HAND HYGIENE PRACTICES AMONG HEALTH CARE WORKERS AT NYANGABGWE HOSPITAL, FRANCISTOWN, BOTSWANA

By: Wazha Hlabano

[redacted]

Submitted in partial fulfilment of the requirements for

Master of Public Health

In the

School of Healthcare Sciences

Faculty of Health Sciences

DEPARTMENT OF MEDICAL SCIENCE, PUBLIC HEALTH AND HEALTH PROMOTION

At the

UNIVERSITY OF LIMPOPO

Supervisor: Professor Linda Skaal

2015

D E C L A R A T I O N

I declare that **HAND HYGIENE AMONG HEALTH CARE WORKERS AT NYANGABGWE HOSPITAL,FRANCISTOWN** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

Full names ...Wazha....Hlabano. Date……..…

Signature ……. Student number…[redacted]

Acknowledgements

I want to thank the following persons for their respective contributions to this dissertation:

- A special thank you to my supervisor, **Professor Linda Skaal** for her guidance, support and encouragement.

- My joint supervisor, .**Mr Percy Kekana**, for her support and guidance.

- My colleagues at Nyangabgwe Hospital for their willingness to participate in this study and for taking time off their busy schedules to participate in the study
- Ministry of Health, for giving me permission to conduct the study. My husband **Shandukani Hlabano,** for his unconditional love, support and encouragement and motivation during my study and for editing the manuscript.

- My three children, **Lebogang, Bose and Mbako**, for their support and understanding.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION AND BACKGROUND

CHAPTER 2: LITERATURE REVIEW

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

METHODS AND MATERIALS

CHAPTER 4: RESULTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES:

LIST OF ABBREVIATIONS

AIDS: Acquired immune deficiency syndrome

ARO: Antibiotic Resistant Organism

BOTUSA: Botswana United State of America

CRs: Compliance rates

CHOP: Children's Hospital of Philadelphia

HAI: Hospital Acquired Infection

HCW: Health Care Worker

HH: Hand hygiene

HIV: Human Immunodeficiency Virus

ICU: Intensive Care Unit

IPC: Infection Prevention and Control

MRSA: Methicillin Resistance Staphylococcus Aureus

NICU: Neonatal Intensive Care Unit

NH: Nyangabgwe Hospital.

SOP: Standard Operating Procedure

WHO: World Health Organisation

LIST OF OPERATIONAL DEFINITIONS

- **Allied Health Staff:** Physiotherapist, Occupational Therapist, Dieticians, Pharmacy Technicians, Pharmacist, Medical Laboratory Technologist etc.
- **Ancillary Staff:** CSSD operators, Mortuary attendant, Mental Attendant, Porters, Hospital Orderly, Dental Attendant ,General Assistant, Cleaners etc
- **Communicable Disease:** Any disease which can be transmitted directly or indirectly from one person to another (Tietjen etal, 2003).
- **Cross Infection**: It is transmission of infection agents between patients within the healthcare setting. It may be direct transmission from one person to another or indirect, for example via incorrectly cleaned pieces of equipment (Friedman and Newsom, 2007).
- **Doctors:** Doctors, Dentist and Medical Students
- **Hand hygiene:** A general term that applies to hand washing, antiseptic hand washing, antiseptic hand rub or surgical hand antisepsis. (Mehtar, 2010).
- **Hand washing**: Process of mechanically removing dirt and debris from the skin with plain soap and water (Mehtar, 2010).
- **Health-care worker (HCW):** Any person who provides health care services (preventive, curative, promotional, rehabilitative).these includes a variety of professionals who are involved in providing health care for patients (Friedman and Newsom, 2007).
- **Hepatitis B:** Hepatitis caused by a virus which is transmitted by exposure to blood or blood products or during sexual intercourse. It causes acute and chronic hepatitis. (Tietjen etal, 2003).

- **Hepatitis C:** Hepatitis caused by a virus and transmitted by exposure to blood or blood products. Hepatitis C is usually chronic and can cause cirrhosis, and primary liver cancer (Tietjen etal, 2003).
- **HIV/AIDS:** Human Immunodeficiency Virus, a virus mainly transmitted during sexual Intercourse or through exposure to blood or blood products. HIV causes the Acquired Immunodeficiency Syndrome (AIDS) (Tietjen etal, 2003).

- **Healthcare Associated Infections (HAIs):** refers to any infections acquired during the process of delivery of health care while receiving treatment from or visiting the health facility. This infection can affect Health Care workers, patients and visitors (Mehtar, 2010).
- **Infection Prevention and Control:** Refers to process where activities, policies and procedures are designed, aiming at the prevention of the spread of pathogens between patients, from health care workers to patients and from patients to health care workers in the health care setting(Mehtar, 2010).
- **Policy guidelines:** are organizational statements that govern operations (Tietjen etal, 2003).
- **Universal precautions:** An approach to infection control that treats all human blood and other potentially infectious materials as if they were infectious for HIV and HBV or other bloodborne pathogens (Friedman and Newsom, 2007).

ABSTRACT

Background: The purpose of the study was to find out if hand hygiene was being done according to World Health Organization hand hygiene Guideline. It was hoped that the study would benefit all health care workers through making recommendations aimed at improving hand hygiene compliance.

Purpose: The aim of the study was to assess hand hygiene practices among healthcare workers in Nyangabgwe Hospital, Francistown, Botswana

Methods: Quantitative, Cross-sectional study, using a self-administered Questionnaire to collect data on 280 participants. The questionnaire consisted of three (3) sections: socio-demographic profile; attitudes of HCWs and practice of healthcare on hand hygiene. For attitude questions Three (3) point Likert scale was used. The sampled Healthcare workers were stratified. The results were analysed using SPSS version 24.0. The descriptive statistical method was used to analyse frequencies, correlations and means. The chi-squared was used to analyse cross tabulation between variables and association with significance level at ($p < = 0.05$).

Results: The results shows that 260 participants aged between 20- 60years responded to the questionnaire. The majority of participants had good knowledge of hand hygiene and younger participants practiced hand hygiene more than older ones ($p<.05$). Barriers to hand hygiene were significant and included lack of time, negative attitude, but not lack of knowledge.

Conclusion: The study highlighted the practices of hand hygiene among health care workers and the status of hand hygiene resources in the hospital which have a negative impact on hand hygiene practices demonstrated that compliance with hand hygiene compliance among health care workers remains unacceptably low, despite

the irrefutable scientific evidence that hands are the most common vehicle for transmission of pathogens

Keywords: Hand hygiene, Health care workers, Hand hygiene practices, Health care associated infection, Resources

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This chapter provides an overview on the study and it will provide information on the purpose of the study and where it was conducted. The chapter is outlined as follows; background of the study, research problem, research question, purpose of the study and aim of the study, the and objectives of the study

1.2 Background of the study

Prevention and management of infection is the responsibility of all staff working in health care services, and an integral element of patient safety programmes (Tietjen, Bossemeyer, and Baltimore, 2003). This is applicable to all healthcare services, regardless of the patient setting or care provider. Infection prevention and control (IPC) is a process of developing and implementing safe, evidence-based practices towards improving quality healthcare and is usually part of quality assurance (Mehtar, 2010).This is achieved by monitoring infection and implementing IPC measures through education of patients, employees and visitors on the principles and practices of IPC (Mehtar, 2010). Appropriate hand hygiene is singled out as the most important measure in preventing these infections. However, hand hygiene compliance among healthcare professionals remains low despite the well-known effect on infection reduction. Hand hygiene is paramount in preventing transmission of pathogen (Mehtar, 2010).Since the publications of the first IPC manuals significant progress has been made globally in understanding the basic principles of infection prevention as well as acceptance and use of evidence-based infection prevention practices (Tietjen, et al. 2003). It is now recognised that IPC does not only reduce the risk of disease transmission to patients and visitors but also protects healthcare workers including doctors, nurses, laboratory workers, cleaning and housekeeping staff (Friedman and Newsom,2007). Comprehensive infection prevention and control practices are therefore required to effectively prevent, identify, monitor, and control the spread of infections in all health care facilities (Reid, 2001).

Transmission of health-care-associated infections (HAIs) most often occurs via the contaminated hands of health care workers (Lankford, Zemblower , Trick , Hacek , Noskin and Peterson , 2003). HAIs also impact on the health service in terms of

extended lengths of stay of affected patients, the costs of diagnosis and treatment of the infections and their complications, and the costs of specific infection control measures (Pittet and Donaldson, 2005). Healthcare workers' hands are the most common vehicle for the transmission of healthcare-associated pathogens from patient to patient and within the healthcare environment. Hand hygiene is the leading measure for preventing the spread of antimicrobial resistance and reducing healthcare-associated infections (HCAIs), but healthcare worker compliance with optimal practices remains low in most settings. According to Mehtar, (2010) adherence rates of hand washing is up to 67% at best and most of the studies reveal that health care workers do not wash hands willingly.

Hands play a major role in the transmission of infection in healthcare setting and the importance of hand hygiene in the control of infection cannot be overemphasized (Jumaa, 2004). Appropriate hand hygiene can minimize micro-organisms acquired on the hands during daily duties (WHO, 2006).Hand hygiene, defined as the act of washing one's hands with soap and water, or disinfecting them with an antiseptic agent, has been recognized as the single most effective and cost-effective means of preventing hospital acquired infection, as well as an effective means of preventing illness in the community that may lead to hospitalization (Allengranzi , Sax , Bengaly ,Richet , Minta and Chraiti , 2010). Despite this, many studies have documented that compliance with hand hygiene recommendations in healthcare settings is consistently less than 50% (Pettit et al, 2012).Intensive education programs have been associated with modest improvements in hand hygiene and dramatic reductions in rates of hospital-acquired infections (Allengranzi et al, 2009). However, few programs have documented continuing success.

Nyangabgwe hospital which is a centre of excellence, and an academic hospital has the basic need for studies on infection control practices. Though infection prevention and control training are carried out there are still gaps which need to be identified on the practices of infection control. To date no hand hygiene study has been carried out in the hospital hence there is need to conduct research on such issues. There have been outbreaks of Paediatric Gastro- enteritis on several occasions but no effort has been made to establish its origin. However, the aforementioned condition

is associated with hand hygiene. Health care workers had suffered from communicable disease after caring for patients with such communicable diseases like Tuberculosis and chicken pox. According to Pittet, et al, (2006), in the mid-1800s, studies by Ignaz Semmelweis in Vienna and Oliver Wendell Holmes in Boston established that hospital-acquired diseases, now known to be caused by infectious agents, were transmitted via the hands of HCWs. In the community, hand hygiene has been acknowledged as an important measure to prevent and control infectious diseases and can significantly reduce the burden of disease, in particular among children in developing countries (Boyce and Pittet, 2002).

In the health-care setting, a prospective controlled trial conducted in a hospital nursery and investigations conducted during the past 40 years have confirmed the important role that contaminated hands of HCWs play in the transmission of health care-associated pathogens Vivas et al, 2006).Currently, hand hygiene is considered the most important measure for preventing the spread of pathogens in health-care settings (Pittet, 2006). HCWs carry high levels of bacteria on their dominant hand, even without direct patient contact, hence the practice of hand hygiene need to be studied. According to Mehtar, 2010 eighty per cent of pathogen transmission both inside and outside healthcare facilities occurs via hands.

Hand-hygiene should be practised at Nyangabgwe Hospital in accordance with WHO Guidelines on Hand Hygiene in Health Care (WHO,2009).The 2009 *WHO Guidelines* provide a comprehensive review of scientific data on hand hygiene rationale and practices in health care. However, compliance by health care workers with recommended hand hygiene procedures has remained unsatisfactory, with compliance rates generally below 50% of hand hygiene opportunities (Pittet, 2009). Some of the factors that have contributed to poor hand washing compliance among health care workers, include lack of knowledge among personnel about the importance of hand hygiene in reducing the spread of infection and how hands become contaminated, lack of understanding of correct hand hygiene technique, understaffing and overcrowding, poor access to hand washing facilities, irritant contact dermatitis associated with frequent exposure to soap and water, and lack of institutional commitment to good hand hygiene(Pittet and Boyce,2001).

