

**FACTORS ASSOCIATED WITH NONCOMPLIANCE TO HAND HYGIENE
STANDARDS AMONG NURSES AT ONE HOSPITAL IN WINDHOEK, NAMIBIA**

by

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DECLARATION

I declare that **FACTORS ASSOCIATED WITH NONCOMPLIANCE TO HAND HYGIENE STANDARDS AMONG NURSES AT ONE HOSPITAL IN WINDHOEK, NAMIBIA** is my own work and that all sources that I have used or quoted have been indicated and acknowledges by means of complete references and that this work has not been submitted before for any other degree at any other institution.



23 February 2017

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ABSTRACT

The purpose of this study was to describe factors associated with noncompliance to hand hygiene standards among nurses in one public hospital in Windhoek, Namibia. A quantitative, descriptive, cross-sectional research design was employed using a stratified sample comprising three categories of nurses (registered, enrolled and auxiliary nurses). Data collection was done using a structured questionnaire.

Based on the results, there were more institutional than individual factors associated with noncompliance to hand hygiene. Compliance to hand hygiene was found to be lowest when nurses provide care for patients in non-isolation rooms, when the perceived risk of acquiring infection from patients was low and following brief encounters with patients. Dryness of the skin caused by hand hygiene agents and lack of active participation in hand hygiene promotion at individual level contributed to noncompliance to hand hygiene among nurses. In addition, the results showed that, institutionally there were no rewards/encouragement for hand hygiene, no sanctions for non-compliers and no workshops, seminars and continuing educational courses on hand hygiene.

The study produced interesting insights into the vital role that good leadership plays in the implementation of hand hygiene policy guidelines. The key recommendations for this study included development of good leadership, characterized by dedication for hygiene standards to encourage staff to maintain hygiene practice and to ensure that there are adequate resources for the implementation of hand hygiene policy as well as rewards/incentives for compliers and sanctions for noncompliers.

KEY CONCEPTS

Hand hygiene practices, health care associated infections, standard precautions, compliance and noncompliance to hand hygiene.

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Dedication

I dedicate this dissertation to my husband and children for their unconditional love and support during the last two years.

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CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Hand hygiene is recognised as the leading and low cost measure to prevent cross-transmission of microorganisms. Its beneficial effects reverse the impact of health care associated infections that result in prolonged hospital stay, long term disability and increased resistance of microorganisms to antimicrobials, massive additional financial burdens and emotional stress for patients and their families (World Health Organization 2009a:12). The selection of hand hygiene as the first pillar to promote the Global Patient Safety Challenge of the WHO World Alliance for Patient Safety signifies its importance in the patient safety agenda (WHO 2016). Scientific evidence supporting the role of hand hygiene in improving patient safety, reducing cost and creating a positive working environment has increased considerably, but compliance with hand hygiene standards remains a challenge for many health care workers worldwide (De Wandel, Maes, Labeau, Vereecken & Blot 2010:232-238).

1.2 BACKGROUND INFORMATION ABOUT THE RESEARCH PROBLEM

Recent systematic review of studies on compliance to hand hygiene conducted in various settings such as hospitals and nursing homes revealed low compliance rates of between 20% to 50% among nurses in developed and developing countries (Abdella, Tefera, Eredie, Landers, Malefia & Alene 2014:4; Ahlström 2014:22; Darawad, Al-Hussami, Almhairat & Al-Sutari 2012:1; Sakihama, Honda, Saint, Flower, Shimuzu, Sato, Arakawa, Lee, Iwata, Mihashi & Tokuda 2014:2). In Namibia, the Ministry of Health and Social Services (MOHSS) acknowledges that hospital infection is a major contributor of morbidity, mortality, increased length of hospital stay and other associated costs for the patient and the health care (Infection Prevention and Control Guidelines 2010:9).

According to the quarterly report by the Infection Control Department of the hospital where the study was conducted, up to 52 patients (5.3%) contracted hospital acquired infections during the April to June reporting period (One Hospital ICD 2014:2). The report further

states that an annual average 21.2% of the admitted patients contracted hospital acquired infections.

A hand hygiene compliance audit was conducted at the same hospital in July 2014. The findings revealed a low compliance to hand hygiene of just above 40% among nurses as shown in figure 1.1

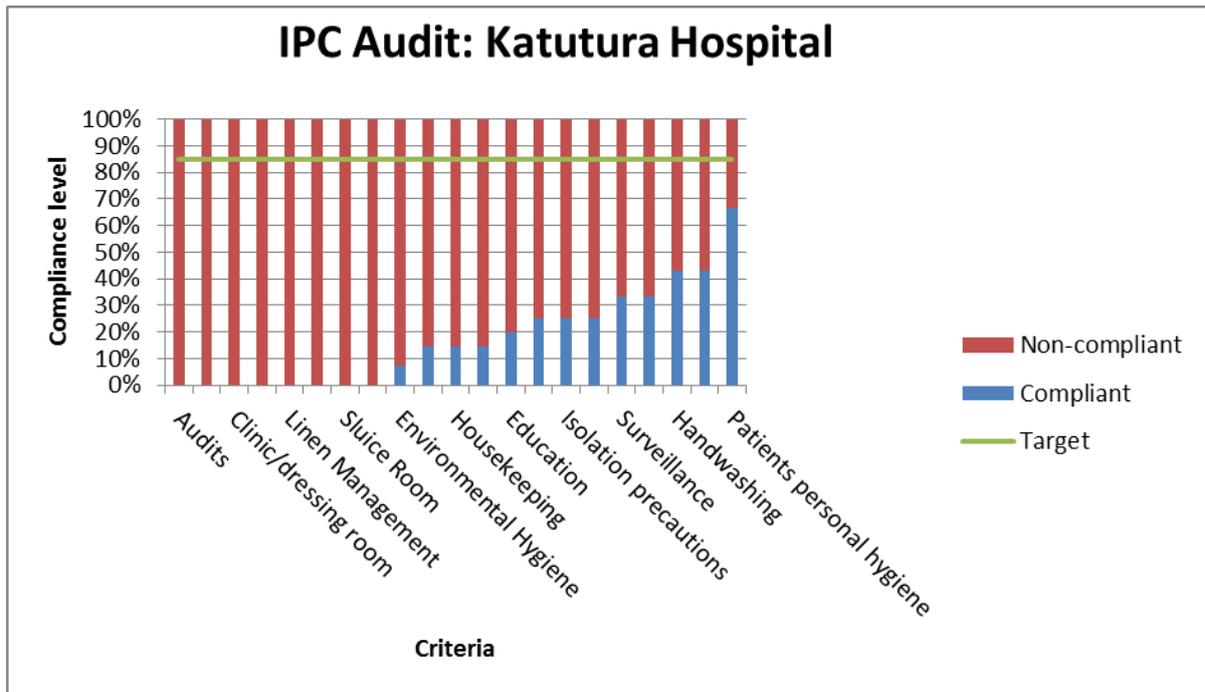


Figure 1.1: IPC audit report
(Adapted from Namibia MOHSS 2014)

Furthermore, the micro-organisms responsible for health care associated infections were isolated on hospital gadgets such as central venous pressure lines, urinary catheters, endotracheal tubes and body fluids (surgical sites incisions/wound, sputum, and blood). Escherichia Coli accounted for 21% Methicillin-resistant Staphylococcus Aureus, Staphylococcus Areas 19.5%, Extended-Spectrum Beta Lactamase 21% and Klebsiella Pnemoniea 24% of health care associated infections during the April to June reporting period (One Hospital ICD 2014:5). It is estimated that the cost burden of infections acquired in hospitals is as high as 30%. The causes of hospital acquired infection include extended stay for patients and the related costs of bed occupancy, laundry, catering and staff time (MOHSS, IPC Guideline 2010:9).

1.3 STATEMENT OF THE RESEARCH PROBLEM

The hand hygiene audit that was conducted at the hospital where the study was conducted showed an unacceptably low compliance of just above 40% to hand hygiene standards among nurses and a high number (average 21.2%) of patients who contracted hospital acquired infection annually.

The low compliance to hand hygiene among nurses and high number of patients who contracted hospital acquired infection happened in spite of the availability of the hospital infection prevention and control hand hygiene policy guidelines based on the World Health Organization (WHO) guidelines of *My 5 moments for hand hygiene*. The low compliance rates to hand hygiene standards among the nurses prompted the researcher to investigate the factors associated with noncompliance to hand hygiene standards.

1.4 RESEARCH PURPOSE AND OBJECTIVES

The purpose of this study was to determine factors associated with noncompliance to hand hygiene standards among nurses at one public hospital in Windhoek Namibia. In order to accomplish the purpose of the study, the following objectives were formulated:

- Describe the factors associated with noncompliance to hand hygiene standards among nurses.
- Make recommendations to address noncompliance to hand hygiene standards among nurses at one hospital in Windhoek, Namibia.

1.5 SIGNIFICANCE OF THE STUDY

Compliance with hand hygiene standards remains a challenge to many health care workers even though there is adequate scientific evidence supporting its role in improving health provider and patient safety, reducing cost and creating a positive working environment. The findings of this study have the potential to contribute to the body of knowledge regarding infection prevention; in particular the factors associated with noncompliance to hand hygiene standards among nurses. The recommendations from this study may enable the management of the selected hospital to plan and implement

hand hygiene promotion programmes to address the identified factors associated with noncompliance.

1.6 DEFINITION OF TERMS

1.6.1 Factors

A factor is defined by the *Longmans Dictionary of Contemporary English* (2015:210) as “any force, conditions, or influences that act with others to bring about a result”. It is also generally referred to “as anything that has some causal influence, some effects on a phenomenon”. In the context of this study, factors are individual or institutional conditions or influences associated with noncompliance to hand hygiene among the nurses.

1.6.2 Hand hygiene

Hand hygiene is defined by (WHO 2009a:4) as a general term that applies to hand washing, antiseptic hand wash, alcohol-based hand rub, or surgical hand hygiene/antiseptics. In this study hand hygiene refers to any action of hand cleaning taken by nurses to reduce the number of microorganisms on hands which involves application of antimicrobial and non-antimicrobial soap and water or the application of alcohol-based antimicrobial agents on hands.

1.6.3 Hand washing

Hand washing refers to washing hands with plain soap and water (WHO 2009a:4). In this study, hand washing means washing hands with antimicrobial or non-antimicrobial soap and water.

1.6.4 Standards

Standard is something used as a measure, norm or model (*Oxford Dictionary of English* 2015:356). In this study standards refer to the WHO *My 5 moments for hand hygiene*.

1.6.5 Compliance

Compliance refers to acting in accordance with or meeting rules or standards (*Oxford English Dictionary* 2015:155).

1.6.6 Noncompliance

Noncompliance is failure to act in accordance with rules or standards (*Oxford English Dictionary* 2015:205). In this study noncompliance refers to failure to act in accordance with the standards of WHO *My 5 moments for hand hygiene*.

1.6.7 Hand hygiene compliance

Hand hygiene compliance is acting in accordance with the WHO *My 5 moments for hand hygiene*. It includes washing of hands with soap and water or using alcohol-based hand-rub when there is an indication or 'moment' for it as stipulated by the "Five moments for hand hygiene", i.e. before touching a patient, before a procedure, after a procedure or body fluid exposure, after touching a patient and after touching a patient's surroundings. According to WHO (2009b), the formula used for calculating compliance to hand hygiene is as follows:

$$\text{Compliance} = \frac{\text{Observed hand hygiene (R/W)}}{\text{Hand hygiene opportunity (O)}} \times 100 = \% \text{ Compliance}$$

1.6.8 Noncompliance to hand hygiene

Noncompliance to hand hygiene is failure to perform hand hygiene when there is an indication for it, namely a "*Moment*" (WHO 2009a:6).

1.6.9 Health care associated infections

Health care acquired infections (HCAI) are defined by World Health Organization (WHO) as an infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission (WHO 2014).

1.6.10 Nurses

Nurses are persons who have successfully undergone different prescribed nursing educational programmes in Namibia and whose names appear on the Nursing Council of Namibia registration or enrolment list (Namibia 2004:4.) For the purpose of this study, nurses include registered, enrolled and auxiliary nurses.

1.7 THEORETICAL FOUNDATIONS OF THE STUDY

According to Vakili, Rahaei, Nadrian and YarMohammadi (2011:40) theories provide a benchmark for understanding and organising facts in studies in a systematic manner, thus making logical judgement and sense of the problem identified. The theoretical foundations of the study are presented in the paragraphs that follow.

1.7.1 Research paradigm

It is important that researchers are clear about what paradigms inform and guide their approach to their inquiry. This is because a paradigm plays an important role of directing research efforts and organising core ideas, theoretical framework and research methods (Feilzer 2010:7). Polit and Beck (2012:11) explain a paradigm as a world view and a general perspective on the complexities of the world. A paradigm is an analytic lens, and a way of explaining the basic set of beliefs that the researcher has and how these influence the way research is done. The worldviews or paradigms as identified by Polit and Beck (2012:11) and Feilzer (2010:6) are positivism, post-positivism, constructivism, transformative and pragmatism.

This study is informed and guided by the positivist paradigm which is based on a belief in universal laws and one objective reality (Parahoo 2006:49). Positivist paradigm is based upon highly structured methodology to enable generalisation and quantifiable observations and evaluate the results with the help of statistical methods. In positivism, the researcher is concerned about facts, as well as cause-and-effect and believes in the existence of a social and physical reality 'out there' that is driven by natural laws as well as the appropriate ways of going about finding knowledge (Burns & Grove 2012:23). This approach is typically associated with quantitative research which is a formal, objective,

systematic process implemented to obtain numerical data for understanding aspects of the world (Burns & Grove 2012:23).

1.7.1 The theoretical framework

A theoretical framework is a foundation of the study comprising a collection of views and concepts that relate to the phenomenon under study (Polit & Beck 2012:128). The theoretical framework plays an important part in guiding the process of the research study and it introduces and describes the theory which explains why the research problem under study exists. The theoretical framework chosen for this study is the PRECEDE–PROCEED framework. PRECEDE is an acronym for Predisposing, Reinforcing, Enabling, Constructs in, Educational Diagnosis and Evaluation while PROCEED is an acronym for Policy, Regulatory, Organisational Constructs in Educational and Environmental Development.

The PRECEDE–PROCEED framework is a cost–benefit evaluation framework proposed by Dr. Lawrence W. Green in 1974. The framework was designed to help health program planners, policy makers, and other evaluators analyse situations and design health programs efficiently (Green & Kreuter 2005). PRECEDE–PROCEED framework is a behavioural change model usually used for health promotion and education. It recognises that behaviour is a complex of factors that need unravelling and need to be influenced by a combination of interventions. The purpose of the model is to direct initial attention to outcomes rather than inputs. This forces planners to begin the planning from the outcome point of view and it approaches the planning process by breaking it into manageable smaller pieces, taking account both internal and external factors. Essentially PRECEDE–PROCEED framework entails assessment, intervention planning and evaluation (Matlo 2012).

As shown in figure 1.2, the PRECEDE part of the model comprise phases 1-4 which include social, epidemiological, behavioural, environmental, educational, administrative, and policy assessments while the PROCEED part has phases 5-8 which include implementation, process evaluation, impact evaluation, and outcome evaluation. The first portion of the model focuses on program planning based on assessment and the second portion focuses on implementation and evaluation (Soleiman Ekhtiari, Shojaeizadeh, Rahimi Foroushani, Ghofranipour , Ahmadi 2013:22).

PRECEDE is based on the premise that just as the medical diagnosis precedes treatment, so should and educational or any problem in the situation precede an intervention plan (Matlo 2012). Components of the PRECEDE model that were used in the study included;

- **Social assessment/diagnosis** refers to the application of multiple sources of information designed to expand mutual understanding of people regarding their aspirations for the common good. This is the stage where program planners try to gain understanding of the social problems affecting the strengths, weaknesses, resources and readiness of the people to change. This stage is characterised by forming planning committees, conducting focus groups and surveys (Green & Kreuter 2005).
- **Epidemiological, behavioural and environmental assessment/diagnosis** involves the systematic identification of health practices and other factors associated with problems or issues (behavioural and environmental factors) that need intervention. Statistics may be used as sources of the identified problem. In the context of this study, the behavioural factor that needed intervention was low compliance of just above 40% to hand hygiene standards among nurses at the selected hospital with resultant 21.2% of patients contracting health care associated infection yearly.
- **Educational assessment/diagnosis.** The next step following the identification of factors needing intervention is to identify factors that need to be in place for the initiation and sustenance of the process of change. Those factors include:
 - *Predisposing factors* include individual factors such as attitudes, beliefs, self-efficacy beliefs, perceptions and skills that provide rationale and motivation for change of behaviour. The focus of this study is on the identification of predisposing factors to noncompliance to hand hygiene standards so that recommendations can be made to help programme planners to include health promotion interventions based on these factors
 - *Reinforcing factors* include rewards or incentives to promote repetition of the desired behaviour change. Reinforcing factors include continued rewards or incentives such as positive feedback, support, supervision and ongoing evaluation. The absence of reinforcing factors may have a negative effect such as noncompliance to hand hygiene standards. Disincentives, lack of

supervision and ongoing evaluation as well as lack of feedback or negative feedback may reinforce noncompliance to hand hygiene.

- *Enabling factors* include institutional or organisational factors that provide motivation or allow the institutional policy to be implemented. Enabling factors include resources such as facilities, and development of new skills that must be present for the intended behavioural change to occur. In the context of this study, there were some enabling factors such as the availability of hand hygiene guidelines and equipment as well as the skills that nurses received during training since the participants were qualified, trained nurses. The absence of enablers such as resources and lack of development of new skills among nurses may contribute to noncompliance to hand hygiene.

The questionnaire used in this study was based on the predisposing, enabling and reinforcing factors associated with noncompliance to hand hygiene.

- **Administrative and policy assessment/diagnosis;** administrative diagnosis entails the analysis of policies, resources and circumstances prevailing organisational situations that could hinder or facilitate the development of the health program. Policy diagnosis refers to the assessment of the compatibility of program goals and objectives with those of the organisation

The PROCEED part of the framework ensures monitoring and continuous quality improvement. It is based on the proposition that because health risks are determined by multiple factors, efforts to effect behavioural and environmental must be multi-faceted (Creedon 2006). The focus of this study was on factors associated with noncompliance to hand hygiene with the aim of making recommendations so that behavioural change (compliance to hand hygiene) and environmental change (prevention of hospital acquired infections and related costs) can be achieved. The PROCEED does not form part of the study because, based on the study objectives there is no intention to implement any program, only to make recommendations.

