



**OPERATING ROOM NURSES KNOWLEDGE, ATTITUDE AND  
PRACTICE OF STERILE TECHNIQUES IN RWANDA REFERRAL  
HOSPITALS**

by

**NSEKAMBABAYE Jean Pierre  
Student Registration number: 216341515**

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Supervisor: Dr. Lilian OMONDI

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## **DECLARATION**

I do hereby declare that this project submitted in partial fulfillment of the requirement for the Master's degree in Nursing Sciences in Perioperative track, at University of Rwanda/ College of Medicine and Health Sciences, is my original work and not previously been submitted elsewhere. Also I do declare that a complete list of references is provided indicating all the sources of information quoted or cited.

Student Name and Number: NSEKAMBABAYE Jean Pierre (216341515)

Signed .....

Date: 24<sup>th</sup>, July 2017

## **DEDICATION**

I strongly dedicate this to my parents,  
To all my classmates for the best moments passed together,  
To all who think and work for the better future of our nation,  
Finally to all my relatives, friends and family friends,  
May the almighty richly bless you

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Finally, but not the least, everyone who contributed to our entire school life, especially to the success of this piece of work, accept our sincere gratitude

My God bless every one mentioned above.

## **ABSTRACT**

**Background:** Surgical site infection continues to be the most common HAIs among operated clients, it associated with expenses and mortality and morbidity. Sterile technique are measures taken by health care worker to prevent the contamination of surgical wounds but still now adherence to sterile technique principle is still low. Operating room nurses play a big role in prevention and control of infection in theatre by applying the principles of sterile technique for that reason the OR nurses to accomplish their tasks must have knowledge and good attitude to practice the sterile technique but various study revealed that the OR nurses have low knowledge, attitude and practice of sterile technique.

**Aim and specific objectives:** The aim of this study was to assess the OR nurses knowledge, attitude and practice of sterile technique in four selected Rwanda Referral Hospitals and the specific objectives of this study were: to assess of the level of knowledge, to determine the attitude, to assess the level of practice of sterile technique among operating room nurses, and to determine the relationship between demographic characteristics, knowledge, attitude and practice of sterile technique.

**Method:** Cross section descriptive study approach was used to find out OR nurses KAP of sterile technique in the operating theatre of four selected hospitals in Rwanda. Eighty nurses working in OR of the 4 selected Hospitals were recruited from the population of 100 using convenience sampling methods. The KAP of sterile technique were assessed by using the self administrated questionnaire among OR nurses. Instrument was pre tested, validated.

**Results:** The finding of this study revealed that 3.8% had very high level of knowledge, 27.5% had high level of knowledge, and few 3.8% had low level of knowledge. The OR nurses had positive attitude regarding sterile technique and 61.3% practiced sterile technique at very high level, 23.8% practiced it at high level, 12.5% practiced sterile technique at moderate level and only 2.5% practiced sterile technique at low level.

**Conclusion:** The majority of respondent had moderate level of knowledge of sterile technique, a right attitude toward sterile technique and good practice of sterile technique. Thus continuous in services training on sterile technique is required to improve knowledge, attitude and practice of sterile technique and also observation study should be done to assess the practice of sterile technique.

## **LIST OF SYMBOLS AND ABBREVIATION**

**AORN:** Association of Operating Room Registered Nurses

**CDC:** center of disease control

**CHUB:** Butare Teaching Hospital

**CHUK:** Kigali Teaching Hospital

**CMHS:** College of Medicine and Health Sciences

**HAI:** health care associated infection

**HCWs:** Health care workers

**KAP:** Knowledge, attitude and practice

**KFH:** King Faisal Hospital

**NHSN:** National Health Safety Network

**OR:** Operating Room

**RMH:** Rwanda Military Hospital

**SSIs:** surgical site infections

**UK:** United Kingdom

**USA:** United State of America

**WHO:** world health organization

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## CHAPTER 1.INTRODUCTION

This chapter includes definition of key terms pertinent to the study, background to the study, problem statement, objectives (main and specific objectives), and significance of this study and subdivision of the project.

### 1.1. DEFINITION OF KEYS TERMS PERTINENT TO THE STUDY

**Operating room or theatre room:** is a room in an operating suit/ complex, which forms part of a hospital where operations are performed (Mangran et al 1999). In this study, operating room will be used as area/ room where surgical procedure is done on clients in hospital setting.

**Operating room nurses:** someone who has completed a program of basic nursing education and qualified. In this study the operating room nurse refers to the registered nurses who work in theatre room.

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

**Attitude:** is the disposition or state of mind, a settled way of thinking or feeling that affects an individual's behaviour.

**Practice:** is the act of an activity or skills so as to acquire or maintain proficiency in it

**Sterile techniques:** is the methods used by health care worker to maintain sterility during surgical procedure or invasive procedure by preventing contamination of sterile instruments.

## **1.2.BACKGROUND TO THE STUDY**

Surgical site infections (SSIs) are still one of the major concerns for the perioperative team (Abraham et al. 2016). SSIs are caused by microorganisms that enter into the wound through incisions made during surgery if aseptic technique and sterile technique is not followed. SSIs menace the lives of millions every year and contribute to the spread of resistance to the antibiotics (WHO, 2016). SSIs cause mortality rate of 3%, and 75% of SSIs associated deaths are directly related to the SSIs (CDC, 2016).

According to Infection Control and Hospital Epidemiology (2013), it is estimated that 4.5 to 5.7 billion people are affected with SSI per year due to lack of aseptic technique practices in hospital. 11% of clients who undergo surgery are infected in low and middle income country. In Africa, more than 20% of women who undergo caesarean section develop wound infection, affecting their health and the health of their babies (2016). Even if the incidence of SSIs is lesser in developed countries; it represents the second most type of HAI in United State of America (USA) and in some European country.

A study done by Reichman et al 2009 at Boston revealed that surgical site infection accounts for 15% of all nosocomial infections and the most common nosocomial infection among surgical patients. This high rate of SSIs have been detected by the study done by Sathyanarayana et al (2011) among 1000 clients undergoing abdominal surgery where the researchers revealed that the rate of SSIs was 13.7%.

AORN has developed standards and recommended practices for perioperative clients that can serve as guidelines for measuring the quality of patient care. The principles of aseptic technique need to be followed by all sterile personnel in the operation theatre (Abraham et al. 2016). The operating room nurses play a big role in prevention and control of SSIs by using sterile technique as they scrub and the circulating nurses are on the alert to catch any breaks that others may not have seen during operation (Metsala, 2015; Berry & Kohn's, 2017). Thus the OR nurses need to be knowledgeable and skillful regarding sterile technique as they are responsible for identifying, interpreting, and implementing contemporary professional

standards (Rothrock, 2007). Berry & Kohn (2013) reported that the sterile techniques are the methods used by health care worker to prevent contamination of sterile instruments or the sterile area during surgical procedure.

According to Philips (2007), sterile technique is the basic of modern surgery where strict adherence to the suggested practice of sterile technique is obligatory for the safety of clients and surgical team members. Compliance with sterile technique principles and infection control prevent HAIs including SSIs in the theatre room thus the expense are prevented (Kilpatrick & Reilly 2002)

WHO (2016) and Labrague et al. 2012 advised that adherence to the sterile technique principles by the sterile members (surgeon, assistant and scrub nurse) and the unsterile members (anesthetist, circulating nurse etc.), must be observed, as the practice of sterile technique prevent contamination of surgical wound. De Laune and Ladner (1998) declared that HAIs are the results of nurses who don't practice sterile technique as recommended.

Preventing contamination of surgical site wound necessitates the efforts of all surgical team members to use their theoretical knowledge and experience in aseptic practices to provide their patients with optimal care resulting in positive surgical outcomes. Labrague et al. 2012 reported that it is the duty of each member of the sterile surgical team to understand the meaning of principles and integrate them into their daily practice.

Fry and Fry (2007) emphasized the role of the nurse in prevention of infection, they said that the perioperative nurses assure the important task as the patient's infection control advocate. Therefore nurses working in operating room must be well prepared and show sound knowledge and practice in sustaining a sterile field be sterile all times to diminish the spread of potential microorganism (Labrague et al.2012)

The survey conducted in Greece among nurses confirmed that the nurses' have knowledge about aseptic principle when asked but the study revealed that only 15.6% contaminated their hands during procedure (Michalopoulos & Sparos, 2003).

Nicolette (2007) recommend that the operating room nurse must wear facemask, caps, and carry out surgical hand scrub and donning sterile gown and sterile glove manipulate and dispose instruments on the table in a sterile way and drapes the surgical site with sterile drape after clients skin cleaning and disinfection to minimize the risk of SSIs. The evidence has demonstrated that operations carry out in high/ medium hospitals have minor SSI rates balanced to the operation done low volume hospitals (WHO, 2016).

The study done by Dhakal et al ( 2016) at selected Hospitals of Bharatpur in Nepal regarding the knowledge of aseptic technique among nurses', demonstrated that more than half of the participants (62 %) had high level of knowledge on aseptic technique, few (37.5%) had average level of knowledge and none of the respondents had low knowledge on aseptic technique. The level of knowledge on aseptic technique was statistically significant ( $p=0.031$ ) with age and educational qualification of the respondents but this research didn't assess the attitude of nurses towards aseptic technique.

In Rwanda, the study done by Bizimana et al 2016, found a prevalence rate of 4.9% SSI after cesarean at Butare University Teaching Hospital (CHUB). In addition to that in Rwanda there is lack of empirical data regarding nurses' knowledge, attitude and level of practice of sterile technique. It is in this light that the investigator was motivated to conduct this study.



### **1.3 PROBLEM STATEMENT**

It is estimated that 4.5 to 5.7 billion people are affected with SSI per year due to lack of aseptic technique practices in hospital according to Infection Control and Hospital Epidemiology (2013). Approximately 9% of Indian hospital patients acquire health care associated infections especially post-operative infections and as a result 5000-15,000 die every year. Fry and Fry (2007) recommended that it necessary to improve the knowledge and practice of sterile technique among operating room nurses. National surveillance service (2002) conducted a survey for healthcare workers in UK reported 2,351 cases of wound infection. Out of these, 44% of infections occur due to lack of knowledge on aseptic procedures, 29% due to lack of time and 28% due to shortage of staffs.

The operating room nurses, play a big role in prevention and the diffusion of HAIs including SSIs in operating room environment. DeLaune and Ladner (2008) stated that HAIs can be transmitted by nurses who fail to practice or adhere to the principles of aseptic and sterile technique. Whilst the maintenance of sterility of open set or instrument is difficult as same bacteria are circulating in air in operating room, it is important to prevent contamination of sterile equipment. Poor aseptic and sterile techniques can lead to contamination of surgical wound. By having the right knowledge, attitude and high level of practice asepsis can be maintained.

