whether the respondents across the five facilities were educated regarding sharps waste disposal. Amongst those who responded n=308(100%), a majority n=193(62.6% indicated that they were not educated regarding sharps disposal, while n=115 (36.7%) indicated they were educated (Figure 4.1). Amongst those n=115 (36.7%) that claim to have been educated regarding sharp waste disposal, the majority n=81(70.4%) were reportedly educated by a nurse, while n=18 (15.7%) were educated by a doctor. The larger part of this education was delivered verbally n=94 (81.7%) When n=308(100%) of the respondents were asked if they feared asking their doctor

or nurse about proper disposal of sharp waste, the majority n=282(91.6%) indicated that they were not afraid, whilst a few n=26(8.4%) admitted that they were.

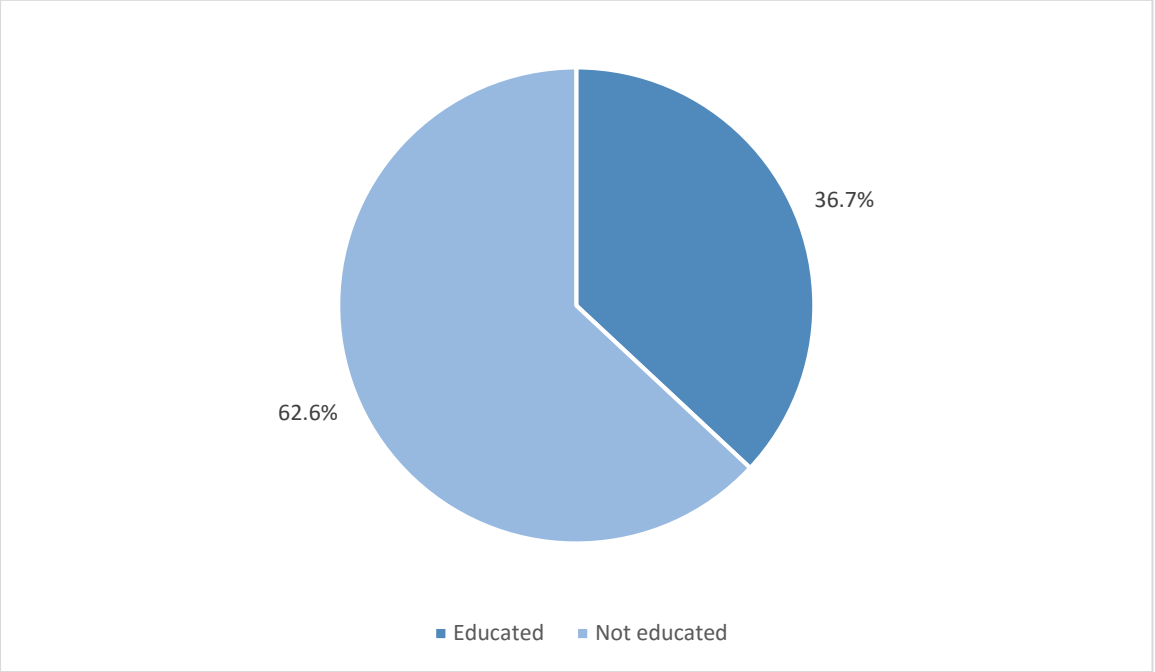

Figure 4.1: Respondents education regarding sharps waste disposal

From the previous investigation, it can be surmised that although some of the respondents have been educated regarding sharp waste disposal, the majority are still ignorant regarding the best way to dispose of their used sharp insulin needles. More concerning is that some participants n=26 (8.4%) are afraid to personally ask their doctor or nurses about the proper disposal of sharps waste. Given these concerns, it became important to know whether the respondents would consider being educated regarding sharp waste disposal. The following question was used to elicit responses: "*If there were a programme (such as return to the clinic or doctor) where you could drop off your needles so that you did not have to worry about them at your home, would you participate in the programme*? As shown in Table 4.21, an overwhelming majority n=296(96.1%) indicated that they would consider this option on condition that it was free.

Table 4.21: Respondents participation in a sharp waste disposal programme

		Number of respondents	Percent
Interest in waste disposal programme	Yes, only if it were free	296	96.1
	No	6	1.9
	Yes, even if I had to pay	6	1.9
	Total	308	100.0

4.8. CONCLUSION

The above chapter explicitly reported and presented the knowledge, attitude and practices of diabetic patients in Umzinyathi District Municipality regarding sharps waste disposal at home. It emerged that although respondents across the five facilities surveyed had little knowledge and understanding of sharp waste and its associated health risk, the practice of waste disposal was, however, a concern to them. It was found that the majority of respondents are in the habit of disposing used needles directly into the toilets/sewage system and household bins. Although the number of needles issued across the five facilities were significantly higher than that of lancets, it was found that majority of participants tended to reuse their needles, whilst the lancets were often not reused.

Furthermore, it was determined that the majority of the respondents have not been educated on the best way to dispose of sharp waste. Among those who received training, the nurses were fundamentally responsible for training, which was executed verbally. Conclusively, the majority indicated that they were willing to attend a programme on proper waste disposal, on condition that such programme was free.

CHAPTER 5

DISCUSSION OF RESULTS

5.1. INTRODUCTION

In this chapter the results obtained from the analysis of the data is discussed and compared with the reviewed literature.

This was the first study conducted to investigate the knowledge, attitude and practices of diabetic patients on sharps waste disposal at Umzinyathi District Municipality. In South Africa, there is only one study similar to this, which was conducted in Wentworth Hospital, which is in an urban area in Durban.

The findings documented in this report are based on the reported knowledge, attitude and practices on sharps waste disposal in home setting of the respondents. The data was collected using the self-administered questionnaire which was first piloted before the commencement of the main study. The 308 respondents who participated in the study were convenience consecutive sampled and therefore it is expected that they represented the total population of diabetic patients in Umzinyathi District Municipality. One questionnaire was ruined and was not included.

5.2. DESCRIPTIVE STATISTICS AS ELICITED FROM THE QUESTIONNAIRE

5.2.1. THE ASSOCIATION BETWEEN AGE, GENDER, RACE, EDUCATIONAL LEVEL AND WASTE DISPOSAL

The race groups recruited for this study are representative of the study population of diabetic patients at Umzinyathi District Municipality. The significant majority 301(97.7%) of the respondents were Africans ($p<0.05$) and the majority of the respondents were females 184 (59.7%). This is found to be similar to a study conducted in the United Arab Emirates where females were the majority (81, 54.0%) of the respondents (Sharif *et al*. 2018: 2). Women are more prone to getting diseases than men because of their DNA (Overdeep 2017: 1). Interestingly, the health survey proved that women are more inactive but put more effort into eating healthily, by eating more fruits and vegetables (Kautzky-Willer, Harreiter and Pacini 2016: 279). The other

study contradicts this by finding that women tend to consume more sugar in their diets that makes them prone to obesity (Kautzky-Willer, Harreiter and Pacini 2016: 279). The lack of association between race, gender or education levels and correct needle disposal practices was surprising, as those with higher level of education were expected to have more knowledge of proper disposal of sharps waste. In the findings, the respondents 120 (39.0%) with a secondary level of education constituted a significant majority ($p<0.05$). In this study, it was found that all respondents, those with a high level of education as well as those with a low level of education reported to practice improper disposal of sharps waste. In the similar study that was conducted in Wentworth Hospital in Durban, it was found that the majority (45) of respondents were Indians, 71% were females and the majority of respondents (84) had secondary education. The findings were similar to this study because the respondents were also practicing improper disposal of waste regardless of their level of education (Govender and Ross 2012: 163). Huang *et al* (2018: 157) reported that in the Unites States of America, age, gender and level of education were not associated with proper disposal of sharps waste. On the other hand, a study conducted in Gondar Town, Ethiopia, reported that there was a higher significant association between level of education and proper disposal of sharps waste for the respondents who went to college or university (Mekuria *et al*. 2016: 3).

5.3. DIABETES DIAGNOSIS AND USAGE OF INSULIN

In this study, it was found that the minimum duration on insulin was reported to be six months and the maximum duration was 38 years. This was found not to have any significant association with the proper disposal of sharps waste. Different results were found in the study conducted in North-East Peninsular Malaysia, where the duration of insulin had significant association with poor disposal of sharps waste (Hasan *et al*. 2019: 11). Results showed that diabetic patients who have been on insulin injections for a longer duration became frustrated and exhausted from being on the treatment for a long time they tended to neglect practicing proper sharps waste disposal. In their study, Atukorala *et al*. (2018: 5) found that those who have been on insulin for less than one year practiced proper sharps waste disposal more effectively than those who have been on insulin more than a year.

The majority 281 (91.2%) of the respondents injected their insulin twice a day, and used a syringe and a needle for their insulin injections. The majority of the respondents collect their insulin injections from public facilities. The respondents who collects from the private facility were issued pen-insulin injections. The assumption was that the government buys what is cheaper due to the high number of diabetic patients who must be serviced.

