

**DETERMINANTS OF THE WORLD HEALTH ORGANIZATION SURGICAL
SAFETY CHECKLIST USE AMONG CLINICIANS AT KENYATTA
NATIONAL HOSPITAL NAIROBI, KENYA**

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REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE
IN MEDICAL SURGICAL NURSING OF
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DECLARATION

I affirm that this thesis is entirely my own creation and has not been previously submitted to any other academic institution for evaluation or recognition.

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DEDICATION

The thesis is dedicated to my family members who supported me throughout the period of my studies; spiritually the family bond grew stronger. You remain the greatest inspiration my live.



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I express my gratitude to the Divine Being for bestowing upon me existence, well-being, and vitality, as well as the capacity to effectively conduct this research study. I thank my research supervisor's, Dr. Nilufar Jivraj, Dr. George Njoroge and school of nursing faculty members for their endless guidance and motivation throughout the research study. I am grateful to the entire faculty of the School of Nursing at Mount Kenya University and my fellow peers for their invaluable support.



ABSTRACT

The World Health Organization (WHO) Surgical Safety Checklist (SSC) aids in minimizing harm and lessens adverse surgical complications to the patients by introducing necessary repetitive surgical safety checks thereby reinforcing good surgical practices. Kenyatta National Hospital (KNH) adopted and localized this checklist in its medical record files in the operating rooms around 2012; however, limited studies had been done to assess its use by the clinicians. The primary aim of the research was to ascertain the utilization of the World Health Organization Surgical Safety Checklist (WHO SSC) among medical practitioners at Kenyatta National Hospital in Nairobi, Kenya. The primary aims were to assess the extent of utilization of the WHO SSC among healthcare providers at KNH in Nairobi, Kenya, and to evaluate both clinician-related and institutional-related factors that affect its usage at the same facility. To accomplish this, a cross-sectional study was conducted within the operating rooms of KNH. Through a multi-stage sampling technique, a total of 178 actively practicing healthcare professionals who utilize the SSC were recruited, excluding those on leave. The sample size was determined using Yamane's formula. Data was collected through self-administered questionnaires, and observations were made on 42 procedures performed by various clinicians, resulting in a total of 178 participants. The frequencies and percentages were employed to summarize the descriptive data, while Pearson's Chi-square and Fisher's exact tests were applied to analyze categorical data and investigate the association between practices and variables. IBM SPSS version 20 was utilized to conduct both descriptive and inferential statistical analyses. A substantial majority (98%) of the participants exhibited knowledge about the SSC, and 95% reported utilizing it on the day of the interview. Approximately 52% of the respondents possessed more than 10 years of clinical experience, while 46% had over a decade of experience in the operating theater. Nearly 95% of the participants indicated the availability and utilization of the SSC, and 99% confirmed its mandatory implementation in the operating theaters. The training rate for clinicians on the use of the SSC was 62%, while the rate of sensitization was reported at 70%. Out of 42 surgeries observed in the operating rooms, there were lower levels on use of SSC. The clinicians gave a lot of importance to confirming sterility, followed by confirmation of completion count of surgical instruments, sponges and needles at 83.7% and 82.5% respectively. The studied respondents at KNH were using and aware of SSC as recommended. Improvement for the least important surgical practices and gaps noted will better surgical safety practices in the operating rooms in this institution.

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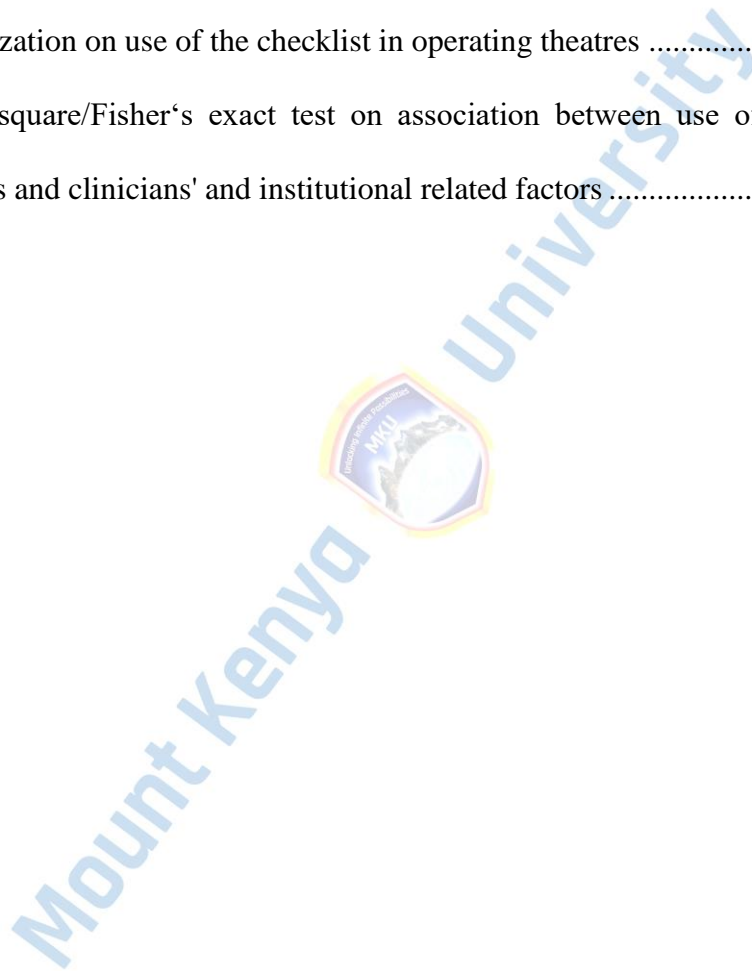
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LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|----------|--|
| BScN: | Bachelor of Science in Nursing |
| CAMH: | Comprehensive Accreditation Manual for Hospitals |
| ERC: | Ethics and research committee |
| ISO: | International organization for standardization |
| JCIA: | Joint Commission International Accreditation |
| KNH: | Kenyatta National Hospital |
| MKU: | Mount Kenya University |
| NACOSTI: | National commission for science, technology and innovation |
| OR: | Operating room |
| ORN: | Operating room nurse |
| PACU: | Post anaesthesia care unit |
| RA: | Receiving area |
| SOP: | Standard operating procedure |
| SOPG: | School of post graduate |
| SPSS: | Statistical Programme Social Sciences |
| UoN: | University of Nairobi |
| WHO: | World Health Organization |

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This section provides an overview of the study's historical context, including the inception of the WHO Surgical Safety Checklist

1.1 Background information

Ensuring patient safety is a critical priority in global healthcare systems and serves as a foundational principle of the Joint Commission for International Accreditation (Commission et al., 2018). Central to this principle is the implementation of safeguarding measures to prevent errors and adverse outcomes for individuals undergoing medical treatment. Safeguarding encompasses a comprehensive set of procedures and practices designed to minimize risks and promote patient well-being throughout the healthcare journey. These measures include stringent protocols for medication administration, infection control practices, accurate patient identification, effective communication among healthcare professionals, and continuous monitoring of patient conditions. The Joint Commission's emphasis on patient safety underscores the commitment of healthcare providers to provide high-quality care that prioritizes the well-being and welfare of patients. By adhering to these safeguarding measures, healthcare organizations can foster an environment that minimizes errors, enhances patient trust, and promotes the delivery of safe and effective medical treatment.

The WHO Surgical Safety Checklist has been an important tool in complementing safety checks among other tools. This tool introduces necessary repetitive surgical safety checks thereby reinforcing good surgical practices. This in turn contributes to

good surgical outcomes. The surgical team, including surgeons, anesthetists, and nurses, utilize the WHO Surgical Safety Worksheet to verify and guarantee that the accurate surgical procedure is carried out on the appropriate patient at the proper site, along with other verification measures (De Vries et al., 2010; Norton & Rangel, 2010).

Therefore, the inception of the safe surgery saves lives campaign in 2007 was instigated by the World Health Organization (WHO), playing a pivotal role in its establishment. This endeavor was designed with the objective of reducing surgical injuries and unfavorable surgical results, such as fatalities and disabilities, on a global scale. Under the guidance of Dr. Atul Gawande, the World Health Organization (WHO) joined forces with surgeons, anesthesiologists, nurses, and a range of specialists to formulate ten fundamental goals for the safe surgery saves life initiative. The checklist functions as a supportive instrument for implementing recognized surgical safety protocols, fostering enhanced communication and teamwork among surgical teams. The implementation and utilization of the WHO Surgical Safety Checklist have been linked to decreased instances of postoperative complications and fatalities in diverse healthcare facilities (Chang, 2011; Panesar et al., 2011).

1.1.1 Surgical practices before the WHO surgical safety checklist

Before the conception of the WHO Surgical Safety Checklist, there had been a rise in the volumes of surgeries performed worldwide and this continues to date. For instance, about 187 to 281 million surgical procedures were conducted in 2004 according to data derived from 56 countries, translating to one operation for every 25 human beings alive (Weiser et al., 2008), with 0.4 to 0.85% surgical associated death rate and 3 to 22% surgical associated complication rate in the industrialized countries, while in the developing countries, the surgical associated rate of death were at 5 to 10%. Adverse surgical outcomes such as postoperative complications or even death affected 3-16 % of

hospitalized patients with nearly half of the cases preventable through good knowledge and practice of clinical practitioners (Chang, 2011; Ronsmans & Graham, 2006). However Kenya was not among the countries studied.

1.1.2 Clinicians' role in the use of the WHO Surgical Safety Checklist

The surgical operating theatre is a unique environment that uses the multi-disciplinary approach of at least three clinical teams comprising surgeons, nurses and anesthesiologists with each performing specific tasks concerning the WHO Surgical Safety Checklist (Helmreich & Schaefer, 2018).

1.1.3: Nurses

To start with, the receiving area nurse receives the patient from the ward nurse upon certificatory, mandatory preoperative checks using the provided preoperative checklist, appends the WHO Surgical Safety Checklist in the patients file among other responsibilities (Aha & Aha, 2014). The scrub nurse is answerable for the specific patient being operated on. She/he oversees the theatre environment preparation, confirms patient identity, ascertains informed consent is signed, orders sterile sets, confirms the sterility of the instruments before the start of the operation, scrubs, gowns, gloves, creates and manages the sterile field, actively participates in the surgery, reports the counts of instruments, sharps and surgical swabs as correct/incorrect before the closure of the surgical wound among other responsibilities (Mitchell & Flin, 2008).

The circulating nurse is the designated coordinator of the surgical safety checks; she/he initiates the safety checks, provides items needed by the scrub nurse, surgeon, and anesthesiologist/anesthetist, and manages the specimens, among other responsibilities (Neyens et al., 2019). After the surgical procedure, the post-anesthesia care nurse assumes the responsibility of receiving the patient and their medical records, including

the completed WHO Surgical Safety Checklist, from the operating room. In addition to other tasks, this nurse oversees the patient's well-being following the operation, carefully monitoring vital signs before transferring the patient to the ward nurse (Akhtar et al., 2013). The anesthetic nurse works together with the anesthesiologist/anesthetist, prepares the resuscitation trolley and necessary consumables in readiness for any adverse event during the induction of anaesthesia among other responsibilities.

1.1.4 Anesthesiologists/anesthetists

The anesthesiologists/anesthetists are in charge of ensuring that the patient remains alive throughout the surgery. They accomplish this by securing and managing the patient's airway, observe the blood loss and take necessary action to manage abnormalities observed among other duties. Moreover, the anesthesiologists/anesthetists also confirm the patient's possible airway difficulty, allergy among other responsibilities during the sign in phase (Craven, 2017).

1.1.5: Surgeons

The surgeon leads the whole team during the surgical procedure. Concerning the WHO Surgical Safety Checklist, he/she confirms that they have the correct patient with the correct site of surgery marked, and raises concerns or critical events that may occur related to the surgical procedure among other duties (Schwendimann et al., 2019).

1.1.6 Adoption of the WHO Surgical Safety Checklist

Kenyatta National Hospital adopted the WHO Surgical Safety Checklist and localized it into its intraoperative notes around 2012 as part of the requirements for ISO certification to document the intraoperative processes and improve surgical outcomes (Chang, 2011). Before this, Kenyatta National Hospital surgical teams performed surgeries based on their own expert opinion.

1.2 Statement of the problem

Usage of the WHO SSC differs across healthcare institutions. The limited use of the WHO Surgical Safety Checklist can lead to surgical errors like reports on the wrong patient operated in a Kenyan hospital in 2018 among other adverse surgical outcomes (Dousis et al., 2008; Merab, 2018a).

In general, the adherence to the WHO Surgical Safety Checklist protocol during the time out phase is typically observed to be between 96 and 100 percent, while the sign out phase demonstrates a compliance rate of approximately 22 percent (Schwendimann et al., 2019). A study investigating the prevalence of surgical safety checklist utilization in Europe and its association with hospital mortality rates found that the overall occurrence of checklist usage in the European population was 67.5%. However, there was a significant variation among countries, ranging from 0% to 99.6% (Jammer et al., 2015). It is worth noting that despite the adoption of surgical safety checklists, adverse surgical outcomes are still being reported. For example, media reports have highlighted.

Research conducted in Nigeria, in Africa found that only 57% of participating nurses used the WHO Surgical Safety Checklist in four tertiary hospitals (Fajemilehin & Faronbi, 2016). While in East Africa, the participating anesthesiologists in a survey on the use of the WHO Surgical Safety Checklist reported 19% compliance at Kenyatta National Hospital among other referral hospitals (Epiu et al., 2016). As demonstrated by the above-cited studies conducted in different countries, there have been varying utilization levels of the WHO Surgical Safety Checklist despite its contribution to safety during surgical procedures in the operating rooms.

1.3 Purpose of the Study

The aim of this study is to evaluate the implementation of the World Health Organization surgical safety checklist among healthcare professionals working at Kenyatta National Hospital in Nairobi, Kenya.

1.4 Objectives of the Study

1.4.1 Broad Objective

To determine the WHO Surgical Safety Checklist use among clinicians at Kenyatta National Hospital Nairobi, Kenya.

1.4.2 Specific Objectives

- i. To determine the level of use of the WHO Surgical Safety Checklist by the clinicians at Kenyatta National Hospital in Nairobi, Kenya.
- ii. To assess the clinicians 'related factors that influence the use of the WHO Surgical Safety Checklist at Kenyatta National Hospital in Nairobi, Kenya.
- iii. To determine the institutional related factors that influences the use of the WHO Surgical Safety Checklist at Kenyatta National Hospital in Nairobi, Kenya.

1.5 Study Questions

The study was guided by the following research questions.

- i. What was the extent of utilization of the WHO Surgical Safety Checklist among clinicians at Kenyatta National Hospital in Nairobi, Kenya?
- ii. What were the factors among clinicians that influenced the use of the WHO Surgical Safety Checklist at Kenyatta National Hospital in Nairobi, Kenya?
- iii. What were the institutional factors that influenced the use of the WHO Surgical Safety Checklist at Kenyatta National Hospital in Nairobi, Kenya?

1.6 Study Hypotheses

- i. The null hypotheses are; there is no statistically significant relationship between clinician's related factors and utilization of the WHO Surgical Safety Checklist.
- ii. There is also no statistically significant relationship between institutional related factors and utilization of the WHO Surgical Safety Checklist.

The alternative hypotheses are;

- i. There are statistical significant relationship between clinician related factors and use of the WHO Surgical Safety Checklist.
- ii. There are statistical significant relationship between institutional related factors and use of the WHO SSC Study objectives

1.7 Justification of the study

Kenyatta National Hospital offers leadership in the healthcare services, policy formulation and implementation not only in Kenya but also in the great lakes region, East and Central Africa. Subsequently, documentation and reports regarding the use of the WHO Surgical Safety Checklist in the operating rooms in this premier hospital are essential in promoting positive surgical outcomes to the healthcare facilities dependent on its guidance. Besides, anesthesiologist reporting varying utilization levels of the WHO Surgical Safety Checklist at Kenyatta National Hospital among other healthcare institutions in East Africa (Epiu et al., 2016), there is limited publications detailing utilization of the same by the surgeons and nurses, yet the WHO Surgical Safety Checklist requires teamwork utilization by all the clinicians who use it (surgeons, nurses and anesthesiologists/anesthetists).

Furthermore, the tenth objective of the WHO's safe surgery saves live programme, requires all healthcare organizations to do routine surveillance of surgical outcomes and

share the same with others through publication. Good surgical practices as detailed by such reports are expected to facilitate other healthcare institutions to learn and embrace (Chang, 2011; World Health Organization (WHO), 2008). Hence, there is a scarcity of data regarding the utilization of the WHO Surgical Safety Checklist by clinicians in the operating rooms of Kenyatta National Hospital.

1.8 Significance of the WHO Surgical Safety Checklist

Diligent usage of the WHO Surgical Safety Checklist in operating rooms eliminates dependency on memory and minimizes omission errors by the operations team (Chang, 2011). While operating team members are expected to implement the use of the WHO Surgical Safety Checklist, it is the nurse who is the designated coordinator of the surgical procedures activities through motivation and facilitation of others in adhering to surgical safety practices agreed thereupon (Schwendimann et al., 2019).

1.9 Scope of the study

This study assessed the use of the WHO SSC by clinicians at Kenyatta National Hospital. The study investigated the determinants that impact the implementation of the WHO Surgical Safety Checklist at Kenyatta National Hospital. This will inform any need to develop further education and training programmes to improve clinicians' knowledge of surgical safety practices in the operating theatres.

1.10 Study limitation and delimitation

The generalizability of the study to other healthcare facilities may be limited due to variations in institutional factors. For example, Kenyatta National Hospital is well established in all aspects including quality assurance department that reinforces standard practices. This may be lacking in other institutions depended on KNH as a role model. It is expected that the Hawthorne effect may manifest, wherein participants in

the study may modify their conduct as a result of being aware of the interviews and their practices being observed.

1.11 Benefits of the study

The study aims to establish a foundational examination of the implementation of the WHO Surgical Safety Checklist among clinicians in a single session, encompassing surgeons, nurses, anesthesiologists, and anesthetists, at Kenyatta National Hospital. Future investigations can then address the identified gaps highlighted by this study to enhance overall patient management in operating rooms.

The research results will be shared at conferences and dedicated forums focused on ongoing professional growth and development. It is anticipated that this will facilitate a shift in attitude and behavior regarding the adoption of the WHO Surgical Safety Checklist.

The study outcomes would also have an impact on enhancing patient safety practices in hospitals across Kenya, particularly considering the role of Kenyatta National Hospital in training healthcare professionals and formulating policies. Thus, the country would achieve one of the big four agenda on health by ensuring that patients do not get complications and if they do occur, they are managed efficiently.

1.12 Assumptions of the study

The study was undertaken with the assumption that there was no statistically significant association between various factors related to healthcare practitioners and the implementation of the World Health Organization Surgical Safety Checklist in the operating theaters of Kenyatta National Hospital in Nairobi, Kenya. Moreover, this study assumed insignificant statistical association between institutional related factors and the use of the checklist in the studied institution.

1.13 Definition of operating terms

Anaesthesia: It refers to a condition of temporary deprivation of all sensation, which is deliberately induced for medical reasons. **Anesthesiologist:** A medical doctor with post graduate degree in management of patients under anesthesia among other responsibilities.

Anesthetic nurse; a nurse charged with the responsibility of preparing the anesthetic machine, equipment, resuscitation trolley in readiness for anesthesia among other activities in the OR.

Anesthetist: A clinical officer who after his/her basic diploma has specialized in administering anesthetic agents among other responsibilities.

Circulating nurse: Nurse allocated in the operating room charged with the responsibility of offering assistance to the members of the surgical team during the surgical procedure.

Clinician: A surgeon, nurse and anesthesiologist/anesthetist who makes use of the WHO surgical safety checklist

Induction room: A room in the operating theatres designed for administration of anesthetic agents.

Intraoperative: This refers to the period the patient enters the induction room to the period he/she leaves the operating room.

Main theatres: a block of twelve theatres where all the major complex surgeries are carried out at the KNH Hospital

Operating room: an area in the operating theatres designed for actual surgical operations to be carried out

Operating theatres: specific construction/building with several rooms for example induction room, scrub room, sluice room, receiving are, offices among others

designed to be used to carry out surgical operations on patients with an aim of restoring ill health

Post anesthesia care nurse: the nurse that is allocated to recover patients' immediate post operatively.

Postoperative: period after surgery and activities carried out including care that is given

Preoperative check list: a standard list that is used to guide the receiving area nurse on safety checks before the patient is received to cross the red line before proceeding to the operating room

Preoperative Nurse: A nurse who after basic training specifically trains to manage patients preoperatively, intraoperative and postoperatively

Preoperative: refers to all activities carried out on a patient before surgery

Receiving area nurse: a nurse in theatre that is charged with the responsibility of receiving patients scheduled for surgery upon certification of the mandatory tests and requirements.

Red line: a barrier that differentiates the restricted area from semi restricted area where the patient from the ward is handed over.