Despite nurses educational background and training and continuous efforts made in the promotion of the practice of aseptic techniques, SSIs continue to be observed in Rwanda clinical setting. It is on this premise that the researcher carried this study on knowledge, attitude and practice of sterile techniques among nurses in operating room to provide insight to problem.

## **1.4.OBJECTIVES**

### **1.4.1 The main objective**

To assess operating room (OR) nurses knowledge, attitude and practice of sterile techniques in Rwanda referral hospitals (Rwanda Military Hospital, Kigali Teaching Hospital, Butare Teaching Hospital and King Faisal Hospital).

### **1.4.2. Specific objectives**

1. To assess the level of knowledge of OR nurses regarding sterile techniques
2. To determine the attitude of OR nurses regarding sterile techniques
3. To assess the level of practice of sterile technique among operating room nurses
4. To determine the relationship between demographic characteristics, knowledge, attitude and practice of sterile technique.

### **1.4.3Research questions**

1. What are the level of knowledge of OR nurses regarding sterile techniques
2. What are the OR nurses attitude regarding sterile techniques
3. What are the level of practice of sterile technique among operating room nurses
4. What are the relationship between demographic characteristics, knowledge, attitude and practice of sterile techniques

## **1.5 SIGNIFICANCE OF THE STUDY**

The result of this study added to the existing knowledge on the extent of operating room nurses' knowledge, attitude and practice of sterile technique.

It may also help operating room nurses to know the intervening variables that affect their attitude and how attitude influences the practice of sterile technique. If noncompliance to sterile techniques is identified, this could assist theatre managers to plan and execute corrective measures such as seminars, workshops, proper supervision, etc. that improved attitude and enhance compliance. At the same time it will help theatre workers to be knowledgeable on the need for positive attitude and adequate compliance to sterile technique. This will help in reduction of surgical site infection among operated clients, leading to better surgical outcome. Finally, the study will be useful for other academic purposes especially to theatre workers, through the provision of data base from which information could be obtained for future research in related areas of study and policy guidelines on infection control.

## **1.6. SUBDIVISION OF THE STUDY**

This research is subdivided into five main parts namely: Introduction, Literature review, Methodology, Result and Discussion, Conclusion and Recommendations.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1. INTRODUCTION**

This chapter provides a review of existing relevant literature on operating room nurses knowledge, attitude and practice of sterile techniques as an important means to prevent surgical site infections in healthcare settings. Resources and data sources that provide adequate information were accessed. Some of these include; databases of electronic journal articles and search engines such as Cinalhl, Medline, Pub Med, Science direct and other websites of Health systems, World Health Organization. Moreover, books, journals and past dissertations related to the topic were also consulted.

Williams et al (2007) have explained the operating room as a dynamic, high-pressure and high risk setting which is susceptible to numerous errors. The modern surgery obliges a set of trained people to work mutually in a team. The operating room staffs should be able to deal with the demands of their complex work environments and effectively deliver safe surgical patient care (Mitchell & Flin, 2008).

### **2.2. THEORETICAL AND CONCEPTUAL FRAMEWORK OF THIS STUDY**

#### **2.2.1. Theoretical framework**

The theoretical framework that applies to this study is the knowledge, attitude and practice model (KAP). The diffusion of innovation theory was proposed by Rogers in 1962 and has been integrated into three stages: knowledge, attitude and practice. This theory explains the way that new ideas extend over time. It have been reported that changes in human knowledge, attitude and practice occur in reaction to a specific intervention as the spreading of knowledge and practice occurs because of the passing time. The person experiences the usage of this theory, not the adoption of an innovation. KAP model can be used for both quantitative and qualitative study. It reveals misconceptions to the activities to implement or potential barriers to behavior. It discloses misconceptions that represent obstacles to the activities that we would like to implement or possible barriers to behaviour alteration.

KAP can evaluate the extent of a known situation as it can prove or disprove a hypothesis and provide new tangents of a situation's reality. It also suggests an intervention strategy that reveals particular local conditions and the cultural factors that manipulate them and the plan activities that are appropriate to the respective population concerned (Hubbard and Hayashi 2013)

### **2.2.2 Relevance of KAP model to the study**

The learning knowledge of the operating room nurse changes his or her learning attitude and behavior. On the other hand, it also enhances the knowledge, attitude and practice of specific themes (sterile technique) and identifies what is recognized and done about various healths related topics. KAP model is used to measure the effectiveness of health education activities and in changing health related behaviors.

This model have been used in nursing since 1960 in teaching nurse how to improve technique in practice, the cognitive leaning focus on the knowledge and ability of realization, the affective learning means to change subject's intention, attitude or norms to adjust themselves through hygiene education. Psychomotor learning requires nurses to learn some skills compared with the practice that requires changing of behavior. Psychomotor learning requires nurses to learn some skills compared which practice which required the changing of behavior as target.

Xie (2013) discovered the relationship between knowledge and attitude, where he found that the nurses who had high level of knowledge his or her learning attitude was relatively more positive. Various studies also found that the knowledge affects the attitude directly and practice and the attitude affect the practice or intentions. The nurses' attitude is determined by personal belief or evaluation about the results of performing the behavior in case the results are deemed desirable, a positive attitude toward the behavior may happen but if the results are deemed undesirable, a negative attitude toward the behavior may happen (Ajzen, 1985).

KAP model will help nurses to utilize their knowledge of sterile technique to adhere to the principle of sterile technique; therefore their attitude towards sterile technique has to be

examined as it affects the practice of sterile technique. Since their attitude is being transformed into their behavior, assessing nurses' attitude will determine how effective and efficient they practice sterile technique. The research has adopted KAP model as framework for this study

### **2.2.3. Surgical site infection**

The operating room is the high risk environment in hospital that encounter high rate of infection and mortality. Therefore, theatre staffs compliance and level of knowledge toward the reduction of risk in OR Healthcare workers (HCW) Compliance and level of knowledge toward mechanisms to reduce this risk have a direct impact on clients and staff safety (Mahdali, 2015).

SSIs are caused by microorganisms which enter into the wound through incisions made during surgery when aseptic and sterile techniques are not followed. SSIs menace the lives of millions every year and contribute to the spread of resistance to the antibiotics (WHO, 2016). SSIs cause mortality rate of 3%, and 75% of SSIs associated deaths are directly related to the SSIs (CDC, 2016). 11% of clients who undergo surgery are infected in low and middle income country. In Africa, more than 20% of women who undergo caesarean section develop wound infection, affecting their health and the health of their babies (WHO, 2016). The study done by Bizimana et al 2016, found a prevalence of SSI of 4.9% at Butare University Teaching Hospital (CHUB).

Surgical site wound contamination happens mostly during intraoperative period and it is associated with endogenous and exogenous factors (Birgand et al 2013). Operating room staff adherence to strict aseptic principles and careful observation of sterile technique reduce post operative wound infection. Perioperative personnel who are not scrubbed at the sterile field must maintain meticulous hand hygiene during the procedure to decrease the transmission of bacteria to the surgical field or the patient (Alexander, 2015).

Surgical teams including nurses are expected to create and maintain a safe therapeutic operation room environment safe for prevention of SSIs (Dlamini, 2015). The nurses take many times with the clients and represent the biggest percentage of the health workers, they are also good position to contribute or play a principal role in taking the initiative aimed to ensure quality of care and thus to enhance client safety which includes prevention of infection (Avşar, 2015).

AORN have developed standards and recommended practices for perioperative clients that can serve as guidelines for measuring the quality of patient care. The principles of aseptic technique need to be followed by all sterile personnel in the operation theatre (Abraham et al. 2016). The operating room nurses play a big role in prevention and control of SSIs by using sterile technique as the circulating nurse is on the alert to catch any breaks that others may not have seen. The circulating nurses is able to observe the field and the sterile team members as they are far from the sterile field than the other and also the scrub nurse must follow the principles of sterile technique during procedure (Metsala, 2015; Berry & Kohn's, 2017) thus the OR nurses need to be knowledgeable and skillful regarding sterile technique as they are responsible for identifying, interpreting, and implementing contemporary professional standards (Rothrock, 2007). Berry & Kohn (2013) reported that the sterile techniques are the methods used by health care worker to prevent contamination of sterile instruments or area Sterile during surgical procedure.

According to Xavier (2009) the aseptic technique are used during the procedure which alters the body's nature defenses or in case same one is manipulating sterile materials. It is observed that a nurses' attitude towards hand washing compliance worsened when the demand for aseptic technique was high.

The operating room nurses adherence to strict aseptic principles, careful observation of sterile technique and thorough antimicrobial preparation of the patient and operative site are essential to minimize the risk of postoperative wound infection. The nurse evaluates the patient's vulnerability for infection, classifies the wound on the intraoperative record,

implements sterile technique, protects the clients from cross-contamination, collaborates in administration of antibiotic prophylaxis, and performs other responsibilities to create and control the environment of care (Petersen, 2011)

The results of a prospective study done to assess the risk factors for SSI during gastrointestinal surgery among 941 clients in 27 hospitals revealed that in general the infection rate was 15.5% and the incidence of infection after gastric surgery was lower 8% than the incidence of infection after small bowel, colorectal, appendectomy, and stoma surgeries where the researcher found that they represented 30%. The research found also that strict adherence to sterile technique and reductions of blood loss were associated with lower occurrence of SSI (AORN, 2012).

WHO global guideline for prevention of SSIs (2016) recommends that the HCWs must scrub their hand with the appropriate product before donning the sterile gloves. In addition to that the panel suggests that the sterile disposal non-woven, reusable woven drapes and gowns must be used during operations to avoid occurrence of SSI.

#### **2.2.4. Sterile technique**

The American Board of Surgery in 2008 and Berry & Kohn (2013) described sterile technique as all attempts, measures and procedures employed in preventing the invasion of surgical wound by micro-organisms by maintain the sterility during surgical procedure or invasive procedure. Nicolette (2007) recommends that the operating room nurse must wear facemask, caps, and carry out surgical hand scrub, donning sterile gown, sterile glove, manipulate and dispose the instruments on table in a sterile way and drapes the surgical site with sterile drape after clients skin cleaning and disinfection to minimize the risk of SSIs. Rowley (2010) identified this technique as the foundation of modern surgery and say that compliance to the recommended practice of sterile technique is mandatory for the safety of client and the personnel in theatre room.

Cartwright (2012), on other hand defined sterile technique as a method or procedure used by doctors and nurses in the operating theatre for tissue handling and wound closure that permits to reduce the risk of postoperative wound infection. The sterile technique is applicable in all



cases of surgical intervention. From the principles of sterile technique as described by Offer (2011), there is no compromise with sterility in sterile technique. In this technique, an item is either sterile or un-sterile. Team members therefore should be certain about sterility as much as possible thus careful observation of sterilization process and verification to detect the sterility of instrument must be observed.