5.4. REUSING OF NEEDLES AND LANCETS

An overwhelming number of respondents n=151 (49.0%) admitted to re-using their needles twice before throwing it away. This finding concurred with the study done in United Arab Emirates, which found that more diabetic patients reported reusing of needles or lancets (Sharif *et al*. 2018: 2). Atukorala *et al*. (2018: 3) conducted a study in Sri Lanka on diabetic patients who reported to have reused their needles six or more times. Reuse of needles has a negative impacts on the health of the patients. This increases the risk of transmitting infections. Healthcare professionals are always trained not to recap and reuse the needles; this should also apply to diabetic patients.

5.5. PRACTICES OF INSULIN NEEDLE AND LANCET DISPOSAL

This study assessed the practices of sharps waste disposal by diabetic patients. Correct practices on proper disposal of sharps waste is very important because this will minimise the negative impacts on the health of the community and the environment. The majority of the participants in this study were found to be practicing improper disposal of sharps waste. There were those respondents who disposed their sharps waste directly into general waste bin, this was the majority; followed by those who disposed of their sharps waste directly into the toilet. A few respondents admitted to burning sharps waste. Only one respondent reported taking his used needles back to the healthcare facility. This study found that in the venue of C1, the majority of the respondents (6 = 54.5%) reported disposing of sharps waste directly in general waste bins. In C2 the majority of the respondents (48 = 42.9%) disposed of sharps waste in the toilet while a good portion (43 = 38.4%) disposed of the waste directly into the general waste bins. In C3, the majority of the respondents (70 = 66.7%) disposed of

their sharps waste in the toilet. In C4, the majority of the respondents n=28 (38.4%) disposed of sharps waste in the toilet and the others n=26 (35.6%) disposed of the sharps waste directly in general waste bins. From C5, the majority of respondents n=4 (57.1%) reported that they disposed of sharps waste directly into general waste bins. In all five facilities, a few respondents reported using special containers like a 2 litre coke container, and reported that even after using these special containers, they disposed of them in general waste, which is still not the proper disposal method of sharps waste. This finding was consistent with one made by Majudar *et al*. (2015: 420) in a multi-country study of diabetic patients, which showed that sharps waste disposal in general waste varied from 46.9% to 67.6%. In a study conducted in Gondar Town, Ethiopia (Mekuria *et al*. 2016: 3) and another recently conducted in Sri Lanka (Atukorala *et al*. 2018: 3), it was reported that the highest number of respondents disposed of their waste in general waste bins. These practices are similar to the practices of the respondents of this study.

Incorrect sharps waste disposal practices can lead to needle stick injuries to diabetic patients, their family members and community members. Needle stick injuries in the community increase the risk of blood borne disease transmission. Few of the respondents reported a needle stick either to themselves or to one of their family members after using the needle. Few respondents reported that these incidents changed their behaviour regarding how they disposed of their sharps waste. This finding was similar to what was found by Hasan *et al*. (2019: 7) where a few respondents admitted needle stick injuries either to themselves or to a family member after using the needle. These incorrect practices can also have a negative impact on the environment, causing land and water pollution. When sharps waste is disposed of incorrectly in the community, it could increase transmission of diseases to children, who take the used needles to play with. In the study conducted by Mangizvo and Wiseman (2012: 126), state that 48 children were treated with azidothymidine (AZT) in a hospital in South Africa, after being pricked with needles that were found in a field in the area of Elsie's River. The attitude of the diabetic patients towards disposal of sharps waste is crucial; this moulds their behaviour in their practice of proper waste management. In order to find out the attitude of the respondents on the sharps waste disposal, they were asked if they agreed that sharps waste must be separated from general waste. The majority (279 = 90.6%) of the respondents agreed.

5.6. KNOWLEDGE ON SHARPS WASTE DISPOSAL

The findings of the study indicate that there is low level of awareness of proper disposal of sharps waste. The majority n=193 (62.6%) of the respondents reported that they were not educated on proper disposal of sharps waste and fewer respondents n=115 (36.7%) reported to be educated on proper sharps waste disposal. This had a high influence on the behaviour and practices of the respondents on how they dispose of their waste. The majority of the respondents practiced improper disposal of sharps waste in their homes. Most of the respondents disposed of their sharps waste in general waste bins. This has a negative impact on the human beings and the environment around them. The finding was consistent with one found by Govender and Ross (2012: 164) in a study conducted in Wentworth Hospital, South Africa. They found that less than 4% of the diabetic patients were educated on proper disposal of sharps waste. Majumdar *et al* (2015: 420) as well as Singh and Chapman (2011: 139) found that respondents had no knowledge on proper disposal of sharps waste. To achieve a goal of proper sharps waste disposal in the home setting by diabetic patients, health education is the most crucial point.

In this study, respondents were asked questions which assisted in measuring their knowledge of proper disposal of sharps waste. The majority of the participants n=248 (81.0%) reported that they believe that improper disposal of sharps waste is a serious problem which can cause harm to the environment and to human beings. A few participants, n=58 (19.0%) however, did not see it as a problem. Across the five facilities, the majority of the respondents n=240 (77.9%) reported to have knowledge that the contraction of diseases was a common risk associated with improper sharps waste disposal. This was found to be their general knowledge as they were not educated about this by the healthcare workers.

The literature reviewed proved that health education regarding proper disposal of sharps waste had a significant impact on sharps waste disposal practices by diabetic patients (Majumdar *et al.* 2015: 423). However, in this study it was noted that the majority of the respondents were not educated on proper disposal of sharps waste. There are key stages of cradle to grave in waste management that are all very important and interrelated. These stages are segregation, collection, storage, transportation, treatment and disposal (KZN Provincial Department of Health KZN

2013: 15). Proper sharps waste disposal forms part of these stages, therefore respondents were asked questions on the method they use to dispose of their sharps waste.

5.7. KNOWLEDGE ON HEALTH RISKS ASSOCIATED WITH SHARPS WASTE

Sharps waste can have a negative impact on human health if it is not properly disposed of; this may include serious diseases like HIV/AIDS and Hepatitis (Nkwana 2017: 34). In this study it was found that respondents are aware that improper disposal of sharps waste can be associated with transmission of diseases. The majority n=240 (77.9%) of the respondents across the five facilities acknowledged that getting diseases is the common risk associated with sharp waste. This knowledge did not influence the attitude and practices of sharps waste disposal by the respondents at home. In the study done in the Sri Lanka, the majority of the respondents reported to be aware of blood borne infections, which they associated with sharps waste (Atukorala *et al*. 2018: 5). A study done in North-East Peninsular Malaysia (Hasan *et al*. 2019: 2) had different finding; respondents reported that they were not aware of any blood borne infections associated with being pricked by a used needle. Nurses and doctors are the first people who have a good platform to inform the diabetic patients about the importance of proper sharps waste disposal. Education of the patients on health risks associated with sharps waste and other negative impacts of improper sharps waste disposal is imperative.

5.8. TRAINING AND EDUCATIONAL PROGRAMME ON SHARPS WASTE DISPOSAL

Having programmes in the communities to assist diabetic patients with the disposal of sharps waste can play a major role in the proper disposal of sharps waste. The lack of education on proper sharps waste disposal for diabetic patients is the contributing factor to the practicing of improper sharps waste disposal. The majority of the respondents of this study reported not being educated in sharps waste by their healthcare providers, only a few disclosed being educated. A similar result was found in a study conducted in Sri Lanka, where the majority of the respondents expressed

never being educated on proper sharps waste disposal (Atukorala *et al*. 2018: 4). Amongst the respondents of this study who claim to be educated the majority reported to have been educated by nurses, followed by those who reported to have been educated by doctors. Those who were educated by TV shows, Community Care Givers, Waste Officers and friends were very few. The majority of the respondents reported that the education was delivered verbally. Another similar Ethiopian study found that a majority of the respondents were educated by doctors, followed by those who were educated by nurses (Mekuria *et al*. 2016: 4). It was observed during the study that most of the diabetic patients preferred education to be demonstrated to them practically. Currently, there are no educational programmes taking place at Umzinyathi District Municipality. This study discovered that there were respondents willing to practice safe and proper waste disposal, but due to financial implications and lack of knowledge, they failed to implement the desired practice of proper waste disposal. Respondents were asked whether they would participate in a programme where they could drop off their sharps waste. An overwhelming majority n=296 (96.1%) said they would participate if the service were free. This showed that diabetic patients do want to practice proper disposal of sharps waste, they only need guidance and support with appropriate resources offered by the government through their health facilities. Formulation of support groups and programmes on proper disposal are needed in the communities. These have been proven to be successful in other countries (Costello and Parikh 2013: 869).

5.9. LIMITATIONS OF THE STUDY

The study had the following limitations:

- The study was limited to the chosen setting without including the larger part of the province and other provinces.
- There is a paucity of information in this topic, particularly in South Africa, and therefore, relevant literature is very scanty.
- The KZN Department of Health stopped the use of registers for chronic patients. This made it difficult to identify diabetic patients.

