

**ADHERENCE PRACTICE TO THE WORLD HEALTH ORGANIZATION'S
SURGICAL SAFETY CHECKLIST IN OPERATING ROOMS IN KISII
COUNTY TEACHING AND REFERRAL HOSPITAL, KENYA**

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the Master of Science in Advanced Nursing Practice (Leadership, Policy and
Management) of Masinde Muliro University of Science and Technology**

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DECLARATION

This thesis is my original work prepared with no other than the indicated sources and support and has not been presented elsewhere for a degree or any other award.

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science Technology a research thesis entitled, **“Adherence Practice to the World Health Organization’s Surgical Safety Checklist in Operating Rooms in Kisii County Teaching and Referral Hospital, Kenya.”**

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May God richly bless you.

DEDICATION

This work is dedicated to all healthcare workers who strive to offer care in a safe environment.

ABSTRACT

World Health Organization (WHO) introduced the Surgical Safety Checklist (SSC) in 2008 to assure safety in operating rooms (ORs). Globally, adherence level varies with developing countries posting the lowest levels compared to their developed counterparts. The main objective of the study was to evaluate adherence practices to the WHO SSC in ORs in Kisii County Teaching & Referral Hospital (KTRH). The specific objectives were to assess the level of adherence and to determine staff and institutional related factors that influence adherence to the WHO SSC in ORs in KTRH. The study preferred a mixed method cross-sectional design. WHO SSC adherence level was assessed by conducting a retrospective review of 424 randomly selected surgical files. The OR staff were selected through a census method and 31 responded to the interviews to determine both staff and institutional factors that influenced adherence to the WHO SSC. Qualitative data was analysed using SPSS and both descriptive & inferential statistics were generated. Statistical significance was set at $p < 0.05$. Qualitative data was analysed using a thematic approach. The study findings indicated that the WHO SSC was available in 100% of the surgical files reviewed. Elective surgeries had better adherence level (78%) compared to emergency cases (22%). There was a varying adherence level as per the type of surgery done orthopaedic (4%), Paediatric (8%), gynaecology (16%), urology (32%) and adult general (40%). A decreasing trend in adherence level on each section of the WHO SSC was noted with the Sign-in posting 5.7%, Time-out (1.8%) and Sign-out posting 0.7%. The average adherence level was 2.7%. Key staff factors that influenced adherence to the WHO SSC included: experience in OR ($p=0.014$), attitude ($p=0.014$) and perception ($p=0.009$). Institutional factors were: lack of essential consumables and drugs (77.4%), lack of refresher trainings (54.5%), understaffing (48.4%) and lack of management support (45.2%). In conclusion, there was a low (2.7%) level of adherence to the WHO SSC in KTRH. The aforementioned staff and institutional influenced the adherence to WHO SSC. This study recommends to the management to institute a structured health system-based quality improvement intervention to improve adherence by addressing the staff and institutional factors to promote surgical safety in the facility.

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LIST OF ABBREVIATIONS AND ACRONYMS

IPSGS	International Patient Safety Goals
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
KII	Key Informant Interview
KNH	Kenya National Hospital
KTRH	Kisii Teaching and Referral Hospital
LREB	Lake Region Economic Bloc
MMUST	Masinde Muliro University of Science and Technology
NACOSTI	National Commission for Science, Technology & Innovation
OR	Operating Room
SPSS	Statistical Package of Social Sciences
SSC	Surgical Safety Checklist
SSI	Surgical Site Infections
UK	United Kingdom
WHA	World Health Assembly
WHO	World Health Organization

OPERATIONAL DEFINATION OF KEY TERMS

‘Adherence practice’ – This is the culture of adhering to a particular protocol in the care of patients. In this study the protocol of care is the WHO SSC. Adherence practice in this study was measured by evaluating the adherence level to the WHO SSC as documented in surgical files and determination of factors (staff and institutional) that influenced adherence.

‘Adherence level’- This was the commitment of the OR staff to use the WHO SSC in all surgical procedures. It was measured by reviewing surgical files for all cases conducted and using a data extraction form developed from the available WHO SSC in the facility. Each of the 19 items in the WHO SSC was scored as either done or not done. A done item was awarded one mark and the undone awarded a zero mark. The cumulative sum was expressed as a percentage. A score of more than 50% was regarded high adherence level and a percentage lower than 50% was regarded low adherence level.

‘Institutional factors’- These were independent factors relating to the organization that influenced adherence practices to WHO SSC. These factors included staffing and workload, supervision and leadership, patient safety policies and guidelines and patient safety programs and initiatives. This was established through OR staff structured interviews and KII with the facility OR managers.

‘Staff factors’ -These were independent factors relating to the OR staff that can determine adherencelevel to the WHO SSC. They comprised of demographic characteristics, knowledge on the WHO SSC, attitude towards WHO SSC and team work during surgical procedures. This was established through OR staff interviews and KII with the facility managers.

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter presents the background of the study, statement of the problem, main objective, specific objectives, research questions, justification, scope of the study, limitations of the study, and conceptual framework.

1.2 Background of the study

Patient safety refers to the evasion, prevention and betterment of adverse outcomes or injuries arising from the process of healthcare (Thibaut *et al.*, 2019). Globally, it is estimated that about 314 million surgeries are done annually and unfortunately about 1-4% die, 3-16% suffer operative morbidities and 5-15% get re-admitted within 30 days(Geoffrey, 2020). Therefore, patient safety is very crucial during surgical operations in Operating Rooms (OR) in the bid to prevent medical errors associated with surgical care (Pugel, Simianu, Flum, & Dellinger, 2015).

The World Health Assembly (WHA) held a meeting in the year 2002 in response to the rise in patient safety concerns. The assembly adopted universal protocols and later launched the WHO patient safety challenge in 2004 with the aim to promote ‘first do no harm’ in healthcare (Bansah, 2019; Sauls, 2019). Driven by the need to improve patient safety during surgery, World Health Organization (WHO) introduced the Surgical Safety Checklist (SSC) to be used in operating rooms (OR) in 2008(WHO, 2008).

The WHO SSC was part of the ‘Safe Surgery Saves Lives Campaign’ of 2007 with a 19-point checklist targeting three key moments of surgery. The WHO SSC was developed to highlight acceptable practices that enhance team work and communication in ORs. The SSC serves as a visual aid to the OR team to ensure that

no important safety issue is skipped before, while doing surgery or after the procedure (Epiu *et al.*, 2016; WHO, 2008).

The WHO SSC comprises of three (3) components/moments: ‘Sign in’, ‘Time out’ and ‘Sign out’ which are carried out when the patient reaches theatre, just before surgery and immediately after surgery respectively (WHO, 2008). The WHO estimated that with proper use of the WHO SSC in ORs, about 500,000 lives would be saved directly. Further, the WHO SSC promotes a team culture in OR thus improving communication and ensure consistency in maintaining patient safety during surgical procedures (Ramsay *et al.*, 2019; WHO, 2009).

The WHO SSC was widely adopted in various countries. Some countries adopted the original checklist as proposed by WHO and others customized it to fit specific needs of their country. Turkey for instance, expanded the WHO SSC and made its utility mandatory to all hospitals in the country in 2009 (Pugel *et al.*, 2015). On the other hand, China developed more other one checklist from the WHO SSC (Tan *et al.*, 2021). In Canada, the introduction of the WHO SSC saw a reduction of peri-operative surgeries by 22% in Ontario Hospitals (Ramsay *et al.*, 2019). Studies show variances in adherence to the WHO SSC, for instance the adherence level was 70.97% at Policlinico University Hospital, Bari, Italy while an adherence level of 79% in 138 hospitals in China (Ferorelli *et al.*, 2022; Tan *et al.*, 2021). Some of the factors influencing adherence to the WHO SSC revolve around knowledge gaps and lack of leadership support (Pugel *et al.*, 2015). An evaluation study done in the United Kingdom (UK) 12 months after introduction of the WHO SSC enumerated system-related barriers (29%) and team-related barriers(51%) hindering adherence to the WHO SSC (Russ *et al.*, 2015).

Mortalities related to surgery in Sub-Saharan Africa are as high as those seen in developed countries about 70 years ago (Epiu *et al.*, 2016). Peri-surgical mortality remains a vital indicator of quality healthcare however, it is poorly documented in developing countries (Sileshi *et al.*, 2018). A South African study conducted in tertiary hospitals on the utilization of the WHO SSC pointed out that there is a variance in completion of the WHO SSC whereby, some sections of the WHO SSC were not filled at all or were partially filled (Sauls, 2019). Low adherence level to WHO SSC in Zambia was associated with negative attitude, hierarchical structure of the surgical team, poor team work and erratic lack of resources (Munthali *et al.*, 2022).

In East Africa, the WHO SSC was introduced for utility in ORs along with other African countries in 2012. A follow up study that was carried out in the all the national hospitals in Uganda, Kenya, Tanzania, Rwanda and Burundi established that only 25% of cases utilized a WHO SSC including a pre-anaesthetic checklist, a practice attributed to the feeling that the SSC was long to fill or sometimes the SSC was unavailable in the hospitals (Epiu *et al.*, 2016). A retrospective review of surgical charts in both privately-owned and government-owned hospitals in Ethiopia indicated that about 59.8% of the surgeries done failed to use the WHO SSC (Sibhatu *et al.*, 2022).

Kenyatta National Hospital in Nairobi, Kenya, posted the highest compliance level (90%) to the WHO SSC in a follow up study after a training was done to key implementers of the initiative in 15 African national hospitals (Kariyo, Hightower, Bosco, & Tumusiime, 2013). Post-surgery mortality rate in 2020 was estimated to be about 0.8% within the first 24 hours, 1.1% within 48 hours and 1.7% within 7 days (Newton *et al.*, 2020). In a study done to examine compliance to the WHO SSC among the anaesthetists in Kenya pointed out that the practitioners largely agreed that the

SSC has been adopted in hospitals and the teams trained. However, adherence level was low (Muthoni, 2021).

Limited literature on the topic was appreciated regarding adherence to WHO SSC in county hospitals. Kisii County is one of the 47 counties in Kenya located in the South-Western region with a population of 1,266,860 people (National census, 2019). There are 72 health facilities within the county (KNBS, 2019). Additionally, neighbouring counties in the Kenya Lake Basin Economic block (KLBEB): Migori, Narok, Nyamira, and Homabay counties refer complex surgical cases to Kisii County Teaching and Referral Hospital (KTRH) making Kisii town a significant medical care destination posting high surgical cases among all county hospitals in the country as per NHIF report of 2022 (Deloitte, 2014). The introduction of WHO SSC in Kenya coincided with the implementation of the 2010 constitution that saw the health sector devolved to counties. A gap therefore exists on how the WHO SSC is used and adhered to in a county hospital. This study sought to evaluate adherence practice to WHO surgical safety Checklist in Operating Rooms in Kisii County Teaching and Referral Hospital.

1.3 Statement of the Problem

Globally, about 314 million surgical cases are performed every year (Geoffrey, 2020). Sadly, about 3 to 16% of these procedures suffer preventable harm. One million patients die each year and another 7 million patients suffer surgical related morbidities (Kariyo *et al.*, 2013). The WHO introduced a Surgical Safety Checklist that was cost effective and easy to use in the bid to reduce mortalities and morbidities associated with surgical care. Studies done by WHO and other studies done on the benefits of using the WHO SSC, showed positive impact on mortalities and morbidities associated with surgery (Kariyo *et al.*, 2013; White, Randall, *et al.*, 2018; WHO,

2008). Previous studies conducted on the topic show variances in adherence practices to WHO SSC with developed countries showing better adherence compared to the developing counterparts (Sibhatu *et al.*, 2022; Tan *et al.*, 2021).

The low and middle income countries post the highest mortalities and morbidities associated with surgery in the world (Epiu *et al.*, 2016). More than a decade since the WHO SSC was introduced in Kenya alongside other African Countries, studies show low adherence to it. Factors associated to the low adherence differ from country to country and from hospital to hospital. During the WHO pilot on the SSC in Kenyatta National Hospital(KNH) the facility had 90% adherence level (Kariyo *et al.*, 2013). Thereafter, the WHO SSC was rolled out in all public and private facilities. However, little is known on the adherence level in other health facilities in Kenya. Mortality associated to surgery in Kenya is estimated to be about 3.6% compared to USA rate that was 1.7% (Geoffrey, 2020; Newton *et al.*, 2020).