1.3 RESEARCH PROBLEM

Hand hygiene practices remain a major challenge among Health Care Workers at Nyangabgwe Hospital. There are still some gaps in the implementation of hand hygiene activities and health care workers attitudes towards hand hygiene strategies. According to hospital mini study on Assessing Infection Control Resources and Practices in Paediatric Units in Nyangabgwe hospital conducted in 2008 non-compliance on hand hygiene practices (Hlabano, Salazar-Austin, Masunge,Shah, Arscott-Mills, Harari, Steenhoff and Coffin,2008)The study was designed to determine compliance with the hand hygiene practices amongst HCW at Nyangabgwe hospital in Botswana, whilst also ascertaining reasons for non-compliance. Hand hygiene practices are required to effectively prevent and control the spread of infections in Nyangabgwe Hospital. The most important scope of such practices are: monitoring of health care practices, surveillance of infection in health care facilities, reporting process, adequate infrastructure, e.g. sinks, availability of appropriate supplies and equipment, education or training of staff and periodic evaluation of the hand hygiene policies and guidelines (Reid, 2001). It is important for all health care Workers to adhere to the infection control guidelines strictly. It is also imperative for health care administrators to ensure implementation of the hand hygiene programme in health care facilities, according to World Health Organization guidelines of 2003.

1.4 RESEARCH QUESTION

What are the hand hygiene practices at Nyangabgwe Hospital, Francistown?

1.5 PURPOSE OF THE STUDY

The purpose of the study was to find out if hand hygiene was being done according to World Health Organization hand hygiene guidelines. It was hoped that the study would benefit all health care workers through making recommendations aimed at improving hand hygiene compliance.

1.5.1 AIM

To assess hand hygiene practices among health care Workers in Nyangabgwe Hospital, Francistown, Botswana

1.5.2 Objectives

- To determine the hand hygiene practices among health care workers at Nyangabgwe Hospital in Francistown, Botswana.
- To determine the resources available for hand hygiene at Nyangabgwe Hospital such as hand basin, elbow tap, hand soap, hand towels and alcohol hand rub (sanitizer)
- To identify the attitude of HCWs towards hand hygiene practice, at Nyangabgwe Hospital
- To identify the barriers (structural, organizational, cognitive and social) to hand hygiene practices.

CHAPTER TWO
LITERATURE REVIEW

2.1. INTRODUCTION

This chapter gives an overview of hand hygiene practices and challenges among health care Workers. The literature review was conducted using a variety of sources. The sources used were direct internet searches, Pub Med, different search engines, publications and relevant books. Most literature was derived from developed countries and only a few were derived within the continent and locally. The discussion of literature focused on hand hygiene practices among health care workers globally, regionally nationally and current practices in the hospital. The purpose of this review was to compare the research findings and reports with the literature regarding hand hygiene practices among health care workers in different countries and different settings.

2.2 Overview of Hand hygiene practices among Health Care Workers Globally:

For centuries, hand washing with soap and water has been considered a measure of personal hygiene but the link between hand washing and the spread of disease was only been established in the last 200 years (Allegranzi et al., 2010). According to Pittet, et al., 2006, in the mid-1800s, studies by Ignaz Semmelweis in Vienna and Oliver Wendell Holmes in Boston established that healthcare associated infections were transmitted via the hands of HCWs. In the community, hand hygiene has been acknowledged as an important measure to prevent and control infectious diseases and can significantly reduce the burden of diseases, in particular among children in developing countries (Boyce and Pittet, 2002). In the health-care setting, a prospective controlled trial conducted in a hospital nursery and investigations conducted during the past 40 years have confirmed the important role that contaminated hands of HCWs play in the transmission of health care-associated pathogens Vivas et al, 2006).Currently, hand hygiene is considered the most important measure for preventing the spread of pathogens in health-care settings (Pittet, 2006)

Compliance with hand hygiene protocols among healthcare workers in the hospital is recognized as one of the most important means of preventing hospital acquired infections (Helder and Latour, 2009; O'Grady et al., 2002). Nosocomial bloodstream infections are in part caused by horizontal transmission of commensals or pathogens due to inappropriate hygiene practices (Kampf and Kramer, 2004). Various sources have reported poor compliance among healthcare professionals (Grol and Grimshaw, 2003; Pittet et al., 2000), Therefore, the most effective strategy to decrease nosocomial bloodstream infections is to improve hand hygiene practices (Kampf and Kramer, 2004; Lam et al., 2004; Yildirim et al., 2008).

Adequate hand hygiene (HH) is regarded as the most effective single measure to prevent healthcare-associated infections (Pittet et al., 2002), and despite several recommendations and guidelines on adequate HH being available (Pittet et al., 2009 and WHO, 2009), observed compliance rates (CRs) in medical staff still remain low (Gould et al., 2007, Erasmus et al., 2010, Scheithauer et al., 2009 and Scheithauer et al., 2010) and have been regarded by public health authorities as unacceptably poor (Day, 2007 and WHO, 2009). Worrisomely, most investigations found even lower compliance in physicians than in nurses. Furthermore, this difference in CRs has been recently confirmed for medical students compared to nursing students van de Mortel et al. (2011).
Infection control practices are of critical importance to overall quality of care and safety of healthcare workers and their patients and the community at large. Despite international engagement in improving hand hygiene, all countries struggle to sustain proper hand hygiene practices in healthcare.

A key action within the Global Challenge is to promote hand hygiene in health care. Poor hand hygiene among health-care providers is a worldwide problem (Randle et al., 2006). Better hand hygiene has the potential to reduce infections in advanced health-care systems, (WHO, 2009 and Erasmus et al., 2010). According to Allegranzi and Pittet (2009), the main objective of the First Global Patient Safety Challenge, launched by the World Health Organization (WHO), was to achieve an improvement in hand hygiene practices worldwide with the ultimate goal of promoting a strong patient safety culture.

2.3 Hand hygiene Practices Challenges:

Although many countries have guidelines regarding hand hygiene for healthcare settings, overall compliance among healthcare workers remains poor (van de Mortel et al. 2010). Improving hand hygiene remains a challenge for infection control practitioners in healthcare institutions and in the community (Jumma 2004).

According to Pittet et al, 2010 at any time, over 1.4 million people worldwide are suffering from infections acquired in hospitals and in modern hospitals in the developed world: 5-10% of patients acquire one or more infections in health care settings .In developing countries the risk of health care-associated infection is 2 to 20 times higher than in developed countries and the proportion of patients affected by HAI can exceed 25% and these lead to the global burden and economic impact of HAI in the health care facilities.

According to Jumaa, 2004, studies on hand hygiene have been mainly observational and may be subject to reactive biases because of the presence of an observer. Blinding, randomisation and controlling for confounding variables may not be feasible (Vivas, Gelaye, Aboset, Kumie, Berhane, and William, 2006).

HCWs are aware of recommendations regarding hand hygiene, but knowledge and education do not in themselves motivate hand hygiene practices, hence the low compliance levels (Pittet et al., 2009). Self-reported rates and observed rates of compliance with hand hygiene practices also differ. There is evidence that HCWs may be unaware of their poor compliance when the intention to perform hand hygiene is there but other factors result in non-adherence. Concern for third party opinion seems to be an important factor in determining hand hygiene practices. In Botswana and Burkino Faso, for example, conforming to social ideals is also an important motivating factor for hand washing. In the healthcare setting it is essential to have strong commitment from management and superiors to change hand hygiene practices.

Hand washing is basically the primary weapon of infection control in the health care setting. It has been observed that infections can travel from patient to patient, from patient to HCW and visitors and from staff to patient and visitors (WHO, 2006). Evidence has shown that many people do not wash hands as often as they should be. However, even if they try washing hands they do it using a wrong technique (Pittet et al 2012). Failure to perform appropriate hand hygiene is considered to be the most leading cause of healthcare associated infections and the spread of multi-resistant micro- organisms. It has been recognized as a significant contributor to disease outbreaks (Alleginzi et al 2010). Therefore effective and timely hand hygiene can contribute to reducing the risks of cross contamination. Infection control is a respected part of the hospital setting .Hand hygiene is the cornerstone measure of prevention of health care-associated infection and to ensure safe client care (Allegranzi et al, 2010). Multiple factors influence hand hygiene performance, and its promotion is particularly complex in developing countries where limited resources and culture-specific issues can strongly influence practices (Pittet et al, 2006).

All health care personnel must practice effective hand washing, and need to be instructed in proper techniques and situations for hand washing. Compliance with hand washing is, however, frequently sub optimal. The reasons for this include, lack of appropriate equipment, low staff to patient ratios, allergies to hand washing products, insufficient knowledge among staff about risks and procedures, the time required, and casual attitudes among staff towards bio-safety (WHO, 2003).

In Ghana, a cross-sectional observational study at the Komfo Anokye Teaching Hospital in Kumasi indicated that the most commonly identified barriers to hand hygiene by health workers were limited resources and lack of knowledge on appropriate times to perform hand washing or rubbing (van de Mortel et al., 2010). In the Korle-Bu Teaching Hospital (KBTH), the largest Teaching Hospital in Ghana, no baseline survey involving the major clinical departments has been undertaken. A study conducted in 2009, at the Neonatal Intensive Care Unit (NICU) of the Department of Child Health in the Korle-Bu Teaching Hospital, indicated that hand hygiene compliance of physicians and nurses in that unit was low (Yawson,2012).

According to Jumma, (2004), there are 2—3 million deaths worldwide each year from diarrheal diseases, many of which could be prevented and it has been estimated that hand washing with soap could save a million lives a year. At the University Hospitals of Geneva, the lowest compliance with hand hygiene was observed in intensive care unit (ICU), where patients at highest risk of infection are admitted (Pittet et al, 1999). Various interventions have proven effective, at least temporarily, in improving hand hygiene compliance. These successful interventions typically are multifaceted and include education in combination with other strategies, such as providing feedback regarding compliance, recruiting role models, and providing rewards for compliance. (Lent et al, 2009).

2.4 Hand hygiene practices in Botswana

In Botswana there are few studies which have focused on hand hygiene or infection control in a broader scope. It is therefore a challenge, given all these methodological limitations, to provide convincing evidence for all the recommendations laid down in guidelines for hand hygiene. Nonetheless, despite these limitations, there is more evidence supporting the benefit of hand hygiene in breaking the chain of transmission of infection in both the healthcare setting and in the community than there is for some widely accepted clinical practices (Pittet et al., 2007).

The practices among health care workers regarding hand-hygiene have never been studied in Nyangabgwe Hospital. Hand hygiene is an essential practice for all health-care workers in order to protect the patients and themselves (Pittet et al, 2006). Hand hygiene has been acknowledged as an important measure to prevent and control infectious diseases and can significantly reduce the burden of disease, in particular among children in developing countries (Boyce and Pittet, 2002). According to Allegranzi and Pittet (2009), the main objective of the First Global Patient Safety Challenge, launched by the World Health Organization (WHO), was to achieve an improvement in hand hygiene practices worldwide with the ultimate goal of promoting a strong patient safety culture. In many outbreaks, infection

transmission between patients and from the environment (both the care setting and patient surroundings) to patients is through health-care workers' hands (Pittet , Allegranzi , Sax , Dharan , Pessoa da Silva , Donaldson , Boyce,2006) .Appropriate hand hygiene can minimize micro-organisms acquired on the hands during daily duties and when there is contact with blood, body fluids, secretions, excretions and known and unknown contaminated equipment or surfaces (WHO,2006)

The study was cross-sectional and a sample was randomly picked among health care workers who qualified for inclusion in terms of the criteria. The study was comparing recommended hand hygiene practices and the real situation for health care workers at Nyangabgwe Hospital. There is rarely just one intervention in studies of hand hygiene practices (Pittet, Allegranzi, Dharan and Sax, 2007). Many previous studies carried out involved small numbers of subjects hence lacked statistical evidence to be generalised. However my study will involve a big sample since I will use a quantitative approach. There has been little or no follow up in hand hygiene studies and so it may not be known if any beneficial effect of an intervention to improve hand hygiene practices has resulted in sustained improvement in compliance (Katowa et al, 2006). The overall aim of hand hygiene studies is to provide evidence that adherence to hand hygiene practices results in a decrease in infection (Vivas et al, 2006). Hand washing is the primary weapon of infection control in the health care setting. According to Pittet et al, (2008) several surveys demonstrated that compliance with hand hygiene among health care workers remains unacceptably low worldwide, despite the irrefutable scientific evidence that hands are the most common vehicle for transmission of pathogens. Most data available from hand hygiene monitoring are related to practices in developed countries.

