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Implementation of the WHO surgical safety checklist in Kenya - a case of Mater Misericordiae hospital.

Gebre, Tigist Sintayo
Strathmore Business School
Strathmore University

Implementation of the WHO Surgical Safety Checklist in Kenya. A case of Mater Misericordiae hospital

TIGIST SINTAYO GEBRE

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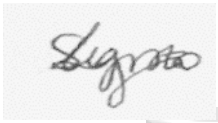
May 2023

DECLARATION

I declare that this research project has not been previously submitted and approved for the award of a degree by this or any other university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Tigist Sintayo Gebre

Signature : 

Authorization

The research project of Tigist Gebre was reviewed and approved for examination by the following:

Name of the Supervisor: Jacinta Nzinga

Signature: 

Faculty Affiliation: Adjunct faculty/Health Systems and Policy Researcher

Institution: KEMRI-Wellcome Trust Research Programme/Strathmore University

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DEDICATION

This research project is dedicated to my entire family for the financial and moral support and the encouragement they have accorded me during the whole process of its development and submission. My supervisor has been very supportive and understanding throughout the process.

ABSTRACT

Surgical checklists have been used by hospitals around the world to improve process efficiency, and team coordination, reduce the adverse outcomes of surgery, and further decrease the overall cost of care. However, studies have shown that despite the use of surgical checklists, the adverse effects of surgical operations, including the rate of mortality and reoperations, remain high, especially in sub-Saharan Africa. To improve the safety of surgery worldwide, in 2008, the World Health Organization's (WHO) Patient Safety Program published the WHO Surgical Safety Checklist, a nineteen- item checklist that acts as a visual aid designed to foster adherence to recommended standards of care and team communication. The checklist has had significant improvements in surgical processes and surgical outcomes in different hospitals, though most of the evidences are reported from high-income countries. The implementation of the checklist, the information on its use, and its impact in low-income countries remain poorly understood. This study sought to examine the implementation experiences of using the WHO surgical checklist and its influence on the delivery of surgical services in a private hospital in Kenya. The study was anchored on Causal Analysis based on Systems Theory. The study was limited to Mater Misericordiae Hospital since it's the leading institution in the country providing a surgical training program and is aacreditaed as a center of excellence for cardiac surgeries. A mixed-methods research design was adopted. The population comprised surgeons, anesthetists, theatre nurses, and medical officers working in the surgical department. Data was collected using semi-structured questionnaires and an interview guide. Quantitative data was cleaned, coded, entered, and analyzed through descriptive statistics using SPSS Version 22.0, while qualitative data were manually coded and thematically analyzed through content analysis. The study found that majority of the health care workers at the Mater Misericordiae hospital were aware of the WHO SSC, and majority used the checklist in the surgical processes in the hospital, but not always. The health care workers acknowledged that the WHO SSC was easy to use; helped reduce human errors; and enhanced the patient's safety in the operating room. The study concludes that aspects such as communication among team members facilitated effective implementation of SSC while barriers such as the high bulk of surgical cases, the turnaround time between cases, lack of resources, understaffing, and lack of adequate training hindered the effective use and implementation of the checklist in the hospital. The study recommends that periodic training for surgical staff to enhance their knowledge and use of the SSC and allocating more resources to ensure adequate and well-trained staff is recommended. This would lead to practical use and implementation of WHO SSC as well as frequent monitoring to ensure compliance with the checklist at all levels in the hospital.

LIST OF TABLES

Table 1: Sampling of study Participants 27
Table 2: Response Rate 31
Table 3: Level of Education 33
Table 4: Occupation of the Respondents in the Hospital 34
Table 5: Whether the Respondents Use the WHO SSC 36
Table 6: Frequency of Use of WHO SSC 37
Table 7: Level of Knowledge on WHO SSC 39
Table 8: Implementation Experiences in Using the WHO SSC 42
Table 9: Barriers Hindering Effective Use of WHO SSC 44
Table 10: Influence of the WHO Surgical Safety Checklist on Surgical Processes and Outcomes 46

LIST OF FIGURES

Figure 1: Conceptual Framework 23
Figure 2: Gender Composition of the Respondents 32
Figure 3: Distribution of Respondents by Age 33
Figure 4: Whether Respondents are Aware of the WHO SSC 35
Figure 5: Staff Training on the Use of WHO SSC 38
Figure 6: Extent the Hospital has Complied with WHO SSC 41

LIST OF ABBREVIATIONS

AEs	Adverse Events
CAST	Causal Analysis based on Systems Theory
COSECSA	College of Surgeons of East, Central, and Southern Africa
HICs	High-income Countries
ISOS	International Surgical Outcomes Study
LMIC	Low Middle Income Countries
MMH	Mater Misericordiae Hospital
OR	Operating Rooms
SSC	Surgical Safety checklist
UK	United Kingdom
WHO	World Health Organization
WHOBARS	WHO Behaviorally Adjusted Rating Scale

TABLE OF CONTENTS

DECLARATION..... ii
DEDICATION..... iv
ABSTRACT..... v
LIST OF TABLES..... vi
LIST OF FIGURES..... vii
LIST OF ABBREVIATIONS..... viii
CHAPTER ONE:..... 1
INTRODUCTION..... 1
1.1 Background to the Study..... 1
1.2 Problem Statement..... 6
1.3 Research Objectives..... 8
1.4 Research Questions..... 8
1.5 Scope of the Study..... 9
1.6 Significance of the study..... 9
CHAPTER TWO..... 11
LITERATURE REVIEW..... 11
2.1 Introduction..... 11
2.2 Theoretical Review..... 11
2.3 Surgical Checklist..... 12
2.4 Surgical Processes and Outcomes..... 14
2.5 Health Care Service Provision in Kenya..... 15
2.6 Empirical Literature..... 16
2.7 Knowledge Gaps..... 22
2.8 Analytical Conceptual Framework..... 22
2.9 Chapter Summary..... 24
CHAPTER THREE:..... 25
RESEARCH METHODOLOGY..... 25
3.1 Introduction..... 25
3.2 The Research design..... 25
3.3 Study Area..... 26

3.4 Population and Sampling 26
3.5 Data Collection Methods 28
3.6 Data Analysis 29
3.7 Research quality- validity, reliability and objectivity 29
3.8 Ethical issues in Research 30
CHAPTER FOUR 31
DATA ANALYSIS, PRESENTATION AND INTERPRETATION 31
4.1 Introduction 31
4.2 Questionnaire Return Rate 31
4.3 Demographic Characteristics of the Respondents 32
4.4. Health Workers' knowledge of WHO Surgical Safety Checklist 34
4.5 Facilitators to Adherence to the WHO SSC Processes 40
4.6 Barriers to Adherence to WHO SSC 43
4.7 Influence of the WHO Surgical Safety Checklist on Surgical Processes and Outcomes 45
4.8 Chapter Summary 47
CHAPTER FIVE 49
DISCUSSION, CONCLUSIONS AND RECCOMENDATIONS 49
5.1 Introduction 49
5.2 Discussion of Findings 49
5.3 Summary of Discussion of the Findings 53
5.4 Conclusion 54
5.5 Recommendations 55
REFERENCES 57
APPENDICES 64
Appendix I: Letter of Introduction 64
Appendix II: Participant information and consent form 65
Appendix II: Questionnaire 68
Appendix III: Interview Guide 71
Appendix IV: Letters of authorization 72

CHAPTER ONE:
INTRODUCTION

This chapter explains the background of the study, problem statement, research objectives, study questions, research hypothesis, scope, and significance of the study.

1.1 Background to the Study

Surgery is an integral part of global health care. It plays a major role in health care worldwide with growing attention to quality and safety in the delivery of such care (Quene *et al.*, 2022). Surgery involves any surgical condition requiring suture, incision, excision, manipulation of organs, or other invasive procedures that usually but do not always require local, regional, or general anesthesia (Haile, 2019). Surgery is an essential element of health care, with an estimated 313 million surgical procedures performed worldwide annually (Meara et al., 2015). Complications are common and occur in 3% to 16% of all surgical procedures (WHO, 2009); with permanent disability or death rates ranging from 0.4% to 2.7% (Weiser & Gawande, 2015). This suggests that at least 1 million patients die, and 7 million patients are injured due to surgical-related complications annually (Borchard et al., 2012). The complication rates are likely to be much higher in low-resource countries, with death rates from major surgery ranging from 5% to 10% (Bickler & Sanno, 2007).

Globally, five billion people lack access to safe, affordable and timely surgical care, and estimates show that more people are dying from lack of high-quality health care than lack of access (Kruk et al., 2018). Sustainable interventions that improve care quality and can be applied at scale are urgently needed. In the realm of surgical care, the World Health Organization (WHO) Surgical Safety Checklist is an intervention consistently shown to reduce mortality and morbidity after surgery (White et al., 2022). Quality surgical care is critical in strengthening health systems to reduce global mortality and morbidity, and achieve health equity and also contributes to achievement of the Sustainable Development Goals (SDGs) 2030 (Quene *et al.*, 2022).

The World Health Organisation (WHO) has been, and is still, considering safe surgery as a significant public health concern in the developing and developed countries (Alnaib et al., 2012). To improve the safety of surgery worldwide, in 2008, the World Health

Organization's (WHO) Patient Safety Program published the WHO Surgical Safety Checklist, a 19- item checklist designed to foster adherence to recommended standards of care and team communication (WHO, 2009). The WHO Surgical Safety Checklist was developed after extensive consultation on how to decrease errors and adverse events and increase teamwork and communication in surgery. WHO also wanted to ensure consistency in patient safety in surgery and introduce (or maintain) a culture that values patient safety (WHO, 2009).

The WHO checklist has 19 items that have been grouped into three 'phases' which entails three safety checks and junctures: "Sign in", "Time out" and "Sign out". At these stages, all operating room team members should stop their activities and pay attention to the check. The patients can also participate in the "Sign in" phase prior to induction of anaesthesia to check identity and planned procedure (Alnaib et al., 2012). The WHO Surgical Safety is presented and elaborated in Figure 1 below.

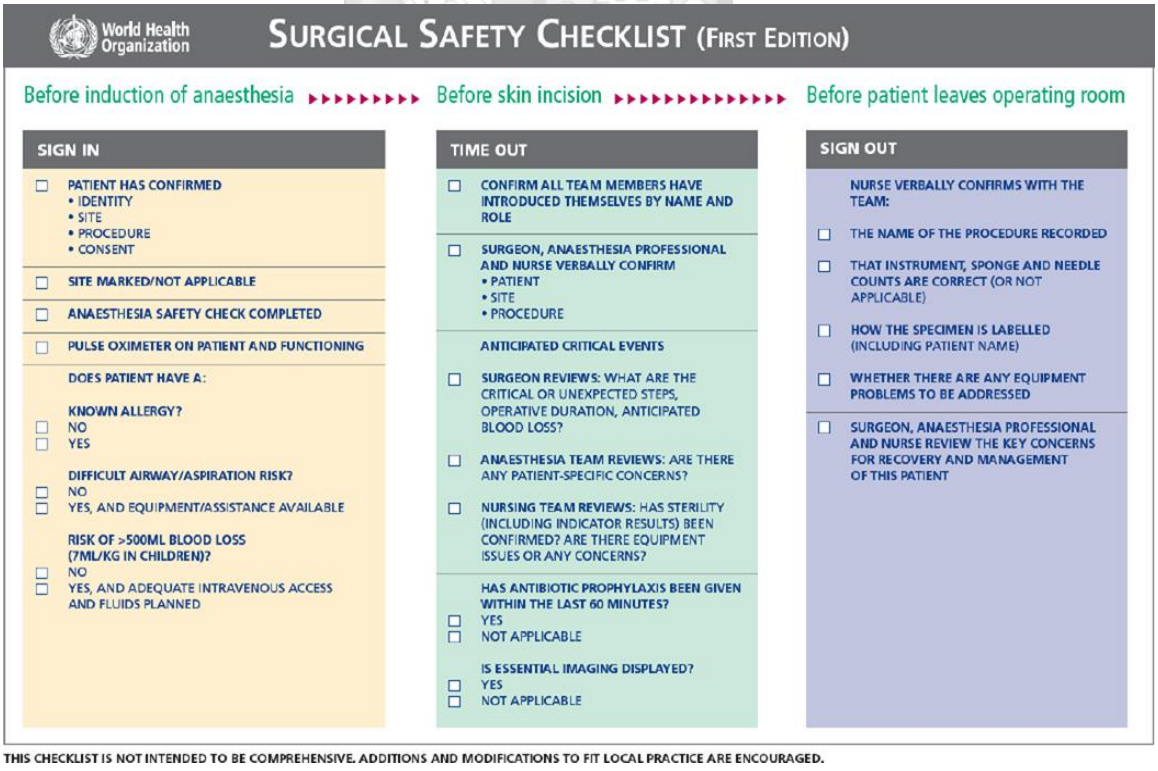

Figure 1: World Health Organization Surgical Safety Checklist (Source: WHO, 2008).

The first phase, "Sign in" it's the stage before induction of anesthesia. Prior to induction of anaesthesia, members of the team orally confirm that the patient has verified his or her

identity, the surgical site and procedure, and consent. It also confirms whether the surgical site is marked or site marking is not applicable. In addition, it confirms the pulse oximeter is on the patient and functioning and whether all members of the team are aware of whether the patient has a known allergy. The patient's airway and risk of aspiration is evaluated and appropriate equipment and assistance are available. If there is a risk of blood loss of at least 500 ml (or 7 ml/kg of body weight, in children), appropriate access and fluids are made available (Woodman & Walker, 2016).

The second stage is "Time out" (before skin incision, with the surgeon present). Prior to skin incision, the entire team (nurses, surgeons, anaesthesia professionals, and any others participating in the surgical process and care of the patient) orally confirms that all team members have been introduced by name and role, the patient's identity, surgical site, and procedure (WHO, 2009). The surgeon reviews the anticipated and unexpected critical events, operative duration, and anticipated blood loss. Anaesthesia staff review concerns specific to the patient. Nursing staff review confirmation of sterility, equipment availability, and other concerns. Prophylactic antibiotics are administered within 60 minutes of the incision or a clarification is made that antibiotics are not indicated. All essential imaging results for the correct patient are checked if displayed in the operating room (WHO, 2009).

The third and the last stage is "Sign out" (before the patient leaves the operating room). Before the patient leaves the operating room, the nurse reviews items aloud with the team, name of the procedure as recorded, and the needle, sponge, and instrument counts. The nurse also confirms the specimen (if any) is correctly labelled, including with the patient's name and whether there are any issues with equipment to be addressed. The surgeon, nurse, and anaesthesia professional review aloud the key concerns for the recovery and care of the patient (WHO, 2009).

