

**EXPLORING CHALLENGES REGARDING
THE SURGICAL HAND SCRUBBING, GOWNING AND GLOVING
IN THE OPERATING THEATRE OF A HOSPITAL IN SWAZILAND**

BY

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APPROVAL

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“GOD BLESS YOU ALL”

DECLARATION

STUDENT NUMBER: 11293323

I, Thelma Smangele Dlamini, hereby declare that:

EXPLORING CHALLENGES REGARDING THE SURGICAL HAND SCRUBBING,
GOWNING AND GLOVING PROCEDURE IN THE OPERATING THEATRE OF A
HOSPITAL IN SWAZILAND

Is my original work, all the sources that I have quoted in this document are indicated and acknowledged by means of complete references and that this work has not been submitted before for any degree or examination at any other academic institution.

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ABSTRACT

Background of the study

The operating theatre is a controlled environment where surgical teams have to adhere strictly to the infection control principles. If infection control principles are not applied correctly or adhered to in the operating theatre, it can lead to contamination and infection of the surgical site. Surgical site infections are the third most common source of nosocomial infections in developing countries. In Swaziland, the incidence of surgical site infections was exceptionally high and a major cause of post-surgical complications as it accounts for about 12-18% of hospital acquired infections in all the regional hospitals.

Surgical hand scrubbing is the process of removing as many microorganisms as possible from the hands of the sterile surgical team members before wearing a sterile surgical attire that consist of a sterile gown and sterile gloves. The antiseptics should conform to the agreed standards of infection control and principles of sterile technique to prevent contamination. Multiple factors influence the availability of the needed resources and the implementation of policies in an operating theatre such as the setting where the research was conducted.

Aim of the Study

The aim of this study was to explore and describe challenges faced by the surgical teams and the hospital management regarding the surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland.

Research Objectives

The objectives of the study were the following:

- to explore and describe the challenges experienced by surgical teams regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre;
- to explore and describe the challenges experienced by the hospital management regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre; and
- to make recommendations to address the challenges regarding surgical hand scrubbing, gowning and gloving in the operating theatre of a hospital in Swaziland.

Methodology

A qualitative design was used. The population for this study was the surgical teams from all the surgical disciplines of the operating theatre and the hospital management which includes the operating theatre nurse managers and the administrative management of the hospital. Data were collected by means of focus group interviews, which were conducted separately for the hospital management and the surgical teams. Data analysis was through qualitative content analysis. Themes and subthemes that merged from the focus groups interviews with relevant literature were used to make recommendations to address the challenges experienced.

Results of the Study

Seven main themes were identified, which were related to the following: Management; Supplies; Physical Facilities; Equipment; Personnel knowledge, skills and attitude; Maintenance of infection control practices; and Process of surgical hand scrubbing, gowning and gloving.

Recommendations

Recommendations were made for clinical practice, education and research in order to improve surgical hand scrubbing, gowning and gloving procedure in the operating theatre.

Key Words: Surgical hand scrubbing, surgical teams, gowning, gloving, surgical site infection, hospital management and operating theatre.

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CHAPTER ONE: OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Surgical teams are expected to create and maintain a safe therapeutic operating theatre environment, in order to prevent the potential development of surgical site infection (Malan, 2009:1). Surgical hand scrubbing, gowning and gloving are important principles of infection control in preventing and reducing healthcare associated infections in surgical cases (McDonald & Evans, 2008:n.p; Washer, 2010:3; Pirie, 2010:207). The operating theatre is a controlled environment where surgical teams have to adhere strictly to the infection control principles. If infection control principles are not applied correctly or adhered to in the operating theatre, it can lead to contamination and infection of the surgical site (Mongram, Horan, Pearson, Silver & Jarvis, 1999:251; Malan, 2009:1).

Surgical procedures performed in the operating theatre of the Hospital are documented to be approximately 400 per month (Operating Theatre Annual Report, 2012:n.p). Surgical site infection has been identified as exceptionally high in the hospital where the study was conducted. This will be discussed in detail in Chapter 2. Several theatre staff members verbalised that adherence to the principles of surgical hand scrubbing, gowning and gloving is problematic, which was also observed by the researcher.

The surgical teams in the operating theatre and the management of the hospital share the responsibility to ensure adherence to infection control principles - the surgical teams to apply aseptic technique principles and the management to provide the necessary means, resources and policies.

Due to the high incidence of surgical site infection, the purpose of the study was to explore and describe the challenges experienced from the surgical teams perspective, as well as from the hospitals management's perspective to adhere to aseptic and sterile technique principles and infection control practices. It was assumed that once the

challenges are known, they can be addressed by appropriate strategies or interventions to ensure adherence to the infection control standards.

1.1 BACKGROUND AND RATIONALE

According to Phillips (2013:274), surgical hand scrubbing is the process of removing as many microorganisms as possible from the hands of the sterile surgical team members before wearing sterile surgical attire that consists of a sterile gown and sterile gloves. The antiseptics used for surgical hand scrubbing as well as the sterile surgical attire (gowns and gloves) should conform to agreed standards of infection control and principles of aseptic and sterile techniques to prevent contamination of both the surgical team and the patient during a surgical procedure (Weaving, Cox & Milton, 2008:1;Phillips, 2013:277).

The risk of surgical site infection stems not only from the patient's own natural flora but also from the transfer of microorganisms by the sterile surgical team. Subsequently, surgical hand scrubbing with an effective antiseptic of povidone and chlorhexidine alcohol significantly reduces the surgical site infection rate (Wascher, 2010:2; Dowson, 2008:1). Generally, surgical sterile gowns should be of non-woven and water repellent material, as bacterial contamination to a surgical wound is significantly lower when used during a surgical procedure (Reichman & Greenburg, 2009:216). Clyburn, (2011:n.p) has shown evidence regarding wound contamination when single and double gloving was compared. It was found that double gloving decreased the frequency of perforation and surgical wound contamination.

Surgical site infections account for the third most common reason for nosocomial infections (Lynch & Rosenthal, 2007:45; DeLissov, Murphy, Song & Vaughn, 2009:1). Surgical site infection rates in developing countries, especially in the Sub-Saharan region, are reported to range between 7-12% of nosocomial infections, which is higher than in developed countries where it ranges between 1-3% (Hyslop, Paul, Smeeth, Gosling & Hopper, 2008:4; Beck & Dunchin, 2011:56).

In Swaziland, the incidence of surgical site infections is exceptionally high and a major cause of post-surgical complications as it accounts for about 12-18% of hospital acquired infections in all regional hospitals in Swaziland (Swaziland National Infection Prevention and Control,2009:n.p).

Nack and Despande (2011:502) and Chavous (2010:n.p) reported that the incidence of surgical site infections may be heightened by lack of adherence to infection control principles, such as the principles of surgical scrubbing, gowning and gloving. Challenges such as shortage of resources and ignorant perceptions of infection control have been documented as some of the risk factors related to surgical site infection (Phillips, 2013:12).

According to Anderson-Manz and Gardner (2001:1) as well as Phillips (2013:271) the behaviour of the surgical teams regarding compliance of hand decontamination and surgical hand hygiene, aseptic and sterile techniques as well as universal precaution practices play an important role in the prevention of surgical site infection. McDonald and Evans (2008:n.p) stated that failure to adhere to sterile and aseptic techniques is reported to constitute as unprofessional conduct and violation of policies of the operating theatre, as well as jeopardizing the safety of surgical patients.

The reality though in the hospital where the study was conducted is that there is a high incidence of surgical site infection, which is 12-18% of acquired hospital infections(Swaziland National Infection Prevention and Control, 2009:n.p) and adherence to the principles of surgical scrubbing, gowning and gloving by the surgical teams is questionable. Some members of the surgical team conveyed that they faced certain challenges with regards to compliance towards infection control.However, the exact challenges were unknown. In addition, the researcher observed that a shortage of resources in this hospital might have greatly contributed to this problem. Members from the hospital management team indicated that they faced challenges in providing the means to ensure adherence. The surgical teams and hospital management might have experienced challenges regarding infection control practices and aseptic and sterile techniques that could be addressed, but the absence of data on challenges experienced by the surgical teams and hospital management made it difficult to address issues of

infection control. It was therefore deemed necessary to investigate the challenges faced by the surgical teams and management, regarding surgical hand scrubbing, gowning and gloving in the operating theatre.

1.3 PROBLEM STATEMENT

Healthcare associated infections, in particular surgical site infections, globally contribute to morbidity and mortality associated with surgery in all countries of the world and that represents a substantial burden of diseases (Gottrup, Melling & Hollarder, 2005:2). According to Hyslop, Paul, Smeeth, Gosling and Hopper (2008:4); and Beck and Dunchin (2011:56) the incidence of surgical site infections range between 7-12% of hospital acquired infections in Sub-Saharan countries in contrast with 1-3% in developed countries. Surgical site infections are a major healthcare problem in Swaziland and constitute 12-18% of nosocomial infections from all the regional hospitals (Swaziland National Infection Prevention and Control, 2009:n.p; Medical Records Report, 2012:n.p).

The Operating Theatre Annual Report (2012:n.p) of the hospital where the study was conducted indicated that the operating theatre performs on average 20 scheduled surgical procedures (minor and major) in a normal working-day (approximately 400 cases per month). This figure excluded emergency cases which were done on an ad hoc basis. The surgical procedures include orthopaedics, general surgery, obstetrics and gynaecology, ear, nose and throat, dental, neurology and ophthalmology.

According to the hospital's Medical Records Report of 2012 the surgical site infections that developed post-surgery were related to the respective disciplines as follows: orthopaedics . 22.7 %; general surgery - 31,8 %; obstetrics - 27,2 %; and 18,3 % from other surgical disciplines.

The reasons for the above mentioned infection rates are not clearly known, but members of the surgical teams mentioned that they face a number of challenges in adhering to the principles of infection control. Members of the hospital management

also indicated that they face challenges in providing the necessary means for adherence. It was against this background that this research was undertaken. It is assumed that the answer might be found in the challenges faced by the crucial role players in the process. If the challenges of these stakeholders are known, it might be possible to address them, which in turn might reduce the number of surgical site infections at the particular setting.

1.4 SIGNIFICANCE OF THE STUDY

Conducting this study in the operating theatre can be very valuable for the hospital management, surgical teams and the surgical patients by giving the surgical teams and management an opportunity to voice the challenges they face, regarding surgical scrubbing, gowning and gloving. Once the challenges have been identified they can be converted into solutions to address a particular problem in practice:

- The findings of the study might improve infection prevention and control practices and aseptic and sterile technique principles in the operating theatre during surgical scrubbing, gowning and gloving if the challenges are known and addressed.
- Surgical patients would significantly benefit, as there would be a decrease in the development of surgical site infections, therefore, reducing the morbidity and mortality rate.
- Findings might contribute to the development of infection prevention and control strategies and policies of the operating theatre that could be used nationally by other healthcare institutions in their operating theatres, in Swaziland.

1.5 RESEARCH QUESTION

The research question was as follows:

What are the challenges experienced by the hospital management and surgical teams regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre of a hospital in Swaziland?

1.6 AIM AND OBJECTIVES

1.6.1 Research Aim

Moule and Goodman (2009:74) describe the research aim as a description of exactly what issues the research intends to address. The aim of this research study is to explore and describe challenges faced by the surgical teams and hospital management regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre of hospital in Swaziland.

1.6.2 Research Objectives

The objectives of the study to answer the research question, were formulated as follows:

- To explore and describe challenges experienced by the surgical teams regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre.
- To explore and describe challenges experienced by the hospital management regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre.
- To make recommendations on how to address the challenges regarding surgical hand scrubbing, gowning and gloving in the operating theatre of hospital in Swaziland.

1.7 CONCEPT CLARIFICATION

1.7.1 Surgical Team

The surgical team comprises of sterile and non-sterile team members, these include the surgeon, assistant-surgeon, registered nurses (scrub and circulating nurses), anaesthetists and support staff who provide intra-operative care to a patient. The sterile team members include the surgeon, assistant surgeon and a scrub nurse who functions in the sterile field and wear sterile attire (Phillips, 2013:56), while the rest of the team members comprise the non-sterile team. In this study the researcher focussed on the sterile team members since they are the ones that perform the surgical hand scrubbing, gowning and gloving procedure in the operating theatre.

1.7.2 Management

The Business Dictionary (2010:n.p) and Kyalan City Life (2011:n.p) define management as a group of individuals that accept responsibilities to run an organisation by planning, organising and co-ordinating activities to achieve defined objectives.

In this study management refers to the most senior staff members of the hospital who are in authority and are expected to supply and fulfil the needs of the hospital departments. The hospital management included the hospital manager, hospital administrator, senior medical officer, the senior matron and operating theatre nurse managers. Their responsibilities include the approval of operating theatres, supplies and purchasing of equipment and supplies needed for surgical hand scrubbing, gowning and gloving procedure, to make sure that the supplies and equipment are always available in the operating theatre and to make sure the standards of care are adhered to.

1.7.3 Surgical Hand Scrubbing

This is the systematic washing and scrubbing of the hands and forearms of the surgical teams using specially developed techniques of mechanical and chemical action, by using the most effective antibacterial agent in order to render the skin of hands and arms free from microorganisms before performing a surgical procedure (The Newcastle Tyne Hospital, 2010:1; Phillips, 2013:267; Pirie, 2010:207). In this particular study surgical hand scrubbing refers to aseptic hand wash which is mechanical rubbing and chemical action of an antimicrobial solution which is an iodine solution.

1.7.4 Gowning

Gowning is an application or donning of a sterile gown by a scrubbed person (Phillips, 2013:267; Pirie, 2010:208). In this study gowning is done after surgical hand scrubbing, it refers to the drying of hands and arms with a sterile towel and then followed by donning of a sterile gown.

1.7.5 Gloving

Gloving refers to donning or application of sterile gloves to self or other members of the sterile team using different methods for instance open or closed, single or double gloving (Phillips, 2013:267; Pirie, 2010:209). In this study, gloving refers to the surgical teams donning or putting on two pairs of sterile surgical gloves (double gloving) over the cuffs of a sterile gown, before starting a surgical procedure.

1.7.6 Operating Theatre

An operating theatre is a unique setting removed from other hospital clinical departments. It is controlled geographically, environmentally and bacteriologically. It is restricted in terms of the inflow and outflow of staff, patients and visitors (Lewis, Kirksen,

Heitkemper, Butcher & Camera, 2011:351). The operating theatre applicable in this study is the theatre complex of the Hospital of Swaziland and is described in section 1.10.3.

1.7.7 Challenges

Challenges refer to a task or activity that needs a lot of skill, energy, mental or physical effort and determination to achieve or deal with successfully (McMillan Dictionary, 2009:n.p; Cambridge Dictionary-on-line, 2013:n.p). In this study challenges of the surgical teams and management refer to the tasks or activities faced that influence their ability to execute their duties effectively (the surgical hand scrubbing, gowning and gloving procedure).

1.8 PHILOSOPHICAL ASSUMPTIONS

Assumptions are principles or statements that are accepted as being true based on logic or reasoning without being scientifically tested (Polit & Beck, 2008:748; Burns & Groove, 2009:688). These assumptions guide and influence the researcher's investigation and implementation of the research process (Brink, 2006:22). The basic assumptions in this study are based on some entities of a paradigm dialogue described by Brink (2006:22), namely ontology, epistemology and methodology.

1.8.1 Ontological Assumptions

Ontology is the science of being or existence in relation to non-existence (LoBiondo-Wood & Haber, 2006:134). Ontology concerns the nature of reality whereby its existence is multiple, subjective and constructed by individuals (Polit & Beck, 2008:14). Kaddorura, (2010:510) states that ontology influences perception of the environment and people. In this study the researcher assumes that:

- The challenges of the surgical teams and management regarding surgical hand scrubbing, gowning and gloving in the operating theatre of a hospital do exist.
- The surgical teams and management are the best individuals to describe and explain their experiences of challenges regarding surgical hand scrubbing, gowning and gloving in the operating theatre of a hospital.
- Data obtained from surgical teams and hospital management will be subjected to the individual's (participants) own feelings, views and perspective.

1.8.2 Epistemological Assumptions

Epistemology is the theory of knowledge, it accepts and justifies what is believed to exist of the knowledge and truth of reality (Holloway & Wheeler, 1998:9). Epistemology is concerned with how we know and what constitute our knowing (LoBiondo-Wood & Haber, 2006:134). In this study, the researcher assumes that:

- The surgical teams and the management have adequate knowledge on challenges regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre of a hospital, therefore, these are the key individuals to participate in this study and share their experiences.
- Conducting the study in the operating theatre allowed the researcher to know and get close to the participants (surgical teams and managers). This allowed the researcher to get more information through in-depth interviews and interaction with the surgical teams and hospital management regarding their experiences and challenges related to surgical hand scrubbing, gowning and gloving in the operating theatre.
- In this study, the findings therefore revealed a true reflection in words of their experiences of challenges in the operating theatre of the hospital regarding the surgical hand scrubbing, gowning and gloving procedure.

1.8.3 Methodological Assumptions

Polit and Beck (2008:14) define methodological assumptions as an inductive process and the beliefs regarding the process of obtaining knowledge and the best evidence about the phenomena on human experiences and perceptions in context. In this study, the researcher assumed that:

- The researcher was able to understand the truth of the challenges experienced by the surgical teams and the management in the operating theatre regarding the surgical hand scrubbing, gowning and gloving procedure.
- Since the study is contextual, conducted in the operating theatre, the surgical teams were able to yield in-depth, rich information that emerged insights regarding the surgical hand scrubbing, gowning and gloving procedure.
- By using the qualitative research method to explore and describe the challenges of the surgical teams and the hospital management, participants were enabled to express their feelings, experiences, and reality of truth regarding surgical hand scrubbing, gowning and gloving procedures in the particular hospital.
- The findings of the study were only applicable to the surgical teams and hospital management of the operating theatre of the Hospital and might be transferred to other operating theatres of Regional Hospitals, though it is not the purpose of the study.

1.9 DELINEATION

The study aimed at exploring and describing challenges experienced by the surgical teams and the hospital management in the operating theatre of the Hospital in Swaziland. Therefore, the target population of the study was the hospital management, the operating theatre nurse managers, the surgical teams, which comprised of the registered nurses and surgeons working in the operating theatre. Findings of the study were relevant to the hospital in Swaziland. The purpose of the study was not generalisation to any other setting, but transferability might be possible.

1.10 QUALITATIVE RESEARCH DESIGN

Qualitative research methods deal with human complexity by exploring and understanding human experiences, while recognising the importance of holistic, subjective and narrative material (Polit & Beck, 2008:17). In this study the researcher will explore and describe in context the challenges experienced by the surgical teams and hospital management in the operating theatre of the Hospital in Swaziland regarding surgical hand scrubbing, gloving and gowning. The design used is explorative, descriptive and contextual of nature.

1.10.1 Explorative Research

Explorative research investigates the full nature of the phenomenon in which it is manifested, related and on underlying processes (Polit & Beck, 2008:21). This study attempted to systematically explore the challenges of the surgical teams, hospital management and operating theatre nurse managers regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre of the Hospital.

1.10.2 Descriptive Research

Descriptive research describes dimensions, variations and importance of phenomena. The in-depth explorative nature of qualitative research is a suited test of answering questions about the phenomenon (Polit & Beck, 2008:19). In this study a description will be given of the challenges of the surgical teams and management regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre of the Hospital.

1.10.3 Contextual Design

According to LoBiondo-Wood and Haber (2010:87) and Brink (2006:113), a study is said to be contextual when the study environment influences the outcome of the study as it focuses on natural settings where people live and activities that take place, bring

meanings, understandings and beliefs of human experience from the viewpoint of the participants (the surgical teams and the hospital management).

This study was conducted in the main operating theatre of a hospital in Swaziland. The Hospital's operating theatre caters for various surgical procedures. The operating theatre has different departments, namely the main operating theatre which has three operating rooms where clean and septic major surgical procedures are performed, septic theatre for infected minor surgical procedures, and the maternity theatre situated within the maternity suite, where obstetric surgical procedures are performed. In addition there is the central sterilization and supply department where surgical instruments, linen and supplies are processed for sterilization, stored and dispersed to all theatres, as well as to other hospital departments. The recovery room is also part of the operating theatre.

The operating theatre has both specialized and non-specialized multidisciplinary team trained in necessary skills to achieve an efficient surgical service, which comprises of two nurse managers, thirteen registered nurses, fourteen nurse anaesthetists and one anaesthetist medical officer, nine specialist surgeons, two or three medical officers per surgical discipline, intern medical officers and nurse anaesthetist, medical and nursing students and eleven support staff. Both maternity and main theatre staff cater for maternity theatre.

The operating theatre provides services 24 hours through an on-call and shifting system of personnel. Surgical procedures are performed by surgeons within six different surgical disciplines which are scheduled in the operating theatre on different days. Surgical disciplines include orthopaedics, general surgery, obstetrics, gynaecology, ear, nose and throat, dental, neurology and ophthalmology. Emergency surgical procedures are catered for at any time of the day or night.

The surgical suite is divided into three designated zones or areas that are defined by the physical activities performed in each area. Increasing environmental controls and surgical attire as progression is made from unrestricted to restricted areas decreases

the potential for cross-contamination and surgical site infections (Phillips, 2013:258; Young & Regan 2009:526).

The unrestricted area includes the central control point established to monitor the entrance of patients, personnel, and materials. Street clothes are permitted in this area and traffic is not limited, this includes the patient receiving, holding and discharge area (Sapna, Majumdac & Venkatesh, 2011:9).

The semi-restricted area include the peripheral support areas of the surgical suite. This area includes storage areas for clean and sterile supplies, work areas for Central Processing, scrub sinks and corridors leading to the restricted areas of the surgical suite. Personnel is required to wear surgical attire and cover all head and facial hair (Sapna, et al, 2011:6; Phillip, 2013:178).

The restricted area only authorized personnel are allowed which include the surgical teams, both sterile and unsterile team members. All doors must be kept closed except as needed for passage of equipment, personnel, and patients. The restricted area includes the operating rooms, procedure rooms and clean core areas. Proper surgical scrub attire is mandatory in the restricted areas. All staff traffic to and from an operating room moves via the sub-sterile door. Talking and the number of personnel allowed to enter the operating room, especially with a surgical procedure in progress, will be kept to a minimum (Phillips 2013:178; Young & Ragan, 2009:259).

This study is contextual in the sense that it takes place in a normal situation of a work place which is the operating theatre complex, the scrub room where surgical hand scrubbing is performed and a gowning area for gowning and gloving. The operating theatre is where the surgical teams and the operating theatre nurse managers actually face challenges on a daily basis when performing the surgical hand scrubbing, gowning and gloving procedure. This is the area where surgical procedures are performed and is an exceptionally high risk area for introducing surgical site infections if practices of infection control and aseptic and sterile techniques are not adhered to. Since this study is qualitative, the findings will be viewed, used, and applied within the context as suggested by LoBiondo-Wood and Haber (2010:131).

The aim of this research study was to explore and describe challenges of the surgical teams and the hospital management during surgical hand scrubbing, gowning and gloving procedure in the operating theatre. The researcher hoped to accomplish three objectives of which the methodology is discussed below.

1.10.4 Objective 1: Challenges experienced by surgical teams

The first objective was to explore and describe challenges experienced by the surgical teams regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of the Hospital.

1.10.4.1 Population

Population is the group of people that are of interest and feasible to the researcher that meets the criteria of the research study (Brink, 2006:123; Burns & Grove, 2009:344). In this objective of the study the population was the healthcare personnel comprising of the sterile surgical team members in the operating theatre of the hospital in Swaziland. The population was chosen because they were the persons working closely with surgical patients in the operating theatre and who are responsible for hand scrubbing, gowning and gloving as part of infection control measures in the operating theatre.