Hand hygiene is the most important and effective measure to prevent cross-infection in hospitals (Katowa, Mukwato, Ngoma, Maimbolwa, 2006). Hand-hygiene should be practised at Nyangabgwe Hospital. The practices among health care workers regarding hand-hygiene have never been studied in Nyangabgwe Hospital. Hand hygiene is an essential practice for all health-care workers (physicians/ doctors, midwives, nurses, pharmacists, dentists, and other care providers including

community health workers and family members) in order to protect the patients and themselves. (Pittet et al. 2006).

Although several studies have examined hand hygiene in the healthcare setting globally, particularly the proper use of hand hygiene resources and knowledge, attitude and practices by health care workers, there is a lack of studies assessing practices of hand hygiene among HCW at Nyangabgwe Hospital. Moreover, previous studies have only addressed these issues within individual specialties, and it is necessary to broaden the focus of this in order to make it general for hospital health care workers in Botswana, particularly at Nyangabgwe Hospital. There has not been any comprehensive study conducted on hand hygiene practices. However, in 2008 there was a mini study which was done in paediatric department and Intensive Care Unit. The objective of the study was to assess existing infection control resources and hand hygiene practices in paediatric inpatient units at Nyangabwe Hospital in Botswana (Hlabano et al, 2011). The scope of the study was limited to only three units in the hospital, whereas the hospital is diverse and has thirty five units hence the study could not provide enough evidence to present a fair picture of the hospital.

In conclusion the promotion of hand hygiene is a complex issue; it concerns perceptions of individual staff among whom compliance with hand hygiene may vary. This suggests that individual factors play a role in determining hygienic behavior (Pessoa-Silva et al., 2005). The main challenge is to conform to good practices of hand hygiene hence preventing health care associated Infections which is a major global challenge.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

METHODS AND MATERIALS

3.1 INTRODUCTION

This chapter discusses the research design, population and sampling method of Health Care Workers at Nyangabgwe Hospital in hand hygiene practices, method used in data collection, data analysis, measures that were taken to ensure validity and reliability, ethical consideration and limitations of the study. This chapter also presents methods and materials used in the study. It describes study design, define population and sampling methods. It further describes data collection tool, procedure followed when collecting data.

3.2 STUDY DESIGN

In this study a quantitative study approach was utilized, in order to provide more insight about the practices of HCW in hand hygiene.

A cross sectional descriptive study design was implemented and data collected using a questionnaire. The study examined data collected at one point in time from the different categories of HCW. The data collected from each category of HCWs was compared using statistical measures (Brink, Van Der Walt & Van Rensburg, 2006).

3.3 Study Site:

The research was conducted at Nyangabgwe Hospital, Francistown, Botswana. Nyangabgwe Hospital is situated in the City of Francistown in the North- Eastern part of Botswana. According to Botswana Census (2011) the Hospital serves a population of 1,057,558. The hospital bed capacity is approximately 572 with a Bed Occupancy Rate of over 110%. The hospital has 35 departments and comprises of 780 multidisciplinary health care workers. The population was selected according to the inclusion criteria. Health Care Workers were selected from different departments which met inclusion criteria using a stratified random sampling technique.

3.4 Study Population

The population of Nyangabgwe hospital health care workers was 1240. These include all workers in the hospital including workers for outsourced services. HCWs were 780 and these included doctors, nurses, dentists, allied health care workers (Pharmacist, Pharmacy Technicians, Microbiologist, Pathologist, Medical-laboratory-technicians, Physiotherapist, Radiologist, Occupational-Therapies, Health Care Auxiliary (HCA) staff and Dental Therapist) . The study population was 780 health care workers.

3.5 SAMPLING METHOD AND SAMPLE SIZE:

A stratified random sampling technique was used to select eligible participants. A stratified random sample involved dividing the population into distinct subgroups (Polit and Hungler, 2013). HCWs were selected according to size of each stratum. The sample size was determined using Morgan and Krejcie (1970) table (see Appendix 3). A sample size of 260 for health care workers from different cadres who qualified for inclusion criteria were selected to participate in the study. Nurses were more than other groups because of their population size, whilst allied health staff was less. The sample size was only for those who were in contact with the majority of patients attended to at the hospital and their hand hygiene practices can either minimize or perpetuate the transmission of infections. A randomly stratified selection sample of 260 different categories of health care-workers was recruited. The sample size of 260 was also based on a 95% confidence level and 5% margin of error. 10% was added to cater for non-response or drop outs; hence the total sample was 286.The were 26 drop outs because of missing information.

Table 3.1: HCW Sample Stratification

Profession	**Population**	**Sample Size**
Nurses	458	124
Doctors	120	38
Dentistry	28	16
Allied Health	62	28
Laboratory staff	57	30
General	**55**	**24**
TOTAL	**780**	**260**

3.6 Study Piloting

A pilot study was done at Area W clinic for twenty HCW in Francistown to ensure that the questionnaire/tool was reliable. The questionnaire proved to be reliable and minor corrections were made , the laboratory staff were group under same category of laboratory personnel instead of laboratory scientist , microbiologist, laboratory technicians. The Pharmacy Staff were also grouped and classified as Pharmacy Personnel.

3.7 Inclusion Criteria and Exclusion Criteria:

3.7.1 Inclusion Criteria:

The inclusion criteria was all health care workers working at the hospital and willing to participate in the study.

.

3.7.2 Exclusion Criteria:

Hospital workers who do not deal directly with touching patients, and those whose mandate is not patient care.

3.8 Data Collection:

3.8.1 Data collection procedure

Data collection was subject to strict controls and procedures were followed precisely, to ensure that the data was valid, reliable and useful (Mehtar, 2010). Data was obtained on the Hand Hygiene practices among HCW at Nyangabgwe hospital. The healthcare workers were informed about the purpose of the study. And consent was obtained prior completion of the questionnaire. The questionnaire was delivered by the researcher personally to the participants. The participants were given clear instructions of filling the questionnaire. It took roughly about 25-30minutes to fill in the questionnaire. Data was collected in fifteen days. The participants were followed in their respective departments (work place) during morning and afternoon shifts. Two departments were covered per day.

3.8.2 Instrument:

A self-administered questionnaire was applied; the questionnaire consisted of three (3) sections: socio-demographic profile; attitudes of HCWs and practice of healthcare on hand hygiene. For attitude questions Three (3) point Likert scale was used.

3.8.3 Data collection Procedure:

The questionnaires were written in English since all participants were able to read and write the English language well and the medium of instruction in the hospital is English.

3.9 Data Analysis:

Data were analysed using SPSS software version 24.0 at that time with the help of the Statistician. The descriptive statistical method was used to analyse frequencies, correlations and means. The chi-squared was used to analyse cross tabulation between variables and association with significance level at ($p <= 0.05$).

3.10 Reliability and Validity:

3.10.1 Reliability

Reliability is the degree of consistency or dependability with which an instrument measures the attribute it is designed to measure Polit and Hungler, 2013)

The questionnaire was pre-tested at another health care facility (Area W clinic) to ensure that it was reliable. Twenty health care workers at Area W clinic were given the questionnaire.

3.10.2 Validity:

Validity is the degree to which an instrument measures what it is intended to measure Sampling (Polit and Hungler, 2013). Validity was addressed by submitting the questionnaire to peers and experts (supervisor), to ensure that the questionnaire covered all areas stated in the objectives of the study.

3.10.2.1 Content Validity

Content Validity is the degree to which the items in an instrument adequately represent the universe of content for the concept being measured (Polit and Hungler, 2013. The questionnaire was submitted to supervisor and also to colleagues who work on researchers within the hospital to ensure that the instrument covered all areas hence content validity was addressed.

3.10.2.2 Face Validity

Face Validity is the extent to which a measuring instrument looks as though it is measuring what it purports to measure (Polit and Hungler, 2013), Face validity was addressed through a series of consultations with the supervisor to ensure that the questionnaire did not mimic what it was intended to do.

3.10.3 BIAS:

Bias is any influence that produces a distortion in the results of a study (Polit and Hungler, 2013). Sampling bias was minimized by using stratified random sampling thereby giving all categories of HCWs an equal chance of being included for the study.

3.11 SIGNIFICANCE OF PROPOSED RESEARCH

The study was to improve hand hygiene practices among health care workers at Nyangabgwe. Once health care workers adhere to good practices in hand hygiene the quality of care for patients was also to improve. A better understanding of knowledge and attitudes towards hand hygiene practice was to assist in the development of effective and efficient hand hygiene programs for Nyangabgwe Hospital, The Research was to be used to begin a process of changing social attitudes towards hand hygiene and the prevention of infection. The study feedback also was to help to reduce spread of Hospital Acquired infection hence reduce the cost of hospital cost. The health care workers realised the gap in hand hygiene practices and hence were to put measures to address the Gaps and come up with Good hand hygiene Standard Operating Guidelines.

3.12 ETHICAL CONSIDERATIONS

A clearance certificate was obtained from the Medunsa Research and Ethics Committee (MREC) before the data was collected. Permission to conduct the study was requested from Ministry of Health Ethical Committee in Botswana. Permission letter was obtained from Nyangabgwe Hospital Ethical Committee.

The research study posed minimal risks to the participants. The questionnaire contained no identifying information which ensures anonymity. Informed consent was obtained from all participants. (See consent form at the appendix).

The study was guided by the following ethical principles:

- Informed consent
- Confidentiality and Anonymity
- Respect for Autonomy
- Justice:

- **Informed Consent:** There was informed consent from participants before they took part. Participants were asked to sign a Consent Form as a way of agreement to take part in research. This means that they knew exactly what

they were being asked to do and the research was all about. The Participants had the option of not taking part. For Participants who failed to complete and return the questionnaire, follow up was made.

- **Respect Individual Autonomy**: The participants had freedom to decide what to do. Even when someone has signed a Consent Form, the participants were made aware that they are free to withdraw from the study at any time, without giving a reason.
- **Anonymity and Confidentiality**: Making data ‘anonymous’ means removing the contributor’s name. Precautions were taken to protect anonymity, and only promise the level of anonymity that was realistically provided. Confidentiality was maintained and it related to the protection of the data collected. Questionnaire were coded
- **Justice:** All participants meeting the inclusion criteria were given equal and fair chance to participate.

CHAPTER 4
RESULTS

4.1INTRODUCTION

This chapter presents result from a sample of 260 Health care workers from Nyangabgwe Hospital at Francistown, Botswana. Data the results were was analyzed using SPSS software 24.0 version at that time with the help of the Statistician. The descriptive statistical method was used to analyse frequencies, correlations and means. The chi-squared was used to analyse cross tabulation between variables and association with significance level at ($p < = 0.05$). The results were presented in the form of tables and graphs a total of 260 participants completed the questionnaires.This chapter also presents the results which are presented using both tables and graphs. The chapter is made out of the following sections as illustrated in the research instrument: Socio demographic characteristics of participants, attitude questions that are divided into Job Satisfaction, workload, Health Aspect, Resources, situational factors, support services, knowledge and skills and staffing.

Table 4.1: Socio-demographic profile of respondents, % in column, n=260

Variables		Frequencies	Percentages %
Gender n=260	Males	94	35.3
	Females	166	64.7
Education n= 260	Junior Certificate	13	5.5
	Secondary Certificate	2	1.1
	Tertiary Certificate	245	93.4
Years of Service N=260	≤ 5yrs	95	36.5
	6-10yrs	70	26.9
	> 10yrs	95	36.5
AGE N=260	≤30yrs	115	44.2
	31-45yrs	99	38.1
	>46	46	17.7

Table 4.1 the above shows the age ranged between 20- 60years. The majority of the participants are Age range ≤30 - 45yrs, with only 17.7% ≥ 46yrs. Also**,** years of

service ranged between 1yr –to > 10yrs, with 63.4% having ≤ 10yrs of service. Also, the majority of respondents had tertiary education, compared to those with secondary (1.1%) and junior certificate (5.5%).