Resuscitation: a process of correcting a physiological disorder in a patient whose condition suddenly changes.

Scrub nurse: A nurse in the operating room that is charged with the responsibility of directly assisting the surgeon after scrubbing, gowning, gloving, creating the sterile field and being responsible for the instruments, swabs among others during surgical operation.

Sign in: Surgical safety checks/activities carried out before the patient is put under anesthesia

Sign out: all surgical safety checks done prior to skin closure and before the patient wheeled out the operating room after surgery.

Staff ratios: the recommended number of nurses to manage an operating room for each surgical case done.

Standard operating procedure: It is a comprehensive document providing detailed instructions on the proper utilization of the World Health Organization Surgical Safety Checklist.

Surgical pause: A brief moment less than a minute used as to confirm presence of all the team members of the surgical team, patient identification equipment concerns and instruments sterility among others.

Time out: all surgical safety checks before skin incision or actual surgical operation

Utilization: An action of making practical and use of WHO surgical safety check list by nurses as per standard requirement.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section outlines the extent to which clinicians in operating rooms utilize the WHO Surgical Safety Checklist, as well as delving into the various components encompassed within the checklist itself. An examination was conducted to explore the clinician-related and institutional factors that could potentially impact the utilization of the WHO Operating Protection Worksheet. Additionally, a comprehensive review of pertinent literature was conducted in accordance with the objectives of the study.

2.1 WHO Surgical Safety Checklist utilization level

While the WHO Surgical Safety Checklist is widely used, significant variations in its implementation and dissemination exist. The presence of such disparities is undesirable, as it has the potential to contribute to unfavorable outcomes associated with surgical procedures (Delisle et al., 2020).

Research on the prevalence of the WHO Surgical Safety Checklists use in Europe observed marked variation of its utilization ranging between 0 to 99.6%. The observed variation was correlated to preoperative healthcare, while its causation was associated with the differing economics of the respective European countries (Jammer et al., 2015).

In a research conducted in Nigeria, a developing nation, it was discovered that merely 57% of the nurses involved in the study were employing the World Health Organization Surgical Safety Checklist in four tertiary hospitals. Good safety practices by the nurses were linked to their socio-demographics and professionalism, while its low usage was due to a lack of awareness and adoption in the studied healthcare facilities (Fajemilehin & Faronbi, 2016). In a survey involving anesthesiologists from various referral

hospitals in East Africa, the participants reported a compliance rate of 19 percent regarding the utilization of the WHO Surgical Safety Checklist specifically at Kenyatta National Hospital (Epiu et al., 2016). Fidelity to the use of the WHO SSC was linked to reduced postoperative complications. However, limited training and resources to avail of the WHO Surgical Safety Checklist hampered its usage (Epiu et al., 2016).

2.2 Components of the World Health Organization Surgical Safety Checklist

The following are important components of the WHO Surgical Safety Checklist (Figure 1) whose implementation guarantees patient safety and minimizes medical errors.

2.2.1 Briefing

The briefing session of the World Health Organization (WHO) Surgical Safety Checklist is a crucial component that plays a significant role in promoting teamwork and enhancing positive surgical outcomes. The briefing typically takes place prior to the scheduled surgery or at the beginning of implementing the WHO Surgical Safety Checklist. During this session, various discussions and deliberations occur among the surgical teams, ensuring a comprehensive understanding of the surgical plan and addressing important considerations and safety issues.

Here are the key components of the briefing session:

The briefing involves a detailed discussion of the surgical plan. This includes reviewing the patient's medical history, the specific procedure to be performed, and any modifications or adaptations required based on the patient's condition. The briefing aims to foster teamwork and collaboration among the surgical team members. It provides an opportunity for all participants to actively engage in the discussion, share their expertise, and clarify any concerns or uncertainties regarding the procedure. During the briefing, the surgical team reviews and confirms the availability of all necessary surgical equipment and resources required for the procedure. This ensures

that the surgical team is adequately prepared and that any potential issues related to equipment or resource availability are addressed beforehand. The briefing session allows for the discussion of any specific requirements related to the surgical procedure. This may include considerations for patient positioning, anesthesia requirements, blood transfusion protocols, or other specialized aspects that need to be taken into account during the surgery. Safety is a critical focus of the briefing session. The team discusses potential safety concerns and implements strategies to mitigate risks. This may involve identifying potential complications, discussing strategies for preventing surgical site infections, reviewing antibiotic prophylaxis protocols, and ensuring patient safety throughout the surgical process. The briefing session is primarily led by the surgeon or another designated individual from the surgical team who facilitates the discussion. The facilitator ensures that all relevant topics are covered, encourages active participation from all team members, and promotes effective communication and collaboration.

By conducting the briefing session, the surgical team can establish a shared understanding of the surgical plan, address potential challenges, and enhance communication and teamwork. This, in turn, contributes to improved surgical outcomes and patient safety.

2.2.2 Sign in (Before induction of anaesthesia)

This is the first phase of the WHO Surgical Safety Checklist. The Checklist supervisor conducts a verbal confirmation, with the aid of the anesthesiologist/anesthetist and, if feasible, the patient, to ensure the accurate identification of the patient and the provision of informed consent for the intended surgical procedure. The coordinator of the The checklist is verbally reviewed, with the assistance of the anesthesiologist/anesthetist and, when feasible, the patient, to ensure that the correct patient has been confirmed and

that informed consent for the specific surgery has been obtained (Woodman & Walker, 2016).

Furthermore, the supervisor visually examines and verbally confirms the identification of the surgical site (when applicable) and assesses the patient's risk factors for airway obstruction, vomiting, blood loss, and allergic reactions in consultation with the anesthesiologist/anesthetist. She/he decides if the anesthetic system and drug safety tests have been carried out (Lennon & Smith, 2020). The presence of the surgeon is essential throughout this procedure, as the surgeon possesses an enhanced comprehension of the patient's anticipated blood loss, allergies, and other factors that may complicate the surgery. However, the presence of the surgeon is not mandatory for the execution of this section of the checklist. Occasionally, the coordinator can change the Sign In checks depending on how important they are for the operation, the level of comfort with which the tests are carried out, the patient's anxiety and the position of the patient on the surgical list (Lennon & Smith, 2020; Taplin et al., 2020).

The "Sign in" phase, which takes place before the induction of anesthesia, is a critical step in the World Health Organization (WHO) Surgical Safety Checklist. This phase involves a series of brief but important discussions and confirmations among the surgical team to ensure the safety and quality of care for the patient undergoing surgery. The surgical team members introduce themselves, reinforcing effective communication and establishing clear roles and responsibilities. This helps create a positive and collaborative atmosphere within the team. The team confirms the patient's identity by checking the patient's name, date of birth, and any applicable identification markers, such as wristbands. This step is crucial in preventing wrong-patient errors. The surgical team verifies that they are performing the correct surgical procedure on the intended patient. This involves cross-checking the surgical consent form, medical records, and

any imaging studies to ensure accurate procedure matching. If applicable, the team marks the correct surgical site on the patient's body. This step is crucial in preventing wrong-site surgeries or incorrect incisions. The team discusses and confirms any known allergies the patient may have, including medication allergies, latex allergies, or other relevant sensitivities. This information helps prevent adverse reactions during surgery. The team confirms the availability of any specific equipment, implants, or resources required for the procedure. This ensures that necessary items are readily accessible during surgery and avoids delays or complications. If an anesthesiologist is present, they review the patient's anesthesia plan, including any specific considerations or risks related to anesthesia. This ensures the anesthesia team is aware of the patient's medical history, allergies, and any potential challenges during anesthesia administration.

The "Sign in" phase serves as a crucial checkpoint to verify critical information, enhance team communication, and identify potential risks or errors before the start of surgery. By implementing this phase of the WHO Surgical Safety Checklist, the surgical team can minimize the occurrence of preventable mistakes, improve patient safety, and promote a culture of transparency and collaboration in the operating room.

2.2.3 Time out (Before skin incision)

This represents the subsequent stage of the WHO Surgical Safety Checklist, carried out prior to finalizing the skin incision. Throughout this process, each surgical team member introduces themselves by name and position. The team members take necessary measures to ensure unified understanding among everyone involved and to guarantee accurate performance of the appropriate surgical procedure on the correct patient at the designated location (Lennon & Smith, 2020). They then discuss the expected essential elements of their preparations for the surgical procedure with each other in turn, using the WHO Surgical Safety Checklist as a reference. Additionally, the

team verifies the administration of prophylactic antibiotics within the last 60 minutes and determines if critical imaging is required. The scrub nurse conducts various checks, including verifying the sterility of the instruments being utilized. This phase is primarily overseen by a circulating nurse, who ensures that all crucial safety checks have been performed (Lennon & Smith, 2020; Wähle et al., 2020).

| World Health Organization SURGICAL SAFETY CHECKLIST (FIRST EDITION) | | |
|---|--|---|
| Before induction of anaesthesia | Before skin incision | Before patient leaves operating room |
| SIGN IN <input type="checkbox"/> PATIENT HAS CONFIRMED • IDENTITY • SITE • PROCEDURE • CONSENT <input type="checkbox"/> SITE MARKED/NOT APPLICABLE <input type="checkbox"/> ANAESTHESIA SAFETY CHECK COMPLETED <input type="checkbox"/> PULSE OXIMETER ON PATIENT AND FUNCTIONING DOES PATIENT HAVE A: KNOWN ALLERGY? <input type="checkbox"/> NO <input type="checkbox"/> YES DIFFICULT AIRWAY/ASPIRATION RISK? <input type="checkbox"/> NO <input type="checkbox"/> YES, AND EQUIPMENT/ASSISTANCE AVAILABLE RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)? <input type="checkbox"/> NO <input type="checkbox"/> YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED | TIME OUT <input type="checkbox"/> CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE <input type="checkbox"/> SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM • PATIENT • SITE • PROCEDURE ANTICIPATED CRITICAL EVENTS <input type="checkbox"/> SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS? <input type="checkbox"/> ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT-SPECIFIC CONCERNS? <input type="checkbox"/> NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS? HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES? <input type="checkbox"/> YES <input type="checkbox"/> NOT APPLICABLE IS ESSENTIAL IMAGING DISPLAYED? <input type="checkbox"/> YES <input type="checkbox"/> NOT APPLICABLE | SIGN OUT NURSE VERBALLY CONFIRMS WITH THE TEAM: <input type="checkbox"/> THE NAME OF THE PROCEDURE RECORDED <input type="checkbox"/> THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE) <input type="checkbox"/> HOW THE SPECIMEN IS LABELLED (INCLUDING PATIENT NAME) <input type="checkbox"/> WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED <input type="checkbox"/> SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT |

THIS CHECKLIST IS NOT INTENDED TO BE COMPREHENSIVE. ADDITIONS AND MODIFICATIONS TO FIT LOCAL PRACTICE ARE ENCOURAGED.

Figure 1: Components of the WHO Surgical Safety Checklist (World, 2008).

This phase serves as a final confirmation and verification step to ensure that all necessary preparations have been completed and that the surgical team is fully ready to proceed with the operation safely.

During the "Time out" phase, the following activities typically take place:

The surgical team verifies once again that they are performing the procedure on the correct patient by rechecking the patient's identity, including their name, date of birth, and any identification markers. This step is crucial in preventing wrong-patient errors, especially when multiple surgeries are scheduled in close proximity. The team confirms the correct surgical procedure and site by reviewing the consent form, medical records, and any relevant imaging studies. This serves as a final check to ensure that the intended surgery matches the patient and avoids wrong-site surgeries or incorrect incisions. If an anesthesiologist is present, they may briefly review the anesthesia plan and ensure that the patient is properly prepared for anesthesia administration. This includes confirming the patient's position, airway management, and any specific anesthesia considerations. The surgical team discusses any critical steps or potential risks associated with the procedure. This may include reviewing specific techniques, addressing any anticipated challenges, and confirming the availability of necessary equipment or resources. The team confirms that the initial instrument count and sponge count have been conducted, ensuring that all instruments and sponges are accounted for before the surgery begins. This step helps prevent the accidental retention of surgical items within the patient's body. If antibiotic prophylaxis is indicated, the team verifies that the appropriate antibiotic has been administered within the recommended timeframe before the incision. This helps reduce the risk of surgical site infections.

The "Time out" phase acts as a final checkpoint to review critical information, ensure the correct patient and procedure, and address any potential risks or concerns. By conducting this phase of the WHO Surgical Safety Checklist, the surgical team promotes a culture of double-checking and attentiveness, which can significantly contribute to patient safety and reduce preventable errors during surgery.

2.2.4 Sign Out (Before a patient leaves the operating room)

The final stage of the WHO Surgical Safety Checklist concludes at this point. The team members review the surgical procedure conducted, completion of surgical sponge, sharps and instrument counts by the scrub nurse is verbalized as correct or incorrect and necessary action taken. The management of the specimens' harvested is carried out. Equipment malfunctions are verbalized and addressed at this juncture (Taplin et al., 2020)

Moreover, before transferring the patient out of the operating room, the surgical team partakes in an extensive discussion concerning essential postoperative care strategies and pertinent factors contributing to the patient's recovery. This important task is initiated by the scrub nurse and should be carried out before the surgeon departs from the operating room (Helmreich & Schaefer, 2018; Taplin et al., 2020).

The "Sign Out" phase is the concluding component of the World Health Organization (WHO) Surgical Safety Checklist, and it occurs before the patient leaves the operating room. This phase focuses on ensuring that all essential tasks and information related to the surgery have been properly documented, communicated, and addressed before the patient is transferred out of the operating room.

During the "Sign Out" phase, the following activities typically occur:

Procedure Confirmation: The surgical team reconfirms the procedure that was performed, ensuring that it matches the intended surgical plan. This serves as a final verification step to prevent any misunderstandings or errors.

Instrument and Sponge Counts: The team performs a final count of instruments, sponges, and other surgical items used during the procedure. This count helps ensure that all items have been accounted for and none are unintentionally left inside the patient's body.

Specimen Verification: If any surgical specimens were obtained during the procedure, the team

verifies that the specimens are properly labeled and documented. This ensures accurate tracking and processing of the specimens for further analysis or pathology examination.

Equipment and Instrument Maintenance: The team ensures that all surgical equipment and instruments used during the procedure are properly cleaned, sterilized, and prepared for future use. This promotes infection control measures and maintains the quality of surgical equipment.

Critical Findings and Concerns: Any critical findings or concerns encountered during the surgery are communicated and documented. This includes any unexpected complications, unexpected anatomical variations, or other significant details that may be important for future patient care or surgical follow-up.

Communication with Post-Anesthesia Care Unit (PACU): The surgical team communicates essential information to the PACU staff who will be responsible for the immediate postoperative care of the patient. This includes details such as the patient's condition, any specific postoperative requirements, and any concerns that need to be addressed during the recovery phase. The surgical team may take a moment to debrief and reflect on the surgical procedure. This allows for open discussion, feedback, and identification of any areas for improvement in the surgical process or teamwork.

The "Sign Out" phase ensures that critical information is properly documented, communicated, and shared among the surgical team and relevant healthcare professionals involved in the patient's care. By conducting this phase of the WHO Surgical Safety Checklist, the surgical team enhances patient handoff, facilitates continuity of care, and promotes a culture of accountability and reflection to improve future surgical practices.

2.2.5: Debriefing

After the conclusion of the WHO Surgical Safety Checklist, a debriefing session takes place. The objective of this session is to redirect the focus of the surgical team towards

the safety checklist, prompting them to share their perspectives on tasks that were effectively completed and those that did not meet expectations. Deliberations on teamwork, theatre atmosphere, errors encountered are discussed during debriefing. Furthermore, at this point, a retrospective assessment can be conducted to review what was agreed upon during the briefing and evaluate the implementation of the WHO Surgical Safety Checklist throughout the surgical procedure (Helmreich & Schaefer, 2018; Papaspyros et al., 2010).

2.3 Clinicians' Related Factors

2.3.1 Awareness of the Checklist

It is crucial for all members of the surgical team, including surgeons, anesthesiologists, nurses, and other healthcare professionals, to be fully aware of the existence and purpose of the surgical checklist. The checklist is designed to improve patient safety, prevent errors, and enhance communication and teamwork during surgical procedures. Healthcare facilities should provide comprehensive training and education to ensure that all members of the surgical team understand the importance of the checklist and how to effectively use it. This includes explaining the rationale behind each checklist item and emphasizing the impact it can have on patient outcomes. Awareness of the checklist should extend beyond theoretical knowledge to practical implementation. The surgical team should be familiar with when and how to use the checklist within their workflow, ensuring that it becomes an integral part of their routine practice. Effective communication is essential for raising awareness of the checklist. Hospital administrators, surgical leaders, and team coordinators should actively promote the use of the checklist, communicate its benefits, and encourage engagement from all team members. Regular reminders and reinforcement of the checklist's importance can help maintain awareness among the surgical team. This can be achieved through posters,

visual aids, team meetings, and periodic refresher training sessions. It is essential to document checklist usage and gather feedback from the surgical team. This allows for continuous improvement and provides an opportunity to address any concerns or challenges that may arise during checklist implementation. Strong leadership support is crucial in creating a culture that values the checklist and promotes its consistent use. Leaders should lead by example, actively participate in checklist discussions, and emphasize the importance of patient safety and teamwork in achieving positive surgical outcomes. Awareness of the checklist should be a shared responsibility among all members of the surgical team. Each team member should feel empowered and accountable for ensuring the checklist is used appropriately and consistently throughout the surgical process.

Awareness of the WHO Surgical Safety Checklist by clinicians is instrumental in its implementation. The clinicians while working as a team during surgery each do specific tasks. To accomplish this objective, it is crucial to deliver consistent training that reinforces and illustrates the advantages of incorporating the WHO Surgical Safety Checklist. This training effectively highlights how the checklist plays a vital role in preventing avoidable negative surgical outcomes, including complications and fatalities. It is essential to comprehend and embrace the roles and responsibilities assigned to each member of the surgical team. This boosts and improves the knowledge of the surgical team members expected to offer positive surgical outcomes to the patient (Kruk et al., 2018).

Though, before college and university knowledge and skills by the clinicians enable them in providing healthcare services to the patients, rigorous and regular training of the standard safety practices amongst use of the WHO Surgical Safety Checklist improve and align their surgical safety practices. The healthcare institution is essential in

ensuring that their surgical personnel is well placed in offering safe surgical services by organizing regular training sessions on standard safety practices (Close et al., 2017). Poor knowledge and lack of training sessions have been associated with limited usage of the WHO Surgical Safety Checklist (Hurtado et al., 2012).

By promoting awareness of the checklist among the surgical team, healthcare facilities can foster a culture of safety, teamwork, and continuous improvement. Increased awareness and adherence to the checklist contribute to reducing surgical errors, improving patient outcomes, and enhancing the overall quality of surgical care.

2.3.2 Attitudes and beliefs towards use of the Checklist

Attitudes and beliefs towards the use of the checklist in surgical settings can vary among healthcare professionals. While many individuals recognize the value and benefits of the checklist in improving patient safety and surgical outcomes, others may hold different perspectives or reservations. Positive attitudes towards the checklist stem from the understanding that it serves as a valuable tool for promoting standardized practices, reducing errors, and enhancing communication and teamwork within the surgical team. Healthcare professionals who embrace the checklist appreciate its ability to mitigate risks, prevent adverse events, and improve overall patient care. They view it as a means of ensuring that critical steps and safety measures are consistently followed, regardless of the complexity or familiarity of the surgical procedure.

However, some individuals may hold reservations or negative attitudes towards the checklist. This could be due to concerns about perceived time constraints or potential disruptions to established routines. They may view the checklist as an additional administrative burden or consider it unnecessary in cases where they have extensive experience or expertise. Additionally, resistance to change or a lack of awareness about the evidence supporting checklist effectiveness may contribute to skepticism.

Addressing these attitudes and beliefs requires targeted efforts. Education and training programs can play a crucial role in highlighting the evidence-based benefits of checklist implementation and dispelling misconceptions. Engaging healthcare professionals in open discussions, sharing success stories, and emphasizing the positive impact on patient safety can help overcome resistance and foster a culture of checklist utilization. It is important to promote the understanding that the checklist is not meant to replace professional judgment but rather to enhance it by standardizing critical safety processes and improving communication and coordination among the surgical team. Ultimately, creating a positive attitude towards the use of the checklist requires ongoing efforts to promote awareness, education, and a shared commitment to patient safety. When healthcare professionals recognize the checklist as a valuable tool that contributes to improved surgical outcomes and enhanced teamwork, its implementation becomes more widely embraced and integrated into routine surgical practice.

The enthusiasm and confidence in the WHO SSC by the clinicians promotes its usage. This positive attitude and belief encourage surgical team members to integrate it instinctively into their surgical plans. Besides, the more the WHO Surgical Safety Checklist is used, the more familiar the clinicians become (Kilbane et al., 2020). Subsequently, modifications can be suggested to ensure its successful usage as it is meant to be adjusted to accommodate whatever situation the healthcare facility is in. For example, a hospital could use alternative mark pens. This ensures filling of the WHO Surgical Safety Checklist chart even if in the absence of the standard mark pens. Such changes need to be agreed upon in advance by the clinicians in consultation with the hospital management (Chang, 2011).