Mortality audit reports in Kisii County still point out lots of documentation gaps including poorly filled or blank WHO SSC in the audited medical records. Morbidity audits further point out post-surgical complications to be on the rise including surgical site infections and a worrying length of stay after surgery averaging 12.9 days in KTRH compared to the national recommended average of 4 days (Riogi & Odhiambo, 2013). Kisii county performs the highest number of surgeries in the region thus surgical safety is very critical. Since the introduction of the WHO SSC in Kenya in 2012, limited studies have been conducted at the county hospitals on adherence practices. This study therefore seeks to evaluate the adherence practices to the WHO SSC in Kisii County Teaching and Referral Hospital, Kenya.

1.4 Objectives of the study

1.4.1 Main objective

To evaluate adherence practice to WHO Surgical Safety Checklist in operation rooms in Kisii County Teaching and Referral Hospital, Kenya.

1.4.2 Specific Objectives

- i. To assess the level of adherence to the WHO Surgical Safety Checklist in operating rooms in Kisii County Teaching and referral Hospital.
- ii. To determine staff related factors that influence adherence practices to WHO Surgical Safety Checklist in operating rooms in Kisii County Teaching and referral Hospital.
- iii. To determine institutional related factors that influence adherence practices to WHO surgical Safety Checklist in operating rooms in Kisii County Teaching and referral Hospital.

1.5 Research Questions

- i. What is the level of adherence to WHO SSC in operating rooms in Kisii County Teaching and Referral Hospital?
- ii. What are staff related factors that influence adherence practices to WHO Surgical Safety Checklist in in operating rooms in Kisii County Teaching and referral Hospital?
- iii. Which institutional factors influence adherence to WHO SSC in operating rooms in Kisii County Teaching and referral Hospital?

1.6 Justification of the study

The WHO SSC introduction for utility in ORs saw 30-50% reduction in surgical-related mortalities in England (Russ *et al.*, 2015). Further, the WHO SSC enhances team work and improved communication in OR. These are essential practices that promote patient safety (Epiu *et al.*, 2016). Reviewed literature show positive uptake of the WHO SSC however adherence practices vary from one country to another and from one hospital to the other (Tan *et al.*, 2021). The present study shall provide the baseline information on the level of adherence to the WHO SSC at a County Referral Hospital after health sector was devolved in Kenya.

Previous studies have been done on the factors that either promote or discourage adherence to the WHO SSC in facilities. The factors vary from region to region however, knowledge on the use of the checklist, staff attitude and leadership support are some consistent factors (Munthali *et al.*, 2022; Ribeiro *et al.*, 2019; Russ *et al.*, 2015). The present study seeks to add the body of knowledge on the topic on the staff and institutional factors that influence adherence practices to the WHO SSC in the bid to offer a wholistic approach to patient safety interventions.

The present study findings will be crucial in designing improvement initiatives by proposing practical target areas during staff capacity building and training sessions. Also, the findings will benefit the hospital management by proposing areas of improvement in that will see the WHO SSC better adhered to. This will therefore see a realization of the benefits associated with the WHO SSC which includes a reduction in mortalities and morbidities associated with surgery.

1.7 Scope of the study

This study assessed the level of adherence to the WHO SSC by performing a retrospective review of the medical records. Also, the study determined the staff and institutional factors that influenced adherence to the WHO SSC by interviewing staff. The study was carried out in two months from (June to August 2022).

1.8 Conceptual Framework

The present study adopted the Donabedian Model that provides a framework to examine healthcare services and evaluating quality of health outcomes (Donabedian, 2005). The Donabedian model was first developed in 1966. The model stipulates that quality of healthcare can be drawn from three categories: Structure, Process and Outcomes. Using this model, structure comprises of administrative and related processes that support and direct provision of care. These include facilities, equipment, qualification of staff and their organization (checklists). Process on the other hand, surrounds the fact as to whether medicine is properly practiced. This entails clinical history, physical examination, diagnosis and justification of diagnosis and therapy (surgery). Lastly, outcomes are the quality indicators that include; recovery, restoration of function, survival and mortality (adherence). Additionally, a recent review in Norway on Impact of the World Health Organization Surgical Safety Checklist on Patient Safety elaborated the significance of the Donabedian framework (Culley, Haugen, Sevdalis, & Sjøfteland, 2019). The review demonstrated that adhering to the structures (checklists) improved care processes which in turn improve patient outcomes.



Figure 1.1: Donabedian Model, 1988

The format of the checklist in the current research included the environment in which surgical operations are performed. It also mentioned the personnel and institutional elements that make the procedures possible. The procedure in this research included operating room surgery. A patient's safety is ensured before, during, and after surgery with the help of the WHO Surgical Safety Checklist. The results of the current research focused on whether or not the WHO surgical safety checklist was followed, which may directly affect the health of the patient. In the current investigation, it was presupposed that a patient would have a successful surgical result if the WHO SSC were followed, and the opposite was also presupposed.

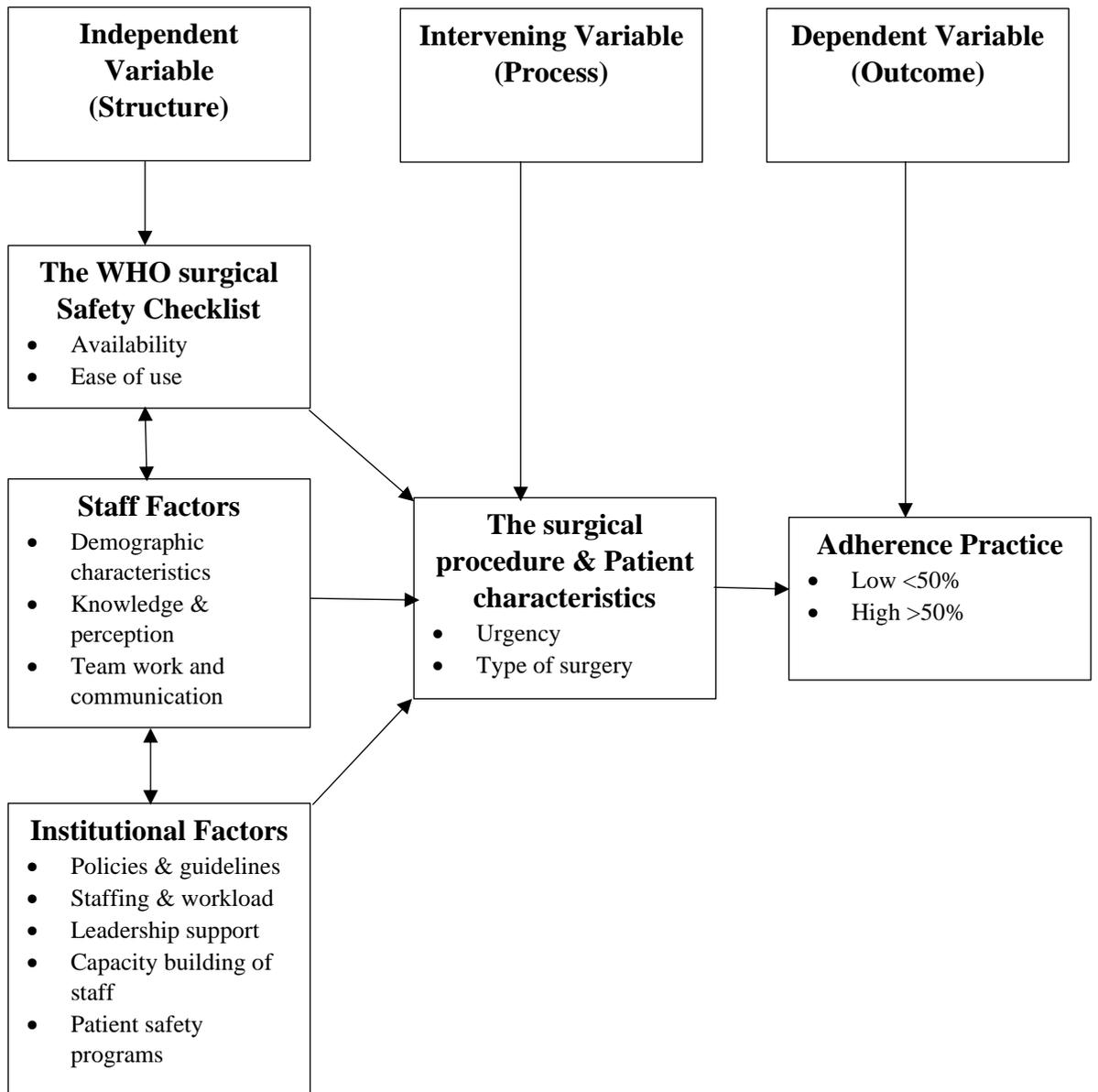


Figure 1.2: Conceptual Framework

Source: *Adopted and modified from the Donabedian Model* (Donabedian, 2005).

CHAPTER TWO

LITRATURE REVIEW

2.1 Overview

This chapter presents a review of literature on the operating room, the WHO surgical safety checklist, adherence levels to the checklist and factors (both staff and institutional) factors that influence adherence levels to the WHO SSC. The section also presents a summary of empirical gaps on WHO SSC related studies.

2.2 The Operating Room

Oxford learners' dictionary defines an operating room as a room in a hospital for surgical procedures. Surgical care involves correctio of defects, restoration of a body function, diagnosis and treatment of diseases (Walsh & Jemma, 2013). Surgical procedures pose both legal and safety concerns since the outcomes are not usually predicted and complications may arise thus requiring patients to consent (Hanson & Pitt, 2017).

The Operating Room (OR) is designed with the idea of controlling traffic patterns and providing a reachable supply during and after each surgical case. The layout also favours cleanliness by separating clean areas from contaminated areas. There are four distinct zones in theatre namely: unrestricted zone or clean area; semi restricted zone or sub sterile area; restricted zone or sterile area and disposal zone (Assem, Ouda, & Wahed, 2012; Kaye A.D, Urman R.D, 2019).

In Kenya, there are six levels of healthcare delivery system with the first 5 levels being managed by the devolved governments (counties) and the 6th level being national referral facilities managed by the national government. The lower levels do not have operating rooms however levels 4,5 and 6 do (MOH, Kenya).

The operating room is a sensitive health delivery unit. Therefore, patient safety is critical. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) came up with six international patient safety goals in 2004. The goals targeted to improve patient identification, improve effective communication, improve safety of high alert medication, assure safe surgery, reduce the risk of healthcare associated infections and reduce the risk of patient harm resulting from falls (JCAHO, 2007).

Threats to patient safety in an operating room can arise from microbial cross transmission which call for infection prevention and control measures like proper hand hygiene, use of appropriate disinfectant, sterilization of surgical equipment and donning of appropriate attire by the surgical teams(Assem *et al.*, 2012; Kaye A.D, Urman R.D, 2019; Ling, Ching, Widadiputra, Stewart, & Sirijindadirat, 2018; Munoz-Price *et al.*, 2019; Santacatalina Mas *et al.*, 2016).

Patient safety in OR is largely informed by Universal Protocols (UP) and the International Patient Safety Goals (IPSGs) (Stahel, 2014). Complications related to surgical care is an important casue of morbidity and mortality. Mortality rates related to major surgeries is as high as 3-17% in industrialized countries and approximately 100-1000 times higher in developing countries (Epiu *et al.*, 2016; Treadwell, Lucas, & Tsou, 2014). The WHO surgical safety checklist is one of the products of all these universal protocols and patient safety goals. The details of the SSC are discussed below.