The WHO Surgical Safety Checklist has been shown to reduce surgical mortality in various settings. According to Haynes et al. (2009), the checklist helps to improve morbidity, and mortality, reduced surgical site infections and complications after surgery by up to 50% when used appropriately. Evidence from Pugel et al. (2015) indicates that use of WHO Surgical Safety Checklist may prevent communication failures and reduce complications

hence making significant reductions in both morbidity and mortality. This is supported by authors such as White et al. (2022) and Abott et al. (2018) indicates that WHO Surgical Safety Checklist has consistently demonstrated to reduce mortality and morbidity after surgery by 23%-43%. The WHO has therefore recommended the implementation of the Surgical Safety Checklist (SSC) in the operating theatres (OR) to prevent adverse events, strengthen safety practices and improve the quality of care provided to the surgical patient globally (WHO, 2009).

The WHO Surgical checklist is an extremely important facet of enhancing patient safety with better outcomes. In Brazil, Poveda et al. (2021) in their study recognized the importance of the checklist for patient safety on the part of professionals; however there were several weak points in applying the checklist steps for Safe Surgery in Brazilian hospital institutions, especially those related to Time-out and Sign-out. Barimani et al. (2020) while reviewing empirical evidences revealed that majority of studies reported an improvement in outcomes for patients after implementation of the WHO SSC. The major limiting factor for successful implementation was lack of adherence to full completion of the checklist. A major barrier to adoption has been lack of a streamlined and cohesive approach in implementing the checklist, making its adoption difficult within the complex and dynamic environment of the operating theatre. In Iran, the implementation of WHO safe surgery checklist was proposed by the Ministry of Health and Medical Education in the operation rooms of Iranian hospitals in 2011, but was canceled after several years due to some challenges in implementation, which were majorly organizational barriers (Khodavandi et al. 2022). In Ethiopia, Girma et al. (2022) in their study revealed that though use of a surgical safety checklist was promising, its utilization and completion were poor. They found that time-out was the least completed section of the checklist. Completion of the checklist was high in the first case on the positions of the theatre list. Hence there was need to look for ways to improve effective utilization and completeness of the surgical safety checklist.

Tostes and Galvão (2019) assert that implementing the checklist is a complex and challenging process that requires effective leadership, clear delegation of responsibilities to each professional, a collaboration between team members, and institutional support. As

argued by several authors above, implementation of the surgical safety checklist plays a significant role in improving surgical processes and outcomes and improving patient safety, but levels of compliance to a SSC implementation by surgical team members vary significantly due to varied barriers.

Surgical care is an integral part of Universal health coverage (UHC) in Kenya included because surgical disease contributes to an estimated 33% of the global burden of disease (White et al., 2022). Universal health coverage focuses on increased access to care, improved quality of care, and greater financial risk protection, aims to save lives and prevent disability, and is one of the over-arching objectives of the Sustainable Development Goals (SDGs) era. Health is an element well placed in the SDGs. The health goal (SDG 3) is broad: '*Ensure healthy lives and promote well-being for all at all ages*'. The SDG declaration emphasizes that to achieve the overall health goal, '*we must achieve universal health coverage (UHC) and access to quality health care. No one must be left behind'* (World Health Organisation (WHO), 2017). This therefore places the aspect of UHC as at the centre of the SDG 3 health goal.

Even though surgical care is a crucial element of UHC, effective delivery of surgical care in low- and middle-income countries (LMICs) remains low (Okoroh et al., 2015). In addition, utilization of the WHO Checklist in low resource settings is, however, not widespread and its economic impact remains unknown (White et al., 2022). Of the 313 million procedures undertaken worldwide each year, only 6% occur in the poorest countries, where over a third of the world's population lives. Low operative volumes are associated with high case-fatality rates from common, treatable surgical conditions. An estimated 143 million additional surgical procedures are needed in LMICs each year to save lives and prevent disability (Meara et al., 2015).

To make the implementation more successful, some hospitals and especially the private hospitals have domesticated or customized the WHO SSC in order to meet the need of different surgical specialties and other institutional needs. This is in tandem with WHO policy which recommends and encourages modification or customization of the checklist to suit each specialty and setup to bring an ownership to it, which will ensure its successful implementation in order to promote safe surgery.

More attention has increased among researchers not only on the volume and importance of surgery in global healthcare, but also on patient safety and quality in surgical care. Implementing the WHO Surgical Safety Checklist in the clinical environment and more so in African countries can be challenging (Kariyo et al., 2013; Bashford *et al.*, 2014) hence jeopardizing the delivery of safe surgical procedures/ services. This study aimed to document health workers' experiences in implementing a locally adapted WHO surgical checklist in the surgical theatre of a private hospital in Kenya. The study also sought to explore the extent of implementation of the WHO checklist and how its use influences the delivery of surgical services. The study focused on Mater Misericordiae Hospital.

1.1.1 Mater Misericordiae Hospital

The study was conducted at The Mater Misericordiae Hospital (MMH) - founded in October 1962 by the sisters of Mercy. It is a 176-bed capacity hospital with 6 Medical centers in Nairobi. The hospital has six operating theatres that are fully functional and with the capacity to handle major and minor surgeries. The theatres are run by 33 theatre nurses, ten anesthetists, six anesthesia assistants, and 21 surgeons in different specialties. Moreover, the hospital is one of the centers of the COSECSA (College of Surgeons of East, Central, and Southern Africa) surgical training programs in the country. COSECSA is a non-profit professional body that fosters postgraduate education in surgery and provides surgical training throughout the East, Central, and Southern Africa region (cosecsa.org). Mater Misericordiae Hospital (MMH) is also a center of excellence in cardiac surgeries through The Mater Cardiac program.

Mater Misericordiae Hospital was selected since it's one of the leading private institutions in the country that undertakes a surgical training program and is a center of excellence of cardiac surgeries. For these reasons, MMH was chosen as the as the case study since it would provide reliable information/ data on the study topic, given the volume, complexity, and variety of the surgeries that are handled.

1.2 Problem Statement

In modern medicine, surgical procedures are essential for surgically treatable conditions, including cataracts, obstructed labor, a variety of inflammatory conditions, and traumatic injuries that exert a huge burden of diseases on humans and the economy of every country

(Haile, 2019). In addition, surgical care is fundamental and part-and-parcel of Universal health coverage (UHC) because surgical diseases contribute significantly to the global burden of disease (White et al., 2022); and it is essential in achieving Sustainable Development Goal (SDG) Target 3.8 (Albutt et al., 2019). An estimated 313 million surgical procedures are performed worldwide per year (Meara et al., 2015). It is further reported that most of the surgeries that are done in the world occur in high-income countries. The number of surgeries is expected to rise every year across the globe, especially with improvements in technology and human skills in the LMICs. This is likely to contribute to an additional 14.4 million surgeries every year globally (Meara et al., 2015).

Surgical safety through use of WHO Surgical safety has advanced rapidly with evidence of improved patient outcomes. However, knowledge of how to apply and successfully implement is often lacking especially in low- and middle-income settings (White, 2021). Complications and mortality following surgery in sub-Saharan Africa are much higher than in developed countries (Bainbridge, Martin & Arango, 2012; Okoroh et al., 2015). The specific challenges likely to be faced in such settings remain under-researched. Evidence indicate that successful use of WHO Surgical Safety Checklist may prevent communication failures and reduce complications (Pugel et al. 2015), and has also consistently demonstrated to reduce mortality and morbidity after surgery (Abott et al., 2018). According to White et al. (2019) poor and low implementation of the checklist can negate these benefits as is the case in LMICs where evidence of successful implementation is generally limited as compared to that of high-income countries (HICs). Hence, the need to gather evidence on the implementation, barriers and enablers of successful use of Surgical Safety Checklist in low-and middle-income countries such as Kenya.

Although checklists have the potential to improve surgical safety, reduces morbidity and mortality; their ability to do this hinges on the effectiveness of their implementation, an area that remains under-researched in Kenya and other similar low-income countries. The only notable study is by Ojakaa et al (2022) who investigated the determinants of the world health organization surgical safety checklist use among clinicians at Kenyatta National Hospital Nairobi In addition studies (for example Khodavandi et al. 2022; Barimani et al.

(2020); Girma et al. (2022) among others) established that levels of compliance to WHO SSC implementation by surgical team members especially in low-income countries vary significantly due to varied barriers. Therefore, this study aimed to understand the experiences of implementing a surgical checklist in Kenya among the surgical team and its influence on delivery of surgical services. The study first assessed the healthcare workers knowledge of the WHO surgical safety checklist; examined the facilitators and barriers to adherence to the WHO checklist processes; and lastly investigated the influence of the WHO surgical safety checklist on surgical processes and outcomes.

1.3 Research Objectives

1.3.1 Broad Objective

To examine the implementation experiences of using the WHO surgical checklist and its influence on the delivery of surgical services in Kenya: A case of Mater Misericordiae Hospital.

1.3.2 Specific Objectives

i. To assess health workers' knowledge of the WHO surgical safety checklist in Mater Misericordiae Hospital.

ii. To explore the facilitators to adherence to the WHO checklist processes in Mater Misericordiae Hospital.

iii. To examine the barriers to adherence to the WHO checklist processes in Mater Misericordiae Hospital.

iv. To determine the influence of the WHO surgical safety checklist on surgical processes and outcomes in Mater Misericordiae Hospital.

1.4 Research Questions

i. What are health workers' knowledge of the WHO surgical safety checklist at Mater Misericordiae hospital?

ii. What are the facilitators to adherence to the WHO checklist at Mater Misericordiae hospital?

iii. What are the barriers hindering adherence to the WHO checklist at Mater Misericordiae hospital?

iv. What is the influence of the WHO surgical safety checklist on surgical processes and outcomes in Mater Misericordiae Hospital?

1.5 Scope of the Study

This study was carried out at Mater Misericordiae Hospital Operating theatres to explore the implementation experiences of the WHO surgical safety checklist and its influences on surgical care. The theatre staff attitudes, inter-cadre communication, compliance, and implementation were explored in this study.

A self-administered questionnaire (quantitative survey) which included questions on the participants' demographic profile, the attitude of the staff on implementation of the checklist, communication among the theatre staff related to the checklist, and feedback on potential barriers was used. Further comments on the checklist implementation were explored using in-depth interviews, which explored health workers' knowledge, use, and compliance with the checklist.

1.6 Significance of the study

There are limited studies and data on the implementation of the surgical safety checklist in Kenya hence need to explore the implementation experiences of the theatre staff in one of the leading private institutions in the country that undertakes a surgical training program and is a center of excellence of cardiac surgeries.

The study is expected to be of value to the medical staff in theatre at Mater Misericordiae hospital by providing a deeply accurate understanding and overview of health workers' knowledge of the WHO surgical safety checklist at Mater Misericordiae Hospital. The findings will provide an account of the workers' experiences and knowledge to improve their level of knowledge so that they can effectively implement the WHO surgical safety checklist when carrying out surgeries.

In addition, other private and public hospitals may find this study valuable in terms of providing practical recommendations-such as reorientation of surgical work processes and standardization of shared learning that they could apply in their institutions in order to improve their surgical care through adherence of the WHO surgical safety checklist.

It is anticipated that the results of this study will also add to the body of knowledge and provide additional evidence on the implementation experiences of using the WHO surgical safety checklist in LMIC health settings, which are contextually different from the HIC settings where a majority of this research is currently drawn from. Thus, this work will contribute to the implementation science literature and the potentially context-specific evidence that will be useful in improving surgical practices at the study hospital and other similar health facilities in the country.

Lastly, it is also hoped that the findings from this work may provide policy lessons on adaptation and adherence to WHO-recommended guidelines in Kenya and the region. Providing quality health care is a priority for any governments and therefore the study might may provide useful evidence for informed policy formulation, change or improvements on the aspect of surgical care with an aim of reducing mortality and morbidity.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature. The chapter first presents the theoretical foundation describing the theories guiding the study. It further explores various studies that have been reviewed and are of relevance to this study. Previous studies have been reviewed as informed by the research objectives and knowledge gaps identified. Lastly, the chapter presents the analytical, conceptual framework and the chapter summary.

2.2 Theoretical Review

Systems theory is primarily accredited to the Austrian biologist Karl Ludwig von Bertalanffy. It was developed in the 1940s and 1950s to understand the behavior of complex systems in biology and engineering (Von Bertalanffy, 1968). The application of this theory rests on the assumption that most individuals strive to do good work but are also affected by diverse influences and that functional and efficient systems not only account for but also embrace these influences (Anderson, 2016). Systems theory can be used to identify and prevent Adverse Events (AEs) in the complex systems involved in health care today (Leveson et al., 2016)

Causal Analysis based on Systems Theory (CAST) asserts that when errors occur, one ought not to focus solely on individual failings but on the surroundings that allow such events to transpire (Anderson, 2016). The theory simply indicates that accidents are not just the result of individual system component failures or errors but more generally result from inadequate enforcement of constraints on the behavior of the system components. Examples of safety constraints are that preemptive immunosuppression must be administered to patients before receiving a heart transplant or that all required equipment must be available during cardiac surgery (Leveson et al., 2016). Controls enforce the safety constraints. Controls include physical and logical design to reduce or eliminate common errors, checklists, performance audits, altering the order of steps in a procedure to reduce the risk of skipping some, and changing incentive structures (i.e., aligning individual incentives with system-level goals). In general, controls may be physical, procedural, or social. Losses result when the controls are inadequate and flaws in the overall system

design and the interactions among the system components violate the safety constraints. Safety is treated not as a human reliability problem but as a control problem where the system design should prevent (control) unsafe behavior (Leveson et al., 2016).

The CAST approach is based on the principle that accidents are not only the result of individual system component failures or errors but more generally result due to inadequate enforcement of constraints on the behavior of the system components (i.e., safety constraints enforced by controls, such as checklists) (Leveson et al., 2020). Safety is treated not as a human reliability problem but as a control problem in which the system design should prevent or control unsafe behavior. In the case of this study, the WHO surgical checklist is being evaluated (as a tool to enhance safety in surgical care) and its effect on the safety and delivery of quality surgical care/ services. The goal of the CAST in this case is to evaluate the implementation of the WHO checklist, identify the limitations of the safety control structure, examine the process and outcomes, and identify how to strengthen the structure in the future.

This theory therefore guides the approach adopted in this study by helping identify the system components that facilitates or hinder the implementation of the WHO surgical checklist and the influence of implementation of WHO SSC on the surgical processes and outcomes of surgeries, that is, in terms of surgical complication, mortality rates, morbidity and delivery of quality surgical care. This theory therefore guides the study in its entirety including the specific objectives.