5.10. SUGGESTIONS FOR FUTURE RESEARCH

There is a need to conduct similar studies in other areas of the province and in the country as a whole so that more diabetic patients from other population groups can be engaged. Further research will shed light on focus areas, thereby suggesting the best way of managing the disposal of sharps waste in the community. Further research can assist in closing the gap between the healthcare workers and diabetic patients, presenting new ways or tools to be used when nurses, doctors and community care givers when they are conducting health education to the patients.

5.11. CONCLUSION

5.11.1. CONCLUSIONS RELATED TO THE AIMS OF THE STUDY

This was a cross sectional descriptive survey study which looked at issues pertaining to the subject of sharps waste disposal by diabetic patients in their homes.

5.11.2. KNOWLEDGE AND ATTITUDE OF DIABETIC PATIENTS ON PROPER DISPOSAL OF SHARPS WASTE AT HOME

According to the findings of this study, it is concluded that there is little emphasis on educating patients on proper disposal of sharps waste at home. The majority of the respondents reported that they were not educated on sharps waste disposal in their health care facilities. They know that sharps waste is a problem, and must be treated in certain way, which is different from general waste but they were never given information on the appropriate methods of proper sharps waste disposal. They are aware that sharps waste is associated with transmission of diseases, however they do not have enough information as to how to dispose of sharps waste in order to prevent transmission of diseases.

The majority of the respondents have little information that improper disposal of sharps waste can cause harm to the children playing with used needles. It was observed that a few respondents do have a little knowledge that sharps waste must be separated from general waste, but even that knowledge did not change they still disposed their sharps waste in the incorrect manner. The majority of the respondents reported that

either they or family members were once accidentally pricked by the used needle. These incidents, however, did not prompt them to change the way they disposed of their sharps waste.

5.11.3. CURRENT PRACTICES OF DIABETIC PATIENTS ON SHARPS WASTE DISPOSAL

It is a conclusion of this study that diabetic patients do not practice proper disposal of sharps waste in their homes. Based on the findings, the majority of the respondents disposed of their sharps waste directly into general waste bins or flushed them down the toilet. Of all the respondents, only one reported to have taken the sharps waste to the clinic on the next scheduled clinic visit. The findings prove that there is a serious concern on the current practices of sharps waste disposal by diabetic patients at home.

CHAPTER 6

RECOMMENDATIONS

6.1. INTRODUCTION

In this chapter, the results are assessed in relation to the aims of the study in order to make appropriate conclusions. Appropriate recommendations are made within the context of the study findings. These recommendations are mainly focused on the improvement on the improvement of proper disposal of sharps waste in home settings.

6.2. TRAINING AND EDUCATIONAL PROGRAMMES ON SHARPS WASTE DISPOSAL

- Healthcare workers need to place more emphasis on the awareness of proper sharps waste disposal in order to equip the patients with relevant information regarding sharps waste disposal, as well as all other types of waste. They are in the front line when it comes to educating diabetic patients. Healthcare workers must include disposal of sharps waste when they conduct their health education to the patients while they are awaiting consultation in the waiting area. In the literature review, it was found that the introduction of waste management programmes in the communities contributed positively to proper waste management. Programmes such as Bring-Back-Waste-To-The-Facility, where diabetic patients bring back their used needles to the healthcare facility when they return for their follow-up visits has made improvement in other countries. The government should introduce the drop-off or Bring-Back-Waste-To-The-Facility programmes, which will assist the diabetic patients and the community at large to practice proper disposal of sharps waste. This will also minimize the needle stick injuries and the transmission of blood borne diseases in the community.
- The government and community organisations must introduce educational programmes where they will raise awareness of proper disposal of sharps waste. The government should implement the educational programmes in the community. These programmes should employ informational videos, pamphlets to impart information and also to demonstrate practically the disposal of sharps

waste. Included in these programmes must also be an emphasis on the importance of practicing proper disposal of sharps waste. Government should standardise the educational programmes on sharps waste disposal in order for everyone to have the same knowledge. Healthcare workers must integrate sharps waste disposal with diabetic education when they are educating patients on diabetic management.

- The use of Community Care Givers as part of PHC Re-engineering outreach programme could also play a vital role in raising awareness of the community regarding proper sharps waste disposal. Proper and sufficient training must be given to the Community Care Givers to equip them with enough information to pass on to the patients and community members when they conduct their outreach programmes. Community Care Givers are trained in the duties that they are required to perform in the community; sharps waste disposal should be part of their curriculum.

6.3. POLICIES AND GUIDELINES ON HEALTHCARE RISK WASTE MANAGEMENT IN THE COMMUNITY

Good governance, compliance and improved healthcare risk waste management practices across the country must be standardised through policies. Government should formulate and implement policies and guidelines, which will assist in enforcing compliance on sharps waste disposal in home settings. After formulation and implementation of national guidelines and policies, public participation must be conducted. After the completion of all these stages of making the community aware of proper disposal of sharps waste, a penalty system could be introduced where improper disposal will be penalized.

6.4. CONCLUSION

This study was the first of its kind to be conducted in a rural area, focusing on diabetic patients who inject insulin at home. There is generally a lack of awareness on proper disposal of sharps waste by diabetic patients in the home setting. This is a serious matter, which requires attention from the healthcare professionals because they are

the ones who are entrusted with the responsibility of providing the diabetic patients with information on proper disposal of sharps waste. The onus also lies with policy makers who have the responsibility of formulating and enforcing compliance regarding the policies and guidelines regulating healthcare risk waste in the community.

LIST OF REFERENCE

Aldous, C., Rheeder, P. and Esterhuizen, T. 2013. *Writing your first clinical research protocol*. Cape Town: Juta & Company Ltd.

Akintola, O. and Hangula, L. 2014. Infection Control in Home-Based Care for People Living With HIV/AIDS/TB in South Africa: An Exploratory Study. *Global Public Health*, 9, 382-393. http://dx.doi.org/10.1080/17441692.2014.895405 (Accessed 10 April 2018).

Atukorala, K.R., Wickramasinghe, S.I., Sumanasekera, R.D.N. and Wickramasinghe, K.H. 2018. Practices related to sharps disposal among diabetic patients in Sri Lanka. *Asia Pacific Family Medicine*, 17 1-12 https://apfmj.biomedcentral.com/track/pdf/10.1186/s12930-018-0049-7 (Accessed 06 May 2019).

Blerkharn, J.I. 2008. Sharps disposal: a universal responsibility. *British Journal of Dermatology*, 159, 1207-1214. (Accessed 16 February 2018).

Bouhanick, B., Hadjadj, S. and Weekers, L. 2000. What Do Needles, Syringes, Lancets And Reagent Strips Of Diabetic Patients Become in The Absence of Common Attitude? *Diabetes and Metabolism*, 26(4), 288-293

Costello, J. and Parikh, A. 2013. The Sticking Point: Diabetic Sharps Disposal Practices in the Community. *Journal of General Internal Medicine*: 28(7), 868-869. http://web.a.ebscohost.com.dutlib.dut.ac.za/ehost/ (Accessed 15 February 2018).

du Toit K. and Bodenstein J. 2014. Disposal of Medical Waste: A Legal Perspective. *South African Medical Journal*, 104 (1), 14-15.

Furth, R., Anderson, A. and Krishendat, G. 2010. Safer insulin needle use and disposal. *Internal Journal of Infection Control*, 6, 1-10. (Accessed 15 February 2018).

Gold, K. 2011. Analysis: The Impact of Needles, Syringes, and Lancet Disposal on the Community. *Journal of Diabetes Science and Technology*, 5(4), 848-850.

Govender, D. and Ross, A. 2012. Sharps Disposal Practices Among Diabetic Patients Using Insulin. *South African Medical Journal*, 102(3), 163-164.

Hangula, L. 2016. Policy and Practice of Health Care Waste Management in Community-based Care in South Africa. Ph.D., University of KwaZulu Natal.

Hangula, L. and Akintola, O. 2017. Perspectives of Policy-makers and Stakeholders about Health Care Waste Management in Community-based Care in South Africa: A Qualitative Study. *Biomedical Central Health Services Research*, 17, 1-13 (Accessed 23 April 2019).

Hasan, U.M., Hairon, S.M., Yaacob, N.M., Daud, A., Hamid, A.A., Hassan, N., Ariffin, M.F. and Vun, L.Y. 2019. Factors Contributing to Sharps Waste at Health Care Facility Among Diabetes Patients in North-East Peninsular Malaysia. International Journal of Environmental Research and Public Health, 16(2251), 1-12. doi:10.3390/ijerph16132251 (Accessed 25 September 2019).

Health Advanced Institute. 2015. Learner guide 2015. Health Care Waste Management. 1-79 KwaZulu Natal Department of Health 15 July 2015.