2.3 The WHO Surgical Safety Checklist

The World Health Assembly (WHA) held a meeting in 2002 in response to a rising global concern on patient safety after which universal protocols to prevent wrong (site, procedure and person) errors were adopted. Subsequently, the launch of WHO Patient Safety Challenge in 2004 came along with the aim to promote ‘first do no harm’ in healthcare (Bansah, 2019; Sauls, 2019). Driven by the need to improve patient safety during surgery, World Health Organization (WHO) introduced the Surgical Safety Checklist (SSC) for utility in ORs in 2008(WHO, 2008).

The WHO SSC was part of the ‘Safe Surgery Saves Lives Campaign’ of 2007 with a 19-point checklist targeting three key moments of surgery. The WHO SSC was developed to highlight acceptable practices that enhance team work and communication in ORs. The SSC serves as a visual aid to the OR team to ensure that no important safety issue is skipped before, while doing surgery or after the procedure (Epiu *et al.*, 2016; WHO, 2008).

The WHO SSC comprises of three (3) components: ‘Sign in’, ‘Time out’ and ‘Sign out’ which are carried out when the patient reaches theatre, just before surgery and immediately after surgery respectively (WHO, 2008). The three components are discussed in details below:

2.3.1 First component of the WHO SSC- ‘Sign in’

The first moment of the WHO SSC contains seven items and requires at least a nurse and anaesthetist to be execute it. This moment happens immediately the patient is received in OR and before induction of anaesthesia. At this stage, the patient is correctly identified, the correct site of surgery is also identified and marked. Also, the team checks whether an informed consent was given by the patient or next-of-kin.

Anaesthetic machine and drug checks are also done. The pulse oximeter is connected to the patient and the functionality ascertained. The team also examines the patient to anticipate whether there will be airway difficulties including aspirations. Finally, the risk for blood loss is estimated (WHO, 2008).

2.3.2 Second component of the WHO SSC- 'Time out'

This phase of the checklist contains seven items that are checked after induction of anaesthesia and just before surgical incision is made. The surgeon, the anaesthetist and the nurse are required to fill the WHO SSC as a team. 'Time out' starts with an introduction of the surgical team taking part in the operation including their roles. The name of the patient, the procedure and where the incision is going to be made is clarified at this point. The team also confirms whether prophylactic antibiotics have been administered within the last 60 minutes. Also, anticipated events in regards to critical or non-routine steps are mentioned by the surgeon. The surgeon also states how long the procedure will take and re-affirms the anticipated blood loss. On the other hand, the anaesthetist will raise any concerns while the nursing teams confirms sterility and any issues relating with surgical equipment. Finally, the relevant images are displayed if applicable for the procedure(WHO, 2008). WHO SSC 'Time out' can be called by any member of the surgical team, usually the circulating nurse and the procedure can only proceed when the team agree on the details of the 'Time out' (Dillon, 2008).

2.3.3 Third component of the WHO SSC- 'Sign out'

The last component of the WHO SSC is the 'Sign Out'. This phase happens after the surgical procedure and before the patient leaves the OR. The nurse, anaesthetist and the surgeon participate at this phase. The name of the procedure is verbally confirmed; a correct instrument and sponge count; specimen labelling; and whether there are any

equipment problems to be addressed. This phase concludes by inquiring concerns for recovery and management of the patient as stated by the surgeon, anaesthetist and the nurse (WHO, 2008).

2.3.4 Benefits of using the WHO SSC in OR

The official launch of the WHO SSC was done in Washington DC, United States of America, on 25th June 2008. WHO conducted a pilot study in 8 countries (Canada, India, Jordan, New Zealand, Philippines, Tanzania, United Kingdom and USA) on the “safe surgery saves lives campaign”. Findings of the pilot showed that appropriate use of the SSC saw a reduction in surgery related complication by 36% and a reduction of re-admission rates by 47%. Additionally, the SSC saw a reduction in mortality rates from 1.5% to 0.8% (WHO, 2008).

Other studies also point out that the WHO SSC improves communication and enhance team work (Malik, 2018; Ramsay *et al.*, 2019). Studies done in Nepal and Ethiopia established strong association between better adherence to the WHO SSC and a reduction in surgical complications. (Bajracharya, Shrestha, Karki, & Shrestha, 2021; Sibhatu *et al.*, 2022). The use of the WHO SSC saw a reduced length of stay after surgery in Italy (Ferorelli *et al.*, 2022). A cohort study done in China to assess the impact of the surgical safety checklist on post-operative clinical outcomes on gastrointestinal tumour patients saw a reduction of morbidity from 16.8% to 14.55%. Further, the findings pointed out that there was a reduction in mortality from 0.48% to 0.18%. Risk for surgical infections also decreased with appropriate use of the WHO SSC (p=0.003) (Wang *et al.*, 2019).

2.4 Adherence to the WHO SSC in operating rooms

Attitudes and compliance to the WHO SSC was evaluated in 138 Chinese hospitals and findings indicated high adherence level of about 79.8%. Prospective observations in various sites showed better adherence when the process was initiated by a doctor compared to when the checklist filling was initiated by a nursing staff (Tan *et al.*, 2021). On the other hand, a mixed method observation study done in a university hospital in Basel, Switzerland, showed a similarly high level of adherence on the time out component of the WHO SSC at 96%. However, the study pointed out that sign out component had the least adherence level at 22%. An Italian study targeting OR staff conducted a training and measured the adherence level prior to training and after the intervention. The findings illustrated an improvement in full adherence from 20.43% to 43.75% (Ferorelli *et al.*, 2022). Similarly, after a training intervention in a UK hospital, adherence level improved from 40% in time out to 82.4% in sign out moment (Malik, 2018).

A descriptive cross-sectional study that reviewed post-surgical files in a hospital in Nepal assessed the compliance of the WHO SSC. The study findings established the adherence level to be at 38.6% full compliance and 35.6% non-compliant to the WHO SSC. The OR staff complied with the sign in moment at 55.4%, the time out moment at 47.9% and sign out moment at 56.9%. The study further established that elective type of surgeries had better adherence (49.7%) compared to emergency cases at 113.4% (Bajracharya *et al.*, 2021). The level of adherence to the WHO SSC in Pakistan was established to be 26.1% in the patient boards and 36.8% in the post-surgical files (Gul, Nazir, Abbas, Ashraf, & Shahzad, 2022). In Brazil, a study done in a tertiary hospital established compliance to the SSC to be 67.4% (Tostes & Galvão, 2019).

In Africa, the adherence level to the WHO SSC in Ethiopia was 58.9% in 172 public and private hospitals(Sibhatu *et al.*, 2022). A study done in Ghana found out that the adherence level to the WHO SSC was low at 30.4% (Bansah, 2019). A cross-sectional survey among anaesthetists in East African referral hospitals (Kenya, Tanzania, Burundi, Rwanda and Uganda) showed that averagely, 25% of the 85 interviewed anaesthetist agreed to regularly use the WHO SSC(Epiu *et al.*, 2016). In Madagascar, there was no hospital that was using the WHO SSC. After training was conducted, the adherence level to the SSC 4 months later was at 65% with another 13% partially filled(White, Baxter, *et al.*, 2018). Further, in southwestern Uganda the adherence level was established to 7% which improved to 92% after an education intervention(Ngonzi, Bebell, Boatin, Owaraganise, Tiibajuka, *et al.*, 2021).

In Kenya, 19% of the anaesthetists in Kenyatta National Hospital mentioned that they regularly adhered to the WHO SSC(Epiu *et al.*, 2016). In another study done in a Nairobi County tertiary hospital, 51.1% staff indicated that they had initiated the use of the WHO SSC in surgery before(Midigo, 2019).

2.5 Staff factors influencing adherence to WHO SSC in OR

A wide range of staff related factors directly or indirectly influence how the same staff adhere to safety measures like the WHO SSC. These factors are; staff knowledge towards WHO SSC, attitude toward the WHO SSC and the level of team work among other factors.

2.5.1 Staff Knowledge on WHO SSC

In a study done in Switzerland, one of the factors that was seen to enhance compliance to the WHO SSC was the support the expert OR staff give the junior staff in regard to the use of the SSC (Schwendimann *et al.*, 2019). An interventional study in the UK

where the OR staff were trained and adherence tested afterwards showed remarkable improvement in adherence practices(Malik, 2018). This finding was also consistent with a similar study done in Italy that showed improved adherence after the OR staff were trained(Ferorelli *et al.*, 2022). A study conducted in Turkey found out that about 80.4% of the OR staff were knowledgeable about the WHO SSC(Kisacik & Cigerci, 2019).

A study done in Pakistan observed that lack of awareness and training was a major factor that directly influenced adherence to the WHO SSC(Gul *et al.*, 2022). Sharma et al (2020) in their study in North India found out that majority of OR staff (92.3%) were aware of the WHO SSC however, only 54.7% were knowledgeable about the items in the WHO SSC. These findings were consistent with a Mexican study that established that only 46.3% of the staff were knowledgeable about the SSC(Sanchez, Alvarez, Lopez, Jara, & Cohen, 2018).

In Africa, a study done in Cape Town, South Africa established that the OR staff knowledge and skills are crucial to adherence practices to the WHO SSC (Sauls, 2019). Similarly, a study conducted in a teaching hospital in Ghana showed that majority of the respondents knew about the WHO SSC, nonetheless, adherence to the checklist was pointed to be below expectation (Bansah, 2019). Training on the use of the WHO SSC was done in hospitals in Madagascar and a review thereafter of the OR staff was very positive(White, Baxter, *et al.*, 2018). In a Zambian study to identify barriers and enablers to utilization of the WHO SSC, the study pointed out that inconsistent trainings to improve the OR staff knowledge and skills was of the barriers to better adherence to the SSC (Munthali *et al.*, 2022).

A study conducted at Muhimbili National Hospital in Dar-es-Salaam, Tanzania and Dartmouth Hitchcock Medical Centre, United States established that 67.3% and 73.4% of the OR staff interviewed were aware about the WHO SSC in Tanzania and Dartmouth Hitchcock medical centre respectively (Ngaiza, Mchembe, Ridgway, & Freeman, 2016). Epiu et al (2016) in their study in East Africa established that anaesthetists were generally knowledgeable however, adherence was low. Contrary to this finding, a study done in Kenya targeting anaesthetists showed a strong association between knowledge on the WHO SSC and its adherence (Muthoni, 2021).

2.5.2 Attitude towards use of WHO SSC

Positive staff attitude toward success of any initiative is key. OR staff positive attitude towards the use of the WHO SSC checklist directly influences checklist adherence (Sharma *et al.*, 2020). A study conducted in eight tertiary general hospitals in Tehran, Iran, saw 145 OR staff (surgeons, anaesthetists and nurses) interviewed. The findings established that 90% of them had a positive attitude towards the WHO SSC. The adherence level to the WHO SSC was considered high in Iran (Tan *et al.*, 2021). In support to this, study findings in a North Indian survey showed a 60% positive attitude rating among OR staff. This promoted the use of the WHO SSC in all surgical procedures (Sharma *et al.*, 2020). Russ et al (2015) differed in their findings in a study done in 10 England facilities that saw 29% of OR staff not believing that the WHO SSC added safety benefits to patients (Russ *et al.*, 2015).

Some studies sought to compare attitude toward the WHO SSC in OR staff cadres with mixed findings. Surgeons had positive attitude towards the use of the checklist compared to other OR staff (Sokhanvar M, Kakemam E, Goodarzi N, 2018). The findings of a Brazilian and Turkey studies rated nurses higher in terms of attitude toward the WHO SSC compared to other cadres. However, the studies observed that

despite positive attitude, adherence level still remains lower than expected (Kisacik & Cigerci, 2019; Santana, Rodrigues, & Do Socorro Nantua Evangelista, 2016). Similarly, a South African hospital study investigated the barriers influencing the utilization of the WHO SSC indicated that the attitude towards the use of the checklist differed between health professionals. Whereas nurses believe that the SSC was mandated by the organization to be completed, the surgeons were concerned with the communication and safety benefits of the WHO SSC (Sauls, 2019).