2.3 Surgical Checklist

The WHO's surgical checklist contains 19 checks to be read aloud to the whole team at each of the three stages of an operation - sign in, time out, and sign out. This WHO Checklist aims to give teams a simple, efficient set of priority checks to reinforce accepted safety practices, improve effective teamwork, foster better communication, and encourage active consideration of patient safety for every operation performed to reduce unnecessary surgical deaths and complications (World Health Organization, 2009; Georgiou et al., 2018).

Furthermore, the WHO patient safety- in consultation with surgeons, anesthetists, nurses, patient safety experts, and patients around the world-has identified ten essential objectives for safe surgery as follows: The team will operate on the correct patient at the correct site; the team will use methods known to prevent harm from the administration of anesthetics while protecting the patient from pain; the team will recognize and effectively prepare for life-threatening loss of airway or respiratory function; the team will recognize and effectively prepare for risk of high blood loss; the team will avoid inducing an allergic or adverse drug reaction for which the patient is known to be at significant risk; the team will consistently use methods known to minimize the risk of surgical site infection; the team will prevent inadvertent retention of instruments and sponges in surgical wounds; the team will secure and accurately identify all surgical specimens; the team will effectively communicate and exchange critical information for the safe conduct of the operation. Lastly, the hospitals and public health systems will establish routine surveillance of surgical capacity, volume, and results (WHO Patient Safety & World Health Organization, 2009).

These objectives were then compiled into what is now referred to as the WHO surgical safety checklist to minimize unnecessary loss of life and serious complications. In 2008, a WHO-funded study in eight countries (Toronto, Canada; New Delhi, India; Amman, Jordan; Auckland, New Zealand; Manila, Philippines; Ifakara, Tanzania; London, England; and Seattle, Washington) reported impressive results on the use of the surgical checklist. Overall, surgical complications within 30 days of operating fell from 11% at baseline to 7% after the checklist was implemented, and in-hospital deaths fell from 1.5% to 0.8%. These observations were consistent with other surveys that have also demonstrated the checklist's potential in effectively reducing surgical complications and mortality rates (Haynes et al., 2009. McLachlan (2019) revealed that checklists could help reduce mortality and morbidity, but only if they are well implemented and used systematically. Although the adoption of a surgical checklist is strongly recommended worldwide as an effective practice to improve patient safety, several studies have reported mixed results and several issues remain unresolved (Rodella *et al.*, 2018).

Furthermore, while evidence shows that a surgical safety checklist is associated with significant reductions in postoperative complication and death rates (Haynes et al. 2009, Weiser et al. 2010; Patel, 2014; McLachlan, 2019), similar evidence from resource-poor settings is limited. In the multinational study of eight pilot sites in WHO's Safe Surgery Saves Lives program, results from the low-resource sites could not be distinguished from the LMIC sites, making it difficult to test apart the use of the checklist in these varied settings (Haynes, 2009). Thus, although a potentially cost-effective approach to improving the quality of surgical care (Semel et al. 2010), empirical data to support the widespread use of the checklist in LMICs is lacking. Moreover, though almost 200 registered institutions in Africa are reported to be using the checklist (Safe Surgery in Africa 2012), complications and mortality following surgery in sub-Saharan Africa remain far higher than in developed countries (Bainbridge, Martin & Arango, 2012). Therefore, the specific challenges faced in such settings ought to be investigated.

2.4 Surgical Processes and Outcomes

The delivery of safe surgical care is a complex and multifaceted issue. According to WHO (2008), in all surgical procedures, an estimated 3% to 16% of complications are likely to occur. Hence, the operating room (OR) is one of health care's most complex work environments. However, up to 50% of these complications are considered avoidable errors (de Vries et al., 2008). It has been demonstrated that the implementation of the WHO Surgical Safety Checklist (SSCL) can reduce surgical mortality in a range of surgical settings (Haynes et al., 2009; McLachlan, 2019).

In Africa, a survey conducted by Kariyo et al. (2013) to review the implementation of the WHO surgical safety checklist in 15 countries (15 hospitals) revealed that of the 15 hospitals surveyed, 10 (67%) had successfully implemented the checklist. Four out of ten hospitals (40%) adapted the SSCL to suit their local conditions, while the other six (60%) used the generic WHO version. None of the implementing hospitals had completed implementation in all of the institution's operating rooms (OR). The mean compliance rate of use of the checklist was 48.5% while the mean duration of use was 9.2 months. The main barriers identified were staff resistance in 70% of the hospitals that implemented the checklist and the perception that the SSCL was not a priority in all hospitals. However,

enabling factors identified included the presence of a strong hospital leadership support, group discussions, and regular meeting to address arising issues from the use of SSCL and, in one hospital, making the SSCL mandatory. Problems associated with surgical safety in the developing world included the poor state of infrastructure and equipment, unreliable supplies and quality of medications, shortcomings in organizational management and infection control, difficulties in the supply and training of personnel, and severe under-financing (WHO, 2009).

2.5 Health Care Service Provision in Kenya

Health services in Kenya are provided by both the public and private sector. Health care delivery in Kenya has undergone numerous reforms since gaining independence in 1963. One of the notable development happened in 1994, where the Government of Kenya (GOK) approved the Kenya Health Policy Framework (KHPF) as a blueprint for developing and managing health services. It spelled out the long-term strategic imperatives and the agenda for Kenya's health sector. To operationalise the document, the Ministry of Health (MOH) developed the Kenya Health Policy Framework Implementation Action Plan and established the Health Sector Reform Secretariat (HSRS) in 1996 under a Ministerial Reform Committee (MRC) in 1997 to spearhead and oversee the implementation process (Muga et al., 2005). The other and most recent major reform is the devolution of health service delivery and management to 47 county governments as provided in the Fourth Schedule of the 2010 Constitution, while the central Ministry of Health coordinates with local authorities on the distribution of funding and supplies and synthesizes guidelines for national health policy. All these developments have been geared to improve health care service provision.

Kenya also developed the National Health Policy 2014–2030 which is a local framework that guide health care delivery. The policy is designed to, among other things, to reduce disability, reduce annual death and increase life expectancy by the year 2030 (Republic of Kenya, 2014). According to Shirley and Wamai (2022) surgery will play a critical role in achieving these goals, and hence the need improve access to surgery and quality of surgical care.

Kenya's health care system is structure as a 6-tiered framework for health care delivery, from local community-based health units up to national referral hospitals. The six levels are: Level 1 (Community Facilities) run by certified medical clinical officers; Level 2 (Health Dispensaries)- run by clinical officers; Level 3 (Health Centres); Level 4 (County Hospitals); Level 5 (County Referral Hospitals) and Level 6 (National Referral Hospitals). There are six different levels of health care facilities. The first five are managed on the county level, the sixth level by the national government. Apart from the public health facilities falling under the county and national governments management, there are also private hospitals run by individuals or organisations and faith-based hospitals in Kenya's Health sector.

2.6 Empirical Literature

2.6.1 Health Workers' Knowledge of the WHO Surgical Safety Checklist

Various studies (such as Vats et al., 2010; Bansah, 2019; Dangyangs & Afonne, 2016, among others) have shown that health care professionals' knowledge also plays a crucial role in correct and compliant checklist use. Vats et al. (2010) explicitly identified lack of knowledge as a critical aspect for incorrectly using the checklist and concluded that the better people are educated about how and why to use the surgical checklist, the more compliant they are.

Schwendimann et al. (2019) examined the level of adherence to the WHO surgical safety checklist through a mixed-method observational study conducted in the surgical department of the University Hospital of Basel, Switzerland. Data was collected through individual structured interviews with selected operating room (OR)team members regarding checklist adherence and on-site non-participant observations of Team Time Out and Team Sign Out sequences in the OR. Comprehensive local expert interviews indicated that individual, procedural and contextual variables influenced the application of the checklist. Facilitating factors included well-informed specialists who advocated the use of the checklist, as well as teams focused on the checklist's intended process and its content. This study, therefore, emphasizes that specialists (health workers) should be well informed and knowledgeable for effective implementation and adherence to the WHO surgical safety checklist.

Bansah (2019) investigated the factors influencing the acceptability and utilization of the WHO SSC among surgical personnel in Korle-Bu Teaching Hospital (KBTH) in Ghana. This cross-sectional study employed quantitative data collection with186 surgical personnel at the KBTH in Ghana. The study found a high level of awareness and acceptability of the WHO SSC among theatre staff at the KBTH. Adherence, however, was low as only 30.4% of surgical personnel at the KBTH used the SSC all the time. The study further established that the majority (67.7%) of the surgical personnel had no training on the use of the SSC and the proportion was significantly higher among the Surgeons (81.2%) as compared to the Nurses (51%) and Anesthesiologists (66.7%). The study identified gaps in knowledge and utilization of the WHO SSC among theatre staff. It recommended periodic training for surgical staff to enhance their understanding and use of the SSC. In a study on overcoming challenges in implementing the WHO Surgical Safety Checklist, Close et al. (2017) established that training programs help hospitals (and health workers) to successfully overcome several implementation challenges and that training can change the general practice in the hospital and enhance the successful implementation of the SSC.

Dangyangs and Afonne (2016) examined the level of awareness, knowledge, and perception of the safe surgery checklist and its implementation in Nigeria. The study was conducted on 68 theatre staff in Jos University Teaching Hospital, Plateau State. It was found that while most of the theatre staff were aware (had heard) of the SSC, only 32.4% could identify the three fundamental issues in the SSC. 39.7% could not mention at least one objective of the SSC, while 95.6% could not correctly mention the three phases of the SSC in the order they are to be followed. This posed a challenge in the implementation of the SSC. These findings underscore the need for proper training and education of the surgical team members on the full knowledge of the SSC. The study recommended more awareness and the need for training to impact understanding of why and how the checklist should be used.

2.6.2 Facilitators to Adherence to the WHO surgical Safety Checklist

Aveling, McCulloch, and DixonWoods (2013) conducted a study comparing experiences of surgical checklists in hospitals in high-income (HICs) and LMICs. The study was conducted in operating theatres in one African university hospital and two UK university

hospitals. It was identified that there was consistent use in the UK setting compared to the African setting. The UK hospitals were observed to have fully completed and documented checklist use in over 90% of the procedures. In the African hospital, however, use of the checklist was highly inconsistent, and direct observations induced a Hawthorne effect, where checklist use increased from a few procedures early in the initial days of the study visits to all procedures by the last days of the visit. In addition, completeness in the use of the checklist highly varied from one procedure to another, and fidelity was problematic. Sometimes checks were performed before or after the procedure rather than in real-time. In the African setting, material shortages posed the most significant barrier to the complete use of the checklist. The study further underlines that resource constraints in LMICs result in poor implementation of the checklist. This might not only fail to reduce patient safety risks but also introduce new risks for staff and/or patients. It was concluded that introducing a checklist will not automatically lead to improved communication and better clinical processes. Therefore, safety checklists are most likely to be effective and sustainable when implemented as part of broader, multifaceted programs addressing social, behavioral, logistical, and organizational issues, where there is a strong institutional focus on patient safety, multidisciplinary leadership, monitoring systems in place, and consequences at all levels for non-compliance.

Böhmer et al. (2012) surveyed employees' attitudes concerning safety-relevant aspects of the perioperative period, work processes, and quality of inter-professional cooperation before and three months after introducing an adapted form of the 'Surgical Safety Checklist.' It was found that after the implementation of the checklist, the recognition of the names and functions of the individual operating room staff members, verification of the patient's written consent for surgery, indication for antibiotics before surgical incision, and the quality of inter-professional cooperation and relation were rated more positively. Surgeons were convinced that all artifacts had been removed from the surgical field. Finally, team communication about intraoperative complications had improved and the checklist was seen to enhance communication between the operating room staff.

Bashford et al. (2014) evaluated the implementation of the WHO Surgical Safety Checklist in a public referral hospital in Addis Ababa, Ethiopia, using a completed Checklist analysis

and staff satisfaction questionnaires. It was found that the checklist compliance rates were 83% for general anesthetics one month after implementation, with an overall compliance rate of 65% at eight months. The 'Sign out' section was reported as the most difficult section of the Checklist to complete and was entirely missed in 21% of cases. The single most commonly overlooked item was the team introduction at the start of each case.

2.6.3 Barriers to Adherence to the WHO surgical Safety Checklist

A review of the literature shows that in China, Gong et al. (2021) investigated the attitudes and barriers of implementation of the surgical safety checklist among gynecological surgery teams. The study established that there various factors affecting implementation of SSC. "Too many operations to check", "Surgeon is eager to start for surgery", "No one initiates" and "Surgeon is not present for 'sign out'" were commonly cited as barriers effective implementation of SSC. The study recommended that surgical team members' excessive workloads should be reduced and their understanding of importance of SSC implementation enhanced, thereby improving surgical team members' effective implementation and compliance with SSC.

In Madagascar, a nationwide survey by White et al. (2018) to examine the implementation of the Surgical Safety Checklist at 12–18 months post-implementation focused on the secondary outcomes of basic safety processes, assessment of team behavior, predictors of checklist use, impact on individuals and organizational culture and identification of barriers. Data were collected during a 1-day hospital visit using validated questionnaires, WHO Behaviorally Adjusted Rating Scale (WHOBARS) assessment tool, and focus groups and analyzed using descriptive statistics, multivariate linear regression, and thematic analysis. It was found that 74% reported sustained checklist use after 15 months. Sustained checklist use was associated with an improved overall understanding of patient safety. A further 87% reported improved understanding of patient safety, while 83% reported increased job satisfaction. Thematic analysis identified improvements in hospital culture (teamwork and communication, preparation and organization, trust and confidence) and hospital practice (pulse oximetry, timing of antibiotic prophylaxis, introduction of a surgical count). Lack of time in an emergency and obstructive leadership were the most significant implementation barriers.

In Uganda, Lilaonitkul et al. (2015) examined the implementation of the WHO Surgical Safety Checklist at Mbarara Regional Referral Hospital. Compliance rates were evaluated prospectively, and monthly structured feedback sessions were held. The findings showed that understaffing, malfunctioning and lack of equipment were the main challenges hindering the effective implementation of the WHO checklist. According to Tostes and Galvão (2019), implementing the checklist requires effective leadership, clear delegation of responsibilities from each professional, a collaboration between team members, and institutional support.

A study by Mahmood et al. (2019) on the challenges in the implementation and use of the surgical safety checklist established that there was insufficient compliance with surgical safety checklist which was as a result of limited staff "buy in," arising from the "top-down" mandated nature of the surgical safety checklist, the perceived lack of benefit in surgical safety checklist completion, and redundancies with other operating room processes. The study suggested that surgical safety checklist quality may be enhanced through better calibration of the surgical safety checklist with existing procedures and staff expectations through a bottom-up implementation strategy.