Huang, L., Katsnelson, S., Yang, J., Argyrou, C. and Charitou, M.M. 2018. Factors Contributing To Appropriate Sharps Disposal In The Community Among Patients With Diabetes. *Diabetes Spectrum*, 31(2), 155-158. www.spectrum.diabetesjournals.org (Accessed 06 May 2019).

Ishtiaq, O., Qadri, A.M., Mehar, S., Gondal, G.M., Iqbal, T., Ali, S., Rahman, M. and Janjua, N.Z. 2012. Disposal of Syringes, Needles, and Lancets Used by Diabetic Patients in Pakistan. *Journal of Infection and Public Healt*h, 5, 182-188.

Jansen, K.E., Kocks, D.J. and Roberts, H. 2017. Healthcare Risk Waste and Waste Legislation in South Africa. *Occupational Health South Africa*, 23, 15-17. Available: https://journals-co-za.eui.proxy.openathens.net/content/journal/10520/EJC.c3c929f20?fromSearch=true (Accessed 29 April 2019).

Kang'ethe, S.M. 2008. Clinical Waste Management in the Context of The Kanye Community Home-based Care Programme, Botswana. *African Journal of AIDS Research*, 7, 187-194. DOI: 10.2989/AJAR.2008.7.2.4.521 (Accessed 23 April 2019).

Kautzky-Willer, A., Harreiter, J. and Pacini, G. 2016. Sex And Gender Differences In Risk, Pathophysiology And Complications Of Type 2 Diabetes Mellitus. *Endocrine Reviews* 37(3), 278-316. Doi:10210/er.2018-1137 (Accessed 08 October 2019).

Kobus, M. 2016. *First steps in research*. 2nd edition. Pretoria: van Schaik Publishers.

KwaZulu Natal. Provincial Department of Health. 2013. *KwaZulu Natal Department of Health Policy For Health Care Risk Waste*. Pietermaritzburg: Government Printer.

KwaZulu Natal. Provincial Department of Health. 2014. *KwaZulu Natal Department of Health 2013/14 Annual report*. Pietermaritzburg: KwaZulu Natal Department of Health. Available www.kznhealth.gov.za/2013-2014-AnnualReport (Accessed 4 May 2017).

KwaZulu Natal. UMzinyathi District Municipality. 2014. *UMzinyathi District Municipality annual report 2014*. Dundee: UMzinyathi District Municipality. Available: http://www.UMzinyathi.gov.za/index/270-201314-annualreportUMzinyathi-dm (Accessed 4 May 2017).

Lamm, D.D. and Adams, S. 2007. Removing Needles from Trash in Indiana: A Necessary Effort. *Journal of Environmental Health*, 70(2), 48-50.

Majumdar, A., Sahoo. J., Roy, G. and Kamalaanathan, S. 2015. Improper Sharp Disposal Practices Among Diabetes Patients in Home Care Setting: Need for Concern? *Indian Journal of Endocrinology and Metabolism*, 19(3), 420-425 http://www,ncbi.nln.nih.gov/pmc/articles/PMC4366785/ (Accessed 15 February 2018).

Mangizvo, V.R. and Wiseman, M. 2012. The Management, Practice and Environmental Health Implications of the Municipal Solid Waste Dump Site in Alice, South Africa. *Journal of Social Sciences Research,* 1(5), 125-131. https:/F:/The-Management-Practice-and-Environmenta.pdf (Accessed 25 September 2019).

Markkanen, P., Galligan, C., Laramie, A., Sama, S. and Quinn, M. 2015. Understanding sharps injuries in home healthcare: The Safe Home Care qualitative methods study to identify pathways for injury prevention. *BioMedical Central Public Health*, 15, 359.

Mekuria, A.B., Gebresillassie, B.M., Erku, D.A. and Taye, K. 2016. Knowledge and Self-reported Practice of Insulin Injection Device Disposal Among Diabetes Patients In Gondar Town, Ethiopia: A Cross-sectional Study. *Journal of Diabetes Research*, 16, 1-7. downloads.hindawi.com/journals/jdr/2016/1897517.pdf. (Accessed 07 October 2019).

Musselman, K.T., Sicat, B.L., Thomas, M.H. and Spencer, E. H. 2010. Patients' Knowledge of and Practices Relating to the Disposal of Used Insulin Needles. *Innovations in Pharmacy*, 1(2), 1-10

Ndayizigamiye, P., Hangula, L. and Akintola, O. 2017. A Design of a Mobile Health Intervention to Enhance Home-Carers' Disposal of Medical Waste in South Africa. *BioMedical Central Health Services Research* 282-287 http://www.researchgate.net/publication/321728280 (Accessed 06 May 2019).

Nkwana, M. 2017. The Security Risk Associated With Illegal Dumping of Medical Waste on Dump Sites in South Africa. *Servamus*: 34-35. https://journals-co-za.eu1.proxy.openathens.net/content/journal/10520/EJC-948188ef9?fromSearch=true (Accessed 29 April 2019).

Olowokure, B., Duggal, H.V. and Armitage, L.E. 2003. The Disposal of Used Sharps by Diabetic Ptients Living at Home. *International Journal of Environmental Health Research*, 13,117-123. http://web.a.ebscohost.com.dutlib.dut.ac.za/ehost.

Overdeep M. 2017. Here's Why Women Get More Diseases Than Men. *Southern Living*, 1-3. https://www.southernliving.com

Quiwa, L. and Jimeno, C. 2014. Knowledge, Attitude and Practices on the Disposal of Sharps in Patients of the UP-Philippene General Hospital Diabetes Clinic. *Journal of the Asian Federation of Endocrine Societies*, 29(2), 139-140.

Sharif, S.I., Al Sha'rawy M., Mhithawi, H., Alketbi, A., Sharif, R.S. and Rashrash M. 2018. Assessment of awareness of Diabetic Patients Regarding Safe Disposable of their Insulin Syringes. *Austin Journal of Public Health and Epidemiology*, 5(2)1-4. https://www.researchgate.net/profile/Mohamed_Rashrash/publication/3256737222_Citation_Sharif_SI (Accessed 06 May 2019).

Singh, A.P. and Chapman, R.S. 2011. Knowledge, Attitude and Practices (KAP) on Disposal of Sharps Waste, Used for Home Management of Type-2 Diabetes Mellitus, in New Delhi, India. *Journal Health Research*, 25(3), 139-140.

Sonmez, M. O., Nazik, F. and Andi, S. 2018. Home Medical Care Waste Collection by Caregivers in Turkey. *Medicine Science International Medical Journal*, 7(4), 732-735. www.medicinescience.org/wp-content/uploads/2018/10/733-735-53-1521457011-ms-2018-03-882.pdf (Accessed 23 April 2019).

South African Bureau of Standards. 2004. *Management of Healthcare Waste*. SANS 10248: 2004. Pretoria: South African Bureau of Standards.

South Africa. Department of Environmental Affairs. 2011. *National Waste Management Strategy 2011*. Pretoria: Government Printer.

South Africa. Department of Health. 2006. Evaluation of Injection Safety and Healthcare Waste Management in South Africa. Making Medical Injection Safer: 69.

South Africa. Department of Justice. 1996. *The Constitution of South Africa*. Pretoria: Government Printer.

South Africa. Department of Health. 2014. *Regulations Relating To Health Care Waste Management In Health Establishments.* Government Gazette 37654: 23 May. Pretoria: Government Printer.

South Africa. Department of Justice. 1996. *The Constitution of the Republic of South Africa, Act 108 of 1996*. Pretoria: Department of Justice: 26. Available: www.justice.gov.za/legislation/constitution/SACostitution-web-eng.pdf (Accessed 03 June 2019)

Subratty, A. and Nathire, M.E.H. 2005. A Survey on Home Generated Medical Waste in Mauritius. *International Journal of Environmental Health Research*, 15(1), 45-52.

Udofia, E.A., Gulis, G. and Fobil, J. 2017. Solid Medical Waste: A Cross Sectional Study of Household Disposal Practices and Reported Harm in Southern Ghana. *BioMedical Central Public Health*. 17, 1-12. DOI 10.1186/s12889-017-4366-9 (Accessed 16 February 2018).

World Health Organization. 2018. Fact Sheet on Health Care Waste. Geneva: World Health Organization.

Zikhathile, T. and Atagana, H. 2018a. Challenges Facing Home-Based Caregivers in the Management of Health Care Risk Waste. *International Journal of Environmental Research and Public Health*, 15, 1-20. www.mdpi.com/journal/ijerph (Accessed 23 April 2019).

Zikhathile T.S. and Atagana H.I. 2018b. Health Care Risk Waste Generated in Domestic Setting through Home Health: A Review of the Health and Environmental Impact in South Africa.10th International Conference on Advances in Science, Engineering, Technology and Heathcar, November 19-20. *International Journal of Environmental Research*, November: 60-68 Available: https://doi.org/10.17758/EARES4.EAP1118222.pdf (Accessed 23 April 2019).