1.10.4.2 Sampling

Sampling is the process of selecting a portion of the population to represent the entire population, so that inferences about the population can be made (Polit & Beck, 2008:339). The population from which the sample was chosen from should be knowledgeable and/or having been affected by the topic of the study (Brink 2006:132). Since this study is of a qualitative nature, the researcher used a non-probability, purposive sampling method as the researcher was confident that the subjects (sterile surgical teams) had adequate knowledge about the topic as they had been affected and had experienced the challenges regarding surgical hand scrubbing, gloving and gowning in the operating theatre of the Hospital.

The surgical team members were selected from all the surgical disciplines at the particular hospital (orthopaedics, general surgery, obstetrics, gynaecology, ear, nose and throat, dental, neurology and ophthalmology). The sample was chosen from a population of thirty six surgical teams which included surgical specialists, assistant surgeons (medical officers) and scrub nurses (registered nurses).

Inclusion criteria for the study:

- Sterile surgical teams which consist of surgeons, assistant surgeons and scrub nurses (registered nurses);
- Sterile surgical teams who participated voluntarily with signed informed consent to the study.

The exclusion criteria:

- Operating theatre healthcare personnel who does not function in the sterile area during intra-operative care, such as anaesthetists and anaesthetic nurses, as they do not participate in surgical scrubbing, gowning and gloving procedure and do not have direct contact with the surgical sites;
- The surgical team members who were not willing to participate in the study.

1.10.4.3 Data collection

The surgical teams were first sensitised about the research study by the researcher who introduced the topic in the Continuous Medical Education (CME) meeting where all surgical teams with Heads of Departments meet once a week and further invited the surgical teams to participate in the study. This was done a week before data collection commenced.

Focus group interview was used to collect data from the surgical teams that were initiated by a set of semi-structured open-ended questions (Annexure 5). There were two focus group interviews done for the surgical teams which consisted of specialist surgeons, assistant surgeons and scrub nurses (registered nurses). The surgical teams were chosen from all surgical disciplines in the operating theatre.

The interview was conducted in the conference room; as this venue was a neutral and comfortable place for all the participants. The researcher conducted two focus group interviews of the surgical team members on separate days and on different times of the day. The first focus group interview took place towards midday at 11:30am and had eleven members of the surgical teams. The second group interview had ten members of the surgical teams, and the interview was conducted in the morning at 9am. Both interviews lasted for one and a half hours. Different times of the day were selected to prevent the time factor to have an effect in obtaining rich in-depth information from the surgical teams.

The researcher facilitated the sessions. Polit and Beck (2008:392) indicated that qualitative research does not have a specific set of questions to be asked in a particular pattern, order or worded in a given way. Therefore, the researcher used an interview schedule that started with an introduction, general questions and the topic (Annexure 5) while allowing the participants to tell their stories in a conversational fashion without being interrupted. The researcher tried to solicit input from all team members and did not allow vocal members to dominate the discussion (Polit & Beck, 2008:395). The researcher used a nurse educator who had an understanding of research to assist in data collection, by recording observational field notes and some responses of the surgical teams while the researcher conducts the interview sessions during the focus group discussion. Voice recorders were used to capture all the discussions without interference and note taking of field notes was recorded on note pads.

1.10.4.4 Data analysis

Data organization and analysis give meaning to data and preserve the uniqueness of the participants' experience while enhancing an understanding of the phenomena (Burns & Grove, 2009:695). Polit and Beck (2008:763) indicated that data analysis involves the interpretation of narrative data for the purpose of discovering important underlying themes, categories and patterns of relationships. Data analysis requires researchers to carefully scrutinize data in order to obtain a deeper insight. Creativity, conceptual sensitivity and sheer hard work are involved in data analysis. In this study,

the data obtained from the surgical team members was analysed by means of content analysis, which is analysis of narrative data to identify emerging prominent themes as described by Polit and Beck (2008:517).

Data analysis was done by first transcribing the data, which was about listening to audio tapes and reading the field notes over and over to make sure they were accurate and valid. Symbols were allocated on transcripts for example %R+ for participants and %R+ for researcher, and established meaningful segments and units during the analysis.

The data was then organized by developing and classifying category schemes, which were then coded into categories and clusters of concepts and themes and subthemes. Breaking the data into segments and comparing them for similarities and dissimilarities to determine the meaning of the phenomena.

Once category schemes have been developed data was again read, carefully scrutinised and coded for correspondence in categories. Data was organized and analysed manually. Copies of the transcripts were kept in lockable filing cabinets in the researcher's personal office, accessible to the researcher only, while the original copy will be kept safe at the University of Pretoria.

1.10.4.5 Data interpretation

Interpretation and analyses of qualitative data occurs simultaneously, thus, data interpretation requires a more critical synthesis and a higher level of thinking (Polit & Beck, 2008:529; Burns & Grove, 2009:523). The data was interpreted whilst reading, categorizing and coding, and then unified the themes and subthemes that merged to interpret the meanings of the data obtained from the surgical teams. Once the data analysis and interpretation was complete, the researcher ensured that member checking was done which involved a group of the surgical teams who participated in the study to confirm the researcher's interpretation of the results and if it reflected the true meaning of the interview.

1.10.5.Objective 2: Challenges experienced by the hospital management

The second objective was to explore and describe the challenges experienced by the hospital management regarding the surgical hand scrubbing, gowning and gloving procedure in the operating theatre.

1.10.5.1 Population

In this objective of the study the population was the hospital management of the particular hospital in Swaziland. In this study, the hospital management included the hospital manager, senior matrons, senior medical officers and the hospital administrator and operating theatre nurse managers.

The population was chosen because the participants are responsible for the provision of all necessary equipment, supplies and other necessities needed by the surgical teams for proper execution of surgical hand scrubbing, gowning and gloving procedures.

1.10.5.2 Sampling

Since this study is a qualitative research design, the researcher used a non-probability, purposive sampling method because the operating theatre nurse managers are the ones responsible for the smooth running of the operating theatre and making sure that all the equipment and supplies are available for the surgical hand scrubbing, gowning and gloving procedure. The hospital management is responsible for providing all the hospital departments, including operating theatre, with appropriate equipment and supplies to cater for the departments needs.

Therefore, the hospital management where the study was conducted were included as participants. The researcher conducted one focus group interview with the hospital management which was held when most of the members were available. The focus group included six hospital management members, which consisted of the two senior

medical officers, two senior matrons, hospital administrator and one operating theatre nurse manager.

Inclusion criteria for the second objective of the study:

- Operating theatre nurse managers;
- Senior hospital management, which is the hospital manager, senior matrons, chief medical officer and the hospital administrator;
- The hospital management members who participated voluntarily with a signed informed consent to the study.

The exclusion criteria:

- Nurse anaesthetists managers;
- Nurse managers from other hospital departments;
- The hospital management and operating theatre nurse managers who did not want to participate in the study.

1.10.5.3 Data collection

A focus group interview was conducted in the board room of the hospital which was a neutral and comfortable place for the hospital management. The data collection procedure used is similar to that described in Objective 1 (section 1.10.4) the same interview schedule was used and is attached in Annexure 5.

1.10.5.4 Data analysis

The data organization and analysis procedure was done in the same way as of the surgical teams data organisation and analysis. Member checking was done with three members of the hospital management who attended the focus group interview.

1.10.5.5 Data interpretation

Data interpretation was done similarly to that of the surgical teams.

1.10.6 Objective 3: Recommendations to address the challenges

In this objective the researcher made recommendations to address the challenges experienced by the surgical teams and hospital management regarding the surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland. The recommendations made were based on the results obtained from the previous objectives, as well as literature control. Member checking helped the researcher obtain the reaction of the surgical teams and hospital management about the interpretations of emerging themes and subthemes whether they were a true representation of the participants' realities.

1.11 TRUSTWORTHINESS

Trustworthiness is the degree of confidence, stability, objectivity and generalization that qualitative researchers have in their data. If the data is accurate, it will represent the experience of the surgical teams and the hospital management regarding challenges related to hand scrubbing, gowning and gloving procedures. Trustworthiness is measured by credibility, transferability, dependability, confirmability and authenticity (Polit & Beck, 2008:539). The central feature of these efforts is to confirm that the findings accurately reflect experiences and viewpoints of the participants (Polit & Beck, 2008:71). These gauges of trustworthiness are generative techniques that support emerged rigor (Vilakati, 2003:12; Polit & Beck, 2008:539). The researcher used these quality criteria for trustworthiness on the data collected and the findings of the surgical teams and the hospital management according to recommendations of Polit and Beck (2008:539). The criteria of trustworthiness are elaborated on in chapter three.

1.12 ETHICAL CONSIDERATIONS

Polit and Beck (2008:753) state that ethical considerations refer to the system of moral values that is concerned with the degree to which research procedures adhere to professional, legal and social obligations to the study participants. These ethical considerations towards the surgical teams and the hospital management included

information from data collection, analysis and findings. The researcher had trust, honesty and respect for the surgical teams and hospital management's autonomy.

The basic rights of participants are the rights to confidentiality, privacy, and the right to protection, not to be harmed in any manner, the right to withdraw from the study, informed consent and dissemination of results (Mouton, 2006:243). The researcher adhered to these basic rights of ethics when conducting the study, as described in detail in chapter three.

1.13 CONCLUSION

In this chapter, the researcher described the background and overview of the study, the problem statement, key concepts, assumptions, aim and objectives of the study, research methodology, trustworthiness as well as the ethical consideration taken into account during the research study. The next chapter will be on the review of literature.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter is an overview of the research study that describes and outlines the background and the framework that was undertaken when conducting this study on challenges of the hospital management and the surgical teams regarding surgical hand scrubbing, gowning and gloving in the operating theatre. This chapter describes literature that explains surgical hand scrubbing, gowning and gloving, the prevention of surgical site infections, aseptic techniques and sterilization.

2.2 SURGICAL SITE INFECTIONS

Infection has always been a feature of human life and sepsis in modern surgery and continue to be a significant challenge for the surgical teams in healthcare facilities all over the world (Gottrup, Melling & Hollander, 2005:2). Surgical site infections are a major healthcare problem throughout the world as they are the third most common nosocomial infection (Lynch & Rosenthal, 2007:45; DeLissovoy et al., 2009:1) and contribute to approximately 7-12% of nosocomial infections in developing countries in the Sub-Saharan region (Hyslop et al, 2008:4; Beck & Dunchin, 2011:56).

Surgical site infections refer to infections that occur in a wound following an invasive surgical procedure within 30 days after the surgical procedure and up to a year if an implant device was placed. Infection might involve skin and subcutaneous tissue, deep soft tissues and any part of the anatomy (body organs) which were opened or manipulated during the surgical procedure (Welsh, Timberlake & Ross, 2008:1; Horan, Gayness, Martone, Javis & Emori, 2008:n.p).

A surgical site infection according to Nack and Deshpande (2011:502) and Chavous (2010:1) is an infection that is acquired in the hospital, is associated with an extended

length of hospital stay, pain, discomfort and sometimes prolonged or permanent disability. Surgical site infections can be associated with any type of surgical operative procedures from all the surgical disciplines, such as orthopaedics, general surgery, obstetrics, gynaecology, ear, nose and throat, neurology and dental (DeLissovoy et al, 2009:1; Chavous, 2010:1). These infections represent a significant burden in terms of surgical patient morbidity and mortality, as well as drastically escalated expenses for both the patient and the institution and higher rates of hospital readmission (Reichman & Greenburg, 2009:213; Gottrup et al., 2005:1).

Meanwhile, potential sources of surgical site infections include the surgical team, surgical instruments, and circulating air in the operating theatre, the patient's physical condition and contaminated wounds arising from trauma. However, these known causes of surgical site infections are complex and no simple solution is capable of eliminating all cases of surgical site infections (Beck & Dunchin, 2011:56). In operating theatres, human hands are widely used and are considered the most important tool. They are utilized to cure and diagnose as they are placed upon each surgical patient who is hoping for answers and healing remedies (Anderson-Manz & Gardner, 2001:1). Yet, the skin of the hands and forearm is a major potential source of microbial contamination in the surgical environment and to the surgical patient (McDonald & Evans, 2008:n.p).

Surgical site infections are a major health problem throughout the world, as 3-5% of all surgical patients develop infection. On average, surgical patients who develop surgical site infections usually remain in hospital for an additional week or more and some surgical patients come back to the hospital as readmissions. Surgical patients who develop surgical site infection are 40- 60% more likely to be admitted to the high care unit and intensive care units and they are more likely to die compared to those who did not develop surgical site infection (Wascher, 2010:2).

Another detriment of surgical site infection is the influence in causing a financial burden to both the surgical patient and the healthcare institution, as the patient has to pay extra costs for the hospital stay and treatment, time off work and societal loss of productivity. Additionally, surgical site infections cost lives, reduce quality of life and results in the

loss of productivity (Wascher, 2010:2; Lyn & Rosenthal, 2007:45; Reichman & Greenburg, 2009:214).

2.2.1 Causes of Surgical Site Infections

There are multiple factors that contribute to development of surgical site infections, which can be classified into intrinsic and extrinsic factors. Extrinsic factors include factors like skin preparation, surgical hand scrub, antimicrobial prophylaxis, hair removal, surgical skill and techniques, operating time, and environmental control. Intrinsic factors are the patients' previous health status prior to admission that the healthcare providers do not contribute to and cannot control (Oklahoma Preventive Collaborative, 2009:2).

Nack and Deshpande (2011:502) state that surgical site infections are caused by exogenous and endogenous microorganisms that enter the operating wound during the course of the surgery. Exogenous sources of surgical site infection pathogens include surgical personnel (especially the surgical teams), the operating theatre room environment, instruments, linen and supplies used in the sterile fields during the operation (Weibel, 2012:2). Endogenous sources of surgical site infection pathogens are from the patient's skin, mucous membranes or hollow viscera when the skin and mucous membranes are incised, the exposed tissues are at risk of contamination with endogenous flora which includes aerobic bacteria and gram negative bacilli such as E-coli (Oklahoma Prevention Collaborative, 2009:2; Weibel, 2012:9).

2.2.2 Classification of Surgical Wounds

Gottrup, Melling, and Hollander (2005:3), described the rates of surgical site infection according to the degree of microbial contamination. This system of surgical wound classification is being used widely to assist and predict the rate of infection after surgery (Wascher, 2010:2) as shown in table 2.1

Table 2.1: Classification of Surgical Wounds based on Degree of Microbial Contamination

Classification	Criteria
Clean	Elective, not emergency, non-traumatic, primarily closed, no acute inflammation; no break in sterile technique, respiratory, gastrointestinal, biliary and genitourinary tracts not entered;
Clean-contaminated	Urgent or emergency case that is otherwise clean; elective opening of respiratory, gastrointestinal, biliary or genitourinary tract with minimal spillage (e.g. appendectomy) not encountering infected urine or bile; minor technique break.
Contaminated	Non-purulent inflammation; gross spillage from gastrointestinal tract; entry into biliary or genitourinary tract in the presence of infected bile or urine; major break in technique; penetrating trauma - 4 hours old; chronic open wounds to be grafted or covered.
Dirty	Purulent inflammation for example abscess preoperative perforation of respiratory, gastrointestinal, biliary or genitourinary tract; penetrating trauma of more than 4 hours old.

Table 2.1 by Wascher, 2010:2

Additionally, it is significant to classify the degree of contamination of the surgical wound according to the source of infection, where it was introduced, the type of wound, pathological findings, anatomical location or a break in aseptic and sterile technique. Milan (2009:2) and Gottrup et al, (2005:5) defined surgical site infections according to anatomical position or location as indicated in table 2.2.

Table 2.2: Surgical Site Infections According to Anatomical Position or Location

<p>Superficial Incision Surgical Site Infection</p> <ul style="list-style-type: none"> • Infection occurs within 30 days of the operation • Infection involves only skin or subcutaneous tissue • At least one of the following: <ul style="list-style-type: none"> - Purulent drainage - Positive culture from the incision - Symptoms of infection (pain or tenderness, localized swelling, redness, heat) and incision is opened by surgeon, unless incision is culture-negative, or - Diagnosis of surgical site infection by surgeon or attending physician.
<p>Deep Incision Surgical Site Infection</p> <ul style="list-style-type: none"> • Infection within 30 days of the operation if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operation; • Infection involves deep soft tissues • At least one of the following: <ul style="list-style-type: none"> - Purulent drainage from the deep incision but not from organs/spaces associated with the surgical site; - Spontaneous dehiscence of deep incision or deliberate opening by a surgeon when the patient has at least 1 symptom of infection (fever, localized pain, or tenderness); unless site is culture-negative; - Abscess or other evidence of infection involving the deep incision found on direct examination, during reoperation, or by histopathology or radiography, or diagnosis of surgical site infection by surgeon or attending physician.
<p>Organ/Space Surgical Site Infection</p> <ul style="list-style-type: none"> • Infection with 30 days of the operation if no implant is left in place or within 1 year if implant is in place and the infection appears to be related to the operation; • Infection involves any part of the anatomy (e.g. organs or spaces); other than the incision, which was opened or manipulated during an operation. • At least one of the following: <ul style="list-style-type: none"> - Purulent drainage from drain placed into the organ/space - Positive culture of fluid or tissue from the organ/space - Abscess or other evidence of infection involving the deep incision found on

direct examination, during reoperation, or by histopathology or radiography or
 - Diagnosis of surgical site infection by surgeon or attending physician

Table 2.2 by Milan 2009:2 and Gottrup, Melling & Hollarder 2005:5

2.3 INFECTION CONTROL PRACTICES

The surgical team needs to adhere to standards that are scientifically accepted towards preventing and controlling infection aseptic and sterile techniques that are appropriate to the operating theatre procedures. Such techniques are based on scientific principles and methods that are carried out primarily to prevent the transmission of microorganisms and contamination of the surgical site by ensuring that only uncontaminated items come into contact with the surgical site. Aseptic technique principles and infection control practices also encourage the use of antimicrobial solutions to disinfect the skin of the surgical patient and hands of the surgical team before commencement of the surgical procedure (Calderdale & Huddersfield, 2008:2; Phillips, 2013:25).

Moreover, the surgical team is expected to be competent when performing a surgical hand scrub, gowning and gloving, regardless of their expected roles during a surgical procedure. Their application of proper infection control practices and aseptic and sterile technique principles when performing operating theatre procedures should reveal self-confidence, proficiency, interest, authority and technical knowledge and skill (Phillips, 2013:11; McDonald & Evens, 2008:n.p). Poor adherence to the aseptic techniques may result in adverse effects in the success of infection control of the entire surgical team. Therefore, each surgical team member is required to exert an effort towards attainment of the common goal of competency and safety of surgical patients from surgical site infections (Phillips, 2013:12).

Hands play an important role as a source of surgical site infections, therefore, surgical hand hygiene and hand decontamination is the most important strategy and a contributor for preventing and reducing nosocomial infections. The hands of the surgical team have to be decontaminated by an appropriate method, before and after patient

contact, with inclusive of completion of a surgical procedure (Rainer & Russ, 2005:2; Cox & Milton, 2008:n.p).

Furthermore, there should be adherence to aseptic and sterile technique, which refers to the methods by which microorganisms is contained in the environment ~~without dirt~~ and ~~absence of microorganisms~~ (Phillips, 2013:253), also called a clean technique as items are cleaned, decontaminated, disinfected or terminally sterilized (Calderdale & Huddersfield 2010:4). Sterile technique incorporates the process of sterilization and disinfection, environmental controls and infection practices and that are associated with asepsis to a higher and controlled degree. In sterile technique all microorganism must be maintained in an irreducible number (Phillips, 2012:254; Malan, 2009: 33). The principles of sterile technique are mandatory for the safety of the surgical patient and personnel during surgery, which are summarised in Table 2.3 based on the descriptions by Malan (2009:34).

Table 2.3: Principles of Sterile Technique

Principle	Description
Only sterile items are used within a sterile field	Every person who dispenses sterile items to the sterile field must be sure of its sterility. If in doubt of sterility, it must be considered unsterile. Contaminated items should not be transferred to a sterile procedure. If a sterilized pack is found in a contaminated area it is considered to be unsterile.
Sterile personnel wear sterile gowns and gloves.	Gowns are considered sterile from the chest to the level of the sterile field at the table and from the elbows to the cuffs of the sleeves. Only the front part of the gown is considered sterile. Self-gowning and gloving is done on a separate table away from the sterile surfaces. Sterile persons must keep their hands in sight and above the waste and away from the face.
Sterile tables are sterile only at table level	Only the top of a sterile draped table is considered sterile. Edges and sides of the drape extending below table level is considered contaminated. Anything that falls below the table level is considered unsterile.

Principle	Description
<p>Sterile personnel should touch only sterile items or areas. Unsterile personnel cannot touch any sterile items or areas</p>	<p>Only sterile surgical team members that are gowned and gloves are allowed to maintain contact with sterile field. Unsterile team members do not directly contact the sterile field.</p> <p>Supplies are brought to sterile members by a circulating nurse and apply a sterile transfer to the sterile team member to the sterile field.</p>
<p>Unsterile persons avoid reaching over the sterile field and sterile persons avoid leaning over an unsterile area.</p>	<p>An unsterile person may not reach over the sterile field to transfer a sterile item. The sterile team members must remain within the sterile field.</p>
<p>The edges of anything that encloses sterile contents are considered unsterile</p>	<p>The inside of a sterile wrapper is only considered sterile within 1 inch of the edges. Sterile persons lift contents from packages by reaching down and lifting them straight up, holding their elbow straight high. If a sterile wrapper is used to cover the tape, it should cover the entire table surface.</p>
<p>The sterile field is created as close as possible to the time of use</p>	<p>The sterile field is created and table is set just before the commencement of the surgical procedure. This is because the degree of contamination is proportionate to the length of time that sterile items are exposed to the environment</p>
<p>Sterile areas are continuously kept in view</p>	<p>Sterile personnel should always face the sterile field and vigilance must be maintained of the sterile set and field</p>
<p>Sterile persons keep well within a sterile area</p>	<p>Sterile persons must allow a wide margin of safety when passing unsterile area, and they pass each other at back to back at 360 degrees turn. Movement within a sterile field is kept to a minimum to avoid contamination</p>
<p>Sterile personnel keep contact with sterile areas to a minimum</p>	<p>Sterile personnel should not lean on sterile tables or on drapers</p>
<p>Unsterile personnel avoid sterile areas</p>	<p>Unsterile persons must maintain a distance of about 30cm from the sterile field and should not walk between sterile fields. Again unsterile persons face and observe a sterile field when passing it to avoid contamination</p>
<p>Destruction of the integrity of microbial barriers results in contamination</p>	<p>A sterile package or drape's integrity is destroyed by perforation, puncture or strike through. Strike through means that moisture soaks through the unsterile layers to</p>

Principle	Description
	sterile layers or vice versa of the package. Thus it leaves the package unsterile and contaminated.
Microorganism must be kept to an irreducible minimum within the operating room	Strict aseptic and sterile technique should be adhered to. Surgical site should be cleaned with mechanical and chemical surgical scrub of hands and arms of sterile members and of the patient's surgical site. Wearing of sterile gowns and sterile gloves and the use of personal protective equipment is compulsory. Movement in the operating theatre must be kept to a minimum to avoid turbulence.

Table 2.3 by Malan 2009:34.

2.4 ANTIMICROBIAL AGENTS

There are a number of antimicrobial soaps used for a surgical hand scrub in the operating theatres. However, the variation in effectiveness of antimicrobial cleansing process is considered in terms of bio burden, mechanical and chemical factors, and individual differences in skin flora (Phillips 2012:275). When members of the surgical teams use a non-antimicrobial scrubbing agent, the bacteria rapidly multiply under surgical gloves, causing surgical site infections (McDonald & Evans, 2008:n.p; Phillip, 2013:279).