While the principle of sterile technique participate in accomplishing the goal of asepsis in the operating room, each member of the sterile surgical team have the responsibility of understanding these principles and integrate them into their daily activity (Osman, 2000). According to Philips (2007), sterile technique is the basic of modern surgery where strict adherence to the suggested practice of sterile technique is obligatory for the safety of clients and surgical team members. Compliance with sterile technique principles and infection control prevent HAIs including SSIs in the theatre room thus the expense are prevented (Kilpatrick & Reilly 2002)

Adhering to the principles of sterile techniques and implementing these processes ask to take immediate action when there are breaks of sterile technique. The operating room nurses serves as the protective mediator between clients and operating room staffs when their practice doesn't meet the highest standards of asepsis. Operating room nurses advocate for the clients and works with other HCWs as team to ensure the safety of clients undergoing surgical procedure or invasive procedure.

Therefore there are 13 principles of sterile technique the surgical team have to follow to prevent the contamination of surgical wound; this is done before the procedure and during the procedure. These 13 principles of sterile techniques are the follow:

Table: 2.1. Principle of sterile technique (adapted from Malan (2009); Berry & Kohn (2013) and Dlamini (2015))

Principles	Description
Only sterile items are used within the sterile field.	The person who distributes 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 the sterile field. The scrubbed team member should not leave the sterile field to retrieve items from the sterilizer as there is risk of contamination. The sterilized pack found in a contaminated area is considered as unsterile.
Sterile personnel are gowned and gloved	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 and the closed method is recommended as efficacy than open. Sterile persons must keep their hands in sight and above the waste and away from the face and arm pit. Surgical hand scrub must be done before donning a sterile gown and gloves
Tables are sterile only at table level	Only the top of a sterile draped table is considered sterile. The edges and sides of the drape extending below table are considered contaminated. Anything that falls below the table level is considered unsterile and is not brought back up to table level. The scrub person does not touch the part hanging below the level of the established sterile field.
Sterile personnel touch only sterile items or areas and unsterile personnel cannot touch any sterile items or areas.	Only sterile surgical team members that are gowned and gloved are allowed to maintain contact with sterile field. The scrubbed team members avoid contacting the unsterile surface of the table or container while lifting the inner basket out and above the container. Unsterile team members do not directly contact the sterile field. 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>Unsterile personnel avoid reaching over the sterile field and the sterile personnel avoid leaning over an unsterile area.</p>	<p>Unsterile circulating nurse never reach over a sterile field to transfer sterile items, he/she holds only the lip of the bottle over the basin when pouring solution into sterile basin and avoid the contact and splashing the solutions. The scrubbed people stand back from the unsterile table when draping it and must remain within the sterile field.</p>
<p>The edges of anything that enclose 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 table 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 degree of contamination is proportionate to the length of time that sterile items are exposed to the environment therefore the sterile field is created and the table is set just before the commencement of the surgical procedure. Covering sterile table for later use is not recommended.</p>
<p>Sterile areas are continuously kept in view</p>	<p>Vigilance must be maintained when a sterile field has been set as inadvertent contamination can occur. Sterile persons must always face the sterile field. An unguarded sterile field</p>
<p>Sterile personnel keep well within the sterile area</p>	<p>Sterile persons must allow a wide margin of safety when passing an 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>

Unsterile personnel avoid sterile areas	Unsterile persons must maintain a distance of about 30 cm 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.
Destruction of the integrity of microbial barriers results in contamination	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 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 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 personnel protective equipment is compulsory. Movement in the operating room must be kept to a minimum to avoid turbulence.

Mechanical washing and chemical antiseptics are recommended to remove or inactivate transient and resident flora from the skin around the surgical site of client and from sterile team members' hands and arms. Gowning and gloving by closed method also is considered as better and the gloved hand must not touch the skin directly and then touch the tissues, and also the instruments used for the skin should be discarded and not reused and when the glove is torn or punctured by instruments they must be removed and the instrument is removed immediately from the sterile field and also the sterile dressing must be applied to the surgical site before the removal of the drapes (Dalamin, 2015)

Different measure must be taken for the area where bacterial is high and scrubbing is difficult, like: mouth, throat, nose or anus. Studies demonstrated that the gastrointestinal tract and vagina are resistant to infection by their normal flora but precaution must be taken to reduce the numbers of microorganisms in this area by use of sponge once in these are and then rejects it. The colon is considered highly contaminated therefore irrigation and suction is recommended to prevent the spread of microorganisms.

Air is infected by droplets, dust and shedding, thus the infection prevention actions must be respected like separation of the anesthesia area and sterile field by placing drapes at the head of the bed and also the movement around the sterile field must be reduced. In addition talking must kept to minimum in OR as the moisture droplets can be expelled out though mask during the process of pronunciation. OR attire is worn properly: the mask covers the nose and mouth, the hair is completely covered, and body covers are close fitting. Unsterile personnel should wear long-sleeved warm-up jackets with knitted cuffs. Fronts of jackets should be completely buttoned.

AORN (2012) recommend the covering of the sterile trays which are not going to be used immediately with the sterile towel to reduce exposure to microorganisms present in operating room as the result of the study revealed that the contamination rate of uncovered trays were 4% at 30 minutes, 15% at 60 minutes, 22% at four hours and the absence of contamination of covered trays.

The use of facemask can reduce the contamination of surgical wound and sterile instruments but during sneezing contamination can happen as demonstrated by the results of prospective study done by orthopedic surgeons among perioperative team members. Therefore the researchers recommend that the surgical team members must maintain distance towards sterile material and surgical wound during sneezing and the change of gowns and gloves after sneezing (AORN, 2012).

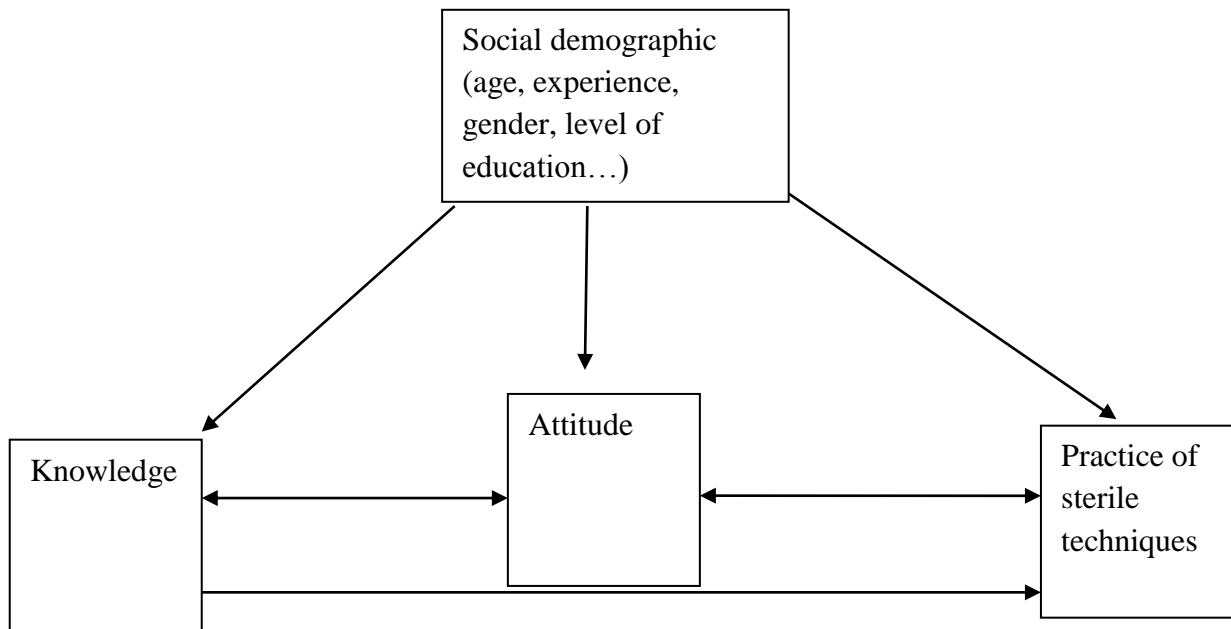
National Health Safety Network (NHSN) reported that the most types HAIs have happened as results of mixing of instrument used for abdominal surgery and perineal area on the same sterile field during surgery. The perineal area has a many microorganism than in the abdomen area. Therefore the separation of these instruments is recommended and sterile technique must be followed during gynecologic laparoscopic techniques when transurethral instruments are used.

WHO (2009) recommend that staff must have short nails and must remove jewelers before surgical hand scrub but same staff demonstrated poor adherence.

Rothrock (2007) stated that the role of operating room nurses includes the technical practice and element of behaviours that characterize the nursing professional in general. The operating room nursing is a blend of technical skills and behaviours, it is critical thinking, which requires knowledge, skills, and experience to accomplish the tasks of caring the clients. Thus the operating room nurses coordinate the intervention, ensure clients safety and comforts, prioritizes and plan care and respond to the needs of clients and teams for surgical operation.

### 2.3. CONCEPTUAL FRAMEWORK

Various studies revealed that there is relationship between demographic, knowledge, attitude and practice of sterile technique. Having more knowledge and positive attitude on sterile technique has positive impact on practice of sterile technique vice versa and also same demographic characteristics like level of education, experience, age and formal training on sterile technique has impact on knowledge, attitude and practice of sterile technique.



**Figure 2.1: KAP conceptual Framework**

## **2.4. EMPIRICAL STUDIES**

### **2.4.1. Nurse knowledge towards sterile technique**

The OR nurses need to be knowledgeable and skillful regarding sterile technique as they are responsible for identifying, interpreting, and implementing contemporary professional standards (Rothrock, 2007). According to Berry and Kohn (2016), both knowledge and experience of aseptic and sterile techniques qualify the scrub person to prepare and arrange instruments and supplies. Operating room nurses knowledge came from education at school, in job training, information given by the colleagues, reading the book, protocol, mass media and internet, previous experience (error with may lead to surgical site infection).

The study done by Dhakal et al ( 2016) at selected Hospitals of Bharatpur in Nepal regarding the knowledge of aseptic technique among nurses', demonstrated that more than half of the participants (62 %) had high level of knowledge on aseptic technique, few (37.5%) had average level of knowledge and none of the respondents had low knowledge on aseptic technique. The level of knowledge on aseptic technique was statistically significant ( $p=0.031$ ) with age and educational qualification of the respondents but this research didn't assess the attitude of nurses towards aseptic technique.