Appendix 1a: DUT Ethics Approval

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

27 May 2018

Ms L N Ziqubu
Private Bag X 5562
Greytown
3250

Dear Ms Ziqubu

Knowledge, attitude and practices of sharps waste disposal by diabetic patients at home settings in UMzinyathi District Municipality.

The Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the IREC acknowledges receipt of your gatekeeper permission letters.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely,

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY
2018 -05- 27
INSTITUTIONAL RESEARCH ETHICS COMMITTEE
P.O.BOX 1334 DURBAN 4000 SOUTH AFRICA

Appendix 1b: DUT Acknowledgement of pilot study

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

17 August 2018

IREC Reference Number: **REC 2/18**

Ms L N Ziqubu
Private Bag X 5562
Greytown
3250

Dear Ms Ziqubu

Knowledge, attitude and practices of sharps waste disposal by diabetic patients at home settings in UMzinyathi District Municipality.

I am pleased to inform you that **PROVISIONAL APPROVAL** has been granted to your proposal REC 2/18 subject to:

- Piloting of the data collection tool. *Please note that should there be any changes to the data collection tool, in a letter signed by the researcher and supervisor, list the changes to the document and submit to IREC with the final data collection tool. Even when there are no changes to the data collection tool, IREC has to be notified.*
- Obtaining and submitting the necessary gatekeeper permission/s to Institutional Research Ethics Committee (IREC).

PLEASE NOTE THAT THIS IS NOT A FINAL APPROVAL LETTER. KINDLY SUBMIT THE ABOVE MENTIONED DOCUMENTS WITHIN THREE MONTHS TO THE IREC OFFICE. DATA COLLECTION CAN ONLY COMMENCE WHEN IREC ISSUES FULL APPROVAL

The Proposal has been allocated the following Ethical Clearance number **IREC 143/18**. Please use this number in all communication with this office.

Approval has been granted for a period of two years, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Yours Sincerely

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY
2018 -08- 17
INSITUTUTIONAL RESEARCH ETHICS COMMITTEE
P O BOX 1334 DURBAN 4000 SOUTH AFRICA

Appendix 2a: Letter to Request Permission from Umzinyathi Health District

Ms Lihle Nomfundo Ziqubu

Durban University of Technology

Department of Community Health Studies

Durban

29 August 2018

To: The Umzinyathi Health District Manager

Department of Health

Dear Sir/Madam

Re: Request for permission to conduct a research study.

I am an Environmental Health Practitioner by profession, currently employed as an Environmental Health Practitioner for Umzinyathi District Municipality. I am currently pursuing a Master's Degree at the Durban University of Technology as a part time student. The proposed research is a requirement in acquiring this Degree.

My research topic is on **"Knowledge, attitude and practices of sharps waste disposal by diabetic patients in home settings at Umzinyathi District Municipality".**

The objectives of the study are:

Determine knowledge of diabetic patients on proper disposal of sharps waste at home.
Describe the attitude of diabetic patients and their families towards proper disposal of sharps waste.
Describe the current practices of diabetic patients on disposal of sharps waste.

The study will benefit the country at large and communities surrounding the research area in the following ways:

The researcher will identify and further describe the risk factors associated with improper sharps waste disposal in the community and obtain solutions that will assist healthcare workers to place more emphasis on raising awareness of diabetic patients on sharps waste sharps waste disposal at home; and encourage policy makers to formulate policies regulating sharps waste in the community.
Research findings will assist diabetic patients in understanding the impact of improper sharps waste disposal practices at home and implement proper waste disposal practices.
The researcher's recommendations aim to achieve a right in the Constitution of the Republic of South Africa, which states that everyone has a right to an environment that is safe and not harmful to his or her health and well-being.
The researcher will be willing to present research finding to hospitals, clinic management and to the diabetic patients.

The research findings will be published thereby benefitting other researchers.

In order to successfully achieve the objectives of this study, the following is required:

Access to collect data from diabetic patients who are on insulin injection in Dundee Gateway clinic, Ehlanzeni clinic, Hlathi Dam clinic and Thembeni clinic.
All information obtained will be treated as confidential. My Ethical Clearance number is IREC 143/18. I trust that my request will be received favourably.

Thanking you in advance

Sincerely

_____

Ms L.N. Ziqubu

_____ _____

Supervisor: Dr D.G. Sokhela Co-Supervisor: Mr S.D. Gabela

Appendix 2b: Approval letter from KZN Department of Health

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Physical Address: 330 Langalibalele Street, Pietermaritburg
Postal Address: Private Bag X9051
Tel: 033 395 2805/ 3189/ 3123 Fax: 033 394 3782
Email:
www.kznhealth.gov.za

DIRECTORATE:
Health Research & Knowledge Management

NHRD Ref: KZ_201810_036

Dear Ms LN Ziqubu
DUT

Approval of research

1. The research proposal titled '**Knowledge, attitude and practices of sharps disposal by diabetic patients at home settings in UMzinyathi District Municipality**' was reviewed by the KwaZulu-Natal Department of Health.

   The proposal is hereby **approved** for research to be undertaken at Dundee Gateway, Hlathi Dam, Thembeni and Ehlanzeni clinic.

2. You are requested to take note of the following:
   a. Kindly liaise with the facility manager BEFORE your research begins in order to ensure that conditions in the facility are conducive to the conduct of your research. These include, but are not limited to, an assurance that the numbers of patients attending the facility are sufficient to support your sample size requirements, and that the space and physical infrastructure of the facility can accommodate the research team and any additional equipment required for the research.
   b. Please ensure that you provide your letter of ethics re-certification to this unit, when the current approval expires.
   c. Provide an interim progress report and final report (electronic and hard copies) when your research is complete to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Mr X. Xaba on 033-395 2805.

Yours Sincerely

Dr E Lutge
Chairperson, Health Research Committee
Date: 6/11/18

Appendix 2c: Approval letter from Umzinyathi District Health

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

DIRECTORATE:
Umzinyathi District Office

34 Wilson Street, Dundee, 3000
Private Bag X2052, Dundee, 3000
Tel:0342991000 Fax:0342124800 Email: charlotte.vanross@kznhealth.gov.za
www.kznhealth.gov.za

Enquiries: Mrs. G.C. Shabangu
Date: 21st September 2018

To: Ms. L.N. Ziqubu

RE: PERMISSION TO CONDUCT RESEARCH AT UMZINYATHI DISTRICT.

This letter serves to confirm that your application to conduct the research study titled " Knowledge, attitudes and practices of sharps waste disposal by diabetic patients at home settings in Umzinyathi District Municipality".

Please also note the following:

1. This research project should only commence after final approval by the KwaZulu- Natal Health Research and Knowledge Unit, and full ethical approval has been granted,
2. That you adhere to all the policies, protocols and guidelines of the Department of Health with regards to this research.
3. All research activities must be conducted in a manner that does not interrupt clinical care at the health care facility,
4. Ensure that this office is informed before you commence your research,
5. The District Office / Facility will not provide any resources for this research
6. You will be expected to provide feedback on your findings to the District Office / Facility.

Yours sincerely

Mrs. G.C. Shabangu
District Director
Umzinyathi District Office DC 24

Appendix 2d: Letter to request permission from Mpilenhle Medical Centre

Ms Lihle Nomfundo Ziqubu

Durban University of Technology

Department of Community Health Studies

Durban

29 August 2018

To: The Mpilenhle Medical Centre Manager

Greytown

Dear Sir/Madam

Re: Request for permission to conduct a research study

I am an Environmental Health Practitioner by profession, currently employed as an Environmental Health Practitioner for Umzinyathi District Municipality. I am currently pursuing a Master's Degree at the Durban University of Technology as a part time student. The proposed research is a requirement in acquiring this Degree.

My research topic is on **"Knowledge, attitude and practices of sharps waste disposal by diabetic patients in home settings at Umzinyathi District Municipality".**

The objectives of the study are:

Determine knowledge of diabetic patients on proper disposal of sharps waste at home.
Describe the attitude of diabetic patients and their families on proper disposal of sharps waste.
Describe the current practices of diabetic patients on disposal of sharps waste.

The study will benefit the country at large and communities surrounding the research area in the following ways:

The researcher will identify and further describe the risk factors associated with improper sharps waste disposal in the community and obtain solutions that will assist healthcare workers to put more emphasis on raising awareness to diabetic patients on sharps waste sharps waste disposal at home; and policy makers to formulate policies regulating sharps waste in the community.
Research findings will assist diabetic patients in understanding the impact of improper sharps waste disposal practices at home and implement proper waste disposal practices.
The researcher's recommendations aim to achieve a right in the Constitution of the Republic of South Africa, which states that everyone has a right to an environment that is safe and not harmful to his or her health and well-being.
The researcher will be willing to present research finding to Hospitals and clinics management and to the diabetic patients.

The research findings will be published thereby benefitting other researchers.