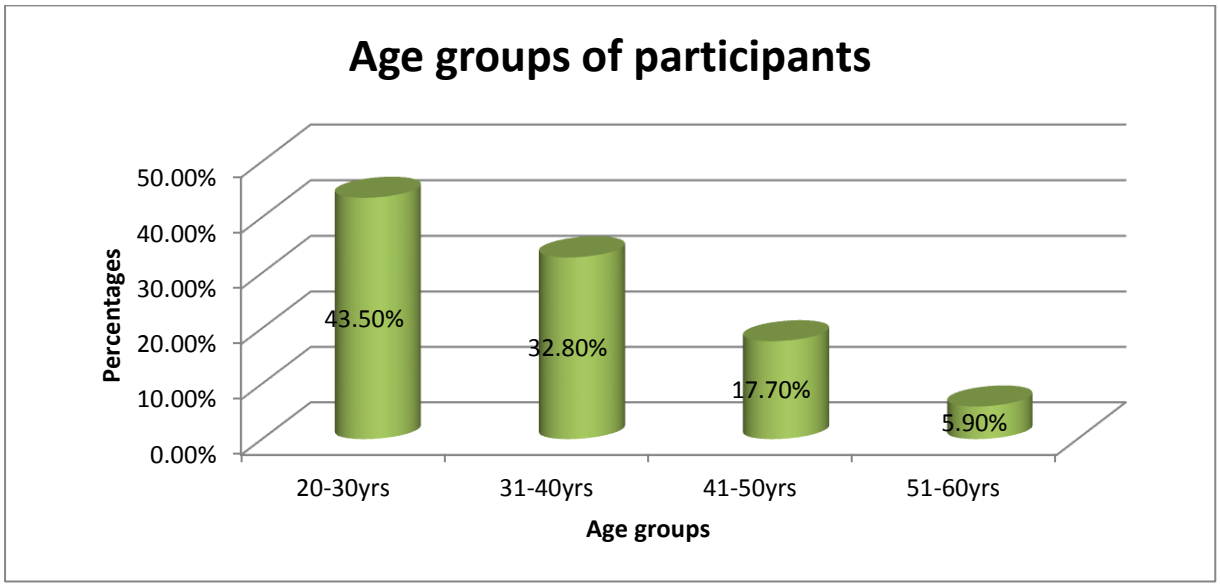

Figure 4.1: Age groups of participants (n= 260)

Fig 4.1 shows that the age of the participants ranged from <30 years, (44%), 31-45 years (38%) and above≥ 46 years represented 18% of the total sample.

Table 4.2 Professions of respondents, % in column; n = 260

Profession	Frequencies	Percentages
Nurses	124	47.7
Doctors	38	14.6
Dentistry	16	6.2
Allied Health	28	10.8
Laboratory staff	30	11.5
General workers	24	9.2
Total	260	100%

Table 4.2 above shows that 47.7% of respondents were nurses followed by 14.6% of Doctors and 11.5% of laboratory personnel and 10.8% other allied health care workers.

Table 4.3 Knowledge of Hand Hygiene as reported by Respondents, n=260; % in rows

Knowledge of Hand hygiene	Yes N (%)	No N (%)	Not Sure N (%)
I was educated on the use of the hand hygiene	248(95.4)	10(3.8)	2(0.8)
I know what is hand hygiene	256(98.5)	2(0.8)	2(0.8)
Performing hand hygiene in the recommended situations can reduce patient mortality	230(88.5)	25(9.6)	5(1.9)
Performing hand hygiene in the recommended situations can reduce medical costs associated with hospital acquired infections	225(86.5)	20(7.7)	15(5.8)
Prevention of hospital acquired infection is a valuable part of a health care worker's role	241(92.7)	17(6.5)	2(0.8)
Failure to perform hand hygiene in the recommended situations can be considered negligence	225(86.5)	24(9.2)	11(4.2)
Performing hand hygiene slows down building immunity to disease	126(48.5)	121(46.5)	12(4.6)
Performing hand hygiene after caring for a wound can protect from infections	257(98.8)	3(1.2)	0(0)
Cleansing hands after going to the toilet can reduce transmission of infectious disease	257(98.8)	3(1.2)	0(0)

Table 4.3 above shows that the majority of the respondents have Knowledge of Hand Hygiene; About 48% of HCWs reported that Performing hand hygiene slows down building immunity to disease.

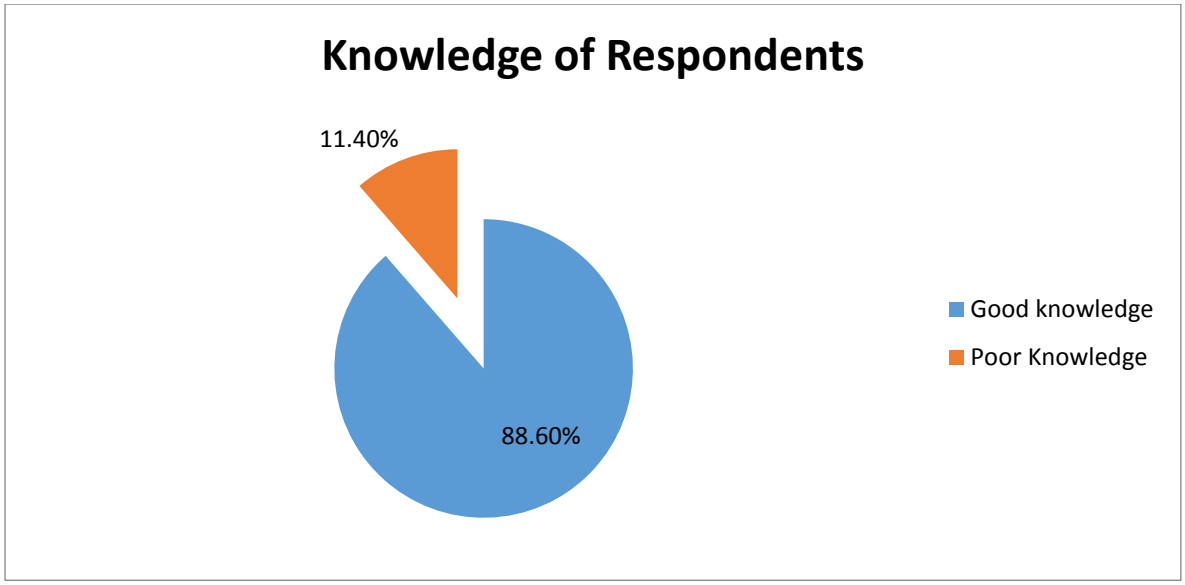

Fig 4.2: Summary of Knowledge of Respondents.

Figure 4.2 above shows that the majority of respondents (88.6%) had good knowledge and only 11.4% had poor knowledge.

Table 4.4 Practice of Hand hygiene as reported by respondents, % in rows, n=260

Practice	Yes N (%)	No N (%)	Not Sure N (%)
I sometimes forget to perform hand hygiene	158(60.8)	98(37.7)	4(1.5)
I wash my hands every-time after I handle patient	149(57.3)	101(38.9)	10(3.9)
When busy it is more important to complete my tasks than to perform hand hygiene	127(48.9)	131(50.4)	2(0.8)
I can't always perform hand hygiene in recommended situations because my patient's needs come first	86(33.1)	169(65)	5(1.9)
I follow the example of senior health care workers when deciding whether or not to perform hand hygiene	88(33.9)	169(65)	3(1.1)
I believe I have the power to change poor practices in the workplace	212(81.5)	33(12.7)	15(5.8)
Hand hygiene is a habit for me in my personal life	217(83.5)	37(14.2)	6(2.3)
I can effectively apply my knowledge of hand hygiene to my clinical practice	232(89.2)	23(8.9)	5(1.9)
It is an effort to remember to perform hand hygiene in the recommended situations	160(61.5)	98(37.7)	2(0.8)
I would feel uncomfortable reminding a health professional to do hand wash	107(41.2)	149(57.3)	4(1.5)
Performing hand hygiene slows down building immunity to disease	126(48.5)	121(46.5)	13(5)
Dirty sinks can be a reason for not washing hands	171(65.8)	80(30.8)	9(3.5)
Lack of an acceptable soap product can be a reason for not cleansing hands	190(73.1)	66(25.4)	4(1.5)
Staff do hand hygiene in between patient	71(27.3)	82(31.5)	107(41.2)

Table 4.4 above shows that 61% of HCW sometimes forget to perform hand hygiene; 57% HCW wash my hands every-time after they handle patient.49% HCW reported that When busy it is more important for the respondent to complete their, tasks than to perform hand hygiene.33% HCWs reported that they can't always perform hand hygiene in recommended situations because their patient's needs come first. 89% of health care workers can effectively apply their knowledge of hand hygiene to their clinical practice.83% HCW take Hand hygiene as a habit for them in their personal life. 82% of HCW believe have the power to change poor Practices in the workplace.62% HCWs reported It was an effort to remember to perform hand hygiene in the recommended situations.

Table 4.5 Practice of Hand hygiene as reported by respondents, % in rows; n=260

Practice	Yes N (%)	No N (%)	Not Sure N (%)
I sometimes forget to perform hand hygiene	158(60.8)	98(37.7)	4(1.5)
I wash my hands every-time after I handle patient	149(57.3)	101(38.9)	10(3.9)
When busy it is more important to complete my tasks than to perform hand hygiene	127(48.9)	131(50.4)	2(0.8)
I can't always perform hand hygiene in recommended situations because my patient's needs come first	86(33.1)	169(65)	5(1.9)
I follow the example of senior health care workers when deciding whether or not to perform hand hygiene	88(33.9)	169(65)	3(1.1)
I believe I have the power to change poor practices in the workplace	212(81.5)	33(12.7)	15(5.8)
Hand hygiene is a habit for me in my personal life	217(83.5)	37(14.2)	6(2.3)
I can effectively apply my knowledge of hand	232(89.2)	23(8.9)	5(1.9)

hygiene to my clinical practice			
It is an effort to remember to perform hand hygiene in the recommended situations	160(61.5)	98(37.7)	2(0.8)
I would feel uncomfortable reminding a health professional to do hand wash	107(41.2)	149(57.3)	4(1.5)
Performing hand hygiene slows down building immunity to disease	126(48.5)	121(46.5)	13(5)
Dirty sinks can be a reason for not washing hands	171(65.8)	80(30.8)	9(3.5)
Lack of an acceptable soap product can be a reason for not cleansing hands	190(73.1)	66(25.4)	4(1.5)
Staff do hand hygiene in between patient	71(27.3)	82(31.5)	107(41.2)

According to table 4.5 In access to hand hygiene tools, the respondents answered eight variable.87% of HCWs respondent that hand soap available and 8% responded that soap was not available, whereas 5% were not sure. 65% responded that there is easy to access hand wash basin, 34% responded that there were no easy access to hand wash 1% was not sure.43% HCWs responded that there were elbow taps in their units,56 % responded that there were no elbow taps and 1% were not sure.82% HCWs reported that soap dispensers were available and functional, whereas 15% said there were no soap dispensers and 3% were not sure .79% responded that disposable hand towel were available and accessible, while 17% responded that disposable hand towels were not available and accessible, and 4% were not sure of the response.

Table 4.6: Hand hygiene Actions for Germ Transmission Prevention to the Patient, as reported by respondents, n= 260; % in rows

Hand hygiene Actions	YES N (%)	NO N (%)	Not sure N (%)
Hand hygiene Before touching a patient	256(98)	2(1)	2(1)
Hand hygiene in Between patients	257(99)	2(1)	0(0)
Hand hygiene after physical contact with patient	242(93)	17(7)	0(0)
Hand hygiene Immediately after a risk of body fluid exposure	246(95)	13(5)	0(0)
Hand hygiene After exposure to the immediate surroundings of a patient	220(85)	34(13)	6(2)
Hand hygiene Immediately before a clean/aseptic procedure	254(98)	6(2)	0(0)
Hand hygiene After inserting an invasive device	236(91)	23(9)	0(0)

Table 4.6 above shows that the majority of HCWS do practice had hygiene, with only a few who did not.

Table 4.7: Hand hygiene actions that prevent transmission of germs to the health-care worker.

Actions	YES N (%)	NO N (%)	Not sure N (%)
Hand hygiene Before touching a patient	186(71.5)	71(27.3)	3(1.2)
Hand hygiene in Between patients	250(96.2)	8(3.1)	2(0.7)
Hand hygiene after physical contact with patient	258(99.2)	2(0.8)	0(0)
Hand hygiene Immediately after a risk of body fluid exposure	260(100)	0(0)	0(0)
Hand hygiene After exposure to the immediate surroundings of a patient	248(95.4)	12(4.6)	0(0)
Hand hygiene Immediately before a clean/aseptic procedure	206(79.2)	41(15.8)	13(5)
Hand hygiene After inserting an invasive device	255(98.1)	3(1.2)	2(0.7)

According to table 4.7 above, 72%HCWs perform Hand hygiene before touching a patient, whilst 27% do not perform hand hygiene before touching patient. . Also, 96% perform Hand hygiene in-between patients and 99% perform Hand hygiene after physical contact with patient.