However, it has been assumed by some surgical teams especially those with dismissive attitude and beliefs that routine tasks cannot be forgotten and therefore no need for the

checklist. The healthcare management and leadership should timely address such weakness and hindrances to the successful utilization of the WHO Surgical Safety Checklist in its intraoperative operations. Routine surveillance reports and discussions can reveal such weaknesses whose address by the management ensures that the hospital does not lose the benefits of the WHO Surgical Safety Checklist (Chang, 2011; Dharampal et al., 2016).

2.3.3 Effective communication for safe surgery

Instances of system failures, particularly severe ones, seldom arise from a solitary unsafe action. Rather than arising from isolated incidents, errors often result from a combination of multiple factors related to the task, team, situation, and organization. These factors that contribute to the phenomenon can be categorized into seven key groups, including overwhelming workloads, insufficient knowledge, skills, or experience, inadequate incorporation of human factors in interface design, insufficient supervision or guidance, a stressful environment, mental exhaustion or monotony, and rapid changes, among other elements (J. Reason, 1995; James Reason, 2000).

Like complex systems, the safety and efficiency of a surgical team rely heavily on the essentiality of effective communication among its members. Nonetheless, due to the criticality of a patient's condition, the extensive information that needs to be processed urgently, and the technical demands placed on clinicians, the surgical sector is considerably more complex compared to other industries. Moreover, an array of systemic hindrances, such as the participation of multiple individuals, overwhelming workloads, stress, fatigue, hierarchical structures, and inadequate organizational practices, collectively contribute to an environment that is susceptible to errors (Sexton et al., 2000; Vincent et al., 2004).

Furthermore, inadequate communication can lead to omissions, misinterpretations, and conflicts, ultimately resulting in unfavorable patient outcomes. Nevertheless, unlike in other complex systems, healthcare practitioners engaged in modern surgical practice do not perceive human error as an inevitable happening. As a result, systematic safety measures have been sporadically incorporated into patient care (Frankel et al., 2007; Leonard et al., 2004; Rogers & Lingard, 2006).

Through observational studies conducted at academic health centers in the United States, it has been discovered that communication breakdowns are prevalent among operating teams. These breakdowns can transpire at various stages of surgical care, including preoperative, intraoperative, and postoperative phases, leading to severe consequences such as patient mortality, disability, or prolonged hospitalization (Greenberg et al., 2007). Research conducted on communication breakdowns within the operating room uncovered that around 30% of team interactions are impacted by these failures (Lingard et al., 2004). As much as a third of these breakdowns pose a risk to patient safety by intensifying cognitive burden, disrupting established routines, and escalating tension (Makary, Sexton, et al., 2006). Moreover, surgical teams acknowledge that breakdowns in communication present a significant obstacle to providing safe and effective care. In a survey, approximately two-thirds of nurses and physicians identified improved team communication as the primary vital factor in enhancing safety and effectiveness in the operating room (Sexton et al., 2000).

Preoperative briefings or checks are essential for safe surgical care. These encompass conversations regarding alterations to standard operating plans, particular patient-related concerns, and the accessibility of essential imaging for the procedure. As an illustration, outcomes from the Australian Incident Monitoring Study revealed that approximately 25% of clinical incidents were attributed to insufficient preoperative

information, assessment, and preparedness (Kluger et al., 2000). Preoperative briefing sessions serve as a mechanism for prompt information exchange among team members. Likewise, debriefing sessions conducted after a procedure, which involve exchanging information upon completion of an operation, offer the team a chance to evaluate the performed procedures, deliberate on noteworthy occurrences throughout the case, and develop plans for postoperative care (Makary, Holzmueller, et al., 2006). Therefore, integrating safety checks into postoperative debriefings can serve as a foundational safety intervention. Research demonstrates that the absence of postoperative debriefings escalates the likelihood of complications (Mazzocco et al., 2009). The implementation of both team briefings and debriefings had a notable effect on enhancing the perceived collaboration among the operating room personnel (Makary, Mukherjee, et al., 2007). While certain individuals may perceive the briefings as disruptive, the majority of surgeons, anesthesiologists, nurses, and technicians who have taken part in such studies expressed that the advantages of these briefings surpassed any inconveniences experienced (Lingard et al., 2004; Makary, Sexton, et al., 2006).

2.3.4 Surgical Teamwork

During surgery, surgeons, anesthesiologists/anesthetists and nurses are crucial and how they conduct themselves as it impacts the surgical outcomes. Such influential leaders should give priority to the safety of the patient. Respect for each other and support is what promotes successful surgeries. Moreover, senior members of staff should champion the support of the junior staff without intimidating them. They should be approachable and free to discuss any issue thereby promoting teamwork in the operating theatre (Wagner, 2018).

The synergy resulting from such kind of leadership immensely contributes to the positive surgical outcomes. The hospital leadership should allow free and open

discussion by the surgical teams on the near misses and medical errors encountered during operation sessions as it creates room for learning and improvement of skills thereby boosting their morale and surgical competencies (Sfantou et al., 2017). In this regard near misses and errors encountered should be recorded for reference but never should they be used to reprimand any staff. However, they should be used for learning and intern improves practice.

Surgical teamwork is a critical aspect of providing safe and effective surgical care. It involves the collaboration and coordination of various healthcare professionals, including surgeons, anesthesiologists, nurses, and other team members, working together to achieve optimal patient outcomes. Effective surgical teamwork is characterized by open communication, mutual respect, and a shared commitment to patient safety. It encompasses several key elements:

Clear and concise communication is essential within the surgical team. Team members must effectively convey information, share critical updates, and actively listen to one another. This includes sharing important patient details, discussing surgical plans, and addressing concerns or challenges that may arise during the procedure. Each team member should have a clear understanding of their role and responsibilities within the surgical team. By delineating roles, tasks can be efficiently assigned, and everyone knows what is expected of them. This clarity helps prevent confusion and ensures that each team member can contribute effectively to the overall surgical process. Collaboration among team members is crucial for successful surgical outcomes. This involves working together, pooling knowledge and expertise, and leveraging each team member's strengths. Collaboration fosters a supportive environment where input and ideas are valued, leading to enhanced problem-solving and decision-making. Building trust and cultivating mutual respect among team members is vital for effective

teamwork. Trust allows team members to rely on one another, share concerns openly, and seek assistance when needed. Respect for each other's expertise and contributions creates a positive and supportive work environment that encourages collaboration and effective communication. Surgical procedures can be complex and unpredictable. A successful surgical team is adaptable and can respond effectively to unexpected changes or challenges during the procedure. This requires flexibility, quick thinking, and the ability to work together to find solutions and ensure the safety and well-being of the patient.

When surgical teamwork is prioritized and fostered, it has a significant positive impact on patient outcomes. Effective teamwork reduces the risk of errors, improves patient safety, and enhances overall surgical efficiency. By leveraging the expertise and perspectives of each team member, surgical teams can provide comprehensive and patient-centered care, leading to better surgical outcomes and enhanced patient satisfaction.

2.3.5 Coordinating correct surgery on correct patient at the correct site

Whereas events for wrong-patient, wrong-site surgical operation are rare, occurrences and public attention to such events demoralizes public confidence in the healthcare systems and the healthcare providers involved in the botched surgical operations. For example, media reports of a wrong patient being operated on in one of the Kenyan hospital horrified and angered the public (Merab, 2018b). Though incidences such as wrong site operations on appendages and the head do occur, the healthcare providers involved in such operations should not expect sympathy or forgiveness from the public in such cases. According to investigators, orthopaedic surgery reports more wrong-site surgery compared to other surgical operations evidenced by 68% wrong- site surgery cases of the malpractice insurance claims, since bilateral operations are commonly

involved in orthopaedic surgery is associated with wrong-site surgery (Robinson & Muir, 2009). Unspecified site making, poor communication between team members and leadership wrangles are factors contributing to wrong-site surgical operations (Agarwal et al., 2008). Researchers found that four cases of incorrect site surgeries were attributed to errors in the surgical schedule, with 66% of the incidents occurring due to an unspecified surgical site (Kwaan et al., 2006).

Furthermore, the absence of radiographic images and incorrect labeling of anatomical sites on the images can result in erroneous surgical procedures. Thus, healthcare systems adopted by surgical teams contribute to a lot of wrong-site surgery events (Robinson & Muir, 2009). Accurate identification of patient and proper labelling, participation of patient in preoperative planning, effective teamwork with better communication among team members minimizes wrong-site surgical operations (Welsh, 2003).

As stated by the Canadian Orthopaedic Association, it is crucial to utilize a permanent mark to indicate the incision site in order to prevent instances of wrong-site surgery (Canale, 2005). Numerous professional organizations worldwide have embraced this practice as an effective measure for mitigating occurrences of wrong-site surgery. As a result, a universally recognized standardized protocol has been established to address errors linked to occurrences such as wrong-site, wrong-patient, and wrong-procedure incidents. The aim of this protocol is to mitigate such occurrences and ensure patient safety. The protocol entails three-step processes (verification, marking and time out) which are complementary to each other, and create redundancy thereby confirming the correct procedure, exact site of operation and accurate patient to be operated (Chang, 2011).

The verification step involves confirming the accurate identification of the patient, the intended surgical site, and the planned procedure at each phase, starting from the moment the decision to proceed with the operation is made until the patient undergoes the agreed-upon procedure. Verification is done by identifying and labelling the patient, while site of operation and procedure is performed during consent process in conformity with the patient's records and radiographs (Michaels et al., 2007). Adherence to this protocol can be challenging when multiple team members engage in the verification process. However, reminders such as use of WHO patient protection checklists or other systematic protocols may counter violation introduced by many players in the verification process and ensure safe surgical practice (Chang, 2011). Clear marking of the site of operation with a permanent marker is a prerequisite of safe surgery according to the Universal Protocol. This complements the verification procedure and collectively establishes redundancies within the healthcare system, aimed at decreasing the occurrence of incorrect surgical site operations (Giles et al., 2006). The fact that the patient remains active participating where possible as well as their caregivers in the aforementioned processes contributes immensely to safe surgery. For example, the patient must give consent and be aware of what is going on besides his or her contribution in ensuring safe surgery, unless in emergency cases among others where the patient is unable to comprehend what is happening (Panesar et al., 2011). Moreover, the caregivers must be informed of the nature of operation and be issued with leaflets detailing their role in ensuring safe surgery (Defontes & Surbida, 2003). Lastly, the "time out" procedure, which entails the surgical team verifying the correct patient, procedure, and surgical site, guarantees appropriate patient positioning and ensures the availability of all necessary implants or specialized equipment prior to the commencement of the actual surgical intervention. (Asunción Márquez et al., 2012).

Active involvement of the surgery team members and the documentation of the concerns raised during this step fosters communication thereby ensuring safe surgery (Saulfl, 2004). Use of the WHO SSC is essential in reminding and fostering effectiveness by the surgery team during this process (Panesar et al., 2011).

Studies showing efficaciousness of preoperative verification protocols in minimizing wrong-site surgery confirm and support their worldwide adoption. Furthermore, professional societies recommend well established affordable protocols to safeguard and promote safe surgical practice (Chang, 2011).

Coordinating the correct surgery on the correct patient at the correct site is a fundamental aspect of patient safety in surgical care. This process involves a series of essential measures to prevent wrong-patient, wrong-procedure, and wrong-site surgeries, which can have severe consequences for patients and healthcare providers.

It is crucial to establish robust protocols for patient identification and verification. This includes confirming the patient's identity using multiple identifiers, such as their name, date of birth, and unique identifiers like wristbands or photo identification. Verifying the patient's identity at multiple points along the surgical pathway helps ensure that the correct patient is undergoing the intended procedure. Accurate and comprehensive documentation is essential for coordinating the correct surgery. This includes thorough review and confirmation of the surgical consent form, medical records, and any relevant imaging studies. Cross-referencing these documents helps confirm the intended surgical procedure, ensuring alignment between the planned procedure and the patient's medical history. Site marking plays a critical role in preventing wrong-site surgeries. The surgical team should mark the correct surgical site on the patient's body, guided by standardized protocols. This visual indicator serves as an additional safeguard to ensure that the surgery is performed at the appropriate anatomical location.

Effective communication among the surgical team is vital for coordinating the correct surgery. This includes structured preoperative briefings where the surgical plan is discussed, potential modifications are addressed, and any safety concerns are raised. Clear and open communication ensures that all team members are aware of the planned procedure, facilitating coordinated efforts to achieve the desired surgical outcome. Furthermore, the involvement of all team members in the surgical time-out is crucial. The time-out is a final verification step before the procedure begins, during which the entire team pauses to confirm essential details, including the correct patient, correct procedure, and correct surgical site. This collective review helps identify and rectify any potential errors or discrepancies before the surgery commences.

Implementing robust protocols, promoting a culture of double-checking, and emphasizing the importance of patient safety at all stages of the surgical process are key to coordinating the correct surgery on the correct patient at the correct site. By prioritizing these measures, healthcare providers can significantly reduce the occurrence of preventable errors, enhance patient safety, and ensure the highest quality of surgical care.

2.3.6 Minimizing surgical site infection

Minimizing surgical site infections (SSIs) is a crucial goal in surgical care as they can lead to significant morbidity, increased healthcare costs, and prolonged hospital stays. To effectively reduce the risk of SSIs, several measures should be implemented throughout the surgical process. Preoperative measures play a vital role in preventing SSIs. Optimizing patient factors, such as ensuring adequate nutrition, controlling blood glucose levels, and addressing modifiable risk factors like smoking, can help enhance the body's immune response and reduce the likelihood of infection. Additionally, preoperative skin preparation with antiseptic solutions, such as chlorhexidine or

povidone-iodine, helps reduce the microbial load on the surgical site. Maintaining a sterile environment during surgery is crucial. This involves following strict aseptic techniques, including proper hand hygiene, wearing sterile gloves and gowns, and using sterile drapes and instruments. Adhering to these protocols minimizes the introduction of microorganisms into the surgical site and lowers the risk of contamination. Prophylactic antibiotic administration is a key preventive measure. Administering antibiotics within the recommended timeframe, guided by evidence-based guidelines, helps ensure adequate drug concentrations at the surgical site during the critical period. However, it is important to use antibiotics judiciously, considering factors such as the type of surgery, local antimicrobial resistance patterns, and individual patient factors. Effective wound closure techniques are essential in preventing SSIs. Proper approximation of wound edges, use of appropriate sutures or staples, and ensuring adequate blood supply to the incision site promote optimal healing and minimize the risk of infection. Additionally, using closed suction drainage when necessary can help prevent the accumulation of fluid that may serve as a potential breeding ground for bacteria. Postoperative care also plays a role in SSI prevention. This includes proper wound care, maintaining a clean and dry environment, and vigilant monitoring for signs of infection. Prompt identification and management of any signs or symptoms of an SSI, such as increased pain, redness, swelling, or discharge, are crucial to prevent further complications.

By implementing these measures consistently and promoting a culture of infection prevention, healthcare providers can effectively minimize the occurrence of SSIs. Continuous monitoring, adherence to evidence-based guidelines, and ongoing education and training for surgical teams are vital in ensuring the best practices are followed to

provide safe and high-quality surgical care while reducing the risk of surgical site infections.

Surgical patients may be susceptible to surgical site infections as a result of invasive procedures conducted in the deeper layers of the incision or in traumatized areas, such as the pleural space (Dimick et al., 2004). The infections are undesirable as they are costly and results in prolonged hospital stay for the affected patients (Sartelli et al., 2018). The prevalence of surgical site infection is a marker of surgical quality care offered by healthcare facilities (Bhangu et al., 2018). Roughly 15% of healthcare-associated infections can be ascribed to surgical site infections, which, in turn, account for approximately 37% of infections contracted by patients during their hospitalization for surgery (Smyth & Emmerson, 2000).

Microbial contamination at some point in a surgical procedure may contribute to surgical site infection. Contamination can be related to poor theatre environmental preparation, the process of instruments preparation to include sterilization and handling of the sterile instruments. Other factor are theatre practices if not followed from the laid down or approved practices (movements, closing of doors, minimal talking among others).

Bacteria colonize and contaminate most surgical wounds with some progressing to clinical infection. This is because; innate host defenses of most patients efficiently eliminate contaminants at the surgical site (Chang, 2011). The occurrence of clinical infection caused by contamination depends on various factors, including the quantity of bacterial contaminants present, the virulence of the bacteria, and the patient's level of resistance. Consequently, the likelihood of infection rises in proportion to the increase in both the number and virulence of the bacteria (Leape et al., 1991). The specific characteristics of the wound, such as the existence of necrotic tissue, sutures, or other

foreign materials, as well as the use of drains, can intensify the effects of the bacterial inoculum (Asunción Márquez et al., 2012). A considerable proportion of bacteria accountable for surgical site infections possess or produce toxins and other compounds that augment their ability to flourish within or on host tissues. The higher the virulence of the bacterial contaminant, the increased likelihood of infection (Chang, 2011; Smyth & Emmerson, 2000).

The primary origin of pathogens responsible for most surgical site infections stems from the patient's endogenous flora, which can exist on the skin, mucous membranes, or within hollow organs. When a surgical incision is made on the skin or mucous membranes, the exposed tissues become vulnerable to potential contamination (Velasco et al., 1998).

In most cases, surgical site infections are primarily caused by aerobic Gram-positive cocci, such as Staphylococci, along with anaerobic bacteria and Gram-negative aerobes from the fecal flora. The presence of these organisms is more prevalent when the incision is in close proximity to the perineum or groin. In surgical procedures that involve accessing gastrointestinal organs, the usual isolates frequently encountered consist of Gram-negative bacilli like *Escherichia coli*, Gram-positive microorganisms such as enterococci, and occasionally anaerobic bacteria like *Bacteroides fragilis* (Chang, 2011; Mateos et al., 2006; Smyth & Emmerson, 2000).

The wound can also encounter bacterial contaminants that derive from external origins, such as the surrounding air in the operating room, surgical equipment, implants, or interaction with the surgical team, among various other potential factors. The exogenous flora predominantly consists of aerobic organisms, particularly Gram-positive bacteria like Staphylococci and Streptococci (Bure, 1963; Smyth & Emmerson, 2000).

The prevalence of pathogens causing surgical site infections exhibits similarity across numerous countries. In a European Union study on these infections, *Staphylococcus aureus* accounted for 27-40% of cases, coagulase-negative *Staphylococci* for 6-11%, *Escherichia coli* for 3-15%, and *Pseudomonas* for 7-10% (Leaper et al., 2004). Based on a study conducted in Turkey, *Staphylococcus aureus* constituted half of the 621 isolated pathogens responsible for surgical site infections. According to Surucuoglu et al. (2005), *Escherichia coli* constituted 8% of the identified pathogens, while In the study, *Staphylococcus pyogenes* and *Pseudomonas aeruginosa* each comprised 7% of the identified causative pathogens, while coagulase-negative staphylococci accounted for 6%. Likewise, in Thailand, the pathogens most commonly identified as causative agents of surgical site infections were *Escherichia coli* (15.3%), *Staphylococcus aureus* (8.5%), *Pseudomonas aeruginosa* (6.8%), *Klebsiella pneumoniae* (6.8%), and *Acinetobacter baumannii* (3.4%) (Kasatpibal et al., 2005).

Approximately 6% of hospital-acquired infections can be prevented through minimal interventions. To minimize risks, various straightforward measures can be implemented. These include performing thorough preoperative assessments for all surgical patients, reducing preoperative hospital stays, addressing and treating infections in distant areas, promoting weight reduction for obese patients, encouraging tobacco cessation, managing hyperglycemia, enhancing the body's immune system, to minimize bacterial contamination originating from within the patient, employing suitable techniques for hair removal, administering timely and suitable antimicrobial prophylaxis, ensuring proper asepsis and antisepsis of the skin, and adhering to meticulous surgical techniques to reduce tissue trauma are essential measures, maintaining normothermia during surgery, minimizing the duration of the operation, and implementing effective wound surveillance (Castella et al., 2006; Delgado-Rodríguez et al., 2001) among others.

2.3.7 Averting accidental retention of instruments and sponges in surgical wounds

The unintentional retention of a sponge, needle, or surgical instrument inside a patient following a surgical procedure is an uncommon yet persistent and serious surgical error (Bani-Hani et al., 2005; Egorova et al., 2008). The presence of retained sponges and instruments often leads to severe outcomes, such as infection, the need for additional surgeries to remove them, bowel perforation, fistula, or obstruction, among various other complications (Couper et al., 2003). This mistake has been linked to three distinct risk factors, namely urgent or emergency surgeries, elevated body mass index, and unanticipated modifications to the surgical procedure (Chang, 2011). Performing a manual tally of all instruments and sponges at the start and conclusion of a surgical procedure is a widely recognized practice advocated by numerous nursing organizations. To enhance detection of retained items in case of counting errors, certain sponges are now equipped with radio-opaque material, enabling their identification through intraoperative radiographs. These standards share common components, such as establishing a standardized counting procedure and implementing a systematic approach to track and account for items within the sterile field and the surgical site (Chang, 2011).