2.6.4 Influence of WHO Surgical Safety Checklist on Surgical Processes and Outcomes

One of the critical studies that show the relationship between the WHO surgical safety checklist and the delivery of surgical services was conducted by Haynes et al. (2009) in eight hospitals in eight cities (Toronto, Canada; New Delhi, India; Amman, Jordan; Auckland, New Zealand; Manila, Philippines; Ifakara, Tanzania; London, England; and Seattle, WA) representing a variety of economic circumstances and diverse populations of patients who participated in the World Health Organization's Safe Surgery Saves Lives program. It was established that the death rate declined to 0.8% from 1.5% after the checklist was introduced, while inpatient complications reduced to 7.0% from 11.0% of patients at baseline after the introduction of the checklist. It was concluded that implementation of the checklist was associated with the safe delivery of surgical services due to reductions in the rates of death and complications.

In another study, Weiser et al. (2010) examined the effect of the WHO 19-Item surgical safety checklist during urgent operations to establish whether implementation of a surgical safety checklist in urgent surgical cases would improve compliance with basic standards of care and reduce rates of deaths and complications. The study prospectively collected clinical process and outcome data for 1750 consecutively enrolled patients 16 years of age or older undergoing urgent non-cardiac surgery before and after the introduction of the WHO Surgical Safety Checklist in 8 diverse hospitals worldwide. It was found that the complication rate was 18.4% at baseline and 11.7% after the checklist was introduced. Death rates dropped from 3.7% to 1.4% following the checklist introduction. Adherence to 6 measured safety steps improved from 18.6% to 50.7%. It was concluded that the implementation of the checklist was associated with a greater than a one-third reduction in complications among adult patients.

An experimental study done in two Liberian hospitals by Yuan et al. (2012) reported that the implementation of the WHO surgical checklist had an impact on surgical outcomes in one hospital, while in the other, it had an impact on the surgical processes. In Hospital 2, the introduction of the checklist was significantly associated with improved surgical outcomes but not with improved adherence to four or more safety processes. Conversely, in Hospital 1, the checklist was significantly associated with improved adherence to four or more safety processes but not associated with improved surgical outcomes. The authors explained that the differences at the hospital level suggest that the checklist's mechanism of improvement may be influenced by the availability of resources needed to complete recommended processes, variation in team functioning, and organizational context. The above findings are in agreement with those of White et al. (2018), who reported that the checklist had a role in the improvement of the operating room safety practices contributing to increased use of pulse oximetry, the introduction of counting of surgical needles, swabs, and instruments and better administration of antibiotic prophylaxis.

Patel et al. (2014) assess the use of the WHO Surgical Safety Checklist and its impact on patient safety through a literature review of 16 studies across various surgical specialties; pediatric surgery, orthopedic surgery, otorhinolaryngology surgery. It was established that surgical checklists have been shown to significantly improve patient outcomes after

surgery, and therefore their use was being widely encouraged and accepted to enhance patient safety in the surgery room. These findings are also reinforced by recent evidence from a study by Pugel et al. (2015)' which also revealed that compliance with the checklist is critical for patient safety to be realized. The checklist was found to improve delivery of surgical services, hence reducing surgical morbidity and mortality.

2.7 Knowledge Gaps

A review of the existing literature shows that while evidence shows that a surgical safety checklist is associated with significant reductions in postoperative complication rates and death rates (Haynes et al. 2009, Weiser et al. 2010; Patel, 2014; McLachlan, 2019), similar evidence from resource-poor settings is limited. In the multinational study of eight pilot sites in WHO's Safe Surgery Saves Lives program, results from the low-resource site could not be distinguished from the LMIC sites, making it difficult to test apart the use of the checklist in these varied settings (Haynes, 2009). Thus, although a potentially cost-effective approach to improving the quality of surgical care (Semel et al. 2010), empirical data to support the widespread use of the checklist in LMICs is lacking. Moreover, though almost 200 registered institutions in Africa are reported to be using the checklist (Safe Surgery in Africa 2012), complications and mortality following surgery in sub-Saharan Africa remain far higher than in developed countries (Bainbridge, Martin & Arango, 2012).

Therefore, the specific challenges faced in such settings ought to be investigated. Several studies have been conducted on the implementation of the WHO Surgical Safety Checklist. Most of these studies have been conducted in high-income countries (developed countries) and not in low-income countries (developing countries). In addition, there is limited literature on the implementation experiences in developing countries such as Kenya and limited empirical evidence on how the WHO surgical checklist influences delivery of surgical services. This study seeks to fill this knowledge gap by unearthing the implementation experiences of using the WHO surgical checklist in a Kenyan hospital, and its influence on delivery of surgical services.

2.8 Analytical Conceptual Framework

The conceptual framework in Figure 1 below shows the hypothesized relationship between the independent variables and the dependent variables in the study.

Independent Variables

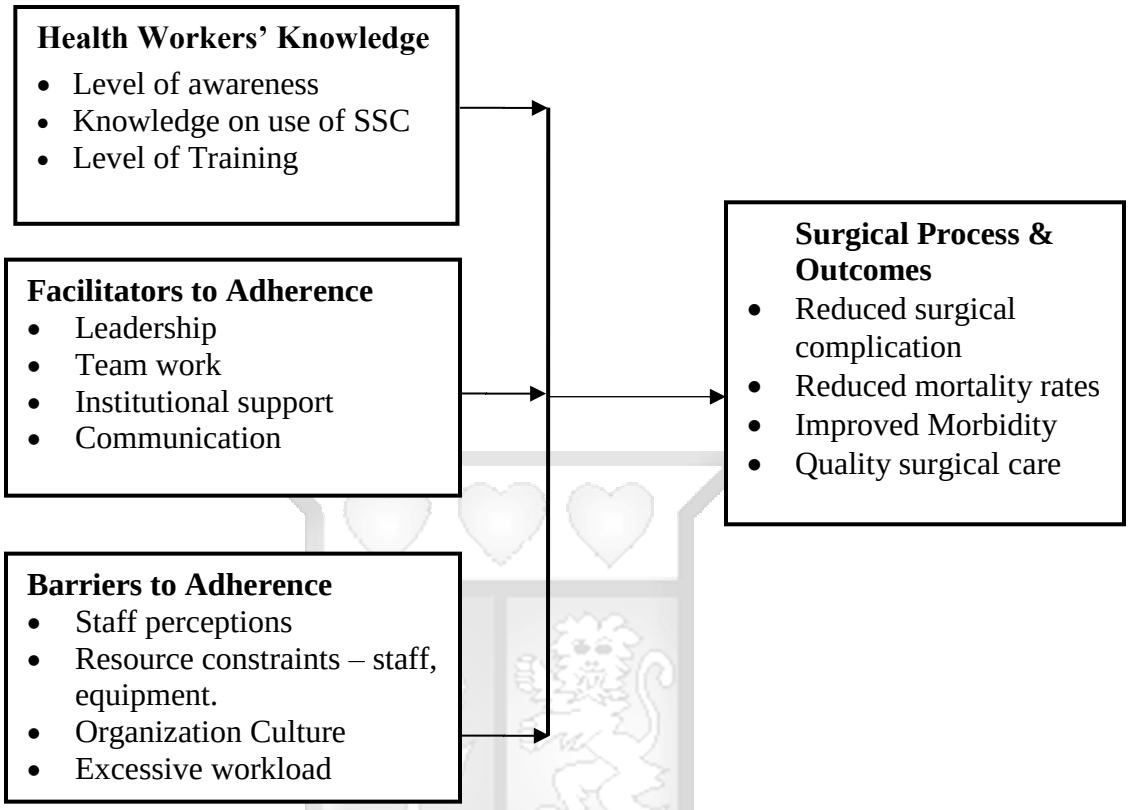

Figure 1: Conceptual Framework

As shown in Table 1, the independent variables are: Health workers' knowledge (measured by level of awareness, knowledge on use of SSC and level of training); Facilitators to adherence (measured by leadership, team work, institutional support and communication); and barriers to adherence (measured by staff perceptions, resource constraints – staff, equipment, organization culture, excessive workload).

The dependent variable is surgical processes and outcomes which was measured by reduced surgical complication, reduced mortality rates, improved morbidity and quality surgical care). From the conceptual framework, the study hypothesized that Health workers' knowledge of the WHO SSC, facilitators and barriers to adherence of the WHO SSC has an influence on the surgical processes and outcomes at Mater Misericordia Hospital.

2.9 Chapter Summary

This chapter covers the theoretical foundation, empirical review, knowledge gaps and conceptual framework. Under theoretical foundation, this study is anchored on Causal Analysis based on Systems Theory (CAST). In the empirical review, the study has discussed various studies from both high-income countries (developed countries) and not in low-income countries (developed countries). The empirical review is based on the research objectives. The chapter ends with a conceptual framework which the hypothesized relationship between the variables (independent and dependent variables) in the study.

CHAPTER THREE:
RESEARCH METHODOLOGY

3.1 Introduction

This section outlines the general approach and the various techniques employed to collect and analyze data. The chapter is organized into research design, study area, target population, sampling technique, sample size determination, data collection methods, data collection procedures, data analysis and ethical considerations.

3.2 The Research design

The study design was a mixed methods research approach, combining both qualitative and quantitative methods to understand a research problem. It involves both collecting and analyzing quantitative and qualitative data. Mixed methods design provides researchers, across research disciplines, with a rigorous approach to answering research questions (Creswell, 2014). The study employed both quantitative and qualitative research methods sequentially.

On the qualitative approach, the study helped to provide an in-depth approach to exploring the phenomena e.g., attitudes, perceptions, practices, etc. using interviews as a data source. On the other hand, quantitative helped collect quantifiable data from participants (a large number of participants); analyze the numbers using statistics; and conduct the inquiry in an unbiased, objective manner. The design also facilitated the use of an interview schedule and questionnaire respectively. The researcher found mixed methods design to be the most appropriate design for this study since it gives mixed data sets. It offers the best chance of answering research questions by combining two sets of strengths while compensating at the same time for the weaknesses of each method which give a better understanding of the problem and yield more complete evidence (Doyle et al., 2016). In addition, mixed methods design helps the researcher gain both depth and breadth; whereas quantitative data bring breadth to the study and qualitative data provides depth to it (Dawadi et al., 2021).

3.3 Study Area

The study was conducted at the Mater Misericordiae Hospital (MMH) - founded in October 1962 by the sisters of Mercy. It is a 176-bed capacity hospital with 6 Medical centers in Nairobi. The hospital has six operating theatres that are fully functional and with the capacity to handle major and minor surgeries. The theatres are run by 33 theatre nurses, ten anesthetists, six anesthesia assistants and 21 surgeons in different specialties. Moreover, the hospital is one of the centers of the COSECSA (College of Surgeons of East, Central and Southern Africa) surgical training programs in the country. COSECSA is a non-profit professional body that fosters postgraduate education in surgery and provides surgical training throughout the East, Central and Southern Africa region (cosecsa.org). The Mater Misericordiae Hospital (MMH) was chosen because it is a center of excellence in cardiac surgeries through The Mater Cardiac program. MMH is also an ideal study site given the volume, complexity and variety of the surgeries handled within the facility.

3.4 Population and Sampling

The study targeted all qualified surgeons who have attained a Master of Medicine (MMed) degree in Surgery from a recognized institution and working at MMH. It also included anesthetists, theatre nurses and medical officers working in the surgical department at the time of data collection.

The study included all qualified surgical staff practicing at Mater Misericordiae Hospital as well as all qualified surgical staff who gave informed consent to participate in the study. The study excluded qualified surgical staff who had worked in the hospital for less than two weeks, and surgical staff who did not consent to the study (not willing to provide information even after being provided with full details of the study and intended use of output and after assurance of confidentiality and ethical approval).

A total of 92 research participants (40 Surgical Consultants, 9 Surgical Residents, 10 Anesthetists, and 33 theatre Nurses were included in the study on the use of the checklist. The population was grouped based on the various professional cadres (strata). Since there were no previous studies on how often surgical checklists are used at the Mater Misericordiae Hospital, the study used a universal sampling technique of all the clinical staff who were deployed in the surgical department as represented in the table below:

Table 1: Sampling of study Participants

Professional Cadre	Numbers for the quantitative study	Numbers for the qualitative study
Surgical Consultants	40	5
Surgical Residents	9	5
Anesthetists	10	5
Theatre Nurses	33	5
Total	**92**	**20**

Therefore, a total of 92 research participants were included in the quantitative survey on the use of the checklist.

Thereafter, from this sample of 92, through purposive sampling, different members of each cadre were randomly selected for interviews in criteria that aimed to ensure representation across professions, age, gender and experience. Thus, for each cadre, 5 participants were purposively identified for in-depth interviews, resulting to a total of 20 in-depth interviews although this number was also guided by point of data saturation (i.e., stopping when no new information is being reported). The study purposively picked only 5 participants in each cadre; and they were deemed adequate. The study chose to have a small but valuable, and information-rich number of participants that would give reliable information for the qualitative study.

Purposive sampling (also called judgment or selective sampling) is a sampling technique in which researcher relies on his or her own judgment when choosing members of population to participate in the study (Palys, 2008). Purposive sampling was employed in this study since only specific participants with specific characteristics were required (health workers in working in theatre and/or in the surgical department spread to represent different professional cadres, variation in age and length of experience working in theatre & surgical departments and ensuring representation of both genders). According to Ames et al. (2019) purposive sampling is widely used in qualitative research for the identification and selection of information-rich participants to take part in the study. The researcher used own judgment in order to research participants and especially those who participated in in-depth interviews.

3.5 Data Collection Methods

The data collection tools that were used in this study were both quantitative and qualitative. The study used a questionnaire and in-depth interview guide. The questionnaire was semi-structured and contained both closed- and open-ended questions. The closed questions included likerst scale questions. The questionnaire had questions on the participants' (health workers) demographic profile, the attitude of the staff on implementation of the checklist, communication among the theatre staff related to the checklist, feedback on potential barriers and further comments on the implementation of the checklist. The questionnaire was administered to the health workers during break periods, earlier on, or at the end of their shifts to ensure minimum disruption of routine service provision. The questionnaire was deemed appropriate for collecting quantitative data for this study because it is easier to collect data in a standardized way, it is easier to analyze, it's easy to administer especially on a large sample, and the research participants can complete filling within a short time (Kothari, 2011).

The qualitative in-depth interviews were used to complement data collected from the questionnaires mainly focusing on collating information on how experiences, attitudes and influences of using the checklist interact with the processes of delivery of surgical services. Interviews were conducted with 20 participants, 5 from each cadre. The interviews were conducted through use of an interview guide at a time and place of convenience to the participants, lasted 30 minutes in the English language and were audio-recorded after consenting and notes were taken as backup to the recordings. An interview guide helped probe deeper on the subject matter from the respondents who had been purposively selected.

