

**AN INVESTIGATION INTO THE BARRIERS PREVENTING THE  
IMPLEMENTATION OF THE SURGICAL SAFETY CHECKLIST IN THE  
OPERATING ROOM IN TERTIARY HOSPITALS IN THE CAPE METROPOLE**

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## DECLARATION

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## ABSTRACT

### Background

Peri-operative patient safety remains crucial in healthcare to prevent avoidable errors. The World Health Organization developed a surgical safety checklist that was implemented by the Western Cape Department of Health in 2009. However, no evidence could be found regarding barriers during the implementation thereof in the South African context.

### Research question

The study was guided by the question: “What are the barriers preventing the implementation of the surgical safety checklist in the operating room in tertiary hospitals in the Cape Metropole?”

### Aim

The aim of the study was to investigate the barriers that prevent the implementation of the surgical safety checklist in the operating room in two tertiary hospitals in the Cape Metropole.

### Objectives

The objectives of the study were to determine:

- The attitudes of the staff towards the implementation of the checklist
- Communication amongst surgical team members, related to the checklist
- Beliefs of surgical team members about the checklist
- Support from surgical team members, implementing the checklist
- Feedback on potential barriers
- Any statistical associations between the biographical data and the barriers preventing the implementation of the checklist

### Research methodology

To reach the objectives of this study, a descriptive design with a quantitative correlational approach was followed. Approval was granted from the Health Research Ethics Committee of Stellenbosch University (Ethics reference 0557), and the two tertiary hospitals.

After a pilot-study, data was collected through a self-administered questionnaire and analysed using descriptive and inferential data analyses. The population of 304 participants included surgeons, surgical assistants, anaesthetists, nurses and theatre technicians.

## **Reliability and Validity**

The instrument used in this study was used in a previous study where an alpha score of 0.7 indicated an acceptable level of internal consistency. A pilot-study was done to test the methodology and the data collection tool. The instrument was reviewed by experts to ensure validity.

## **Results**

The study results confirm that the surgical checklist is well suited, although participants over 50+ (23.8%), with more than 10 years' experience (19.4%) and doctorate education (30.8%) disagreed that the SSC was always implemented. A statistical significant difference ( $p=0.010$ ) between the years of experience and proper training on the implementation of the checklist was identified. Congruently, participants (59.9%) observed that nurses just tick off the checklist. Anaesthetists (60.9%) and participants with a degree (47.7%) indicated that sections of the checklist were sometimes not completed. Also, statistical significant differences between occupation ( $p=0.004$ ), age ( $p=0.030$ ), education ( $p=0.006$ ) and that the checklist is an added responsibility, were identified, and 88.1% find it time consuming.

## **Recommendations**

Identify and train local champions to represent management in quality improvement initiatives to promote the correct use of the checklist.

Inter-professional team training on quality improvement initiatives should be instituted to address practical issues regarding the correct implementation of the surgical safety checklist.

## **Conclusion**

The study highlighted incomplete use of the checklist and insufficient training that may result in a tick-box exercise. Consequent to improper use of the SSC, institutions may not experience the full benefits of the surgical safety checklist.

## OPSOMMING

### Agtergrond

Peri-operatiewe pasiëntveiligheid bly kritiek te wees in gesondheidsorg om peri-operatiewe skadelike gebeurtenisse te verhoed. Die Wêreld Gesondheidsorganisasie het 'n chirurgiese kontrolelys ontwikkel wat deur die Wes-Kaapse Departement van Gesondheid in 2009 geïmplementeer is. Nietemin, geen bewyse kon verkry word oor die hindernisse wat gedurende die implementering van die chirurgiese veiligheidskontrole-lys in die Suid-Afrikaanse konteks voorkom nie.

### Navorsingsvraag

Die studie was deur die volgende vraag gelei: "Wat is die hindernisse wat verhoed dat die chirurgiese veiligheidskontrole-lys in die operasiesaal by tersiêre hospitale in die Kaapse Metropool geïmplementeer word?"

### Doel

Die doel van die studie was om die hindernisse te ondersoek wat die implementering van die chirurgiese veiligheidskontrole-lys in die operasiesaal in twee tersiêre hospitale in die Kaapse Metropool verhoed.

### Doelwitte

Die doelwitte van hierdie studie was om die volgende te bepaal:

- Die houding van die personeel oor die implementering van die kontrole-lys
- Kommunikasie onder chirurgiese spanlede ten opsigte van die kontrole-lys
- Oortuigings van die chirurgiese spanlede oor die kontrole-lys
- Ondersteuning van chirurgiese spanlede aangaande die implementering van die kontrole-lys
- Terugvoering in verband met potensiële hindernisse
- Enige statistiese assosiasies tussen die biografiese data en die hindernisse wat die implementering van die kontrole-lys verhoed

### Navorsing metodologie

Om die doelwitte van die studie te bereik, is 'n nie-eksperimentele, beskrywende ontwerp, met 'n kwantitatiewe korrelerende benadering geselekteer. Etiese goedkeuring is vooraf verkry van die Gesondheidsnavorsingsetiekkomitee aan die Universiteit van Stellenbosch (Etiese Verwysing 0557) en twee tersiêre hospitale in die Kaapse Metropool.

Na 'n loods-studie, is data deur middel van 'n selfgeadministreerde vraelys ingesamel en deur beskrywende en afleibare data-analise uitgevoer. Die populasie van 304 deelnemers het geneeshere, chirurgiese assistente, narkotiseurs, verpleegsters en teatertegnici ingesluit.

