

**INFECTION PREVENTION AND CONTROL PRACTICES AT CHARLOTTE
MAXEKE CENTRAL HOSPITAL NEONATAL UNIT, JOHANNESBURG, SOUTH
AFRICA**

By

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DECLARATION

I declare that **THE INFECTION PREVENTION AND CONTROL PRACTICES AT CHARLOTTE MAXEKE CENTRAL HOSPITAL NEONATAL UNIT, JOHANNESBURG, SOUTH AFRICA** 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.

SIGNATURE DATE

(MR BE MSIBI)

DEDICATION

I dedicate this thesis to God Almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. He has been the source of my strength throughout this study and on His wings only have I soared. I also dedicate this work to my loving family and friends who have encouraged me all the way and whose encouragement has made sure that I give it all it takes to finish that which I have started. To my sons Siphesihle and Solwazi who have been affected in every way possible by this quest. A special feeling of gratitude to my loving mother, Puseletso Msibi whose words of encouragement and push for tenacity ring in my ears. Last but not least I am dedicating this to my late father Samuel Msibi gone forever away from our loving eyes and who left a void never to be filled in our lives.

Thank you. My love for you all can never be quantified. God bless you.

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ABSTRACT

Background: The purpose of this study was to investigate the extent of adherence to Infection Prevention and Control (IP&C) practices and programs amongst healthcare workers (HCWs) in the neonatal ward at Charlotte Maxeke Central Hospital (CMCH).

Methods: Quantitative research was conducted on 57 Clinicians directly providing care to the patients and 5 Health Care Workers indirectly providing care to the patients by means of supporting the environment and logistics where patients are being taken care. Data collection was done using structured questionnaires. Because the population was so small, all available HCWs, who were willing to participate in the study were selected to participate in the study. Furthermore, the SAS statistical software was used to describe and analyse data received from the data collection tools.

Results: Two groups of respondents participated in the study which were (n=57) who in the neonatal ward at CMCH and Health Care Workers (n=5), most of the clinicians were having 1 – 4 years' experience working in the neonatal unit at 54.6% followed by 5 – 9 years at 21.8%. Participants were in the age group ≤ 30 years at 39.3% followed by 31 – 40 years (32.1%) and least being at ≥ 51 years (5.4%). Clinicians included 46% of professional nurses, 28.6% Auxiliary Nursing Assistant, 16.1% student nurses and 8.9% medical doctors. The findings revealed that there are some areas where there's inconsistent in using gloves when anticipating exposure to blood or body fluids, drying of hands after washing and removing jewellery during clinical care among clinicians particularly doctors, professional nurses and student nurses about IPC practices during clinical care.

In Conclusion: There was inadequate compliance with IPC standards and there's a need for regular trainings to improve the knowledge about IPCs and awareness of its importance among clinicians and health care workers in the neonatal unit. The IPC committee need to be revitalized by the hospital management to be able to undertake its mandate. Furthermore, the Hospital administration should provide copies of IPPC policy Guidelines in all wards/units and ensure effective implementation through

constant supervision and adequate supplies and conduct regular audits to enhance compliance and implementation of IPPC policy.

The study concluded that there was inadequate compliance with IPC and there's a need for regular trainings to improve the knowledge about IPCs and awareness of its importance among clinicians and health care workers in the neonatal unit.

KEY CONCEPTS:

Clinicians, Health-Care-Associated Infection (HAI), Health Care Worker (HCW), Infection Prevention and Control; Neonatal

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LIST OF ABBREVIATIONS

CEO	Chief Executive Officer
CMCH	Charlotte Maxheke Central Hospital
ENA	Enrolled Nursing Assistant
HAI'S	Health-Care-Associated InfectionS
HCW	Health Care Worker
IPC	Infection Prevention and Control
IPCP	Infection Prevention Control Policy
MD	Medical Doctor
MDRO	Multiple Drug Resistant Organisms
MEC	Member of Executive Council
MRSA	Methicillin-Resistant <i>Staphylococcus Aureus</i>
RN	Registered Nurses
WHO	World Health Organization
USAID	United States Agency International Development
VLBW	Very Low Birth Weight
ICP	Infection Control Protocol
IPCP	Infection Prevention Control Policy
IPPC	Infection Prevention Practices and Control
BSIs	Bloodstream Infections
DAI'S	Device Associated Infections
HCAI	Healthcare-associated infection
ICU	Intensive Care Unit
INICC	Nosocomial Infection Control Consortium
CLABSI	Central Line Associated Bloodstream
CL	Calendar
CAUTI	Catheter Associated Urinary Tract Infections
IC	Infection Control
HH	Hospital Hygiene
SAS	Statistical Software
SPS	Strengthening Pharmaceutical Systems
SPSS	Statistical Package for the Social Sciences
SANC	South African Nursing Council
IEC	Information Education and Communication

DEFINITION OF CONCEPTS

Auxiliary Nursing Assistant (ANA). Is a person educated to provide elementary nursing care in the manner and to the level prescribed (*Nursing Act No. 33 of 2005*). This definition will be used as is in this study.

Clinicians means a health professional, who is directly involved in patient care, as distinguished from one who does only administrative work. This definition will be used for Medical Doctors and Nurses in this study.

Health-Care-Associated Infection (HAI) is defined as an infection occurring in a patient during the process of care in a hospital or other health-care facility that was not manifest or incubating at the time of admission (Lobdell, Stamou and Sanchez (2012). This definition will be used as is in this study.

Health Care Worker (HCW). All people “involved in the provision of health services to a user” and who are not health care providers, such as persons responsible for cleaning, security, medical waste disposal, general assistance, operators and clerical work (Health & Democracy,2011). This definition will be used for cleaners and ward Clarks in this study. Joseph, B., and Joseph, M. (2016) argued that a healthcare worker is one who delivers care and services to the sick and ailing either directly as doctors and nurses or indirectly as aides, helpers, cleaners, general assistance, operators laboratory technicians, or even medical waste handlers.

Medical Doctors (MD) means a person licensed to practice medicine, as a physician, surgeon or dentist. This definition will be used as is in the study.

Professional Nurses (PN) is a person who is qualified and competent to independently practice comprehensive nursing in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for such practice (*Nursing Act No. 33 of 2005*). This definition will be used as is in this study.

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1. INTRODUCTION

Health care–associated infections (HAI) are infections acquired at the hospital while receiving treatment of other conditions (Polin, Denson and Brady, 2012). HAI's are a major global safety concern for both patients and health-care professionals (Nejad, Allegranzi, Syed, Ellis and Pitted, 2011). These include infections acquired in the hospital and any other setting where patients receive health care and some infections may appear even after discharge (Nejad et al; 2011). Backman, Marck, Krogman, Taylor, Sales, Marcand and Ada (2012) suggest that infection prevention and control (IPC) in the acute care environment is one of the most important issues in modern healthcare. HAIs is becoming a more common medical complications due to complex medical care. These are therefore associated with significant morbidity, mortality, and high health care costs (Sydnor and Perl, 2011).

The overriding aims of all health systems is to have good access to health care which is safe and of better quality (Hussein et al, 2011). To achieve all these with an aim of reducing the growing rates of HAIs; active surveillance and infection control practices should be improved (Sydnor, Perl, 2011). Improving and maintaining infection control as part of delivery care requires an efficiently functioning health system (Nejad et al; 2011). Hospital epidemiology and infection control programs are crucial when considering the problem of infections resulting from childbirth and thus the role for infection control programs has grown and continues to grow as rates of antimicrobial resistance rise and HAIs lead to increasing risks to patients and expanding health care costs (Sydnor, Perl; 2011).

There is a risk of common gastrointestinal viruses that can be spread by contaminated hands, water or food in an overcrowding poor health facility. Although the importance of IP&C is well recognized and numerous research studies and best practice guidelines have been published on this topic, infection rates are on the rise and IPC remains a challenge. Infections related to healthcare are among the most important causes of morbidity and mortality amongst hospitalized patients (Madrazo et al, 2009).

A health systems approach is therefore necessary to strengthen infection prevention and control strategies to prevent such tragedies from happening again. Although there are infection control and prevention strategies in place in this hospital, the HCW's were obviously not following and adhering to the guidelines. The MEC: Health and Social Development Gauteng province (2011) reported that the possible reasons for why the HCWs are not adhering to the guidelines for IP&C are related to staff shortages, and lack of equipment that contributed to most deaths. Thus, a scientific research was never conducted at CMCH though investigation was conducted to determine possible reasons why the clinicians and HCWs at the Charlotte Maxeke Central Hospital Neonatal Unit are not adhering to the prescribed guidelines. This brought the idea to scientifically explain the possible factors contributing to non-adherence to infection control practices at CMCH.

1.2. PROBLEM STATEMENT

Although the importance of IPC is well recognized and numerous research studies and best practice guidelines have been published on this topic, infection rates are on the rise and IP&C remains a challenge. Infections related to healthcare are among the most important causes of morbidity and mortality amongst hospitalized patients (Madrazo et al; 2009).

The Member of Executive Council (MEC) for Department of Health and Social Development in Gauteng province reported that following the tragic events at the Charlotte Maxeke Academic hospital in which six babies died on 18 and 19 May 2010, she appointed an independent team of experts to probe the circumstances surrounding this unfortunate incident. The team concluded that the babies were infected by norovirus, a relatively common gastrointestinal virus that is spread by contaminated hands, water, or food and that overcrowding of patients.

A health systems approach is therefore necessary to strengthen infection prevention and control strategies to prevent such tragedies from happening again. Although there are infection control and prevention strategies in place in this hospital, the clinicians and were obviously not following and adhering to the guidelines. The MEC: Health and Social Development Gauteng province (2011) reported that the possible reasons for

why the HCWs were not adhering to the guidelines for IP&C were related to staff shortages, and lack of equipment contributed to babies' deaths

1.3. PURPOSE OF THE STUDY

1.3.1. Aim

Aim of this study was to investigate the extent of adherence to Infection Prevention and Control (IP&C) practices and programs amongst healthcare workers (HCWs) in the neonatal ward at Charlotte Maxeke Central Hospital (CMCH).

1.3.2. Objectives

- To determine the adherence of HCWs to infection prevention and control practices at Charlotte Maxeke Central Hospital neonatal unit
- To describe factors influencing compliance to the Infection Prevention and Control Policy amongst Health Care Workers at Charlotte Maxeke Central Hospital neonatal ward

1.3.3. Research question

- Are the clinicians working at Charlotte Maxeke Central Hospital neonatal ward adhering to Infection Prevention and Control practices and programs?

1.4. SIGNIFICANCE OF THE STUDY

This study identified some gaps and key areas where more research is needed. Pittet (2013) argued that much of similar studies were conducted in high-income countries hence the study will benefit the academic fraternity in South Africa and the teaching universities attached to Charlotte Maxeke Hospital. Furthermore, the study will allow executive management in CMC Hospital to make better informed IPC policy decisions and an understanding of infection prevention and its budget implications. Clinical care staff are the frontline defence for applying daily infection control practices to prevent infections and transmission of organisms to other patients, will also benefit in the study. Conducting research on Infection Prevention and Control practices at Charlotte Maxeke Central hospital neonatal unit, Johannesburg, South Africa would be beneficial to the researcher, the employer as well as the community of Gauteng Province in that the research outcome might be an indication of what factors need to

be considered in ensuring that healthcare workers apply daily infection control practices to prevent transmission of infections and organisms to other patients.

1.5. OUTLINE OF CHAPTERS

The subsequent chapters will discuss literature review about the study in Chapter 2. Chapter 3 will explain the methods of conducting the study such as, sampling and data collection. Chapter 4 will outline the results of the study and Chapter 5 will discuss the results of the study.

This mini-dissertation is organised into five chapters and the details of each chapter are presented below as follows:

- **Chapter 1** comprises of an introduction, the aim of the study, the research question, objectives of the study and the organisation of the mini-dissertation.
- **Chapter 2** consists of a general literature review and is sub-divided into specific sections, namely: the Introduction, Healthcare Associated Infections, African incidence of HCAs, South African perspective of Infection control, Types of healthcare associated infections, Causes of infection in Hospitals, Transmission of infection in Hospitals, Principles of preventing healthcare associated infections (HCAs), Infection control strategies, Difficulties in implementing IPC practices
- **Chapter 3** presents the methodologies used for the study
- **Chapter 4** presents the findings of the study which is presented in phases based on the methods used in data collection.
- **Chapter 5** presents a general discussion on the findings of the overall study, their public health implications for infection control and the recommendations from the study findings.

1.6. CONCLUSION

This chapter has outlined the background of the study, the rationale of why the study was conducted, the research question, ethical considerations and the significance of the proposed research.

CHAPTER TWO

LITERATURE REVIEW

2.1. INTRODUCTION

A literature review was conducted to gain a greater understanding of what is already known about Infection Prevention and Control. This chapter explores and describes the current situation in the different parts of the world in terms of Infection Prevention and Control and the factors affecting the adherence to IPC thereof. Poor hospital hygiene has been widely publicised, including patients' concerns about safety in hospitals. This has made infection control a hot topic in clinical practice, the media and the community at large. The main purpose of infection control is to reduce the occurrence and transmission of infectious diseases.

Ojulong, Mitonga and lipinge (2013) reported that hand hygiene is an important healthcare issue globally and is the single most cost-effective and practical measure to reduce the incidence of healthcare-associated infection and the spread of antimicrobial resistance across all settings from advanced health care systems to primary healthcare centres as well as to health workers. This chapter begins by looking at the HCAI incidence rates, causes and factors, variety of infections and characteristics of infection will then be reviewed. The chapter will progress to an explanation of the impact of infection on patients in hospital. The final section will look at interventions and difficulties in implementing IC practices.

2.2. HEALTHCARE ASSOCIATED INFECTIONS

Nosocomial infections, also known as hospital-acquired infections are those infections acquired in hospital or healthcare service unit, that first appear 48 hours or more after hospital admission or within 30 days after discharge following in patient care (Samuel, Kayode, Musa, Nwigwe, Aboderin, Salami and Taiwo, 2010). The centre for Disease Control and Prevention (CDC, 2010), defined healthcare associated infections or healthcare acquired infections (HAIs) as "infections acquired while receiving treatment for other conditions within a healthcare setting". In addition, the CDC have used the generic term "healthcare-associated infection" or "HAI" instead of "nosocomial" since 1988 (Horan et al; 2008).

2.3. GLOBAL INCIDENCE OF HCAs

According to WHO (2009), the worldwide burden of HCAI is unknown because of difficulties in gathering reliable diagnostic information from all countries, particularly developing countries. However, overall estimates by WHO indicate that more than 1.4 million patients worldwide in developed and developing countries are affected at any time. (Samuel et al; 2010) reported that Nosocomial infections may range from mild to severe with an incidence of 5-10 %. A WHO prevalence study puts its 103 prevalence rate at 3.0-20.7% and hospital infection control programs can prevent 33% of nosocomial infections. Weston (2008); Breathnach (2009) supported by further reporting that current prevalence survey of all patients in Europe, Australia and North America also found that 5-10% of all patients will acquire HCAs during admission and rates differ substantially between the developed countries. Moreover, rates of infection are also different even within developed countries. HCAI rates also vary within developing countries. The incidence is reported to be 5-15% of hospitalized patients and can affect 9-37% of those admitted to intensive care units (WHO; 2009).