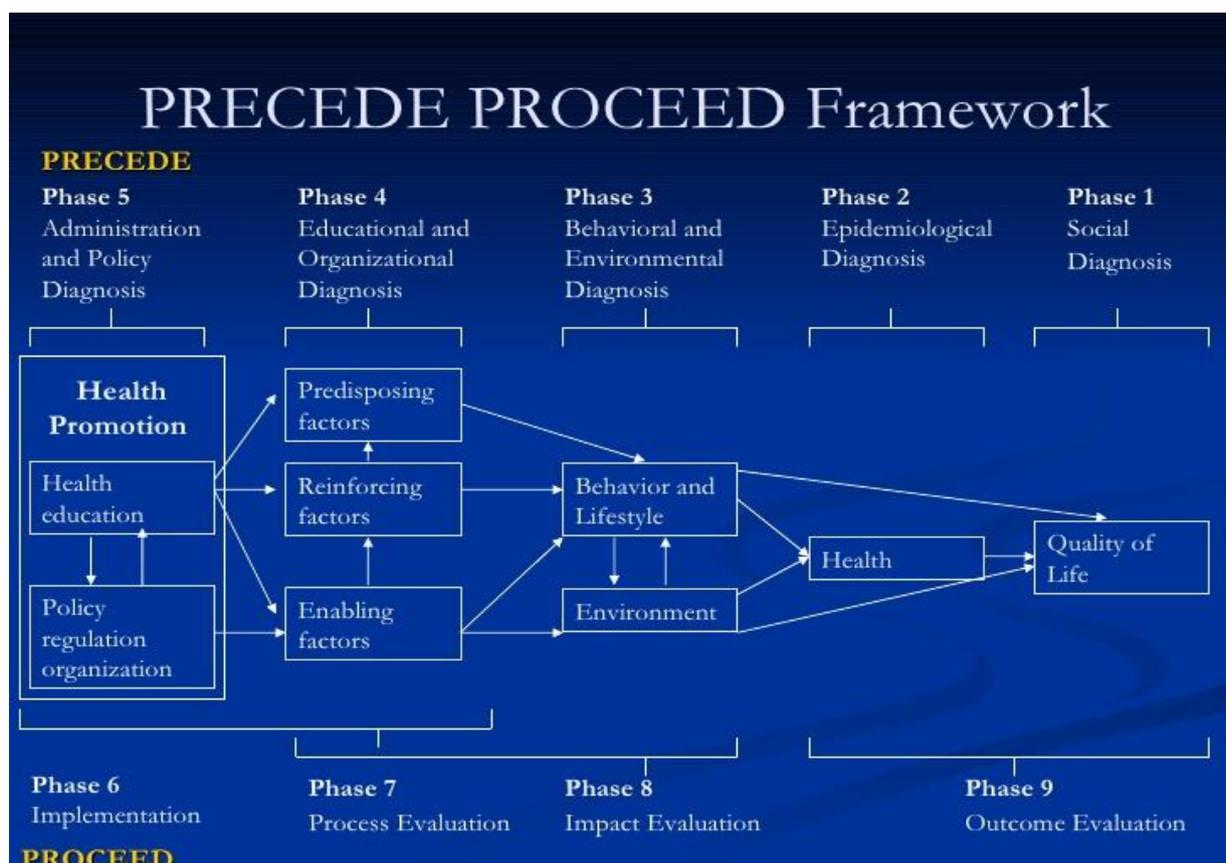


Figure 1.2: The PRECEDE–PROCEED framework

(Adapted from Green & Kreuter 1991; 1999; 2005)

1.8 RESEARCH DESIGN AND METHOD

The overview of the research design and methods used in this study is given in the paragraphs that follow but a detailed description of the research methodology is presented in Chapter 3

1.8.1 Research design

A research design is the overall plan for addressing a research question, including specifications for enhancing the study's integrity (Polit & Beck 2012:58). It ensures that the evidence obtained is able to answer the research question as unambiguously as possible (Polit & Beck 2012:58). A quantitative descriptive and cross-sectional design was used to conduct this study. The design was non-experimental in nature.

1.8.2 Research methods

Research methods refer to the techniques used to structure a study and to gather and analyse relevant information to the research question in a systematic fashion (Polit & Beck 2012:12).

1.8.2.1 Setting/context

Burns and Grove (2011:359), define the research setting as a location where a study is conducted. Polit and Beck (2012:743) further explain that study setting or context means the physical location and conditions in which data collection takes place. This study was conducted at one referral, state-owned hospital in Windhoek, in the Khomas region of Namibia.

1.8.2.2 Population

Polit and Beck (2012:59) define a population as entities (individuals or objects) in which specified measurement of interest or defining characteristics are represented. The target population of this study included all nurses working at one state-owned hospital in Windhoek, Namibia.

1.8.2.3 Sample and sampling techniques

Sample denotes the selected group of people or elements included in a study (Burns & Grove 2013:351) or a sub set of a population comprising those selected to participate in the study (Polit & Beck 2012:742). The sample for the study included nurses working at the one state-owned hospital in Windhoek, Namibia. Sampling involves selecting a group of people, events, behaviour or other elements with which to conduct a study (Burns & Grove 2013:351). Sampling methods involves selecting a group of people, events, behaviour or other elements that represent the population being studied (Burns & Grove 2013:357). Probability, stratified sampling was used for selecting a representative sample from the three categories of nurses working at the selected hospital in Windhoek, Namibia.

1.8.2.4 Data collection

The method that was used to collect data was a descriptive survey and the data collection instrument was a structured self-administered questionnaire that was designed by the researcher in consultation with a statistical consultant.

1.8.2.5 Data analysis

Data analysis is the systematic organisation and synthesis of research data, and the testing of research hypothesis using those data (Polit & Beck 2012:725). A software package called Statistical Package for Social Sciences (SPSS) version 23.0 was used for data analysis.

1.9 SCOPE OF THE STUDY

The study was conducted at one hospital in Windhoek, Namibia. The target population included all qualified nurses employed at the selected hospital selected by means of stratified random sampling. Even though student nurses were among the nurses working at the selected hospital, they were excluded from the study because of training and clinical attachment that rotates and exposes them to several hospitals environment other than the selected hospital.

1.10 STRUCTURE OF THE DISSERTATION

This dissertation is organised into five chapters as follows;

- Chapter 1e introduces the study providing a background on hand hygiene as a universal precautionary measure that health care workers should adhere to.
- Chapter 2 focuses on relevant literature review related to this study.
- Chapter 3 provides a detailed description of the research design and research methods used.
- Chapter 4 presents data analysis procedures used and the results of the study.
- Chapter 5 focuses on the discussion of the results of the study, conclusions drawn from the study and recommendations for practice and further research.

1.11 CONCLUSION

This chapter focused on the background and motivation of the study. The research problem, research purpose and objectives of the study were introduced. The significance and purpose of the study were stated. Operational terms used in the study and the theoretical framework which guides this study were explained. The researcher briefly outlined the structure of the dissertation and the scope of the study. Chapter 2 focuses on the literature review.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides findings of a review of existing relevant literature on the practice of hand hygiene among nurses as an important means of preventing health care associated infections in health care settings.

2.2 PURPOSE OF THE LITERATURE REVIEW

The literature review was done for the purpose of broadening the researcher's knowledge base on developments and trends in hand hygiene standards. The review was also done to identify, summarise and synthesise research previously carried out on hand hygiene standards and practices, place the study in the context of what is already known about the hand hygiene standards and to verify the significance of the problem (Burns & Grove 2013:98; Grove, Gray & Burns 2015:177). According to Grove et al (2013:99), when literature review for a study that is quantitative in design is done, the process is aimed at directing the development and implementation of the study and ultimately producing a written report thereby adding to the body of knowledge for the research area.

2.3 SCOPE OF LITERATURE REVIEW

A computer-assisted search was conducted in the Cumulative Index of Nursing and Allied Health Literature (CINAHL), the National Library of Medicine PubMed service (PubMed) and Ovid Medline databases using the keywords; hand hygiene practices, health care associated infections, standard precautions, compliance and noncompliance to hand hygiene. The reference lists from retrieved studies were searched manually. The reviewed literature comprised various reports and research conducted on noncompliance to hand hygiene standards globally including the country of the study Namibia from 2006-2016. However, older sources were included for history-based literature.

2.4 LITERATURE REVIEW

The review was organised and presented using the headings developments in hand hygiene, health care-associated infections (HAIs), hand hygiene guidelines and noncompliance to hand hygiene.

2.4.1 Developments in hand hygiene standards and practices

Hand hygiene includes two primary actions, namely washing the hands with soap and water to decrease colonisation of transient flora and rubbing hands with a small amount of highly effective, fast-acting antiseptic agent (Hamilton 2014). Hand washing with soap and water has been considered for many years as a measure of good personal hygiene and it was a practice that was common to many religions and cultures. It was only in the last two centuries that a link between hand hygiene and the spread of disease was established by the Hungarian Doctor Ignaz Semmelweis. In 1846, Ignaz Semmelweis observed that women whose babies were delivered by physicians at the General Hospital of Vienna consistently had a higher mortality rate than those delivered by midwives. He noted that physicians who went directly from the autopsy room to the obstetric ward had abnormal, foul odor on their hands. Semmelweis postulated that puerperal fever was caused by particles from the cadavers transmitted from the autopsy room to the obstetrics ward by way of the hands of physicians. He instituted a mandatory policy of washing hands with chlorinated lime for those leaving the autopsy room, following which the rate of maternal mortality dropped remarkably to 3% and remained low thereafter (CDC 2002; Mathur 2011:611; Tortora, Funke & Case 2010:184).

The United States of America's public health service made recommendations in 1961, which directed personnel to wash their hands with soap and water for 1–2 minutes before and after patient contact. Rinsing hands with an antiseptic agent was believed to be less effective than handwashing with plain soap and was recommended only in emergencies or in areas where sinks were not available (Hamilton 2014; Mathur 2011:612). Guidelines on handwashing practices in hospitals that were published by the Centers for Disease Control (CDC) in 1975 and 1985 recommended handwashing with plain soap between patients and washing with antimicrobial products before and after performing invasive procedures. The waterless antiseptic agents such as alcohol-based solutions were recommended only in situations where sinks were not available (Steere & Mallison 1975 cited in Mathur 2011:612). The Association for Professionals in Infection Control (APIC) published guidelines similar to those of the CDC in 1988 and 1995 which included the

discussion of alcohol-based hand sanitizers and supported their use in more clinical settings than had been recommended earlier (APIC 2011).

In 1995, the Health care Infection Control Practices Advisory Committee (HICPAC) published guidelines which advocated the use of antimicrobial soap or a waterless antiseptic agent for cleaning hands upon leaving the rooms of patients infected with multidrug-resistant pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA). Centers for Disease Control and Prevention's Health care Infection Control Practices Advisory Committee (HICPAC) published comprehensive guidelines for hand hygiene in health care settings in 2002. One of the principal recommendations of these guidelines was the use alcohol based hand rubs (liquids, gels or foams) for decontamination of hands between each patient due to the efficacy of these agents in rapidly reducing bacterial counts on hands and their ease of use (Boyce & Pittet 2002:20; CDC 2002; WHO 2009b:9).

The World Health Organization introduced the first Global Patient Safety Challenge "Clean Care is Safer Care" in 2005 as part of its world alliance for patient safety. In 2006, advanced draft guidelines on "Hand Hygiene in Health Care" were published and implementation tools were developed and tested (WHO 2006). Five Moments for hand hygiene emerged from the WHO Guidelines on Hand Hygiene in Health Care to add value to any hand hygiene improvement strategy.

The first global handwashing day was observed on October 15, 2008 and a WHO Patient Safety 2009 initiative was established. By April 2009, a total of 3,863 health care facilities registered their commitment, effectively equating to a staff of over 3.6 million people globally. WHO launched guidelines and tools which highlighted the importance of hand hygiene, based on the next phase of "Patient Safety" work programme called "Save lives: clean care". "Save lives: clean care" programme reinforced the *My 5 Moments for hand hygiene* approach to protect patients, health care workers and the environment against the spread of pathogens and thus reduce health care associated infections.

In 2012, the World Health Organization reaffirmed the recommendation to wash hands with soap and water when visibly dirty, soiled with blood or other body fluids, or exposed to potential spore-forming pathogens such as *Clostridium difficile*. Soap and water removes the spores from the hands when conducted properly (APIC, 2013). When hands

are not visibly soiled, the WHO recommends the use of alcohol-based hand rubs as the preferred means for routine hand antisepsis (WHO 2012).

2.4.2 Health care-associated infections

Health care acquired infections (HAI's) are a major, yet preventable threat to patients' safety and a significant source of complications across the continuum of health care.

Literature still reveals high prevalence of HAI's despite the implementation of effective infection prevention measures and strategies such as development of *Objectives for Healthy people 2020* and the *National action plan to prevent HAI's; the roadmap to elimination*.

2.4.2.1 Prevalence and incidence of HAI's

Statistics show that, at any time 1 400 000 people suffer from complications related to HAI's and 1 in 25 hospitalised patients has at least one hospital acquired infection on any given day (CDC Annual Report National and State HAI 2014-2016; WHO 2014; Malihe, Mohammad, Mahnaz, Majid, Alehe & Marzieh 2015:45; Siddharth et al 2014:689). The prevalence of HAI's varies between 3.5% and 12% in high income countries and between 5.7% and 19.1% in middle and low income countries respectively (Malihe et al 2015:45). In developing countries, the impact of HAI's is reported to be 2-20 times higher than in developed countries. Allegranzi, Nejad, Combescure, Graafmans, Attar, Donaldson and Pittet (2011) assessed the epidemiology of health-care-associated infections in developing countries and the findings confirmed the high burden of HAIs in developing countries with a pooled prevalence of 15.5 per 100 patients.

Health-care-associated infections occur in all types of hospital settings including acute care hospitals, ambulatory surgical centers, outpatient departments and dialysis units as well as in long term nursing and rehabilitation centers. The most frequent infections are urinary tract, followed by respiratory tract infections, post-surgery and bloodstream infections.

The most common health care associated pathogens include the gram-positive and gram-negative vegetative bacteria, including fungi and multi-drug resistant pathogens such as

MRSA and vancomycin-resistant Enterococci (VRE) and Clostridium difficile (Mani, Shubangi & Saini 2010:115). MRSA is located in approximately 5% of all HAI's. However, recent studies suggest that a 70% reduction in certain HAI's can be achieved if the existing preventative measures (including hand hygiene) can be implemented (Magill, Edwards, Bamberg, Beldavs, Dumyati, Kainer, Lynfield, Maloney, McAllister-Hollod, Nadle, Ray, Thompson, Wilson & Fridkin 2014:1198; WHO 2014).

2.4.2.2 Transmission of health care-associated microorganisms

According to WHO (2009b:12), transmission of infections through health care workers' hands is the most common pattern in most settings and the sequential steps required for the transmission of pathogens to occur are described in the paragraphs that follow.

Organisms present on the patient's skin, or that have been shed onto inanimate objects immediately surrounding the patient are must be transferred to the hands of health care workers. These organisms must be capable of surviving for at least several minutes on health care workers' hands. Hand washing or hand antisepsis by the health care workers must be inadequate or omitted entirely, or the agent used for hand hygiene inappropriate. The contaminated hands of the caregiver must come into direct contact with another patient or with an inanimate object that will come into direct contact with the patient (Weber, William & Rutala 2010:1; WHO, 2009).

Research has provided adequate evidence that the area under the fingernails is associated with a high numbers of microorganisms. Long nails and artificial nails, as well as chipped nail polish may be associated with a further increase in the number of bacteria on fingernails most frequently Pseudomonas spp, Corynebacteria and yeasts (Fagernes & Lingaas 2011; Jefferies, Cooper, Yam, & Clarke 2012; Patrick & Van Wicklin 2012; Yuan, Dembry, Higa, Fu, Wang & Bradley 2009:157).

2.4.2.3 HAI's within the context of the study

According to the Namibian Ministry of Health and Social Services (MOHSS), HAI's constitute a major contributor of morbidity, mortality, increased length of hospital stay and other associated costs for the patient and the health care (Infection Prevention and Control (IPC) Guidelines (2010:9). The quarterly report by the Infection Control Department of the hospital where the study was conducted indicated that up to 52 patients (5.3%) contracted hospital acquired infections during the April to June reporting period (Namibia MOHSS 2014:2). The report further states that an annual average 21.2% of the admitted patients contracted hospital acquired infections.

Kasterody (2015:1) conducted a retrospective descriptive study on trends of surgical sites infections at the hospital where the study was conducted from 2006 to 2014 and found that surgical site infections contributed to 20% of all HAI's. The same author reported that micro-organisms responsible for health care associated infections were isolated on hospital gadgets such as central venous pressure lines, urinary catheters, endotracheal tubes and body fluids (surgical sites incisions/wound, sputum, and blood). The frequently isolated microorganisms responsible for HAI's included Escherichia Coli, Methicillin-resistant Staphylococcus Aureus, and Klebsiella Pneumoniae (Namibia MOHSS 2014:5).

2.4.5 Hand hygiene

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, William & Rutala 2010:1). Hand hygiene was selected as the first pillar to promote the Global Patient Safety Challenge of the WHO World Alliance for Patient Safety; thereby signifying its importance in the patient safety agenda (WHO 2016). Bereket et al (2012:1043) emphasise that reducing HAI's rates depends on a variety of factors but emphasis should be placed on staff related procedures especially hand hygiene.

2.4.5.1 The role of hand hygiene in the prevention of HAIs

Hand hygiene is the simplest and most effective measure for preventing HAI's and the scientific evidence supporting its role in decreasing HAIs is adequate. The evidence from systemic review studies on the effectiveness of hand hygiene from 2008-2013 suggests that compliance to hand hygiene practices has significantly reduced the rates of acquisition of pathogens on hands and has ultimately reduced the rates of health care associated infections in health care settings (Al-Tawfig, Abed, Al-Yami & Birrer 2013; Chen, Sheng, Wang, Chang, Lin & Tien 2011; Grayson, Russo, Cruickshank, Bear, Gee & Hughes 2011; Ho, Seto, Wong & Wong 2012 ; Lee, Cooper, Malhotra-Kumar, Chalfine, Daikos & Fankhauser 2013; Mestre, Berbel, Tortajada, Alarcia, Coca & Gallemi 2012). All the stated studies showed significant reduction in infection related outcomes even in settings with a high infection rates.

2.4.5.2 Hand hygiene standards / guidelines

My 5 Moments for hand hygiene is an approach that defines the key moments or indications for hand hygiene during patient care. The approach is based on the evidence linking hand washing to the prevention of health care associated infections. *My 5 Moments for hand hygiene* represents a unified vision which was adopted by WHO member states and it promotes a strong sense of ownership. According to the *5 Moments for hand hygiene* approach, all health care workers are required to perform hygiene at the following 5 distinct stages of caring for patients;

- 1. Before patient contact:** Clean your hands before touching a patient when approaching him or her to protect the patient against pathogens carried on your hands
- 2. Before an aseptic task:** Clean your hands immediately before any aseptic task to protect the patient against harmful microorganisms, including the patient's own microorganisms from entering his or her body
- 3. After a body fluid exposure risk:** Clean your hands immediately after an exposure risk to body fluids and after glove removal to protect yourself and the health care environment from harmful patient micro-organisms.

4. **After patient contact:** Clean your hands after touching a patient and his or her immediate surroundings when leaving. To protect yourself and the health care environment from harmful patient microorganisms.
5. **After contact with patient surroundings:** Clean your hands after touching any object or furniture in the patient's immediate surroundings when leaving, even if you have not contacted the patient to protect yourself and the health care environment from harmful patient microorganisms (WHO 2012).

Gloves are used during patient care in situations in which contact with blood or other potentially infectious material is likely. In order to be effective, the following guidelines for the use of gloves in the clinical setting must be adhered to;

- Wash hands before putting on or after removing gloves.
- One pair of gloves must not be used for the care of more than one patient to prevent transmission of organisms from patient to patient.
- When wearing gloves, change or remove gloves during patient care if moving from a contaminated body site to another body site (including non-intact skin, mucous membrane or medical device) within the same patient or the environment.
- Remove gloves after caring for a patient and do not reuse.
- When gloves are removed, hands must be washed with antiseptics or soap and water or an alcohol-based hand sanitizer used as a precaution against any contamination of the hands that may have occurred during glove removal. (Patrick & Van Wicklin 2012; Pittet et al 2009: 612; Van Wicklin 2014).

2.4.5.3 Hand hygiene equipment

- *Soap and water*

Hand washing with plain soap is indicated in routine health care and for washing hands soiled with dirt, blood or other organic material. The importance of hand washing with soap was demonstrated in a systematic review on hand washing and diarrhoea, in which Curtis and Cairncross (2003) found that community hand washing interventions reduced the risk of contracting diarrhea by 47%. Plain soap and water will remove many transient organisms. The bacterial counts on the skin can be reduced by 0.6-1.1 log₁₀ if hands

were washed with soap and water for 15 seconds whereas washing hands for 30 seconds reduces the bacterial count by 1.2-2.8 log₁₀ (Naik, Khanagar, Kumar, Vadavadagi, Neelakantappa, & Ramachandra 2014:160). However, hand washing with plain soap does not remove pathogens from the hands of hospital personnel, hence the use of alcohol-based antiseptics.