Antiseptic scrubbing agent is applied with friction on wet hands and arms to remove dirt, transient and residential microorganisms (International Federation of Perioperative Nurses, 2005:n.p). Antiseptics alter the physical or chemical properties of microorganisms' cell membrane and thus, destroying or inhibiting cellular function (Phillips, 2012:275). The most effective antiseptics that have become popular for use for surgical hand scrubbing and skin preparation are iodine, chlorhexidine and alcohol (Woodhead et al, 2003:10).

Surgical scrub antimicrobial agents come in many forms of which liquid or foam soap are the most used products, but can also be a dry brush or sponge, impregnated

brushes or sponges preloaded with antimicrobial agent and a brush free surgical scrub agent with water (Anderson-Manz & Gardner, 2001:2).

2.4.1 Characteristics of Antimicrobial Agents

Performance characteristics for surgical hand scrubbing agents generally fall into four categories. Anderson-Manz and Gardner (2001:2) and Queensland Health (2010:3) described performance characteristics for surgical hand scrubbing agent as follows:

Antimicrobial action: An ideal agent would have a broad spectrum of antimicrobial activity against pathogenic organisms and has to work rapidly to provide adequate bacterial reduction before being rinsed off.

Persistent Activity: An agent with persistent activity keeps the bacteria low underneath the gloves.

Safety: The ideal agent has to be non-irritating and non-sensitive with no appreciable ocular or toxicity, safe to use on the body and not damaging to the skin or environment.

Acceptance: An agent must achieve compliance and be accepted by the surgical teams.

A comparison table for skin antiseptics that are widely recommended for a surgical hand scrub and pre-operative skin preparation for prevention of surgical site infections was made by Queensland Health (2010:2), as indicated in Table 2.4.

Table 2.4: The Comparison Table of Surgical Hand Scrubbing Antiseptics

Antiseptic agent	Spectrum of activity	Residual effect	Time and use	Comments
Iodophors	Broad spectrum Ineffective against	Minimal	3 . 5 minutes used for skin pre-operative	Iodophors are very irritating to the skin None staining

Antiseptic agent	Spectrum of activity	Residual effect	Time and use	Comments
	enteroviruses		and surgical hand scrub	Avoid use in neonates and mucous membranes
Chlorhexidine	Broad spectrum Good gram positive activity	Excellent	3 . 5 minutes Used for skin pre-operative preparation Surgical hand scrub	Safe for neonates and mucous membranes Ototoxicity if instilled into middle ear
Triclosan	Broad spectrum Ineffective against paeruginosa	Excellent	3 . 5 minutes Used for anti-bacterial hand hygiene only	Slow to become effective Non-toxic It is neither indicated nor suitable for use as a surgical scrub
Alcohol	Broad spectrum	None	Rapid activity may be used for skin pre-operatively prior to prevent infection Can be used for surgical hand scrub	Alcohol is non-toxic but has a drying effect on skin

Table 2.4 Adapted from Queensland Health2010:2

Alcohol-based solutions are an effective and probably most commonly used scrubbing agent. The selection should be based upon the solution that provides persistent, cumulative activity and has broad-spectrum antimicrobial properties that denature proteins of microorganisms. It also should be approved by the hospital management and infection control personnel. Solutions that contain 60%-95% alcohol are the most effective (Anderson-Manz & Gardner, 2001:4; Clyburn, 2011:n.p).

Nevertheless, alcohols have rapid activity when applied to the skin alone and do not have a persistent, cumulative activity compared to when combined with another scrub solution. Therefore, if an operating theatre adopts the use of alcohol, it is highly advisable that the agent should be a combination of alcohol and another scrubbing agent (Anderson-Manz & Gardner, 2001:4; Dowson, 2008:7).

2.4 SURGICAL HAND SCRUBBING, GOWNING AND GLOVING PROCEDURE

The purpose of surgical hand and arm hygiene is to remove or deactivate soil, debris, natural oil, hand lotions and transient microorganisms from nails, hands and forearms of the surgical team and to also reduce the resident microbial count to a minimum and inhibit rapid rebound growth of microorganisms (International Federation of Peri-operative Nurses, 2005:n.p).

A sterile surgical gown is worn to permit the wearer to enter the sterile field, prevent inter-contamination between the wearer, the sterile field and the surgical site (Phillips, 2013:272). Phillips (2013:272) and Reichman and Greenburg (2009:217) emphasise the importance of gloving in the prevention of surgical site infections.

2.4.1 Surgical Hand Scrub

The Recommended Standards of Practice for Surgical Hand Scrubbing procedure was designed and recommended by the Association of Surgical Technologists(2008:n.p) to guide the surgical teams while performing surgical scrubbing, gowning and gloving

procedure in the operating theatre. The purpose of the standards is to provide an outline that the surgical teams in the operating theatre can use to develop and implement policies and procedures for performing the surgical scrub. These standards can be subdivided into seven categories, as indicated in the following insert:

Insert 2.1: Standard of practice of surgical hand scrubbing procedure

Standard of Practice I

The surgical scrub should be performed by all members of the sterile surgical team, who will be donning a sterile gown and gloves.

Standard of Practice II

The fingernails should be kept clean, not extended beyond the fingertips and artificial nails should not be worn as well as no nail polish. Skin should be inspected for cuts and abrasions prior to scrubbing. All hanging jewellery should be removed.

Standard of Practice III

The scrub solution dispensing containers should be a closed container that is maintained and in working condition. The scrub solution dispensing containers should have a lid. The use of single-use containers is recommended, and they should be discarded when empty according to the healthcare facility policy. If reusable containers are used, they should be evaluated prior to purchase to check if they are easy to clean, the dispensing spout ability, if function is maintained for long periods of time and autoclavable.

Prior to reuse, the decontamination and sterilization process should be completed to include the outside and inside of the reusable container, sterilized if possible and dried. The container should be dry in order not to ~~water-down~~ the scrub solution and reduce its microbial effectiveness. The container should never be refilled without decontaminating the container to prevent contamination of the scrub solution and container, thus contributing to the risk of cross contamination.

Standard of Practice IV

The healthcare facility should provide an approved scrub solution that has immediate, cumulative and persistent antimicrobial action for use by the surgical personnel. The surgical personnel especially operating nurse managers and infection control officer should be involved in the process of evaluating and selecting scrub solutions.

Standard of Practice V

Alcohol-based solutions are an effective scrubbing agent. The selection of an alcohol-based solution should be based upon the solution that provides persistent, cumulative and broad spectrum activity and is approved by the healthcare facility. Alcohol solutions that contain 60%-95% alcohol are the most effective and have the ability to destroy gram-positive and gram-negative organisms.

Standard of Practice VI

Surgical team members should perform a standardized surgical scrub procedure that is based on the manufacturer's written instructions specific to the scrub solution to be used and according to the healthcare facility policy and procedures. In addition, the surgical team member should follow the general principles of completing a surgical scrub.

Standard of Practice VII

Performing the surgical scrub without a brush or sponge is acceptable. The practice of using a brush can damage the skin resulting in increased shedding of microorganisms from the hands and arms. Scrubbing with a brush also contributes to an increase in the shedding of skin cells. Several studies confirmed that the use of a brush or sponge is not necessary and demonstrated lower bacterial counts when a brushless surgical scrub is performed, as compared to the use of a brush, in particular when an alcohol-based solution is used that consists of 1% chlorhexidine and 61% to 70% alcohol.

Adapted from the Association of Surgical Technologists 2008

Surgical hand scrub must be performed preoperatively by the sterile surgical team members to eliminate transient and to reduce resident hand flora. The Association of Operating Room Nurses (2008:n.p), Dawson (2008:2-4), Phillips (2013:274-280) and Queensland Health (2010:8) describe the procedure as indicated in the following insert:

Insert 2.2: Surgical Hand Scrub with Water and Antiseptic solution

Surgical Hand Scrub with Water and Antiseptic solution

1. Open and prepare a nail cleaner and scrub brush for later use. Note: single use disposable brush/sponges impregnated with antimicrobial soap are also available.
2. Rinse the hands and arms and wash with sufficient antimicrobial soap to ensure

adequate skin coverage to 2.5 cm above the elbow and contact time with the antimicrobial soap

3. With the hands under gently running water, use the nail cleaner to remove debris from underneath the fingernails. The antimicrobial soap is left in contact with the forearms while the fingernails are cleaned
4. When finished with the nail cleaner discard in a safe manner and rinse the hands and forearms
5. Apply antimicrobial soap to the bristles of the scrub brush and continue cleaning the fingernails.
6. Apply antimicrobial soap to the sponge side of the brush and wash all surfaces of hands and forearms working from the nail beds and between fingers before proceeding to wash the forearms (to the level of the elbow) using circular hand motions. Apply more antimicrobial soap if necessary. On completion, dispose of the scrub brush in a safe manner and rinse the hands and forearms.
7. Hands and forearms are washed again using the same principles and procedures above, but stopping at mid forearm. On completion, rinse the hands and forearms.
8. Hands are washed again using the same principles and procedures.
9. Finally, the hands and forearms are rinsed thoroughly.
10. Remain at the scrub sink until the hands and arms are free of excess water, being careful to avoid splash, contamination or injury on wet surfaces.
11. Approach the gown trolley and grasp the sterile towel by one corner, being careful to avoid contamination of the sterile field with drips from hands (which are clean, not sterile).

Subsequent scrubs of the day - three minutes

1. Hands and forearms are washed again using the same principles and procedures above, but stopping at mid forearm. On completion, rinse the hands and forearms.
2. Hands are washed again using the same principles and procedures.
3. Finally, the hands and forearms are rinsed thoroughly.
4. Remain at the scrub sink until the hands and arms are free of excess water, being careful to avoid splash, contamination or injury on wet surfaces.

Approach the gown trolley and grasp the sterile towel by one corner, being careful to avoid contamination of the sterile field with drips from hands (which are clean, not sterile).

Insert 2.2 adapted from the Association of Operating Room Nurses (2008), Dawson (2008:2-4), Phillips (2013:274-280) and Queensland Health (2010:8)

Effective surgical hand scrub should be performed for a minimum of 3 to 5 minutes (Rainer & Russ, 2005:2). According to Dawson (2008:2-4), Phillips (2013:276) and Queensland Health (2010:3), subsequent to the surgical hand scrub with water, the scrub or scrub-less-waterless-brushless skin preparation with a thorough washing, rinsing, and drying of hands and arms at the beginning of the day or if skin is visibly contaminated, is done as described in the following insert:

Insert 2.3 Scrubbing using alcohol solution

Scrubbing using alcohol solution

1. Dispense approximately 5 ml (three doses) of alcohol-based hand rub in the palm of your left hand, using elbow of your other arm to operate the dispenser.
2. Dip the fingertips of your right hand in the hand rub to decontaminate under the nails.
3. Smear the hand rub on the right forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the hand rub has completely evaporated
4. Repeat procedure for the left arm.
5. Dispense approximately 5 ml (three doses) of alcohol-based hand rub in the palm of your right hand, using elbow of your other arm to operate the dispenser.
6. Dip the fingertips of your left hand in the hand rub to decontaminate under the nails.
7. Smear the hand rub on the left forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the hand rub has completely evaporated.
8. Cover the whole surface of the hands up to the wrist with alcohol-based hand rub, rubbing palm against palm with a rotating movement.
9. Rub palm against palm back and forth with fingers interlinked.
10. Rub the back of the fingers in the palm of the other hand with a sideways back and forth movement and rub the thumbs by rotating in the clasped palm.
11. At all times, ensure sufficient surgical hand rub is used so as to keep hands and forearms wet throughout the procedure
12. When hands are dry, a sterile surgical gown and gloves can be donned.

Insert 2.3 by Dawson (2008:2-4), Phillips (2013:276) and Queensland Health (2010:3)

2.5 SURGICAL ATTIRE (INCLUDING GOWNING)

Proper According to Dawson (2008:2-4), Phillips (2013:276) and Queensland Health (2010:3), subsequent to the surgical hand scrub with water, the scrub or scrub-less-waterless-brushless skin preparation with a thorough washing, rinsing, and drying of hands and arms at the beginning of the day or if skin is visibly contaminated is a key component of aseptic environmental control and an important factor in controlling the potential spread of infection to the surgical patient (Vaele, Moss, Pfister & Adams, 2010:5). The Centre for Disease Control (2012:1) for prevention of surgical site infection addresses surgical attire as one of spectrum of considerations that may affect the incidence of surgical site infection as well as acknowledging the relationship between the use of surgical attire and surgical site risk. Surgical attire has an appropriate purpose to combat sources of contamination exogenous to the patient as well as protecting the surgical teams against exposure to infection and hazardous materials (Phillips, 2013:268).

Surgical attire refers to body covers which consist of pant suits, head covers, surgical face mask and shoe covers+ (Mongram, Horan, Pearson, Silver & Jarvis, 1999:261; Feistritz, Beauchamp & Higgins, 2008:n.p). Additionally, Phillips (2013:268) asserts that a sterile gown and gloves should be added to the basic attire for sterile surgical team members at the sterile field. Each item of the surgical attire has a specific means for containment of or protection against potential sources of environmental contamination and to combat sources of exogenous contamination to the patient (Vaele et al, 2010:7; Mongram et al, 1999:261).

2.5.1 Components of Appropriate Attire

Every member of the surgical team dons a surgical attire intended for use within a semi

-restricted area, a pant suit or dresses are worn, which should be available in solid colours or attractive prints. Pant suits are effective in the prevention of bacteria, as 90% of bacteria disseminate from legs and perineum (Phillips, 2013:269).

Head Covers: Human hair is a significant source of bacteria. Many outbreaks of surgical site infections have been associated with material isolated from the hair or scalp of the surgical teams even when caps had been worn (Vaele et al., 2010:15). It is recommended that surgical caps be worn and hair should be completely covered to prevent the shed and dispersal of scalp dandruff that may contaminate the sterile field (Phillips, 2013:269; Mongran et al, 1999:262). The hair covering should also cover facial hair, side burns and the nape of the neck (Braswell & Spruce, 2012:140).

Shoe Covers: Shoe covers are to be worn in semi-restricted and restricted areas where blood, fluid spills and splashes are anticipated. The surgical teams should wear knee-height boots to protect themselves from contamination during the surgical procedure (Phillips, 2013:270; Freistritzer et al, 2008:n.p). However, Phillips (2013:270) alluded that the use of shoe covers have not shown a significant correlation between footwear and surgical site infection.

Surgical Face Mask: A surgical face mask should be worn in the restricted area to contain and filter droplet micro-organisms. Surgical masks filter about 99% of particulate matter that is larger than 0.5/5mm in diameter but only about 45%-60% of particles 0.3/3mm in diameter (Phillips, 2013:270). A face mask should always cover the mouth and nose completely during a surgical procedure and should not be worn around the neck after the procedure (Rainer & Russ, 2005:14). A surgical mask should always be worn in the operating room whether or not the surgical procedure is in progress. The mask should be changed in between cases (Phillips, 2013:270).

Phillips (2013:270) described other types of face masks that could be used during surgery for special procedures like laser masks which are worn to prevent plume from laser and electro surgical unit (diathermy). In addition, there are high efficiency particulate filtration masks that are worn by the surgical teams when performing a surgical procedure of patients infected with tuberculosis.

2.5.2 Considerations for Appropriate Surgical Attire

According to Phillips (2013:268) dressing rooms are to be located in the unrestricted area adjacent to the semi-restricted area, allowing street clothes not to go beyond the unrestricted area. Only freshly laundered attire is worn within the semi-restricted area and is donned each time on arrival in the operating theatre (Phillips, 2013:268; Vaele et al., 2010:14). The attire should be made of low lint generating material, highly woven, stain resistance, antistatic, durable, loosely fitting for comfort, be able to transmit water vapour and heat to protect the wearer, coloured to reduce glare under lights and easy to don and to remove (Braswell & Spruce, 2012:124; Phillips, 2013:274). When attire gets wet or soiled before the end of the shift, it should be changed immediately and it is advisable for the operating theatre to have adequate attire (Vaele et al, 2010:14; Freistritz, 2008:n.p).

Comfortable and supportive shoes should be used to minimize fatigue and need to be cleaned frequently despite wearing of shoe covers (Phillips 2013:268). The attire should not be worn outside the theatre to prevent contamination of the theatre environment (Phillips, 2013:268; Vaele et al., 2010:12).

Braswell and Spruce (2012:130), Davis (2009:6) and Freistritz et al (2008:n.p) emphasize the importance of maintaining high standards of personal hygiene by surgical team members, with daily bathing using antiseptic soap, especially to reduce micro-organisms in the hair bearing areas of the body. Finger nails are to be kept short, clean natural and healthy. Artificial nails and nail polish should not be worn as it harbours and increases microbial growth (Cooper, Wallace, Archman, Humphries & Howes, 2009:82;; Vaele et al, 2010:13). When entering semi-restricted and restricted areas the surgical teams must remove all jewellery and watches, as it increases bacterial shedding and there is a concern that it could fall into the sterile field or surgical site (Cooper et al, 2009:82; Freistritz et al 2008:n.p).

2.5.3 Personnel Protective Equipment

Surgical teams need to be protected from hazardous conditions and reduce the risk of exposure to potential infectious materials in semi-restricted and restricted areas. The types and characteristics of this attire depend on the task and degree of exposure anticipated. Protective attire does not allow blood or other potentially infectious materials to reach the inner clothing, skin or eyes (Phillips, 2013:271; Cooper et al, 2009:78). Considerations concerning protective attire are aprons that are fluid proof against blood and body fluids as well as lead aprons that protect against radiation exposure during the surgical procedures. Eye wear or face shields are worn by the sterile team members to prevent splashes from body fluids and splashes from bone chips. Also, laser eye wear is worn for eye protection from laser beams (Phillips, 2013:271).

2.5.4 Surgical Gowns

Sterile gowns are worn over the scrub suit to permit the wearer to enter into the sterile field. Surgical gowns prevent contamination between the wearer and the sterile field as well as differentiating the sterile surgical teams from unsterile team members. They also form a protective barrier from the skin of sterile members to the sterile field and patient and vice versa. Surgical gowns come in reusable and disposable gowns (Phillips, 2013:272; Freistritzer et al, 2008:n.p; Veale et al., 2010:14).

2.5.5 The Gowning Procedure

Anderson-Manz and Gardner (2001:5) and Phillips (2013:278) described the gowning procedure as follows:

- Once in the gowning area, hands and arms should be dried using a sterile towel and aseptic technique and be ready to don your gown and sterile gloves.
- When gowning oneself, grasp the gown firmly and bring it away from the table with the outside facing away, hold the gown at the shoulders, allow it to unfold gently.

- Place hands inside the armholes and guide each arm through the sleeves by raising and spreading the arms, avoiding contamination and do not allow hands to slide outside the gown cuff.
- The circulating nurse should pull the gown up over the shoulders and tying it.

2.5.6 Surgical Gloves

In as much as there are a variety of surgical gloves such as latex, neoprene, vinyl, thermoplastic elastomers, polyethylene and natural rubber, latex gloves are widely recommended and frequently used worldwide. However, the selection of surgical gloves used depends on the specification of the surgical procedures and on the surgeons or sterile team members needs (Phillips, 2012:272; Cooper et al, 2009:79).

In addition, the use of two pairs of surgical gloves has also been suggested as a means of reducing glove puncture and potential contamination of the surgical wound by microorganisms from the operator's skin (Pirie, 2010:209). This practice of double gloving is important to both the patient and the surgical team members when consequences for contamination of the operating site are high (Welsh, Timberlake & Rose, 2008:55; Clyburn, 2011:n.p).

2.5.7 The Gloving Procedure

The process for gloving is described as follows by Anderson-Manz and Gardner (2001:6), Association of Operating Room Nurses (2008:n.p) and Phillips (2013:279):

- To glove, lay the glove palm down over the cuff of the gown with the fingers of the glove facing toward you.
- Working through the gown sleeve, grasp the cuff of the glove and bring it over the open cuff of the sleeve.
- Unroll the glove cuff so that it covers the sleeve cuff. Proceed with the opposite hand, using the same technique.
- Never allow the bare hand to contact the gown cuff edge or outside of glove.

- To glove another person, the principles of asepsis must be observed, the sterile hands should not touch the non-sterile surface of the surgeon being gloved.
- The right glove is placed in the palm away from you and slide the fingers under the glove cuff and spread them so that a wide opening is created keeping thumbs under the cuff.
- The surgeon will thrust his or her hand into the glove and gently release the cuff while unrolling it over the wrist.
- Proceed with the left glove, using the same technique

2.6 CONCLUSION

This chapter focussed on literature relevant to the topic. It discussed issues of surgical site infections and their classifications, principles of infection control practices and surgical hand scrubbing, gowning and gloving. The next chapter discusses methods used for conducting this research study.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The study aimed at exploring and describing challenges experienced by surgical teams and hospital management regarding the surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland.

The previous chapter is a description of the literature relevant to surgical site infections, as well as surgical hand scrubbing, gowning and gloving. This chapter describes the research design and methodology including sampling, data collection, and data analysis techniques, as well as ethical considerations and trustworthiness.

3.2 DESIGN

Qualitative researchers specify a research methodology and design before collecting any data. The overall plan and techniques used are emergent that evolves over the course of the study, reflecting what had been learned in achieving the intended goal of the research study (Polit & Beck, 2012:487). In this study, the research design was a qualitative, exploratory, descriptive and contextual research study with an interpretive and naturalistic perspective. This design was selected because it was flexible and rich information was gathered to answer the research question.

Qualitative research design is the process or plan for conducting the specific steps of the study which encompasses a variety of underpinnings and research methods to enhance trustworthiness. The overall plan, techniques and method permits multiple ways of exploring and describing the different phenomena in context, generating data that comprises of words (Schneider, Whitehead, Elliott, LoBiondo-Wood & Haber, 2007:106; Moule & Goodman, 2009:170, Grove, Burns & Gray, 2013:707; LoBiondo-Wood & Haber, 2010:86; Brink, 2006:111; Polit & Beck, 2012:487.

Qualitative research has a philosophical perspective of ontological (being related), epistemological (knowledge related) and methodological beliefs of interpretive, holistic and naturalistic methods that value more of a subjective science that potentially provide an understanding of the unique, dynamic study of human experience from their view point (Grove et al., 2013:24; Brink, 2006:113; Parahoo, 2006:62; Schneider et al, 2007:107). Qualitative researchers often put together a complex array of data, derived from a variety of sources and using a variety of methods. Meanwhile, analysis techniques use words as a basis of analysis from the images and documents provided by the participants who guide the organizing, reducing and clustering of data to achieve the goal of describing and understanding (Grove et al, 2013:264; LoBiondo-Wood & Haber 2010:113; Polit & Beck, 2012:487).

There is a range of research designs available and no particular research design is considered more valuable than another, such that the best design is the one that is most appropriate to the research problem and purpose, to ensure that evidence collected is able to answer the research problem as well as to meet the research aim and objectives of the study (Moule & Goodman, 2009:32; Brink, 2006:118; Parahoo, 2006:184 Polit & Beck, 2012:487). Qualitative research design was used in this study to develop a deep understanding on how surgical teams and hospital management perceived their challenges in social realities and consequences regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of the Hospital.