One of the key findings in a Zambian study was that attitude directly influenced adherence practices to the WHO SSC (Munthali *et al.*, 2022). In a Nairobi referral facility in Kenya most of the respondents (50.7%) who participated believed that failing to use the checklist is bad professional practice and 50% of the respondents believe that by using the WHO SSC, human errors can be avoided. Only 36.7% of the respondents felt that the WHO SSC should be used in all procedures despite 65.5% of the respondents believing that the WHO SSC was very instrumental in enhancing patient safety and improves team work in theatre (Midigo, 2019).

2.5.3 Communication and team work among OR Staff

The roles of OR staff are interdependent in the step-to-step procedures done in OR to assure patient safety. In this regard, the nursing, anaesthesia and surgical teams must communicate effectively (Pugel *et al.*, 2015). Some of the factors that foster or hinders communication in OR include team dynamics and professional cadre wars (Ngonzi, Bebell, Boatin, Owaraganise, Tiibajuka, *et al.*, 2021; Russ *et al.*, 2015) .

2.6 Institutional factors influencing adherence to WHO SSC

Health system factors have been shown to influence behaviour change among OR staff. Some of these factors are as follows: staffing and workload, supervision and leadership and availability of integrated WHO Surgical safety checklist in usual documentation practice

2.6.1 Staffing and workload

One of the major barriers cited by OR staff, especially in high turn-over of cases settings, is the work load. OR staff felt that the WHO SSC was increasing workload unnecessarily in a busy routine (Divya Jain, Ridhima Sharma, 2018; Stock & Sundt, 2015).

2.6.2 Availability of WHO SSC in OR

A qualitative evaluation of barriers and facilitators towards implementation of the WHO SSC in England found out that there was a huge variation across facilities on the utilization of the checklist. The design of the checklist was blamed by 34% of the respondents while 24% pointed out that the way the checklist was introduced was not proper and was too long to fill (Russ *et al.*, 2015). In a study done in Minas Gerais State, lack of an electronic form of WHO SSC was associated with non-adherence (Ribeiro *et al.*, 2019).

A study conducted in 5 East African national hospitals (Kenya, Tanzania, Rwanda, Burundi, and Uganda) found out that one of the main reasons there was non-compliance to the WHO SSC was unavailability of the checklist in OR. Though periodically available, reliability was not assured. OR staff also felt that the length of the WHO SSC had an association with low adherence since was time consuming to fill (Epiu *et al.*, 2016). Similarly, a Kenyan study observed that the common barriers

to implementation of SSC were the requirements for signatures, lack of assertiveness of staff, lack of time, lack of training and lack of electronic version of the checklist (Midigo, 2019).

2.6.3 Supervision and leadership

In an England study, Russ et al (2015) observed that some of the barriers towards implementation of the WHO SSC in OR included resistance by the team, lack of support from senior team members and unsupportive facility management. Correspondingly, a study conducted in ten hospitals in China to assess the compliance and attitude of staff towards the use of the WHO SSC noted that improvement in compliance level was directly proportional to the process being led by a senior staff (Tan *et al.*, 2021).

Despite the documented evidence on the impact of the WHO SSC on the outcomes of surgery, a study done in National referral hospitals in East Africa, found out that there was no specific person responsible leading the use of the WHO SSC (Epiu *et al.*, 2016).

2.6.4 Capacity building of staff

Reviewed literature shows that facilities that have structured capacity building initiatives had better adherence. In various studies, interventional education to OR staff saw a sharp rise in adherence (Ferorelli *et al.*, 2022; Gul *et al.*, 2022; White, Baxter, *et al.*, 2018). Better still Gul et al (2022) and Munthali et al (2022) recommends consistent capacity building initiatives to staff.

2.6.5 Patient safety programs

Organizational culture in patient safety is crucial when it comes to adherence to a set of quality improvement initiatives. In this case a deliberate behaviour change is necessary to assure adherence to WHO SSC among staff. Patient safety programs and enhanced communication are measures put in place to improve patient safety. Introduction of patient safety programs in health institutions need to consider the Pugel et al (2015) recommendations. In their study, they advocated that, SSC program needs to be modified to fit the needs of the institution, staff training and evaluation on the program should be conducted. Further, the facility leadership should to take an advocacy role and periodic audits on the implementation of the SSC program ought to be conducted.

2.6.6 Communication and team work

Investigators have attempted to describe the link between checklist use and improved patient outcomes. A consensus explanation is that the use of the checklist improves the safety culture within an institution by facilitating communication (Pugel *et al.*, 2015). Communication is an important element to enhance performance of a surgical team. The hierarchical nature of the surgical team has been an undoing since the senior OR staff might influence the adherence to the WHO SSC by the junior staff. Better adherence is seen when a senior staff takes lead in ensuring the WHO SSC is used (Assem *et al.*, 2012; Hurtado, Jiménez, Peñalongo, Villatoro, & Izquierdo, 2012; Tan *et al.*, 2021).

2.7 Summary of Literature and Research gaps

Reviewed literature assessed the global adherence levels to the WHO SSC. Staff factors and institutional factors that influenced adherence level were also examined in the review. In summary, the adherence levels to the WHO SSC vary from country to country. Literature from developed countries showed better adherence levels compared to middle or lower-income countries. The adherence level per the three sections of the WHO SSC were also varying with the least adhered section being the sign out. Some studies have also shown better adherence on elective surgeries compared to emergency cases.

Further, the review identified several methodologies that were used to collect data to assess the levels of adherence. Some of the methods were; retrospective data review, non-participants observations, use of interviews and questionnaires. Most studies reviewed existing data on past surgeries to get baseline information regarding the adherence level. Studies done in Africa and in Kenya particularly, used qualitative approaches (interviews and questionnaires) to determine adherence or compliance levels. This was done by basically asking the OR staff whether they use the WHO SSC in operations or not. This was seen as a weak methodology in assessing adherence level. The present study sought to determine the adherence level to the WHO SSC by performing a documentation audit/review for a period of one year.

The literature review also focused on factors that influence adherence to the WHO SSC. Staff related factors and institution related factors were reviewed. All studies had an agreement in methodology is assessing these. Staff working in OR were either interviewed, given questionnaires or experts interviewed as key informants. The present study sought to interview all the OR staff. The nurse in-charge and the lead surgeon were interviewed as key informants. The literature reviewed show a wide

range of factors that influence adherence. The factors vary from hospital to hospital. Many studies agree that knowledge and attitude of the OR staff on the WHO SSC was key to determine adherence. Leadership support and staff capacity building initiatives were some institutional factors that influence adherence. The research gap that the present study sought to close was that most of the factors were not expounded. This study chose to use structured interviews which provided more information through probing. This was helpful in proposing possible solutions and recommendations.

In Kenya, limited studies on the topic were reviewed. The few studies that were done focused on the factors influencing adherence in one of the cadres working in OR.

Assessment of the adherence practices requires a review of both the practice (measuring the adherence level quantitatively) and seeking the factors influencing the outcome qualitatively. Little is known on how counties, after devolution of the health sector in 2013, are adhering to the WHO SSC. The present study employed a mixed approach to evaluate the adherence practices to the WHO SSC in Kisii County Teaching and Referral Hospital, Kisii, Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter describes the strategies employed in collection, analysis and presentation of data in the bid to answer the research questions. The chapter contains the study design, study area, target population, inclusion and exclusion criteria, sampling procedure and determination of sample size, development of research instruments, data collection procedure, data analysis, dissemination of findings, and ethical consideration.

3.2 Study Design

The study was an analytical cross-sectional study with a mixture of both quantitative and qualitative approaches.

3.3 Study Area

Kisii County (*Appendix VIII*) is one of the 47 counties found in south-western Kenya. It is one of the Lake Region Economic Bloc (LREB) counties which includes: Bungoma, Homabay, Kakamega, Kisumu, Migori, Nyamira, Siaya, Trans Nzoia, Kericho, Bomet, Nandi and Vihiga counties. It shares common borders with Nyamira County to the North East, Narok County to the South and Homabay and Migori Counties to the West.

The County lies between latitude 00 30' and 100 South and longitude 340 38' and 350 East and covers an area of 1,317.5 km². The county exhibits a highland equatorial climate with two rain seasons in a year. The main economic activity in the county-crop farming.

The County is comprised of nine sub-counties and a population of 1.267 million persons and a population density higher than the national average at 958 persons per square kilometre. The average household size in Kisii County is four persons (2009, KNBS). The County's poverty index is 51% while the national poverty index is at 43.8%. Life expectancy in the county is estimated at 56 years compared to the national indicator of 53 years. The adult literacy level in the County is estimated at 71.5 percent as compared to that of the national level at 79.2 percent.

Kisii County has 142 private and public health facilities of which 11 facilities are level 4. Kisii County Teaching and Referral Hospital (KTRH) is the only level 5 hospital in the county and it serves as a referral facility in the region. Kisii County Teaching and Referral Hospital (KTRH) was purposively chosen as the study site since it is the largest facility in the region which acts as the main referral facility for all surgical cases. The facility is the only one with employed surgeons. Though statistics on morbidities and mortalities relating to surgery were scantily kept, a brief analysis of mortality data for the period of study (1st June 2021 to 30th May 2022) showed that there were 173 mortalities recorded against all 2730 surgical admissions (KTRH Health Records).

3.4 Target Population

This study targeted all the surgical cases done in the OR at Kisii County Teaching and Referral Hospital for a period of one year (June 2022 to May 2023) to assess the level of adherence to the WHO SSC. OR staff were interviewed to determine staff-related factors as well as institution-related factors that influenced adherence practices to the WHO SSC at KTRH.

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion criteria

All surgical cases done between 1st June 2021 to 30th May 2022 by a complete surgical team (surgeon, anaesthetist and nurse) in all ORs were eligible to be included in the study to answer first research question. The second and third research questions were answered by interviewing all OR staff (Surgeons, Anaesthetists and Nurses). The OR officers in-charge (Surgeon and Nurse) were interviewed as KI because of their expertise in the field of surgery and OR processes.

3.5.2 Exclusion criteria

Surgical files that had not been coded and filed as complete were excluded from answering the first research question. Exclusion was made to the OR staff who failed to consent and those who had not finished six (6) months of probation when answering the second and third objectives.

3.6 Study Variables

3.6.1 Independent variables were the WHO surgical safety checklist (availability and ease to use); staff factors (Demographic characteristics, knowledge, attitude, perception, communication and team work); institution factors (Policies, capacity building programs, leadership and support, patient safety programs).

3.6.2 Intervening variables were the type and urgency of surgeries. This was measured by co-relation of these variables with the outcome (dependent variable)

3.6.3 Dependent variables were either adherence or non-adherence to the WHO SSC. A score of less than 50% was considered to be non-adherent and a score that was more than 50% was considered adherent.

3.7 Sampling Procedure

3.7.1 Sample size determination and selection of surgical cases (1st Objective)

A review of surgical cases done in the facility from 2016-2022 (5-year period) showed an average of 2730 surgical cases per annum (KTRH, Health Records, 2022). Shown below, is a summary of case selection criteria used in similar studies done as per the literature reviewed.

Table 3.1 Sample Size Determination

Author(s)	Case numbers	Period of Documentation Review
(Tostes & Galvão, 2019)	423	1 year
(Bajracharya <i>et al.</i> , 2021)	267	6 months
(Ferorelli <i>et al.</i> , 2022)	318	6 months

From the systematic reviews above, this study reviewed 424 surgical cases through a period of one year (between June 2021 to May 2022). To minimize fluctuation effect owing the varying number of surgeries done per month, the sample was stratified per month. The number of surgeries done each month included in the study formed the sampling frame. The first case was randomly selected and the subsequent cases identified systematically using the OR register. Once the cases were selected, the unique patient numbers were submitted to the health records department for file retrieval as per institutional policy.

3.7.2 Selection of OR staff (2nd and 3rd Objective)

All OR staff were targeted. Since the total number of staff was 40, a census method was preferred. The Nurse in-charge and Lead surgeon were purposively selected to give expert opinion by participating in Key Informant Interviews (KII).