- *Alcohol-based hand antiseptics*

Alcohol rubs and medicated soaps or foams containing chlorhexidine are the main hand antiseptics used (Naik et al 2014: 162). Alcohols are rapidly antimicrobial when applied to the skin, but they have no persistent or residual activity that will prolong antimicrobial activity or inhibit the survival of microorganisms after application. Alcohol solutions containing 60%–95% alcohol are most effective but higher concentrations are less potent. Alcohols have antimicrobial activity against gram-positive and gram-negative vegetative bacteria, including fungi and multi-drug resistant pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococci* (VRE). Regrowth of bacteria on the skin occurs slowly after use of alcohol-based hand antiseptics (Naik et al 2014:162).

The WHO recommends alcohol-based hand rubs based on the following reasons:

- Evidence-based, intrinsic advantages of fast-acting and broad-spectrum microbicidal activity with a minimal risk of generating resistance to antimicrobial agents.
- Suitability for use in resource-limited or remote areas with lack of accessibility to sinks or other facilities for hand hygiene (including clean water, towels, etc.).
- Capacity to promote improved compliance with hand hygiene by making the process faster and more convenient.
- Economic benefit by reducing annual costs for hand hygiene, representing approximately 1% of extra costs generated by HCIs.
- Minimisation of risks from adverse events because of increased safety associated with better acceptability and tolerance than other products.

Hand washing with an antiseptic agent is indicated for the following instances:

- Heavy microbial soiling, for example in the presence of infection or a high level of contamination with organic matter such as infected wounds and feces
- Prior to performing invasive procedures (e.g., the placement and care of intravascular catheters, indwelling urinary catheters)
- Before contact with patients who have immune defects, damage to the integumentary system (e.g., wounds, burns), or percutaneous implanted devices
- Before and after direct contact with patients who have antimicrobial-resistant organisms.

Alcohol-based hand sanitizers are not appropriate for use when hands are visibly dirty or contaminated with proteinaceous materials such as blood. In these situations, the hands of the health care worker first should be cleansed with soap and water. Then, an antiseptic hand rub, using an alcohol-based hand sanitizer, can be applied to prevent pathogen transmission.

2.4.5.4 Hand hygiene techniques

According to the WHO guidelines for hand hygiene with soap and water, the health care workers need to perform hand washing for the duration of 40-60 seconds following the steps outlined in the paragraphs that follow.

- Wet hands with water.
- Apply the amount of soap product necessary to cover all hand surfaces.
- Rub hands palm to palm.
- Rub right palm over left dorsum with interlaced fingers, and vice versa.
- Rub palm to palm with fingers interlaced.
- Rub backs of fingers to opposing palms with fingers interlocked.
- Rub left thumb rotationally while clasped in right palm, and vice versa.
- Rub clasped fingers of right hand rotationally in left palm, backwards and forwards, and vice versa.
- Rinse hands with water. Avoid using hot water in order to decrease the risk of dermatitis.
- Dry hands thoroughly with a single-use towel.

- Use towel to turn off faucet.

The same technique is used when decontaminating hands with an alcohol-based hand rub, however no water is used. Similarly, towels are not used for drying, as hands will quickly dry on their own. When using alcohol-based hand rubs, the CDC recommends health care personnel rub their hands until the alcohol evaporates and the hands are dry (CDC 2012).

2.4.6 Noncompliance to hand hygiene

Hand hygiene is recognised as one of the most effective intervention to control the transmission of infections in a hospital as well as control of antimicrobial resistance. However compliance to hand hygiene has been disappointingly low in many health settings (Mathur 2011:611). Hospital-acquired infections often occur because of lapses in accepted standards of practice on the part of health care personnel. According to Aziz (2013), on average health care workers follow recommended hand hygiene procedures less than half of the time. The recent systematic reviews of studies on compliance to hand hygiene conducted in various settings such as hospitals and nursing homes revealed low compliance rates of between 20% and 50% among nurses in developed and developing countries (Ahlström 2014; Abdella et al 2014; Darawad et al 2012:1; Sakihama et al 2014; Muharjan & Mathew 2013; Erasmus et al 2013; Wen-I et al 2013 & Krediet et al 2011).

The lowest adherence rate of 36% was found in intensive care units, where indications for hand hygiene were typically more frequent. The highest adherence rate of 59% was observed in pediatrics wards, where the average intensity of patient care was lower than in other hospital areas. This study indicates that much needs to be done to improve adherence to hand hygiene practices (Vissher & Wickett 2012). In a study by Naik et al (2014), self-reported reasons for frequent lack of compliance to hand hygiene included the (1) hand washing agents cause skin irritation and dryness, (2) lack of soap or too busy/hand washing takes too long, (3) wearing of gloves; hands do not look dirty; and 4) a perceived low risk of acquiring infection from patients.

A study in Nigeria by Unekea et al (2014:24) outlined a summary of factors associated with noncompliance with hand hygiene identified by nurses and doctors as inadequate supply of water soap and paper towel, lack of awareness, inadequate manpower, absence of guidelines on hand hygiene and disinfection practices, unreported consequences of noncompliance the need for regular re-orientation and training of health care workers, the importance of improvement of health facilities. In Australia White et al (2015:8) cited major themes of barriers to hand hygiene as being too busy, being distracted or forgetful, dealing with emergency situations.

In certain surveys, signs and symptoms of dermatitis were reported by approximately 25% of nurses following the use of hand hygiene agents, resulting in noncompliance to hand hygiene. The potential for detergents to cause skin irritation varies considerably and can be alleviated by the addition of emollients and moisture-retaining products. Damaged skin may change skin flora, resulting in more frequent colonisation by *Staphylococci* and gram-negative bacilli (Vissher & Wickett 2012).

Some studies report that the frequency of handwashing or antiseptic hand rubs by personnel is affected by the accessibility of hand hygiene facilities. In some institutions, only one sink or hand hygiene product dispenser is available in rooms housing several patients. This discourages hand cleansing between patients and adds extra steps and effort for caregivers

Results from studies using self-administered questionnaire indicated high compliance rates (Sax, Uckay, Richet, Allegranzi & Pittet 2007; Tai, Mok, Ching, Seto & Pittet, 2009; Vu Binh 2007; Al-Wazzan, Salmeen, Al-Amiri, Abul, Bouhaimed, Al-Taïar 2011; Ryan, 2012), while findings 12 from studies using observation revealed poor hand hygiene compliance rates (Vu Binh 2007; Al-Wazzan et al 2011; Asare et al 2009).

A variety of studies support an increase in staffing of wards because of the belief that when patient-care units are understaffed and health care providers are overworked, they tend to cut corners and they do not comply with hand hygiene standards (Serratt et al 2011; Wallis 2013).

In 2011, a Hand Hygiene Self-Assessment Global Survey organised by the World Health Organization to assess the compliance with hand hygiene practices among health care

workers in Namibia. Among the 7 selected public health facilities, the results showed between 20% to 31% compliance to hand hygiene practices (Ngandu-Mbanga 2012:1). Compliance to hand hygiene in Namibia stands between 20-40% and Namibia MOHSS (2010:9). The hand hygiene compliance IPC audit among nurses conducted in July 2014 by the Infection control Department of the hospital where the study was conducted showed a low compliance to hand hygiene of just above 40%. Hand hygiene compliance is considered poor if <60% and excellent if greater than 90% (Song 2013:101-105).

2.5 CONCLUSION

The literature reviewed revealed low compliance to hand hygiene among nurses globally including the public health facilities in Namibia, and in particular the hospital where the study was conducted. This finding justified the need for investigation into the factors associated with noncompliance to hand hygiene among nurses in this study. The review also assisted in identifying the appropriate theoretical framework which was used in the design of the data gathering instrument and data analysis.

In the following chapter, a description of the research design and methods utilised in the study to achieve the objectives of the study is presented.

CHAPTER 3

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

The research design and methods that were followed during the study are described in this chapter. The chapter begins with a discussion of the research design followed by a description of the research methods used. The research methods included the description of the study setting, population, sampling as well as data collection and analysis methods. The discussion of related ethical issues and measures taken to enhance the validity and reliability are included.

3.2 THE RESEARCH AIMS AND OBJECTIVES

As indicated in Chapter 1, the purpose of this study was to determine factors associated with noncompliance to hand hygiene standards among nurses at one public hospital in Windhoek Namibia. In order to accomplish the purpose of the study, the following objectives were formulated namely:

- Describe the factors associated with noncompliance to hand hygiene standards among nurses.
- Make recommendations to address noncompliance to hand hygiene standards among nurses at one hospital in Windhoek, Namibia.

3.3 RESEARCH DESIGN

Grove, Burns and Gray (2013:214) define research design as a “blueprint” of how the researcher intends to collect data for a study in order to answer research questions in given conditions. As noted by Polit and Beck (2012:741), the research design specifies as clearly as possible the researcher’s overall plan for obtaining answers to the research questions being studied and for identifying strategies to minimise bias during the research process. The choice of a study design guides the researcher in planning and implementing the study in terms of how they go about the selection of a study population,

sampling methods of measurement, data collection and analysis with the main objective of maximising the validity of the study (Grove et al 2013: 215). A quantitative, descriptive and cross-sectional design was used to conduct this study. The design was non-experimental in nature.

3.3.1 Quantitative research design

Quantitative research is a formal, objective, systematic process implemented to obtain numerical data for understanding aspects of the world. For quantitative research design, structured tools are used to generate numerical data and statistics are used to organise and interpret the data collected (Grove et al 2013:23). Quantitative research processes are objectively constructed and its findings are replicable and generalisable (Parahoo 2006:49). Quantitative research design was selected because the phenomenon (factors associated with noncompliance to hand hygiene standards) were studied by way of precise measurement and quantification involving rigor and a controlled design. The design was non-experimental in nature because data was collected without introducing any treatment or changes to the subjects.

3.3.2 Descriptive design

According to Grove et al (2013:215), quantitative research design describes what exists and it determines the importance and the frequency with which something occurs. Descriptive research designs therefore seek to give an accurate picture profile of people, events, situations and covers aspects such as who, what, where, how many and how much. In the context of nursing, a descriptive design is appropriate when the current practice seems insufficient or when the researcher has identified an area of concern that needs investigation (Grove et al 2013:217). The design was adopted for the purpose of describing factors associated with noncompliance to the standards of hand hygiene. Parahoo (2014:165) further explain that the purpose of quantitative descriptive research design is to describe phenomena about which little is known (factors associated with noncompliance to WHO *My 5 moments* for hand hygiene standards).

3.3.3 Cross-sectional design

Descriptive studies can involve a one-time interaction with groups of people (cross-sectional study) or a study might follow individuals over time (longitudinal study). In this study, a cross-sectional descriptive design was used. Cross-sectional studies are described as snapshots of the populations about which data was gathered (Joubert, Ehrlich, Katzenellenbogen & Karim 2007:85). In a cross-sectional study, data is collected to make inferences about a population of interest at one point in time.

A cross-sectional or prevalence study is when a sample of persons from a defined population is enrolled to examine the possible relationship between the exposure and the outcome/event, phenomenon, problem, attitude or issue by taking a snap-shot or cross-section of the population (Joubert et al 2007:85). A cross-sectional study involves looking at people who differ on one key characteristic at one specific point in time. The data is collected at the same time from people who are similar on other characteristics (nurses) but different on a key factor of interest such as category of nursing or level of training (registered nurses, enrolled nurses and auxiliary nurses).

3.4 RESEARCH METHODS

The research methods applied in this study comprised the description of the setting/context, population selected for the study, procedures and strategies for data collection and analysis. These are described in the paragraphs that follow:

3.4.1 Research setting

Burns et al (2011:359) define the research setting as a location where a study is conducted. Polit and Beck (2012:743) further explain that study setting or context means the physical location and conditions in which data collection takes place. It can be a natural or controlled environment. Natural settings are real-life study environments without any changes made for the purpose of the study (Burns et al 2011:40). This study was conducted in Windhoek, Namibia at one state-owned hospital which is the second largest, referral hospital situated in the Khomas Region, Windhoek.

3.4.2 Population

A population is defined as entities (individuals or objects) in which specified measurement of interest or defining characteristics are represented (Polit & Beck 2012:59). The population for the study comprised all nurses working at state-owned hospitals or the public health sector in Windhoek, Namibia. The target population refers to groups of individuals who meet the eligibility criteria and to which the study findings will be generalised (Burns et al 2011:343). The target population of this study included all nurses working at one selected hospital. The accessible population represents the group from which the sample (sample frame) is taken and it provides a sample that generalises to the target population (Polit & Beck 2012:744). The accessible population were patients who met the inclusion criteria.

3.4.2.1 Eligibility criteria

Eligibility criteria defines the characteristics that the subject or element must possess to be part of the target population (Grove et al 2013:353). For this study nurses working at the selected hospital were included in the study if they met the following eligibility criteria

- Male and female nurses
- Registered, enrolled and auxiliary nurses

3.4.2.2 Exclusion criteria

Exclusion criteria are the characteristics that can cause a person or element to be excluded from the target population (Grove et al 2013:353). Student nurses were excluded from participating in the study

3.4.3 Sampling

A process of choosing part or a subset of the population in order to represent the whole research study population is called sampling (Grove et al 2013: 352). In conducting research, a sampling plan or a strategy on how to get study participants for the research study is required, and these plans and strategies can use either probability or non-probability procedures with the main aim of increasing representativeness of the sample

and decreasing systematic bias (Polit & Beck 2012:260). In this study, probability, stratified random sampling was used for selecting participants for the study.

3.4.3.1 Probability sampling

Probability sampling is a method used in quantitative research to ensure that each element in the population has an equal and independent chance of being selected and achieves representativeness (Polit & Beck 2012:280). Probability sampling prevents subjectivity, bias and allows the results to be generalised to the target population. Probability sampling does not allow the researcher to intentionally exclude a certain portion of the population.

3.4.3.2 Stratified random sampling

Stratified sampling is a probability sampling technique wherein the researcher divides the entire population into homogeneous strata or subpopulations to ensure representation, then randomly selects the final subjects from the different strata (Polit & Beck 2012:281). Stratified sampling technique was employed to select a representative sample of nurses from three categories of nurses, namely registered nurses, enrolled nurses and auxiliary nurses. A proportional number of participants were selected by simple random sampling technique from the list of nurse's categories in each stratum.

3.4.3.3 Sample size

The researcher used ratio to make sure that the final subjects are proportionally selected from the different strata of registered, enrolled, auxiliary nurses (Polit & Beck 2012:279). This made it possible to get a sample that is big enough and enabled the researcher to draw valid conclusions from the findings. In this study three sampling frames were drawn up i.e., complete and up-to-date list of all three categories of nurses in alphabetical order. The final random samples of participants were selected using SPSS version 23. A total number of 510 nurses (261 registered nurses, 246 enrolled nurses, and 3 auxiliary nurses) were employed at the hospital at the time of data collection. A randomly selected proportional representative sample size of 170 (33%) nurses was used. The sample comprised 87 registered nurses, 82 enrolled nurses and 1 auxiliary nurse.

The advantage of selecting a sample is that it is less costly and time saving than collecting information from the whole population. The sample selected should have similar characteristics to the population under study to allow generalisability of the results. (Burns et al 2011:365; Polit & Beck 2012:259). The advantage of stratified sampling technique is that it warrants more precise statistical outcomes.

3.4.5 Data collection

Data is described as information that is gathered from counts, measurements responses or observations (Grove et al 2013:507) while data collection is the precise and systemic gathering of information to address a research question (Polit & Beck 2012:725). A descriptive survey was used as a method of data collection using a questionnaire as a data collection instrument.

3.4.5.1 Survey

According to Polit and Beck (2012:744), surveys collect information on peoples' actions, knowledge, beliefs, intentions, opinions, attitudes, preferences and values through direct questioning. A survey consists of asking questions of a representative cross-section of the population at a single point in time. The questions are often mailed to members of the target population, asked through personal face-to-face interviews, asked over the telephone, distributed electronically or handed out to self-contained groups such as nurses in a hospital, to answer and return. The latter method was used in this study to ensure that data are collected within a short period of time and the return rate was enhanced. Polit and Beck (2012:265) point out the strengths of surveys. Firstly, a great deal of information can be obtained from large representative samples or the entire population in a fairly economical manner. Secondly, the surveys have the potential to generalise to large populations provided that appropriate sampling design and proper methods were implemented.

3.4.5.2 Questionnaire

A self-designed, structured self-administered questionnaire in English was used to collect data. A questionnaire is a document used to gather self-report data via self-administration of questions. The use of structured questionnaires in research enhances the objectivity and support statistical analysis (Polit & Beck 2012:297). The respondents complete the instrument for themselves on a paper -and-pen instrument or directly onto the computer, responding to a series of pre-determined questions by the researcher (Polit & Beck 2012:265). Questionnaires are used to gather more information from a large number of participants that can be easily quantified and analysed. The paper-and-pen questionnaire was used in this study.

The researcher developed the questionnaire (Annexure G). The questions that were formulated were guided by the objectives of the study outlined in the first chapter of the study as well as the literature review presented in Chapter 2. The questionnaire was designed to capture information on biographical and data factors associated with hand hygiene standards. The questionnaire comprised the following sections:

(i) The questionnaire covering letter

The purpose, the nature, the process and the activities of the study were explained to the participants in a covering letter that accompanied the questionnaire. The participants were informed that participation in the study was voluntary and that they had the right to decline to participate in the study or to withdraw from it at any point without explanation or consequences even after they had already signed a consent form (Polit & Beck 2012:158). The covering letter requesting the nurses' participation in the study is included as Annexure D. Instructions for completing the questionnaire were also included.

(ii) Section A: Biographical data

This section contained five (5) questions which sought biographical information such as gender, age, nurse's category, years of experience and the ward/unit in which the nurse was working. The purpose of eliciting such information was to ensure that the participants met the inclusion criteria and to secure a descriptive profile of respondents so as to

ensure a basis for data analysis in relation to other sections of the questionnaire as per objectives of the study.

(iv) Section B: Factors associated with noncompliance to hand-hygiene

This section contained items designed to elicit the information about factors associated with noncompliance to hand hygiene among nurses. This was in line with the objectives of the study. A four-point rating scale with *never*, *seldom*, *sometimes* and *always* was utilised for some questionnaire items to enable the respondents to indicate the extent to which they complied with hand hygiene standards and the reasons for noncompliance to hand hygiene standards. For other items, close ended questions with *agree* and *disagree* response category were utilised to enable respondents to choose the response that closely matched their reasons, beliefs and values regarding the importance of hand hygiene (Polit & Beck (2012:297). The last two questions were open-ended to allow the participants to respond in their own words, to explain the factors affecting their practice of hand hygiene and to make suggestions on how they could be assisted with consistent practice of hand hygiene protocols. Adequate space was provided for participants' responses to the open-ended questions.

- *The validity of the questionnaire*

Validity is the degree to which an instrument measures what it is supposed to measure (Polit & Beck 2012:331). In quantitative research validity is derived from the assumption that there is only one reality, which can be viewed objectively, controlled and manipulated. The procedure to establish content related validity as suggested by Polit and Beck (2012:723) was followed. The procedure included exhaustive literature review, consultation with experts and representatives of the relevant population.