The development of the questionnaire and in-depth interview was guided by the conceptual framework variables and indicators; previous empirical work from other others and through guidance by the study supervisor. Both tools were piloted before use and adjusted for face and construct validity. Additionally, the tools were checked for common errors like double-directed, confusing, and leading questions for discussion. The unclear items were then reviewed, and adjustments were made before final tools' construction and before they were administered to the participants (please see sample data collection tools in the Appendices).

3.6 Data Analysis

The questionnaires were checked for completeness, coded and entered into Statistical Package for the Social Sciences (version 22) software for analysis. Descriptive statistics was calculated using median, IQR, frequencies, and percentages on the knowledge and practice aspects of using the checklist. These were then reported as calculated proportions and where appropriate confidence intervals were reported. The preliminary results from the quantitative analysis were used to refine the interview guide in a manner that provided a deeper understanding of some of the issues around implementing the checklist that could not be elucidated from the questionnaires.

Audiotaped data from the interviews were transcribed into Microsoft word together with any hand-written notes taken during the discussions. These transcripts were cleaned and checked for errors and completeness before manually coding them using a coding framework developed from a combination of the research objectives and tool items and informed by relevant prior literature. The data was inductively analyzed using thematic content analysis and allowing for emerging themes during the first layer of coding. The second layer of coding was the categorization of the first-order themes into larger categories using emerging patterns and interrelationships across the themes and in discussion with the supervisor. The final themes were presented alongside the quantitative data and cross-referenced for complementarity.

3.7 Research quality- validity, reliability and objectivity

Validity, reliability and objectivity of the research were checked to enhance research quality. The research instruments (questionnaires and interview guides) were checked/ tested for validity and reliability. This was ensured by pre-testing during piloting with a sample of 5 participants to ensure the items in the questions were relevant.

Validity is defined as the degree to which an instrument measures the attributes of a concept accurately (LoBiondo-Wood & Haber, 2010). To establish the validity, the data collection instruments were subjected to a review by the supervisor and the defense panel, who understand the area of study. This panel of experts reviewed and evaluated whether the questions effectively capture the topic/ issues under investigation.

Reliability is defined as an instrument's ability to measure a concept's quality consistently (LoBiondo-Wood & Haber, 2010). To test for reliability, Cronbach alpha (*a*) was used – it is the most commonly used measure of internal consistency reliability. The reliability analysis was performed using SPSS software. The Alpha coefficient ranges in value from 0 to 1. An alpha value of 0.7 and above has been agreed upon by various authors (such as Tavakol & Dennick 2011), as an excellent value to indicate that an instrument is reliable. The higher the score, the more reliable the generated scale is.

3.8 Ethical issues in Research

Ethical approval was first sought from the Stathmore University Institutional Ethics Review Committee (SUIERC) as well as the National Commission for Science, Technology and Innovation (NACOSTI). With the two approvals, permission was sought from the Mater Misericordiae Hospital Ethics and Research Committee. It is with these approvals/ permits that the researcher was granted access to get audience with the respondents to undertake the study. All the study participants received information sheets giving them necessary details on the research and an assurance that the information collected would be used solely for educational purposes and to improve health care services offered to the public.

Confidentiality was maintained throughout the study by avoiding the use of participants' names in the questionnaires and during the interviews; they were allocated codes instead to ensure anonymity. The data would only be available to the researcher and supervisor for analysis and was not shared with other people.

The results of this study will be shared with the relevant stakeholders, including the COSECSA Program Director, The Medical Director, The theatre In Charge and the head of Surgical Department at The Mater Misericordiae Hospital to improve service delivery.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents and discusses the data findings from questionnaires and interviews conducted with theatre medical staff at Mater Misericordiae Hospital. This study aimed to examine the implementation experiences of using the WHO surgical checklist and its influence on delivery of surgical services in Kenya, with Mater Misericordiae Hospital being the case study. The data from questionnaires and interviews were analyzed through qualitative and quantitative data analysis techniques, and findings discussed according to the study objectives.

4.2 Questionnaire Return Rate

A total of ninety-two (92) questionnaires were administered while 20 interviews were set to be conducted. The questionnaires were administered to the theatre medical staff at Mater Misericordiae Hospital. The team included Surgical Consultants (40), Surgical Residents (9), Anaesthestists (10) and Theatre Nurses (33). Out of the total number of questionnaires administered, 76 questionnaires were successfully filled and returned for analysis. This represents a return rate of 82.6%. On the other hand, 12 interviews were successfully conducted which represents a response rate of 60% as shown in Table 2. According to Babbie and Earl (2009), 50% response rate is deemed adequate, and one can proceed with data analysis, while a response rate of 70% and above is deemed good. This response rate was therefore deemed to be adequate and good enough for the data analysis to continue to answer the study objectives.

Table 2: Response Rate

Response Rate	**Questionnaires**		**Interviews**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Returned Questionnaires	76	82.6	12	60.0
Unreturned Questionnaires	16	17.4	8	40.0
Total	**92**	**100.0**	**20**	**100.0**

4.3 Demographic Characteristics of the Respondents

This section presents data on the various demographic characteristics of the respondents. This covers the respondents' gender, age, highest level of education reached by the respondents and their occupation in the hospital.

4.3.1 Gender Composition of the Respondents

This section presents information on the gender composition of the respondents who took part in the study. The results are presented in Figure 2.

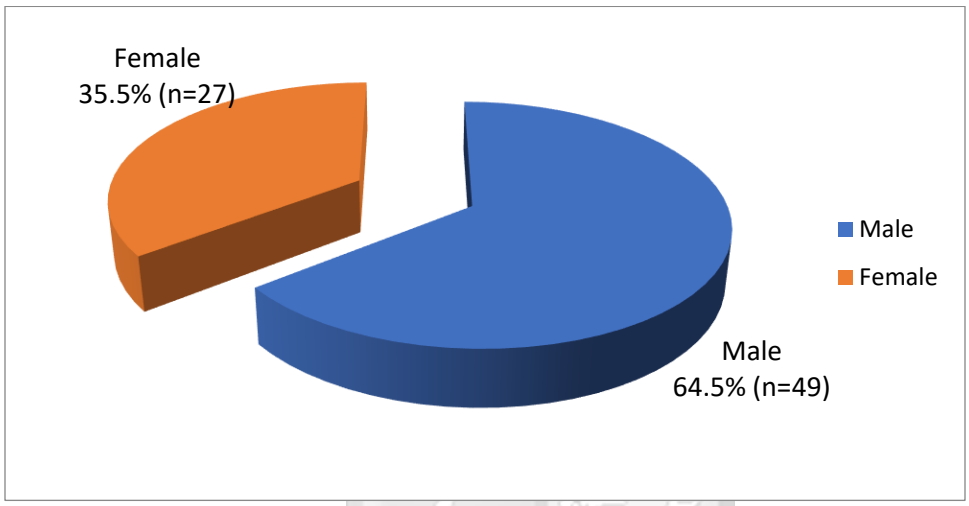

Figure 2: Gender Composition of the Respondents

The findings in Figure 2 show that a majority of the respondents (64.5%) were male, while 35.5% were female. This could imply that most of the theatre medical staff at Mater Misericordiae Hospital were males. This data was important as it provides information on composition of theatre medical staff by gender at Mater Misericordiae Hospital.

4.3.2 Distribution of Respondents by Age

This section shows the distribution of respondents by age. The age of the respondents was captured in a structured age brackets as shown in Figure 3.

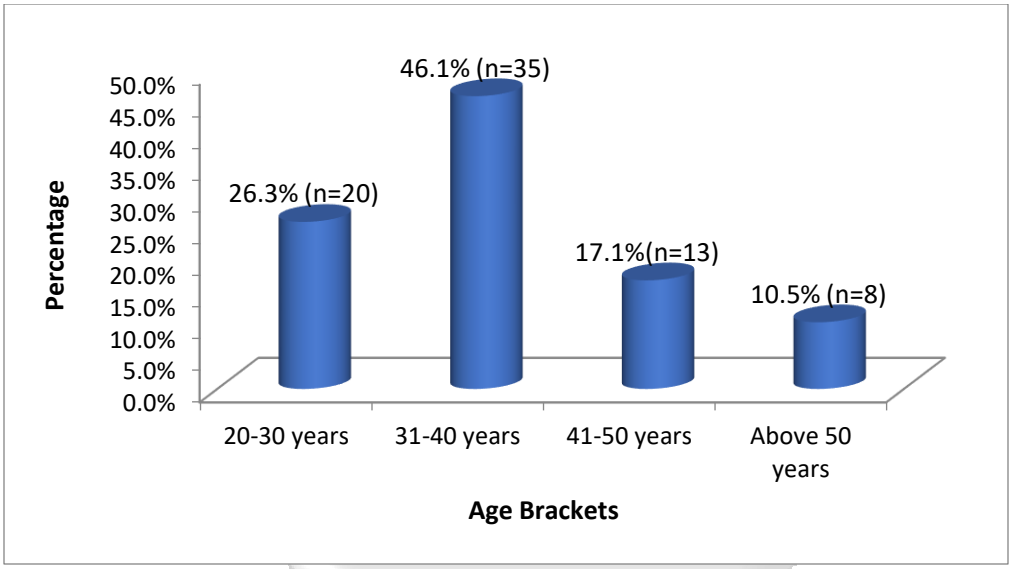

Figure 3: Distribution of Respondents by Age

As shown in Figure 3, most of the respondents (46.1%) were aged between 31-40 years while 26.3% were aged between 20-30 years. In addition, 17.1% of the respondents were aged between 41-50 years, while 10.5% indicated that they were aged more than 50 years. Age of staff is to often extent linked with experience, the young medical staff would be assumed to have less experience than their counterparts who are much older. The information on the age of the theatre medical staff was therefore valuable since it depicts the experience of the staff who took part in the study, which would affect the implementation of the WHO SSC in the hospital.

4.3.3 Level of Education

The respondents were asked to indicate the highest level of education they had reached. Table 3 depicts the respondents' level of education.

Table 3: Level of Education

Level of Education	Frequency	Percent
Diploma	23	30.3
Bachelor's degree	26	34.2
Post-graduate degree	27	35.5
Total	**76**	**100.0**

The findings in Table 3 show that 35.5% of the respondents indicated that they had attained post-graduate degree as their highest level of education while 34.2% had attained a

Bachelor's degree. On the other hand, 30.3% of the respondents revealed that they had attained a Diploma as their highest level of education. From the findings it can be deduced that a majority of the theatre medical staff at Mater Misericordiae Hospital were highly educated. Education is linked to skills, and therefore information on education level of the theatre medical staff was important to the study since it depicts the skills level of the staff, which would affect the implementation of the WHO SSC in the hospital.

4.3.4 Occupation of the Respondents in the Hospital

This section captures the occupation of the respondents in the hospital. Table 4 shows the distribution of the respondents who participated in the study as per their occupation.

Table 4: Occupation of the Respondents in the Hospital

Occupation	Frequency	Percent
Surgical Consultants	27	35.5
Surgical Residents	9	11.8
Anaesthestists	7	9.2
Theatre Nurses	33	43.4
Total	**76**	**100.0**

As shown in Table 4 above, 43.4% of the respondents were Theatre Nurses while 35.5% were Surgical Consultants. A further 11.8% of the respondents were Surgical Residents while 9.2% were Anaesthetists.

4.4. Health Workers' knowledge of WHO Surgical Safety Checklist

This section addresses the first objective which was to assess health workers' knowledge and understanding of the WHO surgical safety checklist at the Mater Misericordiae hospital. To answer this, the respondents were asked whether they were aware of the WHO Surgical Safety Checklist (SSC); whether they used it; whether they had received training on the use of the SSC; and their level of knowledge on WHO SSC.

4.4.1 Awareness of the WHO SSC

The respondents were asked to indicate whether they were aware of the WHO Surgical Safety Checklist (SSC). The findings are presented in Figure 4.

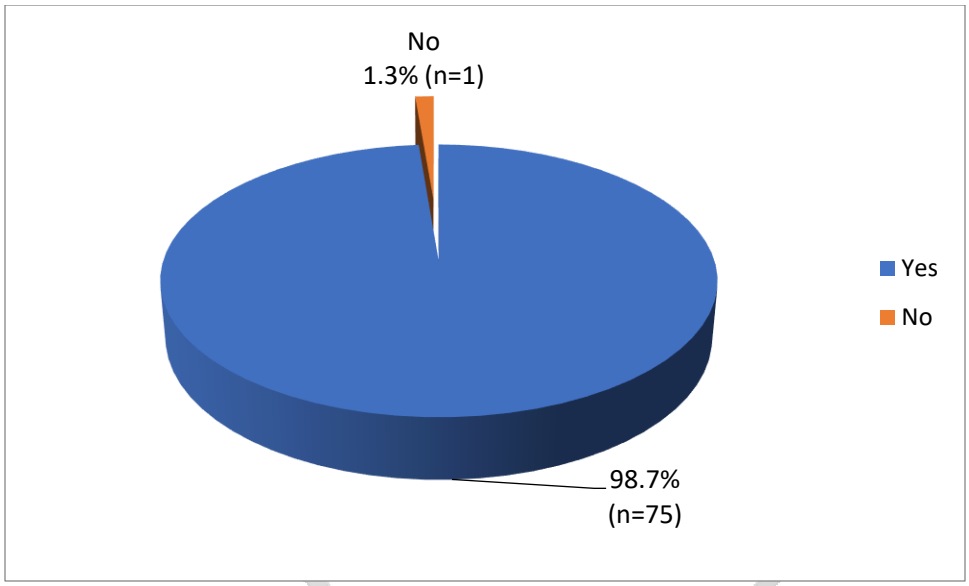

Figure 4: Whether Respondents are Aware of the WHO SSC

The results in Figure 4 show that majority of the respondents (98.7%) indicated that they were aware of the WHO Surgical Safety Checklist. However, 1.3% of the respondents reported that they were not aware of the WHO checklist. This implies that majority of the theatre staff at the Mater Misericordiae hospital were aware of the WHO SSC.