3.8 Development of Research Instruments

A data extraction form developed from the available WHO SSC at KTRH was used as a checklist for each of the surgical file selected. Each of the 19 items in WHO SSC were checked whether they were marked. This helped the researcher determine the level of adherence to the WHO SSC. The researcher developed a structured interview guide from reviewed literature on the topic. The structured interviews were conducted to OR staff and KII to determine staff and institutional related factors influencing adherence practices to the WHO SSC by OR staff (*See Appendixes II, III & IV*).

3.9 Pre-test of study Instruments

A trial administration of the instruments was done to identify flaws and how easy the questions could be answered. The research instruments were piloted at one of the ORs at the facility that was not involved in the study.

3.10 Validity of the Instrument

The instruments were developed through review of literature on studies done in related topics. The researcher also sought professional input from surgical specialists and from two supervisors from the school of Nursing, Midwifery and Paramedial Sciences at Masinde Muliro University of Science and Technology (MMUST) in Kakamega.

3.11 Instrument Reliability

Taherdoost (2016) holds that reliability concerns the extent to which a measurement of a phenomenon provides stable and consistent results. A test-retest reliability shows whether the same results are obtained with repeated administration of the same survey or consistency to similar study participants (polit & Beck 2017). The study instrument was tested for reliability using the analysis of the pilot study results. A Cronbach's alpha value of +8 or greater indicated that the tool was consistent enough. Further, in the bid to minimize errors, only eligible respondents were interviewed.

3.12 Data Collection Procedure

Two data collection instruments were used in the study. An extraction form was used to answer objective one and structured interviews were conducted to both staff and supervisors. The researcher administered the two tools.

The researcher used the extraction form to assess the adherence level to the WHO SSC (1st objective). The extraction form that was designed from the existing WHO SSC in the facility was used. An extraction form was subjected to each selected surgical file to check whether all the 19 items were complied with in terms of documentation. The data was entered into excel templates.

The researcher administered structured interviews to all the 40 OR staff to determine staff and institution related factors influencing adherence practices to the WHO SSC (2nd & 3rd Objectives). The nurse in-charge and lead surgeon were interviewed as key informants. All qualitative data was audio-recorded and also written in the researchers' notebooks in form of direct quotes. The Covid-19 protocols during data collection were adhered to as follows; the researcher and participants put on surgical masks, maintained social distance in interview; sanitized their hands before and after

interview and the interview room was well ventilated. Though Covid vaccination was not a requirement for this study; all the respondents and the researcher had been fully vaccinated.

3.13 Data Analysis

All collected data was checked for quality and completeness before analysis.

3.13.1 Analysis of quantitative data

Quantitative data that was entered in Excel was cleaned, coded and analysed using the Statistical Package for Social Sciences (SPSS version 28) by two data entry clerks under the supervision of a data analyst. Descriptive statistics methods: Frequency, Mean, percentages, standard deviation were used. For all analyses, significance was set at $p < 0.05$.

3.13.2 Analysis of qualitative data

Data collected from OR staff interviewed was analysed in themes. Thematic analysis was made using NVivo software (version 12) thereafter the data was presented based on the generated themes.

3.14 Dissemination of Research Findings

Findings of this study will be shared with the university school of graduate studies during thesis defence. Article publications will be done in peer reviewed journals. The findings will also be presented in various scientific conferences and workshops on patient safety. Further, the findings will be presented to the Kisii county health leadership to influence formulation of policies on patient safety especially in surgery.

3.15 Ethical consideration

Authority was sought from Masinde Muliro University of Science and Technology Research and Ethics Committee (MMUST/IERC/064/2022) (*see Appendix V*),

National Commission of Science and Technology Institute (NACOSTI/P/22/18068) (*See Appendix VI*), the Director of Health Kisii County, and the Kisii County Teaching and Referral Hospital Ethics Committee (KS/C/HS/42 VOL. III (56)) (*See Appendix VII*). Permission was sought to collect data from the facility administration and informed consents from the respondents.

Anonymity of the respondents was upheld, and all the data received was kept confidential under key and lock. For soft copy copies, passwords were created to control unauthorized access and was only maintained by the researcher.

The study observed all the COVID-19 protocols during interviews to prevent spread by ensuring the participants wore masks, observe social distancing, observe hand hygiene and wear gloves while handling patient files. Appropriate personal protective equipment was worn in OR to maintain sterility and curb infection spread.

The data was processed into information to be consumed by the beneficiaries including a researcher's dissertation report for a Master of Science in Advanced Nursing Practice program.

3.15.1 Respect for human beings

The participants were assured fundamental rights as human beings. The participants were granted a right to voluntarily participate in the study and withdraw at any given point. Participants' dignity was observed by allowing anonymity and questions asked in a socially and culturally sensitive manner. There was freedom from exploitation and that the findings of the study cannot be used as a performance appraisal or institute disciplinary actions for the gaps as the findings are purely to improve the safety of surgical procedures.

3.15.2 Beneficence

There was no physical, social, psychological, and economic harm to the respondents. No exploitation of the participants was allowed to benefit the researcher. Participants were not coerced to participate in the study. Benefits, unforeseen occurrences and guaranteed anonymity was emphasized to the participants.

3.15.3 Justice

The researcher observed dignity measures by following the documented procedure of obtaining responses and retrieving data from medical records. The research findings will be disseminated transparently irrespective of the outcomes and that all the stakeholders benefited from the research findings.

3.15.4 Confidentiality

Information gathered was treated with at most privacy and confidentiality. All information gathered in hard copies were kept under key and lock and all soft-copy copies of the information had name and password control.

3.15.5 Informed Consent

The participants were taken through the contents of the informed consent which included, the study title, researcher's name, purpose of the study, confidentiality of the information given, anonymity of the respondents and procedures to be followed. The willing participants were asked to sign consents to verify that they agreed to participate in the study (*See Appendix I*).

CHAPTER FOUR

RESULTS

4.1 Overview

This chapter presents findings from the study conducted on “adherence practices to WHO Surgical Safety Checklist in operation rooms in Kisii County Teaching and Referral Hospital, Kenya.”. The demographic characteristics of the respondents in this study are presented. It also presents analysis of findings of the study. Study variables that had adjusted odds ratio (95% CI) after adjusting confounding factors and a p-value of less than 0.05 were considered significantly associated with the outcome (adherence practices to WHO SSC). A mean of <3 in the Likert scale analysis was considered as disagreement to the study item while a mean of >3 was considered as in agreement.

4.2 Surgical cases characteristics

Data obtained from the extraction form in regard to surgical cases characteristics is as shown in **Table 4.1**. Elective surgeries contributed 76.4% of all surgical cases done while emergency cases were 23.6%. Orthopaedic surgeries contributed 159(37.55%), paediatric general surgeries 89(21.0%), urology surgeries 83(19.6%), gynaecology surgeries 49(11.6%), and adult general surgeries 44 (10.4%) of all the surgeries done.

Table:4.1 Surgical Cases Characteristics

	Item	n (424)	%
Surgical Case Urgency	Elective	324	76.4%
	Emergency	100	23.6%
	Adult General	44	10.4%
	Gynae	49	11.6%
Type of surgery	Orthopaedic	159	37.5%
	Paediatric	89	21.0%
	General	83	19.6%
	Urology	83	19.6%

4.3 Assessment of the adherence level to the WHO Surgical Safety Checklist in operating rooms in Kisii County Teaching and referral Hospital

The study findings showed that 100% of all post-surgical files had a WHO SSC. However, attempted filling was seen in only 7.1% (30) of the reviewed surgical files.

4.3.1 Adherence to the WHO SSC as per the surgical case urgency

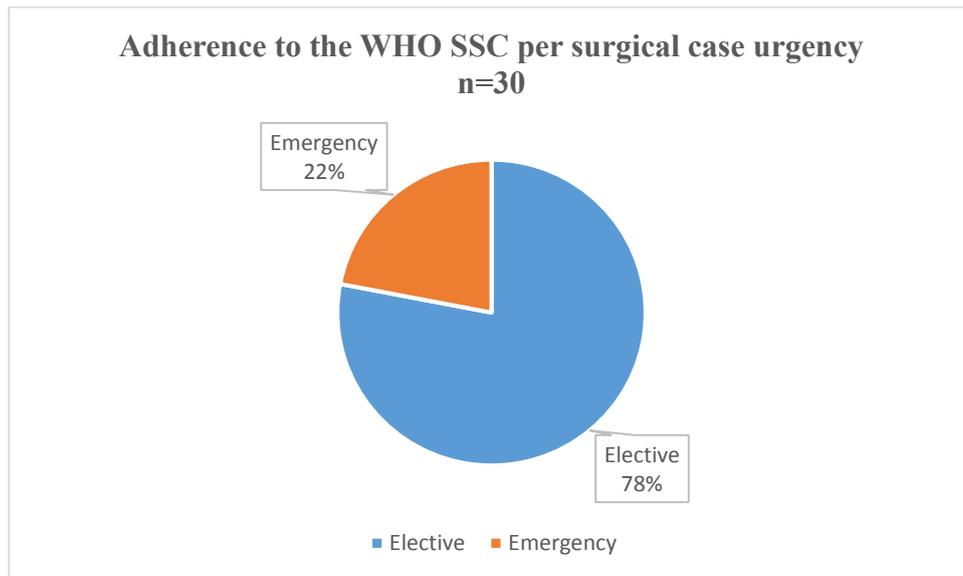


Figure 4.1: Adherence to the WHO SSC per surgical case urgency

A descriptive analysis on adherence level as per the surgical case urgency was done. As shown in **Figure 4.1**, the WHO SSC was better filled in elective cases (78%) of the 30 cases that used the WHO SSC compared to emergency cases (22%).

4.3.2 Adherence to the WHO SSC as per the type of surgery

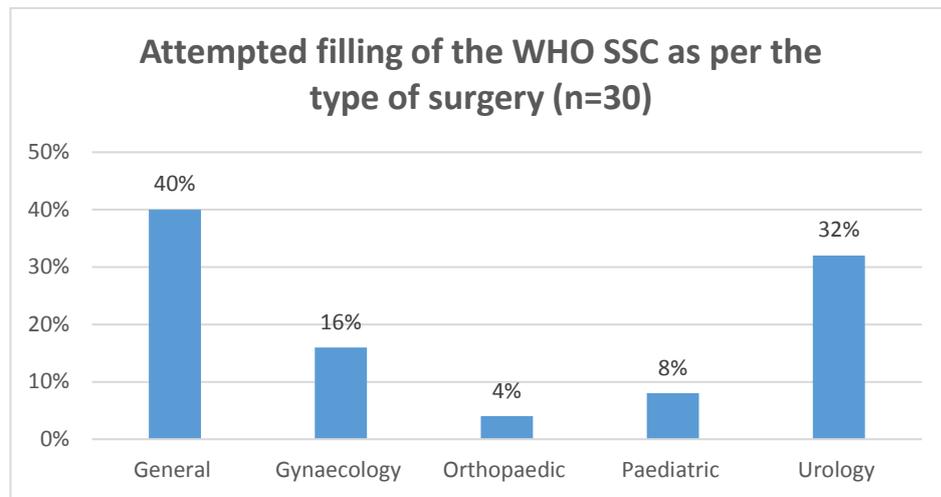


Figure 4.2: Attempted filling of the WHO SSC as per type of surgery

The study findings indicated that that adherence level to the WHO SSC had a variation when all the type of surgeries were compared. **Figure 4.2** illustrates the difference in adherence per surgical type. Adult general surgeries had better adherence level at 40%, followed by urology surgeries (32%), gynecology surgeries (16%), Pediatric surgeries at 8% and orthopedic surgeries had the least level of adherence at 4%.

4.3.3 Adherence Level to WHO SSC

The **table 4.2** shows how adherence level to the WHO SSC as was documented in the surgical files. The three sections of the checklist were compared. The first section, sign in, had better adherence at 5.7%. The second section, time out, had an average adherence of 1.8%. The third section, that is, the sign in, had the lowest adherence level of 0.7%. Generally, the adherence level to the WHO SSC at Kisii County Teaching and Referral Hospital had a critically low adherence level at 2.7%.