Neonatal deaths account for over a third of the global burden of child mortality (WHO; 2009). In many developing countries, neonatal mortality rates (deaths in the first 28 days of life) are as high as 40–50 per 1000 live births, with infections being the major cause of death (Mahfouz, Al-Azraqi, Abbag, Al-Gamal, Seef, Bello, 2010). Unfortunately, hospitals in developing countries are at high risk of infection transmission, and improvements in neonatal outcomes are subverted by hospital-acquired infections and their associated morbidity, mortality and cost (Mahfouz et al;2010).

Backman et al; (2012) reported that HAI's are a potential burden on patients in terms of increased morbidity and length of stay including an economic burden on the healthcare system. This is supported by Yassi, Bryce, Breilh, Lavoie, Ndelu, Lockhart and Spiegel (2011) who report that HAI's are often linked to invasive devices, longer hospital stays, and more time spent in intensive care. The HAI's infections make up a substantial proportion of the infectious disease burden in high income as well as in low and middle- income countries (Shamim, Qazi and Stoll, 2008). Further emphasised that neonatal mortality is increasingly recognized as an important global public health challenge that must be addressed if we are to reduce child health disparities between

rich and poor countries. Most of the estimated 4 million neonatal deaths per year occur in low and middle-income countries (Shamim, Qazi and Stoll, 2008).

2.4. AFRICAN INCIDENCE OF HCAs

McKay and Bamford (2015) reported that a paediatric cohort study was conducted in Kenya and a case fatality rate of 24% for community-acquired and 53% for hospital-acquired bacteraemia was reported. They further reported that a systematic review of admissions to hospital in various regions of Africa estimated that 13.5% of adults and 8.2% of children had community-acquired Bloodstream Infections (BSIs) and account for a substantial proportion of all healthcare admissions.

2.5. SOUTH AFRICAN PERSPECTIVE OF INFECTION CONTROL

South Africa has both national and provincial infection control guidelines which have been adapted for implementation in health facilities (Suleman and Meyer, 2011). Duse (2005) argued that guidelines for IPC in South Africa and developing countries have been formulated to assist health professionals with five important challenges that face healthcare workers which are antimicrobial resistance, nosocomial pneumonia, blood stream infections caused by intravascular catheters, nosocomial pneumonia, blood stream infections caused by intravascular catheters, nosocomial urinary tract infections and nosocomial intra-abdominal infections. Suleman and Meyer (2011) reported that South Africa has not yet implemented nationally standardised hospital infection and antimicrobial resistance surveillance systems or fully translated available antimicrobial resistance surveillance data into policy. Suleman and Meyer (2011) reported that due to limited resources, there is insufficient commitment to strengthening infection prevention and control in South Africa, as well as inadequate staffing and training of infection prevention and control practitioners. Tagoe et al; (2011) suggest that in South Africa it is estimated that approximately 1 in 7 patients entering South African hospitals are at high risk of acquiring a HAI of which lower respiratory tract infections, urinary tract infections, bloodstream infections and post-surgical infections account for the majority (about 80%) of HAIs.

Lowman (2016) reported that surveillance of HAIs in South Africa (SA) is neglected and poorly resourced. The true burden of HAIs is unknown, although it is largely accepted that it is greater in the public sector than in the private sector, and probably

accounted for 10 - 20%. Further emphasised that a figure of 10 - 20% provides a very limited perspective on HAIs, and if we are to use the scarce resources at our disposal efficiently, more detailed analyses and reporting of HAI rates can be required.

2.6. TYPES OF HEALTHCARE ASSOCIATED INFECTIONS

HCAIs are classified differently by different organisations which can make it difficult to make comparisons between countries. According to the literature, most HCAIs are related to device associated infections (DAIs), resulting from advances in medical technology and treatment (BMA 2006; Doshi et al; 2009). Hence, HCAI rates are high in intensive care units (ICUs), where medical devices are commonly used (Rosenthal et al; 2008; WHO 2009). For example, the International Nosocomial Infection Control Consortium's surveillance, which studied 78 ICUs in 37 cities in 13 countries, found that the ventilator associated pneumonia (VAP) rate was 18.6 per 1000 device days, central line associated bloodstream (CLABSI) infection rate was 10.1 per 1000 central line days, and catheter associated urinary tract infection (CAUTI) rate was 6.9 per 1000 device days (Rosenthal 2008).

Barba et al; 2006 study from four Mexican public hospitals presented to some extent different order of results, it stated that the overall rate of catheter-associated bloodstream infections was 23.1 per 1000 device-days; VAP rate was 21.8 per 1000 device days, and CAUTI rate was 13.4 per 1000 device days (Barba et al; 2006). However, HCAIs can be roughly grouped into six main criteria, including urinary tract infection, respiratory tract infection, surgical site infection, gastrointestinal infection, bloodstream infection, and others such as infections occurring in infants that result from passage through the birth canal.

2.7. CAUSES OF INFECTION IN HOSPITALS

Samuel and colleagues reported that there are several reasons why nosocomial infections are even more alarming in the 21st century. These include hospitals housing large number of people who are sick and whose immune system are often in a weakened state, increased use of outpatient treatment meaning that people who are in hospital are sicker on average, many medical procedures that bypass the body's natural protective barriers, medical staff move from patient to patient thus providing a way for pathogens to spread, inadequate sanitation protocols regarding uniforms,

equipment sterilization, washing and other preventive measures that may either be unheeded by hospital personnel or too lax to sufficiently isolate patients from infectious agents and lastly the routine use of anti-microbial agents in hospitals creates selection pressure for the emergence of the resistant strains of microorganisms.

Mahfouz, et al; 2010, reported that infection control processes, coupled with inadequate infrastructure, systems of care and resources can be attributed to lack of knowledge and training about basic infection control processes. Stiller, Salm, Bischoff and Gastmeier (2016), reported that the number of patients occupying in one single room, the amount of space assigned for each patient within this room is also an important factor. Theoretically speaking, the less space that is provided for patients and healthcare workers within a room, the higher the risk for the transmission of pathogens and for breaches in infection prevention measures possibly leading to an increase in infections. Lowman (2016) argued that in South African public health sector, surveillance activities are sorely lacking owing to understaffing and lack of training. Similarly, in the private sector, human resources dedicated to surveillance activities are often insufficient.

In the study done by Gichuhi and colleagues, 2015, it was demonstrated that studies that poor decontamination of instruments and ineffective infection prevention practices and control often led to outbreaks of nosocomial infections. Lowman (2016) further argued that newborns admitted to neonatal units in poor-resource countries are at high risk of acquiring HCAI.

2.8. TRANSMISSION OF INFECTION IN HOSPITALS

Samuel, et al; 2010, reported that Microorganisms are transmitted in hospitals by several routes and same microorganisms may be transmitted by more than one route. The main routes of transmission include contact, droplet, airborne and vector borne. Contact transmission is the most important and frequent mode of transmission of nosocomial infections. Further emphasized that direct contact transmission involves a direct body surface-to-body surface contact and physical transfer of micro-organism between a susceptible host and an infected or colonized person such as occurs when a health care worker turns a patient in bed or gives a bath or performs other patient-care activities that require personal contact. Mahfouz, et al; 2010 reported that there

can also be cross-infection between two patients with one serving as the source of infection and the other as the susceptible host. (WHO; 2009) reported that indirect contact transmission involves contact of a susceptible host with a contaminated intermediate object, usually an instrument such as needle, dressings, or contaminated gloves that are not changed between patients.

2.9. PRINCIPLES OF PREVENTING HEALTHCARE ASSOCIATED INFECTIONS (HCAIs)

Apisarnthanarak and Madriaga (2015) reported that HAIs are unnecessary adverse events as they are preventable with proper healthcare worker behavior and compliance with evidence-based infection prevention procedures and guidelines. Lowman (2016) reported that surveillance of HAIs is the cornerstone of any infection prevention and control programme. A well-coordinated and effective surveillance system should prevent a significant proportion of HAIs from occurring and support construction and implementation of further IPC efforts. Reducing HCAIs is a major concern worldwide. Patient safety is a key component of healthcare (WHO 2009). Patients should be protected against infection during their hospital stay. It is difficult to eliminate the risk of HCAIs entirely, but proper IPC practice can reduce the incidence of HCAIs.

According to the literature review, HCAIs can be prevented through good clinical practices and applying the basic principles of Infection Control when undertaking patient care. Most outbreaks reported in clinical settings are associated with non-compliance with Infection C procedures (The Committee of Infectious Diseases and Committee on Practice and Ambulatory Medicine, 2000). Good practices include ensuring healthcare professionals comply with hygiene guidelines such as hand-washing, sterilization of equipment, uncontaminated food and a clean environment. Moreover, to battle HCAIs, basic IC actions need to be implemented by all healthcare staff all the time (Weston 2008). Gichuhi et al;2015 further argued that Adherence to infection prevention and control guidelines is critical to improving the quality of hospital care based on their efficacy in reducing the occurrence of infections that compromise patients' outcomes.

2.10. INFECTION CONTROL STRATEGIES

Christabel, Laryea and Newman (2009) reported that many factors contribute to the adherence of recommended hand hygiene guidelines, therefore, it is crucial to understand the current practices and behaviours of health care workers to develop appropriate and targeted interventions that might improve their hand hygiene practices. Preventing HCAI should be integral to all hospital policies. It should be done not only during outbreaks but also in every-day healthcare settings. IC policies and strategies are important in driving IC practice. Raka (2010) argued that when policies are set out, practitioners and relevant staff, including ICTs, will set goals and strategies related to those policies in the clinical setting. This can lead to effective infection prevention and control as a result. Stiller et al; 2016 reported that providing hand rub dispensers in patient rooms at the point of care can be a contributing factor for hand hygiene compliance. The proper procedure of hand disinfection has been proven to be one of the most effective infection control measures (Madrado et al; 2009).

2.11. DIFFICULTIES IN IMPLEMENTING IPC PRACTICES

Different factors that are contributing to the low levels of Hospital Hygiene (HH) compliance that have been described include: lack of knowledge of the importance of preventing infection, a lack of understanding of the appropriate techniques involved, the occurrence of contact dermatitis; staff shortages, work overload, difficulty accessing points used for conventional hand hygiene, and the absence of an institutional policy.

Backman et al; 2012 reported that the importance of IPC is well recognised and numerous research studies and best practice guidelines have been published on this topic however infection rates of multidrug resistant organisms (MDRO) are on the rise and IPC remains a challenge. Backman et al; 2012 cited that the environmental design of the unit provides challenges to proper IPC practices thus leading to many workarounds. Gichuhi, Kamau, Nyangena and Otieno-Ayayo (2015) further argued that disparity in knowledge, attitudes, practice and compliance by health care workers brings challenges in infection prevention and control in healthcare institutions.

Birgand, Johansson, Szilagyi and Luce (2015) reported that the professional background or experience of Health Care Practitioners can influence IPC practice beliefs. Hence many characteristics of individual professionals might influence the decision to implement guidelines, creating differences in behaviour. Disagreement with guidelines or with specific recommendations, a lack of outcome expectancy, a lack of self-efficacy expectations, and a lack of motivation might all lead to suboptimal patient safety and difficulty in implementing IPC practices.

2.12. CONCLUSION

Birgand, Johansson, Szilagyi and Luce (2015) reported that Hospital acquired infections (HAIs) or nosocomial infections pose a real and serious threat to both the patients and health care workers. Common pathogens may easily be transmitted through health care workers' hands, equipment, supplies and unhygienic practices. It is evident that Healthcare Association Infections (HCAIs) are infections acquired during hospital admission. HCAIs are generally caused by pathogens, various factors may contribute to HCAIs, including intrinsic and extrinsic factors. Backman and colleagues reported that there are several barriers to IPC which hampers compliance including inadequate supplies, frequent water shortage and inactive IPC committee.

Mahfouz and colleagues reported that there are many factors influencing healthcare staff ability to follow the guidelines for preventing and controlling HCAIs. The most important of these appear to be intrinsic factors related to personal responsibility and individual behaviours of healthcare staff. Yawson (2013) reported that HCAIs impact directly on the patient and on healthcare staff, the healthcare system and public confidence. Further emphasised that HCAIs occur most frequently in intensive care where patients are vulnerable. Neonates and paediatric patients are more vulnerable than adult patients. It is, therefore, of utmost importance and need to explore further why the clinicians and HCWs at the Charlotte Maxeke Central Hospital Neonatal Unit are not adhering to the prescribed guideline.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. INTRODUCTION

In this chapter the study's research design, methodology, population, sampling, data collection, and analysis as well as the ethical considerations will be explained.

3.2. RESEARCH METHODS

3.2.1. Research design

The current study used quantitative research approach. Quantitative research approach is defined as means for testing objective theories by examining the relationship among variables (Polit and Hungler, 2013). Moreover, Grove and Burns (2010) define a research design as "a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings. Research design is concerned with what the researcher intends to study and the data collection and analysis methods to be utilised in the process (Barbie, 2010). This study was focusing on the meanings and interpretations of the participants on how they justify their action as prescribed by the Infection Prevention Control Policy (IPCP) and Infection Control Protocol (ICP) at CMCH neonatal ward. Hence in this study, a descriptive cross-sectional study design was chosen to allow for the respondents to share first-hand experience of the subject under investigation to produce quality research information. According to Barbie (2010), the major purpose of social sciences studies is to describe situations and events (in our case Infection Prevention and Control). Descriptive studies enable researchers to present a picture of the specific details of a situation, setting or relationship by focusing on explaining why something happened (Neuman, 2011).

3.2.2. Sampling technique and Sample selection

A sampling frame is a list of units composing a population from which a sample is selected Levy and Lemeshow (2008). A list of nurses, cleaners and ward clerks working in neonatal ward in CMCH were supposed to be used as a sampling frame. However, for this study the hospital management was of the view that all clinicians and CHW's must participate in the study because the study may provide valuable information for a community or the general population in Neonatal ward at CMCH. For

this study, the decision to participate in a research study began with a process known as informed consent to all clinicians and HCW's. According to Lemeshow (2008) informed consent is a voluntary agreement to participate in research. For this study, all clinicians and HCW's agreed to participate in the study. The researcher went into neonatal ward for three weeks to make sure that he had an opportunity to distribute questionnaires to those who were keen to participate in the study.

3.2.3. Inclusion and exclusion criteria

All health care workers (cleaning, security, medical waste disposal, general assistance, operators and clerical work) working in the neonatal wards of CMAH were included in the study and any health care not working in the neonatal wards was excluded in to participating in the study.