The validity of the questionnaire of the study was considered in the construction of the questionnaire in consultation with experts (statistician and content experts) including sending the draft questionnaire to the study supervisor at the University of South Africa. This allowed identification of problems arising from question structure and interpretation. Before the questionnaire was administered to the study participants, it was subjected to a pre-test on a convenience sample of five nurses who were not part of the final study. Each nurse was requested to critically analyse all aspects of the questionnaire and to

comment on the wording, order and clarity of questions, redundant questions, length of the questionnaire, the time required to complete the questionnaire and inadequate or confusing response categories (Polit & Beck 2012:337). The questionnaire was refined by incorporating the suggestions from the experts and the results of the pre-test.

- *Reliability of the questionnaire*

An instrument's reliability describes the consistency with which it measures the target attribute. In other words the likelihood of obtaining the same results when the research measures the same variable more than once or more than one person measures the same variable (Polit & Beck 2012: 336). Grove et al (2013:389) state that the reliability of an instrument denotes the consistency of the measures obtained of an attribute, item, or situation in a study and clinical practice.

Reliability of a quantitative instrument is major criterion for assessing the questionnaire quality and it relates to the measurement of accuracy of the data collection instrument. An instrument is said to be reliable if its measurement accurately reflects the true scores of the attribute under investigation (Polit & Beck 2012:331). According to Streiner and Norman (2008) cited in Yusoff (2012:314) reliability is the reproducibility of a measurement over time and occasions that can be gauged in the form of internal consistency and stability. Yusoff (2012:315) further explain that items are considered to represent an acceptable level of internal consistency if the Cronbach's alpha value is within 0.5 to 0.7. Lance, Butts, and Michels (2006:202) and Tavakol and Dennick (2011:53) also consider Cronbach's alpha values of $0.6 \leq \alpha < 0.7$ as acceptable. In this study the Cronbach's alpha reliability coefficient was used as an estimate of the internal consistency of the whole questionnaire which was deemed acceptable at 0.60.

3.4.5.3 Data collection process

Research study packs containing a covering letter and a questionnaire in an envelope addressed to the principal researcher were given to the nurses who gave consent to participate in the study. The letter granting permission to conduct the study from the hospital (Annexure C) was also part of the research pack. The reminder for collection (Annexure E, point 4) clearly indicated that the completed questionnaire would be collected after 24 hours of delivering it in the unit. The actual collection of questionnaire

was only possible after 24 hours of delivering the questionnaire in the units for nurses who were on duty. For those nurses who were on day off, it was 72 hours. The data collection process took two months. Completed data collection instruments were checked daily during data collection process for completeness by the researcher.

3.4.6 Data analysis

Data analysis is the systematic organisation and synthesis of research data, and the testing of research hypothesis using those data (Polit & Beck 2012:725). The analysis of data was done by means of IBM SPSS Version 23 using descriptive statistics that enabled the researcher to reduce, summarise and describe quantitative data obtained from empirical evidence e.g. means and percentages (Polit & Beck 2012:725). The questionnaires were numbered as soon as they were received and they were kept safe.

Data were entered into IBM SPSS Version 23.0. Prior to analysis, questionnaires were checked for missing data during the data collection process and one incomplete questionnaire was not usable. The data that had been analysed were then summarised using frequency distributions in table and graphic presentations.

3.5 ETHICAL CONSIDERATIONS

Ethical principles applied in this research protected the rights of the participants and the institutions at which the research was done, and maintained scientific integrity. The following ethical considerations were adhered to during the execution of this study process.

3.5.1 Ethical clearance

The research proposal was submitted to the higher degrees committee of the Department of Health Studies at UNISA. An ethical clearance certificate was issued and the permission to conduct the study was given (Annexure A).

3.5.2 Approval

A written request to conduct the study was made to the Ministry of Health and Social

Services and the management of the hospital where the study was conducted (Annexure B). Permission to conduct the study at the hospital was granted in writing (Annexure C).

3.5.3 Informed consent

Consent is an explicit permission given the study participants, indicating their willingness and agreement to take part in the study. Informed consent means that participants have adequate information regarding the research, they comprehend the information given, and they have the capacity or competency to make decisions and they make the decisions voluntarily, without coercion. The study participants have the right of free choice which enables them to consent, decline and to withdraw from participating in the research (Polit & Beck 2012:157; 730).

A detailed explanation of the purpose and nature of the study and the importance of participation were given to the study participants in a letter that accompanied the questionnaire. The participants were informed that participation in the study was voluntary and that they had the right to refuse to participate or to withdraw from it at any point without explanation or consequences even after they had already signed a consent form (Polit & Beck 2012:158). Consent to participate in the study was sought from the nurses, all of whom were 18 years and above. The consent for participation in a research study is included as Annexure F.

3.5.4 Anonymity and confidentiality

Confidentiality means that the information that the researcher obtains about and from the research participants should not be divulged to other people without their permission. Anonymity, on the other hand, means that the researcher should ensure that no participant in the study can be identified from any of the responses that they have given. The following measures were taken to ensure anonymity and confidentiality:

- The participants were requested not to write their names on the questionnaire.
- The identity of the hospital where the study was conducted was protected and they were not disclosed in any way.
- The raw data were kept safe and confidential, locked up with unauthorised access.

- Data were reported in a manner that did not identify or link the participants with the information.

3.5.5 Justice

According to Polit and Beck (2012:155), the research participants have the right to be treated fairly and equally unless there is reasonable justification to treat them differently. The principle of justice means that the research strategies and procedures must be fair and just. In order to uphold this principle, the researcher made use of the eligibility criteria to select participants for the study to ensure proper representation in the research samples and respect for diversity in terms of age and gender.

3.5.6 Beneficence and non-maleficence

Beneficence refers to the principle of doing 'good' and protection of participants from physical, emotional, social and psychological harm (Polit & Beck 2012:171; Parahoo 2006:748) while non-maleficence means not doing harm to the research participants. According to the two principles, researchers must act for the good of the participants all the time to maximise the benefits and minimise harm to the research participants. The participants for this study were at no foreseeable physical harm from the study as it involved completion of the questionnaires. The researcher gave the participants the necessary information and provided opportunities for them to ask questions and to raise their concerns during all information giving sessions in order to prevent anxiety. Respect for the principles of beneficence and non-maleficence was also shown by upholding confidentiality because breach of confidentiality can cause psychological and/or social harm. The study was only conducted after the ethical clearance had been issued.

3.5.7 Scientific integrity

In order to protect the scientific integrity, the research process was followed and documented. All the sources consulted were acknowledged accordingly.

3.6 CONCLUSION

This chapter described the research design and methods used in this study. The related ethical issues and measures taken to enhance the validity and reliability were described. In the next chapter, the analysis and findings of the study are presented.

CHAPTER 4

ANALYSIS, PRESENTATION AND DESCRIPTION OF THE RESEARCH FINDINGS

4.1 INTRODUCTION

This chapter provides a description of the data analysis, the presentation and the description of the findings of the study. The data collection and analyses presented in this chapter were carried out according to the research methods as described in Chapter 3.

4.2 DATA MANAGEMENT AND ANALYSIS

A total of 170 of the 171 distributed questionnaires were returned, resulting in a response rate of 99% which was found to be adequate for data analysis. Prior to data analysis, the questionnaires were given unique identity numbers from 1-170 and they were checked and co-checked for completeness and consistency before entering them into the Excel spread sheet by the researcher and the statistician. With the assistance of the statistician, data were imported from the Excel spread sheet to IBM SPSS Version 23.0 that was used for data analysis.

Descriptive statistics that were performed included the mean, standard deviation (SD), frequency distribution and percentages. The statistics were presented as received from the data analysis software but they were rounded to two decimal places. The results were presented mainly by means of tables and figures.

4.3 RESEARCH FINDINGS

The results of the study are presented in the order in which data were collected; starting with the demographic data followed by the factors associated with noncompliance to hand hygiene standards among nurses.

4.3.1 Demographic data

The respondents' demographic characteristics included age, gender, category, years of experience as a qualified nurse and the wards or units where the nurse was working.

4.3.1.1 Age

Figure 4.1 shows the distribution of the respondents' ages.

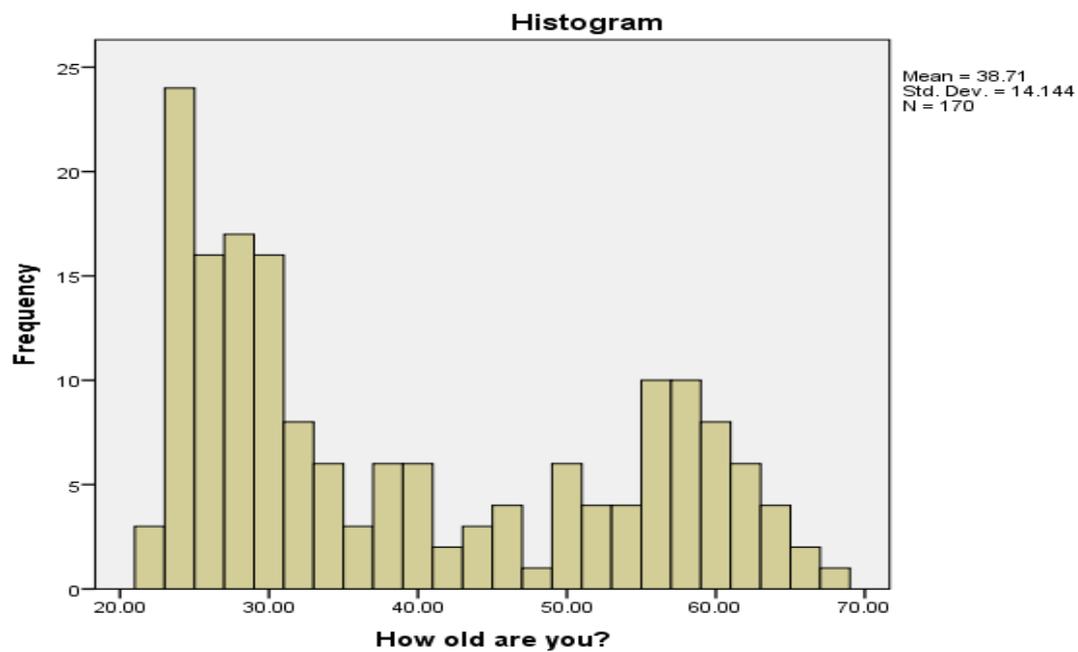


Figure 4.1: Age respondents (N=170)

The age of the respondents ranged from 22 to 68 years with a mean of 38.71 and a standard deviation of 14.14 (95% confidence interval: 36.77 to 40.85). The findings show clustering of nurses between the ages 22-30 years and another visible cluster between 55 and 60 years.

4.3.1.2 Gender

The majority of respondents were female as shown in figure 4.2.

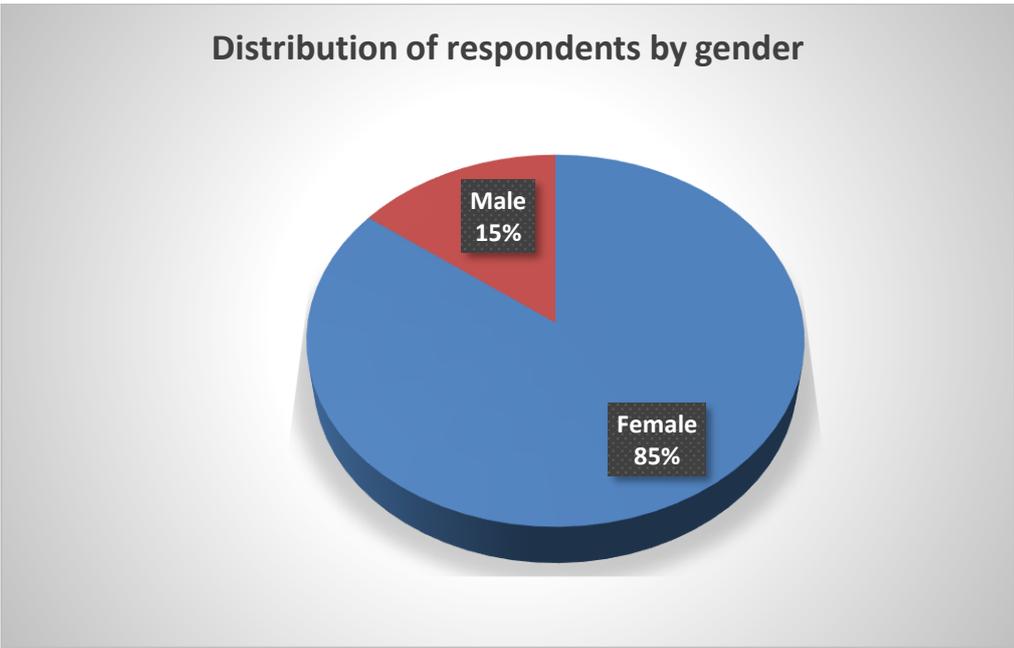


Figure 4.2: Gender of respondents (N=170)

4.3.1.3 Category of nurses

As shown in figure 4.3, the largest number of respondents 87 (51.2%) was registered nurses followed by enrolled nurses 82 (48.2%). Only 1 auxiliary nurse took part in the study.

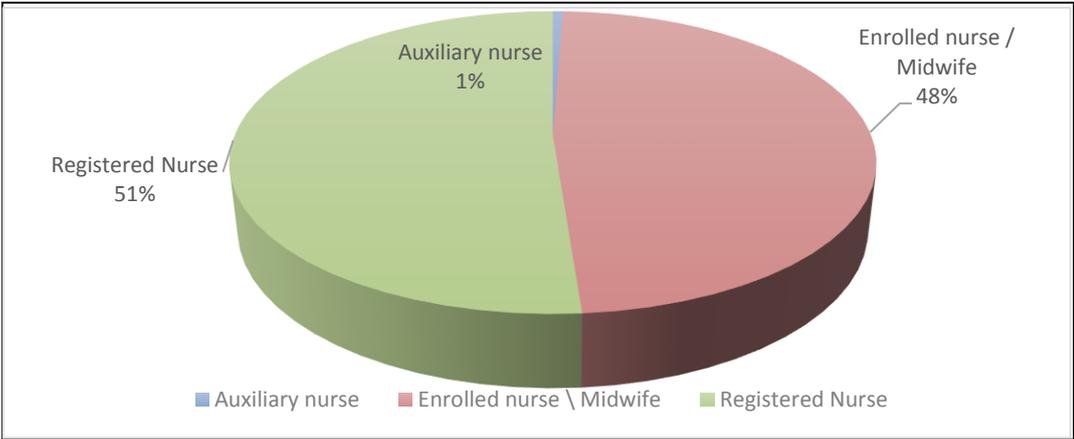


Figure 4.3: Categories of respondents (N=170)

4.3.1.4 Years of experience of respondents as qualified nurses

The respondents' years of experience as qualified nurses is shown in figure 4.4.

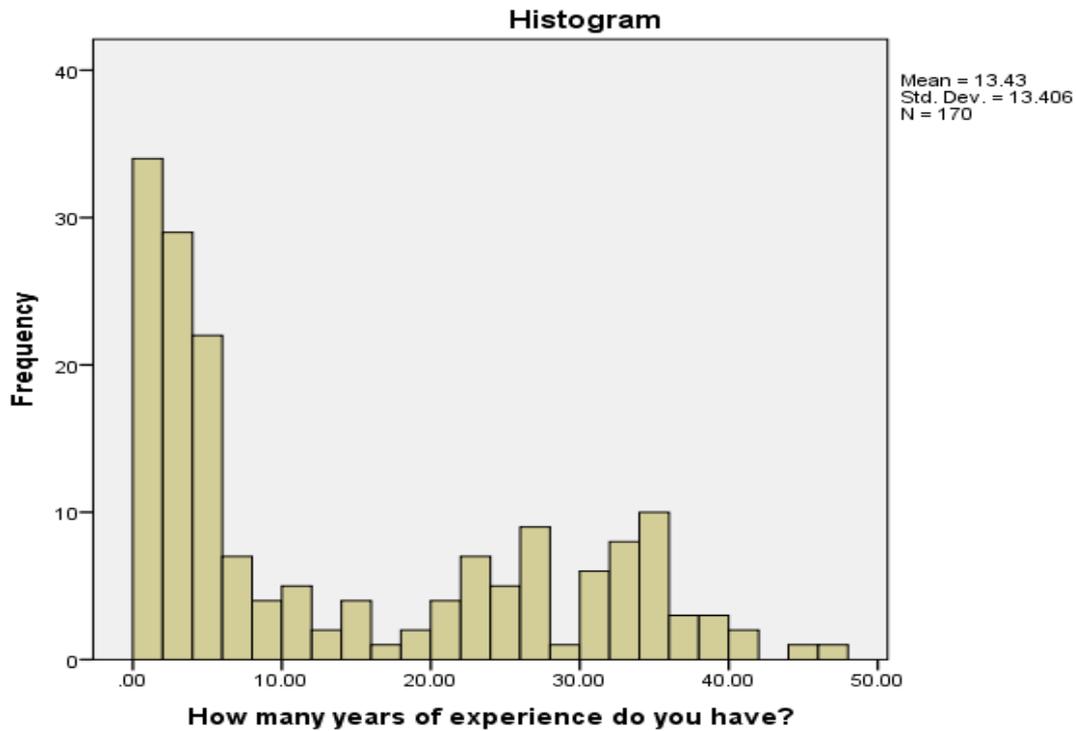


Figure 4.4: Years of working experience of respondents (N=170)

The nurses' years of experience ranged from 1 to 46 years with a mean of 13.43 and a standard deviation of 13.41 (95% confidence interval: 11.40 to 15.46). The working experience of participants is consistent with their age distribution

4.3.1.5 Wards/units in which participants work

Figure 4.5 shows that the largest number of nurses worked in the medical wards 41 (24.1%), followed by pediatric wards 31 (18.2%) and surgical wards 30 (17.6%). The nurses who worked in the maternity ward were 19 (11.2%), while those in the operating theatre and casualty were 17 (10.0%) and 5 (2.9%) respectively. The nurses working in outpatient department were 12 (7.1%) and those in ICU were 5 (2.9%). Six (3.5%) nurses worked in other departments not included in the list. There were no nurses working in the psychiatric ward and health center.

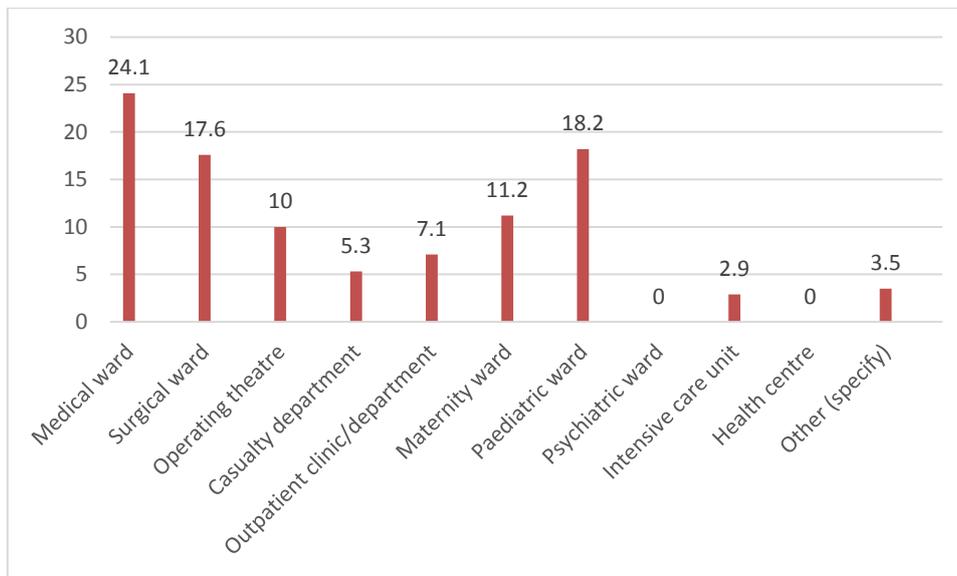


Figure 4.5: Wards in which respondents worked (N=170)

Summary and discussion of the findings of the biographical data of respondents

A summary of the demographic data of respondents is presented in table 4.1. Of the 170 nurses who participated in the survey, 25% were male and 85% were female. Accordingly, the female nurses represented in the study constituted a reflection of the gender distribution of nurses working at the selected hospital and in the nursing profession where female nurses are in the majority. According to the hospital records (Namibia MOHSS 2016) the ratio of male to female nurses working at the selected hospital was 1:7.