Table 4.2: Descriptive on assessment of adherence level to WHO SSC items(n=424)

WHO SSC Section	WHO SSC Item	n (424)	n%
Sign in section	Has the patient confirmed his/her identity, site, procedure, and consent?	30	7.1
	Is the site marked?	30	7.1
	Is the anaesthesia machine and medication check complete?	27	6.4
	Is the pulse oximeter on the patient and functioning?	24	5.7
	Does the patient have a known allergy?	21	5
	Does the patient have a difficult airway or aspiration risk?	21	5
	Risk of >500ml blood loss (7ml/kg in children)?	15	3.5
	Overall Sign-in adherence level		5.7
	Confirm all team members have introduced themselves by name and role	15	3.5
	Confirm the patient's name, procedure, and where the incision will be made	15	3.5
Time out	Has antibiotic prophylaxis been given within the last 60 minutes?	9	2.1
	Anticipated Critical Events to Surgeon: What are the critical or non-routine steps? How long will the case take? What is the anticipated blood loss?	6	1.4
	To Anaesthetist: Are there any patient-specific concerns?	3	0.7
	To Nursing Team: Has sterility (including indicator results) been confirmed? Are there equipment issues or any concerns?	3	0.7
	Is essential imaging displayed?	3	0.7
	Overall Time out adherence level		1.8
	Nurse Verbally Confirms the name of the procedure	3	0.7
	Nurse verbally confirms Completion of instrument, sponge and needle counts	3	0.7
	Nurse verbally confirms Specimen labelling (read specimen labels aloud, including patient name)	3	0.7
	Nurse verbally confirms Whether there are any equipment problems to be addressed	3	0.7
Sign out	To Surgeon, Anaesthetist and Nurse: What are the key concerns for recovery and management of this patient?	3	0.7
	Overall Sign out adherence level		0.7
	Average Adherence level (all items)		2.7%

4.4 Staff related factors that influence adherence practices to WHO SSC in ORs at KTRH

4.4.1 Staff demographic characteristics

OR staff who participated in the survey were 31 out of 40. As illustrated in **Table 4.3**, nurses comprised the larger profession in OR where 16 were interviewed. Surgeons who were interviewed were 9 and 6 anaesthetist/anaesthesiologists participated in the study. Male gender was dominant of all the respondents at 17 compared to female respondents who were 14 in number. In regard to years of experience, 5 nurses had less than 2 years of continuous OR experience. More surgeons (8 out of 9) had more than 3 years' experience in OR compared to 4 out of the 6 anaesthetists/anaesthesiologist. Only 5 out of 16 nurses had more than 3 years' experience in OR.

Table 4.3: Staff demographic characteristics (n=31)

Profession	Pseudonym	Gender		Years of Experience (Months)				Total
		M	F	0-11	12-23	24-34	>36	
a) Surgeon	S	6	3	0	0	1	8	9
b) Anaesthetist/ Anaesthesiologist	A	4	2	0	0	2	4	6
c) Nurse	N	7	9	3	2	6	5	16
TOTAL		17	14	3	2	9	17	31

4.4.2 Descriptive staff related factors influencing adherence practices to WHO SSC at KTRH

Operating room staff perceptions on team work and attitude towards the WHO surgical safety checklist are shown in **table 4.4**. OR staff largely agreed that they would feel safe to be treated at the place they work at 48.8% (15) with a mean of 4.09. On the other hand, 77.4% (24) of OR staff agreed with a mean of 4.71 that prior briefing about the surgery is important to enhance patient safety. OR staff were asked whether they

were free to report any safety concerns in OR and 77.4% (24) agreed with a mean of 4.16 that they did. Further, the researchers sought to find out the difficulty in pointing out perceived patient safety issues in OR and 32.2% (10) agreed with a mean of 3.86. The OR staff agree that all cadres in OR work in a coordinated manner 77.4% (24) with a mean of 4.01. Whether OR staff felt that the guidelines that are established in OR are duly followed, 35.9% (11) agree with a mean of 4.01.

Findings further indicated that 54.8% (17) of the respondents agree that the WHO SSC was easy to fill with a mean of 3.91. As to whether the WHO SSC improved safety in OR, 38.8% (12) with a mean of 3.66 agreed to the statement. OR staff felt that the WHO SSC improved on communication and could prevent errors at 77.4% (24) with a mean of 4.16 and 4.21 respectively as shown in table 4.3. OR staff were asked whether they would recommend the WHO SSC to be used on them whenever they underwent a surgical procedure and 77.4% (24) of the respondents strongly agreed with a mean of 4.21.

Table 4.4: Descriptive statistics on staff perception on team work an attitude towards the WHO SSC (n=31)

Variable	Description	n	SD (%)	D (%)	U (%)	A (%)	SA (%)	Mean	Std
Perceived influence of the WHO SSC to Team work and Safety	I would feel safe being treated here as a patient	31	0 (0.0)	4 (12.9)	5 (16.1)	15 (48.4)	7 (22.6)	4.09	1.212
	Briefing OR personnel before a surgical procedure is important for patient safety	31	0 (0.0)	0 (0.0)	0 (0.0)	24 (77.4)	7 (22.6)	4.71	0.818
	I am encouraged by my colleagues to report any safety concerns I may have	31	0 (0.0)	0 (0.0)	3 (9.7)	24 (77.4)	4 (12.9)	4.16	1.220
	In the operating room here, it is difficult to speak up if I perceive a problem with patient care	31	2 (6.5)	9 (29.0)	6 (19.4)	10 (32.2)	4 (12.9)	3.86	1.420
	The physicians and nurses here work together as a well-coordinated team	31	0 (0.0)	0 (0.0)	2 (6.5)	24 (77.4)	5 (16.1)	4.16	1.219
	Personnel frequently disregard rules or guidelines that are established for the OR	31	1 (3.2)	9 (29.0)	6 (19.4)	11 (35.5)	4 (12.9)	4.01	1.315
Attitude towards the checklist	The checklist is easy to use	31	1 (3.2)	3 (9.7)	3 (9.7)	17 (54.8)	7 (22.6)	3.97	1.212
	The checklist takes long to fill	31	2 (6.5)	10 (32.2)	6 (19.4)	10 (32.2)	3 (9.7)	3.72	1.120
	The Checklist improved OR safety	31	3 (9.7)	8 (25.8)	6 (19.4)	12 (38.7)	2 (6.7)	3.66	1.048
	The checklist improved communication in OR	31	0 (0.0)	4 (12.9)	5 (16.1)	15 (48.4)	7 (22.6)	4.01	1.225
	The checklist helps prevent errors in the OR	31	0 (0.0)	0 (0.0)	3 (9.7)	24 (77.4)	4 (12.9)	4.16	1.220
	If I am to undergo a procedure, I would want the checklist to be used	31	0 (0.0)	0 (0.0)	2 (6.5)	24 (77.4)	5 (16.1)	4.21	1.219
	Do you think that a conscious patient may become anxious if we repetitively confirm the patient's identity, the procedure and operation site and discuss the potential airway problems and blood loss in their hearing?	31	2 (6.5)	9 (29.0)	6 (19.4)	10 (32.2)	4 (12.9)	3.86	1.420

D- Disagree **U-** Undecided **A-** agree & **SA-** Strongly Agree

4.4.3 Bivariate and Multivariate analysis of staff related factors that influence adherence practices to the WHO SSC in ORs at KTRH

The **table 4.5** shows a summary of staff related factors that influence adherence to the WHO Surgical safety checklist based on a bivariate and multivariate analyses. The findings showed that staff experience in OR 95% CI ($p=0.004 < 0.05$), attitude towards the WHO SSC OR 95% CI ($p=0.014 < 0.05$), and perception on the WHO SSC OR 95% CI ($p=0.002 < 0.05$) were significant staff related factors that influenced adherence practices to WHO surgical safety checklist in operating rooms in Kisii County Teaching and referral Hospital.

Table 4.5: Bivariate analysis of staff related factors that influence adherence practices to WHO SSC in OR at KTRH

Variables		Adherence practices to WHO safety		COR (95% CI)	AOR (95% CI)	p value
		Yes	No			
Gender	Female	12	2	1.00	1.00	0.073
	Male	14	3	1.82(0.2-1.7)	0.71(0.1-1.4)	
Time worked in the theatre (Experienced)	0-11 Months	1	2	1.00	1.00	0.004
	12-23 Months	1	1	0.43(0.3-1.0)	0.6(0.2-0.9)	
	24-36 Months	8	1	0.88(0.5-1.8)	1.04(0.7-1.3)	
	>= 36 Months	12	0	1.23(0.4-0.9)	1.46(1.2-2.5)	
Profession	Theatre nurse	13	2	1.00	1.00	0.812
	Surgeon	8	1	0.43(1.2-2.6)	0.9(1.1-1.9)	
	Anaesthetist	5	1	0.93(1.1-2.1)	1.1(1.4-3.6)	
Attitude	Negative	2	2	1.00	1.00	0.014
	Positive	23	3	0.61(0.2-0.8)	0.7(0.3-1.2)	
Perception	No	5	3	1.00	1.00	0.009
	Yes	18	5	1.14(0.6-1.1)	1.56(0.4-1.3)	

AOR=Adjusted Odds Ratio, CI=Confidence Interval

4.5 Institutional related factors that influence adherence practices to WHO surgical Safety Checklist in operating rooms in Kisii County Teaching and referral Hospital

Table 4.6 shows the findings of institutional related factors that influence adherence to the WHO SSC. OR staff were asked whether they benefit from a capacity building program on the use of the WHO SSC and 54.8% (17) disagreed with a mean of 2.05. As to whether the facility has policies to guide OR staff on the use of the WHO SSC, 38.7% (12) disagreed with a mean of 3.12. The findings also indicated that 51.5% (16) of OR staff felt that the hospital management did not communicate on the implementation of the WHO SSC. Also, 45.2% (14) of the respondents with a mean of 2.96 felt that the hospital management was not supportive enough to promote adherence to WHO SSC. In regard to staffing levels, 32.2% (10) of the respondents felt that they were under staffed while 48.4% (15) of the OR staff had the view that whenever they were short staffed in OR, adherence to the WHO SSC was affected negatively. The findings further indicated that OR staff, 77.4 (24), with a mean of 4.01, agreed that the lack of consumables, modern technology and adequate drugs greatly contributed to non-adherence to the WHO SSC.

Table 4.6: Descriptive on institutional factors influencing adherence to WHO SSC practices

Variable	SD	D	U	A	SA	Mean	Std
	(%)	(%)	(%)	(%)	(%)		
The hospital provides continuous staff capacity development programs	5 (16.1)	17 (54.8)	7 (22.6)	2 (6.5)	0 (0.0)	2.05	.249
The hospital has policies that introduces the use of WHO SSC in the facility	3 (9.7)	12 (38.7)	8 (25.8)	5 (16.1)	3 (9.7)	3.12	1.682
The hospital management provides communication to the staff on the implementation of WHO SSC in the facility	2 (6.5)	16 (51.5)	6 (19.4)	4 (12.9)	3 (9.7)	2.12	1.249
The hospital provides leadership support on the use and implementation of WHO SSC in the facility	1 (3.2)	14 (45.2)	6 (19.4)	5 (16.1)	5 (16.1)	2.96	1.592
The hospital has employed adequate number of staff to handle all surgical cases in the hospital	2 (6.5)	10 (32.2)	6 (19.4)	10 (32.2)	3 (9.7)	3.72	1.120
Lack of consumables, modern facilities, and adequate drugs in the health facility hinders my adherence to WHO SSC practices	0 (0.0)	0 (0.0)	2 (6.5)	24 (77.4)	5 (16.1)	4.16	1.219
When the theatre unit is short staffed, adherence to WHO SSC is poorly managed	0 (0.0)	4 (12.9)	5 (16.1)	15 (48.4)	7 (22.6)	4.01	1.235
High influx of patient in the theatre unit affects my adherence to WHO SSC practices	2 (6.5)	9 (29.0)	6 (19.4)	10 (32.2)	4 (12.9)	3.86	1.420

SD=strongly disagree, D=Disagree, U=undecided, A=Agree, SA=Strongly agree, std=standard deviation

4.6 Themes generated from qualitative data on adherence practices to WHO SSC

The nursing officer in-charge (N1) of OR and the Surgeon in-charge (S1) were interviewed as Key Informants. Three (3) themes were generated from the interviews as illustrated in the Table 4.6. A further 10 sub-themes were discussed as shown.