The results of study done by Devi (2014) on Knowledge and Practice of aseptic technique during delivery among health professionals in Sikkim revealed that 57% practiced aseptic technique during delivery and there was a significant association between knowledge on practice of aseptic technique during delivery with the years of experience in labour room as seen by chi square value ( $p<0.05$ ) (Devi et al 2014)

The results of study done by Dlamini (2015) exploring challenges regarding the surgical hand scrubbing, gowning and gloving in the operating room of a hospital in Swaziland found that same personnel don't have enough knowledge to perform their duties well. The participants suggest the following regarding knowledge: the surgical team need to be knowledgeable about the science behind scrubbing, gowning and gloving and other procedure of the operating theatre and regular in services education to increase knowledge. They know how to apply the principles of aseptic and sterile technique during the surgical

hand scrubbing, gowning and gloving technique but are disturbed by the shortage of resources and supplies.

The results of study done by Shamir (2013) showed that overall, 19% of operating room staff believed that their knowledge of infection control practice as inadequate but those with working knowledge of infection control practice achieved it mostly through informal communication (80.4% and self directed research 62.4%

#### **2.4.2.Nurses attitude toward sterile technique**

Macleod, (2010) defines attitude as a prediction, tendency or a propensity to react positively or negatively to an idea, object, person or situation. Attitude is therefore a serious variable in compliance (Leon, 2011).This is precisely because attitude influences individual's choice of action either positively or negatively. A positive attitude is sure to affect compliance positively by reduction of SSIs as collateral, while poor attitude is associated with noncompliance to the protocol and corresponding increase of rate of surgical site infection (Ugwokwe, 2016)

Birgand et al (2013) stated that improper operating room staff behaviours can lead to contamination of the theatre which can lead to SSIs.

Sara (2014) said that the high rates of SSIs in Middle East countries are attributed to poor compliance with infection control guidelines as results of inadequate education of staffs and ignorance of existing infection control protocol and poor physician training.

#### **2.4.3.Practice of sterile technique**

In a study done by Petersen et al (2011) describing the role of perioperative cardiac nurses in promoting patient safety in the OR, the researchers observed 18 operations and noted an average of 11.11 (61%) errors or incidents per procedure and the most common errors was related to breaks in sterile technique (56/28%) or the surgical prep (36/18%); other possible



errors included potential for infection and preventive measures (19/10%), counting (16/8%), and skin or tissue injury (16/8%).

Study surveyed Jordanian nurses' compliance to infection control guidelines (Al-Rawajfah et al., 2013) the results showed that 65% demonstrated high compliance whereas 32% demonstrated weak compliance with infection control (Sara, 2014)

The study carried out by Unsworth in 2011 at clinic of school of health community and education studies at Northumbria University in UK on knowledge, attitude and practice of aseptic techniques among nurse, the results revealed that 85.5% of nurses were knowledgeable, all nurses had the right attitude but in only 75% nurses practiced aseptic technique. The research also identifies misconceptions about aseptic techniques and factors that hinder practice of aseptic technique among nurses.

The results of the study done by Pankaj et al (2014) to assess the attitude and practice of aseptic technique applied in nursing practice among staff nurses working in selected hospital, revealed that the overall practices mean score for (YES) was  $(15.08 \pm 4.08)$  that is 75.40% of the total score. This implies that the staff nurses maintain very good practices of aseptic techniques applied in nursing practice. Also the study shows that the nurse's attitude towards aseptic technique was good as they were able to fill the correct answer to pertinent questions. There was significant association found between demographic variable like years of working experience and the attitude towards aseptic technique applied in nursing practice among staff nurses. This shows that high cadre nurses have the right attitude towards aseptic technique than low cadre nurses; this is due to their years of experience and effectiveness in the work. There was significant association found between the practices and the variables like sex. Hence it was concluded that it is essential to raise awareness about aseptic technique on attitude and practices while providing nursing care to patients and its impact on health; and develop health seeking behaviours among the patients and caregivers to provide better care and improve the quality of life. However there was no relationship between level of education and practice of aseptic technique.

#### **2.4.4. Conclusion**

The surgical site infection continue to be a bid problems for operated clients, this is related to no adherence to the sterile techniques principles by operating room staffs. The operating room nurses can prevent the contamination of surgical wound by applying sterile techniques and control the compliance with sterile technique. Thus knowledge and attitude can affect the practice of sterile technique and visa versa. Therefore the finding of this study revealed that 3.8% had very high level of knowledge, 27.5% had high level of knowledge, and few 3.8% had low level of knowledge. The OR nurses had positive attitude regarding sterile technique and 61.3% practiced sterile technique at very high level, 23.8% practiced it at high level, 12.5% practiced sterile technique at moderate level and only 2.5% practiced sterile technique at low level. The policies and the continuous in services training on sterile technique is required the improve knowledge, attitude and practice of sterile technique.

## **CHAPTER.3.METHODOLOGY**

This chapter describes the methodology that was used to carry out this study. It consists of the following: description of the study area, study design, study population, study sample, sampling strategy, data collection, procedures, data analysis, study limitation and ethical consideration

### **3.1. STUDY AREA**

This study was carried out in the operating theatres of four selected Referral Hospitals in Rwanda, including Rwanda Military Hospital (RMH), Kigali Teaching Hospital (CHUK), Butare Teaching Hospital (CHUB) and King Faisal Hospital (KFH).

RMH is the referral hospital locates in Kigali city, Kicukiro District and Kanombe sector and has 5 operating rooms. The operating theatre of RMH has 31 OR nurses and it has a capacity to receive 5 patients at the same time and able to receive 20 clients per day and the capacity to receive an average of 300 patients per month

Kigali Teaching Hospital (CHUK), is other area where this study was carried out, CHUK is located in Kigali city, Nyarugenge district and Nyarugenge sector. The operating theatre of CHUK has 6 operating rooms, 30 OR nurses, and it a capacity to receive 6patients at the same time and able to receive 20 patients a day and the capacity to receive an average of 250 patients per month.

This study also was conducted in University teaching Hospital of Butare (CHUB), it is located at Mamba, Butare cell, Huye district in the southern province. CHUB is referral hospital which serves the Southern Province's populations and others from some Districts of Western Province. It served more than 3,772,230 peoples according to the assessment of population carried out in 2012. CHUB operating room have 20 OR nurses

Lastly this study involved King Faisal Hospital (KFH) which is also the referral hospital located in Rwanda country, Kigali city, Gasabo district and Kacyiru sector. It receives national and international patients who come for seeking different care according to their

illness, including surgical care. The operating theatre of KFH has 5 operating room and 19 OR nurses.

These referrals hospital have different services including: accident and emergency service, Intensive care Unit, Neonatal Intensive Care Unit, Outpatient Department (OPD), maternity, internal medicine, paediatric, surgical wards, Operating theatre, radiology, laboratory, dentistry, ophthalmology department, neurology service, nutritional etc.

These referrals hospitals were selected by the researcher because different types of surgical operation are done in those hospitals and the researcher have observed the case of surgical site infection which may be related to some staffs who doesn't adhere to the principle of sterile techniques (not wearing correctly the face mask, wearing gown and gloves by using open method and same time the gown and gloves is mixed with instruments where there is risk of contamination of instrument, same unsterile staff pass between two sterile fields. In addition to these the referral hospitals are teaching hospitals, they receive students from different school in Rwanda and outside the country therefore the operating room nurses who work in theatre of referral Hospital must have knowledge, attitude and good practice of sterile technique.

### **3.2. 2.STUDY DESIGN AND STUDY APPROACH**

Cross sectional descriptive design and correlation method of research was used to conduct this study. Quantitative descriptive design was used because this study described the knowledge, attitude and practice of sterile technique among operating room nurses. The correlation analysis was used to determine the relationship between and among the selected variables. According to Burns and Grove (1999) a descriptive design is used to get more information about characteristics within a particular area of a study, this design can be also used in developing theory, identification of problem with current practice, justification of current practice, making judgments or determining what others are doing in similar situations. The study approach used in this study was quantitative approach

### 3.3. STUDY POPULATION

Population is the entire aggregation of case in which a researcher is interested (Polit and Beck, 2008). The study population were all nurses (100 nurses) working in operating room of four selected referral hospitals: Rwanda Military Hospital (31 nurses), Kigali Teaching Hospital (30 nurses), Butare Teaching Hospital (20 nurses) and King Faisal Hospital (19 nurses). The population was chosen because operating room nurses play a big role in prevention of surgical site infection by applying sterile technique and also they are responsible for detecting correcting any error in asepsis and sterile technique in operating room.

### 3.4. STUDY SAMPLE

A sample is subset of population elements. An element is the most basic unit about which information is collected (Burns and Grove, 2007). According to Polit and Hungler (1997:456), eligibility criteria refer to criteria that the researcher uses to designate the specific attributes of the target population and to select participants for the study. Therefore a number of 80 participants were selected as sample to represent 100; this sample size was calculated by online software called Raosoft with confidence interval of 95% and margin error of 5%. <http://www.raosoft.com/samplesize.html>.

The formula applied is  $n = N / (1 + N(e)^2)$ .

After calculation of sample size of 80 participants to represent all operating room nurses (100) who worked in 4 selected referral hospitals, also the sample of participants who represented each institution was calculated to represent the number of operating room nurse who worked in theater of that institution as follow: the research recruited 24 OR nurses from CHUK, 16 OR nurses from CHUB, 25 OR nurses from RMH and 15 OR nurses from KFH.

Site	CHUK	CHUB	RMH	KFH	Total
Population	30	20	31	19	100
Sample	24	16	25	15	80

Table 3.1 Distribution of participants according to their working institution

### **3.5. SAMPLING STRATEGY**

A purposive and convenience sampling strategy were used in this study. A purposive sampling strategy is a sampling method whereby the units to be chosen for the study sample depend on the interest of the researcher. Therefore the researcher used this sampling strategy to select the study area where the research operating room of four referral Hospitals where nurses who work in those hospitals are many and many surgical cases from district hospital are performed in referral hospitals and may face problems of sterility. The convenience involved in accessing the participants. Convenience sampling is a type of non probability sampling where members of the target population that meet certain practical criteria, such as easy accessibility, geographical proximity, availability at a given time, or the willingness to participate are included for the purpose of the study (Etikan et al, 2016)

#### **3.5.1. Inclusion criteria**

The study participants included all nurses regarding their level of registration working in operating room of the identified Hospitals (RMH, CHUK, CHUB and KFH) who were available during study period and who had accepted to participate in this study.

#### **3.5.2. Exclusion criteria**

The study excluded those who were on leave during the data collection period.

### **3.6. DATA COLLECTION METHODS AND PROCEDURE**

Data collection method is defined as activity of gathering facts or information about a subject with a purpose to obtain the information to keep on record, to make decisions about important issues and to pass information.