3.2.1 Explorative Descriptive Research

In this study the researcher used an explorative, descriptive research design. Explorative, descriptive studies are conducted to address a problem or an issue that is in need of a solution especially where there is lack of knowledge that can be addressed by seeking the viewpoints and characteristics of people using a distinct methodological classification. Data collection patterns may emerge, but the main emphasis is the description and exploration of the phenomena to generate new knowledge (Parahoo, 2006:467; Grove et al, 2013:66, 694; Sandelosky, 2010:82).

The philosophical base and orientation of explorative descriptive qualitative studies undergird most methods of a naturalistic inquiry approach and ascribe to a perceived view of reality that meaning and situation of the participants is created and maintained in the context of their natural state, such that their experiences is the source of information that offer new strategies to solve the problem (Grove et al., 2013:66; McCready, 2010:192). In this case it was the challenges of the surgical teams and hospital management regarding surgical scrubbing, gloving and gowning procedures in the operating theatre of the specific hospital in Swaziland.

3.2.2 Context or setting

The study setting was the operating theatre of a hospital in Swaziland. For a full description please refer to chapter one under the heading **3.2.2 Contextual design**. The study was contextual of nature, as it focussed on a particular problem in a particular context, and of which the results are not expected to be generalised.

3.3 RESEARCH QUESTION

The main question that should be answered by this research was the following: **What are the challenges experienced by the hospital management and surgical teams regarding surgical hand scrubbing, gowning and gloving in the operating theatre of a hospital in Swaziland?**

3.4 RESEARCH AIM

The aim of this research study is to explore and describe challenges faced by the surgical teams and the hospital management regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of the Hospital in Swaziland.

3.5 RESEARCH OBJECTIVES

In order to answer the main question of this study, the following objectives need to be met:

- To explore and describe challenges experienced by the surgical teams regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre.
- To explore and describe challenges experienced by the hospital management regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre.
- To make recommendations on how to address the challenges regarding surgical hand scrubbing, gowning and gloving in the operating theatre of a hospital in Swaziland.

3.5.1 Objective 1: Challenges experienced by surgical teams

The focus of the first objective was to explore and describe challenges experienced by the surgical teams regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of the particular hospital in Swaziland.

3.5.1.1 Population

The target population for this objective was the surgical teams from all the surgical disciplines who participate on surgical hand scrubbing, gowning and gloving procedure in the operating theatre of the Hospital.

3.5.1.2 Sampling

The method used for sampling in this study was a non-probability, purposive sampling method because the population of relevance (surgical teams in the operating theatre of the hospital) is a limited number of staff, which makes randomisation inappropriate as suggested by Polit and Beck (2012:515) and Grove et al (2013:364). The sample of

both focus group interviews constituted of the sterile surgical teams which consisted of three specialist surgeons, six assistantsurgeons and twelve scrub nurses (registered nurses). The sterile surgical teams were chosen because they were an accessible population to the researcher and the appropriate study participants for the topic as they perform the surgical hand scrubbing, gowning and gloving procedure on daily basis afore carrying out a surgical procedure. Consequently, they have authentic experience of the challenges regarding surgical hand scrubbing, gloving and gowning in the operating theatre of the Hospital and therefore could contribute rich information on the topic of study.

In this study, the researcher consciously selected the sterile surgical teams from all the surgical disciplines of the operating theatre according to the specific sampling criteria based on the judgment that they have in-depth information about the challenges they experience during surgical hand scrubbing, gowning and gloving in the operating theatre. Thus, the challenges of the participants will emerge into enrichment and conceptualizations. The researcher introduced the topic and the brief content of the research study in a weekly meeting where all the surgical teams usually meet for continuous medical education. An invitation to participate in a focus group was made to all members of the sterile surgical teams. Participants were asked from all the surgical disciplines of the operating theatre to participate in this study, while they were assured of maintenance of privacy and confidentiality throughout the study.

Inclusion criteria

The inclusion criteria were as follows:

- Surgical teams consisting of surgeons, surgeon assistants and scrub nurses (registered nurses) involved in surgical scrubbing, gowning and gloving during surgical procedures.
- Participate voluntarily with signed informed consent to the study.

The exclusion criteria:

- Operating theatre personnel who do not function in the sterile area during intra-operative care, such as anaesthetists and anaesthetic nurses as they do not

participate in surgical scrubbing, gowning and gloving and do not have direct contact with the surgical sites.

- The sterile surgical team members who were not willing to participate in the study.

Written consent (see Annexure 4) was obtained from the research respondents so that they participated in the research study out of their free will and the dates for the interview were selected by the surgical teams and the researcher.

In this study, the researcher used focus group interviews. An invitation was given to all the surgical teams from the different surgical disciplines of the operating theatre which is orthopaedics, general surgery, obstetrics and gynaecology, ear, nose and throat, dental, neurology and ophthalmology surgery. Each surgical discipline has a total number of seven members who are involved in surgical scrubbing, gowning and gloving.

3.5.1.5 Data Collection

Data collection is the precise, systematic, gathering of information that is relevant to the research purpose, objectives and questions of the research study. Procedures and techniques should be planned that is consistent and free of the researcher's bias. Therefore, decisions on what to collect evolve in the research field where researchers gather and digest information (Polit & Beck, 2013:532; Grove et al., 2013:691; Loboindo-Wood & Haber, 2010:269; Brink, 2006:141). In this research study, the researcher used focus group discussion interviews to gather data from the surgical teams on their challenges regarding surgical hand scrubbing, gowning and gloving in the operating theatre of the hospital.

The researcher conducted two focus group interviews. The first group had a total number of eleven participants, which included three specialist surgeons, two assistant surgeons and six scrub nurses while the second group had ten participants consisting of one specialist surgeon, two assistant surgeons and seven scrub nurses. Twenty one out of the potential forty nine participants therefore participated in focus group discussion, which was reckoned as good representation of the population. It appeared as if data

saturation has been obtained as the second focus group did not add new information from the surgical teams.

3.5.1.5.1 Focus group interviews

Focus group interviews are designed to access and obtain rich information on the views, opinions and experiences of participants at once in an economical manner, in a setting that is permissive. These interviews are helpful to explore, develop, understand the phenomena and refine the initial research questions and interview schedule (Moule & Goodman, 2009:298; Grove et al., 2012:537; Schneider et al., 2007:129; Parahoo, 2006:331).

People with the same character usually feel safe and less anxious when talking about difficult experiences, thus, the group interaction can help to express and clarify their views (Moule & Goodman, 2009:298; Kruger 2002:3. The process of focus groups consists mainly of the interviewer asking a broad question and inviting participants to answer voluntarily, which in turn generates further questions (Parahoo, 2006:331).

Focus group interviews offer a collective set of values, experiences and observations of participants that are later interpreted in context (Schneider et al, 2007:129). Moreover, focus group interviews are able to facilitate consensus and agreeable solutions on important objectives of the study participants and provide the opportunity to collect qualitative data in small purposefully selected interactive groups regarding experiences, perceptions and opinions (Latimer, 2003:85). This data collection technique is often useful in allowing participants to share their thoughts with each other, in this way they generate new ideas and consider a range of views before answering the researcher's question (Brink, 2006:152).

Among other factors, focus group interviews have the potential to bring the researcher close to the research topic of interest through a direct encounter with the research participants through rich dialogue (Moule & Goodman, 2009:298; Latimer, 2003:85).

However, there are challenges of focus group interviews which include difficulty in getting all the participants at the same time. Researchers need a high level of expertise

to conduct focus group interviews. Some people may feel uncomfortable talking to the group and dynamics of the group sessions may foster a group culture that could inhibit individual expression, especially when dominant personalities monopolize the discussion. Furthermore, focus group interviews are not replicable, and the reliability and validity of the findings are difficult to ascertain (Burns et al, 2013:275; Parahoo, 2006:331-332; Schneider et al, 2007:129; Brink, 2006:152).

3.5.1.5.2 Data Collection Instrument

The researcher prepared an interview schedule (attached as **Annexure 5**) that was used for both the surgical teams and the hospital management focus group interviews. The interview schedule was used to guide the interviews, which helped to direct data collection using in-depth interviews as suggested by Brink (2006:151) and Schneider et al. (2007:129). In view of the fact that the purpose of the study was to describe and explore the challenges experienced by the surgical teams and hospital management as well as to adhere to aseptic and sterile technique principles and infection control practices during surgical hand scrubbing, gowning and gloving procedure, hence, the researcher came with four main questions and a closing question, which were concerned with the perceptions and challenges of the surgical teams and hospital management, infection control practices and aseptic technique during surgical hand scrubbing, gowning and gloving procedure:

1. What are your perceptions towards surgical hand scrubbing, gowning and gloving procedures practiced in this hospital?
2. What is your opinion regarding the extent to which infection control and aseptic techniques are maintained during surgical hand scrubbing, gloving and gowning procedures in this hospital?
3. Describe challenges you encounter regarding surgical hand scrubbing, gloving and gowning procedures.
4. What could be done to address the challenges regarding surgical hand scrubbing, gloving and gowning procedures?

5. Do you have any further comments with regards to surgical hand scrubbing, gowning and gloving procedures practiced in this hospital?

The researcher provided a comfortable environment which made the participants to relax and be comfortable. The researcher also tried to control the dominant people, the group culture and to allow the surgical teams to express themselves freely as well.

The researcher conducted the interviews with the help of a research interview facilitator who played an important role in making decisions about the progress of the interviews. The focus group interviews were tape recorded and the researcher extracted data from the recorded material after the interviews were over.

3.5.1.5.3 Conducting focus group interview

The researcher and interview facilitator organized, prepared and made sure that the recording equipment and material were available and in good working order for the duration of the interviews. The researcher was quietly taking observational notes while the interview facilitator was conducting the interview. In a short time the interview facilitator created a thoughtful, permissive atmosphere and ground rules were set for the discussion, which included switching off cell phones of the surgical teams and remaining in the interview room until the end of the session as suggested by Polit and Beck (2012:547), Kruger (2002:2) and Speziale and Carpenter (2007:30).

After the interview had begun, the interview facilitator played a dual role to be empathic, a good listener, warm, non-judgmental, friendly, honest and flexible and at the same time need to remain distinct and objective. The facilitator furthermore assumed a less active role by allowing the sterile surgical teams more time to talk.

The interview facilitator started the interview with an introduction whereby the facilitator introduced herself and the topic. The sterile surgical team members were asked to introduce themselves and to talk about their perceptions towards surgical hand scrubbing, gowning and gloving procedure practiced in this hospital. This question was followed by other questions that are in the interview schedule.

The surgical teams were encouraged to continue to tell their stories in their own words, the facilitator used encouraging techniques to the surgical teams such as nodding the head or making sounds that indicated interest in the discussion. In doing so, the facilitator wanted to gain rich information as well as giving participants the freedom to provide as much information and explanation as they wanted. In some instances, the participants were encouraged to further elaborate on a particular dimension of the discussion by using probes to yield rich, extensively detailed and pertinent data and to follow cues during the interview. This was done in order to get the full meaning of the experiences of the surgical teams.

An atmosphere of concern and caring was created during the interview. The facilitator controlled and stopped some members of the group from dominating by guiding and giving each member an opportunity to contribute in order to obtain varying responses and views from all the group members to ensure the coverage of the phenomenon under discussion. The facilitator did not intervene or interfere with responses - she remained neutral. The facilitator asked for clarification of points and views from the surgical teams. She also clarified questions that were not understood by participants, ensuring mutual understanding between the research respondents and the facilitator.

The research interview facilitator did not pressurize the sterile surgical teams in any way to talk or give their views and opinions on the challenges regarding surgical hand scrubbing, gowning and gloving, but they were allowed to respond in the way that they felt was suitable to explain their views and express their feelings. Emotions were not revealed much and were well controlled by the participants during the interviews.

The researcher was present in the room during the interviews, but remained in the background while recording observational field notes. The researcher recorded participants' observation field notes paying attention to non-verbal cues which among others included gestures, movements, tone of voice, stammering, repetition as well as other behaviour which the research participants reflected without recording any preconceived ideas. Both focus group interviews took one and a half hours. The researcher acknowledged the participants for their involvement in the study and refreshments were served after each interview session.

3.5.1.6 Data Analysis

Polit and Beck (2012:556) state that qualitative data analysis and interpretation is a process of examining and interpreting data or translating the words of participants in order to elicit meaning, gain understanding and develop empirical knowledge. It is labour intensive and a challenging activity that needs to be conducted with rigor and care, and findings must remain trustworthy. Qualitative data analysis occurs simultaneously with data collection and begins as soon as the first data is collected (Polit & Beck, 2012:556; Corbin & Strauss, 2008:1; Moule & Goodman, 2009:344). In this study, the researcher used a qualitative data analysis approach to identify key points that described the challenges of the surgical teams regarding surgical hand scrubbing, gowning and gloving in the operating theatre of the hospital.

After each focus group interview the interview is transcribed verbatim. The researcher familiarized herself with the data by listening to the tapes several times and scrutinizing and sensitively reading field notes over and over in search of meaning and understanding of what was said and observed from the surgical teams, until completely immersed in the data. The researcher made sure transcriptions were accurate, valid and a true reflection of the interview.

Coding involves inventing and applying a category system which the researcher uses to identify the most prevalent codes (Brink, 2006:185; Moule & Goodman, 2009:345). Through coding, the researcher explored the phenomenon under study. Later as the study progressed, codes were grouped into abstract codes for logistics as well as for development of the taxonomy or a theoretical framework as suggested by Grove et al (2013:281) and Schneider et al (2007:143). The codes were then interpreted and developed into themes which were further organized and managed in a way that was consistent with the philosophical base of this study. The researcher summarized the interviews with the main focus of reducing the volume of data into manageable segments by coding and attaching meaning to elements of the data with a label or a phrase.

Only two focus group interviews were held as data saturation was reached with the second group, as such, no new information was further obtained and no new themes emerged. The results are discussed in Chapter 4.

3.5.2 Objective 2: Challenges experienced by hospital management

The second objective was to explore and describe the challenges experienced by the hospital management regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre.

3.5.2.1 Population

For the second objective the population was the hospital management, which were eight in number and consisted of the two senior (chief) medical officers, two senior matrons, hospital manager, a hospital administrator and two operating theatre nurse managers.

3.5.2.2 Sampling

The sample of the participants was chosen by means of a non- probability, purposive sampling method, as they knew the best about their challenges regarding surgical hand scrubbing, gowning and gloving in the operating theatre. The hospital management who were on duty on the day of the interview and had consented were included in the study because of their availability during the time of the interview.

In this study, the researcher consciously selected the hospital management according to the specific sampling criteria based on the judgment that they had significant information about the challenges they experience during surgical hand scrubbing, gowning and gloving.

The hospital management usually meets weekly to deliberate on issues pertaining to the hospital, so the researcher requested to use this time to introduce the topic of the

study, as well to invite the hospital management to participate in the study. Privacy and confidentiality were assured and maintained and the interview date was confirmed two weeks later. Written consent (**Annexure 5**) was obtained from the hospital management to participate in the research study voluntarily.

Inclusion criteria

The inclusion criteria were as follows:

- The participants should be part of the management team of the hospital that plays a role in the implementation of hand scrubbing, gowning and gloving in the hospital, namely the two operating theatre nurse manager and senior hospital management which included two senior (chief) medical officers, two senior matrons, the hospital manager and the hospital administrator.
- Participate voluntarily with signed informed consent to the study.

The exclusion criteria

The exclusion criteria were the following:

- Any members of the management team who are not involved in implementation of hand scrubbing, gowning and gloving, such as anaesthetics, nurse anaesthetists, managers, and nurse Managers from other hospital departments.
- The hospital management and operating theatre nurse managers who do not want to participate voluntarily in the study.

3.5.2.2.1 Sampling Size

In this case the size of the sample is determined by the availability of participants (Polit & Beck, 2013:52; Grove et al, 2013:371). The hospital management consists of two senior (chief) medical officers, two senior matrons, one hospital administrator and one operating theatre nurse manager.

Only one focus group interview was held with a total number of six hospital management members which included both senior (chief) medical officers, the hospital administrator, two senior matrons and one operating theatre nurse manager. The researcher decided to conduct one focus group interview because the hospital

management is small in number, they could not form another focus group and the researcher believed that they had mentioned everything that needed to be said concerning the challenges experienced by hospital management regarding surgical hand, gowning and gloving.

3.5.2.3 Data Collection and Data Analysis

In this research study, the researcher used a focus group discussion interview with field notes to gather data and qualitative analysis to analyse the data. The process used is similar to that of objective one.

The reason the researcher separated the two groups (surgical teams and hospital management) is that their roles are different. The surgical teams are executing hand scrubbing, gowning and gloving as part of their intra-operative care. The hospital management is responsible for the provision of all necessary equipment needed by the surgical teams for the proper execution of surgical hand scrubbing, gowning and gloving procedures. Consequently, the researcher wanted to get the views of both teams separate rather than mixing the groups.

The interview was held in the conference room which is only used by the hospital management, and was facilitated by the research interview facilitator, while the researcher remained in the background and made field notes. The questions asked were the same as for the surgical teams (**see Annexure 5**). Participants were encouraged to express their views and feelings about the topic under discussion and the facilitator used communication techniques in acknowledgement of what was being said. The hospital management appeared to be comfortable, calm and collected during the interview. There was no domination amongst the group members and each member had the opportunity to contribute their views and opinions about the topic. The interview lasted for one hour twenty minutes.

The interview was transcribed verbatim and analysed the same manner than described for objective one. The results are discussed in chapter 4.

3.6 TRUSTWORTHINESS

Trustworthiness is the degree of confidence qualitative researchers have in their data, which can be assessed using credibility, transferability, dependability, confirmability and authenticity (Polit & Beck, 2012:745). According to Schneider et al. (2007:148) trustworthiness ensures and evaluates the rightness or correctness of the result of a qualitative research study. Trustworthiness is the rigor of the research study, which also involves the quality of the qualitative research study (LoBiondo-Wood & Haber, 2010:588). In this study the researcher will demonstrate quality through paying attention to participants' experience, maintaining of data adequacy as well as discovering and confirmation of new information.

The researcher utilized the framework for quality criteria and quality enhancement strategies as described below by Polit and Beck (2012:584-585) derived from Lincoln and Guba (1985 & 1994:n.p).

3.6.1 Credibility

Credibility refers to the confidence in the truth of data and interpretation as judged by participants and others in the discipline (Schneider et al., 2007:149). Credibility was achieved by the demonstration of confidence in the truth of data by assessing the findings that are a true representation of the challenges experienced by the surgical teams and hospital management, regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre. This will be achieved by using quality enhancement strategies of prolonged engagement, triangulation, peer debriefing and member checking.

3.6.1.1 Prolonged Engagement

Prolonged engagement is spending sufficient time in the field with the participants to learn and understand the social context and the phenomenon under study (Cohen & Crabtree, 2006:1). The researcher spent sufficient time with research participants to establish a relationship and create a rapport with participants in order to gain trust and understanding the meaning of the situation as well as to identify and take care of distortions that might disorganize the participants during the interviews of the surgical teams and hospital management regarding surgical hand scrubbing, gowning and gloving. Prolonged engagement provided the researcher with scope and depth of the challenges faced by the sterile surgical teams and hospital management regarding surgical hand scrubbing, gowning and gloving as they experienced it and also allowed submersion in the research setting to enable recurrent themes to be identified and verified.

In this study the researcher has worked in the operating theatre for many years with the surgical teams and the hospital management as well as a nurse manager. It gave the researcher insight in the interpretation of the results, but it also posed a risk to be biased. To reduce biasness in the study, research interview facilitator with a vast experience in research was allotted to facilitate the interviews and the researcher acted impartial during the focus group interviews, while taking field notes of the observations done during the focus group interviews.

3.6.1.2 Triangulation

Triangulation refers to the use of multiple data sources in an investigation to bring an understanding and draw some conclusions of what constitutes the truth that has been compared with convergent validation and to facilitate deep understanding and capture a contextualized portrait of the phenomenon under study (Polit & Beck, 2013:590; Cohen & Crabtree, 2006:2). Danzin (1989:313) identified four modes of triangulation which are data triangulation, investigator triangulation, method triangulation and theory triangulation for corroborating findings and to test validity to ensure credibility.

In this study the triangulation of data was done by using different groups, which was the surgical teams and hospital management.

3.6.1.3 Peer Debriefing

Peer debriefing involves reasons with peers to review and explore various aspects of the enquiry. Peer debriefing exposes researchers to the research questions of others who are experienced in the methods of enquiry, the phenomenon being studied or both (Polit & Beck, 2012:594). Peer debriefing or review can help incomes taken for granted blazes, perspectives and assumptions (Cohem & Crabtree, 2006:3). The researcher made use of a senior colleague who had experience in research enquiry and specifically in qualitative research to confirm the researcher's interpretation of the findings and to criticise the study. The input from the peer members was mainly editorial of nature, and was accepted by the researcher and corrected accordingly.

3.6.1.4 Member Checking

Member checking is when data analytic categories, interpretations and conclusions are tested with members of the groups from which data was originally obtained (Cohen & Crabtree, 2006:2). Member checks provide feedback to participants about emerging interpretations, obtain participants' realities and confirm their accuracy (Polit & Beck, 2012:591). For credibility of the study, the researcher managed to do member checks with a group of six members of the surgical teams and three members of the hospital management that had participated in the focus group interviews. Results were presented and shown to the groups to confirm if they were realistic to the challenges they experienced regarding the surgical hand scrubbing, gowning and gloving procedure in the operating theatre of the hospital.

3.6.2 Dependability

Dependability refers to the stability of data overtime and conditions. Credibility cannot be achieved in the absence of dependability (Polit & Beck, 2012:583). Dependability measures trustworthiness in qualitative research studies in a sense that it uses the process of replications and enquiry audit. In the replication technique the findings of an inquiry should be replicated with the same or similar participants in the same context (Polit & Beck, 2012:583). In an enquiry audit, the reader and critic of the research study attests that the findings are supported by data, and are coherent, clear and follows accepted standards (Holloway & Wheeler, 1998:68). The focus of the study was not to be transferable to another setting, but to provide for dependability checks. The researcher made replication possible by means of a thick description of the study.

3.6.3 Confirmability

Confirmability refers to objectivity that is potential for congruency between two or more independent people about the data's accuracy, relevance and meaning (Polit & Beck, 2013:583). Confirmability is concerned with the extent that the data is linked to its sources in order for the reader to establish if the conclusions and interpretations arise directly from participants (Holloway & Wheeler, 1998:168). The findings must reflect the participants' voice (Polit & Beck, 2013:585). In this study the researcher used audit trails as it provides rigor in qualitative research and was able to evaluate the entire study. Audit trails are a systematic collection and documentation of data allowing an independent audit to come to conclusions about trustworthiness of the research study data.

3.6.4 Transferability

This refers to how the findings can be generalized or be transferred from a represented sample to the whole group (Holloway & Wheeler, 1998:168). It is the responsibility of the researcher to provide sufficient descriptive data necessary for applicability to the

other contexts (Lincoln & Guba, 1985:168:n.p). The researcher used the appropriate research methods that facilitated exploration and dense descriptions of the process followed during the focus groups. The researcher described the data in a manner that it will allow flexibility and comparison to other surgical teams and hospital management and be transferred to other operating theatres as well as allowing other researchers to judge the amount of transferability that is reflected in the research study to be determined by the consumers of the study results.

3.7 ETHICAL CONSIDERATIONS

Qualitative research studies involve human beings and researchers have to deal with ethical requirements, care must be exercised to ensure that their rights are protected (Polit & Beck, 2012:150). Ethical and legal issues in research are concerned with the protection of human participants to ensure absence or minimization of harm, fraud or discomfort (Schneider et al, 2007:81; Polit & Beck, 2012:153). The researcher considered the following factors when conducting this research study to ensure that ethical measures were respected:

3.7.1 Capability of the Researcher

The researcher has undergone training in qualitative research methodology and has acquired knowledge about ethical and legal issues in research as well as the methods and techniques of conducting the research study. The research project has been supervised by qualified supervisors who are experienced in qualitative research methodology.