Table 4.7: Themes generated from qualitative data on adherence practices to the WHO SSC.

Themes	Sub-Themes
i. Adherence level to WHO SSC	a) The use of WHO SSC in OR b) The level of adherence
i. Staff related factors influencing adherence	a) Staff knowledge on WHO SSC b) Staff attitude towards the WHO SSC c) Team-work and communication among OR staff d) WHO SSC related factors
ii. Institutional related factors influencing adherence	a) Policies, guidelines and procedures on WHO SSC b) Work load and staffing in OR c) Leadership and management support d) Training and capacity building of OR staff

4.6.1 Adherence level to the WHO SSC at Kisii Teaching & Referral Hospital (KTRH)

4.6.1.1 The use and Level of adherence to the WHO SSC in OR

The findings indicated that the WHO SSC was available in KTRH OR. However, both key informants agree that the adherence level could be low. The nurse in-charge who had worked for more than 3 years at the position observed that:

The facility has invested and has ensured that each file has a WHO SSC. The problem is in the filling, I must say the adherence level is low (N1)

His sentiments were echoed by the Surgeon in-charge who has had experience of more than 10 years as a surgeon and more than 3 years as the Surgeon in-charge:

The checklists are available. Adherence level is very low. (S1)

4.6.2 Staff related factors that influence adherence practices

The key informants were further probed as to why they felt the adherence level was low in the OR. The staff related factors that were mentioned included: Lack of knowledge, negative attitude and lack of specialised nurses in peri-operative nursing, uncoordinated teams, and breakdown on communication as quoted below:

Adherence to the WHO SSC largely depend on the staff knowledge, and attitude. Experience is also very important. We have been having rapid staff change-overs and currently I have majority of nurses being new. We only have 2 nurses out of 18 who are trained as specialists in peri-operative nursing. (NI)

The other key informant further stated:

Team work, communication and the WHO checklist-related issues are some of the reasons the adherence is low as per my opinion. I feel the knowledge is not a problem since this checklist is a common document in surgery. Staff have just decided not to use it. This is a key pointer to unfavourable team spirit in OR. Furthermore, there is no clear direction regarding who is accountable in filling the WHO SSC in OR (each cadre seems to pull in different directions) (S1)

4.6.3 Institutional related factors influencing adherence to WHO SSC

The researchers sought to find out from the Key Informant the institutional related factors that influence adherence practices to the WHO surgical safety checklist. The factors that were mentioned included: Lack of specific policies on WHO SSC, increased work load, inadequate management support and lack of structured capacity building initiatives. Some of the quoted responses from the respondents were:

There is no single policy document or procedure/protocol on the use and adherence to WHO SSC though some are at draft stage (N1).

In agreement, the other KI said:

Lack of standardization in procedures, protocols, guidelines and policies (S1).

Both the nurse in-charge and the surgeon in-charge who were key informants said:

There is acute understaffing in OR. The staff in OR did not support the demands. This has been made worse by the rapid change-overs especially with the nursing team which makes it difficult to develop a team and promote mastery of knowledge (N1)

The surgeon in-charge said:

Rapid staff change over (most staff deployed are new) (S1).

From the study findings, the facility leadership has a vital role in promoting adherence to the WHO SSC. One of the key informants mentioned that:

Little management support on implementation of policies and recommendations from audits. General system's culture of responsibility has remained low (S1).

The findings further established that, OR preparation and case turn-around-time was largely affected factors relating to resource allocation and functionality of some key equipment like sterilization equipment. Surgeon in-charge said:

High work load with limited resources including insufficient sterile gowns and occasional lack of antibiotics (S1)

Patient safety culture at health facility is key to ensure patients undergo safer procedures including surgery. The findings of this study point to a weak patient safety culture as pointed out by the surgeon in-charge:

Patient safety culture in OR is described as low though there is an acknowledgment of individual efforts from few staff to ensure safety is maintained (S1)

In furtherance to this the Nurse in-charge observed:

Inadequate Patient safety programs in OR and that patient safety programs are inadequate. What I mean with this is that, there are no quality improvement not patient safety programs that are currently running to empower staff on this critical element of patient safety. Again, there is no clear framework/appraisal tool to evaluate OR staff on adherence to the WHO SSC (N1)

The surgeon in-charge observed that:

Quality Assurance in theatre is not adequately carried out though efforts exist from the in-charges to champion IPC and use of 'Time out'. There is no clear link between the institutional Quality Department/ Quality Improvement team to theatre processes (S1).

CHAPTER FIVE

DISCUSSION

5.1 Assessment of the adherence level to WHO SSC

The first objective of the study was to assess the adherence level of the WHO SSC in OR based on retrospective review of files. Findings indicated that the WHO SSC was available for use in all surgical files that were reviewed. Attempted filling was only seen in 7.1% (30) of the files. Further, these findings showed that more elective cases (78%) attempted to use the WHO SSC while only 28% of emergency cases attempted to use the WHO SSC.

In regards to the type of surgery, general adult surgeries had an adherence of 40%, urology (32%), gynaecological cases (16%), paediatric surgeries (8%) and orthopaedic surgeries was least adherent at 4%. These findings agree with a study done in Nepal that showed that emergency surgeries were non-adherent to the SSC at 64.6% and the type of surgery was a confounding factor (Bajracharya *et al.*, 2021).

When the three moments of surgery were evaluated, the first moment, sign in, had an adherence level of 5.7%, second moment, time out, had 1.8% and the last moment, sign out, had the least adherence level at 0.7%. The average adherence level through the three moments of surgery was 2.7%. These findings contrary to studies done in developed countries that showed better adherence level. A Swiss study showed 80% adherence level, Italian study showed 90% and Chinese study showed 96% (Rodella *et al.*, 2018; Schwendimann *et al.*, 2019; Tan *et al.*, 2021). However, a study done in Australia showed a lower adherence of 27% (Giles *et al.*, 2017).

Studies done in low and middle level countries showed a lower adherence level. In 172 public and private facilities in Ethiopia the adherence level was about 58.9% (Sibhatu *et al.*, 2022). In a Ghana the adherence was about 30.4% (Bansah, 2019). The average adherence level in the five East African National Hospitals (Kenya, Tanzania, Burundi, Rwanda and Uganda) was about 25% (Epiu *et al.*, 2016). In Uganda, an adherence level of 7% was established (Ngonzi, Bebell, Boatın, Owaraganise, Tiibajuka, *et al.*, 2021).

There is a general agreement in most reviewed studies that adherence to three sections of the WHO SSC vary (Cristina *et al.*, 2015; Schwendimann *et al.*, 2019; Tan *et al.*, 2021). However, Ribeiro *et. al* (2019) in Brazil, noted no difference in adherence level across the three surgical moments.

5.2 Staff factors influencing the adherence to WHO SSC

The second objective of the study was to determine staff related factors that influence adherence practices to WHO Surgical Safety Checklist in operating rooms in Kisii County Teaching and referral Hospital. The present study identified three staff related factors that were significant in influencing adherence practices to the WHO surgical safety checklist. These factors were: years of experience in operating room OR 95% CI p=0.004; staff attitude OR 95% CI p=0.014; and staff perception towards the WHO SSC OR 95% CI p=0.009.

The findings meant that positive staff attitude, a good perception towards the checklist and longer experience would promote adherence to the WHO SSC and the reverse is true. These findings were consistent with a study done in Zambia that identified staff attitude(especially the right attitude of senior members of the surgical team), and perception were fostering factors(Munthali *et al.*, 2022). Also, the findings of the present

study was in agreement with a study that proposed an educational intervention to staff to improve adherence level to the WHO SSC (Ngonzi, Bebell, Boatin, Owaraganise, Tibaijuka, *et al.*, 2021). The present study did not find knowledge level being significant similar to an Indian study that established that there was a favorable awareness level of the SSC that helped foster adherence (Sharma, Tripathi, & Gupta, 2020). Contrary to this, findings in a study done in Angeles Hospital Lomas in Mexico found out that there was 46.3% of OR staff who did not know phases of the WHO SSC (Sanchez *et al.*, 2018).

Key informant interviews identified poor communication and dysfunctional teams as significant staff factors that would influence adherence to the WHO SSC. Team work was largely seen to be affected by the hierarchical nature of staffing in OR that saw cadre differences. This finding was consistent with other studies on the subject which largely agree with the present study that poor communication and dysfunctional surgical teams contributed largely to the low adherence to WHO SSC (Ngonzi, Bebell, Boatin, Owaraganise, Tiibajuka, *et al.*, 2021; Russ *et al.*, 2015). In furtherance to these findings, a study done in Zambia pointed out hierarchical conflicts as one of the reasons OR teams are dysfunctional (Munthali *et al.*, 2022).

5.3 Institutional Related factors influencing adherence to the WHO SSC

The third objective of the study was to determine institutional related factors that influence adherence practices to WHO surgical Safety Checklist in operating rooms in Kisii County Teaching and referral Hospital. In the present study, some of the factors that were significantly influencing the adherence practices included: lack of consumables, modern technology and adequate drugs, 77.4% (24); lack of capacity building and

structured trainings, 54.8% (17); understaffing, 48.4% (15); and lack of hospital top management support on implementing the WHO SSC, 45.2% (14).

Lack of consumables and some critical supplies like antibiotics was a unique finding in the present study. Regular capacity building programs for staff has been shown to be very instrumental in ensuring OR staff adhere to the WHO SSC. Educational interventions on the correct use of the SSC saw a sharp rise in adherence levels (Ferorelli *et al.*, 2022; Gul *et al.*, 2022; White, Baxter, *et al.*, 2018). Better still Gul et al (2022) and Munthali et al (2022) recommended consistent capacity building initiatives to staff.

Staff to workload ratio was one of the emotive factors OR staff raised in the present study. The rapid staff change overs was seen to reduce the expert hands in OR. This finding was consistent with other studies that showed that staff dynamics greatly influenced adherence practices. (Divya Jain, Ridhima Sharma, 2018; Stock & Sundt, 2015). Leadership support was a key-factors identified in the present study. In agreement to this, a study done by Russ et al (2015) in England identified barriers to the SSC adherence to be lack of support from the senior members of the surgical team and the hospital leadership. Correspondingly, a study conducted in ten hospitals in China to assess the compliance and attitude of staff towards the use of the WHO SSC noted that improvement in compliance level was directly proportional to the process being led by a senior staff (Tan *et al.*, 2021). Further, WHO did not specify the person responsible to lead the implementation of the WHO SSC in OR, this factor is observed by Epiu et al (2016) as a gap.

The respondents mentioned that, there were policies that introduced the use of the WHO SSC in the facility. However, the policies are poorly communicated to the staff who should implement them. Also, the study findings hint at a gap between the hospital leadership and the staff regarding outcome of care, In agreement with the present study, a study done to explicate themes across ‘Clean Cut’ implementation strategy in Ethiopian surgical sites, emphasized on the need to involve hospital leadership as well as staff in quality improvement programs (Mattingly *et al.*, 2019).

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In conclusion, findings on the assessment of the adherence level to the WHO SSC showed that each surgical file had a WHO SSC. Unfortunately, attempts to fill the checklist was seen in only 7.1% of the surgical procedures done. Further, the three sections of the checklist were inconsistently filled with the first section (sign in) being filled at 5.7%, second section (Time out) was at 1.8% and the third section (Sign out) was poorly filled at 0.7%. The average adherence level was critically low at 2.7%. With such low levels of adherence, the benefits of the WHO SSC of improving team work, communication, reduction of preventable morbidities and mortalities associated with surgery might not be realised.

The study pointed out various staff factors that influenced adherence practices. Some of the staff factors that determine adherence included: attitude, knowledge, safety culture, team work, communication and continuous training. These factors directly influenced adherence to the WHO SSC. A positive attitude and good knowledge on the WHO SSC had better outcome in terms of adherence to the SSC. On the other hand, a team culture that promotes safety and communicates freely enhanced adherence to the SSC. The opposite is also true.