#### **3.6.1. Data collection tools (Instruments)**

Polit and Hungler (1997:466), state that a questionnaire is a method of gathering self-report information from the participants through self-administration of questions. According to Fox and Bayat (2007:88), questionnaires have the following advantages: questionnaires are cost-effective compared to investigations involving large sample sizes and large geographical areas, as well as when the number of questions increases; they can be easily analyzed and can be done with many computer software packages, they are familiar to most people; questionnaires reduce the incidence of bias, because there is uniform question presentation and no middleman bias and they are less intrusive than telephone or face-to-face surveys.

The researcher used the adapted questionnaire from other similar studies conducted on knowledge, attitude and practice of sterile techniques in health facilities and the questionnaires were adapted based on the research questions and objectives as the objective of this study were different with these previous study. The questionnaire had four sections questionnaires in gathering data.

The section was composed by social demographic of the participants including: age, sex, level of education, religion, year of experience, current working institution and formal training of OR nurses on sterile technique.

Section two was designed to assess the operating room nurses knowledge regarding sterile technique it had 30 questions: 14 multiple choice questions and 16 questions for which the respondents ticked yes or not if the statement is correct or not. The score ranged from 0-30 and the score obtained were transformed into percentage. The higher scores indicated the higher level of knowledge, and then the research transformed scores into five levels of knowledge according to Mc. Donald, 2002 as follows: the respondents who had scores <60% was classified as having very low level of knowledge, 60-69.99%: low; 70-79.99%:

moderate; 80-89.99%: high level and 90-100:very high level of knowledge of sterile technique. The higher score showed the great knowledge about the sterile technique the participant had.

The section three was designed to assess attitude of operating room nurses attitude towards sterile technique, it includes 10 questions. It was scored using 5 point rating scale, by 15 comparing their mean values with a central mean of 3, this was obtained using strongly agreed (5), agreed (4), neutral (3), disagreed(2) and strongly disagreed:  $((5+4+3+2+1)/5)=3$ . A mean of above 3 to the attitudinal statements showed that the respondent had positive attitude while a score below 3 showed that the respondent had negative attitude to the attitudinal statements.

The section four was used to assess the practice of sterile technique, it had 12 questions were the respondents answered yes if he or she practiced the given question regarding the practice of sterile technique and No if he/she didn't practiced the given question regarding the practice of sterile technique. The score ranged from 0-12 and the score obtained were transformed into percentage. The higher scores indicated the higher level of practice of sterile technique, and then the research transformed scores into five levels of practice according to Mc. Donald, 2002 as follows: the respondents who had scores <60% was classified as having very low level of practice, 60-69.99%: low; 70-79.99%: moderate; 80-89.99%: high level and 90-100: very high level of practice of sterile technique.

The validity and the reliability of the instrument were done. For validity: the instrument was validated through content and facial validity by the research and supervisor. For Reliability, the knowledge, attitude and practice questions were tested for 10 nurses used in pre-test who had the same characteristics as the actual participants outside the selected study areas.

### **Validity of instrument**

Validity refers to the degree to which an instrument measures what it is supposed to be measuring; it refers to whether the instrument measures the actual concept in the question and whether the concept is accurately measured (Polit and Hungler, 1997).



### **Content validity**

According to Rubin and Babbie (2005) content validity is established on the basis of judgments and other experts' making judgment of whether the instrument covers the facets that make up the concept. The researcher ensured content validity of the instrument by consulting experts in operating room technique. They reviewed the questionnaire that was adapted by the researcher on other studies and on literature based on sterile technique principles adjustment and regrouping of the questions were done.

### **Face validity**

Face validity is concerned with the superficial appearance of a measurement procedure. According to Polit and Hungler (1997) face validity refers to whether the instrument looks or appears as if it is measuring the appropriate construct. The questionnaire was evaluated by experts mentioned above to ensure that the structure of the questionnaire was in logic order and also the questionnaire was also assessed by statistician and supervisor.

### **Reliability of instrument**

A reliable instrument provides consistent, stable and repeatable results. Reliability refers to the degree of consistency or dependability with which an instrument measures the attribute it is designed to measure (Polit and Hungler, 1997). Therefore the reliability of instrument was established again by submitting the questionnaire to the experts in OR technique to ensure that the information gathered from the questionnaire was consistent with the research study and that the questions were consistent with the topic of research study. The reliability test was 0.68 and then the research did some change.

### **3.6.2. Data collection procedures**

After getting the authorization from College of Medicine and Health Sciences (CMHS), the researcher contacted the selected hospitals (Rwanda military hospital, Kigali Teaching Hospital, Butare Teaching Hospital and King Faisal Hospital) administration to request for permission to conduct the study in their institution especially in operating room. Once approval from the authorities was received the researcher went in selected hospitals, introduced himself to the unit managers of the operating rooms of selected hospitals and the operating room nurses, and provided explanations about the study in brief, importance of their participation, procedure to be followed and the purpose of the study. The researcher sensitized and explained more to the participants before giving them questionnaire the importance of research about the procedure. The participants signed the consent form before beginning to complete the questionnaire. The researcher remained in service for the day shift to collect the complete questionnaires and remained to give also the questionnaire to the participants who came for night shift. Those same participants was not available and leaved the service when the research was not available, therefore the unit managers of the operating room have been explained about the procedure and helped in giving and collecting the questionnaires when the researcher was not available. The researcher then returned to collect the completed questionnaire for coding and analysis.

### **3.6.3. Pre-test**

In order to assess whether the participants easily understand the questions, one day pre-test study was carried out of ten nurses from Rwamagana Hospital not under the study to avoid influence and bias of the study results. The participants in pre-test study were selected by convenience sampling method. This have been done to test accuracy and clarity of questions before conducting the main study and also the pre-test study gave an idea on the number of days needed for data collection. In addition to that each participant was requested to comment on questions which were understandable and those which were not well understandable and then the researcher adopted the questionnaire. Pre-test study therefore helped to address the reliability and validity of the instruments for utilization and the questionnaire was revised based on the finding of the pre-test

### **3.7. DATA ANALYSIS**

According to Polit and Hungler, 1997, quantitative data is analyzed through statistic procedure. Descriptive and inferential statistics were used to analyze and interpret the collected data as the descriptive design was used in the present study. The quantitative variables were obtained using measures of central location (mean, median) and measures of dispersion (standard deviation, standard error and 95% confidence interval). Pearson r coefficient correlation was used to determine correlation of variables. The cut point to determine significance was at P-value  $\leq 0.05$ . The data was analyzed by using the SSPS (20 version) statistic package program.

#### **3.7.1 Data management**

Data from the study were used only for the purpose of completing this study. Crude data were secured confidentially in a locked place and will be destroyed after a period of five years. Analyzed data were saved in computer files, secured by a security code that is only known to the researcher.

### **3.8. PROBLEMS AND LIMITATIONS OF STUDY**

Same problems and limitation were encountered by the researcher during implementation of this research. Same study area requested to print the hard copy and to present the research proposal before they gave the permission for data collection and also same institution gave the researcher the permission for data collection so rate. The sample size and sampling method used in this study limited the generalization of findings. The researcher anticipated also same problems including: some participants did not return the provided questionnaire; this asked the researcher to distribute again the questionnaire in other to have sample size.

### **3.9. ETHICAL CONSIDERATION**

Polit and Beck (2008) state that ethical consideration refer to the system of moral values that is concerned with the degree to which research procedure adhere to professional, legal and social obligations to the study participants. Therefore prior to conduct the study, a written permission to carry out the study was obtained from UR/CMHS administration and the identified Hospital authorities (RMH, CHUK, CHUB and KFH). The vital rights of participants are the rights to confidentiality, right to protection and privacy, not to be harmed in any manner, the right to withdraw from the study, informed consent and dissemination of results (Mount, 2006). Therefore informed consents were obtained from study participants before the study and an understanding of participants' right was discussed before. Regarding confidentiality, the study questionnaires were anonymous without respondents' identity. Likewise data from this study will be kept safely in such a way that it will not be possible to identity the respondents. Feedback will be communicated to the participant and hospitals administration, also the finding of this study will be disseminated though publication, conference.

## **CHAPTER 4: RESULTS**

This chapter describes the results of the information obtained through the self administered questionnaires, the Operating Room Nurses' Knowledge, Attitude and Practice of Sterile Techniques in Rwanda Referral Hospitals. Eighty questionnaires were administered and received back for analysis. All data generated were analyzed using frequencies, percentages, means, Chi-square tests and this was presented in form of table, bar chart and pie according to objectives of this study.

### **4.1 DEMOGRAPHIC CHARACTERISTICS OF OR NURSES**

Demographically, the highest percentage 38 (47.5%) of the respondents were in the age group above 35 years, 52 (65%) were female, 77 (96.3%) were Christian and the majority of respondent were married (88.8%). Most 50 (62.5%) respondents had advanced diploma in nursing (A1), 48 (60%) of respondents had experience below 10 year, 81.3% worked in public institution and only 31 (38.8%) had formal training on sterile technique. Table4. 1

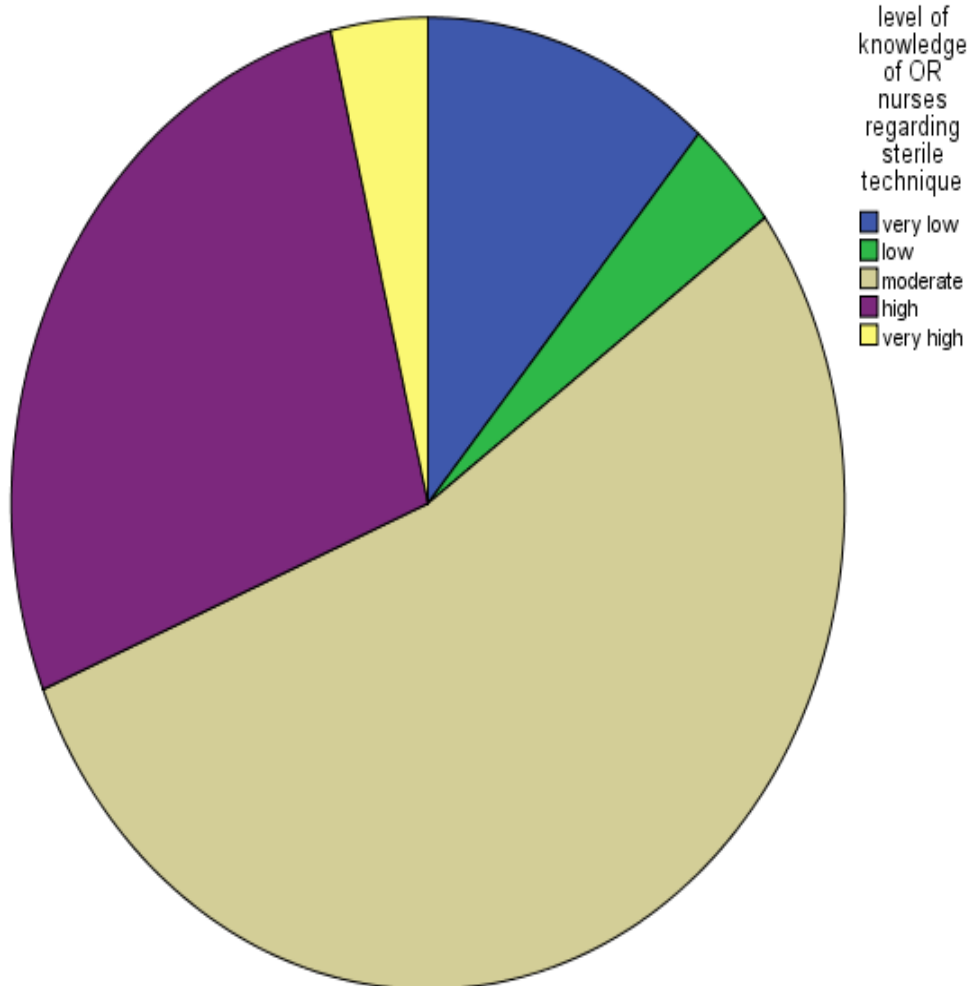
**Table4.1. Demographic characteristics of OR nurses**