In order to successfully achieve the objectives of this study, the following is required:

Access to collect data from diabetic patients who are on insulin injection in Mpilenhle Medical Centre, Greytown.
All information obtained will be treated as confidential. My Ethical Clearance number is IREC 143/18.

I trust that my request will be received favourably.

Thanking you in advance

Sincerely

_____

Ms L.N. Ziqubu

_____ _____

Supervisor: Dr D.G. Sokhela Co-Supervisor: Mr S.D. Gabela

Appendix 2e: Approval letter from Mpilenhle Medical Centre

To: Ms L N Ziqubu

<u>RE: PERMITION TO CONDUCT RESEARCH AT MPILENHLE MEDICAL CENTRE</u>

This letter service to confirm that your application to conduct your study has been approved.

You can use our patients who are on insulin to collect your data.

Yours sincerely

Dr N Ntombela

MPHILENHLE MEDICAL CENTRE
131 PINE STREET GREYTOWN, 3250
PH [illegible]
FAX [illegible]
DR NTOMBELA & PARTNERS : 0147958

Appendix 3a: Information letter and consent to adults for use of records

LETTER OF INFORMATION

Title of the Research Study: Knowledge, attitude and practices of sharps waste disposal by diabetic patients in home settings at UMzinyathi District Municipality

Principal Investigator/s/researcher: Ms L. N. Ziqubu, BTech: Environmental Health

Co-Investigator/s/supervisor/s: Dr. D.G. Sokhela; PhD Nursing and Mr. S.D. Gabela; MTech Public Health

Brief Introduction and Purpose of the Study: There are proper ways to follow when handling waste; waste needs to be separated from the point of generation to the final disposal. Waste must be disposed in the way that it does not harm the people and the environment. The purpose of the study is to determine the knowledge, attitude and practices of sharps waste disposal at home by diabetic patients. The study will also assist in evaluating the risk factors associated with improper disposal of sharps waste at home. At the end of the study, the results will assist in understanding the challenges faced by diabetic patients regarding sharps waste disposal at home. The results will also assist the government to establish and implement community programmes and awareness on sharps waste management in the community.

Outline of the Procedures: As you are agreeing to participate in the study, you will have to fill in a questionnaire that will be asking questions about knowledge, attitude and practices on disposal of sharps waste at home. The survey will take place at the clinic where you visit for consultations. Questionnaires will be handed out to you after the consultation with the nurse or doctor. Answering the questionnaire will take 10 minutes of your time. There will be a private and quiet room allocated for you to use when filling out the questionnaire. Only diabetic patients who inject insulin at home are requested to participate in the study. You will be requested to sign a consent form as proof that you agreed to participate in the study. Participation is voluntary, should you decide to withdraw from the study at any point, you can withdraw with no consequences. There is no treatment that you will be required to take

as a participant.

Risks or Discomforts to You as a participant: There are no risks or any discomforts involved in the study. You are only requested to fill in a questionnaire in a private and quiet room with no disturbances

Benefits: At the end, the study will be published. The researcher will present the results to the clinic management and request to conduct presentations to diabetic patients in order to raise awareness on management of sharps waste at home.

Reason/s Why You May Be Withdrawn From the Study: Diabetic patients who are injecting insulin at home will be included in the study. The study does not contain any treatment and it does not have any risks. You can withdraw from the study at any point; there will be no adverse consequences.

Remuneration: You will not receive any incentives. No payments will be made to you.

Costs of the Study: You are not expected to pay any costs towards the study.

Confidentiality: All information collected will be kept confidential. Your actual name will not be used in the study. A code will be allocated to you. All questionnaires will be accessible to the researcher and supervisors.

Research-related Injury: There will be no research-related injuries. The study does not have any risks involved.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher: Ms Lihle N. Ziqubu (078 2413160) or biyase.ziqubu@gmail.com, my supervisor: Dr D. G. Sokhela (031- 373 2292) or dudu@dut.ac.za and Mr. S.D. Gabela (031 373 2809) or Sibusisog1@dut.ac.za or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Acting Director: Research and Postgraduate Support, Prof C. E. Napier on 031 373 2577 or carinn@dut.ac

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Ms. L.N. Ziqubu about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, Ms. L.N. Ziqubu herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix 3b: Incwadi yolwazi locwaningo nesivumelwanosokusebenzisa amakhadi

INCWADI EQUKETHE

ULWAZI

Isihloko socwaningo: Ulwazi, isimomqondo Kanye nokwenziwa emakhaya yiziguli eziphathwa isifo sikashukela ngokulahlwa kwemfucuza yemijovo kuMkhandlu Omkhulu UMzinyathi.

Umcwaningi omkhulu/abacwaningi abakhulu: NKsz
L. N Ziqubu, BTech: Environmental Health

Umluleki/ abeluleki bocwaningo: Dr. D.G. Sokhela; PhD Nursing and Mr. S.D. Gabela; MTech Public Health

Isingeniso Kanye nenhloso yocwaningo ngamafuphi: Kukhona izindlela eziqondile zokulawula ukulahlwa kwemfucuza. Kumele imfucuza ihlukaniswe la ivela khona nalapho ilahlwa khona. Imfucuza kumele ilahlwe ngendlela engeke ibenobungozi kubantu nakwimvelo. Lolucwaningo luhlose ukuthola ulwazi, isimosomqondo kanye nokwenziwa emakhaya ngezinaliti esezisebenzile kulabo abaphethwe isifo sikashukela. Ucwaningo lungabuye lusize ukuhlola ubungozi noma umonakalo ongadalwa ubudedengu bokugcina izinaliti zemijovo esisebenzile emakhaya eziguli. Ucwaningo luzosiza uhulumeni ukusungula izinhlelo zokuqwashisa umphakathi ngobungozi balemfucuza.

Inqubo ezolandelwa: Wena obambe iqhaza kulolucwaningo, uzogcwalisa ikhasi lemibuzo ebuza mayelana nolwazi, isimosomqondo nokwenziwa ekhaya nxa kulahlwa imfucuza yezinaliti eziyingozi ebezijova abaphethwe isifo sikashukela. Inhlolovo izokwenziwa emtholampilo la ohambela khona ukuyothola ukwelashwa. Uzonikwa iphepha lemibuzo nxa usuphuma kuMhlengikazi noma kudokotela. Ukuphendula lemibuzo kungakuthatha imizuzu elishumi. Uzokuba negumbi elisesithe nelingenamsindo elilungiselwe lokhu. Iziguli ezijovela ushukela ekhaya kuphela ezizosetshenziswa kulolucwaningo. Uma uvuma ukubamba iqhaza kulolu cwaningo, kuzodingeka ukuba usayinde incwadi yesivumelwano, ezoba ubufakazi bokuthi uvumile ukuba yingxenye yalo. Ukubamba iqhaza okokuzinikela akuphoqi, uma ukhetha ukuhoxa ukhululekile, angeke kube nemiphumela emibi ngakuwe. Akunamuthi noma iphilisi ozonikwa kona kodwa ukuphendula imibuzo nje kuphela.

Ubungozi noma okungaphatha kabi wena obambe iqhaza: Akunabungozi kumbe ukuhlukumezeka okuhambelana nalolucwaningo. Wena ozinikelayo uzogcwalisa iphepha lemibuzo endaweni esesithe futhi ethule ngaphandle kokuphazamiseka.

Imihlomulo: Ekupheleni kocwaningo imiphumela iyoshicilelwa. Umcwaningi uyoveza imiphumela kubaphathi bomtholampilo ebese ecela ukwenza isifundiso kwabaphethwe isifo sikashukela ukuze

aqwashise ngezindlela okumele inakwe ngayo imfucuza yezinalidi nemijova osekusebenzile emizini yabo.

Okungadala ukuthi uhoxisa ukubamba iqhaza kulolucwaningo: Iziguli ezijovela ushukela ekhaya ezizofakwa kulolucwaningo. Ucwaningo alunikezani ngamuthi wokwelapha futhi alunabungozi. Wena obambe iqhaza ungahoxa noma inini ngaphandle kokubangelwa inkinga.

Iholo: Akunankokhelo ozonikezwa ngokubamba iqhaza.

Izindleko zocwaningo: Akunamali ozoyikhokha ngokubamba iqhaza kulolucwaningo.
Ubumfihlo: Lonke ulwazi oluzotholakala luzogcinwa luyimfihlo. Angeke kusetshenziswe amagama empela akho. Bonke abayingxenye yocwaningo bazonikezwa amakhodi. Umcwaningi Kanye nabaphathi abazokwazi izimpendulo zababambe iqhaza.

Ukulimala okuhambelana nalolucwaningo: Angeke kubekhona ubungozi. Lolucwaningo alunabucayi neze.