Although manual counting methods have been traditionally employed, they are susceptible to human errors. In order to enhance precision and enhance the detection of unintentionally retained sponges, newer methods have been introduced. To address this issue, various approaches have been developed, including the implementation of tracking systems for sponges, such as bar-coded sponges and sponges equipped with radiofrequency identification tags. In a randomized trial evaluating a sponge system integrated with barcodes, the rate of correctly identifying miscounted or misplaced

sponges witnessed a significant three-fold increase, indicating a notable improvement (Greenberg et al., 2008).

2.3.8 Specimen management.

Although there is a substantial amount of data on processing and diagnostic errors related to surgical specimens, there is limited evidence available regarding the occurrence and characteristics of errors caused by insufficient or incorrect labeling, missing or inadequate information, and misplaced specimens. These errors have the potential to impede patient care and safety, yet the available information on them is scarce (Cooper, 2006; Troxel, 2004). An analysis of medico-legal claims concerning errors in surgical pathology revealed that around 8% of these claims were linked to "procedural" errors (Troxel, 2004). These incidents often lead to treatment delays, repeated procedures, and surgical interventions performed on incorrect body parts. It is important to note that these occurrences can transpire across various medical specialties and involve different types of tissues (Makary, Epstein, et al., 2007).

Misidentification of surgical pathology specimens can result in more serious repercussions compared to other laboratory errors that may happen prior to specimen analysis (Howanitz, 2005; Ideation & Medical, 2009). Findings from a study investigating this matter indicated that errors transpire at a frequency of 3.7 per 1000 specimens collected from operating rooms. These errors predominantly encompass insufficient or erroneous labeling, exclusion of crucial information pertaining to the tissue location, and the lack of the patient's name (Makary, Epstein, et al., 2007).

To mitigate the risk of mislabeling, there are several straightforward measures that can be implemented. Initially, it is crucial to positively identify the patient associated with each surgical specimen using a minimum of two identifying factors, examples of essential patient information include name, date of birth, hospital number, and address.

Subsequently, it is crucial for the circulating nurse to meticulously review the specific details of the specimen with the surgeon, verbally confirming both the patient's identity and the particulars of the specimen, which encompass its source location and any pertinent markings.

In healthcare facilities where it is obligatory, the surgeon is required to fill out a requisition form that includes the same identifying details as the specimen container. This requisition form should be meticulously reviewed by both the circulating nurse and the surgeon to verify its consistency with the specimen before it is sent to the pathology department. Furthermore, it should include pertinent clinical details, such as the suspected diagnosis and the exact site from where the sample was obtained.

To ensure utmost safety in surgical care, it is advisable for the surgical team to validate the accuracy of all specimen labels, including the patient's identity, the name of the specimen, and the specific anatomical location from which it was obtained. One approach to achieve this is by designating one team member to audibly recite the specimen label while another team member verbally confirms the precision and concurrence of the information. This meticulous verification process provides a secure and reliable foundation for the delivery of surgical care (Chang, 2011).

Specimen management is a critical component of the surgical process that involves the proper handling, documentation, and processing of tissue or fluid samples obtained during a surgical procedure. Effective specimen management ensures accurate diagnosis, timely treatment decisions, and optimal patient care. The first step in specimen management is accurate and clear labeling. Each specimen should be labeled with the patient's identifying information, including their name, medical record number, and the date and time of specimen collection. Proper labeling prevents specimen mix-ups and ensures traceability throughout the entire process. Once collected, specimens

should be handled with care to preserve their integrity. This includes appropriate packaging, sealing, and transport to the pathology laboratory using designated containers and ensuring that they are kept at the correct temperature if required. Proper handling minimizes the risk of contamination or degradation of the specimen, preserving its diagnostic value. Documentation is an essential aspect of specimen management. Accurate and detailed documentation should include the type of specimen collected, the anatomical site from which it was obtained, and any relevant clinical information. This information aids pathologists in interpreting the specimen and providing an accurate diagnosis.

Timely communication between the surgical team and the pathology laboratory is crucial for effective specimen management. The pathology laboratory should be promptly notified of any specimen collection, ensuring that the specimen reaches the laboratory in a timely manner. This enables efficient processing, analysis, and reporting of results, allowing for prompt treatment decisions and patient management. Proper storage of specimens is also important. Specimens may need to be stored before processing or for future reference. Appropriate storage conditions, such as temperature and container type, should be followed to maintain specimen integrity and prevent degradation. In addition, it is essential to establish protocols and quality assurance measures to ensure the accuracy and reliability of specimen management processes. Regular audits, adherence to standard operating procedures, and participation in external quality assurance programs contribute to maintaining high standards of specimen management.

By implementing proper specimen management practices, healthcare providers can ensure that surgical specimens are handled, labeled, and processed correctly, leading to accurate diagnoses and appropriate treatment decisions. This ultimately improves

patient care and outcomes by facilitating effective communication between surgical teams and pathology laboratories and maintaining the integrity of the specimens throughout the entire process.

2.4 Institutional Related Factors

2.4.1 Standard operating procedures

These serve as guidelines for hospital staff while offering services to the patients. This help in unifying documented processes and services. They form a basis for evaluating the services offered. The management of the theatre staff needs to ensure that such important documents are available for staff to use in their operation areas (Fukushima & Kaibori, 2018). Standard operating procedures (SOPs) are detailed, step-by-step instructions that outline the standardized processes and best practices to be followed in specific tasks or activities within an organization. SOPs are designed to ensure consistency, efficiency, and quality in the execution of routine or critical operations. SOPs serve as a reference guide for employees, providing them with clear instructions on how to perform their tasks effectively and in compliance with organizational policies, industry regulations, and safety protocols. These procedures are typically developed through a collaborative effort involving subject matter experts, process owners, and relevant stakeholders to ensure accuracy and alignment with the organization's goals and standards.

The main purpose of SOPs is to establish a standardized approach to tasks, minimizing variations and errors that can lead to inefficiencies, risks, or substandard outcomes. By clearly defining the sequence of steps, responsibilities, timelines, and quality control measures, SOPs help ensure consistency and reliability across different individuals, teams, or departments. SOPs have numerous benefits for organizations. They improve operational efficiency by streamlining processes and reducing the time and effort

required to complete tasks. SOPs also enhance quality control by providing guidelines and checkpoints to monitor and evaluate the outputs or outcomes of a process. This helps identify deviations or discrepancies, allowing for timely corrective actions to be taken.

Moreover, SOPs play a vital role in risk management and compliance. They provide a framework to address potential hazards, mitigate risks, and ensure adherence to industry regulations, legal requirements, and safety standards. SOPs also support training and onboarding processes by providing new employees with clear instructions and guidelines for performing their assigned tasks. Regular review and updates of SOPs are essential to keep them relevant and up to date with changing technologies, industry best practices, and regulatory requirements. This ensures that the procedures continue to reflect the most effective and current practices within the organization.

Overall, SOPs are invaluable tools for organizations to promote consistency, efficiency, quality, and compliance in their operations. By establishing standardized processes and providing employees with clear instructions, SOPs contribute to improved performance, risk mitigation, and enhanced overall organizational effectiveness.

2.4.2 Training sessions

To facilitate the successful use of the WHO Surgical Safety Checklist in the hospital setting, a local arrangement must be put in place to oversee training and monitor its implementation. Challenges in its utilization need to be deliberated and a solution found to ensure safe surgery is conducted to their clients with a lot of ease. Training of staff on the value and how to use the WHO Surgical Safety Checklist should be done regularly. This helps to keep those who are aware up to date while those new in the team learn and implement good surgical practices that guarantee safe surgical care to the patients (Close et al., 2017). Moreover, the shortcomings of the surgical teams should openly

and freely discuss during debriefings without fear of retributions. This allows team members to learn and correct their weakness as no one is perfect (Conley et al., 2011).

During training sessions, employees are introduced to the purpose, importance, and benefits of SOPs. They learn how SOPs contribute to operational efficiency, quality control, risk management, and compliance. The sessions emphasize the role of SOPs in standardizing processes, reducing errors, promoting consistency, and ensuring that tasks are performed in alignment with organizational goals and industry standards. Training sessions on SOPs typically include interactive components to engage participants actively. This may involve presentations, demonstrations, case studies, group discussions, and practical exercises. Such interactive elements help employees understand the rationale behind SOPs and encourage their active participation in the learning process.

These sessions provide detailed explanations of each step outlined in the SOPs. Employees learn the sequence of tasks, the specific requirements, and any critical points to be mindful of during the execution of each step. Additionally, employees are educated on the roles and responsibilities associated with each task and the importance of effective communication and coordination within a team or across different departments. To ensure comprehension and retention, training sessions on SOPs often incorporate assessments, quizzes, or hands-on activities. This allows participants to apply their knowledge and receive feedback on their understanding of the SOPs. Such assessments help identify areas that may require additional clarification or reinforcement.

Training sessions also serve as an opportunity for employees to provide feedback or ask questions regarding the SOPs. This facilitates a two-way communication process, allowing for clarification of any ambiguities or addressing any concerns that employees

may have. The feedback received during these sessions can be valuable in refining and improving the SOPs themselves. In addition to initial training, organizations may schedule periodic refresher sessions to reinforce the knowledge and skills related to SOPs. These refresher sessions serve as reminders, updates on any revisions or changes to the SOPs, and opportunities for employees to share their experiences or suggest improvements to the procedures.

Overall, training sessions on SOPs are essential for ensuring that employees have a clear understanding of the established procedures and can consistently apply them in their work. By providing the necessary knowledge, skills, and opportunities for engagement and feedback, these sessions contribute to the effective implementation of SOPs, promoting operational efficiency, quality control, and compliance within the organization.

2.4.3 Resources availability

Resource availability SOPs typically include a comprehensive inventory of required resources, such as equipment, materials, finances, human resources, and technology. The SOPs specify the quantity, quality, and specifications of each resource needed for different tasks or projects. This inventory helps ensure that all necessary resources are identified and accounted for in a systematic manner. The SOPs define the procedures for procuring resources. This includes guidelines for sourcing, purchasing, or acquiring resources through appropriate channels, ensuring compliance with organizational policies and legal requirements. It outlines the responsibilities of different stakeholders involved in the procurement process, such as procurement officers, department heads, or project managers.

Effective utilization and allocation of resources are also addressed in the SOPs. This involves guidelines for resource planning, distribution, and tracking. It specifies who is

responsible for managing and allocating resources, as well as the processes for requesting, approving, and monitoring resource usage. SOPs may outline strategies for prioritizing resource allocation based on urgency, importance, and availability. Maintenance and upkeep of resources are integral to their continuous availability. SOPs detail procedures for regular inspections, maintenance, and repairs of equipment and infrastructure. This ensures that resources are kept in optimal working condition and minimizes disruptions or downtime due to malfunctioning or inadequate resources.

The SOPs may also include measures for resource optimization and cost management. This involves guidelines for monitoring resource usage, identifying inefficiencies, and implementing strategies to maximize resource utilization while minimizing waste. It may include procedures for conducting periodic audits or assessments to evaluate resource availability and identify opportunities for improvement. Furthermore, the SOPs address contingency planning to mitigate resource unavailability or unexpected disruptions. This may involve establishing backup or alternative resource options, developing response plans for emergencies or shortages, and implementing strategies to address resource constraints or limitations.

Regular review and updates of the resource availability SOPs are crucial to ensure their relevance and effectiveness. As organizational needs, technologies, and processes evolve, the SOPs should be revised to reflect any changes in resource requirements or management practices. By implementing SOPs for resource availability, organizations can streamline resource management processes, improve operational efficiency, and ensure the availability of necessary resources when and where they are needed. These SOPs provide a standardized framework for resource planning, procurement, allocation, and maintenance, supporting the organization's ability to achieve its objectives effectively and efficiently.

The use of the WHO Surgical Safety Checklist, provision of resources such as the checklist, pulse oximeters, mark pens, among others is important. The institution should supply all the needed resources, and in case of shortage, the checklist coordinator must not tick the checklist dishonestly. Such anomaly needs to be noted down and those in charge of supplies notified (Complications, 2016).

Regular documentation of all the surgical events and its discussions thereafter by the surgical teams improve and boost the positive surgical outcomes (Merry et al., 2010).

2.4.4 Routine surgical surveillance

Information on how surgical teams use the WHO Surgical Safety Checklist needs to be regularly gathered and analyzed. This helps the hospital to know whether the checklist is helping its staff to cut down preventable adverse surgical complications. Moreover, this data enables the hospital to formulate ways and means to enable its staff to meet the challenges of using the surgical safety checklist during the operations (Gillespie & Marshall, 2015). Furthermore, regular analysis of such data allows the hospital to know shortcomings of its staff such as lack of training. This should prompt further training of the staff and provision of whatever resources materials that may be hindering successful utilization of the checklist (Chang, 2011; Kisacik & Cigerici, 2019).

Routine surgical surveillance is a fundamental component of surgical safety protocols in healthcare settings. It involves systematic monitoring and evaluation of surgical procedures to identify and mitigate potential risks, ensure adherence to established safety guidelines, and enhance patient outcomes. Standard Operating Procedures (SOPs) for routine surgical surveillance provide a framework for conducting surveillance activities consistently and effectively. The SOPs for routine surgical surveillance outline the key elements to be monitored during surgical procedures. This includes compliance with surgical safety checklists, adherence to infection control

practices, documentation of critical events, and tracking of adverse events or complications. The SOPs define the parameters, indicators, and data collection methods to be utilized during surveillance activities. Surveillance activities are typically performed by trained healthcare professionals, such as infection control practitioners, quality assurance teams, or surgical staff. The SOPs outline their roles and responsibilities, specifying the tasks, timelines, and reporting mechanisms for surveillance activities. This ensures a coordinated and systematic approach to surgical surveillance within the healthcare facility.

Data collection, analysis, and reporting procedures are also detailed in the SOPs. The SOPs provide instructions on how to collect accurate and consistent data during surgical procedures, ensuring that all relevant information is documented appropriately. They may include guidelines on data management tools or software to be used for analysis and reporting purposes. Analysis of surveillance data helps identify trends, patterns, and areas for improvement, facilitating targeted interventions and quality improvement initiatives. The SOPs also address the reporting and feedback mechanisms for surveillance findings. This includes guidelines on how to report surveillance data to the appropriate stakeholders, such as surgical teams, hospital administrators, or regulatory bodies. Regular feedback loops and mechanisms for disseminating surveillance findings help promote awareness, accountability, and continuous improvement in surgical safety practices. Continuous review and updates of the SOPs for routine surgical surveillance are essential to ensure their relevance and alignment with current best practices and guidelines. This allows for incorporating new evidence-based recommendations, emerging technologies, or changes in regulations into the surveillance procedures.

By implementing SOPs for routine surgical surveillance, healthcare facilities can enhance surgical safety practices, mitigate risks, and improve patient outcomes. These

SOPs provide a standardized approach to surveillance activities, ensuring consistency, accountability, and the continuous improvement of surgical safety protocols. Through systematic surveillance, healthcare providers can identify areas for improvement and implement targeted interventions to ensure the highest standards of safety and quality in surgical care.

2.4.5 Hospital Leadership

The hospital leadership that listens to the feedback and requests from its staff benefits as it adapts to the new dynamics such as new surgical equipment that improve its surgical services to its clients. The use of the WHO Surgical Safety Checklist requires collaborative and enthusiastic support of not only the surgical teams in the hospital but also the hospital leadership should ensure that its staff embracing, are well trained and supported to conduct surgical safety checks with help of the WHO Surgical Safety Checklist (Conley et al., 2011).

2.4.6 Hospital policies

Hospital policies play a crucial role in promoting compliance with established professional practices, ensuring the maintenance of professional standards. By adhering to these policies, healthcare staff can effectively prevent both omissions and commissions that may compromise patient care. Operating in accordance with the established standards and regulations set by their respective professional governing bodies is of utmost importance for the staff. These standards and regulations define their professional behavior and practices, and it is essential for the staff to adhere to them (Buerhaus et al., 2007).

2.4.7 Hospital staffing

A hospital is expected to employ and deploy sufficient staff to competently make use of the WHO Surgical Safety Checklist for positive surgical outcomes for its clientele. The

hospital operating with insufficient staff may find it difficult to adhere to the acceptable standards proposed by the WHO Surgical Safety Checklist. Quality hospital services such as surgical have been shown to improve with a higher proportion of hospital staff (Amiri & Solankallio-Vahteri, 2019).

Maintaining adequate staffing levels is essential for promoting surgical safety. Hospitals need to ensure that they have an appropriate number of healthcare professionals, including surgeons, anesthesiologists, nurses, and support staff, to meet the demands of surgical procedures. Insufficient staffing can lead to fatigue, stress, and increased risk of errors during surgery. Adequate staffing allows for better patient monitoring, timely interventions, and improved coordination among surgical team members. Surgical safety heavily relies on the skills and competency of the healthcare professionals involved in the surgical process. Hospitals should ensure that their staff members possess the necessary qualifications, training, and experience in their respective roles. Surgeons, anesthesiologists, and nurses should have specialized knowledge and expertise in their areas of practice. Ongoing professional development and training programs can further enhance the skills and competency of the surgical staff.

Effective teamwork and communication are vital for surgical safety. Hospitals should foster a collaborative environment where interdisciplinary teams work together seamlessly during surgical procedures. Strong communication channels between surgical team members, including surgeons, anesthesiologists, nurses, and other support staff, enable timely exchange of information, accurate handoffs, and coordination of care. Good communication reduces the likelihood of errors, enhances patient safety, and promotes positive surgical outcomes. The ratio of staff members to patients is an important factor in surgical safety. Hospitals should establish appropriate staffing ratios to ensure that healthcare professionals can provide individualized care and attention to

each patient. Staffing ratios need to consider factors such as the complexity of surgical procedures, patient acuity, and the need for continuous monitoring during surgery. Striking the right balance between patient volume and staffing levels is crucial to prevent errors and ensure optimal patient care. Addressing staff well-being and preventing burnout are essential for maintaining surgical safety. Healthcare professionals working in high-stress surgical environments may be susceptible to burnout, which can negatively impact patient care and safety. Hospitals should prioritize initiatives that support staff well-being, such as providing adequate rest periods, promoting work-life balance, and offering psychological support services. Addressing burnout helps to maintain staff morale, attentiveness, and overall performance. Ongoing education and training programs are critical for ensuring that surgical staff stay updated with the latest advances in surgical safety practices. Hospitals should provide regular training on topics such as infection control, patient safety protocols, use of surgical checklists, and handling of emergency situations. Continuous education and training enable staff members to stay current with best practices and enhance their skills in delivering safe surgical care.

In summary, hospital staffing is a vital component of surgical safety. Adequate staffing levels, staff competency, collaboration, effective communication, appropriate staffing ratios, staff well-being, and ongoing education and training are all crucial factors in promoting surgical safety and ensuring positive patient outcomes. Hospitals should prioritize investments in staffing resources and strategies that support a culture of safety and continuous improvement in surgical care.

2.4.8 Hospital Accreditation

Accredited hospital adheres to set standards and policies, audits its processes and strives continually to improve on identified gaps. Continuous improvement involves adopting

certain processes practices like the quality improvement model among others (Al-Abri & Al-Balushi, 2014).

Hospital accreditation is a process by which healthcare facilities undergo an evaluation to determine their compliance with specific standards and guidelines set forth by accrediting bodies. Accreditation plays a significant role in ensuring and promoting surgical safety within hospitals. Here are some key points regarding hospital accreditation on surgical safety:

During the accreditation process, accrediting bodies assess the hospital's adherence to established surgical safety protocols, including the implementation of standardized procedures, checklists, and guidelines. This evaluation ensures that hospitals have robust systems in place to minimize errors, prevent infections, and improve patient safety during surgical procedures. Accreditation often requires hospitals to meet internationally recognized standards for surgical safety, such as those set by the World Health Organization (WHO). These standards encompass various aspects of surgical care, including pre-operative, intra-operative, and post-operative phases, ensuring that hospitals follow best practices to enhance patient outcomes and reduce complications. Accreditation involves monitoring the surgical performance of hospitals, including surgical outcomes, infection rates, and compliance with quality indicators. This assessment helps identify areas for improvement and facilitates benchmarking against other accredited institutions. Regular performance monitoring encourages hospitals to strive for excellence in surgical safety and promotes a culture of continuous quality improvement. Hospitals are required to demonstrate that their staff members receive appropriate training on surgical safety practices, including the use of checklists, infection control, and patient communication. Continuous education ensures that healthcare professionals stay updated with the latest advancements and best practices in

surgical safety. Accreditation encourages hospitals to conduct comprehensive risk assessments related to surgical procedures. This includes identifying potential hazards, evaluating the likelihood and severity of adverse events, and implementing appropriate risk mitigation strategies. Accreditation bodies assess hospitals' risk management processes to ensure that they have protocols in place to minimize surgical risks and respond effectively to unexpected events. Accreditation focuses on ensuring that hospitals prioritize patient-centered care in their surgical services. This includes considerations for informed consent, patient involvement in decision-making, clear communication, and respectful treatment of patients. Accreditation processes assess hospitals' commitment to upholding patient rights, dignity, and safety throughout the surgical journey. Accreditation is not a one-time event but a continuous process. Hospitals must demonstrate a commitment to ongoing quality improvement initiatives related to surgical safety. This involves monitoring and analyzing surgical outcomes, participating in quality improvement programs, conducting regular audits, and implementing evidence-based practices to enhance surgical safety.