On the hand, the major institutional factors that influenced adherence level included; policy implementation, staffing dynamics, leadership and management and staff capacity building. These factors were seen to be enablers or barriers to the outcome (adherence to the WHO SSC). Good staff ratios, a policy direction with a responsive leadership that

empowers staff through capacity building were seen as enablers while the opposite meant that adherence of the WHO SSC was negative.

6.2 Recommendations to improve adherence to WHO SSC

In regards to the low adherence levels to the WHO SSC, this study recommends regular internal compliance audits. This can be done quarterly, where the adherence levels are established and corrective measures put forward. This quality improvement project can be spearheaded by a committee in OR that is drawn from various cadres working in OR.

In promotion of a positive staff. Regular trainings are recommended to all OR staff. This study also recommends that each of the staff joining OR to undergo a robust induction and orientation process on the WHO SSC. Competency based assessments can be regularised to promote the use and perception of the WHO SSC by closure of gaps.

The institution management has a role to align policies and guidelines regarding WHO SSC. This study recommends that, regular staff capacity building initiatives to be in place. The leadership should also introduce a quality improvement and patient safety program to promote patient safety initiatives. Further recommendations are made to the County Governments to increase health financing to prevent stock-outs of essential supplies and drugs.

Finally, this study recommends that patient safety training be included in the regular training programs of all health care workers. Further research on this topic is recommended to improve the body of knowledge and evidence-based practice in ensuring healthcare interventions are safe for all.

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APPENDICES

Appendix I: Informed Consent Form

The title of the study: Adherence Practices to WHO Surgical Safety Checklist in Operating Rooms in Level 4 and 5 Hospitals in Kisii County, Kenya

Name of Principal Investigator: Jonathan Taiswa email address: jtaiswa@gmail.com

Phone number: +254726389618

The purpose of the Study: I am a student at Masinde Muliro University of Science and Technology (MMUST) doing a Master of Advanced Nursing Practice. I am conducting a study on the above title in partial fulfilment of a Degree in Master of Science in Advanced Nursing Practice (Leadership, Policy and Management)

Procedure: You will be requested to fill the questionnaire given to you as honest as you can. You are required to relax and feel free to ask any clarifications on the questions.

Risks: There are no risks involved for participating in this study

Benefits: There are no direct benefits from this study since it is purely for academic purposes. However, the findings will be shared to MMUST, Ministry of Health, Kisii County Department of health and to the community of health professionals to inform policy changes regarding to patient safety in ORs.

Confidentiality: Information on personal identifies will be avoided and the information will be limited to the study only

Voluntary participation: You have been chosen to participate in this study, your participation and honest information in the study will be most appreciated. Your

participation will be purely voluntary and you are allowed to withdraw your consent at any point of the study. Equal rights and opportunity will be given to those who consent to participate in the study.

Participant acknowledgement: I hereby consent to be a participant in the aforementioned research survey. All the details I have read is well understood.

Participant Signature: Date:

Investigator Signature: Date:

Thank you for agreeing to participate in this study

Appendix II: Structured Interview Questions for OR Staff

SECTION A: Biodata

1. What is the name of your hospital.....?
2. Please state your profession
 Theatre Nurse Anaesthetist/Anaesthesiologist Surgeon
3. Gender Male: Female:

SECTION B: Attitude of Staff on Patient safety

Team-work and Safety	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
4. I would feel safe being treated here as a patient					
5. Briefing OR personnel before a surgical procedure is important for patient safety					
6. I am encouraged by my colleagues to report any safety concerns I may have					
7. In the operating room here, it is difficult to speak up if I perceive a problem with patient care					
8. The physicians and nurses here work					

together as a well-coordinated team					
9. Personnel frequently disregard rules or guidelines that are established for the OR					
Attitude towards the checklist	Strongly Agree	Disagree	Neither agree or disagree	Agree	Strongly Agree
10. The checklist is easy to use					
11. The checklist takes long to fill					
12. The Checklist improved OR safety					
13. The checklist improved communication in OR					
14. The checklist helps prevent errors in the OR					
15. If I am to undergo a procedure, I would want the checklist to be used					
Staff Perception & Observation of patient anxiety	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
16. Do you think that a conscious patient may become anxious if we repetitively confirm the patient's identity, the procedure and operation					

site and discuss the potential airway problems and blood loss in their hearing?					
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SECTION C: Factors influencing Adherence to the WHO SSC

In my opinion the potential problems to the correct use of the WHO SSC may be:	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
17. The requirement of signatures					
18. Lack of assertiveness by the staff					
19. Lack of time					
20. Lack of training					
21. The lack of an electronic version of the checklist that could be completed on the theatre computer system					

Appendix III: Key Informant Interview (KII)

Section 1: Factors influencing adherence of the WHO SSC in OR

1. Does this OR use WHO SSC in all procedures? Yes No
If the answer is No, give reasons why you think it is so
2. How useful do you find the WHO SSC?
3. What policy, procedures or guidelines exist in this facility to promote the use of WHO SSC?
4. Have staff been trained on the use of the WHO SSC in this OR?
5. What staff factors do you think influence adherence to WHO SSC?
6. What system factors do you think influence the adherence of the WHO SSC among staff?
7. How will you describe the patient safety culture in your institution?
8. What are some patient safety programs that are currently running?

Section 2: Adherence to the WHO SSC in OR Procedures

9. How would you rate the adherence rate of the WHO SSC in this OR?
10. Why do you rate adherence in that level in 7 above?
11. What factors do you think influence the adherence to the WHO SSC among OR staff?
12. How do you evaluate staff on the correct use of the WHO SSC?
13. What other Quality Assurance (QA) measures are in place to promote surgical safety?

Appendix IV: WHO SSC Data extraction checklist

ITEM	File 1	File 2	File 3	File 4	File 5	File 6	File 7	File 8	File 9	File 10
File Code										
Age (Enter Numeric in Years)										
Gender (1=Male, 2=Female)										
Case Urgency (1=Emergency, 2=Elective)										
Surgical Procedure Type (1=General, 2=Gynae, 3=Orthopaedic, 4=urology, 5=paediatric surgery, 6=Others)										
Mode of Anaesthesia (1=General, 2=Spinal, 3=other)										
Was the WHO SSC utilized (1=Yes, 2=No)										
Adherence to WHO Surgical Safety Checklist										
A. Sign in (With at least a Nurse and Anaesthetist) (Yes=1, No=2)										
1. Did the patient confirm her/his identity, procedure, site and consent?										
2. Was the site marked?										
3. Were the anaesthesia machine and medicines checked?										
4. Was the pulse oximeter on the patient and functional?										
5. Did the patient have any allergies?										
6. Was a difficult airway or aspiration risk anticipated?										

7. Was the risk of >500mls blood loss (7mls/kg in children) anticipated?											
B. Time out (With at least a nurse, surgeon and anaesthetist) (Yes=1, No=2)											
8. The team introduced themselves by name and role?											
9. The team confirmed the patient's name, procedure and where the incision will be made?											
10. Was antibiotic prophylaxis given within 60 minutes prior to surgery?											
11. Critical events by surgeon anticipated?											
12. Critical events by anaesthetist anticipated?											
13. Critical events by nursing team anticipated?											
14. Essential images were displayed?											
Sign Out (With at least a nurse, surgeon and anaesthetist) (Yes=1, No=2)											
15. The Nurse verbally confirmed the name of the procedure?											
16. The nurse verbally confirmed the completion of instrument, sponge and needle count?											
17. The nurse verbally confirmed that the specimen was well labelled?											

18. The nurse verbally confirmed whether there were any instrument concerns to be addressed?										
19. The surgeon, anaesthetist and nurse stated key concerns in the recovery and management of the patient?										
Length of stay after surgery (insert numeric)										

Appendix V: Institutional Scientific and Ethics Review Committee (ISERC) Approval



MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
Tel: 056-31375 P. O. Box 190,
Fax: 056-30153 50100,
E-mail: ierc@mmust.ac.ke Kakamega,
Website: www.mmust.ac.ke KENYA

Institutional Scientific and Ethics Review Committee (ISERC)

REF: MMU/COR: 403012 Vol 6 (01)

Date: May 26th, 2022

To: Taiswa Jonathan
Dear Sir.,

RE: ADHERENCE PRACTICES TO WORLD HEALTH ORGANIZATION SURGICAL SAFETY CHECKLIST IN OPERATING ROOMS IN LEVEL 4 AND 5 HOSPITALS IN KISII COUNTY, KENYA.

This is to inform you that the *Masinde Muliro University of Science and Technology Institutional Scientific and Ethics Review Committee (MMUST-ISERC)* has reviewed and approved your above research proposal. Your application approval number is **MMUST/IERC/064/2022**. The approval covers for the period between **May 26th, 2022 to May 26th, 2023**.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including informed consents, study instruments, MTA will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by **MMUST-ISERC**.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **MMUST-ISERC** within 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to **MMUST-ISERC** within 72 hours.
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- 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 to **MMUST-ISERC**.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke> and also obtain other clearances needed.

Yours Sincerely,

Prof. Gordon Nguka (PhD)
Chairperson, Institutional Scientific and Ethics Review Committee

Copy to:

- The Secretary, National Bio-Ethics Committee
- Vice Chancellor
- DVC (PR&I)

Appendix VI: National Commission for Science, Technology & Innovation (NACOSTI) Research License



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

RefNo: 961743
Date of Issue: 22/June/2022

RESEARCH LICENSE



This is to Certify that Mr. Jonathan Taiswa of Masinde Muliro University of Science and Technology, has been licensed to conduct research in Kisii on the topic: ADHERENCE PRACTICES TO WORLD HEALTH ORGANIZATION SURGICAL SAFETY CHECKLIST IN OPERATING ROOMS IN LEVEL 4 AND 5 HOSPITALS IN KISII COUNTY, KENYA for the period ending : 22/June/2023.

License No: NACOSTI/P/22/18068

961743

Applicant Identification Number


 Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code



NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix VII: Kisii County Director of Health Data Collection Authorization Letter



**KISII COUNTY GOVERNMENT
MINISTRY OF HEALTH
OFFICE OF THE COUNTY DIRECTOR OF HEALTH**

Telegramme "Medical"
Telephone: 0721-422400/0753122723
E-Mail: kisii-county-health-coordinator@gmail.com

Kisii County
P.O Box 92 – 40200,
KISII

When replying quote:

REF: KS/C/HS/42 VOL.III/ (56)

Date: 15th July, 2022

TO WHOM IT MAY CONCERN

RE: AUTHORIZATION OF TAISWA JONATHAN TO CONDUCT A RESEARCH STUDY TITLED "ADHERENCE PRACTICES TO WORLD HEALTH ORGANIZATION'S SURGICAL SAFETY CHECKLIST IN OPERATING ROOMS IN LEVEL 4 AND 5 HOSPITALS IN KISII COUNTY, KENYA"

Reference is made to the above subject matter.

Having met all the requirements, TAISWA JONATHAN REG NO HNR/G/01-52564/2018 is authorized to conduct research in Kisii County within the next 365 days from the date of this letter.

The study will be carried out subject to adherence to the laid down procedures. The researcher should observe confidentiality of study subjects at all times. He should also submit the final report to the County Research Unit for retention and use.

Study timelines exceeding 365 days will require a fresh application that will include an annual progress report.

Kindly accord him any support that he requires that falls within the scope of this study.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'D. Muvengi'.

**KISII COUNTY GOVERNMENT
COUNTY HEALTH DIRECTOR
P. O. Box 92 – 40200
KISII.**

**DR. DANIEL MUVENGEI
COUNTY RESEARCH OFFICER AND COORDINATOR
FOR: COUNTY DIRECTOR OF HEALTH**

Cc: -

- The CEO - KTRH
- All SMOHs – Kisii County

Appendix VIII: Map of Study site- Kisii County Teaching and Referral Hospital



Kisii County Teaching & Referral Hospital
(Study site)