The ages of the respondents ranged from 22 to 68 years with a mean of 38.71. A large numbers of nurses were in the 22-30 and 55-60 age ranges. With regard to work experience, the majority of respondents had a work experience of less than 10yrs which was consistent with the age of respondents' findings.

The sample comprised registered (51.2%), enrolled (48.2%) and 1 auxiliary nurses working at the selected hospital. This finding was reflective of the distribution of qualified nurses employed at the hospital where the study was conducted where registered nurses are in the majority. A total number of 510 nurses were employed at the hospital during data collection, 261 of which represented registered nurses, 246 enrolled nurses, and 3 auxiliary (Namibia MOHSS 2015)

In table 4.1 a summary of demographic data of respondents is presented.

Table 4.1: Frequency distribution of respondents according to biographical data (N=170)

Variables	Registered nurses 87	Enrolled nurses; 82	Auxiliary nurses; 1	Total
Gender				
Male	11 (6.8%)	14 (8.2%)	0 (0%)	25 (14.7%)
Female	76 (44.7%)	68 (40%)	1 (0.59%)	145 (85.3%)
Age in years				
<30	35 (20.5%)	35 (20.5%)	0 (0%)	70 (41.2%)
30-39	13 (7.6%)	18 (10.6%)	0 (0%)	31 (18.2%)
40-49	12 (7.1%)	2 (1.2%)	0 (0%)	14 (8.2%)
50 and above	27 (15.9%)	27 (15.9%)	1 (0.59%)	55 (32.2%)
Years of work experience				
<10	46 (27.1%)	55 (32.4%)	0 (0%)	101 (59.4%)
11<20	8 (4.7%)	1 (0.59%)	1 (0.59%)	9 (5.3%)
21-<30	19 (11.2%)	6 (3.5%)	0 (0%)	26 (15.3%)
31-<40	13 (7.6%)	17 (10%)	0 (0%)	30 (17.6%)
41 and above	1 (0.59%)	3 (1.8%)	0 (0%)	4 (2.4%)
Wards /units where nurses work				
Medical wards	19 (11.2%)	22 (12.9%)	0 (0%)	41 (24.1%)
Surgical wards	15 (8.8%)	14 (8.2%)	1 (0.59%)	30 (17.6%)
Operating theatre	7 (4.1%)	10 (17.0%)	0 (0%)	17 (10%)
Casualty	6 (3.5%)	3 (1.8%)	0 (0%)	9 (5.3%)
OPD	6 (3.5%)	6 (3.5%)	0 (0%)	12 (7.1%)
Maternity	13 (7.6%)	6 (3.5%)	0 (0%)	19 (11.2%)
Paediatric wards	15 (8.8%)	16 (9.4%)	0 (0%)	31 (18.2%)
Psychiatric wards	0 (0%)	0 (0%)	0 (0%)	0 (0%)
ICU	2 (1.2%)	3 (1.8%)	0 (0%)	5 (2.9%)
Health centre	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Others	4 (2.4%)	2 (1.2%)	0 (0%)	6 (3.5%)

4.3.2 Factors associated with hand hygiene standards

Section B of the questionnaire consisted of items designed to elicit the information about factors associated with noncompliance to hand hygiene. For some items the respondents had to indicate on a four-point rating scale of *never*, *seldom*, *sometimes* and *always* the extent to which they complied with hand hygiene standards and the reasons for noncompliance to hand hygiene standards. For items 14-28 and 38-41, the respondents had to indicate the extent to which they agree or disagree with the statements about reasons for not performing hand hygiene according to the recommended guidelines and beliefs about hand hygiene.

4.3.2.1 Compliance with WHO My 5 moments for hand hygiene

Table 4.2 shows the participants' responses regarding compliance with WHO *My 5 moments for hand hygiene*

Table 4.2: Respondents responses regarding compliance with WHO *my 5 moments for hand hygiene* (N=170)

1 Never 2 Seldom 3 Sometimes 4 Always						
The practice of the WHO 5 moments for hand hygiene		1	2	3	4	Total
1	I perform hand hygiene before helping a patient to move around	31 (18.2%)	25 (14.7%)	58 (34.1%)	56 (32.9%)	170 (100%)
2	Immediately before performing any aseptic procedure	3 (1.8%)	2 (1.2%)	19 (11.2%)	145 (85.9%)	170 (100%)
3	Immediately after an exposure risk to body fluids	1 (0.6%)	3 (1.8%)	5 (2.9%)	161 (94.7%)	170 (100%)
4	After the removal of gloves	2 (1.2%)	10 (5.9%)	59 (34.7%)	99 (58.2%)	170 (100%)
5	After touching a patient and his or her immediate surroundings when leaving	9 (5.3%)	13 (7.6%)	62 (36.5%)	85 (50.0%)	170 (100%)
6	After changing bed linen	6 (3.5%)	13 (7.6%)	49 (28.8%)	102 (60%)	170 (100%)

- *Before helping the patient to move around*

The first moment of the WHO *My 5 moments for hand hygiene* guidelines is performing hand hygiene before touching the patient. The standard is that health workers should *always* perform hand hygiene before touching the patient to protect them against harmful organisms carried on their hands. The results show that only 56 (32.9%) reported that they “always” perform hand hygiene before helping the patient to move around. Fifty eight (34.1%) of the respondents indicated that they “sometimes” perform hand hygiene while 25 (14.7%) were those who “seldom” perform hand hygiene before helping the patient to move around. The number of respondents who indicated that they “never” perform hand hygiene before helping the patient to move around was 31 (18.2%).

The findings of a variety of studies on compliance to hand hygiene before touching the patients show low compliance rates. Erasmus et al (2010:289) conducted a systematic review of studies on compliance to hand hygiene guidelines in hospital care and found low compliance with a median rate of 21% for performing hand hygiene before touching the patient. Onuhoa, Zulu, Charles, Joseph, Moonilal and Persad (2016:011) found that the percentage of nurses reporting “always” perform hand hygiene before touching the patient was 44% and 23% in Trinidad and Tobago respectively. In another study of self-reported hand hygiene practices among health care workers in China, the hand hygiene compliance was suboptimal, and the lowest compliance of 63% was for Moment 1; ‘before touching a patient’ (Li et al 2015:1-6). In Nigeria, a low compliance rate of 58% was recorded for “before touching a patient” (Unekea, Ndukwea, Oyiboc, Nwakpua, Nnabub & Prasopa-Plaizierd (2014:24). According to Sessa, Di Giuseppe, Albano, Angelillo and the Collaborative Working Group (2011:3) only 58.7% nurses “always” washed their hands before patient contact in the United Kingdom.

- *Immediately before performing any aseptic procedure*

Moment 2 of *My 5 moments for hand hygiene* is perform hand hygiene immediately before performing any aseptic procedure. This should be done to protect the patient against harmful microorganisms, including the patient’s own microorganisms from entering his or her body. The results show that the highest number of respondents reporting “always” performing hand hygiene immediately before performing any aseptic procedure was 145 (85.9%), followed by “sometimes” 19 (11.2%) and 3 (1.8%) and “seldom” for performing

hand hygiene immediately before performing any aseptic procedure. Two (1.2%) responded “never” to performing hand hygiene immediately before performing any aseptic procedure.

Similar results were reported in studies conducted by Unekea et al (2014:24) and (Li et al 2015:5) which found that 84.4% and 76.7% of the respondents reported “always” to Moment 2 respectively.

- *Immediately after an exposure risk to body fluid*

The results show that a large number 161 (94.7%) of nurses reported that they “always” practice hand hygiene after an exposure to risk to body fluid. This was followed by 19 (11.2%) who indicated that they “sometimes” perform hand wash after an exposure risk to body fluid. Three (1.8%) and 2 (1.2%) responded “never” and “seldom” to perform hand wash after an exposure risk to body fluid respectively. According to WHO (2009b:72) and Erasmus et al (2010:290), higher compliance rates are consistently associated with moment 3 (immediately after an exposure risk to body fluid) of *My 5 moments for hand hygiene*. This is attributed to the perceived risk of infection which is associated with level of dirtiness during patient contact. A study conducted by Unekea et al (2014) reported hand hygiene compliance after body fluid exposure risk of 75.3%.

- *After the removal of gloves*

According to the standards, hands should always be cleansed with antiseptics or soap and water after the removal of gloves as a precaution against any contamination of the hands that may have occurred during gloves removal (Patrick & Van Wicklin 2012; Van Wicklin 2014). The results show that a total of 99 (58.2%) responded “always” to moment 3 (perform hand hygiene after the removal of gloves), while 59 (34.7%) responded “sometimes”, 10 (5.9%) and 2 (1.2%) responded “seldom” and “never” to moment 3 respectively. Similar results were reported by Fuller (2014:106-110) and Onuhoa et al (2016:11) who found that low hand hygiene compliance (19% and 41% respectively) was associated the removal of gloves.

- *After touching a patient and his or her immediate surroundings when leaving*

The standard is that hand hygiene should “always” be performed after touching a patient to protect the health care worker and the health care environment from harmful patient microorganisms (WHO 2009b). According to the results of the study, half (50%) of the respondents reported “always” to perform hand hygiene after touching the patient while the 65 (36.5%) indicated that they “sometimes” perform hand hygiene. Nine (5.3%) and 13 (7.6%) reported “never” and “seldom” respectively. The findings of the study conducted by Unekea et al (2014) on promotion of hand hygiene showed that 73.6% of the respondents reported “always” perform hand hygiene after touching a patient. Erasmus et al (2010:290) also reported low compliance with a median of 47% after patient contact.

- *After changing bed linen*

The results show that a large number 102 (60%) reported “always” perform hand hygiene after changing bed linen, followed by 49 (28.8%) reporting “sometimes” perform hand hygiene after changing bed linen. Six (3.5%) and 13 (7.6%) participants responded “never” and “seldom” perform hand hygiene after changing bedlinen.

Summary and discussion of results regarding compliance to My 5 moments for my hand hygiene

The results of the study show an average of 73% of the participants responding “always” to 4 out of the 5 Moments for hand hygiene as follows; 161 (94%) for Moment 3 (immediately after an exposure risk to body fluid), 145 (85.6%) for Moment 2 (before clean/aseptic procedure), 102 (60%) for Moment 5 (after touching patient surroundings) and 85 (50%) for Moment 4 (after touching a patient). Fifty six (32.9%) participants responded “always” and 31 (18.2%) responded “never” to Moment 1 (before touching a patient). Similar results were reported by Unekea et al (2014:24) and (Li et al 2015:1-6) which showed the high compliance to Moments 2, 3, 4, 5 and the lowest compliance to Moment 1 (before touching a patient). The results of the study by Chavali, Menon and Shukla (2014) on hand hygiene compliance among health care workers in an accredited tertiary care hospital revealed excellent compliance of 93% and 91% to moments 3 and 4 respectively. In another study by Harne-Britner et al (2011) compliance rates proved to be better after patient care activities than before.

The results of the study show that, on *My 5 moments for hand hygiene* guidelines compliance after exposure to body fluid exposure was the highest while compliance to before patient contact was the lowest. Similar findings were reported by Erasmus (2010), Unekea et al (2014:24) and Harne-Britner et al (2011).

The minimum standard of 80% compliance with a target of 100% compliance is acceptable. Hand hygiene compliance is considered poor if it is less than 60% and excellent if greater than 90% (Song 2013:101).

According to the results of the study, compliance to *my 5 Moments for hand hygiene* is high but suboptimal. Similar results were reported by Fuller et al (2014), Caglar et al (2010), Cummings et al (2010), Higgins and Hannan (2013), Langston (2011), Lebovic et al (2013), Mathai et al (2011) and Santos et al (2013) which reported a high but suboptimal compliance to hand hygiene of between 58.7% and 64.3%.

4.3.2.2 *Hand hygiene practices*

Table 4.3 shows respondents' hand hygiene practices, with specific reference to responses to the question: *When is it appropriate to perform hand hygiene?*

Table 4.3: Respondents responses regarding hand hygiene practices (N=170)

Hand hygiene practices					
1	Never				
2	Seldom				
3	Sometimes				
4	Always				
When is it appropriate to perform hand hygiene?	1	2	3	4	Total
7 When caring for patients in non-isolation rooms	11 (6.5%)	20 (11.8%)	45 (26.5%)	94 (55.3%)	170 (100%)
8 When duration of contact with patient is < or equal to 2 minutes	23 (13.5%)	26 (15.3%)	58 (34.1%)	63 (37.1%)	170 (100%)
9 When there is low risk of acquiring infection from patients	19 (11.2%)	28 (16.5%)	40 (23.5%)	83 (48.8%)	170 (100%)
10 When there are staff shortages	47 (27.6%)	21 (12.4%)	34 (20.0%)	68 (40.0%)	170 (100%)
11 Doing activities with high risk of cross-transmission	5 (2.9%)	2 (1.2%)	11 (6.5%)	152 (89.4%)	170 (100%)
12 High number of opportunities for hand hygiene per hour of patient care	17 (10.0%)	25 (14.7%)	46 (27.1%)	82 (48.2%)	170 (100%)
13 Caring for patients recovering from clean/clean-contaminated surgery in post-anaesthesia care unit	11 (6.5%)	13 (7.6%)	32 (18.8%)	114 (67.1%)	170 (100%)

- *When caring for patients in non-isolation rooms*

A large number 94 (55.3%) of participants responded “always” to performing hand hygiene when caring for patients in non- isolation rooms, followed by 45 (26.5%) who responded “sometimes” and 20 (11.8%) responding “seldom” to performing hand hygiene when caring for patients in non-isolation rooms. Eleven (6.5%) indicated that they “never” perform hand hygiene when caring for patients in non-isolation rooms. Gilbert, Stanfford, Crosby, Fleming and Gaynes (2010:515) reported 51.7% compliance to hand hygiene among nurses taking care of patients not in any isolation. The same authors concluded that compliance with hand hygiene among health workers did not differ between contact precautions and noncontact precautions rooms. Chassin et al (2015:9) identified provision of patient care in non-isolation room as one of the risk factors for poor compliance to recommended hand hygiene standards

- *When duration of contact with patient is < or equal to 2 minutes*

According to the results of the study, 63 (37.1%) and 58 (34.1%) participants responded “always” and “sometimes” respectively to performing hand hygiene when the duration of contact with patient is < or equal to 2 minutes. Twenty six (15.3%) indicated that they perform hand hygiene “seldom” while and 23 (13.5%) responded “never” to performing hand hygiene when duration of contact with patient is less than or equal to 2 minutes. This result is consistent with the findings of the study conducted by Dedrick, Sinkowitz-Cochran, Cunninham, Muder, Perreieh, Cardo and Jernigan (2007:344) on hand hygiene practices after brief encounters with patients. The results of the same study found that adherence to hand hygiene practices was lowest after brief patient encounters (< 2 minutes) with overall adherences of 30.0% after encounters of < or equal to 1 minute and 43.4% after encounters longer than 2 minutes. Even though studies have demonstrated the strong association between the duration of patient care activities and the intensity of bacterial contamination of hands of health care workers, hand hygiene is not dependent on the duration of contact with the patient (WHO 2009b: 12) and should therefore be performed “always”.

- *When there is low risk of acquiring infection from patients*

Eighty three (48.8%) nurses responded “always” to the statement *hand hygiene is performed when there is low risk of acquiring infection from the patients* followed by 40 (23.5%) and 28 (16.5%) who responded “sometimes” and “seldom” respectively to the statement. Nineteen (11.2%) gave the response “never” to the statement. Similar results of low compliance (44.7%) for low risk of cross-transmission were reported by Sharma, Sharma, Sandeep and Jagdeep (2011:2017). The same authors attributed the low compliance result to insufficient knowledge, lack of motivation and increased workload as some of the factors contributing to noncompliance to hand hygiene standards.

- *When there are staff shortages*

The results show that 68 (40%) participants responded “always” to the statement *hand hygiene is performed when there are staff shortages*, 34 (20%) responded “sometimes” while 21 (12.4%) responded “seldom” to the statement. Forty seven (27.6%) indicated that they never perform hand hygiene when there are staff shortages. Staff shortage, high workload and understaffing resulting in insufficient time for hand hygiene were reported as factors affecting hand hygiene practices in a variety of studies (Chavali et al 2014;

Erasmus et al (2010) and WHO (2009b). Sharma et al (2011:22) observed that when the workload was heavy or the activity index was high (>20), there was higher demand for hand hygiene and higher hand hygiene opportunities with low compliance rate (38.2%).

- *Doing activities with high risk of cross-transmission*

According to the results, 152 (89.5%) respondents gave a rating of “always” to performing hand hygiene when doing activities with high risk of cross-transmission. This was followed by 11 (6.5%) for “sometimes”, 5 (2.9%) for “never” and 2 (1.2%) for “seldom”.

WHO (2009b:72) and Erasmus et al (2010:290) noted that the only factor that is consistently associated with higher compliance is the type of task (dirty versus clean task) with many studies showing higher compliance with dirty tasks. The finding is consistent with the study participants’ response to Moment 3 in 4.3.2.1 where the majority 161 (94.7%) responded “always” to performing hand hygiene after an exposure to risk to body fluids.

- *High number of opportunities for hand hygiene per hour of patient care*

Less than half of the respondents, 82 (48.2%) indicated that they “always” perform hand hygiene when there is high number of opportunities for hand hygiene per hour of patient care, followed by 46 (27.1%) who responded “sometimes” and 25 (14.7%) 17 (10%) responding “seldom” and “never” perform hand hygiene when there is high number of opportunities for hand hygiene per hour of patient care respectively. The results of this study are consistent with Hamilton and Crane’s (2014) finding that hand hygiene compliance is low when a there is a high number of opportunities for hand hygiene per hour of patient care.

- *Caring for patients recovering from clean/clean-contaminated surgery in post-anaesthesia care unit*

The results show that 114 (67.16%) of study participants responded “always” to the statement *hand hygiene is done when caring for patients recovering from clean/clean-contaminated surgery in post-anaesthesia care unit*. Thirty two 32 (18.8%) responded “sometimes” while 13 (7.6%) and 11 (6.5%) responded “seldom” and “never” respectively to the statement.

Krediet et al (2011) and WHO (2009) also reported low compliance to hand hygiene when caring for patients recovering from clean/clean-contaminated surgery in post-anesthesia care unit.

4.3.2.3 Reasons for not performing hand hygiene according to the recommended guidelines

The respondents' reasons for not performing hand hygiene according to the recommended guidelines' are shown in table 4.4.