The study further interviewed the key informants on the whether the hospital complied with WHO surgical safety checklist, and also about the level of knowledge/ awareness on WHO surgical safety checklist among theatre staff. The findings from interviews indicate that majority of the respondents indicated were aware of the WHO surgical safety checklist. Some of the respondents, they indicated that:

> (Index 1): *"Every theater staff is aware, every staff is appraised, and I would describe it as ignorance and not everyone is willing to participate in doing the WHO SCC before an operation".*

> (Index 2): *"All the staff are aware right now in applying the WHO SSC. My cadre is nursing, and every nurse is knowledgeable and at least 95% know what the SSC is and its implications, whom to use and they remind other team members on what to do".*

(Index 3): *"Most of the theatre staff are well aware and that there are adequate resources and provision of needed materials to comply with the checklist. They interact with the checklist every day and hence their awareness is expected to be high. Every theater team member knows that they have to apply the checklist even in day-to-day procedures".*

(Index 5): "Every surgeon in the hospital is aware of the checklist and goes through the checklist before and after every surgery. The components of the checklist are written on a wall board in each theatre and one of the appointed team members reads it aloud, records the answers provided and makes checks and corrections where necessary'.

4.4.2 Use the WHO SSC by Theatre Staff

The study further enquired from the respondents on whether they used WHO SSC in the surgical processes in the hospital. The results are presented in Table 5.

Table 5: Whether the Respondents Use the WHO SSC

Responses	**Frequency**	**Percent**
Yes	73	96.1
No	3	3.9
Total	**76**	**100.0**

As shown in Table 5, majority of the respondents (96.1%) reported that they used WHO SSC in the surgical processes in the hospital. Only 3.9% indicated that they did not use the WHO SSC. This implies that the use WHO SSC at the Mater Misericordiae hospital was to a great extent.

From the interviews, various explanations were provided why the WHO SSC was not applied by the few including unwillingness of the healthcare workers, staff ignorance on the importance of the checklist, staff ego, attitude and lack of time to implement during emergencies:

(Index 1)*: "At times when some specific people are on duty is when the WHO SCC is done. Not everyone is willing to participate in doing the WHO SSC before or after a surgery. Attitude of some staff, ego and ignorance concerning the importance of the checklist is also a key barrier preventing its use.*

(Index 2)*: "All the staff are knowledgeable right now in applying the SSC in every procedure even in day-to-day procedures. However, at times when some specific staff are on duty is when the WHO SCC is done. Not everyone is willing to participate in doing the WHO SSC before or after a surgery. Attitude of some staff, ego and ignorance concerning the importance of the checklist is also a key barrier preventing its use.*

(Index 4)*: "All surgical staff in the hospital consistently applied the checklist as required.*

(Index 5)*: "Application is around 70% and mostly in some emergency cases, application of the checklist is usually overlooked or forgotten".*

Out of those respondents who indicated that they used the WHO SSC, the study further enquired from them on how often they used the checklist while carrying out surgical processes. The findings are presented in Table 6.

Table 6: Frequency of Use of WHO SSC

Frequency of Use	**Frequency**	**Percent**
Always	18	24.7
Mostly	37	50.6
Sometimes	18	24.7
Total	**73**	**100.0**

The findings in Table 6 indicate that 50.6% of the respondents revealed that they used the WHO SSC mostly in the surgical processes. On the other hand, 24.7% of the respondents reported that they used the WHO SSC always carrying out surgical processes while 24.7% indicated that they used the WHO checklist sometimes.

During the interviews, of use of WHO SSC was reported as frequently used:

> (Index 4): *"From a surgical point of view, I can generally say that surgical staff in our hospital including doctors consistently carry out the checks which are written on a wall board. The checklist is used routinely before any surgical intervention, not just before complex procedures. Before every operation as the patients arrives in the operating theatre, the data indicated in the checklist is checked and confirmed.*
>
> (Index 5): *"Every theater staff consider the checklist as vital and consistently applies it at all times during surgery".*

4.4.3 Staff Training on the Use of WHO SSC

The respondents were asked to indicate whether they had received training on the use of the WHO SSC. The results are presented in Figure 5.

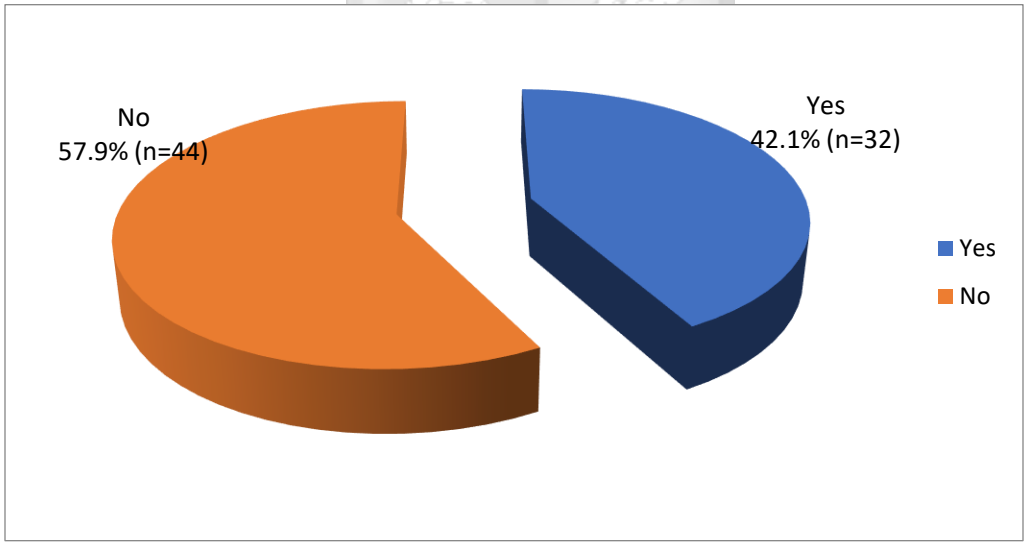

Figure 5: Staff Training on the Use of WHO SSC

The results in Figure 5 show that 57.9% indicated that they had not received training on the use of the WHO SSC. However, 42.1% indicated that they had received training on the use of the WHO SSC. This implies that more than 50% of theatre staff at the Mater Misericordiae hospital had not received training on the use of the WHO SSC.

In regard to training, the interviewees indicated that training has been done however there is no available record of this, simulations and spot checks are done, training of new staff and refresher trainings are done:

> (Index 1): *"There is a knowledge gap and knowledge deficiency, however, sensitization during the continuous medical education has been done that WHO SSC is a l that must be used before the surgery or before the operation. Training has been done but information on those who have received training is not available, but training is still ongoing"*
>
> Index (2)*: "We do simulations every Friday as part of continuous training, even among the senior staff. We also do spot checks awareness whereby during procedures to establish whether the checklist is being used. Even when the patient is recovering, we do spot checks to ensure that the SSC is duly signed". However, the training has not covered all the theater staff, mostly the new staff".*
> (Index 3)*: "There is always training conducted when a new staff joins the team. However, frequency of training is determined by the hospital leadership".*
>
> (Index 5)*: "Usually, there are refresher trainings for existing staff and to cater for updates to the checklist'.*

4.4.4 Level of Knowledge on WHO SSC

The respondents were asked to describe their level of knowledge on WHO SSC. The results are presented in Table 7.

Table 7: Level of Knowledge on WHO SSC

Level of Knowledge	Frequency	Percent
Very Good	17	22.4
Good	45	59.2
Average	12	15.8
Bad	1	1.3
Poor	1	1.3
Total	**76**	**100.0**

From the results in Table 7, it can be seen that majority of the respondents (59.2%) revealed that they had good knowledge on WHO Surgical Safety Checklist while 22.4% indicated that they had very good knowledge on the WHO checklist. On the other hand, 15.8% of the respondents indicated that their knowledge on WHO checklist was average while only 1.3% indicated that their knowledge on the WHO checklist was poor.

Results from interviews described the level of knowledge as high;

> (Index 1): *'Though not all theatre staff have been trained on use of WHO SSC, they have been made aware of the checklist and the trainings are ongoing"*
>
> (Index 2): *"95% of nurses know the use and implications of the checklist'. Respondent 4 indicated that 'the level of knowledge about the checklist is high since the checklist is on a wall board in all theaters in the hospital'.*
>
> (Index 4): *"Surgical staff in our hospital are highly knowledgeable and consistently carry out the checks which are written on a wall board. The checklist is used routinely before any surgical intervention, not just before complex procedures.*

4.5 Facilitators to Adherence to the WHO SSC Processes

This section addresses the second objective of the study which sought to explore the facilitators to adherence to the WHO checklist processes in Mater Misericordiae Hospital.

4.5.1 Extent the Hospital has Complied with WHO SSC

The study enquired from the respondents on the extent to which the hospital complied with WHO surgical safety checklist. The findings are presented in Figure 6.

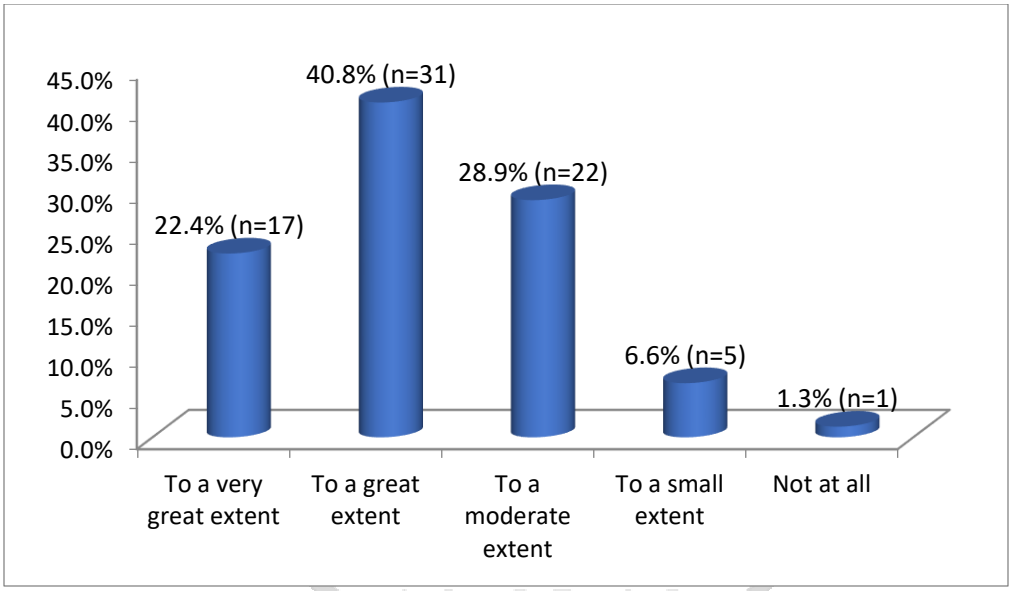

Figure 6: Extent the Hospital has Complied with WHO SSC

As shown in Figure 6 above, 40.8% of the respondents indicated that the hospital complied with WHO SSC when carrying out surgical processes to a great extent while 22.4% indicated that the hospital complied. In addition, 28.9% of the respondents were of the opinion that the hospital complied with WHO SSC to a moderate extent while 6.6% revealed that the hospital's compliance with WHO SSC was to a small extent.

Interview results from the staff indicated that the hospital mostly supported use of WHO SSC by ensuring the staff knows it is their duty to use the SSC, actively encouraging the staff to us the checklist:

> (Index 1): "*The hospital has not wholly complied though it provides and requires all theatre staff to conduct the WHO SSC, before and after every surgery".*
>
> (Index 2): *"Every nurse knows their duty and the requirements for the checklist for every procedure'.*
>
> (Index 5): *The hospital actively encourages all theater staff to use the checklist in all procedures regardless of whether they are minor or major. However, sometimes the checklist is forgotten or overlooked during emergency cases".*

4.5.2 Implementation Experiences in Using the WHO SSC

The respondents were asked to indicate their extent of agreement with statements on implementation experiences in using the WHO SSC. The study employed a five-point (1-5) likert scale whereby results were interpreted using mean scores and standard deviation. A mean score of 1-2.5 means that the respondents disagreed; mean scored of 2.6- 3.5 means the respondents were undecided (neither disagreed nor agreed) while 3.6-5.0 means the respondents agreed to the statement. The findings are presented in Table 8.

Table 8: Implementation Experiences in Using the WHO SSC

Statements	Mean	Std. Deviation
It is easy to use	4.89	5.894
It is comprehensive and easily understood	4.21	.998
It is a good format that helps for the ultimate safety of the patient in the operating room.	4.21	1.050
I found it is very important for patient care.	4.21	1.075
SSC stimulates communication among team members.	4.12	1.045
SSC helps reduce human errors.	4.22	1.015
Surgical personnel (surgeon) support the use of the checklist.	3.75	1.156
There is confidence among staff in the Checklists ability to improve patient safety and overall patient care.	3.86	1.151

The study findings show that the respondents agreed that the WHO SSC was easy to use (mean score = 4.89), and that SSC helped reduce human errors (mean score = 4.22). The respondents also agreed that the WHO SSC was comprehensive and easily understood; it helped for the ultimate safety of the patient in the operating room; and it is very important for patient care, as shown by a mean score of 4.21. The respondents also agreed that SSC stimulates communication among team members (mean score = 4.12); and that there was confidence among staff in the Checklists ability to improve patient safety and overall patient care (mean score = 3.86).

The study further enquired the interviewees who comprised of surgical consultants, surgical residents, anesthetists and theatre nurses to describe their implementation experiences in using the WHO SSC in the hospital.

Various interview respondents provided varied experiences on use of WHO SSC including: reduced infections and morbidities, enabled better team communication, harmony and accountability :

> (Index 1): *"It's good, actually we are happy about it. We have reduced a lot of cases, such as infections, morbidities etc. The experience is used to train the new staff coming to understand its use and importance".*
>
> Index 2): *"Use of WHO SSC had enabled the hospital to reduce cases of infections during surgeries, has enable team members to communicate better as they first introduce themselves and their duty during the operation, and they hence work in harmony".*
>
> (Index 3): *"Use the checklist increases communication between the team members and enables team members who are new to each other to liaise well during the procedure".*
>
> (Index 4): *"All staff members participate in the checklist and each respond to areas of the checklist that concerns them, and the checklist is then signed by the team leader'. This is important for patient care as every member understands their duty, they are accountable and ensure all the right process is followed".*

4.6 Barriers to Adherence to WHO SSC

The study also sought to establish the barriers hindering effective use of WHO SSC in the hospital. The study used a five-point likert scale to interpret the results using mean scores and standard deviation. A mean score of 1-2.5 means that the respondents disagreed; mean score of 2.6- 3.5 means the respondents were undecided while 3.6-5.0 implies that the respondents agreed to the statement. The results are presented in Table 9.