3.7.2 Permission to Conduct the Research Study

The researcher requested for permission to conduct the study from relevant authorities in Swaziland where the study was conducted. Letters were written to the Ministry of Health and Social Welfare Ethics Committee, the Hospital and the Operating Theatre

Department. Written permission was also obtained from the research participants (see **Annexure2**).

3.7.3 Confidentiality

Maintaining confidentiality means that identities of research participants will not be linked to the information they provide (Fenwick, Hawcky & Downie, 2005:24; Schneider et al, 2007:87). The research information should not be shared with strangers or people known to participants unless participants give explicit permission to do so (Polit & Beck, 2012:162; Fenwick et al, 2005:25). Participantsqindividual identities will not be linked to the information they provided and will not be divulged in public, however, the results will be presented in conferences and published in articles. Assurance was made to participants that shared information will not subject them into employment vulnerability. Confidentiality will also apply to the hospital as its name will be not being mentioned to the public, conferences and in published articles. Data was analysed as group data so that research participants cannot be identified by their responses as recommended by LoBiondo-Wood & Haber, (2010:258).

3.7.4 Privacy

This refers to keeping matters concealed ensuring that they are not widely known or made public. Respect for privacy is both an ethical and legal requirement (Schneider et al, 2007:87). In this study, privacy was maintained by ensuring that during the interview probing was not meant to be the sterile surgical teams and hospital management were assured their data will be kept in a strict confidentiality.

3.7.5 The Right to Withdraw

Research participants have a right to discontinue or withdraw from the research study at any time without penalty, loss of benefit or being prejudiced (Grove et al, 2013:178;

Schneider, 2007:89). During the research study, participants were informed about their rights (**Annexure 4**) throughout the research study that is before engaging into the research study they were asked to sign an informed consent and explanations about the research process and activities were fully explained to the surgical teams and hospital management.

3.7.6 Informed Consent

Informed consent in research means that the study participants have adequate knowledge and information about the research study, comprehend that information and have the ability to consent or decline participation voluntarily (Polit & Beck, 2012:157; Schneider et al, 2007:84).

The researcher gave a fully comprehensive explanation of the research study to the surgical teams and hospital management before obtaining their permission to participate in the study (**Annexure 4**). Since the researcher conducted a focus group interview and used audio tapes for recording data, the researcher requested permission from the sterile surgical teams and hospital management to record the interview. Participants were reassured by the researcher about the safety of the information and guaranteed privacy and confidentiality, and that there were no potential risk in participating in the study. Participants were also told to alert the researcher if there was a piece of information they did not want to be recorded so that the audio tape could be switched off.

3.8 CONCLUSION

In this chapter the researcher has described the research design, research methodology, data collection, data analysis, trustworthiness and ethical considerations. The next chapter will discuss the research findings of the focus group interviews with the sterile surgical teams and hospital management.

CHAPTER FOUR: RESEARCH FINDINGS

4.1 INTRODUCTION

This chapter presents the themes and subthemes of the challenges of the hospital management and surgical teams regarding the surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland. All members of the sterile team are required to perform a surgical hand scrub to wear a sterile gown and sterile gloves before performing a surgical procedure to prevent contamination and surgical site infections (Queensland Health, 2010;2; Phillips, 2013:272,277; McDonald & Evans, 2008:n.p) as discussed in chapters one and two. The research design and methodology used in this study was a qualitative, exploratory, descriptive and contextual research study. As discussed in chapter three, one focus group interview was held with the hospital management and two focus groups with the surgical teams were conducted. The data was analysed using qualitative content analysis. The findings of the study will be discussed in this chapter.

4.2 MAIN THEMES

The main themes identified from both the hospital management and the surgical teams were related to management, supplies, facility, personnel, maintenance of infection control practices, equipment and the surgical hand scrubbing, gowning and gloving procedure. Under each theme, sub-themes were identified from words extracted from the verbatim transcribed data. Direct quotes from the focus groups are indicated with text in italics within inverted commas. Each sub-theme will indicate the challenges experienced by the participants, as well as strategies identified by them. Discussion of the themes and sub-themes also include literature control done to confirm or disconfirm the findings.

4.2.1 Management

Management is a process whereby human, financial, physical and information resources are employed in order to achieve the goals and objectives of the organization by applying the fundamental management activities of planning, organizing, leading and control (Muller, Bezuidenhout & Jooste, 2011:20). In this study policies, procedures and standard operating procedures, supervision, leadership, authority and availability of human resource were identified as sub themes of management.

4.2.1.1 Policies, procedures, standard operating procedures and Guidelines

According to Bahadur (2014:n.p) and Business Dictionary (2014:n.p) policies are defined as high-level statements which are signed by a person of significant authority. Standards are acceptable level of quality or attainment to enforce and support application of a policy and are used as reference points to ensure organizational compliance. Guidelines are recommended practices that allow discretion or leeway in implementation of activities, they also serve as reference when standards are not in place. Whereas, procedures are detailed specific tasks necessary to meet a standard, written in step-by-step format from the very beginning to the end.

Challenges

The participants mentioned that there are no policies, procedures and standard operating procedures in the operating theatre. These standard operating procedures, policies and procedures are important and assist in the management of the department as well as the surgical teams and theatre personnel supervision. A comment from the participants indicate the following:

“There are no standard operating procedures in the operating theatre”. The sisters in charge of the operating theatre are always very busy because our operating theatres are extremely busy to develop the policies and standard operating procedures”. The people responsible for developing the policies, procedures and standard operating

procedures are the theatre nurse managers, developing such will assist them with the supervision of the department.

It was also mentioned that some procedures in the operating theatre *are as old as five years old*". The surgical hand scrubbing procedure has been used in the operating theatre for more than five years without being revised. With time and ongoing research studies things change, hence the surgical hand scrubbing procedure needs to be changed. *"They no longer take to below elbow" and "the last two end steps", "they no longer do the wrist, the last one it's not necessary"*. Some participants have learned that there is a new scrubbing procedure that is used by other operating theatres whereby some steps of the procedure have been removed, like reaching the elbow when scrubbing and the last part of the procedure where the wrists are taken care of.

Strategies

The participants indicated the following strategies to be implemented:

- *"The theatre sisters and management has to develop those policies"*. The policies and the standard operating procedures is considered to be the responsibility of those in management.
- *"The scrubbing procedure needs to be revised"*. The surgical hand scrubbing procedure and other theatre procedures as well need to be revised and adopt the new procedure used universally.
- *"Policy processes need to be converted into plans of actions and have to be audited"*. The surgical teams suggested that the policy and procedure enhancement should be done and then be transformed into plans and actions that have to be audited periodically.

Written policies, procedures, standards and guidelines will prevent confusion within the institution and departments, they foster coordination of activities on how to perform a task and incorporate recommended practices to patients (Bahadur, 2014:n.p; Phillips, 2013:16). Work place practices are best regulated by written and communicated policies, procedures, guidelines and standards for performance and behaviour, and should be applied in the handling of grievances, disputes, discipline and retrenchment

(Muller et al, 2011:381). According to (2011:2), the management of every healthcare organization or department need to develop guiding principles, policies, procedures and standards. These should include economic and health perspectives, competences, responsibility and ethics. Again, the hospital management and operating theatre nurse managers have to provide the hospital and departments with the Public Service Staff Act and Code, Personnel Administration Standards (Booyens, 2008:37).

In addition, the management must set up quality assurance and risk management programmes (Booyens, 2008:39). Policies that need to be developed should include purchasing of equipment and supplies, education and training, cleaning, sterilization and disinfection of medical devices, health and safety, surgical hand scrubbing, gowning and gloving, waste management, theatre attire and management of water services (Vearnicombe, Card, Civino, Henning, McGeer, Piaskowski, Roth, Horne, Zoutman & Bountovics, 2007:34; Ngwenya, 2012:4, Alberta Health and Wellness; 2008:4; Vaele, Moss, Pfister and Adams 2010:16; Viessman, Hammer, Perez and Chadik, 2009:25).

4.2.1.2 Supervision

Supervision refers to the action or process of watching and directing what someone does or how something is done, in other words is the action or process of supervising someone or something (The Merriam-Weber Unabridged Dictionary, 2014).

Challenges

“There is poor supervision in the operating theatre”. The operating theatre is supervised and managed by two nurse managers, participants feel that the surgical teams are poorly supervised when executing the surgical hand scrubbing, gowning and gloving procedure and other theatre procedures, probably that is why they do not comply with the steps of surgical hand scrubbing, gloving and gowning procedure. *“I don’t know how much time they spend on supervision”*. The operating theatre nurse managers do not have time to supervise the department and other issues pertaining to the operating

theatre such as the follow up or supervision on the quality of supplies that are used and infection control issues.

"When they tell the personnel, this is the way it should be done, they are resistant, they don't want to follow, and they say I want things to be done my way+. Meanwhile, some participants felt like the surgical teams and theatre personnel are very resistant to the nurse managers - they do things their way and do not want to be corrected and supervised. As a result the nurse managers become frustrated.

Strategies

Participants decided on the following strategies concerning supervision:

- For the operating theatre to function well, the nurse managers have to be serious with the supervision of the surgical teams as well as the other theatre staff. *"The theatre nurse managers must supervise theatre personnel"*. The surgical teams would like to see the nurse managers doing proper supervision during the surgical hand scrubbing, gowning and gloving procedure in the operating theatre and on other procedures that are done in theatre.
- The operating theatre nurse managers and the surgical teams agreed on two issues concerning supervision of the theatre department, namely:
 - The surgical teams suggested that the theatre personnel should learn to practice supervision among themselves as team members.
 - Both groups of participants (the surgical teams and the hospital management) suggested that the operating theatre should have *somebody senior+* (a head of department who is a surgeon and from the general surgery discipline), and a theatre matron who is stationed in theatre department. The participants indicated *"In our case we don't have, is just the sisters managing the theatre"*.

According to Muller, et al (2011:3, 71) the success of management depends on competence of managers with specialized and general abilities of knowledge, skills, attitudes and values. Adding to that, the operating nurse managers have to adopt a participative management style, which is the process of interactive decision-making and

problem solving, shared governance, ownership, accountability, organizational transformation, empowerment and applicable and good communication skills. The operating theatre nurse managers must refer to the standards of care and practice that are governed by the statutory law of professions and professional code of ethics, norms and moral for acceptable of safe practice and good supervision (Booyens, 2008:39).

Close and Castledine (2006:274) suggested that the operating theatre nurse managers must ensure quality control through policies, procedures and standards that are understood and followed by the surgical teams. Furthermore, nurse managers were encouraged to constantly remind the surgical teams about the importance of teamwork and to conduct regular departmental meetings to discuss best way of quality delivery. Operating nurse managers need to supervise all aspects of the operating theatre and CSSD activities (Vearnicombe et al, 2007:34, Ngwenya, 2012:4; Aydin, Esen, Gunaydin, Gurler, Orztuk, Percin, Samasti, Sanic, Cetinkaya & Zenciroglu , 2008:11). Last but not least, the operating nurse managers should adopt the system of peer review of individual performances (Booyens, 2008:39).

4.2.1.3 Leadership

Leadership influences relationships among the leaders and followers who intend real changes that reflect their shared goals and effective leadership leads to competent, motivated healthcare practitioners who are the most valuable assets of the institution or organization (Muller et al, 2011: 417).

Challenges

“There is no leader in theatre”; *“Generally when you want something to be followed you put somebody as a leader and people follow”*; *“When things are not in order, the leadership comes”*; *“I don’t know whether we have no heads at all”*. The surgical teams see the operating theatre department as without a leader, according to them a leader is followed by the subordinates and a leader is supposed to bring some order when things are not going well. *“I think they don’t look at theatre as their territory or their kingdom”*. The operating theatre nurse managers don’t see theatre as their department territory or

kingdom, because *“They could not enforce some discipline on surgical teams, and no one is above and no one is below”*. The nurse managers are failing to instil discipline to the surgical teams and other theatre personnel and from the look of things no one is above another they do as they please. *“This is beyond touch”*. The situation is beyond control and this really lowers the standard of practice in the operating theatre.

Strategies

To strengthen leadership in the operating theatre, the following strategies were suggested:

- The hospital management and operating theatre nurse managers should be strong enough to handle issues and challenges pertaining to their department.

According to Muller et al (2011:3) the operating theatre nurse managers require certain abilities to become real leaders of the operating theatre. These abilities include: interpersonal abilities which are the skill required to lead, enable and motivate the staff (surgical teams) towards goal achievement; conceptual abilities that is a mental capacity to view the department in a holistic manner based on thinking, analytic and planning; and technical ability refers to the application of several sciences by utilizing and integrating operational information.

Operating theatre nurse managers should have communication skills that will assist the surgical teams in developing surgical conscience and credit should be given if due or when an error is admitted. Above all, the operating theatre nurse managers should be friendly, trusting, show concern, listen, consult and be open for suggestions (Booyens, 2008:422; Phillips, 2013:17). It is quite possible for leadership to enable ordinary people to produce extraordinary things in the face of challenges and change and reflect shared goals through influence, purpose and personal responsibility (Muller et al, 2011:415).

4.2.1.4. Authority

Authority is the power assigned by another to enforce laws, exact obedience and command, determine or judge (American Heritage Dictionary, 2009).

Challenges

"The sisters doesn't have the right and the authority to tell that person that 'this is not the real thing here'". "We don't have full authority over the staff". "Issue of concern, is being unable to discipline our staff when they have done something wrong"; "You find that your hands are tight in terms of addressing disciplinary issues so I don't know how that can be done to our Government employees by having the autonomy to be able to discipline the staff". Theatre nurse managers and the hospital management do not have the authority to discipline the surgical teams, theatre personnel and support staff from other hospital departments if they are misusing the theatre attire and theatre supplies as well as other issues pertaining to the theatre and hospital departments. The Ministry of Health is the one that have the full authority to do to discipline the personnel

Strategies.

Participants agreed on the following strategies concerning authority:

- Participants are of the opinion that the Ministry of Health should be asked to grant the hospital management and operating theatre nurse managers full authority to be able to discipline the surgical teams as well as other hospital staff

The manager or supervisor should have authority and the power to give orders and to discipline subordinates and influence inherent in management(Booyens, 2008:664-665).

4.2.1.5 Human Resource Availability

Human resource is complex, it requires a great deal of care and attention, it is responsible for the hiring and training of new employees, for implementing the strategies and policies set for the company. Furthermore, they are responsible for making the most out of a company's work force while minimizing financial risk (Business.com Media, 2014).

Challenges

“We are seriously short staffed”; “Really, it’s hectic, staff shortages”; “We are talking about the staff numbers”; “What I can say is that we need more staff”. The operating theatre as well as the entire hospital has a challenge of shortages of staff members. The shortage of personnel is unbearable, this applies to surgical teams as well as the other theatre personnel. *“Sometimes you find that you have to wait at the gowning table for someone to tie you at the back”; “We find ourselves waiting for 5 to 10 minutes for someone to come to tie you at the back”; “Sometimes you have to shout ‘can someone help me’”; “The circulating nurse may come from the another room”; “Anybody please help”; “This delays the surgical procedures”.* In some instances there is no circulating nurse to assist during surgical hand scrubbing and gowning and gloving procedure and with the operating theatre procedures. To get assistance you need to shout for help to be heard in another room and this delays the surgical procedures starting and finishing time. It is difficult to work in harmony if one person has to run around the rooms trying to do work that has to be done by other people who are not available in the theatre. *“Some people have burn out”.* The surgical teams complained that due to insufficient numbers of theatre personnel, they work hard and now they have lost interest in their work because they experience some burnout which results in doing short cuts during theatre procedures and resistance to continue to work.

“That is why in theatre there should be the head of department and theatre matron”. Some important posts are left vacant, for instance in the operating theatre there is no head of department and a matron to manage the department. *“We write about the kind of issues to the Ministry”,* but *“when it comes to hiring of staff the hospital get staff from*

the Ministry of Health who work hand in hand with Civil Service Commission". According to the hospital management, the Ministry of Health in collaboration with the Ministry of Public Service are responsible for the hiring and dismissal of the personnel in this hospital, hence the hospital management and theatre nurse managers are unable to employ additional staff unless they negotiate with the Ministry of Health. This results in some important posts being left vacant in the operating theatre and other hospital departments.

Strategies

The issue of staff shortages in the operating theatre made the participants to suggest the following strategies:

- *"We need to increase the number of posts". "It's a matter of increasing the posts so that we can get the more people on the ground to actually deliver the work"*. The hospital management will have to increase the number of posts in the hospital and request the Ministry of Health to employ more personnel for the hospital and the operating theatre.
- The hospital management have to provide the hospital with human resources of different cadres and specialties.

Muller et al (2011:254,547) and Booyens (2008:37,39) suggest that the relevant authorities have to engage in planning, recruiting and providing processes of human resource with different types of professional specialities and highly skilled personnel and develop professional personnel as well. The hospital should employ enough personnel for all the departments and cadres that are based on the ratio of healthcare workers to the population in the category of all the hospital personnel to ensure safe standards of delivery. Management and nurse managers should have motivational strategies for personnel to maintain high productivity levels and for retention of staff (Booyens, 2008:451). Periodic performance appraisals for the staff need to be done by managers of departments to assess the strengths, weaknesses and development needs of an employee in order to improve productivity (Muller et al, 2011:356, Booyens, 2008:551). Since the health status of personnel, such as disease burden and death has an impact on human resource availability, the management and nurse managers should

encourage all the personnel to go for physical examinations and treatment of medical conditions (Strydom & King, 2009:822).

4.2.2 Supplies

Supplies refers to provision that supply the needs or wishes of the personnel and making it available for use (Merriam-Weber Dictionary, 2014:n.p).

Subthemes regarding supplies include antiseptics, surgical gowns, surgical gloves, surgical attire and procurement of supplies.

4.3.2.1 Antiseptic Solutions

An antiseptic is a substance which inhibits the growth and development of microorganisms (Free Dictionary, 2014:n.p).

Challenges

“We are using only one antiseptic solution”. “Sometimes we go without antiseptics for scrubbing”. The hospital has only one type of antiseptic solution that is commonly used, namely betadine antiseptic solution, but this solution is sometimes not available in the entire hospital as there is no constant supply from the Central Medical Stores.

“But I heard that the pharmacy do have alcohol”. “After scrubbing you will then rub alcohol in your hands or your arms”. The surgical teams have an understanding that the hospital pharmacy does keep alcohol for a surgical hand scrub. *“The alcohol came with a lady from Taiwan”. “Was responsible for refilling alcohol dispensing machines”, “Machines are now broken+.* It looks like the alcohol was a trial project from Taiwan Medical Mission and the person who was responsible for it left the hospital. Some of the alcohol dispensing machines are broken and the available containers of alcohol are always empty as no one is responsible for refilling the alcohol dispensing machines. *“Maybe it was personalized, as ‘her’ project”. “Such activities doesn’t have to be an individual’s responsibilities”.* The surgical teams think that the project was owned by the sponsors and did not allow other people to be involved.

Strategies

The surgical teams would like the hospital management to provide them with antiseptic solutions:

- *“We have to get another type of antiseptic, if someone is allergic to this one he can opt to this one”. “I’m suggesting that we can use both alcohol and betadine”.* The hospital is expected to make different types of surgical hand scrubbing antiseptics in the operating theatre available.
- *“There should be consistent supply of scrubbing soaps”.* Antiseptic solutions used for surgical hand scrubbing should be reliably supplied and always available in the operating theatre.
- *“Someone has to be responsible for fixing alcohol machines”.* The broken alcohol dispensing machines should be in good working order and always filled with alcohol.

The different types of antiseptics for surgical hand scrubbing should be available in all operating theatres for surgical teams to choose from in case of skin reaction and irritation (Dowson, 2008:n.p; Phillips, 2013;275). Antiseptics that contain chlorhexidine, iodophors or triclosan are highly recommended for surgical hand scrubbing because of residual activity against microorganisms, moreover, the scrubbing antiseptic solution should cover all the aspect of the hand and the arm to the elbow completely, during the scrubbing the process (Close & Castledine, 2006:173). Antiseptic solutions should always be used in full strength and be correctly labelled with clear description of properties contained in the solution (Dowson, 2008:3). It is highly recommended that antiseptic hand scrubbing solutions with pump-action dispensers should be used in theatre (Close & Castledine, 2006:185).

4.2.2.2 Surgical Gowns

A surgical gown is a garment that is worn by the sterile surgical team just after a surgical scrub before performing a surgical procedure to prevent transfer of infectious agents (Rogester & Croes, 2013:n.p)

Challenges

The surgical gowns are one of the major challenges that are faced by the surgical teams in the operating theatre of this hospital.

“You have to use a smaller gown and adjust on a smaller gown exposing yourself to infection.” “So you find that the gowns for other surgical procedures either are too short, the sleeves are half way your arm and the back is open”. The surgical teams are made to wear short small gowns that do not cover the back completely and also have short sleeves, whereas, a surgical gown has to be big enough, of a good length and has sleeves covering the whole arms and protect the surgical teams from infection. *“Gowns are old and torn and are patched with a tape”*. There is a shortage of surgical gowns in this operating theatre, most of the gowns are old, torn and tape patched. Torn surgical gowns are not supposed to be used in the operating theatre as they put at risk and expose both the surgical team and the surgical patient to contamination. *“We use artery forceps to fasten the gown if there are no ties”*. Most of the time the surgical gowns have no straps or ties and an artery forceps is then used instead - this unintended use cause damage to the instrument.

“The cuffs can be abrasive, now you are compromising lives of both the patient and yourself, we don’t want broken skin there”. Sometimes the cuffs of the old surgical gowns become very tight with repeated exposure to autoclaving such that the surgical teams cannot pass their hands through and the cuffs bruise and cause abrasions on the hands and wrists. Abrasions to the hands expose the surgical teams and the patient to infection.

“Gowns are portioned in this theatre” depending on what procedure you are going to do”; *“When people are scrubbing for orthopaedic procedures, they need a high sterility than when scrubbing for other procedures”*. Gowns are portioned, in this operating theatre and the best surgical gowns are reserved for the orthopaedic cases. As a result the other surgical teams feel their disciplines and surgical procedures are not important in terms of sterility in the operating theatre

"We have good gowns that are wrapped around but are not enough for everybody". The nurse managers said there are also good quality gowns which wrap around, called ortho gowns because they are mostly used in orthopaedic procedures., However, they are not enough to be used by all the surgical disciplines. When surgical gowns are not available in the operating theatre all booked cases are cancelled to the detriment of the patients, surgical teams and surgical ward nurses and it causes a back load.

Strategies

Concerning the surgical gowns, the surgical teams suggested the following:

- Supplies of surgical gowns must be improved in theatre.
- Torn and old gowns should be removed from circulation and never be used.
- *"Packing should be according to the size like medium, short or large."* The surgical gowns should be packed and labelled according to sizes to make it easier for the surgical teams to choose the size of the surgical gown.
- The support staff in CSSD should be well oriented about surgical gowns and no gown should be packed without tie bands and with tight cuffs.
- *"Surgical gowns should be standard for all the surgical disciplines"* and it should be well distributed for use by all the surgical disciplines.
- The hospital should purchase new surgical gowns which are a wrap around.
- The disposable surgical gowns and drapes need to be available and to be used by the orthopaedic surgery or for surgical procedures where a lot of fluid or blood is anticipated.