3.2.4. Study setting and Population

Levy and Lemeshow (2008) defines the study population as the aggregation of elements from which the sample is selected. The study was conducted at CMCH neonatal ward and the target population was the clinicians (student nurses, Professional Nurses, Auxiliary Nursing Assistance, Medical Doctors) and health care workers at the neonatal ward of Charlotte Maxeke Central hospital. Furthermore table 3.1 below presents the target population of clinicians at the neonatal unit at CMCH where the clinicians are all responsible for the provision of clinical care to the neonates admitted within the neonatal unit. The HCW's comprised of cleaners and ward clerks responsible for provision of logistical support services within the neonatal unit.

Table 3.1: Population of clinicians at the neonatal unit

Categories	POPULATION(n)	PER SHIFT	Percentage %	Cumulative Percentage
Neonatal unit				
Professional Nurses	30	5 – 7	52.63%	52.63%
Auxiliary Nursing Assistance	13	1- 5	22.81%	75.44%
Student Nurses	9	1 – 2	15.79%	91.23%
Medical Doctors	5	1- 2	8.77%	100%

Table 3.2 below presents the target population of Health Care Workers at the neonatal unit at CMCH where they are responsible for the provision of support services to the clinical staff and neonates admitted within the neonatal unit. The HCW's comprised of cleaners, administrator, general assistants and operator responsible for provision of support services within the neonatal unit.

Table 3.2: Population of Health Care Workers at the neonatal unit

Categories	Population(n)	PER SHIFT	Percentage	Cumulative Percentage
Administrator	1	1	20.00%	20.00%
Cleaner	2	2	40.00%	60.00%
General Assistant	1	1	20.00%	80.00%
Operator	1	1	20.00%	100.00%

3.2.5. Sample size

Convenient sample technique was used to select participants because the population was so small, all available HCWs and clinicians, who were working to in the neonatal unit were conveniently. Total number 62 HCWs and clinicians were sampled out of 65.

3.3. ETHICAL CONSIDERATIONS

Wimmer and Dominick (2006) provide general ethical principles which the researcher should consider. Firstly, the principle of autonomy which has its roots in the categorical imperative and demands the researchers to respect the rights, values and decisions of other people. The second is non-maleficence, which is the avoidance of intentional harm to respondents, and beneficence, which stipulates that a positive obligation to remove existing harm can be identified. Lastly, the principle of justice holds that people are equal and should be treated equally. The conduct of the research process should not cause harm to the participants and organisations, thereby supporting the principle of beneficence (Streubert & Carpenter, 2011). According to Wimmer and Dominick (2006), there are various reasons for ethical behaviour. These include that unethical behaviour may have an adverse effect on the participants, and that unethical research

practices reflect poorly on the profession. In a clinical or health environment, the researcher will meet health professionals and their patients, possibly invading their work space, which is normally managed by authorities. The researcher ensured compliance with principles of ethical research throughout the study period by implementing the measures required for conformance with the principles of autonomy, beneficence, justice and informed consent as explained below.

3.3.1. Obtaining Ethical clearance

Ethical clearance for this study was obtained from the University of Limpopo and approval to conduct the study was obtained from the Chief Executive Officer of the CHCH (*see Appendix E and F*).

3.3.2. Right to self-determination (autonomy)

The prospective participants should have the opportunity to choose whether to participate in the study (Burns & Grove, 2010). The potential respondents were not coerced into being part of the research by being promised rewards but did so with the full understanding that their contribution may provide valuable information for a community or the general population in Neonatal ward at CMCH. The participants were informed of their right to withdraw at any time or reserve their comments and inputs without being penalised.

3.3.3. Informed consent

According to Polit and Beck (2014), informed consent means that participants have adequate information regarding the research and can comprehend the information. They also have the power of free choice which enables them to consent voluntarily to participate in the research or decline participation. Informed consent in the current study consisted of four elements namely: disclosure of essential information, comprehension, competency and voluntarism.

The reasons, benefits, impact, and content of the research, as well as the criteria for participating in the study were provided to the participants prior to commencing the study. This enabled the participants to decide whether to take part in the research. All participants in this study were above the consenting age of 18 years and understood the research. They also received written and verbal requests to voluntarily participate

in the research and signed a voluntary consent form for participation in the study on acceptance (*see Appendix C*).

3.3.4. Privacy and confidentiality

Researchers have a responsibility to protect the anonymity of subjects and to maintain the confidentiality of data collected during the study (Burns & Grove 2010). The participants' names and personal identifying information was not used in the records.

3.3.5. Respect

The participants were not judged for their responses or experiences. All inputs were regarded as valuable; contributing to realising the purpose of the research.

3.4. DATA COLLECTION TOOLS

Marshall and Rossman (2016) defines data collection as the process of gathering information relevant to the study. An anonymous questionnaire was given to participants to complete. The plan was to survey the participants and questions were distributed to those selected as part of the sample. The knowledge, attitude and practice questionnaire were designed to be self-administered and was provided in English and Zulu. The researcher used Likert scales containing: strongly agree, agree, neutral, disagree, strongly disagree) to assess' attitudes and for practices (never, rarely, sometimes, very often, always). The Likert scales was later collapsed into dichotomous values for data analysis.

3.5. DEVELOPMENT AND TESTING OF THE DATA COLLECTION INSTRUMENT

A data collection instrument was developed by the primary researcher for use in this study (*see Appendix B*). This survey tool was titled "Infection Control Questionnaire" and consisted of a demographic data section and a section that explored factors affecting clinicians and HCW's. The demographic data section included: a) age, b) gender, c) level of education, d) years of experience in clinical practice, e) shift worked, f) marriage status, and g) information about dependents. The questionnaires were piloted at CMAH paediatric wards other than the neonatal ward. The questionnaires were not amended after the pilot since there were no changes required.

3.6. CHARACTERISTICS OF THE DATA COLLECTION INSTRUMENT

3.6.1. Characteristics of a questionnaire

Brink and Wood (1998) state that the following aspects characterise a questionnaire:

- Each participant enters his/her responses on the questionnaire, saving the researcher's time, compared to the time required to conduct personal interviews.
- It is less expensive than conducting personal interviews.
- Respondents feel that they remain anonymous and can express themselves in their own words without fear of identification. This aspect was very important in this study where adolescent mothers might not have wished their mothers, friends or health care workers to know about their knowledge, attitudes and beliefs concerning contraception.
- Data on a broad range of topics may be collected within a limited period.
- The format is standard for all subjects and is independent of the interviewer's mood.

3.6.2. Development of the questionnaire

Aim of this study was to investigate the extent of adherence to Infection Prevention and Control (IPC) practices and programs amongst healthcare workers (HCWs) in the neonatal ward at Charlotte Maxeke Central Hospital (CMCH). Tagoe et al., (2011) suggest that in South Africa it is estimated that approximately 1 in 7 patients entering South African hospitals are at high risk of acquiring a HAI of which lower respiratory tract infections, urinary tract infections, bloodstream infections and post-surgical infections account for the majority (about 80%) of HAIs. Different factors that are contributing to the low levels of HH compliance that have been described include: lack of knowledge of the importance of preventing infection, a lack of understanding of the appropriate techniques involved, the occurrence of contact dermatitis; staff shortages, work overload, difficult access to points used for conventional hand hygiene, and the absence of an institutional commitment to overall improvement Madzaro et al; (2009). The questionnaire was compiled and discussed with the researcher's two supervisors. Changes suggested by Research committee were implemented. The questionnaires were typed and translated into Zulu. (*see Appendix E and F*). The researcher translated the questionnaire into Zulu version.

3.6.3. Structure of the questionnaire

The questionnaire consisted of the following four sections:

- Section A Personal (biographical) data, Sex education
- Section B Knowledge, attitudes and beliefs regarding IPC
- Section C open-ended and closed questions

3.6.4. Reliability of the research instrument

Reliability refers to the degree of consistency or accuracy with which an instrument measures the attribute it is designed to measure (Polit & Hungler 2013). If a study and its results are reliable, it means that the same results would be obtained if the study were to be replicated by other researchers using the same method. A pre-test utilising HCW's, excluded from the actual research, with similar characteristics to the study sample was conducted to determine the clarity of the items and consistency of the responses.

3.7. DATA COLLECTION PROCESS

An introductory e-mail was sent through the hospital neonatal unit management and personnel. This e-mail included the study purpose, a brief description of the survey tool, and the researchers' contact information. The data collection tools were then delivered by the researcher to neonatal unit. Completed data collection tools were collected by the researcher from each of the participants on every Friday. Once a week, the researcher visited the study setting and distributed questionnaires to the participants willing to participate in the study. Reminder e-mails were sent to the neonatal unit each week. The surveys were available to all participants for a total of three weeks.

The questionnaires were completed by clinicians and Health Care Workers working in the neonatal unit in the Charlotte Maxeke Hospital. Sixty-five questionnaires handed out to clinicians by the researcher. Only fifty-seven (57) were correctly completed and returned to the researcher by the clinicians. Moreover, of the ten (10) questionnaires handed out to the HCWs by the researcher five (5) were completed and returned by the HCWs then gave a response rate of 50% amongst HCWs.

Statistical evaluation of the collected data was done with the assistance of a statistician. For the analysis, the data were entered into Statistical Analysis Software Package (SAS) by the researcher and checked for errors. For the purpose of this study the cleaners, security, medical waste disposal, general assistance, operators and clerical workers were regarded generally as health care workers and various categories of nurses and doctors as clinicians.

3.8. DATA MANAGEMENT AND ANALYSIS

De Vos et al; 2005 define data analysis as the process of bringing order, structure, and meaning to the mass of collected data. They further describe data analysis as messy, ambiguous and time-consuming, but also as a creative and fascinating process aimed at searching for general statements about relationships among the categories of data. Data analysis involves organising the data, conducting a preliminary reading through of the database, coding and organising themes, representing the data, and forming of an interpretation thereof. As explained data analysis was performed according to Ritchie and Lewis" data analysis model (Ritchie & Lewis, 2003). During the processes of theme identification, labelling, sorting, summarising and describing the data, the researcher applied inductive reasoning to assemble generalisations from the data set.

3.8.1. Data organisation

The responses had both closed and open questions which were 'coded' differently, in the case of 'closed' questions, coding simply involved capturing data on excel spreadsheet and assigning a numerical value to each response (e.g. yes = 1, no = 2) since the range of available response options are already known. However, the coding of coding of 'open' questions involved drawing up a list of categories (a 'coding frame') into which answers were allocated or 'coded'.

3.8.2. Data interpretation

The researcher results were presented through interpretation, reflecting and contrasting the findings with the current literature available.

3.8.3. Data representation

The data were then presented in an approach reflecting the findings and identifying trends and practices affecting Infection Prevention and Control amongst clinicians and HCW's in neonatal unit. Subsequently, the data is presented in for sections. In section A, the biographical data that was gathered at the beginning of each questionnaire is described and in section B, the findings that emerged during the process of data analysis are described.

3.9. DATA ANALYSIS

The SAS statistical software was used to describe and analyse data received from the data collection tools. Descriptive statistics was used, and the software allowed for Categorical data to be displayed using either a pie chart or a bar chart. For inferential statistics, Chi Squared tests, logistic regression was used to calculate associations between variables, odds ratios and Confidence intervals.

3.10. INTERNAL AND EXTERNAL VALIDITY OF THE STUDY

Validity refers to the degree to which an instrument measures what it is supposed to be measuring” (Uys & Basson, 1991). The researcher was using a questionnaire that was developed and used by United States Agency International Development (USAID) and Strengthening Pharmaceutical Systems (SPS). The questionnaires have been pre-validated before by USAID and SPS to see if it measures what it is supposed to measure. The content validity was ensured by submitting the questionnaire to the supervisors.

3.11. Reliability

Reliability is the consistency and dependability of a research instrument in measuring a variable, equivalence and internal consistency (Brink et al;1998). To ensure reliability, the questionnaires were piloted at CMAH but in different ward other than the neonatal wards. The questionnaires were not amended after the pilot because there were no changes required.

3.12. Bias in the study

Šimundić, (2013) defines bias as any trend or deviation from the truth in data collection, data analysis, interpretation and publication which can cause false conclusions. The study might have had selection bias however it was minimised by

informing clinicians that their names will not be recorded so that HCWs would feel more comfortable to carry on with their normal activities without being scared that they will be named if they do something wrong. The questions were designed not to steer responses, or making the interviewee understand the situation in a certain way. Furthermore, questions weren't targeted to a certain group of population or leave some of them out, hence the respondents were asked the same set of questions. Asking different questions might lead to a biased response.

3.13. CONCLUSION

This chapter presented the methodology followed in conducting the study. In the next chapter the data collected will be presented, so doing expressing the views of the clinicians and HCW's on the topic under study

CHAPTER FOUR STUDY RESULTS

4.1. INTRODUCTION

The previous chapters have provided background to the research by providing the literature review and the methodology followed in conducting the study. In this chapter, data collected during the questionnaires distribution and analysed will be presented. The results will be presented in the form of graphs and tables.

4.2. DEMOGRAPHIC CHARACTERISTICS OF CLINICIANS

Table 4.1 below presents the participants' demographic characteristics. Only one (1) clinician was a male and the mean age of the participants was 33.9 with majority of the participants in the age group ≤ 30 years at 39.3% followed by 31 – 40 years (32.1%), and least being at ≥ 51 years (5.4%). Seventy five percent (75.0%) of clinicians had tertiary education (64.3%) followed by certificate in nursing (19.3%), and matric certificate at 5.4%. Approximately 46% of the clinicians were professional nurses, 28.6% were enrolled or assistant nurses, 16.1% were student nurses and 8.9% doctors.

Furthermore, table 4.1 shows that most of the clinicians were having 1 – 4 years experience working in the neonatal unit at 54.6% followed by 5 – 9 years at 21.8%. Clinicians who had less than one (<1 year) and 10 -14 years working in neonatal unit were both at 10.9% while those who worked 15 years and above were at 8.9%. The clinicians who worked in public health facility were more in the category of 5 – 9 years at 49.1% followed by 1 – 4 years, 10 -14 years and less than one year at 26.4%, 20.8% and 3.8% respectively.

Table 4.1: Clinicians demographic characteristics by gender (% in column)

		Female (n=56)	Male (n=1)
		N (%)	N (%)
Age in years	≤ 30 years	22 (39.3)	0
	31 – 40 years	18 (32.1)	1 (100)
	41 – 50 years	13 (23.2)	0
	≥ 51 years	3 (5.4)	0
Education	Matric certificate	3 (5.4)	0
	Certificate in nursing	11 (19.3)	0
	College/University Diploma and degree	42 (75.0%)	1 (100)
Job title	Student nurse	9 (16.1)	0
	Enrolled/Assistant nurse	16 (28.6)	0
	Registered/Professional nurse	26 (46.4)	1 (100)
	Doctor	5 (8.9)	0
Years in the current job	< 1 year	6 (10.9)	0
	1 – 4 years	30 (54.6)	0
	5 – 9 years	12 (21.8)	1 (100)
	10 – 14 years	6 (10.9)	0
	≥ 15 years	1 (1.8)	0
Years in public health facility	< 1 year	2 (3.8)	0
	1 – 4 years	14 (26.4)	0
	5 – 9 years	26 (49.1)	1 (100)
	10 – 14 years	11 (20.8)	0

4.3. DEMOGRAPHIC CHARACTERISTICS OF CLEANERS

The below table 4.2 demonstrates the demographics of the HCW's, four were females and one was a male. Four participants 4(75%) had matric certificate and 1(25%) diploma qualification. Amongst the five (100%) HCW's, one (20%), was an administrator, two were cleaners (40%), one (20%) was a general assistant within the neonatal ICU and one (20%) was an operator. The work experience on current position within the neonatal ICU differs for each participant thus, two (40%) ranged from 1 - 4 years; two (40%) having 5 - 9 years and one (20%) having less than one year of work in the neonatal intensive care unit.