In summary, hospital accreditation on surgical safety is a rigorous evaluation process that ensures hospitals meet internationally recognized standards and guidelines. It promotes the implementation of robust surgical safety protocols, ongoing education and training, risk assessment and mitigation, patient-centered care, and a culture of continuous improvement. Accreditation plays a vital role in fostering a safe surgical environment and enhancing patient outcomes.

2.5 Theoretical Framework

In this study, the utilization of the Avedis Donabedian model was employed to investigate healthcare systems and assess and compare healthcare quality. The model has undergone several revisions since its inception in 1966 (Chun & Bafford, 2014).

Donabedian's theory was employed to evaluate the implementation and effectiveness of the WHO Surgical Safety Checklist in promoting safety and positive clinical outcomes in surgical procedures. This theoretical framework offers flexibility and applicability across various healthcare environments. Through the implementation of this framework, the usage of the WHO Surgical Safety Checklist at Kenyatta National Hospital was evaluated, offering valuable insights into the organization and procedures within the healthcare facility. This assessment will also aid clinicians in gaining a deeper understanding of the practices and protocols in place (Donabedian et al., 1982).

Donabedian's model comprises three key elements: structure, process, and outcomes. According to Donabedian's theory, the structure of healthcare settings influences the processes implemented, which in turn impact the final outcomes. The structure component encompasses various factors such as staffing levels, adhering to internationally recommended clinician-to-patient ratios, availability of equipment, consumables, and stationery, as well as the operating room environment. Furthermore, it takes into account the existence of established protocols that provide guidance for the provision of care and create an appropriate setting for conducting surgical procedures (Naranjo & Viswanatha Kaimal, 2011).

Method assessments were used to assess the extent of the clinicians' expertise, experience and skills in using the WHO Surgical Safety Checklist. This was achieved by administering standardized questionnaires and making observations.

Donabedian highlighted the paramount importance of evaluating the efficiency and caliber of healthcare, specifically within surgical environments, with the ultimate aim of gauging the attained outcomes. These outcomes serve as the ultimate goal, reflecting the success and positive results of the surgical procedures (Donabedian et al., 1982).

2.6 Conceptual Framework

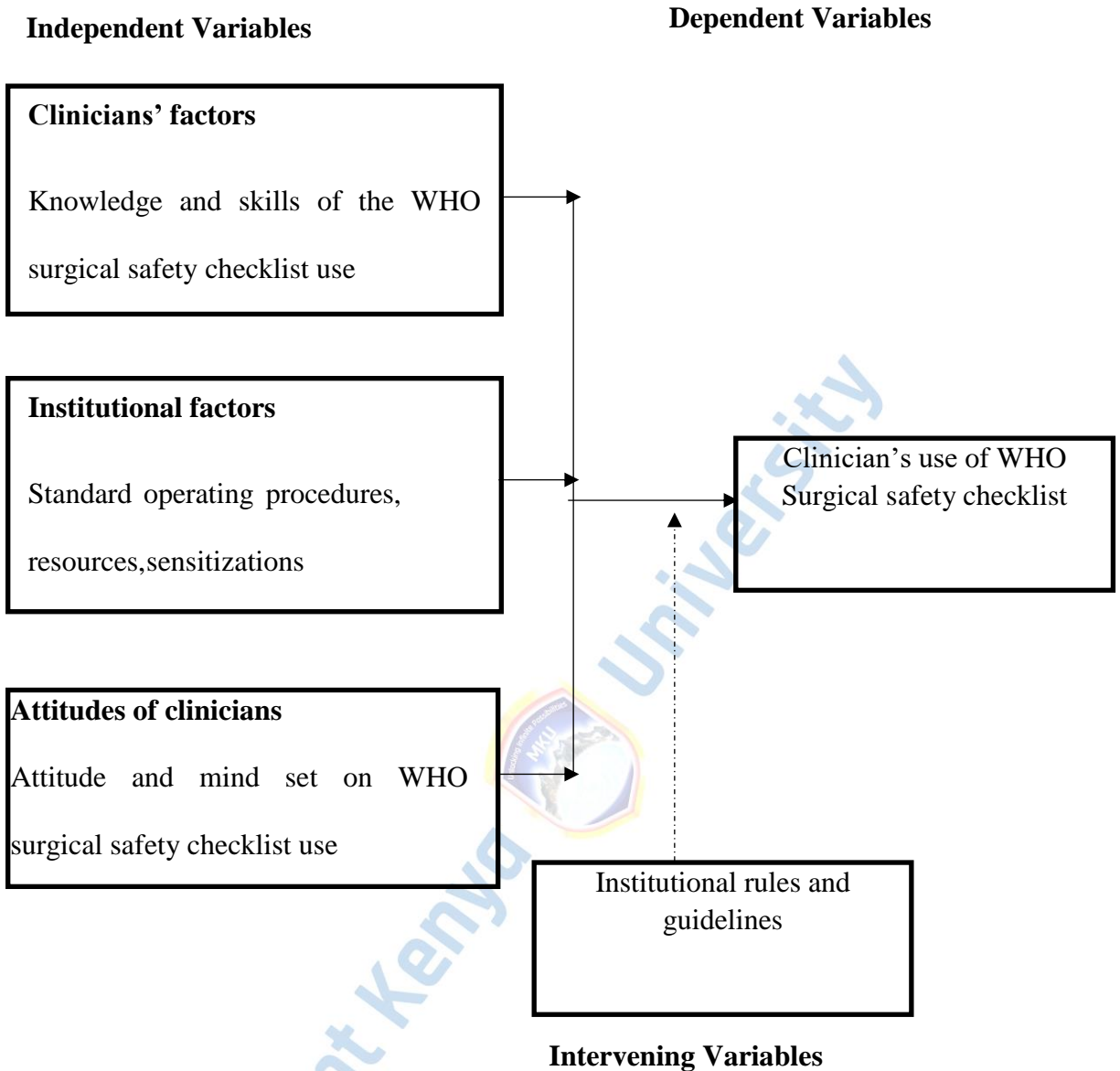


Figure 2: Conceptual Framework

2.7 Recap of Literature Review

The above literature review evidenced significant variations in the implementations of the checklist across the world by the healthcare facilities which institutionalized it in their day-to-day operations. Awareness of the above-discussed checklist improves knowledge of the surgical team members. Clinicians are tagged with the activity of coordinating correct surgery on correct patient at the correct site to avoid incidences of wrong patient surgery

Minimizing surgical site infection in the theatres while carrying out surgical procedure by clinicians is crucial. At the same time, implementing preventive measures to avoid the unintended retention of surgical instruments and sponges is of utmost importance for healthcare practitioners to ensure safe surgical practices and reduce complications. Conversely, the consequences of retained sponges and instruments can be severe, leading to complications such as infections, the need for additional surgeries to remove them, bowel perforation, fistula formation, or obstruction

Ensuring the proper handling and precise identification of all collected specimens is paramount in preventing laboratory errors. Therefore, implementing a rechecking process that involves verifying the identification bands on the patient's wrist can significantly reduce the occurrence of specimen labeling errors. Training on how to use the checklist keeps surgical staff updated while those new in the team learn and implement safe surgical care to the patients. The more the checklist is used, the more familiar the clinicians become. Ensuring the availability of the checklist by the hospital management guarantees its utilization with subsequent better surgical practices. Moreover, noting down shortage of resources including checklists and initiation of its timely availability sustains better surgical practices. Regular surveillance by the healthcare facilities generate data, enabling formulation of ways for the surgical staff to surmount emerging and re-emerging challenges as they endeavor to better surgical practices with the aid of the World Health organization Surgical Safety Checklist.

CHAPTER THREE

MATERIALS AND METHODS

3.0 Introduction

The focus of this chapter encompassed the examination of study design, site selection, population characteristics, as well as the criteria for inclusion and exclusion. Emphasis was also placed on determining the appropriate sample size, including the methods of sampling, and outlining the procedures for data collection. Additionally, variables, data validity and reliability were explained. The process of data analysis and presentation was elucidated, encompassing ethical considerations. The limitations of the study and the dissemination of results were also deliberated upon.

3.1 Study design

The research utilized a descriptive cross-sectional approach to examine the subject matter. The recruitment of study clinicians was based on multi-stage sampling techniques, while the clocking register was used as a sampling frame to gather quantitative data from 21 operating theatres at Kenyatta National Hospital.

The research took place within the surgical operating rooms of Kenyatta National Hospital (KNH), located in Nairobi County. Initially established as King George Hospital in 1901, the facility has evolved into its present form as a prominent civic hospital. It was renamed Kenyatta National Hospital following Kenya's first president, His Excellency Mr Jomo Kenyatta. KNH is 3.5 kilometers from the capital city, west of the central business district of Nairobi off Hospital Road. Being the biggest and highly reputable public hospital in Kenya, this institution functions as a regional referral hospital, catering to patients from the Great Lakes region and diverse nations in East and Central Africa. Additionally, the hospital accepts referrals from all 47 counties in Kenya.

Kenyatta National Hospital is equipped with a total of 24 specialized operating theaters, out of which 12 are commonly referred to as the main theaters. The others include two maternity theatres, two accidents and emergency (trauma), two ophthalmology, two clinics 66, one ear, nose and throat, one burns and two outpatient theatres. The hospital consists of a diverse array of medical disciplines, including cardiothoracic, plastic surgery, pediatrics, orthopedics, oral maxillofacial, otolaryngology, nephrology, neurosurgery, obstetrics, gynecology, general surgery, and various others. Scheduled elective surgeries are typically arranged from Monday through Friday, while emergency surgical procedures are performed around the clock, seven days a week. During the study period, the hospital employed approximately 320 clinicians, including 160 nurses, 80 anesthesiologists/anesthetists, and 80 surgeons.

3.2 Target Population

The study included all healthcare professionals working in the operating rooms who utilize the WHO Surgical Safety Checklist. The clinicians by then were approximately three hundred and twenty, one hundred and sixty being nurses, eighty surgeons and eighty anesthesiologist/anesthetist.

3.3 Inclusion and Exclusion criteria

3.3.1 Inclusion criteria

All clinicians working in the KNH operating rooms that had consented to participate in research

3.3.2 Exclusion criteria

Clinicians who were on leave.

3.4 Sample size determination

The study was conducted at the KNH operating theatres within a period of close to one month. There were approximately 320 clinicians working in the theatres by then.

distributed as follows; nurses 160, surgeons 80 and anesthesiologist/anesthetist 80 and the desired sample size was calculated using Fisher's formula (Kasiulevičius et al., 2006). $n = Z^2 (p) (q) / d^2$

Where:

n= sample size

Z= 1.96

P= the proportion in the target population q=1-p

d= margin of error (+/- 5% or +/- 0.05).

Z= 1.96

d= 0.05(5%)

p= 0.5(50%)

q= 0.5(1-0.5)

$$n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

n=384.16= 384

Since the target population was less than 10,000 the sample size determination was done using the Yamane formula (Kasiulevičius et al., 2006) as follows:

Based on Yamane's formula ($n = \frac{N}{1 + N e^2}$) where; n – Minimum number of samples required

N – Target population size

e - Marginal sampling error (5%/0.05) n= total number of clinicians 320/ 1+320 (0.05)²

n=177.78

=178

With a 95% confidence interval and a 5% degree of precision, a minimum sample size of 178 was reached.

3.5 Sampling Method

Multi-stage sampling techniques were used to acquire a representative sample from all the clinicians. At the commencement of this study the number of clinicians was approximately 320, nurses being 160, surgeons 80 and 80 anesthesiologist/anesthetist. Therefore, the sample size of 178 was targeted from the calculations using Yamens formula.

In every procedure, a minimum number of four clinicians participated namely: one surgeon, one anesthesiologist/anesthetist, one scrub nurse and one circulating. The nurses are also the designated coordinators of theatre activities. Considering the fact that there were more nurses required in each procedure, half of the sample size was apportioned to nurses. The other half was apportioned to 44 surgeons and 44 anesthesiologist/anesthetist. The surgeons were father apportioned to 4 surgeons from each of the 11 specialties (paediatrics, cardiothoracic, neurosurgery, orthopaedic, obstetrics and gynaecology, oral maxillofacial, plastic, ophthalmology, ear nose and throat, general surgery and urology). The apportioning of 4 surgeons to each specialty was to ensure that all areas are captured and the end of the study when dissemination is done to the theatre users there will be consensus. Study clinicians were also categorized into three groups: nurses, anesthesiologists/anesthetists, and surgeons. Study nurses were sampled as follows, the main theatre sixty out of the eighty nurses working in the main theatres (60/80) and thirty out of the forty nurses in maternity theatre (30/40) based on clocking registers at each station. While 44 anesthesiologists/anesthetists were sampled using the same technique recruited based on their allocation rota. This was conducted for close to one month. Study variables

3.6 Study Variables

3.6.1 Independent variables

Clinicians 'related factors like the knowledge and skills of the clinicians.

Institutional related factors like availability of the checklist, guideline on use of the checklist, sensitization program among others.

Attitude of the clinicians on use of the checklist since the checklist is not the requirement for the clinician to carry out the surgery

3.6.2 Intervening variables

Institutional rules and guidelines

3.6.3 Dependent variable

Clinicians 'use of the WHO Surgical Safety Checklists.

3.7 Validity and reliability

The study tool's validity was confirmed through evaluations by supervisors, expert opinions, and assessments by three distinct groups of clinicians who appraised the questionnaires' clarity. The clinicians involved in assessing the validity of the data collection tools were preferably individuals well-versed in the expectations and requirements of the operating room setting. In addition Kenyatta National hospital has a research department so some of the staffs who were experienced, well versed with research were informed and volunteered to validate the study tool. A preliminary investigation was conducted at the second maternity theater, which was excluded from the main study. To minimize the possibility of random errors and improve the reliability of the research instrument, a total of eighteen participants were included in the study. The analysis of the study did not include the participants from the pilot study. To ensure data reliability, research assistants with prior experience and knowledge of the utilization of the WHO surgical safety checklist in operating rooms were engaged.

3.8 Data collection procedure

From the data base of the research department of Kenyatta National Hospital the theatre trained and experienced nurses were identified and recruited based on their availability and willingness. The recruited nurses had been involved in other researches before, thus, they were quite familiar with the exercise.

During the data collection phase, self-administered questionnaires were provided to the clinicians who voluntarily agreed to participate in the study. The questionnaires were designed specifically to collect data on the clinicians' level of experience and identify potential factors that could impact the implementation of the WHO Surgical Safety Checklist in operating theaters. The researcher personally distributed and administered the questionnaires to the consenting clinicians over a span of approximately one month, from Monday to Friday. Quantitative data was obtained through the use of closed-ended questions, where clinicians were provided with predefined response options that closely aligned with their answers. The questionnaire encompassed diverse question formats, incorporating multiple-choice questions that enabled respondents to express their opinions by selecting one or more options. Additionally, dichotomous questions were included, necessitating a binary response of either "yes" or "no". In addition, the questionnaires contained the rating questions.

In the questionnaires, the clinicians' perspectives on the WHO Surgical Safety Checklist were evaluated using a grading system. Participants were asked to express their agreement levels using a rating scale ranging from strongly agree (4), agree (3), disagree (2), to strongly disagree (1). The mean and standard deviation of these responses were then calculated.

Data regarding the practical implementation of the WHO Surgical Safety Checklist in the operating rooms was gathered using a questionnaire that included rating-based

evaluations. The researcher engaged nursing officers knowledgeable, experienced and had undergone training on how to capture such data. One of the recruited nursing officer duties specifically was to observe the practice on the use of the WHO SSC after I and the other nurses consented with the clinicians. Information on the consented clinicians was passed to the observation nurse who noted and carried out covert observations. The observations were not done in one sitting with the questioner responses. The observation nurse tiptoed to the specific theatre where the consented clinicians were carrying out their normal duties on another day or time and without the clinicians knowing that they were being observed noted the practice. The observed surgical practices concerning the WHO Surgical Safety Checklist utilization was scored from not done (1), partial done (2) and done (3) with the results calculated in percentages thereafter. The clinicians undertaking surgery were blindfolded during the observation to minimize bias.

3.8 Data analysis procedure and presentation

Before the analysis, a comprehensive examination of the raw data was undertaken to verify its integrity. The quantitative data was analyzed using Statistical Package for Social Sciences V-20. Descriptive analysis was utilized to examine the demographic variables, and frequencies and percentages were calculated. The results were presented using diagrams and pie charts. To evaluate the relationships between categorical variables, inferential statistics such as Pearson's Chi-square and Fisher's exact test were employed. A significance level of $p < 0.05$ was considered statistically significant in determining the associations. Finally, recommendations and assumptions were made based on the data trends and relationship.

3.9 Ethical consideration

The study protocol underwent thorough review and received approval from three ethical committees: Mount Kenya University Institutional Ethics and Research Committee (845), Kenyatta National Hospital-University of Nairobi Ethics and Research Committee (P242/04/2021), and the National Commission of Science, Technology, and Innovation (463808). Permission to conduct the study was also sought from the County Commissioner, Nairobi City County, The Governor, Nairobi City County (004-07-04-2021), Regional Director of Education, Nairobi City County (RDE/NRB/RESEARCH/1/65 Vol.1). Permission was also obtained from the Head of Department Research and Programmes, Anaesthesia theatres, Kenyatta National Hospital (11461/2021).

The overall head of operation theatres gave a written approval of the study (Anaesthesia theatres, Kenyatta National Hospital (11461/2021)). The information then trickled down to the other heads by serving them with the study approval. The clinicians in the individual theatres got the information through their heads. Thereafter, sample questioner was availed for them to familiarize with the questioner which included the observation part and those who were willing sign informed consent forms to allow them participate in the study. However, observation study was conducted by a trained nurse who conducted the observation without other staff knowing. He tiptoed into the specific theatres where consented clinicians unknown to him were carrying out their day-to-day surgical operations of the patients, noted how the WHO SSC was being utilized during the operation. This was done purposely to capture what is normally done by the staff without supervision.

Clinicians in the selected operating rooms who consented participated in the study. The clinicians were provided with a clear explanation of the significance and objectives of the study, allowing them to make an informed choice regarding their participation.

The clinicians were guaranteed confidentiality through the anonymization of data, ensuring that their identities could not be discerned or associated with their responses.

The study outcomes and conclusions were planned to be shared with appropriate entities, while safeguarding the personal identifiers of the participants.

The lead researcher highlighted that participation in the study was entirely voluntary, and clinicians had the freedom to withdraw from the research at any stage according to their discretion. It was made clear to the clinicians that there were no financial rewards for their participation, nor were there any negative consequences for opting out of the study.

3.10 Results dissemination plan

The findings of the study will be disseminated to the faculty members at Mount Kenya University, the management team of Kenyatta National Hospital, members of the theater users committee, and also presented at scientific conferences for wider dissemination. The results will be shared through the publication of scholarly articles in academic journals, as well as through presentations at relevant conferences and continuous professional development events. The aim is to enhance the quality of surgical patient care during surgical procedures. A copy of the study will be provided to the School of Nursing for the purpose of sharing with other students, allowing them to review the findings and identify any gaps that could inform future studies.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.0 Introduction

In this chapter, the study's results are presented, which include an assessment of the extent to which the WHO Surgical Safety Checklist is used, as well as the factors associated with clinicians and the institution that influence the implementation of the checklist. The chapter also presents an analysis of the observed practices regarding the utilization of the WHO Surgical Safety Checklist in the operating theaters, as well as the correlation between factors related to clinicians and the institution. The findings are visually depicted through the use of tables and pie charts.

The sample size for the study was determined to be 178 using the Yamane's formula. However, the data was keyed as we collected and the incomplete questionnaires put aside at the end 200 structured questionnaires were used. Structured questionnaires with incomplete data were excluded in the final data analysis.

Therefore 178 were analyzed making the response rate to be 100%. Of the observed clinical practices 42 procedures were observed out of 44 representing 95.5% which according to Mugenda and Mugenda, response rate that is above 70% is excellent and suitable for data analysis and reporting (Mugenda, O. M. & Mugenda, 2003). The study had 100% response rate where 178 respondents were found to answer the research instrument.

Objective 1: Utilization level of WHO Surgical Safety Checklist

Majority of the respondents 95% reported use of the WHO Surgical Safety Checklist in an operation they had participated on the day of data collection, the usage however was not broken into the three phases as they responded (see figure 3).