Table 4.4: Respondents' reasons for not performing hand hygiene according to the recommended guidelines (N=170)

Reasons for not performing hand hygiene according to the recommended guidelines			
1: Agree			
2: Disagree			
I do not perform hand hygiene according to the recommended guidelines because...	1	2	Total
14 There are no hand hygiene guidelines in the unit	37 (21.8%)	133 (78.2%)	170 (100%)
15 I do not always have access to hand hygiene material recommended in the guidelines/protocols	56 (32.9%)	114 (67.1%)	170 (100%)
16 Hand hygiene products out of stock	80 (47.1%)	89 (52.4%)	170 (100%)
17 Hand hygiene product(s) not in convenient location	68 (40.0%)	102 (60.0%)	170 (100%)
18 Shortage of sinks	30 (17.6%)	140 (82.4%)	170 (100%)
19 Sinks are out of order	65 (38.2%)	105 (61.8%)	170 (100%)
20 Sinks are inconveniently located	55 (32.4%)	115 (67.6%)	170 (100%)
21 Lack of liquid soap for hand hygiene	68 (40.0%)	102 (60.0%)	170 (100%)
22 Lack of paper towel	93 (54.7%)	77 (45.3%)	170 (100%)
23 Lack of water	33 (19.4%)	136 (80.6%)	170 (100%)
24 Dirty sinks can be a reason for not washing hands	51 (30.0%)	119 (70.0%)	170 (100%)
25 Hand washing agents cause irritation to my skin	33 (19.4%)	136 (80.6%)	170 (100%)
26 Hand washing agents cause dryness of my skin	97 (57.1%)	73 (42.9%)	170 (100%)
27 I forget to wash hands	54 (31.8%)	116 (68.2%)	170 (100%)
28 When busy there is insufficient time for hand hygiene	74 (43.5%)	96 (56.5%)	170 (100%)

4.3.2.3 Reasons for not performing hand hygiene according to the recommended guidelines

The main reasons that were given by the large number of respondents for not performing hand hygiene according to the recommended guidelines were:

- Hand hygiene agents cause dryness of the skin by 97 (57.1%)
- Lack of paper towel by 93 (54.7%)

The results are consistent with some of the findings of WHO's (2009b:72) study on self-reported factors for poor adherence. The findings of the same study 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. Chassin et al (2015:8) 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. Inadequate supply of water, soap and towel were identified by the doctors and nurses as some of the main factors associated with noncompliance to hand hygiene during the focus group discussion conducted by Unekea et al (2014:14) in Nigeria.

4.3.2.4 Factors affect the practice of appropriate hand hygiene

The factors affecting respondents' practice of appropriate hand hygiene are shown in table 4.5.

Table 4.5: Factors affecting the respondents' practice of appropriate hand hygiene (N=170)

The following factors affect my practice of appropriate hand hygiene:					
	1	2	3	4	
	Never	Seldom	Sometimes	Always	
I do not perform hand hygiene according to the recommended guidelines because ...	1	2	3	4	Total
29 Lack of institutional priority for hand hygiene	48 (28.2%)	27 (15.9%)	43 (25.3%)	52 (30.6%)	170 (100%)
30 Lack of active participation in hand hygiene promotion at individual, unit or institutional level	40 (23.5%)	30 (17.6%)	40 (23.5%)	60 (35.3%)	170 (100%)
31 The importance of hand hygiene is emphasised by my unit supervisors	54 (31.8%)	24 (14.1%)	41 (24.1%)	50 (29.4%)	170 (100%)
32 Lack of administrative sanction of non-compliers or rewards for compliers	58 (34.3%)	21 (12.4%)	24 (14.2%)	67 (39.1%)	170 (100%)
33 Hand hygiene is considered an important part of the nursing care in my unit	54 (31.8%)	13 (7.6%)	26 (15.3%)	77 (45.3%)	170 (100%)
34 Workshops, seminars and continuing educational courses on hand hygiene are offered.	49 (28.8%)	33 (19.4%)	46 (27.1%)	42 (24.7%)	170 (100%)
35 Lack of institutional safety climate/culture of personal accountability of HCWs to perform hand hygiene	34 (20.0%)	35 (20.6%)	39 (22.9%)	62 (36.5%)	170 (100%)
36 Availability of rewards/encouragement for hand hygiene	86 (50.3%)	18 (10.7%)	16 (9.5%)	50 (29.6%)	170 (100%)
37 Availability of role models from colleagues or superiors	49 (28.6%)	29 (17.3%)	30 (17.9%)	62 (36.3%)	170 (100%)

- *Lack of institutional priority for hand hygiene*

The results show that 52 (30.6%) of study participants responded “always” to lack of institutional priority for hand hygiene as a factor affecting the practice of hand hygiene, while 43 (25.3%), 27 (15.9%) and 48 (28.2%) responded “sometimes”, “seldom” and “never” respectively to the item. According to respondents, they do not perform hand hygiene according to recommended guidelines because of lack of institutional priority for hand hygiene. Sharma et al (2011:18) reported similar findings of administrative apathy and the low institutional priority for hand hygiene support as some of the reasons for low compliance to hand hygiene amongst health workers as was the case in this study. According to Dunn-Navarra, Cohen, Stone, Pagorzelska, Jordan and Larson (2011:33) and Gluyas and Morrison (2013), systems-level (institutional) factors such as lack of organisational support are likely to influence hand hygiene practices of staff.

- *Lack of active participation in hand hygiene promotion at individual, unit or institutional level*

According to the results of the study, 60 (35.3%) and 40 (23.5%) participants responded “always” and “sometimes” respectively to lack of active participation in hand hygiene promotion at individual, unit or institutional level as a factor affecting the practice of hand hygiene. Thirty (17.6%) and 40 (23.5%) responded “seldom” and “never” to the same item.

Lack of active participation in hand hygiene promotion at individual, unit or institutional level was identified by WHO (2009:75) as an additional perceived barrier to appropriate hand hygiene and overall factor for poor adherence. This view is corroborated by Sharma et al (2011:18) by stating that administrative apathy contributes to low compliance to hand hygiene among health care workers. Suchitra and Lakshmi Devi (2007:186) indicated that at institutional level, the barriers to the practice of hand hygiene were attributed to lack of education and lack of encouragement. In another study by Browall and Walfridson (2014:9) on factors influencing hygiene practice in a rural hospital, it was found that lack of leadership affects compliance to hygiene routines negatively while a good leadership shows dedication for hygiene matters and encourages the health-care personnel to maintain the hygiene practice.

- *The importance of hand hygiene is emphasised by my unit supervisors*

The results show that 50 (29.4%) participants responded “always” to the statement the importance of hand hygiene is emphasised by my unit supervisors as a factor affecting the practice of hand hygiene, 41 (24%) responded “sometimes” while 24 (14.1%) responded “seldom” to the statement. Fifty four (31.8%) responded “never” to the statement.

Lack of supervisors who emphasise the importance of hand hygiene was listed by WHO (2009:74) as one of the factors contributing to poor adherence. This means that in order to accomplish hand hygiene compliance, there is a need for supervision in the wards/units to ensure that hand hygiene guidelines are followed correctly. In a study conducted by Mazi, Senok, Al-Kahldy and Abdullah (2013:15), a team approach with the guidance of a team leader was suggested as a modality for behavior change in sustaining hand hygiene

compliance. Following a variety of interventions such as performance feedback by the team leaders/supervisors, the same authors reported that the presence of team leaders contributed to increased compliance in hand hygiene among the nursing staff in general.

White et al (2015:59) further corroborates this view by stating that the nurses consider work colleagues as the most salient referents supportive of their performing hand hygiene hence the importance of colleagues and supervisors in supporting hand hygiene practice.

- *Lack of administrative sanction of non-compliers or rewards for compliers*

According to the results, 67 (39.1%) and 24 (14.2%) participants responded “always” and “sometimes” respectively to *lack of administrative sanction of non-compliers or rewards for compliers* as a factor affecting the practice of hand hygiene. Twenty one (12.4%) and 58 (34.3%) responded “seldom” and “never” to the same item.

Lam, Lee and Lau (2004 cited in WHO 2009b) found that multimodal interventions such as performance feedback improve hand hygiene adherence. According to WHO (2009:75) lack of sanctions of non-compliers or rewards for compliers has a direct effect on hand hygiene practices. Corrective training on hand hygiene, reprimanding and punishment were some of the suggestions of administrative sanctions on how to get the staff to follow the routines (Browall & Walfridson 2014:9). In a qualitative study on compliance to hand hygiene, Unekea et al (2014:14) found unreported consequences of noncompliance in the list of factors associated with noncompliance to hand hygiene identified by the doctors and nurses. Suchitra and Lakshmi Devi (2007:186) report that there were no suitable rewards offered for those who complied in the form of either incentives or verbal acceptance for the participants of their study and consequently health care workers did not feel motivated to comply with hand hygiene.

- *Hand hygiene is considered an important part of the nursing care in my unit*

The results show that 77 (45.3%) respondents always consider hand hygiene an important part of the nursing care while 54 (31.8%) never consider hand hygiene an important part of the nursing care. Twenty six (15.3%) and 13 (7.6%) consider hand hygiene as an important part of nursing care sometimes and seldom respectively.

- *Workshops, seminars and continuing educational courses on hand hygiene are offered*

According to the results, 49 (28.8%) and 46 (27.1%) participants responded “never” and “sometimes” respectively to the statement that offering workshops, seminars and continuing educational courses on hand hygiene affect the practice of hand hygiene. Forty two (24.7%) and 33 (19.4%) study participants responded “always” and “seldom” to the same item.

Various researchers have found that workshops, in-services education, seminars and continuing educational courses on hand hygiene are fundamental in promoting hand hygiene and help staff to comply with the institutional protocols of infection control. In addition they empower and encourage good practice of hand hygiene (Chassin et al 2015:8; Sharma et al 2011:18; Takahashi & Turale 2010:127-134; WHO 2009b). Chassin et al (2015:9) further explain that the workshops should focus on discipline-specific education that puts hand hygiene within the context of an employee’s daily work and processes.

- *Lack of institutional safety climate/culture of personal accountability of HCWs to perform hand hygiene*

The results show that 62 (36.5%) participants responded “always” to the statement *lack of institutional safety climate/culture of personal accountability of HCWs to perform hand hygiene affect the practice of hand hygiene*. Thirty nine (22.9%) and 35 (20.6%) responded “sometimes” and “seldom” to the statement respectively. Thirty four (20.0%) responded “never” to the statement.

Similar findings were reported by WHO (2009:75), that lack of institutional safety climate/culture of personal accountability of health care workers to perform hand hygiene were perceived as additional perceived barriers to appropriate hand hygiene. According to Chassin et al (2015:8) inadequate safety culture that does not stress importance of hand hygiene for all caregivers regardless of role is a cause of hand hygiene noncompliance. Maxfield and Dull (2011:30-33) maintain that every nurse should be held responsible for reminding co-workers to practise hand hygiene, thereby raising the sense of accountability between the working team.

- *Availability of rewards/encouragement for hand hygiene*

Half of the respondents 86 (50.3%) responded “never” to the availability of rewards /encouragement for hand hygiene while 50 (29.6 %) and 18 (10.7%) responded “always” and “seldom” to the statement. Sixteen (9.5%) respondents gave the statement a “sometimes” rating. The implication is that there is no reward/encouragement for hand hygiene. The participants’ responses are consistent with the responses they gave for the item *lack of administrative rewards for compliers*

- *Availability of role models from colleagues or superiors*

The results of the study show that 62 (36.3%) participants responded “always” to the statement *availability of role models from colleagues or superiors affect my practice of hand hygiene* while 30 (17.9%) and 29 (17.3%) gave responses “ sometimes” and “seldom” to the statement respectively. Forty nine (28.6%) responded “never” to the statement.

A report by WHO (2009b:72) on self-reported factors for poor adherence with hand hygiene states that lack of role model from colleagues or superiors affect compliance to hand hygiene negatively. Scientific evidence supporting the importance of role models among colleagues and seniors to hand hygiene compliance is adequate (Akyol 2007:431; Barrett & Randle 2008:1857; Mani, Shubangi & Saini 2010:115; Suchitra & Lakshmi Devi 2007:186). Takahashi and Turale (2010) highlight the need for nurses who are specialised in health-care hygiene who can translate theory into practice and be leaders for the rest of the staff in the daily work with the patients. According to Lind et al (2013), Bamford et al (2013) and Akyol (2005), when there are skilled and dedicated nurses in hygiene practice who participate in the nursing care of the patients; this affects the compliance to hygiene practice among the other staff in the ward in a positive way. Barrett and Randle (2008:1857) further explain that role-model behaviour from colleagues or superiors strongly influences hand-hygiene adherence in both positive and negative ways.

4.3.2.5 Beliefs about hand hygiene

Respondents' beliefs about hand hygiene are shown in table 4.6.

Table 4.6: Respondents' beliefs about hand hygiene (N=170)

1 Agree			
2 Disagree			
I believe that ...	1	2	Total
38 Hand hygiene interferes with nurse-patient relationship	23 (13.5%)	147 (86.5%)	170 (100%)
39 Wearing of gloves replace hand hygiene	41 (24.1%)	129 (75.9%)	170 (100%)
40 It is more important to complete my tasks than to perform hand hygiene when too busy	39 (22.9%)	131 (77.1%)	170 (100%)
41 Hand hygiene causes an interruption in patient-care activities	18 (10.6%)	152 (89.4%)	170 (100%)

- *Hand hygiene interferes with nurse-patient relationship*

The results show that a large number of respondents 147 (86.5) disagree with the statement that *hand hygiene interferes with nurse-patient relationship* while only 23 (13.5%) agree with the statement. The implication is that the majority of respondents believe that hand hygiene does not interfere with nurse-patient relationships and should therefore be performed according to the WHO *My 5 moments for hand hygiene*.

- *Wearing of gloves replaces hand hygiene*

The majority of respondents 129 (75.9%) gave a disagreement rating to the statement *wearing of gloves replaces hand hygiene* and 41 (24.1%) agreed with the statement. The result means that the respondents disagree with the belief that the use of gloves obviates the need for hand hygiene. The finding is consistent with the results of the study (4.3.2.1) where 99 (58.2%) and 59 (34.7%) of the participants responded "always" to performing hand hygiene after the removal of gloves respectively. The implication is that they believe in handwashing with the use of gloves. Similar findings were reported in a study conducted by Fuller et al (2011:1198) on hand hygiene compliance when gloves are worn. In another study by Chassin et al (2015:8) on perceived barriers to appropriate hand hygiene, different results were obtained. The results of the same study found that the belief that hand hygiene is not needed if wearing gloves was identified as a barrier to appropriate hand hygiene.

- *It is more important to complete my tasks than to perform hand hygiene when too busy*

A large number of nurses 131 (77.1%) gave a disagreement rating to the statement *'it is more important perform hand hygiene than to complete tasks when too busy'* while 39 (22.9%) agree that it is more important to complete my tasks than to perform hand hygiene when too busy.

- *Hand hygiene causes an interruption in patient-care activities*

Most of the respondents (89.4%) disagree with statement that *hand hygiene causes an interruption in patient care activities* while 18 (10.6%) agree that hand hygiene causes an interruption in patient care activities. White et al (2015:59) conducted a study on hand hygiene beliefs at the 5 critical moments among Australian hospital-based nurses. The same authors found that being physically unable to interrupt some tasks deterred performance of hand hygiene and was classified as an inhibiting factor that may result in poor compliance. However the findings of the same study did not find that hand hygiene cause interruption of patient care activities.

Summary of results on respondents' beliefs about hand hygiene

The PRECEDE-PROCEED model that was used in this study outlines important role that predisposing factors such as beliefs may have in providing rationale and motivation for change of behaviour and compliance with hygiene standards. In the context of this study, the behavioural factor that needed intervention was low compliance to hand hygiene standards among nurses at the selected hospital. It was important to determine if individual belief structure regarding hand hygiene was associated with noncompliance to hand hygiene among nurses. The results of the study show that respondents' beliefs were supportive of the performance of hand hygiene.

4.3.2.6 Consistent compliance to wash hands according to the hand hygiene standards

In figure 4.6, responses to the question *"Do you always wash hands according to*

guidelines/protocols?” are presented.

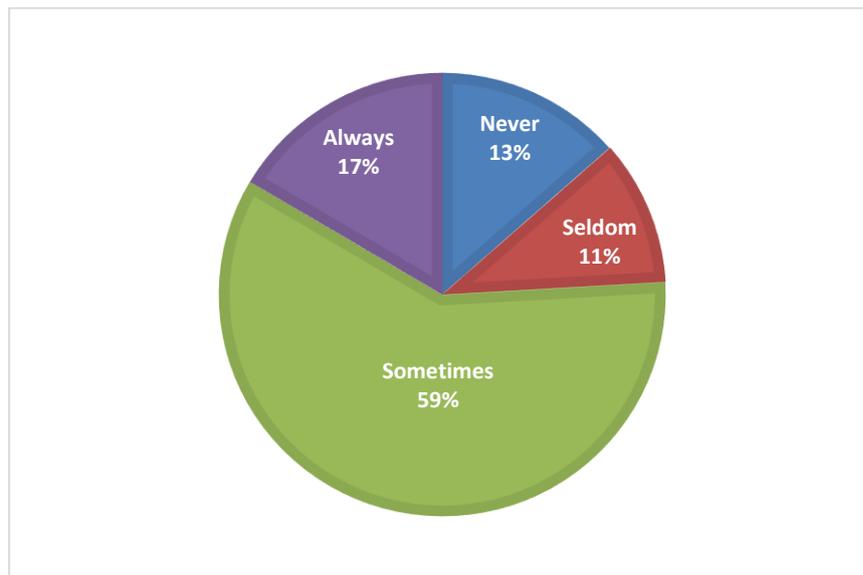


Figure 4.6: Respondents’ responses to a question relating to consistent compliance to hand hygiene (N=???)

A disappointingly small number 29 (17.3%) of participants responded “always” to consistent hand washing according to hand hygiene standards while 101 (59%) participants responded “sometimes” to the question. Eighteen (10.6%) and 23 (13.5%) nurses indicated that they “seldom” and “never” wash hands consistently according to guidelines respectively.

4.3.3 Personal reasons for inconsistent compliance to hand hygiene

The last two questions in the questionnaire were open-ended. In response to the first open-ended question “*What are the reasons, if any, in your case for not performing hand hygiene consistently according to guidelines?*” the following reasons were given and they are presented in order of priority in figure 4.7

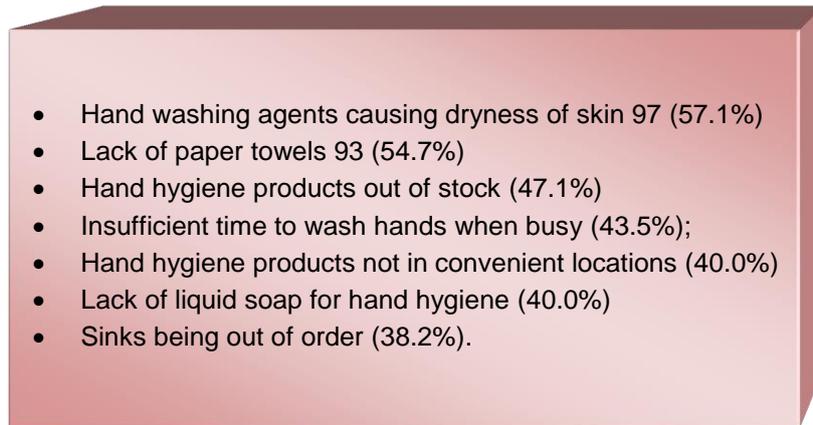


Figure 4.7: Personal reasons for inconsistent compliance to hand hygiene standards

The results are consistent with the findings of the studies by WHO (2009b:72) on self-reported factors for poor compliance with hand hygiene and Chassin et al (2015:8) on perceived barriers to appropriate hand hygiene. According to the findings of the both studies the self-reported factors for poor compliance to hand hygiene included skin irritation and dryness from hand cleaning products, lack of soap and paper towel, no soap at sink, dispenser or sink broken, no hand rub in dispenser and insufficient time to wash hands when the ward is busy.

The findings are also consistent with the reasons the respondents of this study gave for not performing hand hygiene according to the recommended guidelines under 4.3.2.3.