Table 4.2: HCWs demographic characteristics (% in columns)

		Female (n=4)	Male (n=1)
		N (%)	N (%)
Age in years			
	31 – 40 years	3 (75.0)	1 (100)
	41 – 50 years	1 (25.0)	0
Education			
	Matric certificate	3 (75.0)	1 (100)
	Bachelor's degree	1 (25.0)	0
Job title			
	General Assistant	1 (25.0)	0
	Administrator	1 (25.0)	0
	Cleaner	1 (25.0)	1 (100)
	Operator	1 (25.0)	0
Years in the current job			
	< 1 year	1 (25.0)	0
	1 – 4 years	1 (25.0)	1 (100)
	5 – 9 years	2 (50.0)	0
Years in public health facility			
	< 1 year	1 (25.0)	1 (100)
	5 – 9 years	3 (75.0)	0

4.4. THE CLINICIAN'S BELIEFS REGARDING INFECTION CONTROL

This section will begin with overall findings on the clinician's beliefs on infection control practices, the practices in relation to infection control principles and attitudes regarding infection control issues in neonatal ward at Charlotte Maxeke Hospital. Healthcare staff, including nurses, doctors, are mainly in contact with the patients. Thus, an individual's behavior, working styles, and relationship between staff are important in IPC practice. These will be presented in this section.

4.4.1. The overall beliefs of clinicians in relation to infection control practices

Table 4.3: Overall clinicians beliefs in relation to infection control practices

Job title	Preferred answers given: Number (%)		
	Positive beliefs	Negative beliefs	Total
Assistant nurses (n=13)	167 (94.4)	10 (5.6)	177 (100)
Professional nurses (n=30)	357 (89.7)	41 (10.3)	398 (100)
Student nurses (n=9)	99 (80.5)	24 (19.5)	123 (100)
Medical doctors (n=5)	55 (79.7)	14 (20.3)	69 (100)

The percentages of positive beliefs answers given were compared among the four job titles by the Fisher Exact test at Bonferroni corrected p levels. Only two significant differences were found.

- The percentage positive beliefs answers given by Assistant nurses (94.4%) differ significantly ($p=0.0003$) from the percentage for Student nurses (80.5%).
- The percentage positive beliefs answers given by Assistant nurses (94.4%) differ significantly ($p=0.0013$) from the percentage for Medical doctors (79.7%).

4.4.2. Clinicians beliefs in relation to health care environment, nosocomial infections, transmission of MRSA and wearing of gloves for patient's care

Table 4.4. below shows that 55.6% of the student nurses, 75% of the assistant nurses, 100% of the medical doctors and 81.5% of the professional nurses agreed that health care environment contributes to infection prevention and control. Furthermore 66.7% of the student nurses, 56.3% of the assistant nurses, 33.3% of the medical doctors and 59.3% of the professional nurses agreed that Nosocomial infection contributes to the spread of infection. Moreover 55.5% of the student nurses, 62.5% of the assistant nurses, 80% of the medical doctors and 63.3% of the professional nurses strongly agreed that washing hands after wearing gloves is a good practice.

Table 4.4: Clinicians beliefs in relation to health care environment, nosocomial infections, transmission of MRSA and wearing of gloves for patient’s care

Job title	Healthcare environment		Nosocomial infections				Transmission of MRSA		Wearing of gloves and washing hands			
	Strongly Agree	Agree	Strongly Agree	Agree	Disagree	Strongly Agree	Agree	Disagree	Strongly Agree	Agree	Disagree	Strongly disagree
Student nurse	5 (55.6)	4 (44.4)	6 (66.7)	3 (33.3)	0	6 (66.7)	3 (33.3)	0	1 (11.1)	0	3 (33.3)	5 (55.6)
Enrolled/Assistant nurse	12 (75.0)	4 (24.0)	9 (56.3)	7 (43.8)	0	10 (62.5)	5 (31.3)	1 (6.2)	0	1 (6.2)	5 (31.3)	10 (62.5)
Registered/Prof nurse	22 (81.5)	5 (18.5)	16 (59.3)	10 (37.0)	1 (3.7)	15 (60.0)	10 (40.0)	0	0	1 (3.7)	9 (33.3)	17 (63.0)
Doctor	5 (100)	0	4 (33.3)	4 (33.3)	1 (2.6)	0	0	0	1 (20.0)	0	0	4 (80.0)
Years in the current job												
< 1 year	3 (50.0)	3 (50.0)	4 (66.7)	2 (33.3)	0	3 (50.0)	3 (50.0)	0	0	0	1 (16.7)	5 (83.3)
1 – 4 years	24 (80.0)	6 (20.0)	17 (56.7)	12 (40.0)	1 (3.3)	19 (67.9)	9 (32.1)	0	1 (3.3)	0	9 (30.0)	20 (66.7)
5 – 9 years	10 (76.9)	3 (23.1)	10 (76.9)	3 (23.1)	0	8 (61.5)	1 (16.7)	0	0	0	6 (46.2)	7 (53.8)
10 – 14 years	6 (100)	0	4 (66.7)	2 (33.3)	0	5 (63.3)	1 (16.7)	0	1 (16.7)	2 (33.3)	0	3 (50.0)
≥ 15 years	0	1 (100)	0	1 (100)	0	0	1 (100)	0	0	0	1 (100)	0

4.4.3. Clinicians beliefs in relation to working having signs and symptoms of cold, diarrhea, knowledge on training about IPC and hand washing been cumbersome during emergencies

Table 4.5 below shows that 36.8% of the student nurses, 36.8% of the professional nurses and 26.3% of the medical doctors strongly agreed that they believe in working with signs and symptoms of common cold. Furthermore 5.9% of the student nurses, 47.1% of the assistant nurses, 47.1% of the professional nurses agreed that they believe in working with signs and symptoms of cold. However, 10% of registered nurses disagreed that they would go to work while having signs and symptoms of cold. Furthermore table 5 below shows that 25% of the student nurses, 41.7% of the professional nurses and 33.3% of the medical doctors strongly agreed that they believe in working 24 hours after having diarrhea in the past 24hrs. Furthermore 12.8% of the student nurses, 41.0% of the assistant nurses, 43.6% of the professional nurses and 2.6% of the medical doctors agreed that they believe in working 24 hours after having

diarrhea in the past 24hrs. However, 16.7% of the student nurses, 83.3% of the professional nurses and 0% of the medical doctors strongly disagreed that they believe in working 24 hours after having diarrhea. Moreover table 5 below shows that 25% of the student nurses, 41.7% of the professional nurses and 33.3% of the medical doctors strongly agreed that they believe in working 24 hours after having diarrhea in the past 24hrs. Furthermore 12.8% of the student nurses, 41.0% of the assistant nurses, 43.6% of the professional nurses and 2.6% of the medical doctors agreed that they believe in working 24 hours after having diarrhea in the past 24hrs. However, 16.7% of the student nurses, 83.3% of the professional nurses and strongly disagreed that they believe in working 24 hours after having diarrhea.

Table 4.5: Clinicians beliefs in relation to working having signs and symptoms of cold, diarrhea, knowledge on training about IPC and hand washing been cumbersome during emergencies

Job title	Working with signs and symptoms of cold			Working after having diarrhea in past 24 hours			Knowledge on training about IPC	
	Strongly Agree	Agree	Disagree	Strongly Agree	Agree	Disagree	Strongly Agree	Agree
Student nurse	7 (36.8)	2 (5.9)	0	3 (25.0)	5 (12.8)	1 (16.7)	8 (19.5)	1 (6.3)
Enrolled/Assistant nurse	0	16 (47.1)	0	0	16 (41.0)	0	8 (19.5)	8 (50.0)
Registered/Prof nurse	7 (36.8)	16 (47.1)	4 (10)	5 (41.7)	17 (43.6)	5 (83.3)	20 (48.8)	7 (43.8)
Doctor	5 (26.3)	0	0	4 (33.3)	1 (2.6)	0	5 (12.2)	0
Years in the current job								
< 1 year	4 (21.1)	2 (6.1)	0	3 (25.0)	2 (5.3)	1 (16.7)	4 (10.0)	2 (12.5)
1 – 4 years	9 (47.4)	20 (60.6)	1 (25.0)	5 (41.7)	22 (57.9)	3 (50.0)	20 (50.0)	10 (62.5)
5 – 9 years	2 (10.5)	9 (27.3)	2 (50.0)	2 (16.7)	11 (29.0)	0	10 (25.0)	3 (18.8)
10 – 14 years	4 (21.1)	1 (3.0)	1 (25.0)	2 (16.7)	2 (5.3)	2 (33.3)	5 (12.5)	1 (6.3)
≥ 15 years	0	1 (3.0)	0	0	1 (2.6)	0	1 (2.5)	0

4.4.4. Clinicians beliefs in relation to hand washing during emergencies

Table 4.6 below shows that 21.9% of the student nurses, 28.1% of the assistant nurses, 43.8% of the professional nurses and 6.3% of the medical doctors strongly agreed that hand hygiene is cumbersome in case of emergency. Furthermore 11.1% of the student

nurses, 33.3% of the assistant nurses, 38.9% of the professional nurses and 16.7% of the medical doctors agreed that hand hygiene is cumbersome in case of emergency. However, 16.3% of the assistant nurses, 38.9% of the professional nurses and 16.7% of the medical doctors strongly disagreed that hand hygiene is cumbersome in case of emergency. Clinicians <1 year at 9.7% followed by 1 – 4 years' experience at 54.8%, 5 – 9 years at 19.4%, 10 – 14 years at 12.9% and more than 15 years at 3.2% strongly agreed that hand hygiene is cumbersome in case of emergency. Clinicians who had (<1 year) at 11.1% followed by 1 -4 years working in neonatal unit at 50% while those who worked 5-9 years at 27.8% and 10 – 14 years and above were at 11.1% agreed that hand hygiene is cumbersome in case of emergency. The clinicians who worked in public health facility were more in the category of 5 – 9 years at 49.1% followed by 1 – 4 years, 10 -14 years and <1yr at 26.4%, 20.8% and 3.8% respectively.

Table 4.6: Clinicians beliefs in relation to hand washing during emergencies

Job title	Hand washing is cumbersome during emergencies			Hand washing by healthcare workers is a useful way to reduce infections among patients?		Instructions demonstrating correct hand washing techniques to be displayed	Long fingernails of healthcare workers play a role in transmitting infections to patients.	
	Strongly Agree	Agree	Disagree	Strongly Agree	Disagree	Strongly Agree	Strongly Agree	Agree
Student nurse	7 (21.9)	2 (11.1)	0	9 (16.1)	0 (0.0)	9 (15.8)	9 (16.4)	0 (0.0)
Enrolled/Assistant nurse	9 (28.1)	6 (33.3)	1 (16.3)	16 (28.6)	0 (0.0)	16 (28.1)	16 (29.1)	0 (0.0)
Registered/Prof nurse	14 (43.8)	7 (38.9)	6 (85.7)	27 (48.2)	0 (0.0)	27 (47.4)	26 (47.3)	1 (50.0)
Doctor	2 (6.3)	3 (16.7)	0	4 (7.1)	1 (100.0)	5 (8.8)	4 (7.3)	1 (50.0)
Years in the current job								
< 1 year	3 (9.7)	2 (11.1)	1 (14.3)	6 (10.9)	1 (16.7)	6 (10.7)	5 (9.3)	1 (50.0)
1 – 4 years	17 (54.8)	9 (50.0)	4 (57.1)	30 (54.6)	3 (50.0)	30 (53.6)	29 (53.7)	1 (50.0)
5 – 9 years	6 (19.4)	5 (27.8)	2 (28.6)	12 (21.8)	1 (100.0)	13 (23.2)	13 (24.1)	0 (0.0)
10 – 14 years	4 (12.9)	2 (11.1)	0	6 (10.9)	2 (33.3)	6 (10.7)	6 (11.1)	0 (0.0)
≥ 15 years	1 (3.2)	0	0	1 (1.8)	0	1 (1.8)	1 (1.9)	0 (0.0)

4.5. THE CLINICIAN'S COMPLIANCE ON INFECTION CONTROL PROCEDURES

4.5.1. The clinician's compliance on Infection Control Procedures

Fig 4.1 below shows that Only (14.8%) of student nurse has responded to be occasionally using gloves when anticipating exposure to blood or body fluids. The registered or professional nurses (48.2%), enrolled or assistant nurses (27.8%), and doctors (9.3%) have reported to be always using gloves when anticipating exposure to blood or body fluids.

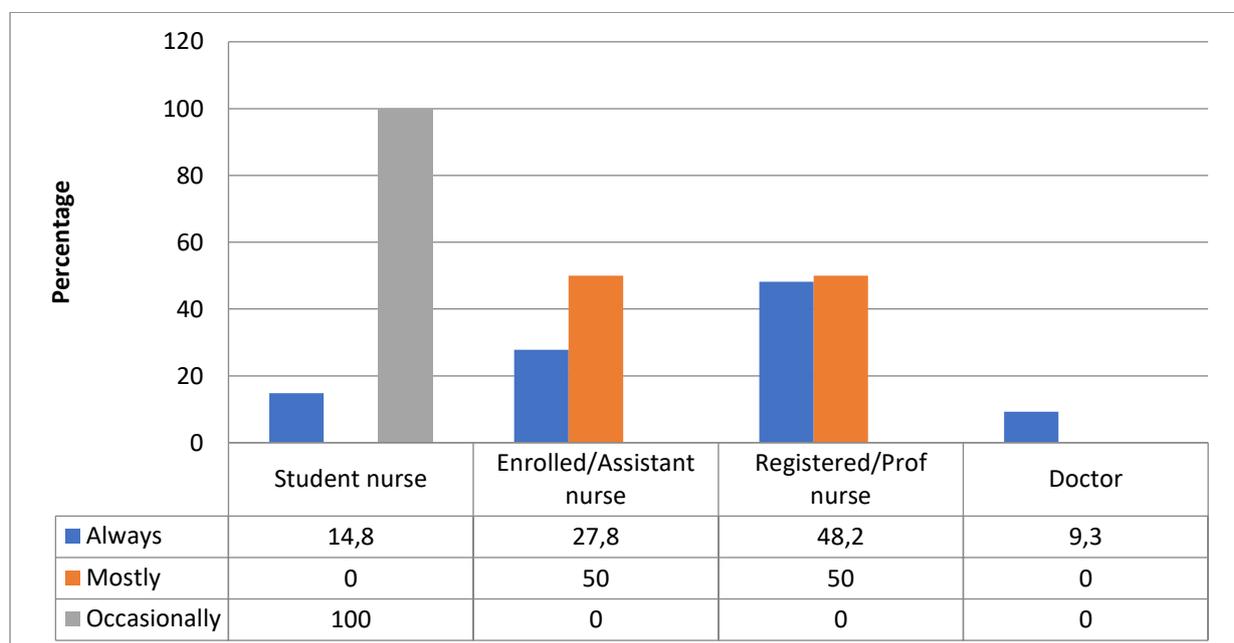


Fig 4.1 The clinician's compliance on Infection Control Procedures

4.5.2. Hands free of jewellery during patient contact and drying of hands with paper towel after washing

Fig 4.2 below shows that 14.6% of professional nurses, 29.1% enrolled or assistant nurses, 49.1% student nurses and 7.3% doctors have reported that they are always hands free of jewellery during patient contact. Also, 50% of professional nurses and 50% of doctors reported to be mostly hands free of jewellery during patient contact. Furthermore, 15.8% of professional nurses, 28.1% enrolled or assistant nurses, 47.4% student nurses and 8.8% doctors reported to be always drying hands with paper towel.