Abangathintwa uma kunenkinga noma imibuzo:

Xhumana nomcwaningi: NKSZ Lihle N. Ziqubu (078 2413160) or biyase.ziqubu@gmail.com, Umphathi: Dr D. G. Sokhela (031 373 2292) noma dudu@dut.ac.za kanye Mr. S.D. Gabela (031 373 2809) noma Sibusisog1@dut.ac.za noma Umphathi weSikhungo Socwaningo nokuphathwa kwabantu ku 031 373 2375. Izikhalazo zingabikwa kuMqondisi obambile: Research and Postgraduate Support, Prof C. E. Napier on 031 373 2577 or carinn@dut.ac

INCWADI YEMVUME

Isitatimende sesivumelwano sokuba ingxenye ocwaningweni:

- Ngiyaqinisekisa ukuthi ngazisiwe umcwaningi ongu Nkosazana L.N. Ziqubu ngobunjalo, inqubo, izinzuzo kanye nobungozi balolucwaningo.- Research Ethics Clearance Number: ……
- Nginikiwe, ngafunda ngaqonda okubhalwe ngenhla mayelana nalolucwaningo.
- Ngiyaqonda ukuthi imiphumela yocwaningo, okufakanemininingwane yami yobulili, ubudala, usuku lokuzalwa, iziqalo zamagama nokutholiwe kuyodluliselwa emikweni wocwaningo ngale kokuveza igama lami langempela.
- Ngokwezidingo zocwaningo, ngiyavuma ukuba umcwaningi afake ku-khompyutha lokho okuyimiphumela.
- Ngingahoxa kulolucwaningo noma inini ngaphandle kwemibandela.
- Ngibe nethuba elanele lokubuza , futhi ngavuma ngokuzithandela ukuthi ngilungele ukufakwa kulolucwaningo.
- Ngiyaqonda ukuthi noma yini entsha ebalulekile ezovela ngenxa yokuba ingxenye yocwaningo, ngizokwaziswa yona.

Amagama ami aphelele sesokudla	**Usuku**	**Isikhathi**	**Isishicilelo/Isithupha**

Mina, Nkosazana L.N. Ziqubu, ngiyaqinisekisa ukuthi lo ongennhla obambe iqhaza ocwaningweni wazisiwe ngobunjalo, inqubo Kanye nobucayi balolucwaningo

Igama lomcwaningi	**Usuku**	**Isishicilelo**
igama likafakazi (umakufanelekile)	**Usuku**	**Isishicilelo**
Igama lomqaphi ogunyaziwe (umakufanelekile)	**Usuku**	**Isishicilelo**

Appendix 3c: Information letter and assent form to the use of children records

INFORMED ASSENT FORM

I, Lihle Ziqubu from Durban University of Technology, am conducting a study to detertmine the knowledge, attitude and practices regarding sharps waste disposal by diabetic patients and evaluating the risk factors associated with improper disposal of sharps waste at home. I am asking you to participate in the research study because you are in the targeted age group of diabetic patients on insulin injections, living in UMzinyathi District Municipality and a patient at the clinic.

For this research,I will ask you questions on your knowledge, attitudes and practices on sharps waste disposal at home. All your answers will be kept private and confidential. Only people working on the study will see your answers (I the researcher, and my supervisors).There will be no problems or risks that will happen to you when you take part in the study.

The study will assist in understanding the challenges faced by diabetic patients on sharps waste disposal at home. The study will also assist the government to establish and implement community programmes and raise awareness on sharps waste disposal in the community.

You should know that:

- You do not have to be in study if you do not want to be. You will not get into trouble with the clinic; you may stop being part of the study at any time.
- Your parent(s)/guardian were asked if it is acceptable for you to be in the study. Even if they give permission, it is still your choice as to whether or not to take part.
- You can ask any questions you have, now or later. If you think of the question later, you or your parents can contact the researcher at 078 241 3160.

Sign this form only if you:

- Have understood what you will be doing for this study
- Have answered all questions
- Have talked to your parents/guardian about this study, and
- Agree to take part of this study

…… …….. ……..

Your signature Printed name Date

…… …… ……..

Parent/guardian signature Printed name Date

…… …… ……

Researcher signature Printed name Date

Appendix 3d: Incwadi yolwazi locwangingo nesivumelwano sokusebenzisa amakhadi ezingane

INCWADI YEMVUME YABANTWANA

Ngingu Lihle Ziqubu ovela Enyuvesi yaseThekwini, ngenza ucwaningo ukuthola ulwazi, isimomqondo kanye nokwenziwa iziguli ezijovela ushukela ekhaya ngokulahlwa kwemfucuza yemijova nezinaliti osekusebenzile, futhi ngiphinde ngihlole ubungozi obungadalwa ukulahlwa ngendlela engafanelekile kwalemfucuza emakhaya.Ngikucela ukuthi ube yingxenye kulolucwaningo ngoba usebudaleni baleziziguli engifisa ukukhuluma nazo, uyisakhamuzi kuMkhandlu waseMzinyathi futhi uthola usizo emthollampilo oyingxenye yocwaningo.

Kulolucwaningo, ngizokubuza imibuzo emayelana nolwazi, isimomqondo kanye nokwenziwa emakhaya ngemfucuza yezinaliti nemijovo esisebenzile. Zonke izimpendulo zakho zizogcinwa ziyimfihlo. Ziyobonwa kuphela umcwaningi kanye nabaphathi bakhe kulolucwaningo. Akunazinkinga kumbe ubungozi obuzokwehlela ngokuba yingxenye yalolucwaningo.

Ucwaningo luzosiza ukuqonda ngezinselelo ezibhekene nabaphethwe isifo sikashukela ngenxa yokulahlwa kwemfucuza yemijovo nezinaliti osekusebenzile ekhaya.Ucwaningo luzosiza uhulumeni ukusungula izinhlelo zokuqwashisa umphakathi ngokulahlwa kwemfucuza yezinalidi nemijovo.

Okumele ukwazi:

- Awuphoqelekile ukuba ingxenye yocwaningo uma ungathandi. Angeke ubesenkingeni nomtholampilo futhi ungayeka noma inini ukuba ingxenye yocwaningo.
- Abazali/abaqaphi bakho babuziwe ukuthi bayakuvumela na ukuthi ube ingxenye yocwaningo. Noma bangavuma bona, unelungelo wena lokuvuma noma wenqabe ukuba ingxenye yocwaningo.
- Ungabuza noma ngabe yimuphi umbuzo, manje nangesikhathi esizayo. Uma uyoba nemibuzo ngokuhamba kwesikhathi, wena noma abazali bakho bangaxhumana nomcwaningi ku 078 241 3160.

Sayina lesivumelwano kuphela uma:

- Ukunqonda ozokwenza kulolucwaningo.
- Uyiphendule yonke imibuzo.

- Uxoxile nabazali/abaqaphi bakho mayelana nalolucwaningo, futhi
- Uvuma ukuba yingxenye yocwaningo.

…… …….. ……..

Isishicilelo sakho Igama Usuku

…… …… ……..

Isishicilelo somzali/umqaphi Igama Usuku

…… …….. ……..

Isishicilelo somcwaningi Igama Usuku

Appendix 4a: Questionnaire

TOPIC: A questionnaire was completed by participants, based on assessment on knowledge, attitude and practices of diabetic patients on sharps waste disposal at home in Umzinyathi District Municipality.

GENERAL INFORMATION

Please tick the appropriate box(es) or write down the answer where necessary

1. Age : ☐
2. Sex: Male ☐ Female ☐
3. Race
   - ☐ African
   - ☐ Coloured
   - ☐ Indian
   - ☐ White
   - ☐ Other, specify……
4. Where do you stay, your residential area?

   ……
   ……
5. What is your highest level of education?
   - ☐ No formal schooling
   - ☐ Primary school
   - ☐ Secondary school
   - ☐ Tertiary education
6. Age at diagnosis of diabetes

   ……

7. Type of insulin set used

☐ Pen set

☐ Syringe and needle

8. How long have you had diabetes? ……..years

9. How long have you been using insulin to control your blood sugar? …..years.

10. How many times do you administer insulin each day?

……

11. Who administers the insulin?

……...

12. Who disposes of the insulin needles or lancet?

……..

13. How many insulin needles are issued to you each month?

……..

14. How many lancets are issued to you each month?

……..

15. How many used needles and lancets do you dispose of per month?

Needles……. Lancets…….

16. How many times do you re-use one needle before changing it?

……

17. How many times do you re-use each lancet before changing it?

……

18. How do you dispose of your insulin needle/lancet?
    - ☐ In a puncture resistant container thrown into the dustbin
    - ☐ Directly into the dustbin
    - ☐ Sewage system
    - ☐ Return them to the hospital/pharmacy
    - ☐ Other method. …… (Give the method)
19. If you use a special container, what do you do with the container when it is full (tick all that apply)?
    - ☐ Throw it in general waste
    - ☐ Take it to the landfill/ dump site
    - ☐ Take it to the nearest healthcare facility
    - ☐ Take it to the pharmacy
    - ☐ Other- Please describe……
20. What are the health risks that you are aware of associated with used insulin needles or lancets …….
21. Have you ever been accidentally stuck by one of your own insulin needles after you threw it away?
    Yes…… No…….
22. Has anyone in your home (other than you) been accidentally stuck by one of your insulin needles after it was thrown away?
    Yes…… No…….
23. If you or someone in your home was accidentally stuck by one of your insulin needles after you threw it away, did it cause you to change how you dispose of your needles?
    Yes…… No……
    If yes, describe what you did differently.
    ……
24. Do you believe that improper sharps waste disposal is a serious problem?
    Yes…….. No……..