Table 9: Barriers Hindering Effective Use of WHO SSC

Statements	Mean	Std. Deviation
The SSC takes too long to complete	2.37	1.153
The SSC duplicates other existing checks	2.43	1.310
There is poor communication between anesthetist and surgeon	2.57	1.330
The SSC is a waste of time; it is unnecessary	1.71	1.075
The SSC is difficult to incorporate into my perioperative routine	1.83	1.124
There is inadequate knowledge on use of the checklist among Theatre staff.	2.76	1.375
Team members attitude towards the questions on the checklist is not encouraging.	2.76	1.305
There is lack of management support in the use of the checklist.	2.74	1.418

As shown in Table 9, the respondents disagreed that the WHO SSC was a waste of time and unnecessary (mean score = 1.71); and that the SSC was difficult to incorporate into the perioperative routine (mean score = 1.83). The respondents also disagreed that WHO SSC takes too long to complete (mean score = 2.37); and that the SSC duplicates other existing checks (mean score = 2.43). The respondents also disagreed that there was poor communication between anesthetist and surgeon (mean score = 2.57). However, the respondents were undecided on whether the Theatre staff had inadequate knowledge on use of the checklist; and on whether the team members attitude towards the questions on the checklist was encouraging as shown by a mean score of 2.76. The respondents were also neither agreed nor disagree on whether there was lack of management support in the use of the checklist (mean score = 2.74).

The barriers to implementation of WHO SSC were reported as including ignorance, limited resources, high workload and poor teamwork:

> (Index 1): *"Human capital, surgeons' ego, surgeons being ignorant, and they are not always there when the surgery is beginning and come later when the process has started, and lack of teamwork to ensure that the WHO SSC is done".*

(Index 2): *"Sometimes the resources are limited and sometimes we get new doctors and surgeons who come and go on with the procedure without going through the SSC". Attitude of the staff is another barrier; some do not want to use it as they find it hectic mostly when they have an emergency, or they just ignore it".*

(Index 3): *"The challenges include high bulk of surgery cases and turnaround time between cases, lack of resources, lack of awareness, mentorship and lack of adequate training. Also, some surgeons seem to be in a hurry thus not giving nurses enough time to do the checklist".*

(Index 4): *"There is lack of specialist to train the theatre medical staff on how to conduct the checklist'. Also, high staff turnover, understaffing and poor teamwork are key hindrances to use of checklist. Sometimes during emergencies, some surgeons are not patient enough to allow it, while others are not willing to use it due to their attitude"*

(Index 5): *"There is no teamwork during surgery on application of WHO SSC due to some surgeons' ego and attitude. Further, lack of resources to ensure the checklist is followed and to guide on its use affects its application. Third, poor collaboration from the interprofessional team hampers application of the checklist. Since surgeons, anesthetists, nurses and all theater staff have a role to play in applying the checklist, poor collaboration and teamwork adversely affects its application'.*

4.7 Influence of the WHO Surgical Safety Checklist on Surgical Processes and Outcomes

This section addresses the fourth objective of the study which sought to determine the influence of the WHO surgical safety checklist on surgical processes and outcomes at the Mater Misericordiae Hospital. The respondents were asked to indicate the extent to which the implementation of WHO SSC influenced the surgical processes and outcomes. A 1 to 5 likert scale was used capture data and mean scores were calculated to interpret the results, whereby a mean score of 1 means 'not at all', a mean score of 2 means to a 'small extent',

3 means to a 'moderate extent', 4 to a 'great extent' while a mean score of 5 implies agreement to a 'very great extent'. The results are presented in Table 10.

Table 10: Influence of the WHO Surgical Safety Checklist on Surgical Processes and Outcomes

Statements	Mean	Std. Deviation
WHO SSC has reduced surgical complications.	4.09	1.085
WHO SSC has reduced mortality rates.	3.72	1.218
The checklist has improved the operating room safety practices.	4.38	0.748
The checklist has improved communication among the operating room staff.	4.01	1.039
The checklist has improved inter-professional cooperation and communication among theatre staff	4.04	0.901
The checklist has improved Morbidity.	3.86	1.251
The checklist has improved the quality of surgical care the patients receive.	4.17	0.958

The results in Table 10 show that the respondents agreed that the checklist had improved the operating room safety practices to a great extent (mean scores= 4.38) and that the checklist had improved the quality of surgical care the patients receive to a great extent (mean score = 4.17). The respondents also agreed that WHO SSC had reduced surgical complications to a great extent (mean score = 4.09); it had improved inter-professional cooperation and communication among theatre staff (mean score = 4.04); and that the checklist had improved communication among the operating room staff to a great extent (mean score= 4.01). In addition, the respondents agreed that WHO SSC had reduced mortality rates (mean score = 3.72); and that the checklist had improved Morbidity to a great extent (mean score = 3.86). These findings imply that the implementation of WHO SSC had delivery of surgical services in the hospital to a great extent.

The participants felt that the WHO SSC had affected delivery of surgical services in different ways, including better knowledge of the patient hence reduced surgical errors, encourages teamwork and harmony, safer surgery, accountable staff;

(Index 1): "*Every time we use the WHO SSC, we get to know more about the patient, we get to understand where exactly the incision site will be, we also get to understand even the post operative care for the patient, and we also anticipate for some of the eventualities that might happen during surgery'. All team members become in sync, brings out teamwork and the teamwork in harmony for the success of the surgery".*

(Index 2): *Good surgery outcomes, patient safety, and accountability. Use of SSC has increased teamwork because it improves communication during the procedures and the team members know each other well'. Risks and infections are reduced, and the process is coordinated from the beginning to the need when the patient is taken to the ward".*

(Index 3): *"There is usually harmony during surgery, and ensuring every step and procedure is conducted. WHO SSC also enables staff to know more about the patient, what each staff role will be, pre- and post-operative cate of patient, and anticipate some incidences during operation. Use of the checklist enables the theater staff to acknowledge and know each other and also appraise the patient of the team members who will participate, therefore keeping the patient at ease".*

(Index 5): *"Patient safety, good surgery outcome, and accountability of the team is improved by using the checklist. Use of the checklist effectively ensures the safety of the patient and the procedures conducted on them. Cases of complications during surgery have gone down courtesy of the checklist".*

4.8 Chapter Summary

This chapter presented and discussed the findings of the study. The chapter starts with a section on demographic information which outlines the demographic characteristics of the respondents who took part in the study. The chapter further presents and discusses the findings as per the study objectives**.** The study had four objectives, the first one was to assess health workers' knowledge of the WHO surgical safety checklist; the second objective was to explore the facilitators to adherence to the WHO checklist processes in Mater Misericordiae Hospital; the third objective was to examine the barriers to adherence

to the WHO checklist processes in Mater Misericordiae Hospital; and the fourth objective to determine the influence of the WHO surgical safety checklist on surgical processes and outcomes in Mater Misericordiae Hospital. The next chapter is covers the discussion, conclusion and recommendations of the study.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECCOMENDATIONS

5.1 Introduction

This chapter presents a summary of the findings as guided by the study objective, conclusion and suggests policy recommendations that can be adopted. At the end of this chapter, the researcher also suggests areas for further study.

5.2 Discussion of Findings

5.2.1 Health Workers' Knowledge of the WHO Surgical Safety Checklist

The first objective was to assess health workers' knowledge and understanding of the WHO surgical safety checklist. From the findings, majority of the theatre staff (98.7%) indicated that they were aware of the WHO Surgical Safety Checklist while majority (96.1%) also reported that they used WHO SSC in the surgical processes in the hospital. Findings from the interviews also revealed that majority of the theatre staff were aware of the SSC, its use and implications there are adequate resources and provision of needed materials to comply with the checklist and that there are adequate resources and provision of needed materials to comply with the checklist. Evidence from studies for example by Vats et al. (2010); Bansah, 2019); Dangyangs and Afonne (2016) have shown that health workers knowledge of SSC enhances the correct use and compliance with the checklist. The better the health workers knowledge about how and why to use the surgical checklist, the more compliant they are.

The findings from the interviews unearthed that even though majority of the theater staff were knowledgeable on WHO SSC and its use, there was some gaps on utilization amongst some theater staff. This was reportedly due to ignorance or simply having a negative attitude towards its use in the surgical process. This is despite reports that components of the checklist were written on a wall board in each theatre and that adequate resources were provided to enhance compliance with the checklist. A similar situation was also observed by Bansah (2019) in Ghana whose study also found that despite a high level of awareness of the WHO SSC among theatre staff, there were gaps in knowledge and utilization of the WHO SSC. The study however recommended for periodic training of surgical staff to

enhance their knowledge and use of the SSC. These sentiments are also echoed by Close et al. (2017) who indicated that training programs help hospitals and health workers to successfully overcome several implementation challenges of the SSC including attitude towards its use.

On health workers' training on the use of the SSC in Mater Misericordiae hospital, the findings indicate that a slight majority (57.9%) indicated that they had not received training on the use of the WHO SSC and only 42.1% reported that that they had received training on the use of the WHO SSC. This shows a gap in training which would further have an effect on the use and effective implementation of WHO SSC in the hospital. Studies by Bansah (2019), Close et al. (2017), Dangyangs and Afonne (2016) underscores the need for proper and periodic training of the surgical team members, to enhance knowledge on the use and importance of SSC, change attitude and subsequently enhance successful implementation of the SSC.

5.2.2 Facilitators to Adherence to WHO SSC

The study also sought to explore the facilitators to adherence of the WHO checklist processes in the hospital. From the findings, 40.8% of the respondents indicated that the hospital complied with WHO SSC when carrying out surgical processes to a great extent while 22.4% indicated that the hospital complied to a very great extent. However, 28.9% of the respondents were of the opinion that the hospital complied with WHO SSC to a moderate extent while 6.6% revealed that compliance was to a small extent. This therefore implies that there was no full compliance with WHO SSC. This was the same scenario observed by studies conducted by Aveling et al. (2013) (in a study between high-income and Low, Medium income Countries; White et al. (2018) (in Madagascar); Bashford et al. (2014) (in Ethiopia); and Lilaonitkul et al. (2015) (in Uganda). All these studies identified varied factors hindering full implementation and compliance with WHO SSC.

The findings further show that the health care workers agreed that the WHO SSC was, easy to use and that SSC helped reduce human errors. They also agreed that the WHO SSC was comprehensive and easily understood; that it enhanced safety of the patient in the operating room; and that it is very important for patient care. The health care workers further agreed that SSC stimulates communication among team members. These findings are in

agreement with those of White et al. (2018) and Böhmer et al. (2012) who also found out that implementation of the checklist improved communication and team work among the health care workers in the operating room. It was also found to enhance quality inter-professional cooperation and positive relation among team members.

The respondents further reported that implementation of WHO SCC improved confidence among staff due to the checklists ability to improve patient safety and overall patient care. These findings corroborate with those of White et al. (2018) who revealed that sustained implementation of the checklist was associated with an improved overall understanding of patient safety hence increased job satisfaction.

5.2.3 Barriers to Adherence to the WHO SSC

On the barriers hindering effective use and implementation of WHO SSC in the hospital, it was found that high bulk of surgery cases and turnaround time between cases, lack of adequate resources, lack of awareness, mentorship and lack of adequate training hindered effective use and implementation of the checklist. In addition, lack of teamwork, limited human capital, high staff turnover also hindered effective use and implementation of WHO SSC in the hospital. These findings are in agreement with those of Lilaonitkul et al. (2015) who found out that understaffing, malfunctioning and lack of equipment were the main challenges hindering effective implement of WHO checklist. The above findings are also corroborates with those of Mahmood et al. (2019) who investigated the challenges in the implementation and use of the surgical safety checklist and established that there was insufficient compliance with surgical safety checklist due to limited staff "buy in," arising from the "top-down" mandated nature of the surgical safety checklist, the perceived lack of benefit in surgical safety checklist completion, and redundancies with other operating room processes.

It was also established that some surgeons sometimes were not willing to use it or patient enough to allow it, which implies that there was non-adherence to some extent. Some of the reason for this was because of high workload by surgery teams. These findings are in agreement with those of White et al. (2018) who revealed that lack of time in an emergency (turnaround time between cases) and obstructive leadership were the greatest implementation barriers. The findings are also supported by Gong et al. (2021) whi

revealed that factors such as high number of operations and unwillingness or absence of the surgeon to initiate or 'sign out'" affected effective implementation of SSC. The study recommended for reduced workloads and offering of more training to the surgery teams for them to understand the importance of SSC implementation, thereby improving effective implementation and compliance with SSC. Tostes and Galvão (2019) also found out that effective implementation of the checklist could be hindered by ineffective leadership, unclear delegation of responsibilities from each professional, lack of collaboration between team members, and lack of institutional support.

5.2.4 Influence of WHO SSC on surgical Processes and Outcomes

The fourth objective was to determine the influence of WHO surgical safety checklist on surgical processes and outcomes. Health care workers described how the checklist had improved the operating room safety practices to a great extent; and that the checklist had improved the quality of surgical care the patients receive to a great extent. These findings agree with those of Haynes et al. (2009) which found out that patient complications reduced after checklist was introduced. On the other hand, Weiser et al. (2010) found out that implementations of WHO Surgical Safety Checklist reduced complication rate of patients undergoing non-cardiac surgery.

The health care workers also agreed that WHO SSC had reduced surgical complications to a great extent; and that SSC had improved inter-professional cooperation and communication among theatre staff as well as improving communication among the operating room staff to a great extent. These findings are also in line with those of Böhmer et al. (2012) and White et al. (2018) who observed that checklist was seen to improve communication among the operating room staff. Aveling et al. (2013) however observed that the introduction of a checklist will not automatically lead to improved communication and better clinical processes

Moreover, the health care workers agreed that WHO SSC had reduced mortality rates; and that the checklist had improved morbidity to a great extent. These findings corroborate with those of Haynes et al. (2009) who conducted a study in eight hospitals in eight cities across the world and found out that implementation of the checklist was associated with safe delivery of surgical services due to reductions in the rates of death and complications. Patel

et al. (2014) and Pugel et al. (2015) in their studies also revealed that compliance with the checklist is critical for the patient safety to be realized. The checklist was found to improve delivery of surgical services hence leading to reduction of surgical morbidity and mortality.

5.3 Summary of Discussion of the Findings

On the level of knowledge on WHO SSC, it can be observed that majority of the theatre staff were aware of the SSC, its use and implications/impact. Majority also revealed that they used WHO SSC in the surgical processes in the hospital. The hospital was keen on keen on enhancing staff knowledge on the application the SSC by providing resources and ensuring that the components of the checklist were written on a wall board in each theatre. It was however observed that there were some gaps on knowledge and utilization of the WHO SSC amongst some theater staff whereby attitude of some staff, and ignorance concerning the importance of the checklist were established as key barriers preventing its use. On health workers' training on the use of the SSC, the findings indicate that there is a gap on training which influences the use and effective implementation of WHO SSC in the hospital. Training as revealed by previous studies is critical since it can play a great role in changing attitude, enhancing knowledge on the use and importance of SSC.