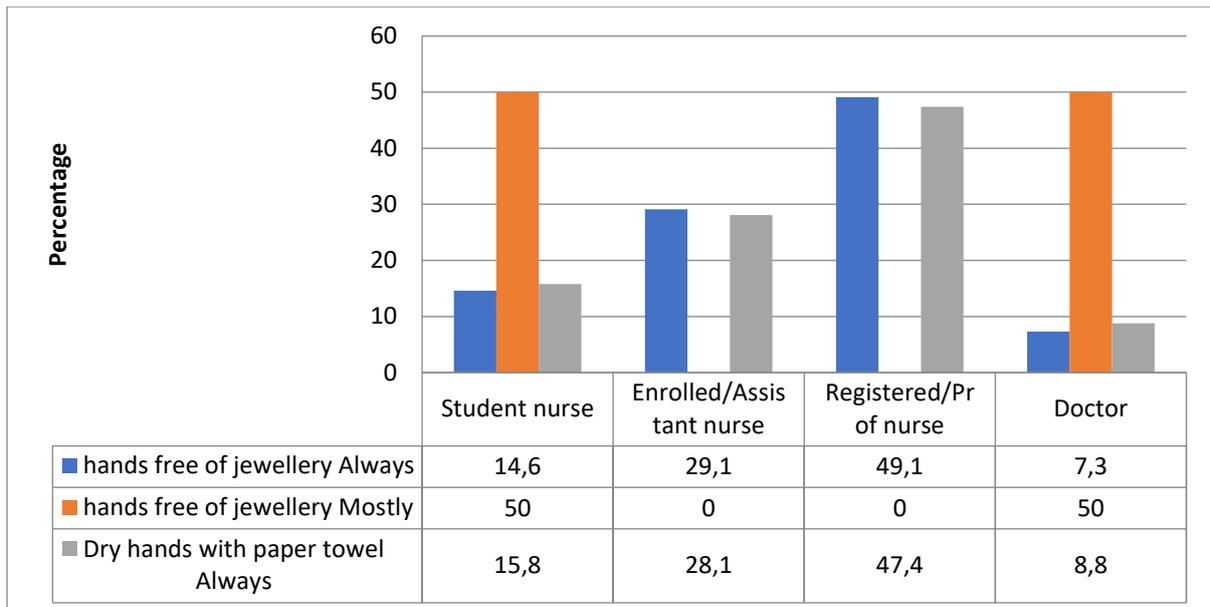


Fig 4.2 Hands free of jewellery during patient contact and drying of hands with paper towel after washing

4.5.3. Disposal of sharps in a yellow sharps container by clinicians

Fig 4.3 below shows that 47% of registered or professional nurses, 28% enrolled or assistant nurses, 16% student nurses and 9% doctors reported to be disposing sharps in a yellow sharps container.

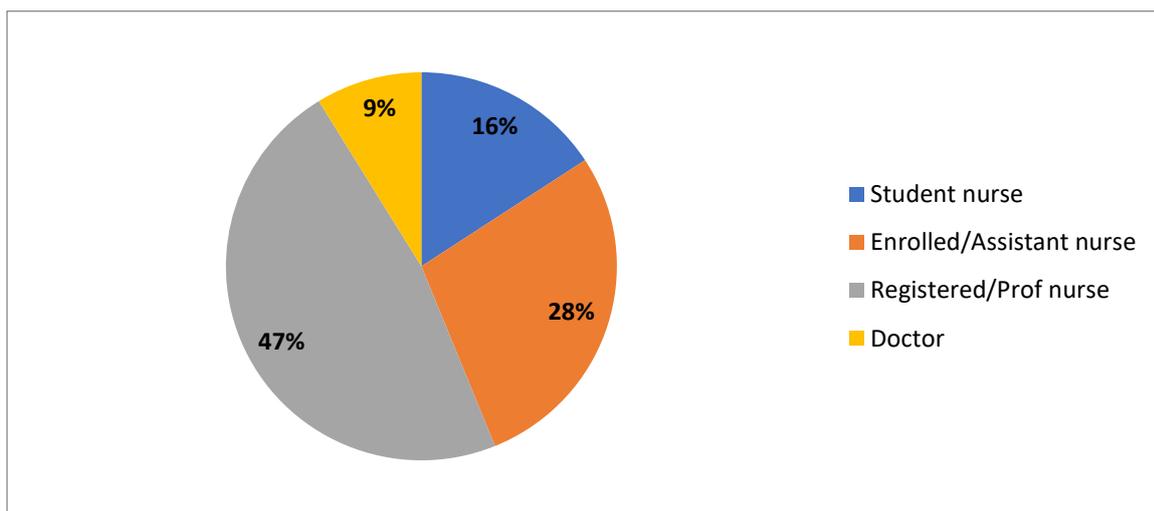


Figure 4.3: Disposal of sharps in a yellow sharps container by clinicians

4.5.4. Disposal of non-contaminated materials by clinicians

Fig 4.4 below shows that 46.4% registered or professional nurses, 28.6% enrolled or assistant nurses, 16.1% student nurses and 8.9% doctors reported to be always disposing non-contaminated material. whilst 100% registered or professional nurses, reported to be occasionally disposing non-contaminated material.

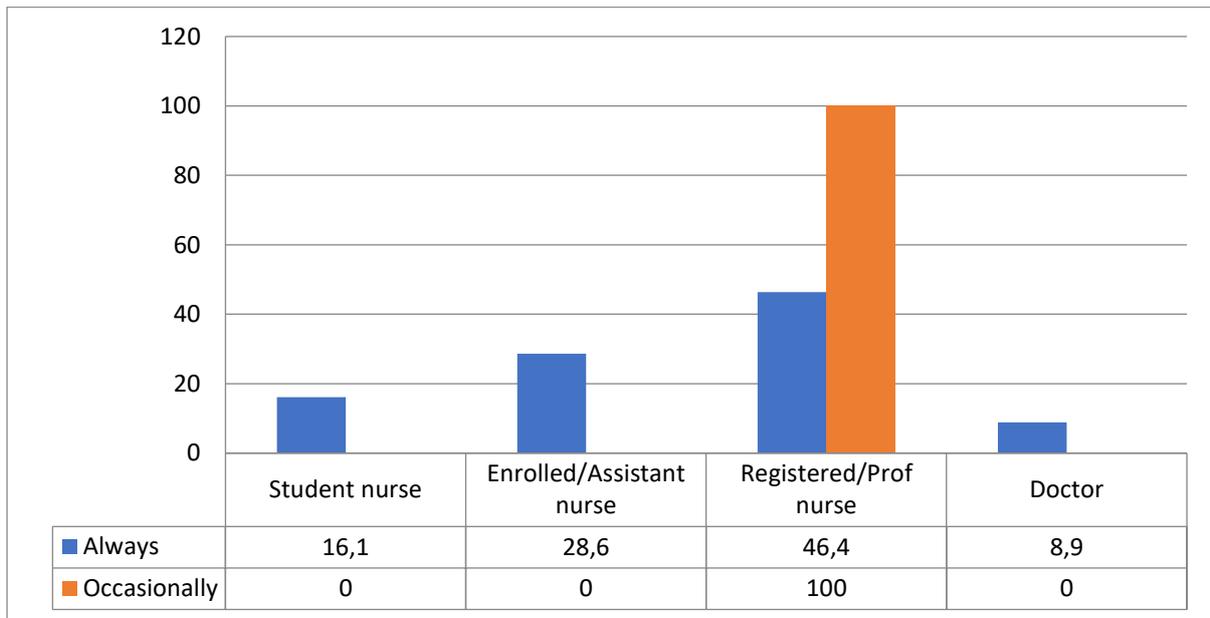


Fig 4.4 Disposal of non-contaminated materials by clinicians

4.6. CONCLUSION

The results of data analysis were presented in this chapter. The data was analyzed using SPSS version 23.0. The results of this data analysis will be discussed in the next chapter, including conclusion, limitations of the study and recommendation.

CHAPTER FIVE

DISCUSSION, CONCLUSION, RECOMMENDATIONS, STUDY LIMITATIONS

5.1. INTRODUCTION

In this chapter the research findings, recommendations and conclusions will be presented. Hence this concluding chapter summarizes the research study and the findings of the study to answer the research questions. Finally, the chapter will finish by describing the areas for further study. The objectives of the study were as follows:

- *To determine the adherence of HCWs to infection prevention programs at CMCH neonatal ward*
- *To describe factors influencing compliance to the IP&C Policy amongst HCWs at CMCH neonatal ward*

5.2. DISCUSSION

5.2.1. Demographic profile of respondents

5.2.1.1 Gender of respondents

The results of study revealed that the majority of respondents were nurses and majority of the health care professionals were females as compared to males. This was expected as the health care profession, especially nursing profession, is specifically dominated by females in South Africa (SANC, 2014). 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”. Yawson (2013) cited that one of the main duties of nurses in health care settings is to minimise infection, cross-infection especially amongst those who are vulnerable such as babies. It is therefore important for these professionals to also ensure that the environment they work at is optimally infection-free by practicing infection control measures. Neonatal unit comprises of new-born babies, whose immune system is still underdeveloped (Backman et al;2011), they therefore easily pick up infections, hence there is a need for all healthcare professionals to minimise infections in this environment as much as possible.

5.2.1.2 Age

The results of this study revealed that the majority of health care professionals were between 30 - 40 years of age. Gebresillassie et al., (2014) cited that young workforce can be of advantage in that these are workers who can bring fresh perspective and a different way of thinking in the organization. Furthermore, most young workers are eager to learn, build their experience and apply their skills in the workforce as compared to old workers. A common assumption regarding older workers is that they are not worth investing time and training on as they are unlikely to remain in employment for long due to retirement. Gebresillassie et al., (2014) also found that younger HCWs were more compliant than older ones. In contrast, WHO (2015) found that younger healthcare professionals, especially females tend to be unstable as they are equally affected by societal issues which lead to them being stressed. Workers that are stressed tend to forget easily, make mistakes or do not care about their surroundings and protocol, which directly impact on their ability to control infections. This therefore implies that as HCWs grow older in the profession, some of them tend to be noncompliant when it comes to precautions such as IPC.

5.2.1.3 Level of Education:

The results of this study revealed that most of the respondents had done tertiary education this is justified by the fact that they have a tertiary qualification. Infection Prevention and Control is part of standard precaution which are taught to all health care professionals before they are exposed to clinical setting. McGuckin, et al (2011) argues that the high level of knowledge on hand standard precautionary measures by the HCWs is not unexpected by virtue of their medical background. Furthermore, the results of McGuckin, et al (2011) study shows that standard precautionary measures were independent from level of education, meaning, it is all about priorities and behavior change. The fact that most of health care workers have gone up to tertiary level means that they have adequate knowledge of IPC however, knowledge does not always lead to good infection control practice.

5.2.1.4 Years of Services

The results of this study revealed that the majority of respondents had worked 1 – 4 years' in the neonatal unit, which correlates to their age grouping that was reported earlier. Furthermore, majority of respondents had worked 5 – 9 years' in the public health facility. 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 suggest similar to Lau Chun Ling study (2012) that level of working experience are not associated with adherence rates.

5.2.2. Clinicians beliefs and compliance with regard to infection prevention and control

Objective 1: To determine the adherence of HCWs to infection prevention programs at CMCH neonatal ward

The results of this study revealed that the majority of health care professionals reported that they were using gloves when there's anticipation of exposure to patient's body fluids. The study findings are similar to that of Ramokate and Bas (2009) which found that 95% of respondents reported that they always used gloves when handling medical waste. Similar findings were reported in a study conducted by Fuller and colleagues on hand hygiene compliance when gloves are worn. Furthermore, a study done by Ehlert and Naude (2014) revealed that less than half of the respondents use gloves when performing the audiological procedures. In the same study done by Ehlert, & Naude (2014), it was disturbing to learn that some of the respondents did not see the significance of wearing gloves when performing clinical procedures. This study further revealed that the majority of clinicians were of the view that hand washing is cumbersome during emergency. This study shows the need for further improvement of the existing hand hygiene training programs to address the gaps in knowledge, attitudes and practices. In another study by Chassin et al; 2015 on perceived barriers to appropriate hand hygiene, similar results were obtained. The results of the same study by Chassin et al., (2015) found that the belief that hand hygiene is not needed if wearing gloves was identified as a barrier to appropriate hand hygiene. Pires et al; 2017 cited that poor compliance with hand hygiene practices remains a challenge for

IPC practitioners all over the world. According to Ekwere and Okafo (2013) 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. 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. This concurs with the study that was conducted by Ehlert, and Naude (2014) which revealed that majority of respondents acknowledged the importance of hand hygiene for the purpose of infection control, however these respondents indicated that they wash their hands after contact with a patient.

Even though the main source of HAIs is the patient's endogenous flora, 20-40% of HAI's have been attributed to cross infection via the hands of health care workers, which may be contaminated by direct contact with the patient's intact skin or inanimate objects in the environment, Weber et al; 2012 emphasise that reducing HAI's rates depends on a variety of factors but emphasis should be placed on staff related procedures especially hand hygiene. Chassin et al., (2015) conducted a study on improving hand hygiene at eight hospitals in the USA by targeting specific causes of noncompliance and found that skin irritation from hand cleaning products and lack of paper towels were associated with noncompliance to hand hygiene standards. The findings of the same study conducted by WHO's (2009) identified skin irritations and dryness due to hand washing agents and lack of paper towels as reasons for not performing hand hygiene according to the recommended guidelines.