4.3.4 Suggestions made by the respondents for promotion of consistent practice of hand hygiene according to guidelines

The responses to the last open ended question “*If we could do one thing to help you with consistent practice of hand hygiene according to guidelines, what would it be?*” are presented in figure 4.8.

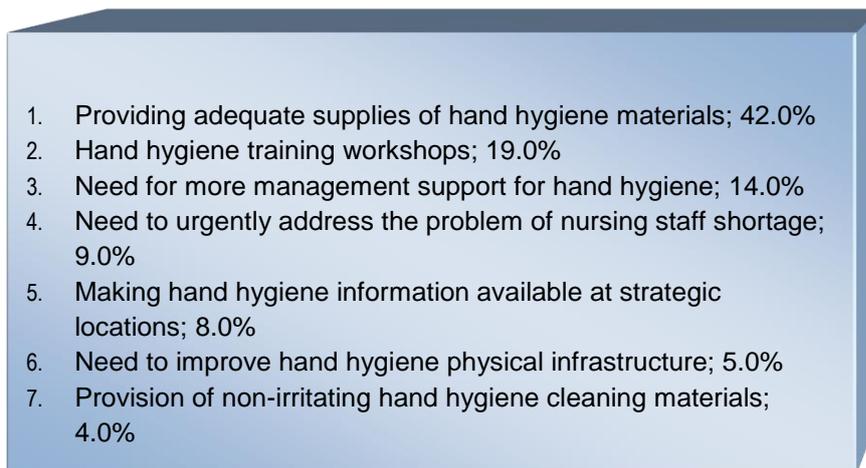


Figure 4.8: Respondents' suggestions for promotion of consistent practice of hand hygiene according to guidelines standards

For the promotion of consistent practice of hand hygiene according to guidelines, the nurses made recommendations as presented in figure 4.8. Chassin et al (2015:9) reported similar suggestions for the promotion of consistent practice of hand hygiene according to guidelines and they included provision of easy access to hand hygiene equipment and dispensers, location of glove dispensers near hand-rub dispensers and sinks to facilitate the proper use of gloves, leadership commitment to hand hygiene as an organisational priority and provision of discipline-specific education that puts hand hygiene within the context of an employee's daily work and processes.

Skin irritation and dryness caused by hand hygiene agents was mentioned by 97 (57.1%) respondents as a factor associated with their noncompliance to hand hygiene, but only 7 (4.0%) respondents made a suggestion of providing non-irritating hand hygiene cleaning materials. Lack of paper towel was mentioned by 93 (54.7%) respondents as a factor associated with their noncompliance to hand hygiene, but only 9 (5.0%) respondents made a suggestion of improving hand hygiene physical infrastructure.

The suggestions made by respondents somewhat explain the results under 4.3.2.4. The results of the study show that 42 (24.7%) and 33 (19.4%) study participants responded "always" and "seldom" to the statement offering workshops, seminars and continuing educational courses on hand hygiene affect the practice of hand hygiene, hence the suggestion of hand hygiene workshops. A similar suggestion was made by the participants of Chassin et al's (2015:9) study, that general education on hand hygiene

expectations should be reinforced by means of workshops and just-in-time coaching. Just-in-time coaching provides real-time reinforcement and feedback to health care workers as well as progressive disciplinary action against repeat offenders and it is critical in creating a change in culture and behavior (Chassin et al 2015:9). The suggestions of using strategies such as posters and visual cues to reinforce compliance were also made by participants of the same study.

Another suggestion made by the respondents is the need for more support for hand hygiene by management. According to the results of the study (4.3.2.4), lack of institutional safety culture to perform hand hygiene, supervisors not emphasising hand hygiene, non-availability of rewards to encourage hand hygiene routines, absence of sanctions for non-compliers and lack of role models point to the lack of management support for hand hygiene; hence the suggestion.

The respondents also made a suggestion of the need to urgently address the problem of nursing staff shortage. This is consistent with the results (4.3.2.4) that hand hygiene compliance is low when there are staff shortages. Staff shortages, high workload and understaffing do not provide adequate time for hand hygiene (Chavali et al 2014; Erasmus et al (2010) and WHO (2009b).

4.4 OVERVIEW OF RESEARCH FINDINGS

A total of 170 nurses participated in the descriptive survey by completing a questionnaire that was designed by the researcher. Data was analysed by means of SPSS version 23.0 and the results were presented by means of table and figures.

The findings of the first section of the questionnaire related to the biographical data of respondents. Twenty five (25%) of the respondents were male and 85% were female. The sample comprised registered, enrolled and auxiliary nurses working at one public hospital in Namibia. The ages of the respondents ranged from 22 to 68 years with a mean of 38.71. A large number of nurses were in the 22-30 and 55-60 age ranges.

The second section of the questionnaire consisted of items designed to elicit the information about factors associated with noncompliance to hand hygiene. The results of the study show that, on *My 5 moments for hand hygiene* guidelines, compliance after

exposure to body fluid exposure was the highest while compliance to before patient contact was the lowest among nurses who took part in the study.

According to the results, factors associated with noncompliance to hand hygiene standards include skin irritation and dryness caused by hand hygiene agents, lack of paper towel, staff shortages, lack of priority for hand hygiene and lack of participation in hand hygiene promotion at individual, unit and institutional levels. In addition, the results show that hand hygiene is not considered an important part of nursing, supervisors in the units do not emphasise the importance of hand hygiene and there are no role models from colleagues or superiors. The results also show that, there is no rewards/encouragement for hand hygiene, no sanctions for non-compliers and no workshops, seminars and continuing educational courses on hand hygiene are offered.

The respondents made suggestions for the promotion of consistent performance of hand hygiene among nurses and they included provision of adequate supplies of hand hygiene materials, hand hygiene training workshops and more management support for hand hygiene, including the need to urgently address the problem of nursing staff shortage. The provision of non-irritating hand hygiene cleaning materials is the last on the list of suggestions and yet it had the higher numbers of respondents who gave it an “always” rating as a reason for noncompliance to hand hygiene.

4.5 CONCLUSION

In this chapter data analysis was described and the results of the study were presented. The next chapter focuses on conclusions drawn from the study, the identified limitations and the recommendations and suggestions for practice and further research.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this chapter, a summary and discussion of the study results are presented, followed by a discussion of conclusions drawn from the study, the identified limitations as well as the recommendations and suggestions for practice and further research.

5.2 RESEARCH DESIGN AND METHOD

This research followed a non-experimental, quantitative descriptive and cross-sectional design using a stratified sample comprising three categories of nurses (registered, enrolled and auxiliary nurses) working in one public hospital in Windhoek, Namibia. A self-designed questionnaire on hand hygiene standards was used to collect data. As reported in Chapter 3, the validity of the questionnaire was ensured and the internal consistency of the whole questionnaire was deemed acceptable as determined by the Cronbach's alpha of 0.60. The response rate of 99% allowed for statistical analysis of data by means of SPSS version 23.0.

5.3 SUMMARY AND INTERPRETATION OF RESEARCH FINDINGS

The summary and interpretation of findings are presented in the paragraphs that follow; starting with the biographical data followed by hand hygiene aspects.

5.3.1 Biographical data

More than half of the respondents 87 (51.2%) were registered nurses and 82 (48.2%) were enrolled nurses. Only one auxiliary nurse took part in the study. The nurses who took part in the study were predominantly female (85%) and males (15%). The ages of the respondents ranged from 22 to 68 years with a mean of 38.71. The large numbers of nurses were in the 22-30 and 55-60 age ranges. The majority of respondents had a work experience of less than 10yrs in various units/wards that included medical, paediatric,

surgical wards and maternity as well as operating theatre, ICU and casualty. There were no nurses working in the psychiatric ward and health center.

5.3.2 Hand hygiene standards

The purpose of this study was to determine factors associated with noncompliance to hand hygiene standards among nurses at one public hospital in Windhoek, Namibia. As indicated in Chapter 1, the hand hygiene audit that was conducted at the same hospital in 2014 revealed an unacceptably low compliance of just above 40% to hand hygiene standards among nurses and this prompted the researcher to investigate the factors associated with noncompliance to hand hygiene standards. It was necessary to first establish if noncompliance to hand hygiene standards among nurses at the same hospital still existed before investigating the factors associated with it.

5.3.2.1 Compliance to my 5 moments for hand hygiene

The WHO “5 Moments for hand hygiene” were used as a standard for establishing compliance to hand hygiene among nurses at the selected hospital. Compliance was defined as the number of actions to the number of opportunities (moments) for hand hygiene. According to the results, an average of 73% of the participants responded “always” to 4 of the 5 Moments for hand hygiene with Moment 3 (immediately after an exposure risk to body fluid) receiving the highest number 161 (94%) of the “always” rating, followed by 145 (85.6%) for Moment 2 (before clean/aseptic procedure), 102 (60%) for Moment 5 (after touching patient surroundings) and 85 (50%) for Moment 4 (after touching a patient). Fifty six (32.9%) participants responded “always” and 31 (18.2%) responded “never” to Moment 1 (before touching a patient). When the results of the study are compared with those of the 2014 hand hygiene audit, compliance to hand hygiene among nurses has increased but it remains suboptimal.

Many studies reported similar results showing the high compliance to Moments 2, 3, 4, 5 and the lowest compliance to Moment 1 (Chavali et al 2014; Fuller et al 2014; Harne-Britner et al 2011; Li et al 2015:6; Unekea et al 2014:24).

5.3.2.2 Hand hygiene practices

According to the results, the factors that were associated with high compliance to hand hygiene standards included *when doing activities associated with high risk of cross-transmission* which received an “always” rating by 152 (89.5%) respondents. The results are consistent with the study participants’ responses to Moment 3 in 5.3.2.1 where the majority 161 (94.7%) responded “always” to performing hand hygiene after an exposure to risk to body fluids. A large number 114 (67.2%) of nurses responded “always” to performing hand hygiene when caring for patients recovering from clean/clean-contaminated surgery in post-anaesthesia care unit.

The results of the study show that compliance to hand hygiene practices was lowest after brief patient encounters of < 2 minutes with an “always” rating of 37.1% by nurses who took part in the study. Similar results were reported in the study conducted by Dedrick, Sinkowitz-Cochran, Cunninham, Muder, Perreieh, Cardo and Jernigan (2007:344) on hand hygiene practices after brief encounters with patients. The results show that 48.8% and 40% of participants responded “always” to *performing hand hygiene when caring for patients in non-isolation rooms* and *when there is low risk of acquiring infection from the patients* respectively. Krediet et al (2011) and WHO (2009) also reported low compliance to hand hygiene when caring for patients recovering from clean/clean-contaminated surgery in post-anesthesia care unit. Provision of patient care in non-isolation rooms was identified as one of the risk factors for poor compliance to recommended hand hygiene standards by Chassin et al (2015:9). In addition, Gilbert, Stanfford, Crosby, Fleming and Gaynes (2010:515) also found that compliance with hand hygiene among health workers did not differ between contact precautions and noncontact precautions rooms.

Compliance to hand hygiene practices was also found to be low in this study when there are staff shortages. This was evidenced by the “always” rating by only 37.1% of nurses who took part in the study. Similar results were reported in other studies that, when there are staff shortages and the workload was heavy or the activity index was high (>20), there was higher demand and higher hand hygiene opportunities with low compliance rate of 38.2% (Chavali et al 2014; Erasmus et al 2010 & WHO). Sharma et al (2011:22) corroborates this finding by stating that staff shortage, high workload and understaffing result in insufficient time for hand hygiene. Hamilton and Crane’s (2014) conducted a

study on hand hygiene and found that hand hygiene compliance is low when there is a high number of opportunities for hand hygiene per hour of patient care.

5.3.2.3 Reasons for not performing hand hygiene according to recommended guidelines

Dryness of the skin caused by hand hygiene agents and lack of paper towel were the only reasons given by more than half of the nurses for not performing hand hygiene according to recommended guidelines; 57% and 54.7% respectively. The results are consistent with some of the findings of WHO's (2009b:72) study on self-reported factors for poor adherence. The findings of the same study 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. Inadequate supply of water, soap and towel were identified by the doctors and nurses as some of the main factors associated with noncompliance to hand hygiene during the focus group discussion conducted by Unekea et al (2014:14) in Nigeria.

5.3.2.4 Beliefs about hand hygiene

The results show that a large number of respondents gave "disagreement" ratings to all statements regarding hand hygiene beliefs. The implication is that the majority of nurses who took part in the study do not subscribe to the beliefs that;

- Hygiene interferes with nurse-patient relationships (86.5%; disagreement rating).
- Hand hygiene causes an interruption in patient care activities (89.4%; disagreement rating).
- The use of gloves obviates the need for hand hygiene (75.9%; disagreement rating).
- It is more important to complete tasks than to perform hand hygiene when too busy (77.1%; disagreement rating).

Similar results were reported in a variety of studies on hand hygiene beliefs at five critical moments (Fuller et al 2011:1198; White et al 2015:59). Chassin et al (2015:8) obtained different results where some of the nurses who took part in their study held belief that hand hygiene is not needed if wearing gloves and identified the belief as a barrier to

appropriate hand hygiene.

5.3.2.5 Factors affecting the practice of hand hygiene

According to the results, institutional factors associated with noncompliance with the practice of hand hygiene among nurses included;

- Lack of institutional priority for hand hygiene (30.6% & 25.3% responding “always” and “sometimes” respectively).
- Lack of active participation in hand hygiene promotion at individual, unit or institutional level (35.3% responded “always” & 23.5% “sometimes”).
- Unit supervisors not emphasizing the importance of hand hygiene (29.4% “always” and 24.1% “sometimes”).
- Lack of administrative sanction of non-compliers or rewards for compliers; (39.3% responded “always” and 14.2% “sometimes”).
- Hand hygiene is not considered an important part of the nursing care in my unit (45.3% responded “always” & 15.3% “sometimes”).
- Workshops, seminars and continuing educational courses on hand hygiene are not offered (28.8% responded “never” & 19.4% “seldom”).
- Lack of institutional safety climate/culture of personal accountability of HCWs to perform hand hygiene (36.5% responded “always” & 22.9% “sometimes”).
- Availability of rewards/encouragement for hand hygiene (50.3% responded “never” & 14.2% “seldom”).
- Availability of role models from colleagues or superiors (28.6% responded “never” & 17.3% “seldom”).

5.4 SUMMARY AND INTERPRETATION OF RESULTS

The purpose of the study was to describe factors associated with noncompliance to hand hygiene standards. Based on the results of the study, individual and institutional factors associated with noncompliance to hand hygiene were identified. A summary of the factors associated with noncompliance to hand hygiene standards among nurses is presented in the paragraphs that follow.

5.3.1 Individual factors

The results showed that compliance to hand hygiene was lowest when nurses provide care for patients in non-isolation rooms, when the perceived risk of acquiring infection from patients was low and following brief encounters with patients. It was also found that dryness of the skin caused by hand hygiene agents and lack of active participation in hand hygiene promotion at individual level contributed to noncompliance to hand hygiene among nurses.

5.3.2 Institutional factors

Institutional factors identified were associated with availability of resources, institutional safety culture and leadership. With regard to resources, the results show that staff shortages and lack of paper towels were associated with noncompliance to hand hygiene among nurses who participated in the study. The results also show that lack of institutional priority for hand hygiene, lack of active participation in hand hygiene promotion at unit or institutional level and lack of institutional safety climate/culture of personal accountability of health care workers to perform hand hygiene were institutional conditions associated with noncompliance to hand hygiene among nurses. In addition, the results show that hand hygiene is not considered an important part of nursing, supervisors in the units do not emphasise the importance of hand hygiene and there are no role models from colleagues or superiors. The absence of rewards/encouragement for hand hygiene, sanctions for non-compliers and workshops, seminars and continuing educational courses on hand hygiene was associated with noncompliance to hand hygiene.

Similar factors associated with noncompliance to hand hygiene were reported by Gluyas and Morrison (2013) that lack of time, workload pressures, lack of knowledge, poor role modeling by other health care professionals and a lack of organisational support affect compliance to hand hygiene negatively. Sharma et al (2011:18) reported similar findings of administrative apathy and low institutional priority for hand hygiene support as some of the reasons for low compliance to hand hygiene amongst health workers. According to Dunn-Navarra, Cohen, Stone, Pagorzelska, Jordan and Larson (2011:33) systems-level (institutional) factors such as lack of organisational support are likely to influence hand hygiene practices of staff.

5.3.3 Interpretation of results

As stated in Chapter 1, the purpose of the study was to describe factors associated with noncompliance to hand hygiene standards among nurses at one public hospital in Windhoek, Namibia. The PRECEED-PROCEED theoretical framework used in this study recognises that behavior is a complex of individual and environmental factors that need to be influenced by a number of interventions. However, before any interventions are implemented, a variety of assessments (diagnosis) such as epidemiological, behavioral, environmental, educational and organisational as well as administration and policy diagnoses has to be made. In the context of the study, the diagnosis refers to the identification of factors associated with hand hygiene standards with the aim of making recommendations so that behavioural change (compliance to hand hygiene) and environmental change (prevention of hospital acquired infections and related costs) can be achieved.

Using the PRECEDE of the theoretical framework, individual and institutional factors associated with noncompliance to hand hygiene standards presented in 5.3.1 and 5.3.2 respectively were classified as predisposing, reinforcing and enabling factors. Individual factors associated with noncompliance to hand hygiene standards fall in the classification of predisposing and reinforcing factors while institutional factors are enabling factors.

5.3.3.1 Predisposing factors

Predisposing factors motivate behaviour prior to or during the occurrence of that behaviour. They are individual factors such as knowledge, attitudes, skills, beliefs and values that provide rationale and motivation for change of behaviour. As shown in 4.3.2.5, the respondents' hand hygiene beliefs were positive and supportive of the consistent performance of hand hygiene according to guidelines. However, the results also found that lack of active participation in hand hygiene promotion at personal level was associated with noncompliance to hand hygiene in spite of positive beliefs about hand hygiene. Nurses' positive beliefs and attitude about hand hygiene have not translated into compliance to hand hygiene.

5.3.3.2 Reinforcing factors

Reinforcing factors are characteristics or conditions of the environment that facilitate behavioural change and they serve to strengthen the motivation for behaviour. Reinforcing factors include rewards or punishment following or anticipated as a consequence of behaviour. Rewards or incentives such as support, positive feedback, supervision and ongoing evaluation promote repetition of the desired behaviour (compliance to hand hygiene standards) while punishment prevents continuation of undesired behaviour (noncompliance to hand hygiene standards). The results of the study revealed absence or lack of the following reinforcing factors;

- rewards/encouragement for hand hygiene
- sanctions for non-compliers
- institutional safety climate/culture of personal accountability of health care workers to perform hand hygiene
- institutional priority for hand hygiene
- active participation in hand hygiene promotion at unit or institutional level
- role models from colleagues or superiors
- hand hygiene is not considered an important part of nursing
- supervisors in the units do not emphasise the importance of hand hygiene

The absence of reinforcing factors may have a negative effect such as noncompliance to hand hygiene standards. Disincentives, lack of supervision and ongoing evaluation as well as lack of feedback or negative feedback may reinforce noncompliance to hand hygiene.

5.3.3.3 *Enabling factors*

Enabling factors are institutional or organisational conditions that facilitate behaviour or any skill or resources required to attain specific behaviour. Enabling factors provide motivation or allow the institutional policy to be implemented. In the context of this study, there were some enabling factors such as the availability of hand hygiene guidelines and equipment as well as the skills that nurses attained during training since the participants were qualified, trained nurses. The absence of enablers such as resources (staff shortage, lack of paper towels and the use of hand hygiene agents that cause dryness and irritation of the skin) and development of new skills (workshops, seminars and

continuing educational courses on hand hygiene) that must be present for the intended behavioural change to occur contributed to noncompliance to hand hygiene among nurses.