On the facilitators to adherence to WHO SSC, it was first observed there was no full compliance with WHO SSC theater staff. On the application of SSC in surgery processes, the health care workers agreed that the WHO SSC was nice, easy to use, and that SSC helped reduce human errors. They also agreed that the WHO SSC was comprehensive and easily understood; that it enhanced safety of the patient in the operating room; and that it is very important for patient care. The health care workers further agreed that SSC stimulates communication among team members. The respondents further reported that implementation of WHO SCC improved confidence among staff due to the checklists ability to improve patient safety and overall patient care.

The study also established that there were some barriers hindering effective use and implementation of WHO SSC in the hospital. It was found that high bulk of surgery cases and turnaround time between cases, lack of adequate resources, lack of awareness, mentorship and lack of adequate training hindered effective use and implementation of the checklist. In addition, lack of teamwork, limited human capital, high staff turnover also

hindered effective use and implementation of WHO SSC in the hospital. It was also established that some surgeons sometimes were not willing to use it or patient enough to allow it, which implies that there was non-adherence to some extent.

On the influence of WHO surgical safety checklist on surgical processes and outcomes, the health care workers agreed that the checklist had improved the operating room safety practices to a great extent; and that the checklist had improved the quality of surgical care the patients receive to a great extent. It was also established the health care workers were of the opinion that WHO SSC had reduced surgical complications to a great extent; and that SSC had improved inter-professional cooperation and communication among theatre staff as well as improving communication among the operating room staff to a great extent. In addition, health care workers were of the perception that WHO SSC had reduced mortality rates; and that the checklist had improved morbidity to a great extent.

5.4 Conclusion

The study concludes that the health care workers at the Mater Misericordiae hospital were aware of the WHO SSC and majority used the checklist in the surgical processes in the hospital, but not always. On training, a slight majority of the theatre staff indicated that they had not received training on the use of the WHO SSC which affected the use and effective implementation of WHO SSC in the hospital. Nonetheless, majority of the theatre staff had good knowledge on WHO Surgical Safety Checklist indicating that the knowledge was acquired elsewhere other than through trainings.

The study concludes that hospital had complied with WHO surgical safety checklist to a great extent. The health care workers acknowledged that the WHO SSC was easy to use; and was comprehensive and easily understood. The implementation of the checklist in the hospital also helped reduce human errors; and it enhanced safety of the patient in the operating room; and therefore, very important for patient safety and overall patient care. However, barriers such as high bulk of surgery cases, turnaround time between cases, lack of resources, lack of awareness, and lack of adequate training hinders effective use and implementation of WHO SSC in the hospital. In addition, high staff turnover, shortage of staff also hindered effective use and implementation of WHO SSC in the hospital.

Lastly, health workers were of the perception that there was improved delivery of surgical services in the hospital due to implementation of WHO SSC. In addition there were perception of improved operating room safety, improved the quality of surgical care the patients receive, reduced surgical complications, reduced mortality rates, and improved morbidity to a great extent with the use of checklist. These perceptions however require additional research to measure the impact of SCC on delivery of surgical services.

5.5 Recommendations

5.5.1 Recommendations for Practice

The study established that a slight majority of the theatre staff had not received training on the use of the WHO SSC. This shows a gap in training which would have an effect on the use and effective implementation of WHO SSC in the hospital. This underscores the need for proper training of the surgical team members on the full knowledge of the SSC. This study therefore recommends for periodic training for surgical staff to enhance their knowledge and use of the SSC, since training (knowledge) is essential for effective use of the SSC.

The study also established that lack of resources, shortage of staff (understaffing) hindered effective use and implementation of WHO SSC in the hospital. There were also limited medial staff especially doctors and surgeons. In this regard, the study recommends that the management should allocate more resources to ensure that there is adequate and well-trained staff, for effective use and implementation of WHO SSC in the hospital. This would ensure that the hospital achieves the maximal benefit of the Surgical Safety Checklist.

The study further recommends that the hospital management should address the behavioral, and organizational/ institutional factors that are hindering full compliance (use and implementation) of WHO SSC in the hospital. There should also be frequent monitoring to ensure compliance with the checklist at all levels.

5.5.2 Recommendations for Study

This study was a case study of Mater Misericordiae Hospital. The researcher suggests that a future study be conducted in other hospitals (both public and private) and incorporate a larger population.

5.5.3 Recommendation for Theory

From the review of the study, there are limited studied conducted in this study area. There are limited empirical evidences and theories on the study topic. More studies should therefore be conducted in the area of implementation of WHO SSC and its influence on surgical processes and outcome in order to give a more conclusive picture on the subject matter. Furthermore, while it was beyond the scope of this study to measure the impact of WHO SCC on delivery of surgical services, an experimental study design would be useful in making specific conclusions of how the checklist improves surgical services. This would add more value to the existing theory and empirical evidences.

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APPENDICES

Appendix I: Letter of Introduction

Appendix II: Participant information and consent form

IMPLEMENTATION EXPERIENCES OF USING THE WHO SURGICAL SAFETY CHECKLIST: A CASE OF MATER MISERICORDIAE HOSPITAL.

SECTION 1: INFORMATION SHEET

Investigator: Tigist Sintayo Gebre

Institutional affiliation: Strathmore Business School (SBS)

SECTION 2: INFORMATION SHEET–THE STUDY

2.1: Why is this study being carried out?

As part of the requirement for the award of the degree, I am conducting academic research aimed at examining the implementation experiences of using the WHO surgical checklist and its influence on delivery of surgical services in Kenya.

2.2: Do I have to take part?

No. Taking part in this study is entirely optional and the decision rests only with you. If you decide to take part, you will be asked to complete a questionnaire to get information on implementation experiences of who surgical checklist and its influence on delivery of surgical services at the Mater Misericordiae Hospital. If you are not able to answer all the questions successfully the first time, you may be asked to sit through another informational session after which you may be asked to answer the questions a second time. You are free to decline to take part in the study from this study at any time without giving any reasons.

2.3: Who is eligible to take part in this study?

- All qualified surgical staff practicing in Mater Hospital
- All qualified surgical staff who give informed consent to participate in the study

2.4: Who is not eligible to take part in this study?

- Qualified surgical staff who have worked in the hospital for less than 2 weeks
- Surgical staff who are not co-operative (not willing to provide information even after being provided with full details of the study and intended use of output and after assurance of confidentiality and ethical approval)

2.5: What will taking part in this study involve for me?

You will be approached by myself, Tigist Sintayo Gebre, and requested to take part in the study. If you are satisfied that you fully understand the goals behind this study, you will be asked to sign the informed consent form (this form) and then taken through a questionnaire to complete.

2.6: Are there any risks or dangers in taking part in this study?

There are no risks in taking part in this study. All the information you provide will be treated as confidential and will not be used in any way without your express permission.

2.7: Are there any benefits of taking part in this study?

The information will be used to improve surgical care at Mater Misericordiae Hospital. It will be used to inform theatre Guidelines and policies to improve surgical care and patient outcomes at Mater Misericordiae Hospital.

2.8: What will happen to me if I refuse to take part in this study?

Participation in this study is entirely voluntary. Even if you decide to take part at first but later change your mind, you are free to withdraw at any time without explanation.

2.9: Who will have access to my information during this research?

All research records will be stored in securely locked cabinets. That information may be transcribed into our database, but this will be sufficiently encrypted and password protected. Only the people who are closely concerned with this study will have access to your information. All your information will be kept confidential.

2.10: Who can I contact in case I have further questions?

You can contact me, Tigist Sintayo Gebre, at SBS, or by e-mail tigist.sintayo@gmail.com or by phone +254720768661. You can also contact my supervisor, Jacinta Nzinga, at the Strathmore Business School, Nairobi, or by e-mail JNzinga@kemri-wellcome.org or by phone +254722243877. If you want to ask someone independent anything about this research, please contact:

The Secretary–Strathmore University Institutional Ethics Review Board, P. O. BOX 59857, 00200, Nairobi, email ethicsreview@strathmore.edu Tel number: +254 703 034 375

I, _____, have had the study explained to me. I have understood all that I have read and have had explained to me and had my questions answered satisfactorily. I understand that I can change my mind at any stage.

Please tick the boxes that apply to you.

Participation in the research study

- o I AGREE to take part in this research

- o I DON'T AGREE to take part in this research

Appendix II: Questionnaire

Kindly answer the following questions and statements regarding the use of the WHO Surgical Safety Checklist and its influence on delivery of surgical services. Information provided will be kept strictly confidential. Thank you.

Section A: Demographic Characteristics

1. Gender

Male ( ) Female ( )

2. Indicate your age (in years)

20 – 30 ( ) 31 – 40 ( ) 41 – 50 ( ) Above 50 years ( )

3. Indicate the highest level of education you have reached

Diploma ( ) Bachelor's degree ( ) Post-graduate degree ( )

Other (specify)……

4. Indicate your occupation in the hospital

Surgical Consultants () Surgical Residents ( ) Anaesthestists ( )

Theatre Nurses ( ) Other (specify)……

Section B: Health Workers' knowledge on WHO Surgical Safety Checklist

5. Are you aware of the WHO SSC?

Yes ( ) No ( )

6. Do you use the WHO SSC?

Yes ( ) No ( )

7. If YES, how often do you use the WHO SSC?

Always ( ) Mostly ( ) Sometimes ( ) Rarely ( )

8. Have you had training on the use of the SSC?

Yes ( ) No ( )

9. How would you describe your knowledge of the WHO SSC?

Very good ( ) Good ( ) Average ( ) Bad ( ) Poor ( )

Section C: Implementation Experiences of healthcare workers in using the WHO SSC

10. To what extent has your hospital complied with WHO surgical safety checklist? (Compliance Rate)

To a very great extent ( ) To a great extent ( ) To a moderate extent ( )

To a small extent ( ) Not at all ( )

11. To what extent do you agree with the following statements on implementation experiences in using the WHO SSC? Use a 1-5 scale where; (5) Strongly agree, (4) Agree, (3) Undecided, (2) Disagree, (1) Strongly Disagree

Statements	**1 (SD)**	**2 (D)**	**3 (U)**	**4 (A)**	**5 (SA)**
It is nice, easy to use					
It is comprehensive and easily understood					
It is a good format that helps for the ultimate safety of the patient in the operating room					
I found it is very important for patient care					
SSC stimulates communication among team members					
SSC helps reduce human errors.					
Surgical personnel (surgeon) support the use of the checklist					
There is confidence among staff in the Checklist's ability to improve patient safety and overall patient care					

12. Which of the following barriers hinder effective use of WHO SSC in your hospital? Use a 1-5 scale where; (5) Strongly agree, (4) Agree, (3) Undecided, (2) Disagree, (1) Strongly Disagree

Statements on barriers	**1 (SD)**	**2 (D)**	**3 (U)**	**4 (A)**	**5 (SA)**
The SSC takes too long to complete					
The SSC duplicates with other existing checks					
There is poor communication between anaesthetist and surgeon					

The SSC is a waste of time; it is unnecessary					
The SSC is difficult to incorporate into my perioperative routine					
There is inadequate knowledge on use of the checklist among Theatre staff					
Team members attitude towards the questions on the checklist is not encouraging					
There is lack of management support in the use of the checklist					

13. Which other barriers hinders effective use and implementation of WHO SSC in your hospital?……

……

Section D: Implementation of WHO SSC and Delivery of Surgical Services

To what extent do the implementation of WHO SSC influence the various aspects in delivery of surgical services? Use a 1 to 5 likert scale; where 1 is not at all, 2 is small extent, 3 is moderate extent, 4 is Great extent and 5 is Very great extent

Statements	**1**	**2**	**3**	**4**	**5**
WHO SSC has reduced surgical complications.					
WHO SSC has reduced mortality rates.					
The checklist has improved the operating room safety practices					
The checklist has improved communication among the operating room staff					
The checklist has improved inter-professional cooperation and communication among theatre staff.					
The checklist has improved Morbidity.					
The checklist has improved the quality of surgical care the patients receive.					

THANK YOU FOR YOUR PARTICIPATION

Appendix III: Interview Guide

1. To what extent has your hospital complied with WHO surgical safety checklist. Explain

2. How would you rate/ describe the level of knowledge on WHO surgical safety checklist among theatre staff under your Cadre?

3. How would you rate the level of awareness on WHO surgical safety checklist among theatre staff, and how does it influence of the implementation of the checklist?

4. To what extent have the theatre staff received training on WHO surgical safety checklist among, and how does it influence of the implementation of the checklist?

5. How would you describe implementation experiences in using the WHO SSC in your hospital?

6. How does resource constraints influence implementation of WHO SSC in your hospital?

7. How does organization culture influence implementation of WHO SSC in your hospital?

8. How does leadership and institutional support influence implementation of WHO SSC in your hospital?

9. How does collaboration between team members influence implementation of WHO SSC in your hospital?

10. Which barriers have you experiences in the implementation of the WHO SSC?

11. What factors have helped in successfully implementing the checklist in the OR?

12. How has implementation of WHO SSC influenced delivery of surgical services in your hospital?

13. Would you say the use of the checklist has improved teamwork, team communication and patient safety? How so?

Appendix IV: Letters of authorization

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **179289**

Date of Issue: **13/September/2020**

RESEARCH LICENSE

This is to Certify that Dr.. Tigist Sintayo Gebre of Strathmore University, has been licensed to conduct research in Nairobi on the topic: IMPLEMENTATION EXPERIENCES OF WHO SURGICAL SAFETY CHECKLIST AND ITS INFLUENCE ON DELIVERY OF SURGICAL SERVICES IN KENYA: A CASE OF MATER MISERICORDIAE HOSPITAL for the period ending : 13/September/2021.

License No: **NACOSTI/P/20/6542**

179289

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Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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Strathmore UNIVERSITY

1st September 2020

Dr Gebre, Tigist
tigist.gebre@strathmore.edu

Dear Dr Gebre,

RE: Implementation Experiences of Who Surgical Checklist and Its Influence on Delivery of Surgical Services in Kenya: A Case of Mater Misericordiae Hospital

This is to inform you that SU-IERC has reviewed and **approved** your above research proposal. Your application approval number is **SU-IERC0705/20.** The approval period is **1st September 2020 to 31st August 2021.**

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 SU-IERC.
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 SU-IERC 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 SU-IERC 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 SU-IERC.

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

Yours sincerely,

Dr Virginia Gichuru,
Secretary; SU-IERC

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE
01 Sep 2020
P.O. Box 59857-00200
NAIROBI - KENYA

Cc: Prof Fred Were,
Chairperson; SU-IERC