The results regarding hand washing after contact with the patient is of great concern, the implication is that respondents expose themselves and their patients to infections. From the results of the current study, some health-care workers felt that they do not have to wash their hands after using gloves because after all; hands are not contaminated. However, Tomas et al 2015, assessed the frequency and sites of contamination on the skin and clothing of personnel during personal protective equipment removal. The study revealed that, contamination of the skin and clothing of health care personnel occurs during the removal of contaminated gloves hence the reason to wash hands.

According to Alexander, Meeker and Rothrock (1999), sharps should be disposed in a container that is colour-coded, puncture-resistant and leakproof. Therefore, the transmission of infection can be prevented and accidental injuries such as needle sticks can be prevented because the container is puncture-resistant. The results of this study revealed that the majority of health care professionals reported that they dispose sharps in a Container designated for Sharps. However, the study findings were different from that of Tomas et al 2015 whereby majority of the HCWs disposed of their sharps from a contaminated case in the sharp container that remained in the operating room where other surgical procedures were still to be performed, which could also contribute to the transmission of infection. On the other hand, the results of this study revealed that the majority of health care professionals reported that they dispose non-contaminated materials in a Container Designated for General Waste. The study findings are consistent with those of a similar study done by Ramokate and Bas (2009) in which it was revealed that most respondents treated health care risk waste differently from health care general waste. The study also revealed that some of the student nurses reported that they don't dispose gloves in a container for contaminated material. The study findings are similar to those of a similar study done by Ramokate and Basu (2009) which revealed that 96% of respondents knew the various types of bins to dispose medical waste and used them appropriately.

Maharjan et al; 2014 argued that healthcare workers wearing bangles, watch and rings can harbor the pathogenic organisms which would be responsible for HAIs. The results of this study revealed that the majority of health care professional's hands are mostly not free of jewellery and other accessories. Maharjan et al; 2014 cited that healthcare workers wearing bangles, watches and rings can transmit the pathogenic organisms which would be responsible for HAIs. Therefore, they should not wear those items or other accessories if they are involved with direct patient care. The study findings are similar to those of a similar study done by Maharjan et al., (2014) which revealed that personal accessories can harbor and act as vehicles for transfer of potential pathogens which may be associated with health care associated or nosocomial infection. The study conducted by Fagernes and Lingaas (2011) revealed that wearing watches was associated with enhanced total bacterial count which is more than three times as many bacteria on hands with watches compared to control hands without watches. Based on this data, they concluded that HCW should not wear

watches during patient care. The findings are similar to the study conducted by Valvizhi et al; 2012 which revealed that watch-wearers had a greater number of bacteria on their wrists than in the non-watch wearers.

Objective 2: To describe factors influencing compliance to the IP&C Policy amongst HCWs at CMCH neonatal ward

This study results also revealed that there were factors that hindered HCWs from practicing hand hygiene. Respondents reported that they are short of paper towels which lead to them wiping hands with their own clothes. according to Yuan et al., (2009) the primary challenges in improving hand hygiene were limited to the lack of resources, knowledge and attitudes. The study findings are similar to a study by Ekwere and Okafo (2013) where the majority of respondents reported that they were not drying their hands after washing. Unfortunately, if hand hygiene is being neglected pathogen transmission to the patients won't be prevented. Zottele et al; 2015 revealed that different factors may be related to low compliance. Among them are healthcare services with limited resources, overcrowding with inadequate or no spatial separation between beds, physical structure which includes poorly located sinks, the use of gloves, staff attitudes, lack of motivation, poor policy; and poor training received where the study findings are similar to the current findings which revealed that low compliance to IPC is due to use of gloves, staff attitudes, lack of motivation and poor policy.

The findings from this study suggest that the primary challenges in IPC practices are due to the lack of policy and standard operating procedures, lack of displayed Instructions demonstrating correct hand washing techniques, lack of paper towels, IPC resources being out of stock. Insufficient time to wash hands in time of emergency and wearing accessories during direct clinical care. Tavalacci et al., (2006) suggest that a lack of policy knowledge with regard to hand hygiene has also been linked to non-compliance of HCWs.

According to Alice et al 2015 failure to segregate waste at point of production puts the life of those who handle waste at increased risk of acquiring HAIs. Further emphasised that the reasons which explain the suboptimal practices are the lack of appropriate knowledge and proper supplies to enable waste segregation implementation. They argued that although health care workers can be trained and have the enthusiasm to change the behavior on IPC practices, if there's limited knowledge and limited supplies of material resources the risk of HAIs will remain high. Kamunge et al; 2015 argues that clinicians spend most of their time with patients, therefore, determining their knowledge, attitudes and practices patterns concerning hospital acquired infections may provide one approach by which health-care associated infections would be addressed.

The findings from this study suggest that the suboptimal IPC practices are the lack of appropriate knowledge, standard operating procedures and proper supplies to enable good IPC practices and the perception on IPC practices. Based on this current study, the reasons for inadequate IPC practices are more related to staff attitudes and the lack of frequent in-service trainings on the implementation of the policy and standards operating procedures. The focus of recommended policy intervention should also be addressing the absent of reinforcement and monitoring the implementation thereof, moreover the provision of resources associated with IPC standards at institutional level.

According to Tsai, (2011) the culture within an organization is very important, playing a large role in whether it is a happy and healthy environment in which to work. In communicating and promoting the organizational ethos to employees, their acknowledgement and acceptance of it can influence their work behavior and attitudes. Further emphasised that when the interaction between the leadership and employees is good, the latter will make a greater contribution to team communication and will also be encouraged to accomplish the mission and objectives assigned by the organization, thereby enhancing job satisfaction. Hence, the results of the current study suggest that strategies to address this negative behavior due to staff attitudes requires greater understanding of the organizational culture and systems of accountability that exist within hospital at large. Bertels, Papania and Papania (2010) argued that organisations with strong cultures of sustainability strive to support a

healthy environment and improve the lives of others while continuing to operate successfully over the long-term. Haugh and Talwar, (2010) cited that in order to create the right culture, sustainability must be embedded in the organisations' day-to-day decisions and processes and learning about sustainability requires employees to acquire new knowledge and change the way they work. They further emphasised that to gain practical experience of working with sustainability initiatives culture of sustainability should be an integral part of training and development programmes.

5.3. CONCLUSION

In conclusion, the study highlights the urgent need for introducing measures to increase good practices on IPC in neonatal unit at Charlotte Maxeke Hospital, which may play very important role in increasing IPC compliance among the clinicians and health care workers. Health care workers are aware of the effects of inadequate hand hygiene practices and how these may lead to an increase of HCAs. What has become apparent is the lack of knowledge of policies and guidelines relating to IPC practices that HCWs have. These must be addressed to narrow the theory to practice gap that is present.

The study identified a number of barriers to comply amongst HCWs' and clinicians some which appeared more significant than others within the Neonatal unit setting. In order to improve IPC compliance of HCWs and clinicians all the influencing factors must be addressed together and not in isolation. This indicates the use of a multimodal improvement system. For example, knowledge and education of HCWs must be improved by conducting IPC audits frequently. While IPC practices are simple, compliance falls in the domain of human behaviour, and altering human behaviour is complex and constitutes an enormous challenge, however without resources there's no how IPC compliance can expand. Although widely preached and recognized by healthcare workers, that compliance to IPC practices is best in preventing HAIs, adherence to practice is difficult. Most of the studies like this one reveals that healthcare workers do not comply willingly.

5.4. RECOMMENDATIONS

The study revealed that the monitoring committee in the hospital is not active and thus many workers do not have access to policies on infection prevention and control. Therefore, the study recommends that the committee be revitalized by the hospital management to be able to undertake its mandate. Furthermore, the Hospital administration should provide copies of IPC policy Guidelines in all wards/units and ensure effective implementation through constant supervision and adequate supplies and conduct regular audits to enhance compliance and implementation of IPPC policy. Frequent sensitization and training of staff is needed to enable them to have positive attitude and practice proper waste segregation. Therefore, the study recommends that the hospital integrates these trainings in to the normal hospital training programmes to ensure that all workers access it frequently.

The study also revealed that there are cases where staff renders clinical care to patients while wearing jewellery. Therefore, the study recommends that the hospital management spearhead a campaign to encourage medical staff to remove jewellery when rendering clinical care. Clinicians are supposed to use gloves when anticipating exposure to blood or bodily fluid however not all clinicians are using gloves when anticipating exposure to blood or bodily fluid. Most clinicians are not adequately protected, and the study recommends that the hospital procures relevant IEC materials. Frequent sensitization and training of staff is needed to enable them to have positive attitude and practice proper IPC practices.

The study recommends that the hospital integrates IPC trainings in to the normal hospital programmes to ensure that all workers access it frequently. There is a need for regular trainings among health care workers with regard to hand hygiene. There is a 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. 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

5.5. CONTRIBUTION OF THE STUDY

This study contributes to the field by exposing the factors affecting the Infection Prevention and Control practices at Charlotte Maxeke central hospital neonatal unit, Johannesburg, south Africa enabling the clinicians to reflect on their role in the provision of safe health care and make recommendations for improving Infection Prevention and Control practices. The consistent implementation of Infection Prevention and Control practices is a non-negotiable service delivery imperative for the South African Department of Health and a vital standard for certification and accreditation for National Health Insurance of health establishments by the Office of Health Standards Compliance.

5.6. LIMITATION OF THE STUDY

The study was conducted in one facility in South Africa and reflects the findings in the context of CMCH. It is up to the reader of this report to attach meaning and understanding of factors affecting Infection Prevention and Control practices at Charlotte Maxeke Central Hospital neonatal unit considering their own context as other hospital situations may be different. Further study should be conducted in other hospitals context to explore the factors affecting Infection Prevention and Control practices.

5.7. SUGGESTED AREAS FOR FURTHER RESEARCH

- Further research needs to be carried out to determine the factors influencing infection prevention and control practices among non-clinical departments within the hospital.
- Further research needs to be done to determine the factors influencing the negative attitude of staff towards infection prevention and control in CMCH neonatal unit.
- Further research needs to be done to compare infection prevention and control practices across the different clinical departments at CMCH.
- The role of policy makers, stakeholders and government leaders in infection prevention and control in a clinical setup.

5.8. SUMMARY

The results of data analysis were discussed with consideration of the objectives of this study. Conclusion was derived based on the discussions. Recommendations and limitations of the study were also discussed in this chapter.

REFERENCES

- Ahoyo TA, Bankolé HS, Adéoti FM, Gbohoun AA, Assavèdo S, Amoussou-Guénou, M, Kindé-Gazard DA. & Pittet D. Prevalence of nosocomial infections and anti-infective therapy in Benin: results of the first nationwide survey in 2012. *Antimicrobial resistance and infection control*, 2014;3(1): 1.
- Alexander EL, Meeker MH, & Rothrock *Calamander's care of the patient in surgery*, 1999. St. Louis, Mosby
- Apisarnthanarak A. & Madriaga N. Initial inappropriate urinary catheters use in a tertiary-care center, incidence, risk factors, and outcomes. *Am J Infect Control*, 2015;35:594–599.
- Babbie E. 2010. *The practice of social research*. 12th ed. Belmont, CA: Wadsworth Cengage
- Barba, M.D, Duque, M.C, Lemus, M, 2006. Plantas útiles de la región semiárida de Aguascalientes. Universidad Autónoma de Aguascalientes, Mexico: 235.
- Backman C, Marck PB, Krogman N, Taylor G, Sales A, Bonten M. & Gingengack AC. Barriers and bridges to infection prevention and control: results of a qualitative case study of a Netherlands' surgical unit. *BMJ open*, 2012;2(2): e000511.
- Bereket W, Hemalatha K. Getenet B, Wondwossen T, Solomon A, Zeynudin A. & Kannan S. Update on bacterial nosocomial infections. *European Review Medical Pharmacology Sciences*, 2012;16 (8):1040-1044.
- Bertels S, Papania L. & Papania D. Embedding sustainability in organisational culture: A systematic review of the body of knowledge. 1–74. London Ontario, 2010.. (Online). Available at: <http://nbs.net/wp-content/uploads/Systematic-Review-Sustainability-and-Corporate-Culture.pdf>. [Accessed: 12 March 2018].
- Birgand G, Johansson A, Szilagyi E. & Lucet C. Overcoming the obstacles of implementing infection prevention and control guidelines, *Clinical Microbiology and Infection*, 2015;21(12):1067-1071.
- Black T, Black V. & Black A. Combined Multi Cellular Phone Charger and Sterilizing Unit to Reduce Hospital Acquired Infections, *International Journal of Applied Science and Technology*, 2015;5(6):74- 78.
- British Medical Association (2006) Healthcare associated infections: A guide for healthcare professionals. IN BMA (Ed.) available at www.bmj.com/cgi/content/full/323/7310/411, accessed 05 May 2018
- Breathnach AS. Nosocomial infections. *Medicine*, 2009;37:557-561.
- Brink HL, Van der Walt C. & Van Rensburg G. *Fundamentals of Research Methodology for Health Care Professionals*. 2012. 3rd ed. Cape Town: Juta

Brink PJ. & Wood MJ. *Advanced Design in Nursing Research*, 1998. 2nd ed. Thousand Oaks, CA: SAGE Publication, Inc.

Burns N. & Grove SK. *The Practice of Nursing Research: Appraisal, Synthesis and Generation of Evidence* 2010. (6th ed.). St. Louis: Saunders.

CDC. 2010. Recommendations to prevent healthcare-associated infections. Available at <http://www.cdc.gov/HAI/pdfs/hai/top-cdc-recsfactsheet.pdf>. Accessed February 13, 2018

Chassin MR, Mayer C. & Nether K. Improving hand hygiene at eight hospitals in the united states by targeting specific causes of noncompliance. *The Joint Commission Journal on Quality and Patient Safety*, 2015;41(1):4-12.

Climo MW, Yokoe DS, Warren DK, Perl TM, Bolon M, Herwaldt LA, Weinstein RA, Sepkowitz KA, Jernigan JA, Sanogo K. & Wong ES. Effect of daily chlorhexidine bathing on hospital-acquired infection. *New England Journal of Medicine*, 2013;368(6):533-542.

Creswell JW, Fetters MD. & Ivankova NV. Designing a mixed methods study in primary care. *The Annals of Family Medicine*, 2004;2(1):7-12.

Christabel, C. Enweronu, L, Mercy, J. Newman, J. Hand hygiene practices in a neonatal intensive care unit in Ghana. *Journal of Infect Control in Developing Countries*, 2009; 3(5):352-35

De Vos AS, Strydom H, Fouché CB. & Delport CSL. *Research at grass roots. For the social sciences and human service professions*. 3rd ed. Pretoria: Van Schaik. 2005. Pages 357-366)

Doshi RK, Patel G, Mackay R. & Wallach F. Healthcare Associated Infections: Epidemiology, Prevention, and Therapy. *Mount Sinai Journal of Medicine*, 2009;76:84-94

Ducel G, Fabry J, & Nicolle L. *Prevention of Hospital acquired Infections: A practical guide*. 2002. 2nd Edition WHO/CDS/CSR/EPH/2002.12. World Health Organization Department of Communicable Disease, Surveillance and Response pp 27.