5.3.3.4 *Administrative and policy assessment*

The PRECEDE model's administrative and policy assessment/diagnosis entails the analysis of policies, resources and circumstances prevailing organisational situations that could hinder or facilitate the development of the health program. Hand hygiene policy guidelines and equipment were available as factors facilitating compliance to hand hygiene, but staff shortages and lack of paper towel as reported in the findings of the study were factors contributing to noncompliance to hand hygiene. Other factors such as lack of institutional priority for hand hygiene, lack of institutional safety culture of personal accountability of health care workers to perform hand and lack of active participation in hand hygiene promotion at institutional level were among the factors associated with noncompliance to hand hygiene standards.

In summary, the results show that there were more institutional than individual factors associated with noncompliance. The implication is that the focus of recommended interventions should be on addressing the absent reinforcing and enabling factors associated with hand hygiene standards at institutional level (the hospital where the study was conducted).

5.3.4 *Suggestions made by nurses*

The study sought to make recommendations to address noncompliance to hand hygiene standards among nurses at the selected public hospital in Windhoek, Namibia. Table 5.1 shows the suggestions that the respondents made to promote hand hygiene standards; and these were presented in 4.3.4.

Table 5.1: Suggestions for promoting hand hygiene standards among nurses

Personal reasons for noncompliance to hand hygiene	Suggestions for the promotion of compliance to hand hygiene
<ul style="list-style-type: none"> • Hand washing agents causing dryness of skin 97 (57.1%) • Lack of paper towels 93 (54.7%) • Hand hygiene products out of stock (47.1%) • Insufficient time to wash hands when busy (43.5%) • Hand hygiene products not in convenient locations (40.0%) • Lack of liquid soap for hand hygiene (40.0%) • Sinks being out of order (38.2%). 	<ul style="list-style-type: none"> • Providing adequate supplies of hand hygiene materials; 42.0% • Hand hygiene training workshops; 19.0% • Need for more management support for hand hygiene; 14.0% • Need to urgently address the problem of nursing staff shortage; 9.0% • Making hand hygiene information available at strategic locations; 8.0% • Need to improve hand hygiene physical infrastructure; 5.0% • Provision of non-irritating hand hygiene cleaning materials; 4.0%

Some of the suggestions made seem inconsistent with the reasons given for noncompliance to hand hygiene. As shown in table 5.1 , dryness of the skin caused by hand hygiene agents was mentioned by 97 (57.1%) respondents as a factor associated with their noncompliance to hand hygiene, but only 7 (4.0%) respondents made a suggestion of providing non-irritating hand hygiene cleaning materials. Lack of paper towel was mentioned by 93 (54.7%) respondents as a factor associated with their noncompliance to hand hygiene, and 42% of respondents made a suggestion of providing adequate supplies of hand hygiene materials. Other suggestions made by the nurses accordingly focused on the institutional factors associated with noncompliance to hand hygiene standards among nurses.

5.4 CONCLUSIONS DRAWN FROM THE STUDY

The study produced interesting insights into the vital role that good leadership plays in the implementation of hand hygiene policy guidelines. It is important to note that resources and institutional support are vital for the successful implementation of the available hand hygiene policy. Good leadership shows dedication for hygiene standards encourages staff to maintain hygiene practice and ensures that there are adequate

resources for the implementation of hand hygiene policy as well as rewards/incentives for compliers and sanctions for noncompliers.

5.5 CONTRIBUTIONS OF THE STUDY

The findings of the study have contributed to the body of knowledge regarding factors associated with noncompliance to hand hygiene standards among nurses. The knowledge generated through this study regarding factors associated with noncompliance among nurses is important for the management of the selected hospital for it will assist in planning and implementing hand hygiene promotion programs to address the identified the predisposing, reinforcing and enabling factors associated with noncompliance among nurses. This study also provided recommendations that nurses made to help management with appropriate content for the in-service education programs for promoting compliance to hand hygiene.

5.6 RECOMMENDATIONS

Based on the results of the study the following recommendations are made:

5.6.1 Recommendations for the practice

It is recommended that the management of the hospital where the study was conducted create an organisational climate or culture that supports hand hygiene. To create such a climate, the institution needs to:

- Ensure that the leadership of the hospital commits to hand hygiene as an organisational priority and demonstrates support by role modelling consistent hand hygiene compliance. The organisational commitment to hand hygiene should be communicated to all nurses and other health care workers, that hand hygiene is regarded as an integral part of nursing. Posters of hand hygiene and reminders should be displayed at strategic areas in the wards to reinforce compliance.
- Ensure that supervisors in the units emphasise the importance of hand hygiene to all nurses and during orientation to newly appointed nurses.

- Enhance supervision, monitoring, and provision of hand hygiene performance feedback or results to all health care providers, including physicians, therapists and nurses.
- In-service education given should focus on hand hygiene expectations, correct procedures for hand washing, raising awareness about patient safety issues, including infection prevention.
- Introduce rewards and incentives system for consistent compliers.
- Introduce sanction or non-compliers to hand hygiene by applying progressive disciplinary action against repeat offenders.
- Do periodic audits to monitor progress and communicate findings to all nurses.
- Supply hand hygiene agents which do not cause skin dryness or irritation.
- Ensure adequate staff patient ratios and hand hygiene facilities.

5.6.2 Recommendations for further studies

The following recommendations for further research:

- Mixed methods research is recommended for further study of the factors associated with noncompliance to hand hygiene. The literature reviewed suggests that compliance to hand hygiene among nurses was higher when self-reports were used to collect data. It is for this reason that mixed methods research is recommended using both self-reports (questionnaires) and direct observation methods.
- Qualitative studies on the reasons for noncompliance in the same region should be conducted in order to gain understanding of the reasons associated with noncompliance to hand hygiene standards among nurses.
- As stated in 1.7.2, the PROCEED did not form part of the study because, based on the study objectives there was no intention to implement any program. The purpose was to make recommendations based on the identified factors associated with noncompliance to hand hygiene standards. There is a need for intervention studies that will use the PRECEDE-PROCEED model to make diagnoses, implement and evaluate programs put in place for addressing noncompliance to hand hygiene.

5.7 LIMITATIONS OF THE STUDY

The study was conducted in one public hospital in Windhoek, Namibia. The results are therefore specific and limited to the hospital and cannot be generalised to private hospitals in Windhoek and hospitals in other regions of Namibia. In addition, the study focused on nurses; so the survey results cannot be generalised to other health care workers in Windhoek, Namibia.

5.8 CONCLUDING REMARKS

The purpose for carrying out this study was to describe the factors associated with noncompliance to hand hygiene standards among nurses. The results show that there were more institutional than personal factors associated with noncompliance to hand hygiene. In line with the PRECEDE-PROCEED model that was used in the study, the factors associated with noncompliance to hand hygiene standards were organised into predisposing, reinforcing and enabling factors. The results of the study revealed that the absence of reinforcing and enabling factors contributed to noncompliance to hand hygiene. The second objective of the study was to make recommendations to address factors associated with hand hygiene standards among nurses. The recommendations made focused on measures to address the identified absent reinforcing and enabling factors.

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WHO see World Health Organization.

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ANNEXURES

ANNEXURE A

APPROVAL FROM UNISA RESEARCH ETHICS COMMITTEE



**UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE**

REC-012714-039

HSHDC/418/2015

Date: 26 February 2015 Student No: 4131-074-8
Project Title: Factors associated with noncompliance to hand hygiene standards among nurses at one hospital in Windhoek, Namibia.
Researcher: Mrs Rebecca Mugweni
Degree: MA in Nursing Science Code: MPCHS94
Supervisor: Dr ME Chauke
Qualification: D Litt et Phil
Joint Supervisor: -

DECISION OF COMMITTEE

Approved

Conditionally Approved

pp Rinsburg
Prof L Roets

CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE

W. Moleki 20150327
Prof MM Moleki

ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

ANNEXURE B

LETTER SEEKING CONSENT FROM MINISTRY OF HEALTH

P.O Box 912

Windhoek

Namibia

22 January 2015

The Permanent Secretary

Mr. Andrew Ndishishi

Ministry of Health and Social Services

Government Republic of Namibia

**Re: Request for permission to conduct a research study at One Hospital,
Windhoek.**

I am currently studying for the Masters Degree in Nursing Science (MA in Nursing science) with the University of South Africa (UNISA); and I am expected to conduct a research study as a requirement for the degree. May I therefore, request your permission to conduct this study in Khomas Region; One Hospital.

The topic for my research is: "***Factors associated with noncompliance to hand hygiene standards among nurses at one hospital in Windhoek, Namibia***".

This is a quantitative, descriptive study as it involves the use of a structured questionnaire to collect data to identify the factors associated with non-compliance to hand hygiene standards among nurses in the workplace.

Thanking you in anticipation.

Yours sincerely,



Mrs. Rabecca Mugweni (UNISA Student Number: 41310748)

ANNEXURE C

LETTER OF APPROVAL: MINISTRY HEALTH: OFFICE OF THE PERMANENT SECRETARY



REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

Private Bag 13198
Windhoek
Namibia

Ministerial Building
Harvey Street
Windhoek

Tel: 061 – 203 2510
Fax: 061 – 222558
E-mail: msimasiku@mhss.gov.na

OFFICE OF THE PERMANENT SECRETARY

Ref: 17/3/3

Enquiries: Mr. M. Simasiku

Date: 18th June 2015

Mrs. Rebecca Musavengana Mugweni
P.O. Box 912
Windhoek
Namibia

Dear Mrs. Mugweni

Re: Factors associated with noncompliance to hand hygiene standards among nurses at Katutura state hospital in Windhoek, Namibia.

1. Reference is made to your application to conduct the above-mentioned study.
2. The proposal has been evaluated and found to have merit.
3. **Kindly be informed that permission to conduct the study has been granted under the following conditions:**
 - 3.1 The data to be collected must only be used for operational purpose;
 - 3.2 No other data should be collected other than the data stated in the proposal;
 - 3.3 Stipulated ethical considerations in the protocol related to the protection of Human Subjects should be observed and adhered to, any violation thereof will lead to termination of the study at any stage,

4

- 3.4 A quarterly report to be submitted to the Ministry's Research Unit;
- 3.5 Preliminary findings to be submitted upon completion of the study;
- 3.6 Final report to be submitted upon completion of the study;
- 3.7 Separate permission should be sought from the Ministry for the publication of the findings,

Yours sincerely,



Andrew Ndishishi (Mr)
Permanent Secretary



ANNEXURE D

QUESTIONNAIRE COVERING LETTER

QUESTIONNAIRE COVERING LETTER

Dear colleagues

I, Mrs R Mugweni, am a registered student with the University of South Africa for the Masters Degree in Nursing Science. I am conducting a research study on noncompliance to hand hygiene standards among nurses at One State Hospital in Windhoek, Namibia.

The purpose of the study is to identify factors associated with non-compliance to hand hygiene standards among nurses at one hospital in Windhoek in order to make recommendations to address noncompliance to hand hygiene standards. I am requesting your participation in this research study by completing the attached questionnaire. Your honest responses to the questionnaire are very important as they will enable the researcher to identify and make recommendations to address the factors associated with non-compliance to hand hygiene, thereby improving patient safety and quality patient care.

Participation in this study is voluntary. You can withdraw from the study at any stage if you do not feel like continuing, even after you have consented to participate in the study. Anonymity will be maintained and all the information given by you will be managed with strict confidentiality. Please do not write your name on the questionnaire, or anything that can identify yourself in any way. Nobody, except the researcher and a statistician, will see your questionnaire once it has been completed.

It should take you approximately 30 minutes to complete the enclosed questionnaire.

For any enquiries, please find my contact numbers on the outer cover. Please place the questionnaire in the envelope provided, and seal the envelope before handing it in to your unit manager.

Thank you very much for your cooperation and input.

For further information, please contact:

Mrs Rebecca Mugweni

P.O Box 912

Windhoek

Contact number +264 81 272 0455

ANNEXURE E

INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE AND REMINDERS

Research Participants

I have purposefully identified you as a possible participant because of your valuable experience and expertise related to my research topic on **factors associated with noncompliance to hand hygiene standards among nurses.**

Below is some of the instructions/information that will assist you in answering the questionnaire.

1. Please complete the **Consent for Participation in a Research Study**
2. Proceed to the questionnaire and answer **ALL** questions
 - Indicate your response by marking the appropriate box with a cross (x), and provide details where required.
 - On questions 29-37 please answer by writing numbers from 1- Never, 2- Seldom, 3-Sometimes and 4- Always
 - Please answer the questions as honestly and objectively as possible.
 - Please answer the questions as they apply to you personally
3. Please place the envelope with the completed questionnaire on the labelled box by the nurses' station.
4. **Reminder for collection.** Please take note that the researcher will be collecting the completed questionnaire after 24 hours of delivering it in the unit.

THANK YOU

ANNEXURE F

INFORMED CONSENT

Consent for Participation in a Research Study

I.....volunteer to participate in a research project conducted by **Mrs. Rabecca Mugweni** from **University of South Africa (UNISA)**. I understand that the study is designed to gather information about **Factors associated with noncompliance to hand hygiene standards among nurses at One State Hospital in Windhoek, Namibia** for academic work of UNISA. I will be one of approximately 180 people who will complete the questionnaire for this research.

1. My participation in this research study is voluntary. I understand that I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty. If I decline to participate or withdraw from the study, no one at One State Hospital will be told.

2. I understand that, if I feel uncomfortable in any way during completion of the questionnaire, I have the right to decline to answer any question or to end the interview.

3. Participation involves answering an **anonymous self-administered questionnaire on factors associated with noncompliance to hand hygiene standards**. Answering the questionnaire will last for approximately 10-30 minutes.

4. I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

5. Managers and administrators from One State Hospital will not know about my participation in the study nor have access to raw notes or transcripts. This precaution will prevent my individual comments from having any negative repercussions.

6. I understand that this research study has been reviewed and approved by the **Institutional Review Board (IRB) for Department of Health Studies' Higher Degrees Committee at the UNISA** and Mr. Andrew Ndishishi, the Permanent Secretary of the

Ministry of Health and Social Services. For research problems or questions regarding subjects, the Institutional Review Board may be contacted.

7. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.

8. I have been given a copy of this consent form.

My Signature

Date



My Printed Name

Signature of the Researcher

For further information, please contact:

Mrs. Rebecca Mugweni

P.O Box 912

Windhoek

Contact number: +264 81 272 0455, Email: 41310748@mylife.unisa.ac.za

ANNEXURE G

QUESTIONNAIRE FOR NURSES

Instructions for completing the questionnaire:

- Indicate your response by marking the appropriate box with a cross (x), and provide details where required.
- Please answer the questions as honestly and objectively as possible.
- Please answer the questions as they apply to you personally.

SECTION A: BIOGRAPHICAL DATA

For office use

1. How old are you? (e.g. 43 years)

2. Indicate your gender

- 1 Female
2 Male

3. Indicate your current nurse category as per your registrations at the Nursing Council of Namibia

- 1 Auxiliary Nurse
2 Enrolled nurse/Midwife
3 Registered Nurse/Midwife

4. How many years of experience do you have? (e.g. 5 years)

5. Indicate the clinical ward / unit in which you work

1	Medical ward	
2	Surgical ward	
3	Operating theatre	
4	Casualty department	
5	Outpatient clinic/department	
6	Maternity ward	
7	Paediatric ward	
8	Psychiatric ward	
9	Intensive care unit	
10	Health centre	
11	Other (specify)	

SECTION B: FACTORS ASSOCIATED WITH HAND HYGIENE

Please answer **ALL** questions in this section regarding your practice of hand hygiene. After reading each statement carefully, please make a cross (X) in the appropriate box to indicate how strongly you agree or disagree with each statement.

The rating scale values are interpreted as:

- 1 **Never**
- 2 **Seldom**
- 3 **Sometimes**
- 4 **Always**

For office use

The practice of the WHO 5 moments for hand hygiene				
	1	2	3	4
2. Immediately before performing any aseptic procedure.				
3. Immediately after an exposure risk to body fluids.				
4. After the removal of gloves.				
5. After touching a patient and his or her immediate surroundings when leaving.				
6. After changing bed linen.				
When is it appropriate to perform hand hygiene?				
7. When caring for patients in non-isolation rooms				
8. When duration of contact with patient is < or equal to 2 minutes.				
9. When there is low risk of acquiring infection from patients.				
10. When there are staff shortages.				
11. Doing activities with high risk of cross-transmission.				
12. High number of opportunities for hand hygiene per hour of patient care.				
13. Caring for patients recovering from clean/clean-contaminated surgery in post-anaesthesia care unit.				
1 Agree 2 Disagree Reasons for not performing hand hygiene according to the recommended guidelines				
	1	2		
14. There are no hand hygiene guidelines in the unit.				
15. I do not always have access to hand hygiene material recommended in the guidelines/protocols.				
16. Hand hygiene products out of stock.				
17. Hand hygiene product (s) not in convenient				

location.		
18. Shortage of sinks		
19. Sinks are out of order		
20. Sinks are inconveniently located		
21. Lack of liquid soap for hand hygiene		
22. Lack of paper towel		
23. Lack of water		
24. Dirty sinks can be a reason for not washing hands		
25. Hand washing agents cause irritation to my skin		
26. Hand washing agents cause dryness of my skin		
27. I forget to wash hands		
28. When busy there is insufficient time for hand hygiene		
The following factors affect my practice of appropriate hand hygiene 1 Never 2 Seldom 3 Sometimes 4 Always		
29. Lack of institutional priority for hand hygiene.		
30. Lack of active participation in hand hygiene promotion at individual, unit or institutional level.		
31. The importance of hand hygiene is emphasised by my unit supervisors.		
32. Lack of administrative sanction of non-compliers or rewards for compliers.		
33. Hand hygiene is considered an important part of the nursing care in my unit.		
34. Workshops, seminars and continuing educational courses on hand hygiene are offered.		
35. Lack of institutional safety climate/culture of personal accountability of HCWs to perform hand hygiene.		
36. Availability of rewards/encouragement for hand hygiene.		
37. Availability of role models from colleagues or superiors.		
I believe that 1 Agree 2 Disagree	1	2
38. Hand hygiene interferes with nurse-patient relationship		
39. Wearing of gloves replace hand hygiene		
40. It is more important to complete my tasks than to perform hand hygiene when too busy		
41. Hand hygiene causes an interruption in patient-care activities		

42. Do you always wash hands according to guidelines/protocols?

1	2	3	4
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- 1 **Never**
- 2 **Seldom**
- 3 **Sometimes**
- 4 **Always**

43. What are the reasons, if any, in your case for not performing hand hygiene according to guidelines?

44. If we could do one thing to help you with consistent practice of hand hygiene according to guidelines, what would it be?

Thank you for answering all the questions.

ANNEXURE H

LETTER FROM STATISTICIAN

P. O. Box 40933
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Department of Nursing Science
UNISA

August 24, 2016

Dear Prof. Gloria Thupayagale Tshweneagae and Dr. Rose Mmusi-Phetoe

MASTERS IN NURSING DISSERTATION: MRS R MUGWENI

This letter serves to confirm, that I, Lillian Pazvakawambwa a Senior Lecturer and Statistical Consultant, assisted Mrs. R. Mugweni, in the analysis of data on the non-experimental, descriptive, cross-sectional quantitative design study to determine factors associated with non-compliance to hand hygiene standards among nurses at KSH, Windhoek Namibia. The Data Analysis process involved the capturing of data from the 170 completed questionnaires using Microsoft Excel, and statistical analysis using IBM SPSS 23. After successful data capture checks were done to ensure completeness and data quality and thereafter produced general descriptive summary statistics. Based on guidance provided by Mrs. R. Mugweni on the outcomes and confounding factors, odds ratios were determined using Binary Logistic regression.

Regards



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Dr Lillian Pazvakavambwa