Table 4.8 Access to hand hygiene tools as reported by respondents, n=260; % in rows

Tools	Yes N (%)	No N (%)	Not sure N (%)
Is Hand Soap available	226(86.9)	22(8,5)	12(4,6)
Are there easy to access hand wash basin	168(64.6)	89(34.2)	3(1.2)
Are taps elbow taps	113(43.5)	145(55.8)	2(0.8)
Soap dispenser available and functional	212(81.5)	39(15.0)	9(3.5)
Disposable Hand towel available and is accessible	205(78.8)	45(17.3)	10(3.8)
Hand hygiene posters demonstrating good hand washing techniques available	216(83.1)	41(15.8)	3(1.2)
Alcohol hand rubs available and functional	146(56.2)	101(38.8)	13(5.0)
Is there hand washing basins in each treatment room	130(50.0)	67(25.8)	63(24.2)

Table 4.8 shows that HCWs generally had access to hand hygiene tools, but 56% reported that their wards did not have elbow taps and 34% reported that had wash basins were not easily accessible and alcohol had rubs were not functional (39%).

Table 4.9 Hand hygiene Actions for Germ Transmission Prevention to the Patient, N= 260; % in rows

Hand hygiene Actions	**YES** **N (%)**	**NO** **N (%)**	**Not sure** **N (%)**
Hand hygiene Before touching a patient	256(98.4)	2(0.8)	2(0.8)
Hand hygiene in Between patients	257(98.9)	3(1.1)	0(0)
Hand hygiene after physical contact with patient	242(93.1)	18(6.9)	0(0)
Hand hygiene Immediately after a risk of body fluid exposure	246(94.6)	14(5.4)	0(0)
Hand hygiene After exposure to the immediate surroundings of a patient	220(84.6)	34(13.1)	6(2.3)
Hand hygiene Immediately before a clean/aseptic procedure	254(97.7)	6(2.3)	0(0)
Hand hygiene After inserting an invasive device	236(90.8)	24(9.2)	0(0)

Table 4.9 above shows that the majority of HCWs practiced hand hygiene before, during, and after dealing with the patient with majority scoring over 90% in all aspects.

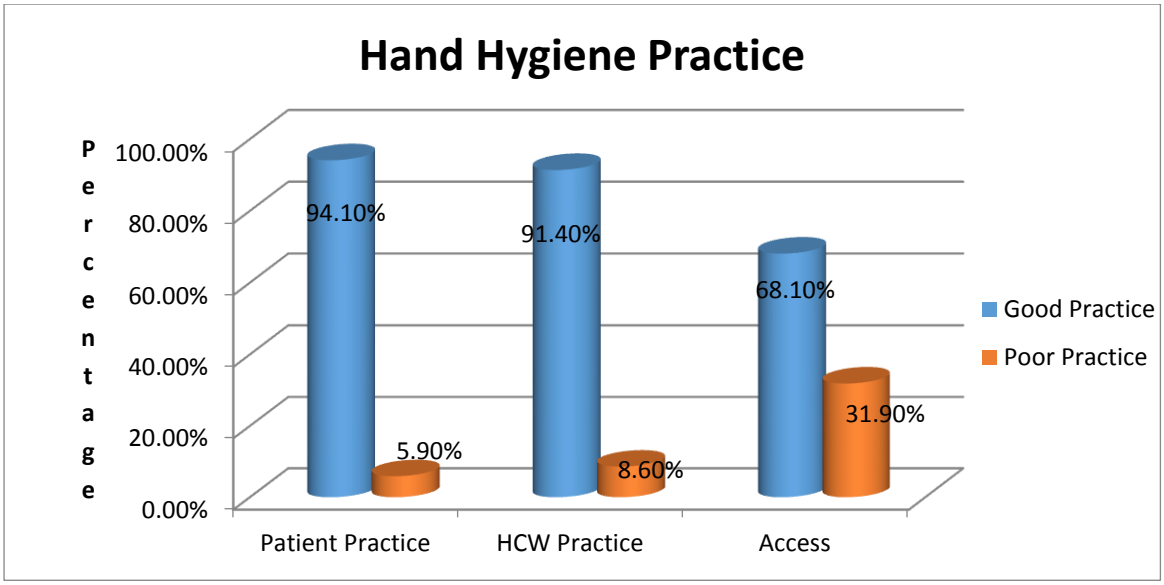

Figure 4.3: Summary of hand hygiene Actions of patients, HCW and access as reported by respondents.

Figure 4.3 shows that the majority of respondents have good hand hygiene practice whilst handling the patient (94.1%); and 31.9% had poor access to hand hygiene tools.

Table 4.10: Protection against germs as reported by respondents:

Items to be avoided	Yes	No
Wearing jewellery	227(87.3)	33(12.7)
Damaged skin	242(93.1)	18(6.9)
Artificial fingernails	224(86.2)	36(13.8)
Regular use of a hand cream	53(20.4)	207(79.6)

Table 4.10 above shows that 87.3% of HCW reported that they avoid to wear jewellery while working; and 86% HCWs avoid artificial fingernails

Table 4.11: Reasons for not Practicing Regular Hand Hygiene as reported by respondents; n=260; % in rows

Reasons	Yes	No	Not sure
Too busy	160(61.5)	92(35.4)	8(3.1)
Forget	150(57.7)	101(38.9)	9(3.4)
Not in convenient location	193(74.2)	55(21.2)	12(4.6)
Damages skin	98(37.7)	152(58.5)	10(3.8)
Out of product	204(78.5)	51(19.6)	5(1.9)
Unsure of need	58(22.3)	127(48.9)	75(28.8)
Always wear gloves	107(41.2)	111(42.7)	42(16.1)

Table 4.11 shows that 61.5% of HCWs reported that they are too busy to perform regular hand hygiene while 57.7 % of HCWs reported that they forget to perform hand hygiene. About 74.2% of HCWs reported that hand hygiene equipments were not in convenient location. 78% HCWs reported that they do not perform hand hygiene because of lack of hand hygiene products, while 20% did not affirm and 2% were not sure. 22% HCWs reported that they were unsure of the need of hand hygiene.41% of HCWs reported that they do not wash hands because they always wear gloves and 43% said they do not always wear gloves.

Table 4.12: Chi-square Tests: Test for independence between 2 or more categorical groups

Table 4.12(a)

	Gender	Age group	Categories of HCW	I know what is hand hygiene
Chi-Square(a,b,c,d)	23.529	163.923	644.691	506.620
Df	1	7	12	2
Asymp. Sig.	.000	.000	.000	.000

Table 4.12 (a) shows that Age, Gender and profession significantly independent with the knowledge of hand hygiene

Table 4.12 (b) Chi-SquareTest Statistics

	I wash my hands every time after I handle patient	Categories of HCW	Gender	Age group
Chi-Square(a,b,c,d)	112.639	644.691	23.529	163.923
Df	2	12	1	7
Asymp. Sig.	.000	.000	.000	.000

Table 4.12(b) shows that Practicing hand hygiene is independent of profession, gender and age

Table 4.12(c) Test Statistics

	I wash my my hands every time after I handle patient	Is there hand washing basins in each treatment room	Lack of an an acceptable soap product can be a reason for not cleasing hands	Is hand soap available	Are there easy to access hand wash basin	Are taps elbow taps
Chi-Square(a,b,c,d)	112.639	32.719	200.059	326.090	164.974	115.463
Df	2	2	2	2	2	2
Asymp. Sig.	.000	.000	.000	.000	.000	.000

Table 4.12 (c) shows that Hand hygiene actions are independent of availability of tools in the work area

.**Table 4.12(d) Test Statistics**

	Performing hand hygiene in the recommended situations can reduce medical costs	Performing hand hygiene in the recommended situations can reduce patient mortality	Categories of HCW	Age group
Chi-Square(a,b,c,d)	326.867	358.754	644.691	163.923
Df	2	2	12	7
Asymp. Sig.	.000	.000	.000	.000

Table 4.12 (d) shows that Any reason for practicing hand hygiene is independent of age and the profession of health workers.

Table 4.12(e) ANOVA test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.091	4	.273	1.962	.101(a)
	Residual	35.448	255	.139		
	Total	36.538	259			

a Predictors: (Constant), Disposable hand towel available and accessible, Failure to perform hand hygiene in the recommended situations can be considered
negligence, Are there easy to access hand wash basin, Are taps elbow taps
b Dependent Variable: Prevention of hospital acquired infection is a valuable part of help care

Table 4.12(f) Coefficients(a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.836	.134		13.747	.000
Failure to perform hand hygiene in the recommended situations can be considered negligence	.031	.043	.045	.730	.466
Are there easy to	.038	.049	.051	.772	.441

access hand wash basin					
Are taps elbow taps	.067	.045	.099	1.488	.138
Disposable hand towel available and accessible	-.093	.045	-.130	-2.066	.040

a Dependent Variable: Prevention of hospital acquired infection is a valuable part of health care system

Regression Analysis Results from above:

Prevention of hospital acquired infection does not depend on; Failure to perform hand hygiene; access to hand wash basin and availability of elbow taps; however accessibility to disposable towel has tested significant.

CHAPTER 5

DISCUSSION, CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

5.1 Introduction

The aim of the study was to assess hand hygiene practices among health care Workers in Nyangabgwe Hospital, Francistown; Botswana.This chapter will include the following areas: discussions which will address each individual objective, a conclusions statement, recommendations and limitation of the study based on the results in chapter four.

OBJECTIVES:

Objective 1: *To determine socio-demographic profile of healthcare workers.*

Objective 2*: To determine the hand hygiene practices among health care workers at Nyangabgwe Hospital in Francistown, Botswana.*

Objective 3: *To determine the resources available for hand hygiene at Nyangabgwe Hospital such as hand basin, elbow tap, hand soap, hand towels and alcohol hand rub (sanitizer)*

Objective 4: *To identify the attitude of HCWs towards hand hygiene practice, at Nyangabgwe Hospital*

Objective 5: *To identify the barriers (structural, organizational, cognitive and social) to hand hygiene practices.*

5.2 Objectives Discussion:

Introduction:

Adequate hand hygiene of healthcare workers is the single most effective means of preventing nosocomial infections. Hand hygiene compliance is based on disinfecting hands appropriately (Mehtar 2010). According to Sydnor and Perl (2011) patients in hospital are at high risk of developing infections that they did not have before

admission. Sydnor and Perl (2011) further argue that most health care-associated infection is spread by direct contact, especially via the hands of health workers. Traditionally hand hygiene, such as washing hands before and after seeing patients, has been considered the single most important way of reducing such infections, but compliance with hand hygiene protocols in health workers is poor (CDC, 2008).

Nyangabgwe hospital is the second biggest hospital in Botswana which caters for the whole northern region of Botswana as both referral and district hospital and it has bed capacity of 547 though most of the time it goes up to 700 patients. The microbiology laboratory results for 2014 showed a high increase on HAis especially the extended spectrum beta lactamase (ESBL) bacteria and Methicillin resistant staphylococcus aureus (MRSA). This development calls for proper management of hand hygiene practices. Hand hygiene brings about greater focus on prevention and control of Healthcare Associated Infections through behavior changes practices by healthcare workers.

Objective 1: *To determine socio-demographic Profile of healthcare workers.*

Gender, age and years of service.

Gender:

The results of study show that the majority of respondents were nurses. Nurses contribute to the majority population of the health care workers in many health institutions. According to Yawson (2013) nurses constitute the largest percentage of the health care workers (HCW) and they are the “nucleus of the health care system”. Because they spend more time with patients than any other HCWs and their compliance with hand washing guidelines seems to be more vital in preventing the disease transmission among patients (Gessessew & Kahsu, 2009).