A sterile surgical gown is worn over a scrub suit to permit the wearer to enter into the sterile field (Phillips, 2013:276). Surgical gowns should be grouped according to sizes, checked for holes and tears (Aydin et al, 2008:43; Piere, 2010:108). Material for surgical gowns should be resistant to penetration of blood and body fluids, comfortable and not produce wearers body sweat (Phillips, 2013:276; Rogester & Croes, 2013 n.p)

4.2.2.3 Surgical Gloves

Surgical gloves are sterile gloves that can be latex or silicon, that are worn by the sterile surgical team members before performing a surgical procedure. They should be thin enough not to interfere with the touch sensation or digital dexterity (Phillips, 2013: 267).

Challenges

“The type of glove quality is not good”; “gloves are of poor quality”; “they get torn during the surgical procedure”; “sometimes you find that the gloves have not been touched, but is already torn”; “and they have holes”; “Pair of gloves with pores results in some blood stains inside the hands”. The type of surgical gloves that are used in the operating theatre are of poor quality with visible and non-visible pores, getting easily torn and punctured and put the surgical team at risk of contamination with body fluids and needle pricks during the surgical procedure. *“Some gloves don’t have powder+ and “they become very, very difficult to put on up to the end, they stick at the finger tips and doesn’t go up to the end”.* This also makes it difficult to handle the instruments during the surgical procedure, thus this process delays the commencement and finishing of the surgical procedure.

“Sometimes, we don’t have enough gloves especially extreme sizes, you find that is out of stock”; “Size 7 and 7.5 are not always available”; “Those gloves they run out quickly”. Because of shortages surgical team members are forced to put on smaller sizes on big hands and big sizes on small hands. *“The glove size affect me, I develop cramps when using small gloves”; “When my hands are tight I don’t work nicely”; “With big gloves when doing the procedure you cannot even hold properly the tools”; “Putting at risk the patient, that is the problem”.* Wearing wrong sizes puts the surgical patient in danger of injuring internal organs and delicate structures, during the surgical procedure. *“And on top of that you don’t have gloves with very long cuffs, to cater for that space that is left out by the short gown”.*

“We just hope and wish to have two types of surgical gloves just in case a reaction occurs.” Furthermore, the operating theatre has only one type of surgical gloves which is made out of latex and there is no substitute for surgical team members who are

allergic to latex. This creates conflict among the surgical team members as the ones with an allergy problem rather want to circulate because gloves are then worn for a short time.

There are conflicting opinions about double gloving: *“We once had gloves which had pores, so we had to double glove; “As a surgeon how are you going to feel the touch when you are double gloved?”; “Double gloving also contributes to shortages of supplies”; “It stick into the surgeons minds that we are still using those poor quality gloves, so they are still double gloving, although now we have better ones”.* Nevertheless, the hospital management mentioned that, at times the operating theatre is supplied with good quality gloves.

Strategies

The following is suggested regarding surgical glove supply and use in the operating theatre:

- *“The pharmacy should order for us good quality gloves”* The hospital should provide the operating theatre with gloves that are of good quality.
- The hospital management and the operating theatre nurse managers need to provide different surgical glove sizes for the surgical teams to choose from. .
- Silicon surgical gloves should be made available in the operating theatre for those surgical teams who are allergic to latex gloves.
- Supplies like gloves and other products should be supplied in adequate quantities in the operating theatre.

Sterile gloves should be worn by the sterile surgical teams for all invasive procedures, if available sterile colour glove liners are worn underneath the glove to act as an indicator when a glove has been punctured (Cooper, Wallace, Archman, Hamphries & Howes, 2009:79; Phillips, 2013:270). All the sterile surgical teams should wear well-fitting latex sterile gloves when performing a surgical procedure. Sterile gloves are packed in pairs

with an inverted cuff to protect the sterile outer surface of the glove during donning and gloves must be changed if it becomes contaminated, to prevent contamination of team members, after the procedure and should not be washed. It should be removed in a manner that minimizes contamination (Phillips, 2013:273; McDonald & Evans, 2008:n.p). Selection of surgical gloves should be worn during specific procedures and depends on: the length of the surgical procedure, the need to double glove, stresses to which the glove is exposed, chemical exposure to the gloves during the surgical procedure, care giver and potential sensitivity and individual preferences (Phillips, 2013:257). Wearing two pairs of gloves is recommended as it reduces the risk of contamination with blood and body fluids during the surgical procedure and when the patient is suspected or known to be infected with transmissible microorganisms (McDonald & Evans, 2008:n.p).

4.2.2.4 Procurement of Supplies and Equipment

Procurement is the process of acquiring supplies and services through a special effort, from third parties and from in-house providers. The process spans the initial concept through to the end of a services contract or the end of the useful life of an asset (Dictionary.com: 2014:n.p).

Challenges

“Procurement not done by our hospital but by Medical Stores”. The hospital is not involved in the procurement of supplies - procurement is done by the Central Medical Stores in conjunction with the Ministry of Health which further supplies all the public hospitals, health centres and the clinics. *“Even though our orders go by due time, sometimes the procurement is unable to purchase the items at that particular time”* The hospital does not receive the ordered supplies in time *“think that we have serious procurement issues”*. It results in shortages of supplies for the hospital and operating theatre if the delivery of an item has been delayed.

“Late payment or non-payment affects the delivery of supplies.” When suppliers have not been paid or when payment has been delayed, the ordered supplies are delivered at a very late date and sometimes are not delivered at all, unless a new requisition is made. *“Procurement system is complicated and we don’t have a way to buy if are we out of tender”*. If suppliers of a certain item are out of tender, that specific item will not be supplied or delivered until the supplier has been awarded a tender to supply.

Strategies

The following strategies are suggested regarding the procurement of supplies and equipment:

- *“Theatre sisters should be part of procurement”* as they know the needs and requirements of the surgical teams.
- *“The Ministry of Health needs to try to solve the problem of procurement as soon as possible”*
- *“The operating theatre needs a small budget for perishables”* This will assist them to purchase items when they run out of stock.

According to Sandham (2008:n.p), when purchasing an item you should know very well about the product and its functions and then select the suitable suppliers for the item you want to purchase. Invitations to tenders are then made indicating the contracts, conditions, specification and financial and technical proposals. The price and other conditions of the tender should be negotiated with the suppliers. During delivery of an item it should be inspected if is in good condition and fully functional and then paid for. The records of purchasing, delivery and maintenance should be kept at least for six years after purchasing the product (University of Cambridge, 2008:n.p).

4.2.2.5. Surgical Attire

Surgical attire is the clothing worn in the operating theatre and during surgical procedures to protect the surgical site from sources of contamination as well as the surgical teams (Feistritzer, Beauchamp & Higgins 2008:n.p).

Challenges

There is a shortage of theatre attire in theatre, which includes shortage of all components of theatre attire; caps, theatre shoe covers, surgical clogs, surgeons' boots, pant suits and dresses. The surgical attire is old and there are a few dresses so you are bound to wear pants even if you do not want to wear trousers.

"We are made to dress like market women". The surgical teams are made to cover their heads with linen, towels or shirts and to wear theatre caps repeatedly for several days until torn. The theatre attire (pant suit and dresses) is often used by the personnel from other departments: *"they steal the attire from theatre and laundry"; "The attire is being used as protective attire in the wards".* There is poor control of surgical attire. *"The casualty staff use the theatre attire, they go out to meet people from outside"; "They mingle with outsiders".* Due to the architectural structure, the casualty department is adjacent to the operating theatre, there are areas which are shared by both departments and the staff wear the surgical attire. The challenge is, the casualty staff moves around the hospital with the surgical attire without an over gown and come back to casualty and theatre, the surgical teams now fear for contamination from the casualty staff.

"Personnel from the other departments when asked 'why wearing theatre attire'? They just say, 'you are not my supervisor', 'this is not yours, and is the hospital stuff'; "We are threatened, insulted and called names 'batsi sadvwalaphela tsine"; "Even the administrator wrote a memo about theatre attire". The operating theatre nurse managers are failing to discipline the hospital staff concerning the theatre attire issue, such that they meet resistance, and attitude, and are also being threatened by the hospital staff when talking about the misuse of the surgical attire...

Strategies

The participants want the hospital management to intervene in the surgical attire issue using the following strategies:

- The hospital management need to devise a method to control the theatre attire especially the scrubs in the hospital departments
- The hospital management is requested to provide the other hospital departments with attire with a different colour from theatre attire to use as protective clothing.
- The operating theatre personnel should know and put into practice that they have to change the attire when using outside passage or to use an over gown.
- The theatre attire should be improved especially supplies of masks, goggles, theatre caps and shoe covers.

The operating theatre personnel should wear facility approved, clean and freshly laundered surgical attire every day. The material should be visible to soil, easy to wear and low in lint (Vaele, Moss, Pfister & Adams, 2010:11). The surgical teams should wear theatre suit or scrubs that are convenient for the personnel to change in the event where there is penetration of blood and body fluids, through the surgical gown (Rogester & Croes, 2013:n.p).Surgical caps and hoods should be worn to ensure all hair is completely covered and to avoid hair falling into an operating field (Vaele et al, 2010:15).To complete the attire, the operating theatre personnel should change footwear into surgical clogs and sterile team members are advised to wear boots especially when there is anticipated risk of blood and body fluid contamination (Phillips, 2013:270). Face masks should be worn in restricted areas of theatre and eye protection should be provided for protection where there is a risk of blood and body fluids (Close & Castledine, 2006:175). Theatre attire is only worn in the operating theatre, when the staff leaves theatre they should change to street clothes. In case of emergency where an item is needed urgently a cover gown with long sleeves is worn over the attire and should completely cover the attire (Vaele, et al, 2010:13).

4.2.3 Physical Facility

A physical facility is a place designed or build to serve a specific function affording a convenience of service (Free Dictionary, 2014:n.p).

Sub-themes regarding the facility include the outlay or structure, water supply, scrub sinks, safety boxes or lockers, operating theatre doors, admission and discharge areas.

4.2.3.1 Layout / Structure

Layout or structure is an arrangement, plan or design in detail of a building of an organization (Your Dictionary, 2014:n.p).

Challenges

The casualty department is attached to the operating theatre and the casualty staff use theatre change rooms and the septic theatre is shared by both the surgical teams and casualty staff. *“You find our casualty staff walking around the hospital with the theatre attire and go back without changing”,*

“The passage between theatre and casualty is used as a common passage”. The theatre passage in question is used by the personnel, visitors and patients from other hospital departments and is in the unrestricted area. The design of the passage contains a risk for infection control as it contaminates the operating theatre because of the traffic and its location.

Strategies

The hospital management and the surgical teams forwarded these suggestions:

- The casualty department should be separated from the main operating theatre.
- The hospital management has to locate space and move the casualty department.
- The operating theatre has an open corridor at the back next to the kitchen, it needs to be renovated and then used for transportation of dirty and contaminated instruments, linen and waste.

The design and location of the operating theatre complex is one of the most important components of asepsis, should be located in a blind wing, on the top or bottom floor away from the inpatient area and flow of traffic, and accessible to critical and surgical

wards. Signs should be posted that indicate attire and environment controls and all personnel should follow delineated traffic patterns (Sapna, Majumdac & Vendatec 2011:9; Phillips, 2013:177). Artificial lighting should be controlled to prevent destruction of video equipment (Phillips, 2013:177).

Both theatre and hospital personnel should consider and respect the three transition zones of the operating theatre, as outlined by Phillips (2013:177-178) Sapna et al (2011:9).

Unrestricted Area: Street clothes are not permitted as well as the traffic like personnel from other departments, patients and visitors.

Semi-restricted Area: Traffic is limited to authorized theatre personnel with proper attire. This area includes theatre peripheral areas like CSSD department, anaesthesia, non-sterile and sterile store rooms, recovery room, tea room, offices, conference room and access clean corridors.

Restricted area: This area is restricted to only surgical teams and surgical patients. Face masks are required to supplement the attire. Surgical procedures are performed under carefully controlled conditions with the goal of minimizing contamination by pathogens.

4.2.3.2 Water Supply

Water supply refers to a source, means or a process of supplying water usually include reservoirs, tunnels, and pipelines (Mirrian Webster Dictionary, 2014:n.p)

Challenges

The hospital as a whole has a challenge of water supply. *“We sometimes experience problems of water because the pipes are very old and leaking”*; *“Taps are leaking, there is no control of the water”*; *“Some water taps are leaking and broken”*. In some parts of the hospital including the operating theatre, water pipes are very old, some pipes are blocked and leaking. The piping system issue even affects the performance of the

autoclaving machines that are used for sterilizing the surgical gowns, linen and instruments, as it needs large quantities of water.

“Really, telling me to spend 5 minutes under that cold tap, you will be taking me to an uphill+. Most of the time cold water is used for surgical hand scrubbing, especially in winter because there is no hot water, yet the surgical teams are expected to perform the surgical hand scrub without compromise. *“When water is cold I just rinse my hands and rush for a gown”; “Like crossing the river”.* Using cold water for scrubbing contributes to the compromise of the surgical hand scrubbing procedure. Geysers are damaged by the poor water supply in the theatre, which reduces the flow and sometimes cuts off the flow of water to the geysers.

“Sometimes there is no water in the hospital yet you are expected to scrub”; “Sometimes we use stagnant water for scrubbing”; “When there is no water a circulating nurse pour water from a bucket to your hands and arms using a container- like jar”. When there is no water the surgical teams are still expected to do a surgical hand scrub to be able to perform the surgical procedures. Surgical teams who are scrubbing are assisted by the circulating nurses to scrub by pouring water on the hands and arms of the scrubbing team members. *“The sisters organize twenty litre containers for collecting water from outside the operating theatre for scrubbing”; “The water is sometimes kept on containers for weeks or months to be used for scrubbing when there is no water”; “Sometimes we use intravenous fluids for scrubbing for emergency patients”.* In case of emergencies intravenous fluid solutions like Normal Saline and Ringers Lactate are used for surgical hand scrubbing when there is no water. During the rainy season, water is usually muddy or brown and it contaminates the sterile packs as this water is used during the sterilizing process.

Strategies

Participants suggested that

- The Water Service Management should be working towards improving the hospital's water supply by replacing old pipes and tanks that are blocked, leaking and broken. This will improve the water flow and supply to various departments.

- There should be installation of large water tanks in the operating theatre and in other hospital departments to provide clean running water to the hospital.
- It was suggested that the hospital should try to do water harvesting to cater for water shortages.

The hospital should practice good water management in correcting the deficiencies and making improvements as well as to meet social and economic goals (Viessman, Hammer, Perez & Chadik, 2009:25; Strydom & King, 2009:425). Integrated water management is required by this institution or hospital to drive water resources decision making processes as suggested by other researchers (Viessman et al, 2009:34). Viessman et al (2009) suggest that pipelines should be changed and be expanded with gate valves, check valves and air release valves to improve water supply. Water is a scarce resource, therefore, in places where water is a challenge it is advisable to store water in tanks for future usage (Strydom & King, 2009:426).

4.2.3.3 Scrub Sinks

A scrub sink is a plumbing fixture equipped to enable medical personnel to scrub their hands prior to a surgical procedure. The hot and cold water supply is activated by a knee-action mixing valve or by wrist or foot control (Dictionary of Construction, 2014:n.p).

Challenges

“We have a challenge of touching the tap of the water with our hands when scrubbing”;
“We don’t have elbow taps and the sinks are small in our casualty theatre and that affect for the purpose of infection control”. In septic theatre the scrub sinks have no elbow taps and are not deep enough, making it difficult to perform a surgical hand scrub.

Strategies

The surgical teams would like the following to be done concerning scrub sinks in the operating theatre:

- Proper scrubbing sinks should be installed in the operating theatres.
- *“Scrub sinks in theatre must have elbow tabs”* All scrub in sinks in operating theatre should have taps with handles that can be controlled with elbow because after a surgical hand scrub, tap handles should not be touched by hands to prevent hand contamination.

Scrub sinks should be deep, wide and low enough to prevent splashes (Phillip, 2013:74). Scrub sinks with automatic sensor controls or foot or knee operated faucets are ideal for a surgical hand scrub to eliminate contamination (Phillips 2013:274; Sapna et al, 2011:13).

4.2.3.4 Safety Boxes or Lockers

A safe deposit box is used to store valuables, can be accessed with keys, pin numbers or some other security password. Valuables such as documents and jewellery are placed inside and customers rely on the security of the building to protect those valuables (Investopaedia, 2014:n.p).

Challenges

There is no safety box or a safe place that is lockable in the operating theatre for keeping valuables of the surgical team. The surgical teams have lost their valuables such as wedding bands, rings and watches. There is no person responsible for keeping valuables safe in the operating theatre.

“Personally, I don’t remove my ring (laughing) because I have a feeling that if I remove it there will be no way to place it”; “I kept it somewhere and failed to find my ring, it’s a problem at home because my wife don’t understand”; “You put your nice ring there and you will never see it, and it could have cost you so many dollars and it disappears”. The surgical teams have lost their valuable items in the operating theatre, such as rings, bracelets, earrings and wrist watches, and it cannot be replaced. Surgical teams are

expected to remove their jewellery before commencing on the surgical hand scrubbing procedure, as jewellery harbours microorganisms and may contaminate the surgical site, but they will rather keep it on during surgery than to take the risk of losing it.

Strategies

The surgical teams decided on the following to be done concerning valuable items

- A safety box that is lockable for keeping valuables of the surgical teams should be provided.
- *“The matron or sister in charge should be responsible for the safety box+.*

Phillips (2013:178) also indicate that the operating theatre should provide lockers to safe guarding the surgical teams and patients clothing and valuable items.

4.2.3.5 Operating theatre doors

A door is a movable structure which can be a hinged or sliding panel used for opening and closing an entrance of a room or for giving access to something (Dictionary.com, 2014:n.p).

Challenges

“We are unable to control the passage traffic, close the doors and lock the theatre”;
“After

hours our theatre is not locked”; *“They steal the attire even the gloves and our abdominal swabs disappear”;* *“Somehow they disappear and we end up with the old stock most of the time”.* These are problems that occur as the entrance doors are not locked after hours. It is important to keep the operating theatre doors closed to prevent the room air pressure exchange of positive and negative air thus reducing contamination. Again, locking the operating theatre entrance doors will from being stolen and will control the unwanted traffic on the common passage leading to casualty department.

Strategies

Participants agreed on the following

- All operating theatre entrance doors should be locked when theatre is not in used after hours to save supplies and equipment.
- All operating theatre doors should be kept closed for infection control purposes and to reduce unwanted traffic.

It is supported by Cooper, et al (2009:102) that operating theatre doors should always be kept closed except when necessary for passage of patients, supplies, equipment and theatre personnel. Doors should always be closed because if left open the positive air pressure in the operating room equalizes with negative air pressure in the hallway, thus mixing air from the operating room and the corridor that are likely to have a high microbial count (Phillip, 2013:258). Control of movement in and entry into the theatre environment is important in reducing airborne contamination, the closing of doors optimizes the efficacy of the ventilation system (Sapna et al, 2011:9).

4.2.3.6 Admission and Discharge Areas

The admission area is an entrance place or area where surgical patients are received and enter the operating theatre when going for their surgical procedures, while a discharge area is a place where surgical patients are sent from the operating theatre to surgical wards, intensive care or high care post-surgery (Phillips, 2013:178).

Challenges

“The receiving and discharging areas are not separated”; “Is not good for patients to see each other especially because anaesthetized ones behave differently and is scary to conscious patients”. The operating theatre uses one room as an admission and discharging area of the surgical patients. In a normal situation the admission room should be separated from the discharge room, surgical patients pre- and post-operatively should not see each other to alleviate anxiety.

Strategies

Participants agreed with one another that:

- The admission and discharge areas for surgical patients in the operating theatre have to be separated.

Phillips (2013:178) is of the opinion that preoperative admission and holding areas for surgical patients should be provided and must ensure privacy and for close observation and monitoring before a patient is sent to the operating room. The recovery area or unit should be separated from the admission area and should be next to the discharge area away from the admission area to avoid patients from seeing each other (Phillips, 2013:179).

4.2.4 Equipment

Equipment refers to the necessary items or set of articles needed for a certain activity or purpose (Merriam Webster Dictionary, 2014:n.p).

Sub-themes regarding equipment are autoclaving machines, laundry machines and maintenance of equipment.

4.2.4.1 Autoclaving Machines

An autoclave machine is an apparatus used for sterilizing surgical instruments, surgical packs and other hospital equipment where by special conditions of pressure and temperature are applied for a variety of applications for the purpose of achieving sterilization (Woodford, 2014:n.p).

Challenges

“We have a problem with the autoclaves; you may find that the autoclaves are not working”; “The autoclaves, they break down now and again”; “We are unable to autoclave the gowns we need in the operating theatre”; “When they are down, automatically all sterile supplies are not available which gowns are as well”; “The hospital has three autoclaves”; “There is only one autoclave in this hospital that is

working well which is not enough". Autoclaving machines are used for sterilization of surgical packs which consist of surgical gowns, linen for draping, surgical instruments and dressing packs. There are a few number of autoclaves in the operating theatre which are three, two small and one big autoclaving machines, among these only one machine is fully functional which the big autoclave is. The autoclaving machines are a major challenge for the surgical teams in this hospital because most of the time they are not working and this makes it difficult for the surgical teams to perform the surgical procedures when there are no sterile packs.

Autoclaves breakdown lead to lack of sterile items like gowns and other surgical supplies which facilitate the cancellation of surgical patients and postponement of surgical procedures. This results in patients' back load in the surgical wards when surgical procedures are not done according to schedule.

Strategies

The following strategies were to be employed to counter the challenges:

- The hospital management need to purchase at least three big new autoclaves in order to replace the old autoclaves.
- The autoclaves need to be monitored and serviced regularly.

Autoclaves should be monitored by the following controls: administrative monitoring which include policies and procedures; mechanical which are the gauges, parameters, timers, thermometers and recorders; chemical which are indicators like tapes and test packs; and biologic indicators are a comparison of exposed and non-exposed microorganisms to a sterilizing agent (Phillips, 2013:304; Ngwenya, 2012:14).

The operating theatre should use different types of sterilizers and methods of sterilization such as steam, dry heat and gas sterilization to accommodate all the types of items that needs to be sterilized without causing harm of the item, patient and personnel (Aydin et al, 2008:45; Ngwenya, 2012:2). Sterilizing machines should be used according to the manufactures manual, whereas, medical devices should be sterilized according to the manufacturer's recommendation of the product (Vearnicombe et al, 2007:36; Sapna et al 2011:10). It should always be remembered that flash

sterilization should only be used for emergencies and not for implantable devices (Alberta Health and Wellness, 2008:19).

4.2.4.2 Laundry Machines

Laundry machine is the machine used for washing laundry which is; clothing, linen and blankets, using water and detergent (Free Dictionary, 2010:n.p).

Challenges

“I would be glad if there could be many laundry machines and one used for theatre linen only, not to mix our linen with the ward linen”; “The hospital has a few laundry machines that cater for the whole hospital, the Public Health Unit and the Campus Faculty of Health Science”; Theatre laundry is mixed with the other hospital department laundry which is not good in terms of infection control purposes”. The hospital laundry room is also used by other nearby institutions yet, the machines are few. Theatre laundry is washed with the other linen, hitherto theoretically, operating theatre laundry should not be washed with the linen from the wards.

“Laundry affects us when it is not properly working and when they are delaying to bring our laundry”; “Sometimes if the laundry is not working, is because of machine break down, so if the machine is not working, we don’t have enough gowns and linen”. The delay in attendance of theatre linen at the laundry and late delivery of theatre linen and gowns from the laundry has an impact on surgical hand scrubbing, gowning and gloving and on the performance of surgical procedures as well.