In contrast to the research conducted in Nigeria (Fajemilehin & Faronbi, 2016), which reported a utilization rate of the WHO Surgical Safety Checklist by only 57% of participants, a study on the prevalence of checklist use in Europe revealed an overall implementation rate of 67.5% among the European population. However, significant variation was observed between countries, with rates ranging from 0% to 99.6% (Jammer et al., 2015).

However, this study observed a higher prevalence of 95% which is remarkable for Kenyatta National Hospital. Possible improvement could have been contributed by the strong institutional factors such as: The guidelines in place, periodic sensitization of the clinicians and making the use of the checklist mandatory for use. Considerable disparities in the adoption of the checklist are evident and could potentially contribute to unfavorable outcomes related to surgical procedures (Delisle et al., 2020).

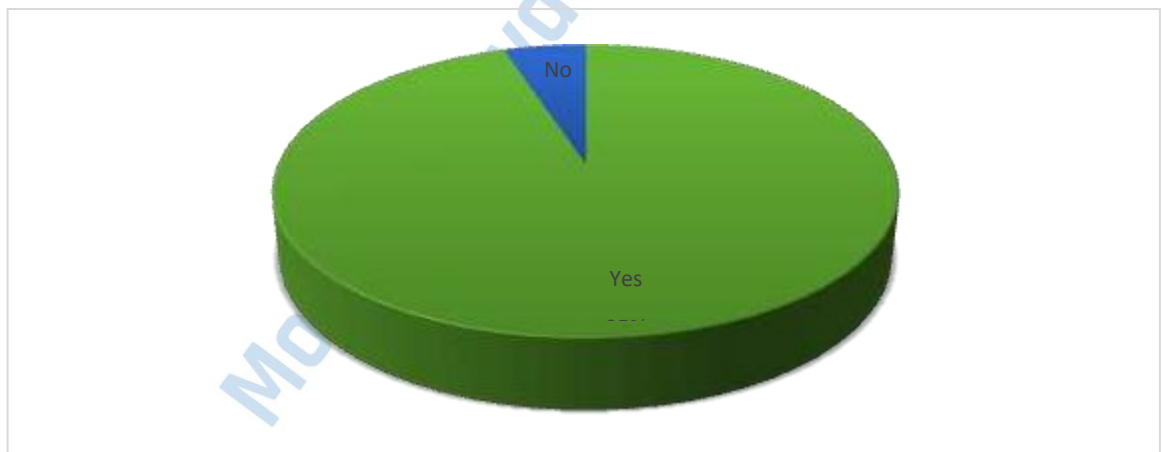


Figure 3: Utilization level of the Checklist

4.2 Objective 2: Clinicians' related factors

The study examined the occurrence and proportion of socio-demographic characteristics among the clinicians, encompassing variables such as their overall work experience, specific experience in the operating theaters, educational attainment, familiarity with the

checklist, previous training received, previous utilization of the checklist, their attitudes towards it, and observations of clinical practice.

4.2.1 Years worked as a clinician in general

Based on the data presented in Table 1, the study's results indicated that slightly over half of the participants, accounting for 52%, possessed a general work experience of more than 10 years.

This factor was significantly associated with the following clinical practices observed in the operating rooms: patient informed consent confirmation ($p=0.035$) among others “This implies that there was significant association between length of time one worked as a general clinician with patient informed confirmation use as its p value was found to be less than 0.05.

Table 1: Years worked as a clinician in general

| Variable | Frequency | Percent | P=value |
|--|------------|-------------|---|
| Length of time worked as a clinician (Years) | 0 to 2 | 3 | P = .000 Df = 3 $\chi^2 = 28.397^a$ |
| | 3 to 5 | 42 | |
| | 6 to 10 | 41 | |
| | Above 10 | 92 | |
| Total | 178 | 100% | |

Source (Field Data 2021)

The study indicated that there was a statistical association between clinicians ‘related factors such as years one has worked as a clinician and use of the checklist since the p value was found to be 0.000 which was less than 0.05. Further, the study found a chi-square value of 28.397.

4.2.2 Years worked in the operating theatre

Results in table 2 show similar findings to table 1 as almost half 46% of the respondents had long working experience in the theatres for over 10 years.

This indicates that regulations on specialization are being followed as a clinician is required to have worked generally before specializing in areas like theatres among others. The findings also agree with a study in Nigeria, in which clinical and professional experience were observed as good predictors of safety practices by the preoperative nurses (Fajemilehin & Faronbi, 2016).

Table 2: Years worked in the operating theatre

| Variable | Frequency | Percent | P= value |
|---|------------------|----------------|-----------------|
| Length of time worked in the theatres (Years) | Less than 1year | 13 | 7.3 |
| | 1to 2 | 26 | 14.6 |
| | 3 to 5 | 58 | 32.6 |
| | 6 years above | 81 | 45.5 |
| Total | 178 | 100% | |

Source (Field Data 2021)

The analysis of the data yielded a Pearson's chi-square value of 10.161 and a p-value of 0.031, which was found to be below the predetermined significance level of 0.05. These results demonstrate a statistically significant association between the years of experience in the operating theaters. Most of the respondents were found to have over 6 years above with a response rate of 81(45.5%) where the experienced professionals often have a better understanding of team dynamics and can navigate complex situations more efficiently. Studies have shown that increased years of experience can lead to improved teamwork, coordination, and communication among operating theatre staff, contributing to better patient care Rosen M (2018).

4.2.3 Participants level of education

The participating clinicians had varying qualification ranging from Masters and above to Diploma and below (table 3), 44% of the respondents had master’s degree and above. Thus, it implies that having high educational qualification increases the chances of observing the clinical practices envisaged by the WHO Surgical Safety Checklist.

Table 3: Participants' level of Education

| Variable | | Frequency | Percent | P=value |
|--------------------|-------------------|------------|-------------|--|
| Level of Education | Masters and above | 78 | 43.8 | P = .022 Df = 3 $\chi^2 = 8.240$ |
| | Bachelor's | 26 | 14.6 | |
| | Diploma | 74 | 41.6 | |
| Total | | 178 | 100% | |

Source (Field Data 2021)

The results of the study revealed a significant statistical association between the level of education of the participants. This was evident from the p-value, which was less than 0.022 at a 95% confidence interval, meeting the threshold of significance set at 0.05. According to study by Bergs et al. (2015) the study indicated that creating awareness and familiarizing healthcare professionals with the purpose and significance of the WHO Surgical Safety Checklist Effective education and training initiatives play a crucial role in ensuring that members of the surgical team comprehend the goals and procedures of the checklist. Enhanced education programs can provide healthcare professionals, including surgeons, anesthesiologists, and nurses, with a deeper grasp of patient safety principles and the significance of integrating surgical checklists into their practice. They are more likely to recognize the value of the checklist and the potential benefits it offers in preventing errors and improving patient outcomes.

4.2.4 Awareness of the respondents towards use of the WHO Surgical Safety Checklist

The frequency and percentage distribution of awareness of participating clinicians towards use of the WHO Surgical Safety Checklist are presented under the following sub-headings.

Awareness about the checklist

Majority 98% of the respondents were aware of the WHO Surgical Safety Checklist with only a few 2% lacking awareness about the checklist (see figure 4).

This suggests that the surgical team members had a clear understanding of their respective roles and responsibilities. This finding aligns with Kruk's (2018) assertion that increased awareness enhances the knowledge of surgical team members (Kruk et al., 2018).

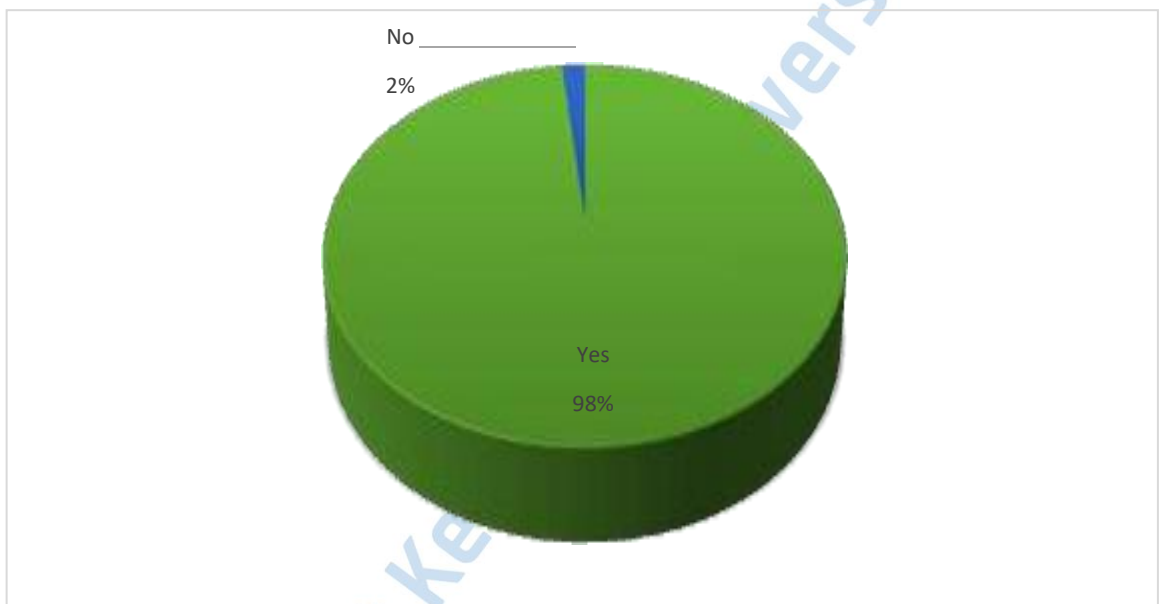


Figure 4: Awareness about checklist

4.2.5 Training on use of the checklist

A majority of the participants, comprising 62% of the respondents, had received training on the utilization of the WHO Surgical Safety Checklist, while 38% reported a lack of such training (see figure 5)

This indicates that clinicians were using the WHO Surgical Safety Checklist despite not being trained and may explain why some of the observed practices were partially done or not done. Similar conclusions were drawn by Hurtado (2012) that poor knowledge

and lack of training are associated with limited use of the WHO Surgical Safety Checklist (Hurtado et al., 2012)

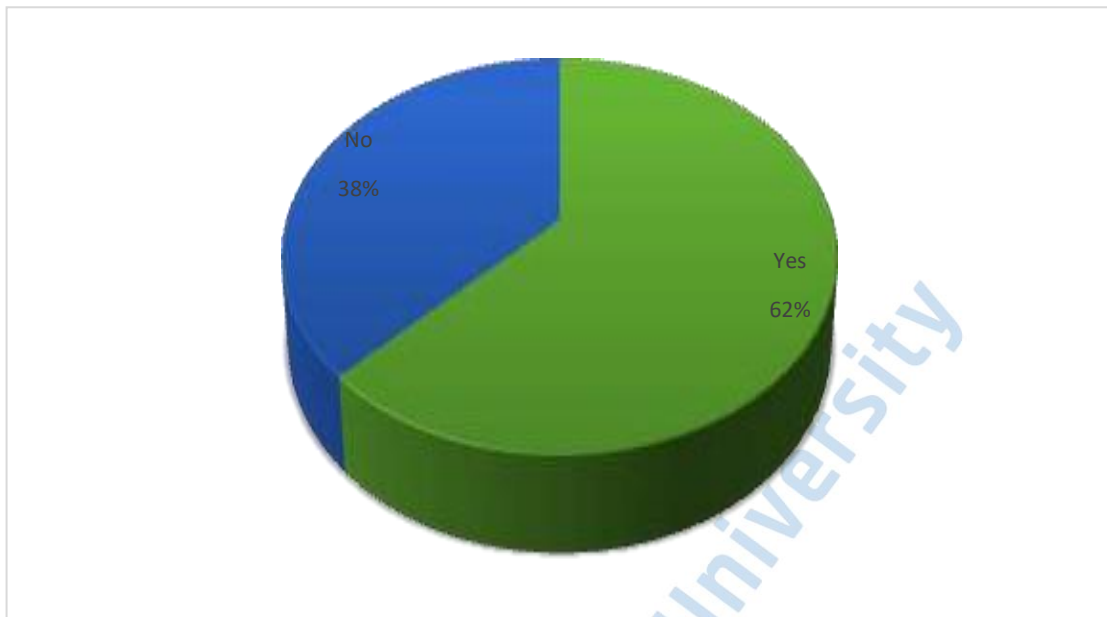


Figure 5: Training on use of checklist

4.3.6 Use of the checklist during surgical operations

The study observed that 98% of the respondents reported use of the WHO Surgical Safety Checklist during surgery (see figure 6).

This factor was significantly associated with the clinical practices observed in the operating rooms: confirmation of patient informed consent ($p=0.012$) (see table 6). Similar conclusions were drawn that regularly use of the checklist makes the clinicians more familiar

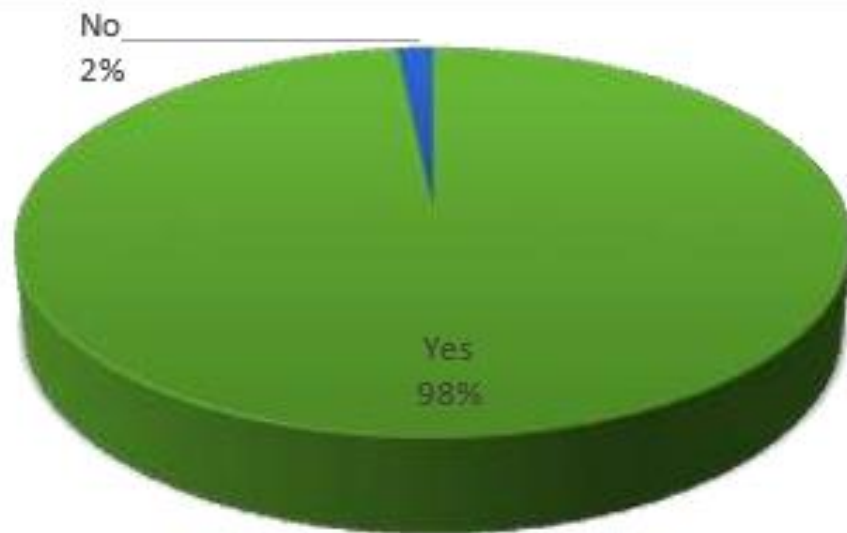


Figure 6: Use of the checklist

4.3.7 Attitude of Clinicians towards use of the WHO Surgical Safety Checklist

As earlier explained in the methodology section, likers scale was used to assess the clinician's attitude where strongly agree represented (4) marks, agree (3), disagree (2) and strongly disagree (1). The mean, standard deviation was also calculated and ranking done.

Over role clinicians had a positive attitude on the use of the WHO Surgical Safety Checklist as majority of them strongly agreed. Use of the checklist in the operating theatre during surgery by participating clinicians was give more importance as it was ranked highest with the mean and standard deviation (SD) value of 3.93 ± 0.319 (see table 4).

This positive attitude encourages team members to incorporate instinctively their surgical plans to use the WHO Surgical Safety Checklist and become more familiar with the worksheet (Kilbane et al., 2020)

The finding also agreed with 95% usage of the checklist by clinicians in the operating rooms according to the questionnaire's responses. On the other hand, least importance

was put on, encouragement of junior clinicians to report any incidents observed and that the clinicians didn't have adequate time to participate in the use of the checklist with mean and SD value 3.51 ± 0.674 and 3.45 ± 0.681 respectively (see table 4).

Not having adequate time to participate in the WHO Surgical Safety Checklist by the clinicians may imply that there could have been low staffing levels or workload.

Similar conclusions were drawn by Amiri, (2019) that quality hospital services such as surgical have been shown to improve with a higher proportion of hospital staff (Amiri et al., 2019).



Table 4: Attitude of clinicians towards use of the WHO Surgical Safety Checklist

| Clinicians attitude towards use of the checklist | Strongly agree | Agree | Disagree | Strongly Disagree | Mean | SD | Rank |
|--|----------------|-------|----------|-------------------|------|-------|------|
| The WHO Surgical safety checklist should be used in the OR during surgery | 167 | 10 | 0 | 1 | 3.93 | 0.319 | 1 |
| It is imperative to provide comprehensive training to all clinicians in the operating theater regarding the utilization of the WHO surgical safety checklist | 161 | 16 | 0 | 1 | 3.89 | 0.360 | 2 |
| Having a confidential reporting system in place to record medical errors plays a vital role in ensuring the safety of patients. | 130 | 43 | 4 | 1 | 3.70 | 0.510 | 3 |
| I find the use of the WHO surgical safety checklist relevant | 126 | 50 | 1 | 1 | 3.69 | 0.540 | 4 |
| I have a strong sense of confidence in my ability to effectively utilize the WHO surgical safety checklist | 122 | 50 | 5 | 1 | 3.65 | 0.566 | 5 |
| I understand the components of the WHO surgical safety checklist | 122 | 51 | 2 | 3 | 3.64 | 0.597 | 6 |
| I have sufficient time available to actively engage in the implementation of the WHO surgical safety checklist | 105 | 61 | 9 | 3 | 3.51 | 0.674 | 7 |
| I receive positive encouragement and support from my supervisors and colleagues to report any observed incidents | 97 | 66 | 13 | 2 | 3.45 | 0.681 | 8 |

Source (Field Data 2021)

42 procedures were observed with an aim of observing each clinician once. In normal circumstances the minimum number of clinicians per procedure is four but the number increases when more clinicians are available or the surgery becomes complex. Clinical practices on how the WHO Surgical Safety Checklist was used in the operating theatres (see table 5) evidenced that the clinicians use of the WHO Surgical Safety Checklist was at a lower percentage (83.7%) compared to the questioner responses which were at 95%. Scrub nurse confirming sterility was given great importance as it was done at 83.7% followed by Confirmation by scrub nurse for completion of surgical instruments, sponge and needle counts at 82.5%. There was a big gap from 82.5% to 57.3% to the next practice which is patient identity and procedure confirmed.

Confirmation of specimen labelling by the circulating nurse was given least importance at 17.4% done.

The clinical practices are important as each has unique implications which have grave implications.

Confirmation of sterility by scrub nurse is equally an important practice whose observation is in tandem with good surgical safety practices that may lead to good surgical outcomes by the institution. This practice reduces possibility of surgical site infections occurring. On the other hand, confirmation by scrub nurse for completion of surgical instruments, sponge and needle counts supports an effective communication among the studied clinicians and usefulness of the practice in ensuring that surgical instruments, sponges and needles are not left in the patient's body cavity.

The clinical practice of anesthesiologist giving nod to surgeon to continue was not done at 61.8% followed by circulating nurse confirms specimen labelling (52.8%), confirmation of operation site making (51.1%) this implies that the clinician's may have

lacked free communication which is key in safety. Similar conclusions were drawn that free and open discussions during the surgery are important in promoting safe surgery as an early resolution reached by the team is recalled to minimize adverse surgical outcome (Leong et al., 2017).

Specimen labelling and subsequent management however remains a very important practice since it determines the treatment of the patient. Confirming that all surgical specimens are correctly labeled secures and guarantees safe surgical care (Chang, 2011)

4.3.8 Clinicians practices on use of the Checklist in the operating

Table 5: Use of checklist in the operating rooms

| Observation on the use of the checklist in the operating theatres | Done | Per cent Done (%) | Partially Done | Percent partially done | Not Done | Per cent not done (%) |
|---|-------------|--------------------------|-----------------------|-------------------------------|-----------------|------------------------------|
| Scrub nurse confirms sterility (including indicator results) | 149 | 83.7 | 18 | 10.1 | 11 | 6.2 |
| The scrub nurse verifies the completion of counts for instruments, sponges, and needles | 147 | 82.5 | 16 | 10.1 | 15 | 8.4 |
| Patient informed consent confirmed | 102 | 57.3 | 12 | 6.7 | 64 | 35.9 |
| Patient identity and procedure confirmed | 102 | 57.3 | 47 | 26.4 | 29 | 16.3 |
| Every team member provided their name and stated their respective role | 88 | 49.4 | 64 | 35.9 | 26 | 14.6 |
| Essential imaging displayed | 68 | 38.2 | 49 | 27.5 | 61 | 34.3 |
| Scrub nurse confirms status of surgical equipment's | 63 | 35.4 | 47 | 26.4 | 68 | 38.2 |
| Confirmation for the patient's possible difficult airway or | 62 | 34.8 | 48 | 26.9 | 68 | 38.2 |

| | | | | | | |
|--|----|------|----|------|-----|------|
| aspiration risk | | | | | | |
| Confirmations of the patient's record for known allergy | 60 | 33.7 | 54 | 30.3 | 64 | 39.9 |
| Confirmation of equipment/instrument availability | 57 | 32.0 | 32 | 17.9 | 89 | 50 |
| Anaesthesiologist gives nod for the surgeon to continue | 55 | 30.8 | 13 | 7.3 | 110 | 61.8 |
| Scrub raises equipment issues or concerns | 47 | 26.4 | 48 | 26.9 | 83 | 46.6 |
| Confirmation for the operation site marking | 41 | 23.0 | 46 | 25.8 | 91 | 51.1 |
| The circulating nurse verifies the labeling of specimens by audibly reading the specimen labels, including the patient's name. | 31 | 17.4 | 53 | 29.7 | 94 | 52.8 |

Source (Field Data 2021)

4.3 Objective 3: Institutional factors influencing use of the WHO Surgical Safety Checklist.

The frequency and percentage distribution of participating clinicians towards institution factors on the use of the WHO Surgical Safety Checklist are presented under the following sub-headings

4.3.1 Standard operating procedures and availability of the checklist.

Majority 95% of the respondents reported having standard operating procedures and that the WHO Surgical Safety Checklist was available for use in the theatres (see figure 7). This indicates that the management of the theatre had ensured that the processes and services are documented for uniformity.