The results of this study further revealed that the majority of the respondents were females compared to males. According to Statistic from Botswana Ministry of health (2011), nursing profession is mainly dominated by females throughout the world including Botswana. It is therefore not surprising that the majority of respondents were females**.** However, according to United Nation statistics (2006) the percentage of female employee in Botswana is 34% and while male is 55% which prove the

exceptions in nursing cadre, where majority of employees are females. Lau Chun Ling (2012) further revealed that female healthcare workers tend to wash hand more often than male ones, meaning, that it is expected that more females than males would practice hand washing compared to males

Age:

The results revealed that most of the respondents were less than 45 years of age, which is consistent with work force age range of 20 to 45 years (Statistics Botswana Report (2011). Owusu-Ofori et al (2010) stated that the hand hygiene compliance was the highest in the age group of 31-40 years old. Studies reveal that younger HCWs are likely to practice hand-washing compared to older ones (Gebresilassie, Kumel & Yemane, 2014). Gebresillassie et al., (2014) also found that younger HCWs were more compliant than older ones. This therefore implies that as HCWs grow older in the profession, they tend to be noncompliant when it comes to precautions such as hand washing.

Education:

The results of this study revealed that the majority of the respondents had done tertiary education. The majority of participants had gone up to tertiary level, this is justified by the fact that the majority of health professionals have to go up to tertiary level for them to be HCWs. Hand hygiene is part of standard precaution which are taught pre-clinical exposure to all health care workers. McGuckin, et al (2011) argues that the high level of knowledge on hand washing by the HCWs is not unexpected by virtue of their medical background. The results of McGuckin, et al (2011) study shows that hand hygiene was independent from level of education, meaning, it is all about priorities and behaviour change.

Effective hand hygiene is essential for reducing healthcare associated infections. However, compliance of healthcare workers to hand hygiene guidelines are reportedly generally poor (WHO, 2009). Avsar et al, 2015) also found that student nurses were not using a correct hand washing technique, and were doing so less frequently. It is therefore important to instil adequate knowledge and good attitudes

and practices at the time of primary training of the healthcare workers as suggested by Boyce et al (2005). The fact that most of health care workers have gone up to tertiary level means that they can effectively apply their knowledge of hand hygiene to their clinical practice.

Years of Services

The results of this study revealed that the majority of respondents had worked for less than 10years, which correlates to their age grouping that was reported earlier. According to Lau Chun Ling study in 2012, the level of working experience was not associated with hand hygiene adherence rates. However findings of the current study

Objective 2: To determine the hand hygiene practices among health care workers at Nyangabgwe Hospital in Francistown, Botswana.

Practices:

The results of the study revealed that most of respondents sometimes forgot to perform hand hygiene and did not wash hands every-time after they handle a patient. According Lau Chun Ling (2012), approximately 27% - 50.8% HCWs reported that they failed to remember that they have to perform hand hygiene. Mathur (2004) similarly reported that adherence to recommended hand-washing practices remains unacceptably low, rarely exceeding of situations in which hand hygiene is indicated. The current results further revealed that HCWs reported that when they are busy as reasons for non-compliance to hand hygiene. It looks like, what becomes more important to them was to complete their tasks than to perform hand hygiene. The fact that some HCWs did not regularly perform hand hygiene means that HCWs are putting the very patients that they are trying to protect at risk of cross infection, and putting themselves at risk of being infected as well. Rosenthal et al, (2008) reported that there are about 5 million cases of healthcare associated infections annually, contributing to 135,000 deaths in Europe alone. This, according to WHO (2009) has an impact on Healthcare cost to billions of dollars, and according to Chen et al, (2005) can significantly increase length of hospitalization of patients.

Mathai , George and Abraham, (2011) reported that the most common reason for the hand hygiene non-compliance was that HCWs were too busy; when the workload is heavy or the activity index is higher (>20), there is higher demand for hand hygiene and that leads to lower hand hygiene compliance, hence lower compliance rate results. According to Pittet et al (2000), there is a direct relation between increased workload and reduced hand hygiene compliance.

The results of the current study revealed that there was no significant difference in practices of hand hygiene between the respondents according to different years of services. Although hand hygiene is a very simple procedure and has long been deemed one of the most important infection control measures, the compliance rates by health care workers are generally reported to be low and does not depend on the years of services.

According to Pettit, (2006), five moment of hand hygiene hand hygiene should be performed before touching a patient, before aseptic / clean procedure, after body fluid exposure risk, after touching a patient and after touching patient surroundings. The WHO (2007) Guidelines on Hand Hygiene in Health Care provider healthcare workers states that , with a thorough review of evidence on hand hygiene in health care and specific recommendations to improve practices and reduce the transmission of pathogenic microorganisms to patients and HCWs. The WHO “SAVE LIVES: Clean Your Hands” programme reinforces the “*My 5 Moments for Hand Hygiene*” approach as key to protect the patients; HCWs and the health-care environment against the spread of pathogens and thus reduce Healthcare-associated infections (HAIs). This approach encourages HCWs to clean their hands: before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient and after touching patient surroundings-(WHO, 2007). Mathur et al, (2004) reported that multimodal strategies have been shown to be more successful in improving rates of adherence with hand hygiene in HCWs than single interventions, e.g. Multi-faceted approaches focusing on system change, administrative support, motivation, availability of alcohol-based hand rubs, training and intensive education of HCWs and reminders in the workplace have been recommended for improvement in hand hygiene. There should also be adequate supply of hand hygiene products, lotions and creams, disposable towels and facilities

for hand washing, where necessary Alcohol hand rubs should be available at the point of care in sufficient quantities. (Pettit, 2009)

The results of this study revealed that the majority of HCWs viewed proper hand hygiene as important, however, due to insufficient hand hygiene equipment and the improper proximity of hand hygiene facilities at point of care had as reported by some HCWs, led to poor hand hygiene practices, As HCWs continue not practicing good hand hygiene, HCWs' hands become progressively colonized with germs as well as with potential pathogens during patient care. According to Fraise, Mailard and Sattar (2012), "*the longer the duration of care, the higher the degree of hand contamination*". Hence proper hand hygiene needs to be practiced to prevent cross contamination.

The results of this study further revealed that Healthcare workers reported that hand hygiene practices were of importance to the patient care, but compliance is still not adhered too and there are still reported cases of Hospital acquired Infections such as MRSA, and ESBL. Indications for hand hygiene are justified by the risk of transmission. Furthermore, the results of the current study; found that all respondents recognized the fundamental role of hand hygiene in infection prevention.

The results of this study further revealed a significant association between age, gender, HCW category and hand hygiene practices. The findings further revealed that the older the HCWs the less the hand hygiene compliance. These findings are similar to Gebresillassie et al., (2014) who reported that younger HCWs were more compliant than older ones.

Knowledge:

The results of this study found that HCWs generally had good knowledge about recommended hand hygiene practices. According to the results, the majority of the respondents had good knowledge on hand hygiene. Pittet et al (2009) further emphasized the fact that training builds the capacity of HCWs, which has a significant association with hand hygiene compliance. Indeed, training can be crucial

in terms of hand hygiene compliance; and by extension, post-training follow-up may contribute to better hand hygiene, according to Allengranzi et al (2010).

According to the previous studies on hand hygiene, knowledge about hand hygiene was found to be significantly better among the obstetrics and gynaecology medical residents when compared to the others (Sax, Uckay, Richet, Allegranzi, Pittet 2007). The low level of knowledge of hand hygiene among the emergency medical residents in the current study was attributed to their workload and nature of their work, where they are required to work under severe pressure, and often missing the opportunity to comply to hand hygiene. Also, observational studies have found that nurses tend to have better hand hygiene practices than doctors (Lau Chun Ling, 2012). In this study there was no significance difference between nurses and doctors according to hand hygiene practices.

Increased awareness of the importance hand hygiene is the key to prevention of HAIs. Educational interventions for HCWs should provide clear evidence that HCWs hands become grossly contaminated with pathogens upon patient contact and that hand hygiene is the easiest and most effective means of decontaminating hands and thereby reducing the rates of HAIs (Sax et al 2007). The results of the current study further revealed that HCWs believed that they have the power to change practice in the workplace. Yuan et al (2008) further suggest that hand hygiene is more of a behavioural practice and the will to change bad practice to good one relies heavily on the willingness to practice proper and consistent hand hygiene.

The finding from the study showed that there respondents affirmed that Hand hygiene posters demonstrating good hand washing techniques were available. Meaning that the poster would constantly remind HCWs on performing hand hygiene. According to Sax et al (2007) study on compliance with hand hygiene, improved significantly following a hospital wide education programme and coinciding with a reduction of nosocomial infections and the posters campaigns also improved adherence which was sustained and observed across the hospital.

Objective 3: *To determine the resources available for hand hygiene at Nyangabgwe Hospital***.**

Resource gaps can limit improvements in hand hygiene practices whereas healthcare workers both appreciated and understood the importance of hand hygiene and the recommended practices (Yuan et al.2008).

The results of the this study found that the majority of HCW reported that proper practices often did not occur due to limited equipment placement to support hand hygiene efforts.

In this current study, some of the respondents reported that alcohol hand rubs are available and dispensers are functional and the majority of the respondents reported that there were functional hand washing basins in each treatment room. According to Pittet et al (2010), hand hygiene was significantly improved when HCWs used alcohol-based product rather than using antiseptic detergent to clean their hands.

According to the current results HCWs indicated that it was easy to access hand hygiene tools, which is therefore a good contributing factor to good hand hygiene practices. Sax et al (2007) affirmed that lack of products of hand hygiene does hamper HCWs from practicing hand hygiene. Hand hygiene resources have many barriers to proper hand hygiene (HH). There is therefore evidence that the resources/ hand hygiene commodities were available however, hand hygiene practices remained poor due to other factors like attitudes, priorities, type of taps and the proximity of hand basins to point of care. Equipment gaps included absence of elbow taps and unavailability of hand soap, hand towels, and improper proximity hand basins to the point of care. The issue of inadequate equipment and resources can limit compliance of hand hygiene practices. Even if healthcare workers' sense to do hand hygiene is strong, facilities and equipment need to improve, like accessible hand basin for instance. It was interesting to note that although hand rub was satisfactorily available the respondents were not practising good hand hygiene

Objective 4: To identify the attitude of HCWs towards hand hygiene practice, at Nyangabgwe Hospital.

The current study revealed that the majority of the respondents had moderate knowledge; while approximately half of the respondents had good attitudes while majority had poor hand hygiene practices. This study shows the need for further improvement of the existing hand hygiene training programs to address the gaps in knowledge, attitudes and practices.

Hand hygiene is a simple procedure which is instrumental in reducing hospital acquired infections and cross transmission of pathogens in the hospitals and especially among patients. ln addition almost half of the respondents felt that the facilities available for hand hygiene was not adequate. Despite the fact that hand hygiene is considered as the single best measure for infection control, compliance of health care workers regarding hand hygiene remains consistently poor.The study also revealed that there were factors that hindered HCWs from Practicing Hand Hygiene, Respondents reported that they were too busy to perform hand hygiene. Others indicated that they forget to perform hand hygiene. The majority of respondents reported that hand hygiene equipment were not in convenient location. Some of HCWs reported that they do not wash hand because they always wear gloves /and lastly some reported that damage skin does not hinder them to practice hand hygiene. According to Pittet et al (2000 HCW's reasons for not washing hands included skin irritation, in accessible hand washing supplies, wearing gloves, being too busy or not thinking about it. There are a lot of challenges as far as hand hygiene practices is concerned, according to Yuan et al (2008) findings from the study suggested that the primary challenges in improving hand hygiene were limited to the lack of resources and knowledge and attitudes Similar to studies reported from other developing countries, the health care workers in the hospitals were not satisfied with the facilities available for hand hygiene. Therefore we need to address this issue and improve facilities such as improving the availability of soap/antiseptics, paper/cloth for drying hands and gloves. Furthermore, it is essential to conduct hand hygiene training programmes for the hospital staff members, (Kudavidnange, Gunasekara and Hapuarachchi 2011).

*Objective 5: To identify the barriers (structural, organizational, cognitive and social) to hand hygiene practices***.**

The results revealed that HCWs reported that the location of hand hygiene equipment hinders them from practicing hand hygiene; this proves that the proximity of the hand hygiene equipment is crucial in good hand hygiene practices. According to Owusu-Ofori (2010), sinks need to be convenient and accessible and, where possible, follow established criteria regarding placement and design. It is also crucial to install alcohol-based hand rub dispensers at the point-of-care so as to improve adherence to hand hygiene Pittet et al (2009).There must be sufficient hand hygiene sinks to encourage and assist staff to readily conform to hand hygiene practices. Hand washing sinks must be cleaned on a regular basis. Hand washing sinks should be regularly inspected to ensure they are maintained in good condition (Owusu-Ofori, 2010). Hand washing sinks must be dedicated to this purpose and not be used for any other purpose. Improper sink placement and design can add to the environmental reservoir of contaminants and can lead to outbreaks, particularly with gram-negative bacilli (e.g., Pseudomonas species). Hand hygiene products must be always at point of care. So as to enhance good hand hygiene practice.