Ehlert K. & Naude AM. 2014. Infection prevention and control measures currently applied in South African audiology. *South African Journal of Communication Disorders*, 2014;11;61(1):55-65.

Ekwere A. & Okafo P. Hand hygiene knowledge and practices among healthcare providers in a tertiary hospital. *South West Nigeria International Journal of Infect Control*, 2013;9(4:1):10

Erasmus V, Daha TJ, Brug H, Richardus JH, Behrendt MD, Vos MC. & Van Beeck, EF. Systematic review of studies on compliance with hand hygiene guidelines in hospital care. *Infection Control & Hospital Epidemiology*, 2010;31(03):283-294.

Fagernes M. & Lingaas E. Factors interfering with the microflora on hands a regression analysis of samples from 465 healthcare workers. *Journal of Advanced Nursing*, 2011;67(2):297-307.

Falagas ME, Karageorgopoulos DE, Leptidis J. & Korbila IP. MRSA in Africa: filling the global map of antimicrobial resistance. *PloS one*, 2013;8(7):e68024.

Farley JE, Tudor C, Mphahlele M, Franz K, Perrin NA, Dorman S. & Van der Walt M. A national infection control evaluation of drug-resistant tuberculosis hospitals in South Africa. *The International Journal of Tuberculosis and Lung Disease*, 2012;16(1):82-89.

Fuller C, Savage J, Besser S, Hayward A, Cookson B, Cooper B. & Stone S. The dirty hand in the latex glove: A study of hand hygiene compliance when gloves are worn. *Infection Control & Hospital Epidemiology*, 2011;32(12):1194-1199.

Ghashghaee A, Behzadifar M, Azari S, Farhadi Z, Luigi Bragazzi N, Behzadifar M, Saeedi Shahri SS, Ghaemmohamadi MS, Ebadi F, Mohammadibakhsh R, Seyedin H. & Moghadam M. Prevalence of nosocomial infections in Iran: A systematic review and meta-analysis. *Med J Islam Repub Iran*: 2018;32:48.

Gichuhi AW, Kamau SM, Nyangena E. & Otieno-Ayayo Z. Health care workers adherence to infection prevention practices and control measures: A case of a Level Four District hospital in Kenya. *American Journal of Nursing Science*, 2015;4(2):39-44.

Hambraeus A. Lowbury Lecture 2005: infection control from a global perspective. *Journal of Hospital Infection*, 2006;64(3): 217-223.

Haugh HM. & Talwar A. How do corporations embed sustainability across the organization? *Academy of Management Learning & Education*, 2010; 9(3):384-396.

Horan WP, Kern RS, Green MF. & Penn DL. Social Cognition Training for Individuals with Schizophrenia: Emerging Evidence. *American Journal of Psychiatric Rehabilitation*, 2008;11:205–252.

Hussein J, Mavalankar DV, Sharma S. & D'Ambruso L. A review of health system infection control measures in developing countries: what can be learned to reduce maternal mortality. *Globalization and health*, 2011;7(1):7-14.

Johnston BL. & Bryce E. Hospital infection control strategies for vancomycin-resistant Enterococcus, methicillin-resistant Staphylococcus aureus and Clostridium difficile. *Canadian Medical Association Journal*, 2009;180(6):627-631.

Joseph B. & Joseph M. The health of the healthcare workers. *Indian journal of occupational and environmental medicine*, 2016; 20(2):71-72.

Kamath S, Mallaya S. & Shenoy S. Nosocomial infections in neonatal intensive care units: profile, risk factor assessment and antibiogram. *The Indian Journal of Pediatrics*, 2010;77(1):37-39.

Kamunge E, Cahill T, Zipp G. & Parasher R. Knowledge, attitudes and practices of registered nurses regarding the spread of nosocomial infections and the impact of organizational support. *Antimicrobial Resistance and Infection Control*, 2015; 4(Suppl 1):60.

Krejcie RV. & Morgan DW. Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 1970;30: 607-610.

Levy PS. & Lemeshow S. Sampling of Populations: Methods and Applications. 2008. 4th Edition, John Wiley & Sons, Hoboken. <http://dx.doi.org/10.1002/9780470374597>

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

Lobdell KW, Stamou S. & Sanchez JA. Hospital-acquired infections. *Surg Clin N Am* 2012;92:65–77.

Lowman W, Active surveillance of hospital-acquired infections in South Africa: Implementation, impact and challenges, *SAMJ* ,2016;106 (5):489-493.

McKay R. & Bamford C. Community versus healthcare-acquired bloodstream infections at Groote Schuur Hospital, Cape Town, South Africa. *SAMJ*, 2015;105 (5):363–369.

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

Madzaro C, Dorado C, Fort A, Herranz J, Selfa R, Ferradal I, Mattoral F, Pau D & Diaz S. Effectiveness of training programme to improve hand hygiene compliance in Primary Health Care. *BMC Public Health*, 2009;.9(1): 469.

Maharjan U, Rajbanshi LG, Gurung G, Gautam R. & Nepal HP. Are personal accessories safe in Hospital settings. *Journal of Chitwan Medical College*; 2014;4(8): 29-31.

Marschall J, Mermel LA, Fakh M, Hadaway L, Kallen A, O'Grady NP, Pettis AM, Rupp ME, Sandora T, Maragakis LL. & Yokoe DS. Strategies to prevent central line-associated bloodstream infections in acute care hospitals: 2014 update. *Infection Control & Hospital Epidemiology*, 2014;35(S2):S89-S107.

Marshall C. & Rossman G. Designing Qualitative Research. 2016. 6th Edition, SAGE, Thousand Oaks.

Mahfouz AA, Al-Azraqi TA, Abbag FI, Al-Gamal MN, Seef S. & Bello CS. Nosocomial infections in a neonatal intensive care unit in south-western Saudi Arabia/Infections nosocomiales dans un service de soins intensifs néonataux du sud-ouest de l'Arabie saoudite. *Eastern Mediterranean Health Journal*, 2010;16(1):40.

National Nosocomial Infections Surveillance System (NNIS) System Report, data summary from January 1992 through June 2004, issued October 2004. *American journal of infection control*, 2004;32(8):470-485.

Nanou C, Paulopoulou L, Liosis G, Tsoumakas K. & Saroglou G. Risk Factors for Nosocomial Infections in Neonatal Intensive Care Units (NICU). *Health Science Journal*, 2015;9(2):9.

Nejad SB, Allegranzi B, Syed SB, Ellis B. & Pittet D. Health-care-associated infection in Africa: a systematic review. *Bulletin of the World Health Organization*, 2011;89(10):757-765.

Neuman, W. L. (2011). *Social Research Methods: Qualitative and Quantitative Approaches* (D. Musslewhite Ed. 7th ed.). USA: Allyn and Bacon.

Pires D, Bellissimo-Rodrigues F, Pittet D. (2017) The evolution in Hand Hygiene literature. In: *Hand Hygiene: A Handbook for Medical Professionals*. Oxford: Wiley-Blackwell, 2017: 391–399.

Ojulong J, Mitonga KH. & lipinge SN. Knowledge and attitudes of infection prevention and control among health sciences students at University of Namibia. *African Health Sciences*, 2013;13(4).

Pires D, Bellissimo-Rodrigues F. & Pittet D. *The evolution in Hand Hygiene literature*. In: *Hand Hygiene: A Handbook for Medical Professionals*. 2017. Oxford: Wiley-Blackwell, pp. 391–399.

Pittet D. Global implementation of WHO's multimodal strategy for improvement of hand hygiene: a quasi-experimental study. *Lancet Infectious Diseases*, 2013;13: 843–851.

Polin RA, Denson S. & Brady MT. Strategies for prevention of health care–associated infections in the NICU. *Pediatrics*, 2012;129(4):e1085-e1093.

Polit DF. & Beck CT. *Essentials of Nursing Research: Appraising Evidence for Nursing Practice*. 2014. 8th Edition, Lippincott Williams & Wilkins, Philadelphia.

Polit DF. & Hungler BPEssentials of Nursing Research: Methods, Appraisal, and Utilization. 2013. (8th Edition ed.). Philadelphia: Wolters Kluwer/Lippincott Williams and Wilkins

Pozgar GD. *Legal aspects of health care administration*. 2011. ed 11, Sundbury Mass. Jones & Bartlett Publishers. Publisher: Jones & Bartlett Learning

Raka L. Prevention and control of hospital-related infections in low and middle income countries. *Open Infect Dis J*, 2010;4:125-131.

Ramokate T. & Basu D. Health care waste management at an academic hospital: knowledge and practices of doctors and nurses. *SAMJ*, 2009; 99(6) :444-445

Ritchie J. & Lewis J. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. 2003.Sage Publications, London.

Ross DS, & Vasantha S. A study on Hospital Acquired Infections, control and management, *International Journal*, 2014;3(1):8654-8660.

Rotter ML. " I wash my hands of it!?"–Trends in hand hygiene over the past decades. *GMS Krankenhaus hygiene interdisziplinär*, 2007;2(1).

Rosenthal VD, Maki DG, Mehta A, Alvarez-Moreno C, Leblebicioglu H, Higuera F, Cuellar IE, Madani N, Mitrev Z, Dueñas I, Navoa-ng JA, Garcell HG, Raka I. International nosocomial infection control consortium report, data summary for 2002-2007, issued January 2008. *American journal of infection control*, 2008;36:627-637.

SA, Council, S.A.N., 1978. The Nursing Act, No 50, of 1978 (as amended). *Government Printers. Pretoria*.

SA, Report on the Klebsiella outbreak at Charlotte Maxeke Hospital in Gauteng. The MEC: Health and Social Development Gauteng province (2011) <http://gautenghealth.gov.za.pdf>. Accessed 2 Nov 2016.

South African Nursing Council (SANC). 2014. Statistics for 2013. From: <http://www.sanc.co.za/stats.htm> accessed 29 May 2014.

Samuel SO, Kayode OO, Musa OI, Nwigwe GC, Aboderin AO, Salami TAT. & Taiwo SS. Nosocomial infections and the challenges of control in developing countries. *African journal of clinical and experimental microbiology*, 2010;11(2).

Schein EM. *Organizational culture and leadership*. 2004. San Francisco: Jossey-Bass.

Strengthening Pharmaceutical Systems. 2009. *Infection Control Assessment Tool, 2nd Edition: User Manual*. Submitted to the U.S. Agency for International Development by the Strengthening Pharmaceutical Systems Program. Arlington, VA: Management Sciences for Health.

Stiller A, Salm F, Bischoff P. & Gastmeier P. Relationship between hospital ward design and healthcare-associated infection rates: a systematic review and meta-analysis. *Antimicrobial Resistance and Infection Control*, 2016;5:51.

South Africa. *National Health Act, no. 61. 2003*. Pretoria: Government Printer.

Sydnor ER. & Perl TM. Hospital epidemiology and infection control in acute-care settings. *Clinical microbiology reviews*, 2011;24(1):141-173.

- Šimundić AM. Lessons in Biostatistics. *Biochemia Medica*, 2013;23(1):12-15.
- Suleman F. & Meyer H. Antibiotic resistance in South Africa: your country needs you. *SA Pharmaceutical Journal*, 2012;79(5):44-46.
- Tagoe DNA, Baidoo SE, Dadzie I, Tengey D. & Agede C. Potential sources of transmission of hospital acquired infections in the Volta Regional Hospital in Ghana. *Ghana Medical Journal*, 2011;45(1).
- Tashakkori A. & Creswell JW. Editorial: The new era of mixed methods. *Journal of mixed methods research*, 2007;1(1): 3-7.
- Tavolacci MP, Merle V, Pitrou I, Thillard D, Serra V. & Czernichow P. 'Alcohol- based hand rub: Influence of healthcare –workers' knowledge and perception on declared use'. *Journal of Hospital Infection*, 2006;64:149-155.
- Tomas ME, Kundrapu S, Thota P, Sunkesula VCK, Cadnum JL, Mana TSC. & Donskey CT. Contamination of health care personnel during removal of personal protective equipment. *JAMA Intern Med*. 2015;175(12):1904-1910.
- Tsai Y. Relationship between organizational culture, leadership behavior and job satisfaction. *BMC Health Services Research*, 2011;11:98.
- The South African Nursing Council. 2006. Nursing Act 33 of 2005. SANC: Pretoria: Pretoria: Government Printers.
- Yassi A, Bryce EA, Breilh J, Lavoie MC, Ndelu L, Lockhart K. & Spiege J. Collaboration between infection control and occupational health in three continents: a success story with international impact. *BMC international health and human rights*, 2011;11(Suppl 2):S8.
- Velvizhi G, Anupriya G, Sucilathangam G, Ashihabegum MA, Jeyamurug A. Wristwatches as the Potential Sources of Hospital-Acquired Infections. *Journal of Clinical and Diagnostic Research*,2012;6(5):807-881
- Voss A, Kluytmans J. & Pittet D. A new journal and new global perspective on infection control and public health. *Antimicrobial Resistance and Infection Control*, 2012;1(1):1.
- Weber DJ, Rutala AW, Miller MB, Huslage K. & Sickbert-Bennett E. Role of hospital surfaces in the transmission of emerging health care associated pathogens: Norovirus, *Clostridium difficile*, and *Acinetobacter* species. *American Journal of Infection Control*, 2010;38(5):S25-S33.
- Wimmer RD. & Dominick JR. Mass Media Research. An Introduction. 2006. (8th edition). Canada: Thomson Wadsworth.
- World Health Organization. 2009. *Guideline on hand hygiene in health care*. From: http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf (accessed 30 May 2015).

World Health Organization.2010. Prevention of health care associated infection and antimicrobial resistance. International conference on patient safety. Health care associated infection and anti-microbial. Madrid, Spain. June 2010

World Health Organization, 2011. Report on the burden of endemic health care-associated infection worldwide. <http://whqlibdoc.who.int/publications.htm> (accessed 10 May 2018).

World Health Organization,2015. Report on Ageing and Health. www.who.int/about/licensing/copyright_form/en/index.html. (accessed 5 April 2018).

World Health Organization. 2013. *Multimodal hand hygiene improvement strategy*. <http://whqlibdoc.who.int/publications.htm> (accessed 5 April 2014).

Uys HHH. & Basson AA. Research methodology in nursing. 1991. Pretoria: Kagiso.

Yang H, Dib HH, Zhu M, Gang Q. & Zhang X. Prices, availability and affordability of essential medicines in rural areas of Hubei Province, China. *Health Policy and Planning*, 2010;25:219-229.