<b>variables</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age categories</b>		
18-24	3	3.8
25-30	8	10.0
31-35	31	38.8
>35	38	47.5
<b>Gender</b>		
Male	28	35.0
Female	52	65.0
<b>Religion</b>		
Christianity	77	96.3
Islam	3	3.8
<b>Status</b>		
single	6	7.5
married	71	88.8
Widow	3	3.8
<b>Level of Education</b>		
A2	15	18.8
A1	50	62.5
A0	15	18.8
<b>Experience</b>		
<10 year	48	60.0
10-20	32	40.0
<b>Institution</b>		
Private	15	18.8
Public	65	81.3
<b>Formal training on sterile technique</b>		
No	49	61.3
Yes	31	38.8

## 4.2:LEVEL OF KNOWLEDGE OF OR ROOM NURSES REGARDING STERILE TECHNIQUES

Figure 4.1 demonstrates the level of knowledge of OR nurses regarding sterile techniques. 9(11.3%) of respondents had very low knowledge while 3 (3.8%) had low level of knowledge. 22 (27.5%) had high level of knowledge and only 3 (3.8%) had very high level of knowledge of sterile techniques

Figure4.1: Level of Knowledge of OR Nurses regarding sterile technique.



### 4.3. ATTITUDE OF OR NURSES REGARDING STERILE TECHNIQUE IN FOUR SELECTED REFERRAL HOSPITAL IN RWANDA

Attitude of OR Nurse towards sterile technique in four selected referral Hospitals in Rwanda was analyzed using the mean of responses. The agreement and disagreement of the attitude statements was determined by comparing their mean values with a central mean of 3, this is achieved by using the average mean of strongly agreed (5), agreed (4), neutral (3), disagreed (2) and strongly disagreed (1):  $5+4+3+2+1=3$  A mean above 3 shows that the majority of respondents agreed with attitude statement which mean that they have positive attitude while a mean below 3 shows that the respondent disagreed with attitude statement (negative attitude).The results on table4.2 shows means and standard deviations for each of 10 items on OR nurses attitude towards sterile technique, the results indicated that the OR nurses had positive attitude towards sterile technique.

Table 4.2: Distribution of OR Nurses attitude according to their agreement regarding sterile techniques in four selected referral hospitals in Rwanda.n=80

Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	Std. Dev
Sterile personnel touch only sterile items or areas; unsterile personnel touch only unsterile items or areas	67 (83.8%)	7(8.8 %)	3 (3.8%)	0(0%)	3 (3.8%)	4.69	.866
Sterile personnel must wear sterile gown and gloves	74(92.5%)	3 (3.8%)	0(0%)	3 (3.8%)	0(0%)	4.85	.597
Self-gowning and gloving should be done from a separate sterile surface to avoid dripping water onto sterile supplies or a sterile table.	55(68.8%)	14(17.5%)	11(13.8%)	0(0%)	0(0%)	4.55	.727
The stockinette cuffs of the gown are enclosed beneath sterile gloves.	52(65.0%)	17(21.3%)	5(6.3%)	6(7.5%)	0(0%)	4.44	.912
Sterile people must keep their hands in sight at all times and at or above waist level or the level	59(73.8%)	3 (3.8%)	15(18.8%)	3(3.8%)	0(0%)	4.48	.927



of the sterile field		)					
The back of the gown is considered contaminated	64(80.0%)	9(11.3%)	5(6.3%)	0(0%)	2(2.5%)	4.66	.810
Gowns are considered sterile only from the chest to the level of the sterile field in the front, and from 5cm above the elbows to the cuffs on the sleeves.	53(66.3%)	16(20.0%)	6(7.5%)	0(0%)	5(6.3%)	4.40	1.074
The unsterile circulating nurse does not directly contact the sterile field	75(93.8%)	2(2.5%)	0(0%)	3(3.8%)	0(0%)	4.86	.590
Sterile areas are continuously kept in view	66(82.5%)	6(7.5%)	5(6.3%)	3(3.8%)	0(0%)	4.69	.756
The outer packaging of the sterile pack is opened and contents are removed using a sliding action ensuring that the inner pack is not touched.	58(72.5%)	15(18.8%)	3(3.8%)	2(2.5%)	2(2.5%)	4.56	.884

#### **4.4. PRACTICE OF STERILE TECHNIQUE AMONG OR NURSES OF 4 SELECTED REFERRAL HOSPITAL IN RWANDA**

Analysis showed that 96.3% of respondents practiced sterile technique, 85% of respondents practice sterile technique every time, 96.3% of respondents wore gowns, gloves and mask while assisting surgery. Majority 96.3% checked to see if the materials are sterile before they use them, 77.5 % consider items of doubtful sterility to be contaminated. Regarding sterility of surgical gown 56.3% of respondents reported touching anywhere on sterile gown, 100% of respondent touch only sterile items or area, 86.3 % scrubbed their hands every time before assisting in the surgical procedure, table4.3

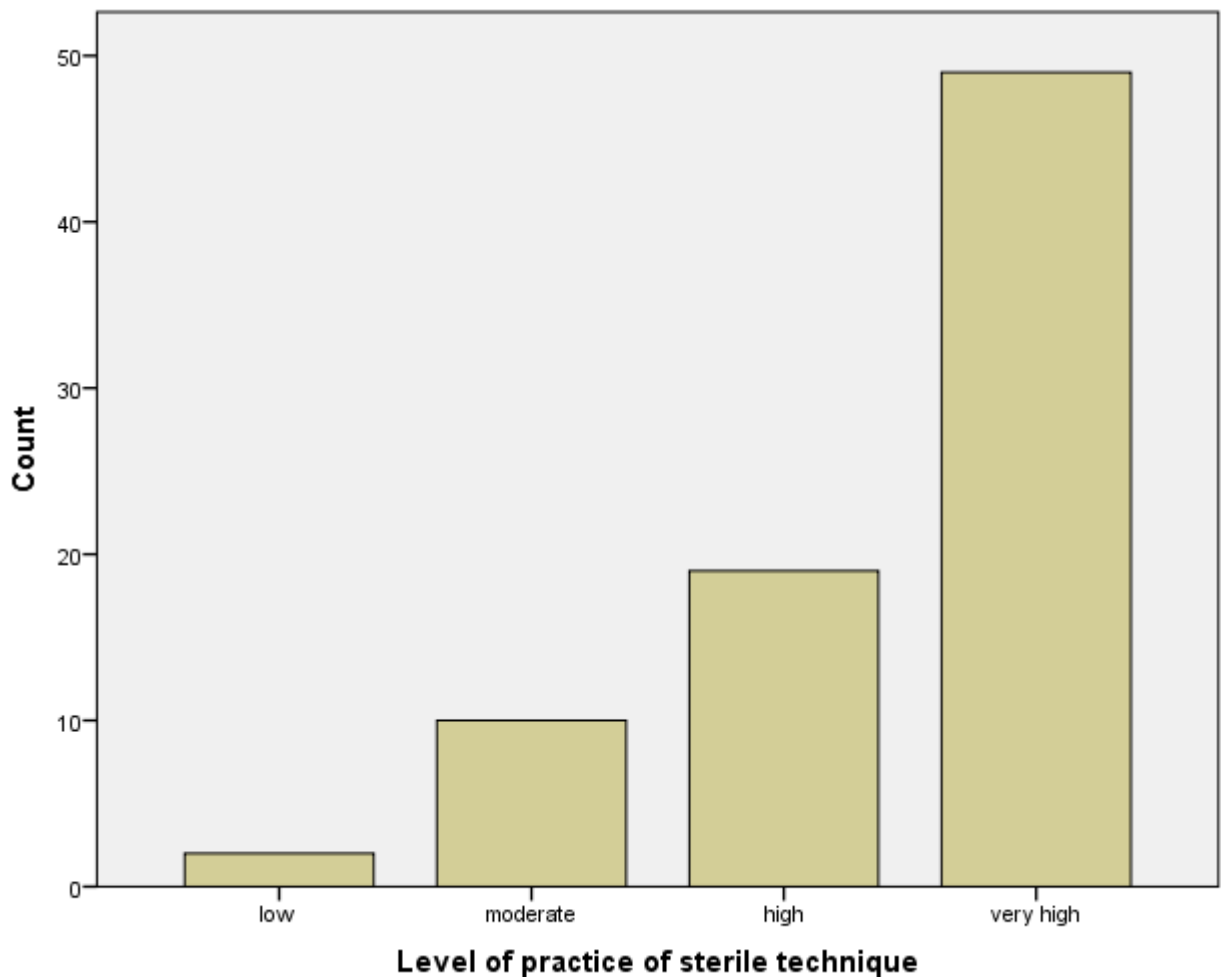
**Table 4.3: Distribution of respondents according to the provided answer towards the practice of sterile technique among operating room nurses**

variable		Frequency	Percent
<b>Do you practice sterile technique?</b>	No	3	3.8
	Yes	77	96.3
<b>Do you practice sterile techniques every time during procedure?</b>	No	12	15.0
	Yes	68	85.0
<b>Do you check to see if the materials are sterile before use?</b>	No	3	3.8
	Yes	77	96.3
<b>Do you wear gown, gloves and mask during assisting surgery?</b>	No	3	3.8
	Yes	77	96.3
<b>Do you use only sterile items within sterile field?</b>	No	5	6.3
	Yes	75	93.8
<b>Do you consider items of doubtful sterility to be contaminated?</b>	No	18	22.5
	Yes	62	77.5
<b>Do you touch anywhere on the sterile gown?</b>	No	35	43.8
	Yes	45	56.3
<b>As sterile person, do you touch only sterile items or area</b>	No	0	0
	Yes	80	100.0
<b>As unsterile person, do you touch only unsterile items or areas</b>	No	6	7.5
	Yes	74	92.5
<b>Do you minimize movement within or around a sterile field?</b>	No	6	7.5
	Yes	74	92.5
<b>Do you minimize movement within or around a sterile field?</b>	No	6	7.5
	Yes	74	92.5
<b>Do you scrub your hands every time before assisting surgical procedure or invasive procedure</b>	No	11	13.8
	Yes	69	86.3
<b>Do you keep the hand held above elbow during surgical hand washing</b>	No	15	18.8
	Yes	65	81.3

**Summary of Level of practice of sterile technique among OR Nurses of 4 selected referrals Hospitals in Rwanda.**

The analysis of the below Pie chart shows that the majority of respondents 49 (61.3%) practiced sterile technique at very high level, 19 (23.8%) practiced it at high level, 10 (12.5%) practiced sterile technique at moderate level and only 2 (2.5%) practiced sterile technique at low level.