It is evident that providing a conveniently located hand hygiene sink in each patient room reduces HAIs rates (Allegranzi et al, 2010). Also, hand washing sink indications and placement criteria are of fundamental importance Owusu-Ofori (2010). Hand hygiene facilities must be readily available in all clinical areas. Hand washing facilities which are not immediately accessible are one of the main reasons that health care providers do not comply with good hand hygiene practices (Allegranzi and Pittet et al, 2009). This Study offer convincing and important evidence that providing conveniently located hand hygiene sink in each patient care room reduces HAIs rates. HCWs encounter difficulties in complying with hand hygiene indications at different levels. Insufficient or poor hand hygiene practices have been reported from all HCW (Boyce and Pittet (2002). The reasons which explain the suboptimal practices are multiple for example, the lack of appropriate infrastructure and equipment to enable hand hygiene performance, the perception on hand hygiene practices. The most frequently observed factors determining poor

hand hygiene compliance are: understaffing and workload; and wearing gloves. Unfortunately, hand hygiene indications at higher risk of being neglected are the ones that prevent pathogen transmission to the patient (i.e. before patient contact and clean/aseptic procedures) Allengranzi and Pittet (2010).

Infection control practices are of critical importance to overall quality of care and safety of healthcare workers and their patients and the community at large. Despite international engagement in improving hand hygiene, all countries struggle to sustain proper hand hygiene practices in healthcare.

The findings from this study suggest that the primary challenges in improving hand hygiene at Nyangabgwe Hospital are the limited resources and the lack of essential resources. These insights are important as previous studies have attributed poor hand hygiene practices to individuals' knowledge and attitudes, and typical strategies to improve hand hygiene involve staff training (Yuan et al, 2008). Based on my study, the reasons for inadequate hand hygiene are more complicated, and strategies to address this behavior require greater understanding of the organizational culture and systems of accountability that exist in hospital. In this study though the hospital, infection control staff often reported within departments and to senior administration about hand hygiene resources. There are still some problems on hand hygiene commodities procurement. The infection control has no budget hence depend on domestic vote. Also, hand hygiene practices depend on the infrastructure, hand hygiene resources and HCW good practices (behavior change). The infrastructure renovation and maintenance lies with a national outsourced company. As for the hand hygiene supplies lies with outsourced cleaning company. although health care workers can be trained and have the zeal to change the behavior on hand hygiene practices, if the infrastructure is improper and there are no hand hygiene supplies and hand compliance remain compromised and can lead to HAIs.

Therefore, more funds should be directed at improving hand hygiene practices. Building management should support infection control measures, and involve infection control on Hospital infrastructure, especially placement of hand basins and

provision of elbow taps. More modern methods of hand hygiene surveillance are also needed.

5.3 CONCLUSION:

In conclusion, the study highlights the urgent need for introducing measures to increase good practices on hand hygiene and improve facilities available for hand hygiene in Nyabgabgwe Hospital, which may play very important role in increasing hand hygiene compliance among the Nyangabgwe Hospital staff and reducing cross transmission of infections among the patients. Hand hygiene is an effective strategy to prevent health care-associated infections and limit the transmission of microorganisms, including antibiotic-resistant organisms (ARO). It is a required practice for all health care providers and it is recommended in all national and international infection control guidelines and is a basic expectation of patients and their families (Provincial Infectious Diseases Advisory Committee.2014). There are many issues concerning all aspects of hand hygiene which remain unresolved. While hand hygiene practices are simple, compliance with hand hygiene falls in the domain of human behaviour, and altering human behaviour is complex and constitutes an enormous challenge.

The Impact of hand hygiene promotion on HAIs given the complexity of hand hygiene behavior and the influence of numerous external factors, promotion of good practices is complex and its potential for success depends on the delicate balance between evaluation of benefits and existent barriers. Demonstration of the effectiveness of recommendations and strategies to improve hand hygiene as the ultimate outcome is crucial in both motivating HCWs' behavioral change and securing an investment in this preventive measure by policy-makers and healthcare managers. However, research in this field represents a very challenging activity since methodological and ethical concerns make it difficult to conduct randomized controlled trials with appropriate sample sizes that could establish the relative importance of hand hygiene in the prevention of HAI. In addition, HAI surveillance is a very resource- and time-consuming activity requiring rigorous and standardized methods, and therefore is seldom available on a regular and reliable basis.

Adequate hand hygiene of healthcare workers is the single most effective means of preventing nosocomial infections. Adequate hand hygiene of healthcare workers is the single most effective means of preventing nosocomial bloodstream infections. Hand hygiene compliance is based on disinfecting hand appropriately. Whereas Health care workers appreciated the importance of hand hygiene and understand recommended hand hygiene practices, many reported limited equipment to support hand hygiene as a big challenge. Without resource there no how hand hygiene practice at Nyangabgwe Hospital can expand. Although widely preached and recognized by healthcare workers and the public that hand hygiene is paramount in preventing transmission of pathogens, adherence to practice is difficult. Several studies worldwide have reported adherence rates of up to 67% at best. Most of the studies like this one reveals that healthcare workers do not wash hands willingly.

5.4 RECOMMENDATIONS

There is a need for regular trainings among health care workers with regard to hand hygiene.

There is need to Periodically monitor and record adherence as the number of hand-hygiene episodes performed by personnel and or number of hand-hygiene opportunities, by ward or by service. Provide feedback to personnel regarding their performance.

Attitude can be improved by increasing one's knowledge via education program while self-efficacy can be enhanced by social learning from role models or providing positive performance feedback and rewards.

More studies are needed to explore the relationship between availability of resources and facility design, product dispenser placement and designated hand washing sinks play a pivotal role in hand hygiene hence they are essential at any point of care.

Hand hygiene education should be a mandatory component of all clinical course curricula and should be delivered to HCWs prior to clinical placement. Adherence to appropriate hand hygiene should be assessed periodically. Hand hygiene programs and continuous quality improvement are necessary: continuous quality improvement process and hand hygiene program.

Hand hygiene campaigns should be conducted more often is essential.

Hand hygiene Posters to be changed frequently to attract health care workers attention.

5.5 LIMITATIONS

The study has several drawbacks which need to be considered when interpreting this data. Data was collected by using a self-administered questionnaire, which allows the respondent to check others responses or discuss the answers as well as document the expected response rather than the health care workers own practice or attitudes. This can be overcome by incorporating an observational study which will enable the investigator to observe the actual hand hygiene practices among these health care workers. However it is not easy to conduct such a study currently due to the high work load and time restrains.

The Study was also a quantitative, cross sectional study in which there was no sought to understand in depth the reasons for inadequate hand hygiene practices at Nyangabgwe Hospital. Questionnaires were administered at Nyangabgwe hospitals, although were ensured about anonymity, some participants declined due to the length of the questionnaire and some left other questionnaire unattended or not completed the results of the study may not be representative of all the Health care workers at Nyangabgwe Hospital. Questionnaire though self-administered they are bias unlike unannounced observation which can be ethical not correct also.

Given the type of responses received and the guaranteed anonymity. The sample was relatively big which is common with quantitative studies. Theoretical saturation was achieved, and this was a hypothesis-generated study about the possible causes of inadequate hand hygiene in hospitals. . Future research should test whether changes in these factors result in significant improvements in hand hygiene practices. As we strive to improve quality of Nyangabgwe hospital care, resource-poor settings present particular challenges finances and infrastructure

REFERENCE:

Allegranzi, B. and Pittet, D. (2009). Role of hand hygiene in healthcare-associated infection prevention University of Geneva Hospitals and Faculty of Medicine. Geneva: Switzerland.

Allegranzi, B., Sax, H., Bengaly, L., Richet, H., Minta, D., Chraiti, M. (2010). Successful Implementation of the World Health Organization Hand Hygiene Improvement Strategy in a Referral Hospital in Mali: Mali.

Boyce, JM and Pittet D. (2002). Guideline for hand hygiene in health-care settings: Geneva: Switzerland.

Central statistics Office: census 2011: Botswana Population and Housing Census – Index of district. Gaborone: Botswana.

Denico P and Becker L. (2012).Developing Research Proposals: Sage Publication London: United Kingdom.

Erasmus, V, Daha, TJ., Brug, H., Richardus, JH., Behrendt, MD., Vos, MC., van Beeck, EF.,(2010).Systematic review of studies on compliance with hand hygiene guidelines in hospital care. Infection Control Hospital.

Friedman C and Newson W.(2007).Basic Concepts of Infection Control: International Federation of Infection Control. Ireland: United Kingdom.

Jumaa PA.(2004).Hand hygiene: simple and complex: Department of Medical Microbiology, Faculty of Medicine and Health Sciences, United Arab Emirates University: United Arab Emirates**.**

Kampf, G. and Kramer, A., (2004). Epidemiologic background of hand hygiene and evaluation of the most important agents for scrubs and rubs.

Katowa, P., Mukwato, M., Ngoma., Maimbolwa. (2006). Compliance with Infection Prevention Guidelines By Health Care Workers At Ronald Ross General Hospital Mufulira District: Department of Post Basic Nursing, School of Medicine, University of Zambia, Lusaka: Zambia.

Kudavidnange,BP.,Gunasekara,TDCP., and Hapuarachchi,S.,(2011).Knowledge, attitudes and practices on hand hygiene among ICU staff in Anuradhapura Teaching hospital: Anuradhapura teaching hospital.'Depa rtment of Microbilogy, University of Sri Jayawardenepura. 'National Hospital of Sri Lanka.Sri Lanka

Lankford,MG., Zemblower, TR., Trick ,WE., Hacek, DM., Noskin. GA., Peterson, LR.,(2003). Influence of role models and hospital design on hand hygiene of healthcare workers. Accra: Ghana.

Lau Chun Ling.(2012) Factors Affecting Hand Hygiene Compliance in Intensive Care Units: A Systematic Review. The University of Hong Kong. Hong Kong.

Liz evans., Kim Sunley.,Rose Gallagher.,(2012). Essential practice for infection prevention and control Guidance for nursing staff.

Mathai, AS. George, SE., Abraham, J., (2011)Efficacy of a multimodal intervention strategy in improving hand hygiene compliance in a tertiary level intensive care unit. Indian Critical Care Med.

McGuckin, M,, Storr, J,, Longtin Y,, Allegranzi, B,, Pittet D.,(2011) American Journal of Medical Quality: Patient empowerment and multimodal hand hygiene promotion: a win-win strategy. Geneva: Switzerland

Mehtar S. (2010). Understanding Infection Prevention and Control: ABC press, Juta & company Ltd .Capetown: South Africa.

Ministry of health. (2010).Botswana CDC Injection Safety project, The Training Manual: Injection Safety in context of Infection Prevention and Control. Gaborone: Botswana.

Morgan DW and Krejcie, RV.,(1970).Determining Sample size for research activities of Minnesota: USA.

Owusu-Ofori A, (2010). Assessing Hand Hygiene Resources and Practices at a Large African Teaching Hospital. Geneva: Switzerland.

Owusu-Ofori, A., Jennings, R., Burgess, J., Prasad, PA., Acheampong, F.,& Coffin, SE., (2010) .Assessing Hand Hygiene Resources and Practices at a Large African Teaching Hospital. Geneva: Switzerland.

Pittet D. (2000) Improving compliance with hand hygiene in hospitals. Infection Control Hospital.Geneva: Switzerland.

Pessoa-Silva, C.L., Posfay-Barbe, K., Pfister, R., Touveneau, S., Perneger,T.V., Pittet, D., (2005) Attitudes and perceptions toward hand hygiene among healthcare workers caring for critically ill neonates. Infection Control Hospital.

Pittet, D., (2007). The WHO Guidelines on Hand Hygiene in Healthcare (Advanced Draft). Geneva: Switzerland.

Pittet, D., Hugonnet, S., &Harbarth, S. (2000). Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Geneva: Switzerland.

Pittet and Boyce. (2003). Revolutionizing hand hygiene in health-care settings: guidelines revisited. Geneva: Switzerland.

Pittet D. (2005).Clean hands reduce the burden of disease. Geneva: Switzerland.