25. Is it necessary to separate sharps waste from general waste?

    Yes…… No……..

26. If there were a programme (such as return to the clinic or doctor) where you could drop off your used needles so that you didn't have to worry about them at your home, would you participate in the programme?

    ☐ No, I would not participate in this programme

    ☐ Yes, I would participate in the programme, but only if it were free.

    ☐ Yes, I would participate in the programme even if I had to pay.

27. Were you educated regarding sharps disposal?

    Yes……. No……

If yes, please answer the following:

28. By whom were you educated?

    ☐ Doctor

    ☐ Nurse

    ☐ Pharmacist

    ☐ Other. …….. (Specify by who).

29. How were you educated?

    ☐ Pamphlets

    ☐ Verbal

    ☐ Demonstration

    ☐ Audio-visual

    ☐ Other. ……. (Specify how).

30. How would you rate the education received?

    ☐ Good

    ☐ Poor

    ☐ Average

31. Do you fear to ask your doctor or nurse about proper disposal of sharps waste?

    Yes……. No……

Thank you for time!!!

Appendix 4b: Imibuzo yocwaningo

Isihloko: Imibuzo eqondene nokuhlola ulwazi, isimomqondo Kanye nokwenziwa iziguli eziphethwe ushukela ngokulahlwa kwemfucuza yezinalidi nemijovo esisebenzile ekhaya kuMkhandlu uMzinyathi.

ULWAZI OLUJWAYELEKILE

Khetha ibhokisi okuyilona lona noma ubhale impendulo la indingeka khona.

1. Iminyaka : ☐
2. Ubulili: Owesilisa ☐ Owesifazane ☐
3. Ubuhlanga
   - ☐ Um-Afrika
   - ☐ Ikhaladi
   - ☐ Indiya
   - ☐ Omhlophe
   - ☐ Okunye, chaza ngokuqondile……
4. Iyiphi indawo noma isigodi ohlala kuso?
   ……
   ……
5. Yiliphi ibanga eliphakeme lemfundo yakho?
   - ☐ Angifundanga
   - ☐ Imfundo yamabanga aphansi
   - ☐ Imfundo yamabanga aphezulu
   - ☐ Imfundo ephakeme
6. Uthole uneminyaka emingaki ukuthi unesifo sikashukela?
   …….

7. Uhlobo lomjovo owusebenzisayo

   ☐ Osapeni

   ☐ Isirinji nenalidi

8. Usukuphathe iminyaka emingaki ushukela? ……..

9. Uneminyaka emingaki ujovela ushukela?……...

10. Ujova imijovo emingaki kashukela ngosuku?

    ……

11. Ngubani okujovayo?

    ……...

12. Ngubani okulahlela inaliti noma into yokuchofoza umunwe?

    ……..

13. Zingaki izinaliti zemijova ozinikwayo nyangazonke?

    ……..

14. Zingaki izinto zokuchofoza umunwe ozinikwa ngenyanga nyangazonke?

    ……..

15. Ulahla izinaliti nezinto zokuchofoza umunwe ezingaki nyangazonke?

    Inaliti……. Into yokuchofoza umunwe…….

16. Uyisebenzisa izikhathi ezingaki inaliti iyodwa ngaphambi koyishintsha?

    ……

17. Uyisebenzisa kangaki into yokuchofoza umunwe ngaphambi kokuba uyishitshe?

    ……

18. Inaliti kumbe into yokuchofoza umunwe esisebenzile uyilahla kanjani?

☐ Ngokuyifaka esitsheni esingabhobozeki kalula bese ulahla kumgqomo kadoti

☐ Uyifaka ngqo emgqonyeni kadoti

☐ Ukuphosa endle

☐ Ukubuyisela esibhedlela/khemisi

☐ Ngolunye uhlelo …….. (Yisho lolohlelo)

19. Uma kunesitsha esakhelwe esakhelwe ukulahla izinaliti, wenzenjani ngaso uma sesigcwele (Bukisisa konke okuhambisana nempendulo yakho)?

☐ Ngikulahla nomunye udoti emgqonyeni

☐ Ngikuhambisa endaweni yokuchitha udoti

☐ Ngikuhambisa emtholampilo oseduzane

☐ Ngikuhambisa ekhemisi

☐ Olunye uhlelo- Luchaze lolohlelo……

20. Ibuphi ubungozi obaziyo obuhambisana nezinaliti kumbe nento yokuchofoza umunwe osekusetshenzisiwe?

……

21. Usuwake wahlatshwa yinaliti ngephutha osewayilahla emva kokuyisebenzisa?

Yebo…… Cha…….

22. Ukhona yini omunye ekhaya ngale kwakho oseke wahlatshwa inaliti yomjovo osuyisebenzisile wayilahla?

Yebo…… Cha…….

23. Uma ekhona ekhaya kini oseke walinyazwa inaliti esilahliwe, ngabe wayijika yini indlela olahla ngayo izinaliti zakho esezisebenzile?

Yebo…… Cha……

Uma kungu Yebo chaza indlela ehlukile osuwenza ngayo

……

……

24. Uyakholelwa ekutheni ukulahla budedengu udoti wezinaliti esezisebenzile kuyinkinga enkulu?

    Yebo…….. Cha……..

25. Ngabe kuyadingeka ukuhlukanisa udoti wezinaliti kudoti wasekhaya?

    Yebo…… Cha……..

26. Ukube bekunohlelo (nje ngokubuyisela emtholampilo noma kudokotela) lokushiya izinaliti esezisebenzile ukugwema inkathazo emakhaya, ubungalibamba iqhaza kuloluhlelo?

    ☐ Cha, angeke ngaba yingxenye yaloluhlelo

    ☐ Yebo, ngingabayingxenye yaloluhlelo, kodwa uma ngingeke ngikhokhe.

    ☐ Yebo, ngingaba yingxenye yaloluhlelo noma kubele ngikhokhe.

27. Wake wafundiswa ngokulahla udoti oyingozi njengezinaliti?

    Yebo……. Cha…….

Uma uke wafundiswa phendula lokhu okulandelayo:

28. Wafundiswa ngubani?

    ☐ Dokotela

    ☐ Mhlengikazi

    ☐ Sokhemisi

    ☐ Omunye. …….. (Owubani).

29. Wafundiswa kanjani?

    ☐ Ngezincwajana

    ☐ Ngomlomo

    ☐ Ngatshengiswa kwenziwa

    ☐ Ngokulalela ngibuke kumabonakude

    ☐ Ngolunye uhlelo ……. (Lusho kanjani).

30. Ungakubeka kuliphi izinga ukufundiswa owakuthola?

☐ Kuhle

☐ kubi

☐ Kuphakathi nendawo

31. Ngabe uyasaba ukubuza kudokotela wakho kumbe kumhlengikazi indlela elungile yokulahla izinaliti, izinto zokuchofoza umunwe kanye nemijovo osekusebenzile?

Yebo……. Cha…….

Ngiyabonga ngesikhathi sakho!!

Appendix 5: Permission to use the questionnaire

Gmail

Lihle Ziqubu <biyase.ziqubu@gmail.com>

Questionnaire

MEKESHNIE govender <shaunandmicci@hotmail.com> Fri, Jun 23, 2017 at 5:32 AM
To: Lihle Ziqubu <biyase.ziqubu@gmail.com>

Good morning
Good luck with your research. You are welcome to use my questionnaire. It was a simple tool with about 25 questions. I will have to look around for a copy since its been such a long time ago.

Kind Regards
Dr Govender

Sent from my Samsung Galaxy smartphone.
[Quoted text hidden]

Appendix 6: Editing Certificate

PROOF READING AND CORRECTING

To whom it may concern

This letter serves to state that I have proofread a copy of the following thesis/manuscript/journal article and have made suggestions in terms of corrections which the researcher may choose/choose not to put into effect in the final copy.

Qualification: Master's Degree

Title: **KNOWLEDGE, ATTITUDE AND PRACTICES OF SHARPS WASTE DISPOSAL BY DIABETIC PATIENTS AT HOME SETTING IN UMZINYATHI DISTRICT MUNICIPALITY.**

Researcher: Lihle Nomfundo Ziqubu

The general areas covered in proofreading this article include:

- Spelling and Punctuation: with special reference to English UK spelling of specific words.
- Correction of grammatical errors: syntax, concord, etc.
- General editing to improve academic language and vocabulary.
- Restructuring of Reference List.

Derna Fynn
BA -English (Unisa)
Academic Development Adviser
University of Technology.
Durban
0313732053
0842645855.

Date: 31.01.20