Similar conclusions were drawn by Fukushima (2018) who said staff needs to ensure that important documents are available for use in their operation areas (Fukushima & Kaibori, 2018).

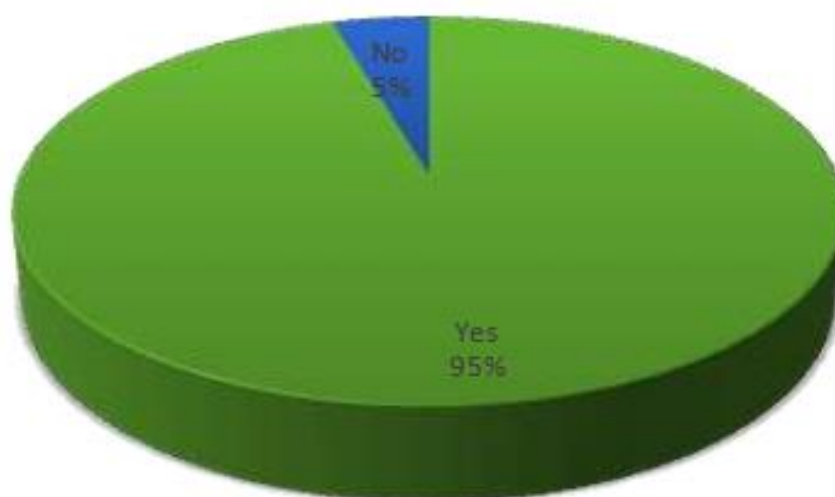


Figure 7: Standard Operating Procedure and availability of the checklist

4.3.2 Mandatory to use of the checklist in operating theatres

Majority of the clinicians 99% who participated in the study confirmed that the WHO Surgical Safety Checklist was mandatory to use in the theatres

| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) |
|---------------------|---------------------|-----------|------------------------------|-----------------------------|
| Pearson Chi-Square | 13.515 ^a | 6 | .036 | .034 |
| Likelihood Ratio | 14.243 | 3 | .027 | .035 |
| Fisher's Exact Test | 13.494 | | | .031 |
| N of Valid Cases | 178 | | | |

Source (Field Data 2021)

The study revealed a statistically significant relationship between the utilization of the checklist in operating theaters. This was supported by a chi-square value of 3.515, which was lower than the critical chi-square value of 7.962 at a 95% confidence level. According to Simonato et al. (2018) the research indicated that have incorporated the use of the Surgical Safety Checklist into their national surgical guidelines or regulations. Some countries have made it mandatory for healthcare facilities to implement the checklist as a part of their surgical safety protocols. In other cases, institutions or hospitals may have their own policies that require the use of the checklist. Buerhaus (2007) similarly emphasized the importance of staff adhering to the mandated standards, regulations, and professional guidelines (Buerhaus et al., 2007). The null hypothesis was rejected, providing evidence in favor of the alternative hypothesis, which suggests a statistical association between institutional factors, such as the mandatory implementation of the checklist in operating theaters, and the utilization of the checklist.

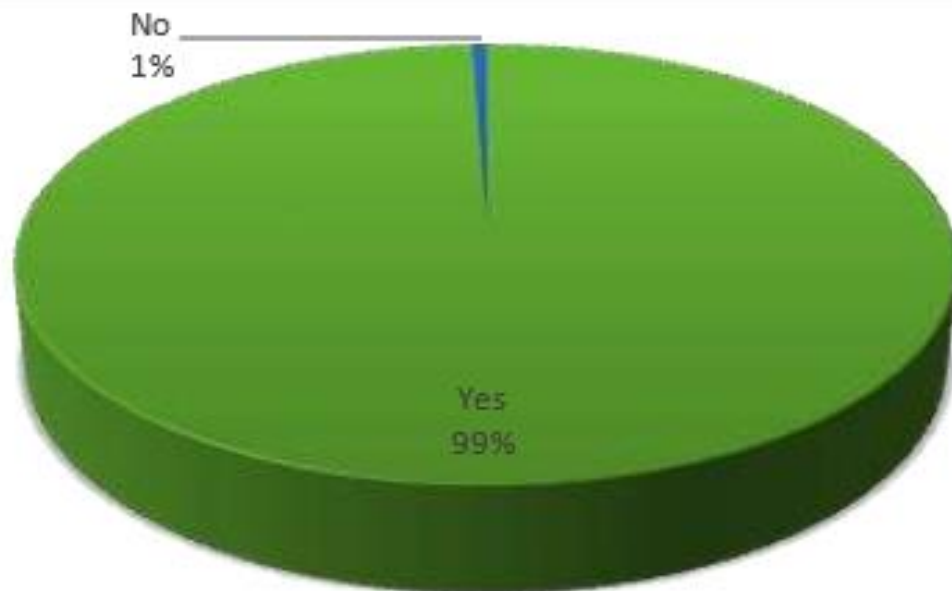


Figure 8: Mandatory use of the Checklist

4.3.3 Sensitization on use of the checklist in operating theatres

Figure 9 illustrates that the awareness regarding the utilization of the WHO Surgical Safety Checklist stood at 70%.

Table 7: Sensitization on use of the checklist in operating theatres

| Chi-Square Tests | | | | |
|-------------------------|--------------|-----------|------------------------------|-----------------------------|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) |
| Pearson Chi-Square | 5.313a | 6 | .018 | .017 |
| Likelihood Ratio | 15.316 | 6 | .018 | .024 |
| Fisher's Exact Test | 14.286 | | | .023 |
| N of Valid Cases | 178 | | | |

Source (Field Data 2021)

Pearson's chi-square test was employed in the study to examine the statistical correlation between the level of sensitization concerning the use of the WHO Surgical Safety Checklist in operating theaters. The findings indicated a significant correlation, with the calculated chi-square value of 5.313 being lower than the critical chi-square value of 8.798 obtained from the chi-square table. This indicates that evaluated the impact of sensitization efforts on checklist compliance and patient outcomes. These studies often highlight the importance of education, training, and ongoing sensitization initiatives to promote checklist adoption.

This supported the alternative hypothesis, indicating a statistical association between factors related to the institution and the utilization of the checklist.

This also implies that the management is committed to ensure their staffs are informed on the safety measures in place. On the other hand, it explains why some observed practices were not done or partially done in the operating theatres.

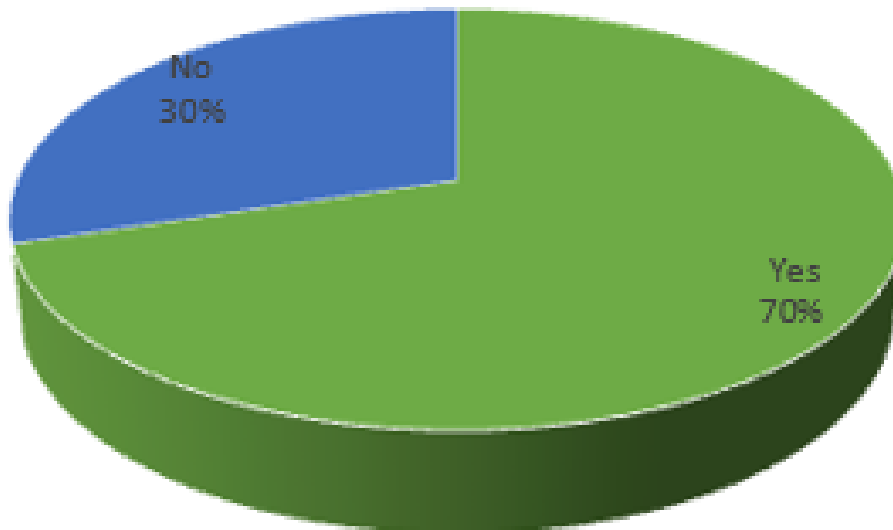


Figure 9: Sensitization on use of the Checklist

4.3.4 Statistical association between use of checklist in operating rooms and clinicians' and institutional related factors

To explore potential associations between the implementation of the WHO Surgical Safety Checklist in operating rooms and factors pertaining to clinicians and institutions, a statistical analysis utilizing Pearson's Chi-square or Fisher's exact test was conducted.. The test results were presented in Table 8. Some practices against the variables were found not significant

There were 11 variables tallied horizontally and 14 practices as stipulated in the WHO SCC tallied vertically. After running the test the results of the p=values which were below 0.05 were found to have significance and those above 0.05 were insignificant.

The obtained p-value from the Chi-square/Fisher's exact test provided compelling evidence in favor of the alternative hypothesis, confirming a statistically significant correlation between clinicians, institutional factors, and the adoption of the checklist. The study participants' practices in the operating theatres showed significant associations with certain clinicians and institutional related factors, while other

associations were found to be insignificant, as indicated in Table 8.

Table 8: Pearson Chi-square/Fisher's exact test on association between use of checklist in operating rooms and clinicians' and institutional related factors

| | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 | V9 | V10 | V11 |
|-----|-------------|-------------|-------|-------------|------|-------------|-------|-------------|-------|-------------|-------|
| P1 | .122 | .155 | .391 | .088 | .931 | .240 | .404 | .003 | .427 | .473 | .353 |
| P2 | .035 | .103 | .235 | .016 | .372 | .012 | .583 | .452 | .067 | 1.000 | .452 |
| P3 | .019 | .031 | .297 | .136 | .708 | 1.000 | .445 | .604 | 1.000 | .221 | .902 |
| P4 | .990 | .023 | .522 | .042 | .373 | .522 | .597 | .575 | 1.000 | .107 | .521 |
| P5 | .339 | .040 | .489 | .015 | .432 | .273 | 1.000 | .089 | .270 | .349 | .688 |
| P6 | .331 | .034 | .294 | .002 | .549 | .294 | .558 | .528 | 1.000 | .157 | .815 |
| P7 | .017 | .058 | .266 | .285 | .600 | .266 | .881 | .799 | 1.000 | .350 | .586 |
| P8 | .803 | .974 | 1.000 | .031 | .399 | 1.000 | .763 | 1.000 | 1.000 | .296 | .584 |
| P9 | .000 | .001 | .797 | .004 | .234 | 1.000 | .522 | .133 | .264 | .015 | 1.000 |
| P10 | .113 | .060 | 1.000 | .172 | .239 | 1.000 | .818 | .577 | 1.000 | .069 | .687 |
| P11 | .005 | .001 | .643 | .003 | .938 | 1.000 | .114 | .257 | .382 | .547 | .743 |
| P12 | .174 | .219 | 1.000 | .011 | .831 | .439 | .791 | .034 | .174 | .405 | .083 |
| P13 | .200 | .021 | 1.000 | .013 | .149 | .291 | .500 | .035 | .472 | .032 | 1.000 |
| P14 | .869 | .090 | .268 | .053 | .836 | .018 | .385 | .307 | .264 | .037 | 1.000 |

KEY

| | |
|---|--|
| V1 Length of time worked as a clinician | P1 Patient identity and procedure confirmed |
| V2 Length of time worked in the operating theatre | P2 Patient informed consent confirmed? |
| V3 Awareness about the WHO surgical safety checklist | P3 Confirmation for the operation site marking |
| V4 Level of Education | P4 Confirmations of the patient's record for known allergy |
| V5 Training on use of the checklist | P5 Confirmation for the patient's possible difficult airway or aspiration risk |
| V6 Use of the checklist in operation | P6 Confirmation of equipment/instrument availability |
| V7 Standard operating procedure on use of the checklist | P7 All team members introduced themselves by name & role? |
| V8 Mandatory use of the checklist | P8 Scrub nurse confirms sterility (including indicator results) |
| V9 Availability of the checklist | P9 Scrub nurse raises equipment issues or concerns |
| V10 Sensitization on use of the checklist | P10 Essential imaging displayed |
| V11 Utilization level of the checklist | P11 Anaesthesiologist gives nod for the surgeon to continue |
| | P12 Scrub nurse confirms completion of instrument, sponge and needle counts |
| | P13 Circulating nurse confirms specimen labelling (read specimen labels aloud, including patient name) |
| | P14 Scrub nurse confirms status of surgical equipment's |

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

In this chapter, a brief summary of the study's results, conclusions, and recommendations is provided. The first section provides an overview of the extent of utilization of the WHO Surgical Safety Checklist. The second section summarizes the clinician-related factors, including the attitude of clinicians towards the use of the checklist, as well as the observed clinical practices in the operating rooms. The third section comprises summaries on institutional factors influencing use of the WHO Surgical Safety Checklist. The fourth section is a discussion on association between observed clinical practices and clinicians' and institutional related factors. Conclusions and recommendations comprise last section.

5.1 Summary

5.1.1 Utilization level of the WHO Surgical Safety Checklist

The findings of the study indicated that the utilization rate of the WHO Surgical Safety Checklist among the respondents in the operating theaters was notably high, reaching 95%. This finding strongly supports the recommendation for its widespread implementation, which could be attributed to factors such as adequate training received by 62% of clinicians and awareness campaigns reaching 70% of participants. Notably, the presence of robust institutional factors, including regular sensitization sessions, mandatory checklist usage during surgical procedures, and clear guidelines, contributed to the checklist's effective adoption and adherence.

5.1.2 Clinician related factors of the respondents

Most of the respondents, specifically 52%, possessed a clinical experience exceeding a decade. Additionally, 46% of the respondents had long general and theatre experience

of over 10 years. Moreover, the study found varying level of education ranging from masters and above to diploma and below. Out of that 42 % of the respondents had a diploma and below as educational qualification and 44% had a master's degree and above. Hence, more clinical and theatre experience together with more educational qualification increased the chances of observing the clinical practices envisaged in the WHO Surgical Safety Checklist.

5.1.3 Attitude of respondents on use of the WHO Surgical Safety Checklist

From the results of the questionnaire on clinicians' attitude, generally the clinicians had a positive attitude as the majority strongly agreed with the statements. Use of the WHO Surgical Safety Checklist in the operating rooms was given great importance and ranked highest among other safety measures with the mean and standard deviation (SD) values of 3.93 ± 0.319 . The findings from the questionnaire responses align with the fact that 95% of clinicians in the operating rooms reported using the WHO Surgical Safety Checklist.

5.1.4 Observed clinical practices in the operating rooms

The observation questionnaire focusing on the utilization of the WHO Surgical Safety Checklist in the operating rooms emphasized the significance of the scrub nurse's role in confirming sterility, with a high percentage of 83.7%. Additionally, the completion count of surgical instruments, sponges, and needles was confirmed by the scrub nurse at a rate of 82.5%. The clinical practice reduces possibility of surgical site infection and ensures that the patient's body cavities are free of foreign bodies. However, labelling of specimens was low at 17.4% attributed to not all patients require specimen, anesthesiologist busy with reversing the patient from anaesthesia and possible fatigue of team members following long surgical procedure.

5.1.5 Institutional factors influencing use of the WHO Surgical Safety Checklist

The studied institution had put in place almost all that is required to ensure successful use of the WHO SSC. This was supported by 95% of the participants who indicated that there was an established standard operating procedure for the utilization of the checklist, and it was readily accessible for implementation. It was also mandatory to use the checklist at 99%. Thus, strong institutional factors at Kenyatta National Hospital maybe a source of good surgical safety practices.

5.1.6 Association between use of checklist in operating rooms and clinicians' and institutional related factors

The study observed significant association between the observed practices in the operating rooms with the clinicians 'and institutional related factors. In addition, good surgical safety practices and possible surgical outcomes maybe due to strong institutional factors embedded at Kenyatta National Hospital.

5.2 Conclusion

The studied institution had 95% utilization level of the World Health Organization Surgical Safety Checklist from the questioner responses which is high compared to other studies. This could have been boosted by training, sensitization and the strong institution factors by Kenyatta National Hospital.

On the contrary, observation of the clinical practices revealed lower usage levels with varying percentages ranging from 83.7% to 17.4% despite the clinicians acknowledging that the practices are important for safety. The low practice of patient identification practice (53.7%) remains a worrying trend most of it attributed to trust as the nature of clinicians who were teaching, attending to other emergencies, calls to say he/she has arrived so the other team members to start or technical appearance of the clinician. The

extreme low adherence level which is specimen labelling was attributed to the fact that it was not applicable to some operations, the anesthesiologist was busy reversing the patient from anaesthesia, the process was being done at tail end where there was fatigue especially in long operations, the surgeons multitasking activities among others. However, the clinical practice of confirming specimen labelling not being done implies that the patient may get wrong or no treatment.

Furthermore, there was a prevailing favorable disposition towards the utilization of the checklist. However, some gaps exist in the utilization and practice. The percentage of the gaps noted may be very low but the impact is very high with grave implications. For example, the practice of site marking if not observed can lead to removal of both parts of the organs or limbs with or without disease leading to the patient not having either organs or limbs.

The 30% of the respondents who reported of not having sensitized on the use of WHO Surgical Safety Checklist in this study maybe as a result of failure of themselves to avail during sensitization sessions organized by the theatre department

The study observed significant association between the observed practices in the operating rooms with the clinicians 'and institutional related factors whose p value were less than 0.05. This rejected the null hypothesis of non-relationship between clinicians 'and institutional related factors and the observed clinical practices in the operating rooms.

5.3 Recommendations

- i. The management of theatres should target 99% utilization by using the WHO Surgical Safety Checklist as a performance contract indicator of leadership.
- ii. The WHO Surgical Safety Checklist to be used as a measure of clinical indicator of quality in the operating theatres.
- iii. New members of staff to be encouraged to use WHO Surgical Safety Checklist so that the high utilization level is sustained through continuous participation in training and sensitization.
- iv. Consider modifying the checklist to give options like not applicable practices like displaying of the image, specimen labeling among others.
- v. Continuous internal review of the surgical practices in the institution to be done to create more awareness and room for improvement.
- vi. Clinicians should be encouraged to report and record incidents as it will help in continuous improvement of the safety practices
- vii. Qualitative study should be done to find out why the checklist is not utilized 100% since the impact on slight mistakes is very high.
- viii. Further observational studies to be done to monitor the observed practices not done or partially done in the operating room and the clinicians and institutional related factors whose p-values were below 0.05.

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APPENDICES

Appendix I: Consent Form

Title of study: Determinants of the WHO surgical safety checklist use among clinicians at Kenyatta National Hospital, Nairobi, Kenya.

Researcher: Pascalia Mary Ojakaa Mobile: 0721387408

Mount Kenya University, Collage of health sciences, School of Nursing

Procedure

What to expect during the Interview?

I will ask you simple questions on the use of the WHO surgical safety checklist at KNH. I will also later observe the practice on how you use the WHO SSC and the observation will be covert.

Confidentiality of the records

Efforts will be made to ensure that the information provided is kept confidentially Your identity will be kept confidential and will only be associated with a unique code. No personal information will be disclosed without obtaining your written consent from the interview. You won't be identified personally in any publication. Absolute confidentiality cannot however be guaranteed. Your records, research student, KNH HOD research and programs may be reviewed

Voluntariness

Being in the study is your choice

This informed consent document provides comprehensive information about the research study, including the potential advantages and disadvantages, as well as the

procedure that will be described to you. After comprehending the study details and providing your consent to participate, you will be requested to sign or place a mark on this document. It is important to acknowledge that your participation in this research is completely voluntary, and you have the freedom to withdraw from the study at any point

.Discomforts

You will not experience any discomfort as a result of participating in this study. You may be asked to attend an interview, which will take place at a location where you feel most at ease, and the duration of the interview will not exceed 20 minutes.

Benefits

The study participant will not receive any immediate personal advantages or benefits from their participation. Nonetheless, the outcomes of this study will hold significant value for the institution in its efforts to enhance surgical safety and achieve favorable surgical results.

Compensation

There is no monetary gain to the study participants

Right of withdrawal

At any point during this study, you have the liberty to voluntarily withdraw your participation without facing any adverse consequences or penalties.

Confidentiality

Your identity will remain anonymous in the questionnaire. Any information you share will be kept confidential and will remain strictly between you and the researcher. Your name will never be disclosed, and your opinions will not be shared with anyone else.

Risks

Your involvement in this study does not entail any anticipated hazards. However, if you come across any questions that make you feel uneasy, you have the option to abstain from answering them.

Voluntary participation

Participation in this research is completely optional. You have the freedom to decline or discontinue your involvement in the study at any point.