Pittet D., & Donaldson, L.,(2005). Clean Care is Safer Care: a worldwide priority. Geneva: Switzerland.

Pittet, D., Allegranzi, B., Sax, H., Dharan, S., Pessoa da Silva C., Donaldson, L., &Boyce, J.,(2006). Evidence-based model for hand transmission during patient care and the role of improved practices. Geneva: Switzerland.

Pittet D., Simon, A., Hugonnet, S., Pessoa-Silva, CL., Sauvan, V.&, Perneger, TV., (2004) Hand hygiene among physicians: performance, beliefs, and perceptions. Geneva: Switzerland.

Pittet D, Boyce JM. (2001). Hand hygiene and patient care: Pursuing the Semmelweis legacy. Geneva: Switzerland.

Pittet, D., (2000). Improving compliance with hand hygiene in hospitals. Geneva: Switzerland.

Polit, DF and Hungler BP, (2013). Nursing Research:principles and methods. Sixth edition.Lippincott Williams and wilkins, Philadelphia.USA

Rotter, M., Sattar, SA., Dharan,S., Webber, P., Voss, A.,& Pittet, D., (2005). Comparative efficacy of hand hygiene agents in the reduction of bacteria and viruses. Geneva: Switzerland.

Sax, H., Uckay, I., Richet , H., Allegranzi, B., Pittet,D.,(2007):Determinants of good adherence to hand hygiene among healthcare workers who have extensive exposure to hand hygiene campaigns. Geneva: Switzerland

Scheithauer., Haefner., Schwanz., Lopez-Gonzalez, B., Schulze-Röbbecke., Weishoff-Houben.,& Lemmen .(2012). Hand hygiene in medical students: Performance, education and knowledge: RWTH Aachen: Germany.

Tietjen L., Bossemeyer D., & Baltimore, NM., (2003). Guidelines for Healthcare Facilities with Limited Resources: United States of America. JHPIEGO Corporation. Maryland: United State of America.

Vivas, A., Gelaye, B., Aboset N., Kumie, A., Berhane, Y., and Williams MA., (2004). Knowledge, Attitudes, and Practices (KAP) of Hygiene. RWTH Aachen: Germany.

WHO.(2005).Clean Care is Safer Care: the first global challenge of the WHO World Alliance for Patient Safety. Geneva: Switzerland.

World Health Organization. (2005).Clean care is safer care: the first global challenge of the WHO World Alliance for Patient Safety. Geneva: Switzerland.

World Health Organization. (2005).Clean care is safer care: the first global challenge of the WHO World Alliance for Patient Safety. Geneva: Switzerland.

World Health Organization. (2009). WHO guidelines for hand hygiene in health care. Geneva: Switzerland.World Health Organization. (2003). Practical guidelines for infection control in health care facilities: Geneva: Switzerland

Yawson A and. Hesse AF.(2012) Hand hygiene practices and resources in a teaching hospital in Ghana Accra: Ghana.
Yawson A .2013. Hand hygiene in a teaching hospital in Ghana. Accra: Ghana.

Yildirim, I., Ceyhan, M., Cengiz, A.B., Bagdat, A., Barin, C., Kutluk, T., Gur, D., (2008). A prospective comparative study of the relationship between different types of ring and microbial hand colonization among pediatric intensive care unit nurses.

Yuan,C T.,Dembry L M.,Higa B., Fu M.,Wang H.,(2008). Perception of Hand Hygiene Practices in China: Yale School of Medicine, New Haven: Connecticut, USA

Appendix 1

Project Time line: Year 2014-2016

Activity	**Ma**	**Apr**	**MAY**	**JUN**	**JUL**	**AUG**	**SEPT**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**
Submission Draft to Supervisor	*												
Correction		*											
Final Proposal Submission			*										
Presentation			*										
Submission to SDC				*									
Submission to MREC					*								
Permission from MOH Research Committee									*				
Permission From NH Ethical Committee										*			
Data Collection											*		
Data analysis												*	
Write up												*	
Submission first draft													*
Editing and Binding													
Submission final mini Dissertation													
Graduation													

Appendix 2

Budget

Action	**Activities**	**Costs**
Data collection	Stationary	P2000
	Transport	P2000
	Telephone calls	P500
Data Analysis		P2500
	Editing	P8000
Report	Print of the report	P1500
	Binding of the Report	P300
	Publishing	P5000
Total		P19300

Appendix3 **3**

Table for Determining Sample Size for a Given Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size.

Source: Krejcie & Morgan, 1970

APPENDIX 4

INFORMED CONSENT FORM

Hand hygiene practices among Health care workers at Nyangabgwe Hospital, Botswana

Researcher: Wazha Hlabano Phone number: (00267)71746266
Email: hlabanowazha@gmail.com

Thank you for taking your time out to go through this form.

What you should know about this research study:

- I give you this informed consent document so that you may read about the purpose, risks, and benefits of this study.
- You have the right to refuse to take part, or agree to take part now and change your mind later.
- Please review this consent form carefully. Ask any questions before you make a decision.
- Your participation is voluntary.

Purpose of the study

You are being asked to participate in a study looking at hand hygiene practices among healthcare workers. The purpose of the study is to find out if hand hygiene is being done according to international standards**.** You were selected as a possible participant in this study because you work with patients and also you need to prevent infection transmission through good hand hygiene practices. Results of this study are hoped to benefit all health care workers through making recommendations aimed at improving hand hygiene compliance. Before you sign this form, please ask any questions on any aspect of this study that is unclear to you.

Procedures

If you decide to participate, you will be invited to complete a short questionnaire that may take 10 minutes to complete.

Risks

Nil. The questionnaire will contain no information that could be used to identify you.

Confidentiality & Anonymity

The information obtained from this study will be used for the purposes of this study only.

Voluntary participation

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your future relations with Ministry of Health, its personnel, and associated institutions**.**

Authorization

You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

_____

Name of Research Participant (please print) _____

Signature of Staff Obtaining Consent

YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP.

Appendix 5

Questionnaire for HCW

Date: _____

Site: NH Code no.....

Questionnaire

Hand Hygiene practices among Health Care workers at Nyangabgwe Hospital in Francistown, Botswana

Part One

General Instruction

Please attempt to answer all questions as honestly and consistently as possible. Your personal identity will not be disclosed in this Study.

Please give one answer per question unless multiple answers are required.

Please write neatly or make cross against the appropriate response as applicable.

Socio-Demographic Data Extraction Tool

Section 1 Information on the demographic and qualification of employees		
Records Identification		
Age of employee		
Years of services		
Gender	Male	
	Female	
What is the highest educational level		
Categories of HCW		

	Nurse	
	Medical Doctors	
	Radiographer	
	Physiotherapist	
	Lab Personnel	
	Occupational Therapist	
	Pharmacy Personnel	
	Phlebotomist	
	Dental personnel	
	Dietetics	
	Attendants	
	Hospital Orderly	

Part Two

Scale: Yes =2 No=1 Not Sure = 0

Please tick the appropriate response

	Yes	No	Not Sure
I was educated on the use of the hand hygiene			
I know what is hand hygiene			
I sometimes forget to perform hand hygiene			
I wash my hands every-time after I handle patient			
When busy it is more important to complete my tasks than to perform hand hygiene			
Performing hand hygiene in the recommended situations can reduce patient			

mortality			
Performing hand hygiene in the recommended situations can reduce medical costs associated with hospital acquired infections			
I can't always perform hand hygiene in recommended situations because my patient's needs come first			
Prevention of hospital acquired infection is a valuable part of a health care worker's role			
I follow the example of senior health care workers when deciding whether or not to perform hand hygiene			
I believe I have the power to change poor practices in the workplace			
Failure to perform hand hygiene in the recommended situations can be considered negligence			
Hand hygiene is a habit for me in my personal life			
I can effectively apply my knowledge of hand hygiene to my clinical practice			
It is an effort to remember to perform hand hygiene in the recommended situations			
I would feel uncomfortable reminding a health professional to do hand wash			
Performing hand hygiene slows down building immunity to disease			
Dirty sinks can be a reason for not washing hands			
Lack of an acceptable soap product can be a reason for not cleansing hands			
Performing hand hygiene after caring for a wound can protect from infections			
Cleansing hands after going to the toilet can reduce transmission of infectious disease			
Is Hand Soap available			
Are there easy to access hand wash basin			
Are taps elbow taps			
Soap dispenser available and functional			
Disposable Hand towel available and is accessible			
Hand hygiene posters demonstrating good hand washing techniques available			

Alcohol hand rubs available and functional			
Is there hand washing basins in each treatment room			
Staff do hand hygiene in between patient			

Part Three

1. **Which of the following hand hygiene actions prevents transmission of germs <u>to the patient</u>?**

	YES	NO	Not sure
Hand hygiene Before touching a patient			
Hand hygiene in Between patients			
Hand hygiene after physical contact with patient			
Hand hygiene Immediately after a risk of body fluid exposure			
Hand hygiene After exposure to the immediate surroundings of a patient			
Hand hygiene Immediately before a clean/aseptic procedure			
Hand hygiene After inserting an invasive device			

Part four

2. **Which of the following hand hygiene actions prevents transmission of germs <u>to the health-care worker?</u>**

	YES	NO	Not sure
Hand hygiene Before touching a patient			
Hand hygiene in Between patients			
Hand hygiene after physical contact with patient			

Hand hygiene Immediately after a risk of body fluid exposure			
Hand hygiene After exposure to the immediate surroundings of a patient			
Hand hygiene Immediately before a clean/aseptic procedure			
Hand hygiene After inserting an invasive device			

Part Five

3. **Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs?**
4.

a. Wearing jewellery ☐ Yes ☐ No

b. Damaged skin ☐ Yes ☐ No

c. Artificial fingernails ☐ Yes ☐ No

d. Regular use of a hand cream ☐ Yes ☐ No

Part Six

5. **Reasons given for not Practicing Hand Hygiene as Required**

	YES	NO	Not Sure
Too busy			
Forget			
Not in convenient location			
Damages skin			
Out of product			
Unsure of need			
Always wear gloves			

Thank you for your assistance

Appendix 6

Letter for Permission

P.O. Box 30514

Francistown

Botswana

Hospital Superintendent

Nyangabgwe Hospital

Private Bag 127

Francistown

Botswana

Dear Sir

RE: Request for permission to conduct the study at Nyangabgwe Hospital

I hereby request for permission to conduct the study among Health Care Worker at Nyangabgwe Hospital .I am Currently an enrolled student for Masters of Public Health Degree at school of Public Health, University of Limpopo(Turfloop Campus).I am required to submit a research report in a a partial fulfilment of my degree.

The title of my study is Infection Prevention and Control Practices among health care workers at Nyangabgwe Hospital, Francistown, Botswana. The study will assist to initiate relevant interventions that will reduce Spread of infection and reduce Hospital acquired infections.

The protocol has been submitted to the Medunsa Research Ethic Committee (MREC) for ethical clearance and Ministry of health Research Ethics Committee. The research will commence after the approval of both committees

All participants will be required to give the informed consent prior participating in the study and they will be informed that the participation is voluntary and will be allowed to withdraw from the study at any time. The findings of the study will be shared with the Hospital

Your Sincerely

Wazha Hlabano: Contact no: 71746266 Email Address: hlabanowazha@gmail.com

Appendix 7

P.O. Box 30514
Francistown
Botswana

Permanent Secretary
Ministry Of Health
Private Bag 0038
Gaborone
Botswana

Dear Sir

RE: Request for permission to conduct the study at Nyangabgwe Hospital

I hereby request for permission to conduct the study among Health Care Worker at Nyangabgwe Hospital .I am Currently an enrolled student for Masters of Public Health Degree at school of Public Health, University of Limpopo(Turfloop Campus).I am required to submit a research report in a a partial fulfilment of my degree

The title of my study is Infection Prevention and Control Practices among health care workers at Nyangabgwe Hospital, Francistown, Botswana. The study will assist to initiate relevant interventions that will reduce Spread of infection and reduce Hospital acquired infections.

The protocol has been submitted to the Medunsa Research Ethic Committee (MREC) for ethical clearance and Ministry of health Research Ethics Committee. The research will commence after the approval of both committees

All participants will be required to give the informed consent prior participating in the study and they will be informed that the participation is voluntary and will be allowed to withdraw from the study at any time. The findings of the study will be shared with the Hospital

Your Sincerely

Wazha Hlabano

Contact no: 71746266

Email Address: hlabanowazha@gmail.com