**Bar chart 1: Distribution of respondents according to their level of Practice of Sterile Technique.n=80**



## 4.5. THE RELATIONSHIP BETWEEN DEMOGRAPHIC CHARACTERISTICS, KNOWLEDGE, ATTITUDE AND PRACTICE OF STERILE TECHNIQUE.

### 4.5.1. Relationship between demographic characteristics of respondents and knowledge of sterile technique among Or Nurses of 4 selected referral Hospitals

There were high statistically significance differences regarding relationships between ages, experience, level of education, formal training on sterile technique, and level of knowledge of sterile technique as the P-values were 0.000 using Fisher's Exact Test. There were no statically significant differences between gender, Religion and current working Institution, table 4.4

**Table 4.4: Relationship between demographics characteristic of respondent and level of knowledge of sterile technique at four selected Referral Hospitals in Rwanda.n=80**

		level of knowledge of OR nurses regarding sterile technique					P-value	(X <sup>2</sup> )	df
		very low	low	moderate	high	very high			
Age	18-24	0	0	1	2	0	.000**	35.987	12
	25-30	0	3	5	0	0			
	31-35	9	0	11	11	0			
	>35	0	0	26	9	3			
Gender	Male	6	3	13	6	0	.017*	10.604	4
	Female	3	0	30	16	3			
Religion	Christianity	9	3	42	20	3	.608	3.296	4
	Islam	0	0	1	2	0			
Status	single	3	0	3	0	0	.035*	.035	8
	married	6	3	40	19	3			
	Widow	0	0	0	3	0			
Level of education	A2	0	3	6	6	0	.000**	25.807	8
	A1	6	0	28	16	0			
	A0	3	0	9	0	3			
Experience	<10 year	9	0	29	10	0	.000**	17.446	4
	10-20	0	3	14	12	3			
Institution	Private	0	1	10	4	0	.458	3.432	4
	Public	9	2	33	18	3			
Formal	No	9	3	28	6	3	.000**	19.639	4

training on sterile technique	Yes	0	0	15	16	0			
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\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

#### 4.5.2 Relationship between demographic characteristics and OR Nurses attitude towards sterile technique

There were high statistically significant differences between age, gender, status and level of education and respondents attitude toward sterile technique using Fisher's Exact Test. Respectively the P-value were, 0.001 for age, 0.001 for gender, 0.000 and 0.000 for level of education. There were no statically significant differences relationship between religion, experience and institution, formal training on sterile technique and respondents attitude towards sterile technique as the p-value were more than 0.5.

Table 4.5. Relationship between demographic characteristics and attitude OR Nurses towards sterile technique at 4 selected Rwanda Referral Hospitals

		Attitude of OR nurses regarding sterile technique					P-value	(X <sup>2</sup> )	df
		6	7	8	9	10			
Age	18-24	0	0	3	0	0	.001**	27.277	4
	25-30	3	0	0	0	5			
	31-35	0	3	7	8	13			
	>35	0	5	3	12	18			
Gender	Male	0	8	10	7	3	.000**	37.900	4
	Female	3	0	3	13	33			
Religion	Christianity	3	8	13	20	33	.633	2.881	8
	Islam	0	0	0	0	3			
Status	single	3	0	3	0	0	.000**	25.531	8
	married	0	8	10	20	33			
	Widow	0	0	0	0	3			
Level of education	A2	0	0	3	0	12	.000**	24.482	4
	A1	3	5	7	20	15			
	A0	0	3	3	0	9			

Experience	<10 year	3	6	10	11	18	.236	5.402	4
	10-20	0	2	3	9	18			
Institution	Private	0	2	0	6	7	.202	5.428	4
	Public	3	6	13	14	29			
Formal training on sterile technique	No	3	2	10	15	19	.038**	9.468	4
	Yes	0	6	3	5	17			

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

#### 4.5.3 Relationship between demographic characteristics and level of practice of sterile technique among OR nurses in 4 selected Rwanda Referral hospitals

There were statically significant difference relationship between age, gender, level of education, experience, institution, formal training on sterile technique and level of practice of sterile technique toward sterile technique using Fisher's Chi Square Test as the p-value were between 0.000 and 0.047. There were not statically significant difference between religions; status and level of practice of sterile technique as the p-value were more than 0.05.

**Table 4.6 Relationship between demographic characteristics and level of practice of sterile technique among OR nurses in four selected Rwanda Referral hospitals**

Demographics * practice sterile technique Crosstabulation								
Characteristics		level of practice of sterile technique among OR Nurses				P-value	(X <sup>2</sup> )	df
		low	moderate	high	very high			
Age	18-24	0	3	0	0	.004**	20.465	9
	25-30	0	0	0	8			
	31-35	0	3	12	16			
	>35	2	4	7	25			
Gender	Male	0	3	14	11	.000**	15.836	3
	Female	2	7	5	38			
Religion	Christianity	2	10	19	46	.728	1.991	3
	Islam	0	0	0	3			
	single	0	0	3	3	.591		6

Status	Married	2	10	16	43		4.602	
	Widow	0	0	0	3			
Level of education	A2	0	0	0	15	.004**	16.181	6
	A1	2	10	13	25			
	A0	0	0	6	9			
Experience	<10 year	1	8	15	24	.047*	7.121	3
	10-20	1	2	4	25			
Institution	Private	2	0	3	10	.031*	8.132	
	Public	0	10	16	39			
Formal training on sterile technique	No	1	2	13	33	.028*	8.286	3
	Yes	1	8	6	16			

## CHAPTER 5: DISCUSSION

This study determined the knowledge, attitude and practice of sterile technique among operating room nurses in 4 selected referral Hospitals in Rwanda. This contributed to the growing body of knowledge towards sterile technique. The results indicated that the majority 43 (53.8%) operating room nurses hold moderate level of knowledge on principles of sterile technique and 22 (27.5%) had high level of knowledge. It is necessary for operating room nurse to have high level of knowledge to provide safe and effective nursing care to the surgical client.

Concerning the demographic characteristics this study revealed that among 80 respondents, the highest percentage (47.5%) of the respondents were in the age group above 35 years this contrary to reports by Dhakal et 2016 and Leodoro et al 2012 which revealed that highest of respondent to be 67.9 % for age group below 25 years and (42.86%) for age group between 25to 30 years old respectively.

Regarding gender, the majority of respondent 65% were female this is supported by Leodoro et al 2012 in their study results which revealed that the majority of respondents were female (76.19%). The reason for this result might be due to the fact that there are more female than males in nursing profession in Rwanda. In addition to that the finding of this study revealed that the majority of respondents 62.5% had advanced diploma in nursing (A1), 60% of respondents had experience below 10 year, and only 38.8 had formal training on sterile technique, The finding of these are supported by Dhakal et al 2016 which revealed that the majority of respondent 80.4% had completed PCL Nursing, most of respondents 75% had working experience of five years and below and 35.7 had formal training on sterile technique.

The high statically significance differences observed between ages, experience, level of education and formal training on sterile technique and level of knowledge of sterile technique (table4.1) show that. This finding is similar to that of Dhakal et al 2016

The finding of the present study revealed that there were statically significant relationships between age, gender, status and level of education and respondents attitude toward sterile technique. This is contrary to Shamble (2014) assessing Knowledge, Attitude and Practice of



fourth, fifth and sixth year medical students on standard precaution in Tash, Addis Abba, Ethiopia” which revealed no significant relationships.

Concerning operating room nurses knowledge towards sterile technique 3 (3.8%) of respondents had very high level of knowledge of sterile techniques, 22 (27.5%) had high level of knowledge, majority of respondents 43 (53.8%) had moderate knowledge of sterile technique and few 3 (3.8%) had low level of knowledge. The finding contradict by Dhakal et al (2016) study which revealed that more than half of the participants 62 had high level of knowledge on aseptic technique, few 37.5 had average knowledge and none of the respondents had low knowledge on aseptic technique and Leodoro et al 2012 where the majority of the respondents 57.14 % had excellent knowledge of sterile technique and 38.09% had very good knowledge of sterile technique. However, the result of this study agrees with the previous studies conducted among nurses and other clinicians regarding knowledge on aseptic technique and standard precaution in hospital setting. Luo et al investigated nurses in China and found out that only half had knowledge on aseptic technique.

Regarding the safe distance for an unsterile person from sterile field, 25% respondents answered 30 cm and other 75% answered 45 and 60 cm. The finding of this study is similarly with Malan (2009) titled: “Registered Nurses knowledge of infection control and sterile technique principles in the operating room complex of private hospitals” which revealed that 20% answered 30 cm and 80% answer 60 cm.

Regarding part of gown is sterile 30% respondents answered from chest level to the level of the sterile field and 5 cm above elbows to the cuffs of the sleeves which is inconsistent with the same study done by Dhakal et 2016 titled: “Nurses’ Knowledge and Practice of Aseptic Technique in the operating theatre which revealed that 71.4% of respondents knew that the gown is sterile from chest level to the level of the sterile field and 5 cm above elbows to the cuffs of the sleeves.

Concerning the level of practice of sterile technique the majority of respondents 49 (61.3%) practiced sterile technique at very high level, 19 (23.8%) practiced it at high level, 10 (12.5%) practiced sterile technique at moderate level and only 2 (2.5%) practiced sterile technique at low level. This finding is contrary with Leodoro et al 2012 study which revealed that the respondents had great extent practice of sterile technique.