Consent confirmation form

I have carefully reviewed the provided details and had the chance to inquire about the study. All my queries have been adequately addressed and answered. Based on this, I willingly consent to participate in this research and acknowledge my right to withdraw from the study at any moment if I wish to do so.

Participant's signature **Date.....**

Researcher's statement

I, as the person conducting this research, have provided a comprehensive explanation of the pertinent information regarding this study to the individual mentioned above. I am confident that the participant has comprehended the details entirely and has willingly granted their consent without any coercion.

Researcher's name..... Signature..... Date.....

Role in the study.....

Contact person;

For any questions or concerns about the content of this study.

| Name and role | Institution | Contact |
|--|--|---|
| Secretariat KNH-UoN ERC | Kenyatta National Hospital and University of Nairobi | Email: uonknh_erc@uonbi.ac.ke |
| Secretariat Ethics Review Committee | Mount Kenya university Research and Ethics | Email: research@mku.ac.ke |
| Pascalina Mary Ojaka (Primary investigator) | Mount Kenya University School of Nursing | Mobile: 0721387408 Email ojakaamary@gmail.com |
| Dr Nilufa Jivraj (Supervisor) | Mount Kenya University School of Nursing | Mobile: 0704088093 Email: nilufar.jivraj@gmail.com |
| Mr George Njoroge (Supervisor) | Mount Kenya University School of Nursing | Mobile: 0722345142 Email: gnjoroge@mku.ac.ke |

Appendix II: questionnaire for clinicians

Research survey for examining the factors influencing the utilization of the WHO Surgical Safety Checklist among clinicians at Kenyatta National Hospital in Nairobi, Kenya.

Instructions: Please carefully review and sign the enclosed consent form prior to completing this questionnaire. Kindly refrain from including your name on the questionnaire itself.

Complete all sections of the questionnaire, ranging from A to F..

Circle the most suitable response for sections A to E.

In section F, mark the option that best represents your sentiments regarding clinicians' attitude and hospital policy concerning the surgical safety checklist.

Section A: Utilization level of the WHO Surgical Safety Checklist

Did you use the WHO Surgical Safety Checklist in the procedure you participated in today?

Yes (b) No

Section B: Clinicians' experience

1. How long have you worked as a clinician?

0 to 2 years (b) 2 to 5 years (c) 5 to 10 years (d) 10 and above years How

2. How long have you worked in the theatres?

(a) 0 to 1 year (b) 1 to 2 years (c) 2 to 5 years (d) 10 and above years

Section C: Clinicians' education

What is the level of your training?

Master's and above (b) Bachelor's (c) Diploma and above

Section D: Awareness, Training and Use of the WHO Surgical Safety Checklist

Are you aware about the WHO Surgical Safety Checklist?

Yes (b) No

Have you had any training on the WHO Surgical Safety Checklist?

(a) Yes (b) No

Do you use the WHO Surgical Safety Checklist during the operation of patients?

(a) Yes (b) No

Section E: Institutional factors

Do you have Standard operating procedures on the use of the WHO Surgical Safety Checklist?

(a) Yes (b) No

Is it mandatory to use the WHO Surgical Safety Checklist in the theatres?

(a) Yes (b) No

Is the WHO Surgical Safety Checklist available for use?

(a) Yes (b) No

Does the institution offer sensitization on the use of the WHO Surgical Safety Checklist? (a)Yes (b) No

Section F: Clinicians' attitude and perception towards use of the WHO Surgical Safety Checklist

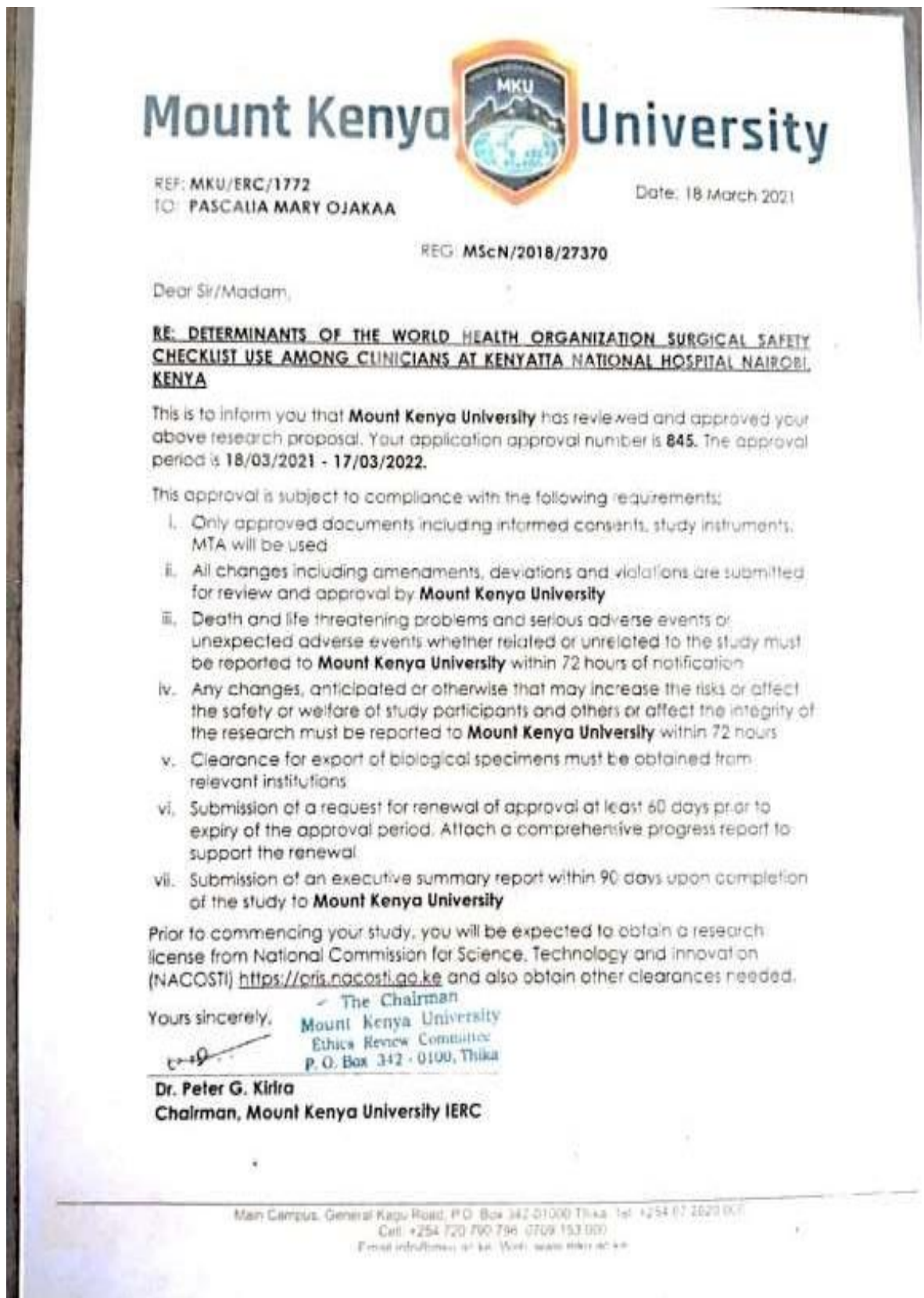
Please indicate your rating by ticking your best choice

| No | | Strongly agree | Agree | Disagree | Strongly disagree |
|----|--|----------------|-------|----------|-------------------|
| 1 | The WHO Surgical Safety Checklist should be used in the OR during surgery. | | | | |
| 2 | All Clinicians in theatre should be trained on the use of the WHO Surgical Safety Checklist. | | | | |
| 3 | I feel confident on my ability to use the WHO Surgical Safety Checklist. | | | | |
| 4 | I understand the components of the WHO Surgical Safety Checklist. | | | | |
| 5 | I have adequate time to participate in the use of the WHO Surgical Safety Checklist. | | | | |
| 6 | I find the use of the WHO Surgical Safety Checklist relevant | | | | |
| 7 | I am encouraged by my leaders and co-workers to report any incidents I may observe | | | | |
| 8 | A confidential reporting system that documents medical errors is important for safety | | | | |

Appendix III: observation on use of the who surgical safety checklist in operating rooms

| EXPECTED CLINICIANS' PRACTICES IN THE OR ACCORDING TO THE WHO SSC | Not Done | Partially done | Done |
|--|----------|----------------|------|
| SIGN IN | | | |
| Patient identity and procedure confirmed? | | | |
| Patient informed consent confirmed? | | | |
| Confirmation for the operation site marking | | | |
| Confirmations of the patient's record for known allergy | | | |
| Confirmation for the patient's possible difficult airway or aspiration risk | | | |
| Confirmation of equipment/instrument availability | | | |
| TIME OUT | | | |
| All team members introduced themselves by name & role? | | | |
| Scrub nurse confirms sterility (including indicator results) | | | |
| Scrub nurse raises equipment issues or concerns | | | |
| Essential imaging displayed | | | |
| Anaesthesiologist gives nod for the surgeon to continue | | | |
| SIGN OUT | | | |
| Scrub nurse confirms completion of instrument, sponge and needle counts | | | |
| The circulating nurse verifies the labeling of specimens by audibly reading the specimen labels, including the patient's name. | | | |
| Scrub nurse confirms status of surgical equipment's | | | |

Appendix IV: Mount Kenya Ethics and Research Committee



Appendix V: introduction letter from postgraduate school, Mount Kenya University



DIRECTORATE OF GRADUATE STUDIES

MScN/2018/27370

29th March, 2021

*The Director, Research Coordination Division
National Commission for Science, Technology & Innovation
Utalii House, 8th & 9th Floor
P.O Box 30623- 00100
NAIROBI*

Dear Sir/Madam,

RE: PASCALIA MARY OJAKAA – REGISTRATION NO. MScN/2018/27370


The purpose of this letter is to introduce the above named student who is pursuing Master of Science in Nursing in the Department of Nursing Education, Leadership Management & Research in the School of Nursing.

The title of her research is *“Determinants of the Worlds Health Organization Surgical Safety Checklist use among Clinicians at Kenyatta National Hospital Nairobi, Kenya.”*

She has been cleared by the University’s Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data for her research between April and June, 2021.

Any assistance accorded to her will be highly appreciated.

Thank you.


Dr. Samuel M. Karenga, Ph.D
Director, Graduate Studies
Enc.

Mount Kenya University
P.O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Appendix ix: NACOSTI research license

| | |
|--|---|
|  REPUBLIC OF KENYA |  NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION |
| Ref No: 463808 | Date of Issue: 06/April/2021 |
| RESEARCH LICENSE | |
|  | |
| <p>This is to Certify that Ms. PASCALIA mary OJAKAA of Mount Kenya University, has been licensed to conduct research in Nairobi on the topic: DETERMINANTS OF THE WORLD HEALTH ORGANIZATION SURGICAL SAFETY CHECKLIST USE AMONG CLINICIANS AT KENYATTA NATIONAL HOSPITAL NAIROBI, KENYA for the period ending 06/April/2022.</p> | |
| License No: NACOSTI/P/21/9838 | |
| 463808 Applicant Identification Number |  Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION |
| | Verification QR Code  |
| <p>NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</p> | |

Appendix x: Nairobi county commission approval


REPUBLIC OF KENYA


NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

REF No: 463808 Date of Issue: 06 April 2021

RESEARCH LICENSE



This is to Certify that Ms. PASCALIA mary OJAKAA of Mount Kenya University, has been licensed to conduct research in Nairobi on the topic: DETERMINANTS OF THE WORLD HEALTH ORGANIZATION SURGICAL SAFETY CHECKLIST USE AMONG CLINICIANS AT KENYATTA NATIONAL HOSPITAL, NAIROBI, KENYA for the period ending : 06/April/2022.

LICENSING UNIT / NAK/REGISTRATION/70/20

463808
Applicant Identification Number




Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY &
INNOVATION



Verification QR Code



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Appendix VI: Nairobi county education office approval



Republic of Kenya

MINISTRY OF EDUCATION

STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION

Telegrams: "SCHOOLING", Nairobi
Telephone: Nairobi 020 2453699
Email: rcenairobi@gmail.com
cdenairobi@gmail.com

REGIONAL DIRECTOR OF EDUCATION
NAIROBI REGION
NYAYO HOUSE
P.O. Box 74629 -- 00200
NAIROBI

When replying please quote

Ref: RDE/NRB/RESEARCH/1/65 Vol.1

DATE: 7th April, 2021

Ms. Pascal Mary Ojaka
Mount Kenya University
NAIROBI.

RE: RESEARCH AUTHORIZATION

We are in receipt of a letter from the National Commission for Science, Technology and Innovation regarding research authorization in Nairobi County on the topic: *"determinants of the World Health Organization Surgical Safety Checklist use among Clinicians at Kenyatta Hospital Nairobi Kenya"* This office has no objection and authority is hereby granted for a period, ending 6th April, 2022 as indicated in the request letter.

Kindly inform the Sub County Director of Education of the County you intend to visit.

JAMES KIMOTHO
FOR REGIONAL DIRECTOR OF EDUCATION
NAIROBI.



Copy to: Director General/CEO
National Commission for Science, Technology and Innovation
NAIROBI.



Appendix VII: Nairobi county governor approval

004-07-04-2021

The County Governor

Nairobi County

Po Box 30075-00100

Nairobi

Dear sir/madam

REF RESEARCH STUDY AT KENYATTA NATIONAL HOSPITAL

I am a nursing student undertaking my master's degree in nursing medical surgical option. My student registration number MScN/2018/27370 at the Mount Kenya University, Thika. I wish to inform your office that I have been given a license by the national commission for science technology and innovation license number NACOSTI/P/21/9838 to carry out research that will enable complete my studies. As a requirement by regulations 2014, your office is supposed to be informed before commencement of the research. I therefore take this opportunity to inform your office of the same. I look forward for your kind considerations.

Attached please find copies of license from NACOSTI, Mount Kenya University ethic and research committee clearance and introduction letter from Mount Kenya University post graduate school.

Thank you

Yours faithfully

M. Ojaka 7/4/2021

Pascalina Mary Ojaka



Appendix VIII KNH-UoN Ethics and Research Committee



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355



KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: <http://www.erc.uonbi.ac.ke>
Facebook: <https://www.facebook.com/uonknh.erc>
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/212

18th June, 2021

Pascalina Mary Ojaka
Reg. No.MScN/2018/27370
School of Nursing
Mount Kenya University

Dear Pascalina,

RESEARCH PROPOSAL:DETERMINANTS OF THE WORLD HEALTH ORGANIZATION SURGICAL SAFETY CHECKLIST USE AMONG CLINICIANS AT KENYATTA NATIONAL HOSPITAL, NAIROBI, KENYA (P242 /04/2021)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 18th June 2021 – 17th June 2022.

This approval is subject to compliance with the following requirements:

- i. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- ii. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
- iii. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
- v. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (Attach a comprehensive progress report to support the renewal)
- vii. Submission of an executive summary report within 90 days upon completion of the study.

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KNH-UoN ERC PAGE 2

This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website <http://www.erc.uonbi.ac.ke>

Yours sincerely,



PROF. M. L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Senior Director, CS, KNH
The Chair, KNH- UoN ERC
Supervisors: Dr. Nilufer Jivraj, Mount Kenya University
Mr. George Njorogo, Mount Kenya University

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Appendix IX: KNH study registration certificate

KNH/R&P/FORM/01



KENYATTA NATIONAL HOSPITAL
P.O. Box 20723-00202 Nairobi

Tel.: 2726300/2726450/2726565
Research & Programs: Ext. 44705
Fax: 2725272
Email: knhresearch@gmail.com

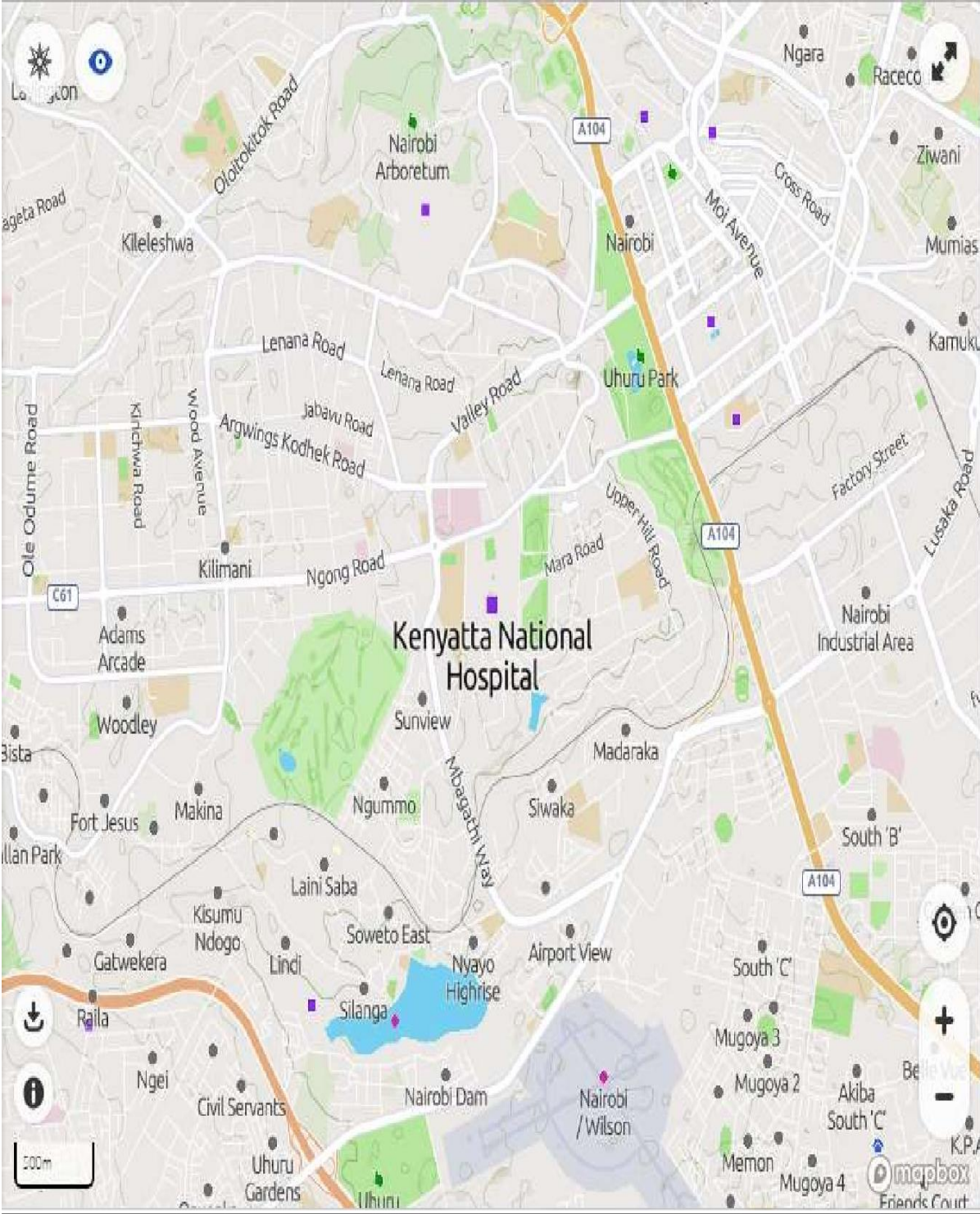
Study Registration Certificate

1. Name of the Principal Investigator/Researcher:
PASCALIA MARY OTAKAH
2. Email address: otakamary@gmail.com Tel No. 0721387402
3. Contact person (if different from PI): PIA
4. Email address: Tel No.
5. Study Title
Determinants of world health organization surgical safety check list use among clinicians at Kenyatta National Hospital Nairobi, Kenya.
6. Department where the study will be conducted Anaesthesia theatres
(Please attach copy of Abstract)
7. Endorsed by KNH Head of Department where study will be conducted.
Name: DR ANDREW KIBET Signature [Signature] Date 25/06/2021
8. KNH UoN Ethics Research Committee approved study number P242/04/2021
(Please attach copy of ERC approval)
9. I Pascalina Mary Otakah commit to submit a report of my study findings to the Department where the study will be conducted and to the Department of Medical Research.
Signature [Signature] Date 24/6/2021
10. Study Registration number (Dept/Number/Year) Anaesthesia 12/16/2021
(To be completed by Medical Research Department)
11. Research and Program Stamp

All studies conducted at Kenyatta National Hospital must be registered with the Department of Medical Research and investigators must commit to share results with the hospital.



Appendix X: map showing location of Kenyatta National Hospital from Nairobi CBD



DETERMINANTS OF THE
WORLD HEALTH
ORGANIZATION SURGICAL
SAFETY CHECKLIST USE AMONG
CLINICIANS AT KENYATTA
NATIONAL HOSPITAL NAIROBI,
KENYA

by Pascalia Mary Ojaka

Submission date: 08-Jun-2023 01:56PM (UTC+0300)

Submission ID: 2111693120

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