“We use coal for steam so that so that they can be able to wash and iron”. “Sometimes there is no coal in the hospital; probably we need a new machine that does not use coal+. The hospital laundry uses a steam machine that is used for ironing the linen and other laundry clothes, this machine is now old and outdated, moreover it uses coal for steam production which is difficult for the hospital to get or purchase, which results in theatre linen shortages.

Strategies

Participants decided on the following strategies to overcome the laundry problem:

- *“Theatre laundry should not be mixed with the hospital laundry”* The hospital should purchase laundry machines to cater for only theatre laundry to speed up the process of washing theatre linen and other theatre items.
- The laundry machines should be driven by electricity instead of the one that uses coal for steam production.

The operating theatre linen should not be washed or mixed with the laundry from other hospital departments. The theatre attire or surgical scrubs should not be mixed with theatre linen and drapes, they must be washed alone and a detergent with fabric softener should be added to prevent linting (Vaele et al, 2010:14). Infected linen should not be mixed and washed with non-contaminated linen (McDonald & Evans, 2008:n.p). Laundry bags should be securely closed before transportation and hospital laundry should not be dry cleaned (McDonald & Evans, 2008:n.p; Cooper et al, 2009:67). Laundry machines should be of a capacity of 50 to 70 kg big, automatic with a safety door interlock system, and should reduce fatigue, be risk free, consisting of high quality inverter system, with easy washing and extracting frequency, multiple sealing system, oil sealing, water sealing and stainless steel sealing (Lijing, 2014:n.p). Good washing machines has a built in timing mechanism that inform the machine about the washing and rinsing process (Johnson, 2014:n.p; Lijing, 2014:n.p).

4.2.4.3 Maintenance of Equipment

Maintenance of equipment is the upkeep of property or equipment to preserve it from failure and decline through regular service and repair of faults (University of Washington, 2013:n.p).

Challenges

“The autoclaves are not serviced but are only fixed when broken”. The machine should not to wait for service until is broken down”; “It’s a matter of ensuring that in between they get serviced”. In this hospital there is no service plan of the equipment especially for the big machinery such as autoclaving and laundry machines they get attended to when are broken.

“Our autoclaves machines cannot be serviced by our biomed team”; “We need to import people from outside the country to come and fix the machines when they are broken down”. Most of the time maintenance and repair of the machines and equipment is done by technicians come from outside the country (South Africa) who has a tender for such a job. *“New machines are taken care by suppliers”.* For the new equipment which is still under guarantee of service, the suppliers of the equipment are the ones that service and repair the machines or equipment.

“Some machines have worked for so many years we need to replace it, but you know that in Government you just use the machine until is old and cannot function well”. There is currently not a replacement plan available. The hospital management has to get permission from the Ministry of Health to replace the equipment which is probably a long process.

Strategies

The participants made the following suggestions concerning maintenance of the hospital equipment:

- *“Regular servicing of equipment is necessary”* .Participants suggested that a service plan for all equipment should be designed and put into practice
- *“We can have a replacement plan after 10 years”.* Participants suggested thatthe hospital management in collaboration with the Ministry of Health should design an equipment replacement plan of 10 years.
- Participants suggested that biomedical engineering staff should be able to service and fix the broken equipment.

Medical equipment in a health institution should be maintained and serviced by the qualified personnel from the biomedical department and should not be in service until it is cleared for use by biomedical department (Phillips, 2013:351). Equipment should be serviced regularly at least four times a year (Ngwenya, 2012:22). Equipment should be maintained by qualified personnel especially from the suppliers (Vaernicombe et al, 2007:16). Equipment should be used and serviced as per manufacturerq recommendations (Alberta Health and Wellness, 2008:19; Vaernicombe et al, 2007:16).

4.2.5 Personnel's Knowledge, Skill and Attitude

The personnel was seen as an important theme for both the hospital management and the surgical teams. The sub-themes regarding personnel include knowledge, attitude and skill.

4.2.5.1 Knowledge

Knowledge is about the level of education, experience and training an individual must have at minimum to be considered qualified for the position (Abu-Ghazaleh, 2014).

Challenges

"The key professional issue of staff is serious" and "we are not combatable with the international standards". Some personnel in the hospital do not have enough knowledge to perform their duties well, this is because they are under qualified to perform to the expected standards required by their work and this mostly applies to the surgical teams, and biomedical staff who can repair the theatre and laundry machines. This really affects the surgical teams and the surgical hand scrubbing, gowning and gloving procedure in terms of the surgical patient booking list and sterile supplies thus, resulting in the cancellation of surgical procedures.

Strategies

Participants suggested the following concerning knowledge:

- The surgical teams need to be knowledgeable about the science behind surgical hand scrubbing, gowning and gloving and on other procedures of the operating theatre.
- In addition, the surgical teams should be provided with regular In-service education to increase their knowledge on surgical hand scrubbing, gowning and gloving.

Knowledge is an important resource and asset of an organization and the department for effective and efficient future process (Muller, Bezuidenhout & Jooste, 2009:155).

Staff knowledge is facilitated by information technology that results in best practices (Muller, Bezuidenhout & Jooste, 2009:156). All theatre personnel have to be well trained and educated to ensure quality (Close & Castledine, 2006:201). Moreover, the personnel working in CSSD must have the knowledge and understanding of the scientific principles of sterilization (Ngwenya, 2012:4).

4.2.5.2 Skill

Abu-Ghazaleh, (2014) defines skill as knowledge application such as the ability to create or manipulate information.

Challenges

"The thing that is confusing to me is what people say to me wash for so many minutes, for 10 minutes, or 5 minutes, 3 minutes... You know different times". Surgical teams are confused by the correct scrubbing time yet they know how to perform the surgical hand scrubbing, gloving and gowning procedure well, the different times make it look like they are doing short cuts .

"We had many instances whereby we run out of water and supplies and to improvise, yet, we would have to continue with the work"; "Sometimes we don't even have the scrubbing solutions to use, such that we start short cuts"; "or have to cancel all those procedures". Theatre personnel and the surgical teams try to perform their duties well by applying every skill they have acquired both at learning institutions and in the operating theatre. They also know how to apply the principles of aseptic and sterile techniques during the surgical hand scrubbing, gowning and gloving procedure but are disturbed by shortage of resources and supplies, this makes the surgical teams to compromise the operating theatre procedures, delays and cancellation of surgical procedures.

Strategies

The following propositions were made by the participants:

- Theatre should have proper induction and orientation programmes for new staff.
- CSSD personnel must be able to display their skills on preparation of surgical linen and instruments as well as operating and monitoring of the autoclaving machines.

The surgical teams should be able to perform the surgical hand scrubbing, gowning and gloving procedure and other operating theatre procedures (Phillips, 2013:276; Dawson, 2008:3). All personnel in the hospital departments must be competent and responsible in their role (Close & Castledine, 2006:201). The CSSD personnel must be skilled and be able to operate and understand the sterilizing machines, monitor sterilization cycle, load the sterilizer as recommended by the manufacture, handle, transport and store sterilized items (Vearnicombe et al, 2007:34; Ngwenya ,2012:4).

4.2.5.3 Attitude

Attitude is a relatively enduring organization of beliefs, feelings, values and behavioural tendencies towards socially significant groups, events or symbols (McLeod, 2009:n.p).

Challenges

“You find that it still remain with the individual, because people may have everything and be doing the wrong thing”; “You see someone not following the whole steps, not because they do not know all the stages of the procedure”;“Some omit some steps deliberately”; “You teach people on how to scrub, gown and glove, but in the end they just do what they want”. “In the septic theatre some procedure need to be scrubbed for, and application of aseptic technique need to be done. Even when all the necessary articles are available, some of the surgical team members continue not to adhere to scrubbing, gowning and gloving procedure and aseptic technique.

“Even with this supervision, we do meet a lot of resistance in the personnel here”. Most of the time the surgical teams and the other theatre personnel need to be checked or monitored regularly in order to do the right thing while performing the surgical hand scrubbing, procedure and other theatre procedures as well. The theatre nurse

managers often meet resistance and attitude from the surgical teams and hospital staff when being corrected to do the right procedure.

Strategies

Participants agreed on the fact that the surgical teams and theatre personnel must learn to correct their mistakes and do the correct thing without being monitored or supervised.

- *“It’s about the conscience”* The surgical teams advocated that each member of the surgical teams should perform their duties honestly and follow the prescribed, policies, procedure and set standards.
- The surgical teams pointed out that the personnel must have the willingness to improve.
- *“Theatre sisters should be respected”* The management suggested that the personnel have to respect the operating theatre nurse managers and know that they are in charge of the operating theatre.
- The hospital management promised to give full support to the operating theatre nurse managers

The surgical teams should have a surgical conscience which simply refers to the surgical golden rule involving both scientific and intellectual honesty, moral obligation, self-inspection and self-regulation (Phillips, 2013:17; McLeod, 2009:n.p). The surgical teams should keep a high sense of duty in mind and aim at perfection and consistency of surgical procedures (Phillip, 2013:17). Correction of practice of asepsis provides a foundation for development of a mature surgical conscience, personal integrity and self-discipline (Phillips, 2013:17). The personnel have a contract with the employer, therefore, the employee must obey and follow instructions from nurse managers and management as well (Close & Castledine, 2006:254).

4.2.6 Maintenance of Infection Control Practices

Maintenance of infection control practices refers to policies and procedures used to minimize the risk of spreading infections especially in hospitals and in human care facilities (Medical Dictionary, 2014:n.p).

Sub-themes regarding maintenance of infection control include microbial swabs, aseptic technique and waste management.

4.2.6.1 Microbial Swabs

Microbial swabs are obtained before or during the procedure and send to the laboratory for analysis (Phillips, 2013:387).

Challenges

“Has anybody taken some swab cultures of your fingers and see what the results is?”; “What are the bacteria contents of contamination”. The surgical teams do not know the bacterial content of contamination before and after surgical hand scrubbing. In this operating theatre there are no swabs taken from the hands of the surgical teams to check for microbial contamination before and after the surgical hand scrubbing procedure to confirm if the surgical teams really infect the patient or get infected by the patient and samples that has been taken laboratory to analyse the effect of a surgical scrub antiseptic on microorganisms or chemical action.

“First before going into the theatre, I know everybody, I leave my house clean, so I’ve already taken a bath in my house before coming, and going to the theatre+.” Every day the surgical teams take a bath or shower to remove dirt and microorganisms on their bodies before going to work in the operating theatre and then are requested to scrub for a long time. Some surgical teams do not believe that microorganisms can always be found on the skin, no matter how many times you can wash your skin and they don’t want to spend time scrubbing and with repeated and subsequent scrubbing. *“Has anybody done research whether you have washed effective during scrubbing”?* The surgical teams would like to see the proof of the findings about such a study.

Strategies

The participants recommended the following:

- Swabs for culture should be taken from the surgical teams' hands periodically and send it to the laboratory for analysis.
- The surgical teams with infections should be treated and not allowed to perform the surgical hand scrubbing, gowning and gloving procedure.
- The surgical teams would like research to be conducted on surgical hand scrubbing and effectiveness of antiseptics on a surgical hand scrub.

Resident microorganisms or flora do not cause disease if they are in their usual place and have specific roles to play, but it causes pathogens and sepsis if in the wrong place. Therefore, cultures and specimen of body fluids and tissues of both patients and personnel should be sent to the laboratory for microbiology regularly (Phillips, 2013:234; Reinchman & Greenberg, 2009:n.p). Swabs should be taken on hands of the surgical teams because finger nails and rings harbour bacteria even if removed before scrubbing and have a potential of contaminating the surgical site (Vaele et al, 2010:16). Environmental microbiologic sampling should be done in each operating theatre room, inclusive of the scrub room (McDonald & Evans, 2008:n.p).

Personnel working in the operating theatre are at high risk for exposure to potentially harmful microorganisms, therefore, they should be provided with a regular medical examination twice a year, given immunization for infectious diseases like hepatitis and be provided with protective clothing (Phillips, 2013:234,236; Rainer & Russ, 2005:9). An outbreak of Infection should be reported to infection control office for further investigation and surveillance (Centre for Disease Control, 2012:n.p).

4.2.6.2 Waste Management

Waste management is the process involved in dealing with the waste of humans, and organisms, including minimization, handling, processing, storage, recycling, transport and final disposal (Dictionary.com, 2014:n.p).

Challenges

“What I have noticed is that, the position of segregation of the waste material and administration is not good, sometimes we don’t know the way to dispose the gloves”;
“We are not able to segregate our waste”; *“We use red and black plastic bags to discard the gloves we used”;* *“There is no follow up, of the red and black colour of plastic bag”.*
The hospital has a challenge of waste segregation and this affects all departments especially the operating theatre because it generates infected and high risk waste material. A shortage of colour coded waste lining bags makes it difficult for the surgical teams to manage the waste in the operating theatre. Used and contaminated gloves are disposed of in any colour coded waste bins because colour coded waste lining bags are not always available.

Strategies

Participants made the following proposals regarding waste bags

- “Segregation of infected and non-infected waste such as used and contaminated gloves should always be done.

Contaminated waste, including contaminated gloves, should not be mixed with the other waste and should be disposed according to the facility’s medical waste process (McDonald & Evans, 2008:n.p). Contaminated waste should be disposed or treated in the incineration or by steam sterilization for waste or alternate waste treatment technology (McDonald & Evans, 2008:n.p; Strydom & King, 2009:703). Waste bags should be leak proof and be of sufficient thickness and strength to ensure integrity during transportation (Phillips, 2008:260). Disposable waste bags should be colour coded red for contaminated waste and black and yellow for non-infected waste, must be sealed and removed from the operating room after each use and should be disposed with minimal handling to prevent the risk of blood borne pathogen transmission (Queens Health, 2010:8; Malan, 2009:41). Waste store rooms or holding areas should be well ventilated and floors scrubbed with disinfectant after removal of waste (McDonald & Evans, 2008:n.p).

4.2.7 Surgical Hand Scrubbing

Surgical hand scrubbing is the systemic washing of the hands and forearms of the surgical teams using specially techniques of mechanical and chemical action to render the skin of hands and arms free from microorganisms before performing a surgical procedure (The Newcastle Tyne Hospital, 2010:1; Phillips, 2013:267; Pirie, 2010:207-209).

Sub-themes regarding surgical hand scrubbing include scrubbing time, preparation for a surgical hand scrub and the surgical hand scrubbing procedure.

4.2.7.1. Preparation for a Surgical Hand Scrub

Preparation refers to the state or position of making something ready for use in anticipation of an upcoming event or action occurring in the near future (Business Dictionary, 2014:n.p) which is in this case, the surgical hand scrubbing.

Challenges

“When I’m going to scrub, I should take off my ring, I take off my watch and yah but it will be very difficult for someone to do that one”; “I took an oath to myself, that this ring will never leave my fingers”; “No matter what, no one can tell me to remove my ring”. “The principles which only reads, earrings out, neck lace out, rings” The surgical teams do not want to remove their rings, watches and hanging jewellery such as earrings and necklaces before performing surgical hand scrubbing, gowning and gloving procedure because they do not want to lose their jewellery.

“Manicure, pedicure out”. The surgical teams should not wear artificial nails and must keep their nails short because long nails harbour microorganisms and can puncture the surgical gloves, contaminate and injure body tissues and internal organs, putting the surgical patient at risk.

Strategies

The participants made the following suggestions concerning the preparation for a surgical scrub:

- *“The sisters should check if people have removed their jewellery before scrubbing”.*
- A safe place should be provided to keep the jewellery of the surgical teams.

The surgical teams should be educated about the importance of removing rings and hanging jewellery before the surgical scrub along with the importance of short nails plus the self-presentation of a theatre nurse and a surgeon in the operating theatre. The skin of the hands and arms and the finger nails of the surgical teams should be kept clean and in good condition and cuticles should be uncut (Phillips, 2013:176). Finger nails should be kept short, not chipped and cracked, and free of nail polish or acrylics. Moreover, nail polish is a potential reservoir of bacteria (Dawson, 2008:7, Reinchman & Greenburg, 2009). All jewellery like rings, bracelets and watches and hanging jewellery must be removed before a surgical scrub begins (Phillips, 2013:176, Dawson, 2008:7). Hair should be completely covered; face mask and goggles should be well adjusted prior to scrubbing (Phillips, 2013:176). Before the beginning of a surgical hand scrub, the surgical teams should roll the sleeves of scrub shirt or dress to up to 5cm below the shoulder joint (Dowson, 2008:7). Water temperature should be adjusted to a comfortable temperature (Phillips, 2013:176, Dawson 2008:7).

4.2.7.2 Scrubbing Time

Scrubbing time refers to the time that is to be spent by the surgical teams when performing a surgical hand scrub. The time may be stipulated by the surgical hand scrubbing procedure or be based on manufacturer’s recommendations for the scrubbing agent (Phillips, 2013:276).

Challenges

“The thing that is confusing to me is what people say to me wash for so many minutes, and may be for 10 minutes, or 5 minutes, you know different times”; “I think the 8 minutes, feels rather too long, in 5 minutes I should have washed every contour of my hands and I should be through, but practically speaking even the 5 minutes is too long”; “The time for scrubbing need to be reduced in this operating theatre”. Scrubbing time is not stipulated in the existing surgical hand scrubbing procedure as a result the surgical teams do not know the exact time to spend when performing a surgical hand scrub.

Some surgical team members feel that scrubbing time does not matter to them, they do not mind how many minutes they spend during a surgical hand scrub. They know the importance of a surgical hand scrub and the duration needed to destroy the microorganisms in the process during the scrubbing. *“When the water is cold you just rinse your hands”; “Sometimes we don’t have hot water, so I end up compromising scrubbing, personally”.* Several surgical team members confessed that when water is cold surgical hand scrubbing procedure and time is compromised.

Strategies

The following strategies are suggested concerning surgical hand scrubbing:

- The surgical teams agreed and decided on that surgical hand scrubbing time should be according to the prescribed procedure adopted by the hospital.
- A clock should be hanged in the scrub room to assist the surgical teams with scrubbing time
- The operating theatre nurse managers should ensure that theatre geysers are working properly to always supply hot water in the operating theatre.

Surgical hand scrubbing time is very important, a clock must be visible to note time and each hand must be allocated time that is equal to the other hand (Dawson, 2008:3; Phillips, 2013:276; Centre for Disease Control 2002:n.p). Scrubbing with a brush can be 3-5minutes depending on the type of antiseptic and the antimicrobial action and cumulative effect (Dawson, 2008:3; Phillips, 2013:276). Surgical hand scrubbing without a brush, using rubbing in circular motion method should take 5 minutes (Reinchman &Greenburg, 2009:n.p). What's more, scrubbing time with aqueous alcohol is 3-5

minutes depending on strength or percentage of alcohol (Reinchman & Greenburg, 2009:n.p; Cooper et al, 2009;81). Whereas, when using antiseptic gel for a waterless scrub no time is stipulated as it does not use mechanical action or friction but the gel has to be applied on clean dry hands that has just been washed (Phillips, 2013:277; Dawson, 2008:4).

4.2.7.3. Surgical Hand Scrubbing Procedure

Surgical hand scrubbing procedure is a fixed, step-by-step sequence of activities or course of action with definite start and end points that must be followed in the same order to correctly perform a task (Business Dictionary, 2014), which in this case is surgical hand scrubbing procedure.

Challenges

You see someone not following scrubbing through the whole procedure, not following the whole steps". "When scrubbing for emergency procedure, we usually ah turn off the scrubbing button". Some surgical teams compromise the surgical hand scrubbing procedure, they deliberately omit the steps of the procedure without any reason, and however, there are valid reasons that make the surgical teams compromise the procedure such as supplies and cold water. This is even worse, when the surgical teams are scrubbing for an emergency procedure because they do not follow all the steps of a surgical hand scrub at all, they just rush and to the gowning and gloving table.

Strategies

- The participants made the following recommendations concerning the surgical hand scrubbing procedure
- The surgical hand scrubbing procedure should be done meticulously according to the prescribed procedure that is adopted by the hospital.

In surgical hand scrubbing with antiseptic, brush and water the skin is cleansed of microorganisms using the two properties; mechanical which removes the soil and

transient microorganisms by means of friction, while chemical reduce resident flora and inactivate microorganisms with the use of antiseptics (Dawson, 2008:3; Phillips, 2013:276). During the surgical hand scrubbing process, an antiseptic should cover completely all aspect of the hand and arm to the elbow (Close & Castledine, 2006:173; Cooper et al, 2009:81). During and after scrubbing the hands need to be kept higher than the elbow to allow water to flow from the cleansed area (Phillips, 2013:276; Centre for Disease Control, 2002:n.p). Aseptic technique should be applied and maintained during surgical hand scrubbing, gowning and gloving procedure (Cooper et al, 2009:81; Phillips, 2013:261).

4.3 CONCLUSION

This chapter presents the findings of the research study of the focus group interviews conducted on challenges of the hospital management and the surgical teams regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland. The themes and subthemes have been discussed under management, supplies, equipment, maintenance of infection control practices, facility, personnel and surgical hand scrubbing procedure. Each of the sub-themes has been discussed in terms of challenges and strategies, followed by literature control. The next chapter will be on recommendations.

CHAPTER FIVE: RESULTS AND RECOMMENDATIONS

5.1 INTRODUCTION

In the previous chapter the findings of the research study were discussed and compared with relevant literature. This chapter summarizes the research study which set out to describe and explore the challenges faced by the hospital management and the surgical teams regarding surgical hand scrubbing, gowning and gloving in the operating theatre. Surgical hand scrubbing, gowning and gloving procedures play an important role in the prevention of surgical site infections during a surgical procedure and combating hospital acquired infections on surgical patients, as discussed in Chapter 2. From the discussion of the findings, the researcher will make recommendations based on the themes and subthemesthat were gathered during the interviews of the hospital management and the surgical teams. The recommendations are expected to be of great help to both the hospital management and the surgical teams. Additionally, this chapter will discuss the limitations of the study.

5.2 OVERVIEW OF THE STUDY

5.2.1 The Research Problem

According to the Hospital's Medical Records Report of 2012, the surgical site infections that developed post-surgery in the hospital were related to all the respective surgical disciplines. The reasons for the infection rate were not clearly known, but it was mentioned by members of the surgical teams that they face a number of challenges in adhering to the principles of surgical hand scrubbing, gowning and gloving. Meanwhile, the members of the hospital management face challenges in providing the necessary articles and means for adherence to surgical hand scrubbing, gowning and gloving. If the challenges of these role players are known it might be possible to address them,

which in turn might reduce the number of surgical site infections at the particular hospital.

5.2.2 Research Question

What are the challenges experienced by the hospital management and the surgical teams regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland?

The study was indeed able to answer the above.

5.2.3 Research Aim

The aim of this research study was to explore and describe the challenges faced by the hospital management and the surgical teams regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland.

5.2.4 Research Objectives

- To explore and describe challenges experienced by the surgical teams regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland.
- To explore and describe challenges experienced by the hospital management regarding surgical hand scrubbing, gowning and gloving procedure in the operating theatre of a hospital in Swaziland.
- To make recommendations to address the challenges regarding surgical hand scrubbing, gowning and gloving in the operating theatre of a hospital in Swaziland.

5.2.5 Methodology

This study followed a qualitative research design to systematically explore and describe in context the challenges of the surgical teams, hospital management and operating

theatre nurse managers regarding surgical hand scrubbing, gowning and gloving procedures in the operating theatre of a hospital in Swaziland. Focus group interviews were conducted separately for the hospital management and the surgical teams. Themes and subthemes that emerged from the focus group interviews were discussed and linked with relevant literature in the previous chapter.