## **Chapter 6: CONCLUSION AND RECOMMENDATION**

### **6.1. CONCLUSION**

The study was designed to assess knowledge, attitude and practice of sterile technique among operating room nurses of 4 selected referral Hospitals. The majority of respondent had moderate level of knowledge of sterile technique, a right attitude toward sterile technique and good practice of sterile technique. Also the finding of this study revealed statically significance differences relationship between level of knowledge and ages, experience, level of education and formal training on sterile technique. However there is still need for nurses to be more educated on sterile technique principles for ensuring safety of the operated client and to reduce the rate of post operative wound infection among operated client.

### **6.2.RECOMMENDATION**

With reference to the findings of this study, the following recommendation were made:

#### **To the Nurses:**

1. The nurses should attend more training on sterile technique to be more familiar with new ideas in practicing sterile technique because the training can give theoretical background pertaining to prevention of infection, this also can make them aware of the importance of implementing sterile technique principles.
2. They should ensure regular practice of sterile technique.

#### **Education:**

1. It should be better to increase the level of education of nurse as revealed in this study the majority of respondents had advanced diploma in Nursing and no one who had masters.
2. Teaching and evaluation of students on sterile technique should be improved to increase adherence to sterile technique.

**To research:**

1. Future research using observation technique should be done among operating room nurses to assess their practice of sterile technique in referral hospital and in other health institution.
2. Also the study was limited only for operating room nurses but there other people who work in theatre who had to adhere to the sterile technique principles like sterile team member, such as surgeon and assistant, it will also be advisable to conduct a research which include them because they are in direct with the patient during surgery and may also a risk for a client to develop post operative wound infection

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## **APPENDICES: 1 INFORMED CONSENT**

Dear Sir/Madam,

**Re: Request participation in Research Study *‘operating room nurses knowledge, attitude and practice of sterile techniques in Rwanda referral hospital’.***

You are being asked to participate in a research study which will be conducted by postgraduate student NSEKAMBABAYE Jean Pierre, supervised by Lilian OMONDI from the School of Nursing and midwifery in College of Medicine and Health Sciences-University of Rwanda. This study will be conducted in four hospitals (RMH, CHUK, KFH and CHUB). The aim of this study is to assess the operating room nurses knowledge, attitudes and practice of sterile technique. Participation in this study will consist of the completion of attached questionnaire on ‘operating room Nurses Knowledge, attitude and Practice of sterile techniques.’ This survey will take no more than 30 minutes to complete.

I guarantee confidentiality of your voluntary participation and the information you provide will be made anonymous once you hand in this questionnaire. This means that your form of identification will not be included in any records presentation and your answers in this questionnaire will not be shared with your medical or nursing team. We can assure you that your team will treat you in the same way whether or not you choose to participate in our survey.

If you consent to participate in this study, please sign this form and remove it from the survey. The participant can keep this signed copy as proof of consent. Then please complete the survey attached. If you have any further questions or require more information about this study, you can contact the researcher directly on email: [peterstar2020@yahoo.fr](mailto:peterstar2020@yahoo.fr) or on mobile +250788538304

With best wishes,

Yours sincerely,

**Participant:** All of my questions and concerns about this study have been addressed. I choose, voluntarily, to participate in this research project.

---

Names of the participants

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Signature of participant

---

date



**QUESTIONNAIRE**

***OPERATING ROOM NURSES KNOWLEDGE, ATTITUDE AND PRACTICE OF STERILE TECHNIQUES***

**SECTION A: SOCIO- DEMOGRAPHIC OF PARTICIPANT**

1. Age- (a) 18-24 years  (c) 31-35 years   
(b) 25-30 years  (d) above 35years
2. Gender (a) male  b) female
3. Religion (a) Christianity  (c) Traditional   
(b) Islam  (d) others
4. Marital status (a) single  (c) divorced   
(b) Married  (d) widow
5. Level of education (a) RN (A2)  (c) RN (A0)   
(b) RN (A1)  (d) RNM   
(e) Others (specify) .....
6. Year of experience (a) below 10 years  (c) 21-30 years   
(b) 10-20 years  (d) 30 years and above
7. Current working Institution: a) Public  b) private
8. Formal training on sterile technique a) yes  b) not

**SECTION B: OR NURSES KNOWLEDGE OF STERILE TECHNIQUES**

Please encircle only one corrected answer

9. Which of the following best describes sterile technique, it is:  
a. applied when stocking supplies in the surgical suite  
b. Employed during terminal cleaning to ensure a sterile environment.  
c. Implemented during surgical procedures to prevent microbial contamination.
10. A gown is considered sterile.....  
a. From the chest to the level of the sterile field  
b. From the chest to the level of the sterile field and 5 cm above elbows to the cuffs of the sleeves  
c. The whole gown is considered sterile
11. A sterile package wrapped in a previous woven material drop to the floor.  
a. Do you place the package back into sterile storage  
b. Open the package for the surgical procedure  
c. Consider the package contaminated
12. When the tape on the large abdominal swabs extends over the table edge, do you....  
a. Move the swab from the edge and continue using it  
b. Discard the swab  
c. Remove the tape from the swab and continue to use it

13. The circulating nurse accidentally contaminates a sterile area indicate your actions as a scrub nurse.
  - a. Discard the trolley that was contaminated
  - b. Redrape a new area
  - c. Continue with the procedure with no intervention
14. When draping an unsterile table, do you...
  - a. Drape the table first towards self and then away from yourself
  - b. Stand close to the table that is to be draped
  - c. Drape the table first away from yourself and then towards yourself
15. When creating a sterile field for the operation it is preferable to open a pack...
  - a. Close to the operative time
  - b. In advance
  - c. In advance and cover it with sterile drapes
16. When requiring sterile water during the surgical procedure do you.....
  - a. Place a bowl on the edge of the table for the nurse to pour in
  - b. Allow the nurse to reach over your table to pour the water
  - c. Discard the sterile water left in the bottle after completion of the operation
17. Upon discovering a hole in glove during a surgical procedure, the OR nurse should
  - a. Change the glove using the closed glove method
  - b. Change the glove using open glove method
  - c. Place another glove over the compromised glove.
18. The safe distance between an unsterile person and sterile field is:
  - a. 30cm
  - b. 60cm
  - c. 45cm
19. When a sterile area has been created, does the scrub nurse...
  - a. Remain within the room to view sterile area
  - b. Exit the theatre to obtain more sterile supplies with no one in the theatre
  - c. Ask another member to collect more sterile supplies
20. During a surgical procedure when passing the sterile team members do you..
  - a. Turn your back towards one another and turn 360 degrees
  - b. Face the other member's back
  - c. Step aside for the unsterile person
21. An unsterile person is allowed to...
  - a. Pass between two sterile areas
  - b. Pass with their back towards the sterile area
  - c. Face and observe sterile area when passing
22. The circulating nurse is allowed to open sterile packages with
  - a. clean and dry hand
  - b. gloves on
  - c. wet hands

Tick the ones that apply:

Nb		YES	NO
23	Only sterile items are used within the sterile field		
24	Sterilized package found in a contaminated area is considered as no sterile		
25	A dropped package is considered contaminated on the outside		
26	Tables are sterile only at table Level		
27	Anything falling or extending over the table or operating bed edge, such as a piece of suture or suction tip, is contaminated.		
28	The edges of anything that encloses sterile contents are considered unsterile		
29	The sterile field is created as close as possible to the time of use		
30	A sterile field is contaminated whenever a sterile barrier is permeable.		
31	Sterile personnel touch only sterile items or areas; unsterile personnel touch only unsterile items or areas		
32	Sterile personnel must wear sterile gown and gloves		
33	Self-gowning and gloving should be done from a separate sterile surface to avoid dripping water onto sterile supplies or a sterile table.		
34	The stockinette cuffs of the gown are enclosed beneath sterile gloves.		
35	Sterile people must keep their hands in sight at all times and at or above waist level or the level of the sterile field		
36	The back of the gown is considered contaminated		
37	Gowns are considered sterile only from the chest to the level of the sterile field in the front, and from 5cm above the elbows to the cuffs on the sleeves.		
38	The unsterile circulating nurse does not directly contact the sterile field		

**SECTION C: OR NURSES' ATTITUDE TOWARDS STERILE TECHNIQUE**

Tick the ones that apply: Strongly agree (5), agree (4), Neutral (3), disagree (2), Strongly disagree (1)

	1	2	3	4	5
1. Sterile personnel touch only sterile items or areas; unsterile personnel touch only unsterile items or areas					
2. Sterile personnel must wear sterile gown and gloves					
3. Self-gowning and gloving should be done from a separate sterile surface to avoid dripping water onto sterile supplies or a sterile table.					
4. The stockinette cuffs of the gown are enclosed beneath sterile gloves.					
5. Sterile people must keep their hands in sight at all times and at or above waist level or the level of the sterile field					
6. The back of the gown is considered contaminated					
7. Gowns are considered sterile only from the chest to the level of the sterile field in the front, and from 5cm above the elbows to the cuffs on the sleeves.					
8. The unsterile circulating nurse does not directly contact the sterile field					
9. Sterile areas are continuously kept in view					
10. The outer packaging of the sterile pack is opened and contents are removed using a sliding action ensuring that the inner pack is not touched.					

### SECTION C: PRACTICE OF STERILE TECHNIQUE

1. Do you practice sterile technique? Yes { } no { }
2. Do you practice sterile techniques every time during procedure? Yes { } No { }
3. Do you check to see if the materials are sterile before use? Yes { } No { }
4. Do you wear gown, gloves and mask during assisting surgery? Yes { } No { }
5. Do you use only sterile items within sterile field? Yes { } No { }
6. Do you consider items of doubtful sterility to be contaminated? Yes { } No { }
7. Do you touch anywhere on the sterile gown? Yes { } No { }
8. As sterile person, do you touch only sterile items or area? Yes { } No { }
9. As unsterile person, do you touch only unsterile items or areas? Yes { } No { }
10. Do you minimize movement within or around a sterile field? Yes { } No { }
11. Do you scrub your hands every time before assisting surgical procedure or invasive procedure Yes { }  
No{ }
12. Do you keep the hand held above elbow during surgical hand washing Yes { } No { }

This tool is adapted from the other tools used by the following researchers in the researcher they conducted, I acknowledge them : UGWOKÉ Angelina Ngozi, Attitude and Compliance with surgical Aseptic standard among theatre workers in Tertiary health institutions in Enugu state; Kim Malan, Registered nurses' knowledge of infection control and sterile technique principles in the operating room complex of private hospitals; Leodoro J. Labrague, Operating Room Nurses' Knowledge and Practice of Sterile Techniques.