Yawson A. Hand hygiene in a teaching hospital in Ghana. Accra: Ghana. 2013

Yuan CT, Dembry LM, Higa B, Fu M, Wang H, Bradley EH (2009). Perceptions of hand hygiene practices in China. *Journal of Hospital Infection*; 71: 157-162. <http://dx.doi.org/10.1016/j.jhin.2008.09.017>

Zottele C, Magnago TSBS, Dullius AIS, Kolankiewicz ACB, Ongaro JD. Hand hygiene compliance of healthcare professionals in an emergency department. *Rev Esc Enferm USP*. 2017;51:e03242.

APPENDICES

APPENDIX A

Dr B Selebano
Head of Department
Gauteng Department of Health
PRIVATE BAG X 085
MARSHALLTOWN
2107
Tel: 011 355 3812 Fax: 011 335 3512

Dear Dr Selebano

Re: INFECTION PREVENTION AND CONTROL PRACTICES AT CHARLOTTE MAXEKE CENTRAL HOSPITAL NEONATAL UNIT, JOHANNESBURG, SOUTH AFRICA

I, Mr Bafana Msibi, a Master of public health (MPH) student at the University of Limpopo, South Africa request permission to conduct research at Charlotte Maxeke Central Hospital on infection prevention and control practices at Charlotte Maxeke Central Hospital Neonatal unit, Johannesburg, South Africa. The aim of the study is to investigate the extent of adherence to Infection Prevention and Control (IP&C) practices and programs amongst clinicians at Charlotte Maxeke Central Hospital (CMCH) in neonatal wards. It is estimated that Health Care Workers as key informants will be interviewed in the period of August 2016 and October 2016. Approval from the University of Limpopo Ethics committee (*Annexure A*).

All the data collected from this study will be safely stored to ensure that no other person has access to them. The research is primarily academic, but the results of the study will be submitted to the University of Limpopo. I therefore request permission to carry out the above-mentioned study in CMCH from August 2016 until October 2016.

For further information please contact Mr Bafana Msibi on (012) 395-8273; emsibi@ohsc.org.za.

Your support for this process will be highly appreciated.

Kind regards

Mr Bafana Msibi

SECTION A: INFORMATION TO PARTICIPANTS AND CONSENT FORM

Thank you for agreeing to be the participant in this study.

Aim of this study will be to:

- Investigate the extent of adherence to Infection Prevention and Control (IP&C) practices and programs amongst clinicians at Charlotte Maxheke Central Hospital (CMCH) in neonatal ward.

You have been selected as an participant for this study on the basis of your expertize and involvement in the provision of care within the neonatal ward.

The data collected during the site visits and interview will form the basis for the Thesis of the Master of Public Health (MPH) and Literature Health Studies Degree with University of Limpopo.

PROCEEDINGS DETAILS

The interview sessions will not exceed 30 minutes for the whole study period per site with a view to learn and share best practices for sustained improvements.

The site visits and interview will be conducted by the researcher using a questionnaire with standard questions.

Participants will be allowed to ask any questions if there is any point you would like to be clarified during this process.

The results will be shared with yourselves once completed for verification purposes.

There shall not be any reference to your personal information, and each informant is free to withdraw or not comment if not comfortable.

You are requested to sign the attached consent form if you are voluntarily willing to be a participant for the study.

Appendix B (Clinicians)

By completing the questionnaire, you are agreeing to participate in the study.

Infection Prevention and Control Questionnaire

GENERAL AND DEMOGRAPHIC QUESTIONS.

What sex are you?

Male

Female

2. How old are you?

Under 30 years

31 – 40 years

41 – 50 years

Over 50 years

3. What is the highest level of education you have completed?

University/College Diploma

Associates Degree

Bachelor's Degree

Other (Please specify) _____

What is your current job title?

5. How long have you been working in this current position?

< 1 year

1 – 4 years ≥ 15 years

5 – 9 years 10 – 14 years

6. How long have you been working in a public health facility?

< 1 year 10 – 14 years

5 – 9 years ≥ 15 years

<i>Health worker's beliefs regarding infection control issues</i>	Strongly agree	Agree	Disagree	Strongly Disagree	uncertain
The healthcare environment plays an important role in infection prevention and control					
A large proportion of healthcare associated infections are preventable					
MRSA can be transmitted between patients on healthcare workers hands					
If you wear gloves for patient care, you do not need to wash your hands					
I would come to work if I had signs and symptoms of a cold					
I would come to work if I had diarrhoea in the past 24 hours					
A health care personnel should have sufficient knowledge and training about Infection Prevention and Control					
Hand washing is cumbersome in case of emergencies					
Hand washing by healthcare workers is a useful way to reduce infections among patients?					
A health care personnel should enrol in regular training sessions regarding Infection Prevention and Control practices					
It doesn't matter what type of cleansing agent is used in your healthcare setting					
Instructions demonstrating correct hand washing techniques to be displayed					
Long fingernails of healthcare workers play a role in transmitting infections to patients.					
I am familiar with the IPC policy of the organization					

<i>Self-reported compliance against infection control procedures</i>	Always	Mostly	Occasionally	Rarely	Never
I use gloves when I anticipate exposure to blood or bodily fluid					
My hands are free of jewelry and other accessories during patient contact					
I Dry hands with paper towel after washing					
I always dispose Sharps in a Yellow Sharps Container?					
I dispose Gloves in a Red Container for Contaminated Materials?					
I dispose Non-contaminated Materials in a Container Designated for General Waste?					

SECTION D: DEBRIEFING AND CONCLUSION

putt an "X" through the block of the appropriate response.

Do you have any other proposals for the improvement on the Infection Prevention and Control Programme at CMCH?	YES	NO
--	-----	----

- How could these be implemented in terms of approach and resources requirement.

CONCLUSION

The draft report will be sent to you after analysis by the researcher for your review and comments before submission for examination.

I would like to thank you for your time and participation in this process.

Appendix B (Cleaners)

By completing the questionnaire, you are agreeing to participate in the study.

Infection Prevention and Control Questionnaire

GENERAL AND DEMOGRAPHIC QUESTIONS.

What sex are you?

Male

Female

2. How old are you?

Under 30 years

31 – 40 years

41 – 50 years

Over 50 years

3. What is the highest level of education you have completed?

University/College Diploma

Associates Degree

Bachelor's Degree

Other (Please specify) _____

What is your current job title?

5. How long have you been working in this current position?

< 1 year

1 – 4 years ≥ 15 years

5 – 9 years 10 – 14 years

6. How long have you been working in a public health facility?

< 1 year 10 – 14 years

5 – 9 years ≥ 15 years

<i>Cleaners attitude regarding infection control issues</i>	Strongly agree	Agree	Disagree	Strongly Disagree	uncertain
The washing of hands must be done only after touching items with blood					
Segregation of waste is necessary even when all waste is to be disposed?					
I would not wash hands after every activity as it can irritate the skin?					
I would come to work if I had signs and symptoms of a cold					
I would come to work if I had diarrhoea in the past 24 hours					

<i>Cleaners beliefs regarding infection control issues</i>	Always	Mostly	Occasionally	Rarely	Never
A cleaner should have sufficient knowledge and training about Infection Prevention and Control					
A health care worker should enrol in regular training sessions regarding Infection Prevention and Control practices					
It doesn't matter what type of cleansing agent is used in your healthcare setting					

Isithathiselo B (Abahlanzi)

Ngokugcwalisa lemibuzo uvumelana nokubamba iqhaza ocwaningweni olumayelana noku theleleka kanye nokuvimbela kwezifo ezithelelanayo.

Imibuzo emayelana nakho Konke kanye neminingwane yakho yobuzwe.

Yini ubulili?

- Owesilisa
- Owesifazane

2. Uneminyaka emingaki?

Ngaphansi kweminyaka engu 30

- 31 – 40 iminyaka
- 41 – 50 iminyaka
- Ngaphezu kweminyaka engu 50

3. Yiliphi izinga eliphezulu lemfundo usugede ngalo?

- Inyuvesi/idiploma yase kolishi
- Isiqu esiphezulu sase nyuvesi

Ezinye (sicela ucacise) _____

Yini isikhundla somsebenzi wakho?

5. Isikhathi esingakanani usebenza kulesikhundla?

- Ngaphansi Konyaka owodwa (1)
- 1 – 4 iminyaka ngaphezu kweminyaka engu 15
- 5 – 9 iminyaka 10 – 14 iminyaka

6. Singakanani isikhathi usebenza esikhungweni somphakathi sezempilo?

- Ngaphansi Konyaka owodwa(1) 10 – 14 iminyaka
- 5 – 9 iminyaka ≥ 15 iminyaka

<i>Indlela yokubuka izinto yabahlanzi mayelana nezindaba zoku kuvimbela kwezifo ezithelelanayo</i>	Ngiyavuma Ngokuqinisekile	Ngiyavuma	Angivumelani	Angivumelani Ngokuqinisekile	Anginasiqini seko
Ukugezwa kwezandla kumele kwenziwe ngemuva koku thinta izinto ezinegazi					
Ukuhlukanisa kwe mfucuzwa ku vumelekile noma yonke imfucuzwa kumele ilahlwe?					
Ngeke ngigeze izandla njalo emva komsebenzi ngoba kungalimaza isikhumba					
Ngingathanda ukuza emsebenzini noma ngingaba nezimpawu zesifo somkhuhlane					
Ngingathanda ukuza emsebenzini uma ngingesifo sohudo esikhathini esidlule amahora angu 24					

<i>Izinkolelo zabahlanzi mayelana nezindaba zoku kuvimbela kwezifo ezithelelanayo</i>	Njalonjalo	Ikakhulukazi	Ngezikhathi ezithile	Akuvamile	Angalokothi
Umhlanzi kufanele abe nolwazi olwanele kanye nokuqeqeshwa mayelana nohlelo lokuvimbelwa kwezifo ezithathelanayo					
Umhlanzi kumele abhalisele ukuqeqeshwa esimisweni esi mayelana nohlelo lokuvimbelwa kwezifo ezithathelanayo					
Akunandaba ukuthi uhlobo olunjani lwensipho olusetshenziswa ukuhlamba isikhungo sezempilo					
Kumele ibekwe obala imiyalelo ebonisa indlela yokugezwa kwezandla					

Appendix C

CONSENT FORM TO BE A PARTICIPANT IN THE RESEARCH FOR THE INFECTION PREVENTION AND CONTROL PRACTICES AT CHARLOTTE MAXEKE CENTRAL HOSPITAL NEONATAL UNIT, JOHANNESBURG, SOUTH AFRICA

I hereby voluntarily consent to participate in the study for the Infection Prevention and Control Practices at Charlotte Maxeke Central Hospital in Neonatal unit.

PARTICIPANT'S SIGNATURE

FULL NAMES

CONTACT NUMBERS

DATE

SIGNATURE OF THE RESEARCHER

MR BE MSIBI

DATE

ISIGABA C:

IMVUME YOHLELO LOCWANINGO OLUMAYELANA NOKU THELELEKA KANYE NOKUVIMBELA KWEZIFO EZITHELELANAYO ESIBHEDLELE CHARLOTTE MAXEKE NEONATAL UNIT, JOHANNESBURG, SOUTH AFRICA

Mina ngalokhu ngiphana ngemvume yokubamba iqhaza ocwaningeni olumayelana nezifundo zoku theleleka kanye nokuvimbela kwezifo ezithelelanayo.

ISIVUMELWANO NGOBAMBE IQHAZA

AMAGAMA NGOKUGCWELE

IZINOMBOLO ZOCINGO

USUKU

ISIVUMELWANO NGO MCWANINGI

MR BE MSIBI

USUKU

.

Appendix D

RESEARCH PROGRAM

July 2017		August 2017		September 2017	
Week 1	-Received provisional approval from Research committee -Corrections of proposal -Re-submission of corrected proposal to Research committee	Week 1	-Data collection(1st Questionnaires distribution) -Submission to supervisor.	Week 1	-Data collection(Interviews) -Submission to supervisor
Week 2	-Approval -Writing Chapter 2(Literature review)	Week 2	-Review and Transcribing -Writing Chapter 4	Week 2	-Review and Transcribing -Writing Chapter 4
Week 3	Request permission from Province and Facility -Writing Chapter 2(Literature review)	Week 3	-Data collection (Interviews) -Submission to supervisor. -Writing Chapter 4	Week 3	-Data collection (Interviews) -Submission to supervisor
Week 4	-Writing Chapter 3 (Awaiting approval)	Week 4	-Data collection (Interviews) -Submission to supervisor	Week 4	Data collection (Interviews) -Submission to supervisor
October 2017		November 2017			
Week 1	-Writing Chapter 4	Week 1	-Writing of Chapter 6	Week 1	
Week 2	-Review and Transcribing -Writing Chapter 4	Week 2	-Editing -Printing and Binding	Week 2	
Week 3	-Writing of Chapter 5	Week 3	-Submission of a completed dissertation.	Week 3	

	-Reporting to supervisor.				
Week 4	-Writing Chapter 5	Week 4		Week 4	

Appendix E



University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 2212, Fax: (015) 268 2306, Email:noko.monene@ul.ac.za

**TURFLOOP RESEARCH ETHICS
COMMITTEE CLEARANCE CERTIFICATE**

MEETING: 03 November 2016

PROJECT NUMBER: TREC/226/2016: PG

PROJECT:

Title: Infection prevention and control practices at Charlotte Maxeke Central Hospital Neonatal Unit, Johannesburg, South Africa
Researchers: Mr BE Msibi
Supervisor: Prof L Skaal
Co-Supervisor: Dr E Maimela
School: Health Care Sciences
Degree: Masters in Public Health

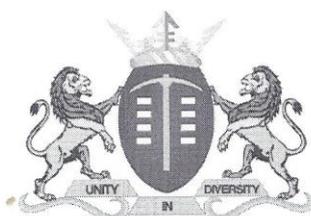
^ **PROF TAB MASHEGO**
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: REC-0310111-031

Note:

- i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
- ii) The budget for the research will be considered separately from the protocol.
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Appendix F



GAUTENG PROVINCE

HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

Enquiries:
Ms. G. Ngwenya
Office of the Nursing Director
Tell: (011): 488-4558
Fax: (011): 488-3786
07 March 2017

Mr. Bafana Elliot Msibi
University of Limpopo

Dear. Bafana Elliot Msibi

RE: "INFECTION PREVENTION AND CONTROL PRACTICES AT CHARLOTTE MAXEKE CENTRAL HOSPITAL NEONATAL UNIT, JOHANNESBURG, SOUTH AFRICA"

Permission is granted for you to conduct the above recruitment activities as described in your request provided:

1. Charlotte Maxeke Johannesburg Academic hospital will not in anyway incur or inherit costs as a result of the said study.
2. Your study shall not disrupt services at the study sites.
3. Strict confidentiality shall be observed at all times.
4. Informed consent shall be solicited from patients participating in your study.
- 5.

Please liaise with the Head of Department and Unit Manager or Sister in Charge to agree on the dates and time that would suit all parties.

Kindly forward this office with the results of your study on completion of the research.

Supported / not supported



Ms. M.M Pule

Nursing Director

Date: 2017/03/07

Approved / not approved



Ms. G. Bogoshi

Chief Executive Officer

08 03 2017