5.3 FINDINGS OF THE STUDY

The researcher identified that the main themes were related to management, supplies, facility, personnel, maintenance of infection control practices, equipment and surgical hand scrubbing procedure. Furthermore, under each theme, sub-themes that emerged from the verbatim transcribed data as challenges and potential strategies regarding the surgical hand scrubbing, gowning and gloving procedure in the operating theatre of this hospital.

5.3.1 Management

In this study, management refers to a process used by the hospital management and operating theatre nurse managers to achieve the hospital and operating theatre goals. Subthemes of management that emerged include policies, standards and guidelines, supervision, leadership and authority as well as availability of personnel.

Table 5.1: Management in operating theatre

Challenges	Strategies
Sub-theme: Policies, procedures, standards and guidelines	
Policy and procedure documents are old	Documents to be revised
Sub-theme: Supervision, leadership and authority	

Challenges	Strategies
Poor supervision, lack of leadership and authority to discipline the surgical teams	Nurse managers to strengthen supervisory skills. The Ministry of Health to grant hospital management and operating theatre nurse managers authority to discipline theatre personnel
Subtheme: Availability of personnel	
There is not enough qualified personnel in the hospital and operating theatre	The hospital management and the Ministry of Health need to employ more personnel of different cadres

5.3.2 Supplies

Emergent subthemes here were; antiseptic solutions, surgical gloves, surgical gowns, surgical attire and procurement of supplies.

5.2: Supplies in the operating theatre

Challenges	Strategies
Subtheme: Antiseptic solutions	
There is only one type of antiseptic solution and always runs out	The hospital should provide different types and supplied to be supplied in good quantities
Subtheme: Surgical gowns	
Surgical gowns are old with limited sizes	Surgical gowns should be improved, new gowns with different sizes should be provided for the surgical teams
Subtheme: Surgical gloves	
Surgical gloves are of poor quality,	The theatre to be supplied with good

Challenges	Strategies
glove sizes are not available	quantities and quality of surgical gloves
Subtheme: Surgical attire	
Surgical attire is poorly controlled	The hospital management is to assist theatre nurse managers to control the theatre attire
Subtheme: Procurement of supplies	
Procurement of supplies is complicated, is not done by the hospital management	Hospital management and theatre nurse managers should be involved in the procurement of supplies

5.3.3 Physical Facility

The structure, water supply, scrub sinks, safety boxes and doors were identified as subthemes under physical facility.

Table 5.3: Physical Facility of the operating theatre

Challenges	Strategies
Subtheme: The structure	
The building is old and dilapidated. Moreover, is situated close to the casualty department, resulting in cross contamination.	The casualty department should be moved and the operating theatre to occupy that place.
Subtheme: Water supply	
Water supply is poor, water pipes are old and leaking.	The hospital management is to ensure that there is a good water supply and the old pipes are replaced
Subtheme: Scrub sinks	
Some sinks don't have elbow taps	Elbow taps are to be mounted

Subtheme: Safety boxes	
There are no safety boxes for safe keeping of valuables for surgical teams	Safety boxes should be mounted for the use of relevant personnel
Subtheme: Doors	
Main doors leading to the operating theatre are not locked, inside doors are sometimes left open.	Doors are to be closed and locked at all times.

5.3.4 Equipment

Autoclaving machines, laundry machines and maintenance of equipment are the emergent subthemes on equipment.

Table 5.4: Equipment in the operating theatre

Challenges	Strategies
Subtheme: Autoclaving machines	
There are few autoclaving machines and are working now and then	The hospital management should purchase new autoclaving
Subtheme: Laundry machines	
Laundry machines are not enough, sometimes are not working	The hospital management to purchase more laundry machines
Subtheme: Maintenance of equipment	
The hospital does not have a service and maintenance plan for equipment.	Service and replacement plan for equipment is to be made.

5.3.5 Personnel's Knowledge, Skill and Attitude

Subthemes identified were knowledge, skill and attitude.

Table 5.5: Personnel’s knowledge, skill and attitude in the operating theatre

Challenges	Strategies
Subtheme: knowledge	
The surgical teams are not knowledgeable about surgical hand scrubbing, gowning and gloving procedure but they do not perform the procedure as expected	The hospital management should provide the hospital and operating theatre with knowledgeable and highly skilled personnel
Subtheme: Skill	
Most Surgical teams possess the skill of surgical hand scrubbing, gowning and gloving procedure but do not display it as expected	Same as for knowledge
Subtheme: Attitude	
The surgical teams have an attitude when corrected while performing the surgical hand scrubbing, gowning and gloving procedure	The surgical teams should be willing to change and accept correction as well respect the operating theatre nurse managers

5.3.6 Maintenance of Infection Control Practices

Subthemes that emerged here pertained to microbial swabs, aseptic techniques and waste management.

Table 5.6: Microbial swabs and waste management in the operating theatre

Challenges	Strategies
Subtheme: Microbial swabs	
There are no microbial swabs taken from the surgical teams hands before	Swabs for culture is to be taken from the hands of the surgical teams

Challenges	Strategies
and after a surgical hand scrub to check the microbial count and the effectiveness of scrubbing antiseptic solutions	regularly
Subtheme: Aseptic techniques	
Aseptic technique is difficult to maintain when all the necessary articles are not available to execute the surgical hand scrubbing, gowning and gloving procedure and as well other operating theatre surgical procedures	The hospital management and nurse managers should supply the operating theatre with all the necessary articles for the surgical hand scrubbing, gowning and gloving procedure to maintain aseptic technique
Subtheme: Waste management	
Waste management is difficult to maintain because of poor supply and shortages of waste bags.	The hospital management and nurse managers should supply the operating theatre with all the necessary articles for waste management in order to allow the surgical teams to proper waste segregation.

5.3.7 Surgical Hand Scrubbing Procedure

Scrubbing time, preparation for a surgical scrub and surgical hand scrubbing procedure were the identified subthemes.

Table 5.7: Scrubbing time, preparation for a surgical scrub and surgical handscrubbing procedure

Challenges	Strategies
Subtheme: Scrubbing time	

Challenges	Strategies
The surgical teams do not know the exact duration for scrubbing. The time spent for scrubbing differs per individual, when preparing for a surgical scrub	Participants suggested that the scrubbing time should be followed as per the prescribed procedure of the operating theatre
Subtheme: Preparation for a surgical scrub	
The surgical teams do not remove rings and hanging jewellery in preparation to perform surgical hand scrubbing, gowning and gloving procedure.	The surgical teams should remove rings and hanging jewellery before scrubbing and place their valuables in safety boxes
Subtheme: surgical hand scrubbing procedure	
The surgical teams do not follow the correct steps of surgical hand scrubbing, gowning and gloving procedure.	The surgical teams should follow the correct steps of surgical hand scrubbing, gowning and scrubbing procedure

5.4 RECOMMENDATIONS

The recommendations stated in this study are based on the findings of this research study and made regarding the nursing clinical practice, education and research. The recommendations will be presented to the hospital management of the hospital where the study was conducted, with the hope that it will assist in the improvement of the operating theatre as well and the hospital.

5.4.1 Clinical Practice

The researcher made the following recommendations regarding clinical practice.

5.4.1.1 Policies and procedures

- The hospital management and operating theatre nurse managers should develop and update existing policies of the hospital and operating theatre.
- The policies of the operating theatre should be standardized for all the operating theatres in this country's hospitals.
- The surgical hand scrubbing procedure should be developed and must match international standards, and then standardized for use by all the operating theatres in this country.

5.4.1.2 Personnel

- The operating theatre personnel should be knowledgeable about the surgical hand scrubbing, gowning and gloving procedure. New staff should go through the orientation process and for the rest of the staff, should attend in-service education and workshops on surgical hand scrubbing, gowning and gloving procedure and other operating theatre procedures. This will make the surgical teams to know and understand the science and importance of the procedure, this will assist the surgical teams to avoid skipping the steps of the procedure.
- The Ministry of Health and the hospital management need to employ well qualified personnel and to have a strategized training plan for the personnel of the operating theatre to improve surgical patient care and prevent surgical site infections.

5.4.1.3 Quality Improvement systems

- The quality improvement committee should routinely perform assessment rounds in the operating theatre especially in the scrub rooms to observe and record whether the surgical teams are following the steps of surgical hand scrubbing procedure and implementing aseptic technique principles during the surgical hand scrubbing, gowning and gloving procedure.
- The quality improvement committee should also see to it that waste is managed properly by ensuring availability of colour coded waste bags.
- The operating theatre nurse managers should strengthen their managerial skills to improve quality surgical patient care.

- Orientation programs for the newly employed surgical team members should be done on operating theatre procedures and surgical hand scrubbing, gowning and gloving procedure.

5.4.1.4 Procurement of supplies and equipment

- Nurse managers should be involved in the procurement of supplies and equipment as they know the right items they need for executing their day to day duties and supplies should be ordered and supplied in large quantities.
- The hospital, being the largest in the country, should purchase modern equipment such as a number of different types of autoclaving machines and industrial laundry machines to be able to cater for the demand of the operating theatre linen which includes surgical gowns and surgical towels.

5.4.1.5 Facility

- The operating theatre rooms in this hospital should be renovated seeing that the building is old and dilapidated and making it possible for contamination of the surgical site during the surgical procedure.
- The hospital management should improve the water supply and the piping system of the operating theatre.
- The casualty department should be moved away from the theatre and the space be used for addition of more operating theatre rooms, this will reduce the scramble over operating rooms by the surgical teams and prevent the cross infection and theft as the doors will be locked after hours.

5.4.1.6 In-service education

- The hospital management should support and strengthen the In-Service Education and the Continuous Medical Education programs, to assist the surgical teams in acquiring more information about the operating theatre procedures such as the surgical hand scrubbing, gowning and gloving procedure and maintenance of aseptic technique.

- The operating theatre department should always provide on-going training on the operating theatre procedures that are conducted by the operating theatre nurse managers as well as the operating theatre trained nurses.

5.4.2 Education

Concerning education, the researcher recommended the following

- The hospital management and the Ministry of Health should establish programs that support and fund the surgical teams' career development, these should include development of orientation programs and quality improvement to facilitate surgical patient nursing care.
- Surgical hand scrubbing, gowning and gloving procedures should be included in the procedure manual that is used by the training institutions for nursing students. Surgical hand scrubbing, gowning and gloving procedures should be introduced to nursing students before being assigned for the operating theatre clinical practice.
- Operating theatre nurses should be encouraged to pursue their nursing education and specialize on operating theatre nursing science.
- The country has a shortage of operating theatre trained nurses. It is therefore recommended that the country's nursing schools should upgrade their programmes and introduce an introductory course which is an advanced certificate in Operating Theatre Nursing Science.

5.4.3 Research

Recommendations concerning research were made as thus

- Research is about enhancing and gaining knowledge, therefore, research on the surgical hand scrubbing; gowning and gloving procedure should be done more often. The findings of the current study could be repeated in other settings to see if the problems are general to operating theatres of other health institutions in Swaziland.

- The surgical teams can continue to conduct similar studies on surgical hand scrubbing, gowning and gloving as well on other operating theatre procedures to reduce surgical site infection, studies such as knowledge and attitudes of the surgical teams towards surgical hand scrubbing, gowning and gloving and on perceptions of the surgical teams regarding sterile technique during a surgical procedure.
- A research program must be established in the hospital where the institutional departments should be encouraged to conduct research and present their studies at least once a year in a conference organized by the hospital and awards be presented to encourage the candidates and to create a research culture.
- Research studies done on the surgical hand scrubbing, gowning and gloving procedure should also be conducted with individual participants, involving individual interviews and direct observation of participants compliance on surgical hand scrubbing, gowning and gloving procedure to gain a more in-depth understanding of issues related to compliance on this procedure.
- A comparison research study on surgical hand scrubbing, gowning and gloving procedure, from different operating theatres and hospitals of this country as well may be done and can give results to improve practice.
- More research should be conducted on implementation of strategies as well as a follow-up study on improvement on the challenges faced by the hospital management and the surgical teams with regards to the surgical hand scrubbing, gowning and gloving procedure.

5.5. LIMITATIONS AND STRENGTH OF THE STUDY

5.5.1 Limitations of the Study

Some of the limitations of the study were related to logistical factors. The researcher had some difficulties in organizing and bringing the surgical teams together for the interview since the operating list is always long and needed to be attended to by the surgical teams to avoid any cancellations of the surgical procedures. As a result, the

researcher ended up with three focus group interviews, one for the hospital management and two for the surgical teams, where more focus group interviews would have been preferred.

Furthermore, the study was conducted at the beginning of the year where some of the surgical team members were on vacation. This reduced the number of available participants in the groups.

The fact that the researcher is employed as a nurse manager in the same hospital and operating theatre where the research was conducted, might have affected the findings of the study, though the researcher put strategies in place to reduce biasness, as discussed in Chapter 3.

As it was a contextual study, the possibility for generalization is decreased, but the intent was not generalization. Thick description of the process followed was included to enhance the possibility for transferability by repeating the study in another setting.

5.5.2 Strength of the Study

The research study of this nature is the first of its kind to be conducted in this country. The researcher hoped that the findings of the study will be of great value to the surgical teams and the hospital management and that the risk of surgical site infections will be greatly reduced on the surgical patients as a result of implementing the proposed strategies.

5.6. DISSEMINATION OF RESULTS

Dissemination of research results can be communicated orally whereby they are presented in conferences or in written reports which can be in thesis and journal articles (Polit & Beck, 2009:691). In this study the researcher will communicate the research findings to other researchers, surgical teams, hospital management and clinicians by the following strategies:

- The researcher will first communicate the findings of the study to the management, operating theatre nurse managers and surgical teams of the operating theatre in the hospital.
- The findings of the study will also be published in a peer reviewed journal and presentations will be made in selected forums nationally and internationally.
- Copies of the research study will be sent to the following institutions and departments:
 - The University of Pretoria, Faculty of Health Sciences Library
 - The Hospital's in-service department
 - The operating theatre department
 - Swaziland National Infection Prevention and Control Program.

5.7 CONCLUSION

This research study revealed several challenges that are faced by hospital management and the surgical teams in the operating theatre during the surgical hand scrubbing, gowning and gloving procedure, which are related to management, supplies, facility, personnel, maintenance of Infection control practices, equipment and surgical hand scrubbing procedure. Addressing these challenges will assist the surgical teams to comply with the surgical hand scrubbing, gowning and gloving procedure, thus reducing the risk and incidence of surgical site infection in the operating theatre and decrease the incidence of hospital-acquired infections in this hospital. To improve the surgical hand scrubbing, gowning and gloving procedure, the hospital management and the Ministry of Health need to collaborate and attend to the needs of the surgical teams, in order to achieve the effective prevention of surgical site infections.

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ANNEXURES

ANNEXURE 1: Letters of Request

P. O. Box [REDACTED]

[REDACTED]
10th August 2013,

The Hospital Manager

[REDACTED] Hospital

P. O. Box [REDACTED]

[REDACTED]
Swaziland

Dear Madam

RE: REQUEST TO CONDUCT A RESEARCH STUDY

I request permission to conduct a research study in the operating theatre on the surgical team.

The study is required as partial fulfilment of the Master's Degree program.

I guarantee that ethical considerations shall be adhered to throughout the execution of the research.

Your cooperation will be greatly appreciated.

Yours faithfully

THELMA S. DLAMINI

ANNEXURE 2:

Letter of Approval to Conduct a Research Study in a Hospital

[REDACTED] Hospital

P. O. Box [REDACTED]

09th December 2013

Thelma S. Dlamini

Box 2689

Mbabane

Dear Thelma

**RE: YOUR REQUEST FOR PERMISSION TO CONDUCT A RESEARCH
TITLED "EXPLORING CHALLENGES REGARDING SURGICAL HAND SCRUBBING,
GOWNING AND GLOVING IN THE OPERATING THEATRE OF [REDACTED]
[REDACTED] HOSPITAL".**

I refer to your letter dated 27th November 2013 requesting to be granted permission to obtain information on the above mentioned subject at the above mentioned health facility .I am pleased to inform you that the Hospital Management has accepted your request as stated above .I would however appreciate if findings and recommendations could be communicated back to the hospital.

[REDACTED] HOSPITAL
Thank you
2013-12-09
Yours sincerely
[Signature]
[REDACTED]

HOSPITAL MANAGEMENT (FOR)

ANNEXURE 3:

Letters of Ethical Clearance from Scientific Ethics Committees

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.

- HVA 011112967, Approved dd 22 May 2012 and Expires 20 Oct 2016.
- IRB 0000 2235 IORG0001762 Approved dd 13/04/2011 and Expires 13/04/2014.



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences Research Ethics Committee

28/10/2013

Approval Certificate
New Application

Ethics Reference No.: 411/2013

Title: Exploring challenges regarding surgical hand scrubbing, gowning and gloving in the operating theatre of a hospital in Swaziland

Dear Mrs TS Dhlamini

The **New Application** as supported by documents specified in your cover letter for your research received on the 25/09/2013, was approved by the Faculty of Health Sciences Research Ethics Committee on the 28/10/2013.

Please note the following about your ethics approval:

- Ethics Approval is valid for 3 years.
- Please remember to use your protocol number (411/2013) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, or monitor the conduct of your research.

Ethics approval is subject to the following:

- The ethics approval is conditional on the receipt of 6 monthly written Progress Reports, and
- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely

DR R SOMMERS; MBChB, MMed(Int), MPharmMed
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee
University of Pretoria

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research, Principles Structures and Processes 2004 (Department of Health)

Telegrams:
Telex:
Telephone: (+268 404 2431)
Fax: (+268 404 2092)



MINISTRY OF HEALTH
P.O. BOX 5
MBABANE
SWAZILAND

THE KINGDOM OF SWAZILAND

FROM: The Chairman
Scientific and Ethics Committee
Ministry of Health
P. O. Box 5
Mbabane

TO: Ms Thelma Dlamini
Principal Investigator
Student # 11293323

DATE: 04th November 2013

REF: MH/599C/ FWA 000 15267

**EXPLORING CHALLENGES REGARDING SURGICAL HAND SCRUBBING, GOWNING AND
GLOVING IN THE OPERATING THEATRE OF A HOSPITAL IN SWAZILAND**

The committee thanks you for your submission to the Swaziland Scientific and Ethics Committee, an Expedited review was conducted.

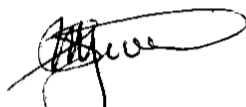
In view of the importance of the study and the fact that the study is in accordance with ethical and scientific standards, the committee therefore grants you authority to conduct the study. You are requested to adhere to the specific topic and inform the committee through the chairperson of any changes that might occur in the duration of the study which are not in this present arrangement.

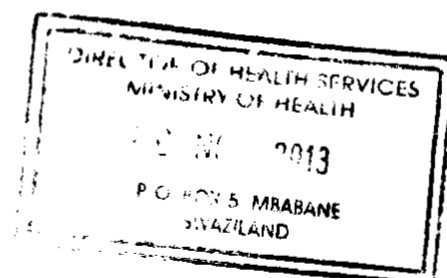
The committee requests that you ensure that you submit the findings of this study (Electronic and hard copy) to the Secretariat of the SEC committee.

The committee further requests that you add the SEC Secretariat as a point of contact if there are any questions about the study on 24047712/24045469.

The committee wishes you the best and is eagerly awaiting findings of the study to inform proper planning and programming to use for analysis

Sincerely,


Dr S.M. Zwane
DIRECTOR OF HEALTH SERVICES
(THE CHAIRMAN)
cc: SEC members



ANNEXURE: 4

PARTICIPANT INFORMATION LEAFLET AND INFORMED CONSENT DOCUMENT

TITTLE OF RESEARCH STUDY

EXPLORING CHALLENGES REGARDING SURGICAL HAND SCRUBBING, GOWNING AND GLOVING IN THE OPERATING THEATRE OF A HOSPITAL IN SWAZILAND

INTRODUCTION

You are invited to participate in a research study. This information leaflet will help you to decide if you want to participate. Before you agree to take part you should fully understand what is involved. If you have any questions that this leaflet does not fully explain, please do not hesitate to ask the investigator interviewer Thelma Smangele Dlamini.

THE NATURE AND PURPOSE OF THIS STUDY

The aim of this study is to explore and describe perceptions and challenges experienced by the surgical teams, the hospital management and the operating theatre nurse managers during surgical hand scrubbing, gowning and gloving procedure in the operating theatre. You, as a member of the surgical teams, hospital management and theatre nurse managers are a very important source of information on this research study.

EXPLANATION OF PROCEDURES TO BE FOLLOWED

This study involves a focus group discussion whereby the surgical teams from the different surgical disciplines will be placed together in a group and be interviewed at the same time. This method will also apply to the hospital management and operating theatre nurse managers. The researcher will make sure that data collection will not

interfere with the normal daily activities, booking and services in the operating theatre. I will ask you some questions about, the challenges experienced by the participants in the operating theatre regarding surgical hand scrubbing, gowning and gloving procedure. I will ask you to express yourselves freely and will observe your actions.

RISK AND DISCOMFORT INVOLVED

There are no risks in participating in this study. Some of the questions we are going to ask you may make you feel uncomfortable, but you need not answer them if you don't want to. The interview session will take about one to one and a half hours of your time.

POSSIBLE BENEFITS OF THIS STUDY

Although you will not benefit directly from the study, the results of the study will enable us to be able to meet the needs of the surgical teams and operating nurse managers in future. You will benefit directly by the study because at the end of the study we will be able to provide you with adequate supplies that are necessary for the surgical hand scrubbing, gowning and gloving procedure.

YOUR RIGHTS AS A PARTICIPANT

Your participation in this study is entirely voluntary. You can refuse to participate or stop at any time during the interview without giving any reason. Your withdrawal will not affect you or your access to the operating theatre in any way.

COMPENSATION

Your participation is voluntary. No compensation will be given for your participation.

CONFIDENTIALITY

All information that you give during the focus group meetings will be kept strictly confidential. Once data have analysed no one will be able to identify you. Research reports and articles in scientific journals will not include any information that may lead to your identification or your hospital.

ETHICAL APPROVAL

The study was approved by:

- The Research Ethics Committee of the Faculty of Health Sciences at the University of Pretoria
- The Research Ethics Committee Swaziland Ministry of Health
- The management of Mbabane Government Hospital

INFORMATION AND CONTACT PERSON

If you have any questions about the study please contact Thelma Smangele Dlamini at the following telephone numbers: (09286)24044256 / cell +26876051904. Alternatively, you may contact my supervisor Dr Carin Maree at cell +27832866696.

INFORMED CONSENT DOCUMENT

I confirm that the person asking my consent to take part in this study has told me about nature, process, risks, discomforts and benefits of the study. I have also received, read and understood the above written information (Information Leaflet and Informed Consent) regarding the study. I am aware that the results of the study, including personal details, will be anonymously processed into research reports. I am participating willingly. I have had time to ask questions and have no objection to participate in the study.

I understand that there is no penalty should I wish to discontinue with the study and my withdrawal will not affect access to the operating theatre in any way.

I have received a signed copy of this informed consent agreement.

Participants nameõ (Print)

Participant Signatureõ õ õ õ õ õ õ õ õ õ õ õ õ õ õ Dateõ õ õ õ õ õ ..

ANNEURE: 5

Interview Schedule

Focus group questions for the surgical teams and the hospital management:

6. What are your perceptions towards surgical hand scrubbing, gowning and gloving procedures practiced in this hospital?
7. What is your opinion regarding the extent to which infection control and aseptic techniques are maintained during surgical hand scrubbing, gloving and gowning procedures in this hospital?
8. Describe challenges you encounter regarding surgical hand scrubbing, gloving and gowning procedure.
9. What could be done to address the challenges regarding surgical hand scrubbing, gloving and gowning procedure?
10. Please make any comment with regards to surgical hand scrubbing, gowning and gloving procedures practiced in this hospital?