### **Betroubaarheid en geldigheid**

Die instrument wat gebruik word in hierdie studie is gebruik in 'n vorige studie waar 'n alpha telling van 0.7 'n aanvaarbare vlak van interne konsekwentheid aangedui is. 'n Loods-studie is gedoen om die metodologie en die data versameling instrument te toets. Die geldigheid van die instrument is deur kundiges verseker.

### **Resultate**

Die studie resultate bevestig dat die chirurgiese kontrolelyns is goed geskik, alhoewel deelnemers oor 50+ (23.8%), met meer as 10 jaar se ervaring (19.4%) en doktorsgraad onderwys (30.8%) nie saamgestem het dat die SSC altyd geïmplementeer was nie. 'n Statistiese beduidende verskil ( $p=0.010$ ) tussen die jare van ervaring en behoorlike opleiding op die implementering van die kontrolelyns is geïdentifiseer. Enersyds, deelnemers (59.9%) het waargeneem dat verpleegsters net die kontrolelyns afmerk. Narkotiseurs (60.9%) en deelnemers met 'n graad (47.7%) het aangedui dat dele van die kontrolelyns soms nie voltooi word nie. Ook, statistiese beduidende verskille is geïdentifiseer tussen beroep ( $p=0.004$ ), ouderdom ( $p=0.030$ ), onderwys ( $p=0.006$ ) en dat die kontrolelyns 'n bykomende verantwoordelikheid is, en 88.1% vind dit tydrowend.

### **Aanbevelings**

Identifiseer en lei plaaslike kampioene op om bestuur te verteenwoordig in gehalte verbetering inisiatiewe om die korrekte gebruik van die kontrolelyns te bevorder. Inter-professionele span opleiding op gehalte verbetering inisiatiewe moet ingestel word om praktiese kwessies met betrekking tot die korrekte implementering van die chirurgiese veiligheid kontrolelyns.

### **Gevolgtrekking**

Die studie het onvolledige gebruik van die kontrolelyns en onvoldoende opleiding uitgelig wat kan lei tot 'n af merk lys oefening. As gevolg van onbehoorlike gebruik van die kontrolelyns, mag instansies nie die volle voordele van die chirurgiese veiligheid kontrolelyns ervaar nie.

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## ABBREVIATIONS

WHO	World Health Organization
SSC	Surgical Safety Checklist
WHO SSC	World Health Organization Surgical Safety Checklist
OR	Operating room
DOH	Department of Health
SPSS	Statistical Packages for Social Science
HREC	Health Research Ethics Committee

## CHAPTER 1

### FOUNDATION OF THE STUDY

#### 1.1 INTRODUCTION

This study sought to investigate the barriers preventing the implementation of the surgical safety checklist (SSC) in the operating room (OR) in tertiary hospitals in the Cape Metropole. Chapter one introduces the systematic groundwork of the study. The reason for the study, problem statement, research aim, objectives and conceptual framework are presented. In addition, a brief account of the research methodology as applied in the study is outlined.

Surgical care of a patient has been identified as an essential part of healthcare globally (World Health Organization, 2009:1). As the incidences of traumatic injuries, cancers and cardiovascular diseases increase, the majority of the population will possibly have an invasive procedure once in their life (Haynes, Weiser, Berry, Lipsitz & Breizat, 2009:491). According to Vijayasekar and Steele (2009:260) and Haynes *et al.* (2009:491), two hundred and thirty-four million operative procedures are performed worldwide every year.

Unsafe practices in surgical care can lead to unfavourable healthcare events, instead of saving lives (WHO, 2009:1). Safe surgery is globally accepted as a health concern (Jones, 2011:271). Medical errors have become a significant global public health concern and create a warning to patient safety. Globally it has been evidently acknowledged that adverse events in healthcare is roughly 10% (Mahajan, 2011:161), whilst the World Health Organization (2008:5) stated that globally, 50% of adverse events are preventable. Results have further shown that 50% of adverse events are related to incidents which occur intra-operative with half being avoidable, such as wrong site surgical procedures and the retaining of swabs. The root cause of the events reported are 75% being mainly communication breakdown and lack of team co-operation (World Health Organization, 2008:5).

Further, invalid technological devices are prone to malfunction due to complexity thereof and minimal training for effective use by OR staff. Consequently, the effectiveness of safety devices maybe debatable, as human error can cause numerous unpredicted collaborations (Van Beuzekom, Boer, Akerboom & Hudson, 2010:52). Examples of human error that may cause adverse events, include failure to pay sufficient attention to device connectivity, defibrillator failure due to flat batteries and improper cleaning, and disinfection techniques of flexible endoscopes. Thus, reducing human mistakes and system breakdowns are priority in the operating room (Van Beuzekom *et al.*, 2010:52).

The medical profession recognized that human factors contribute to unsafe practices in the OR (Perry & Kelly, 2014:59). In addition to human error, multidisciplinary staff may experience various communication challenges, such as low-reliability systems, unfavorable communication between teams and incomplete patient endorsements. These challenges may adversely affect the patient involvement, compromise patient safety, and result in negative incidents in healthcare (Hudson, 2016:112).

Donabedian's model is a conceptual model which provides a quality framework for the evaluation of health services. It comprises of three categories of standards namely structure, process and outcome standards (Schoenberg, Fondahn & Lane, 2016:115). For the purpose of this study the researcher applied process standards to give guidance to the investigation of the barriers that prevent implementing the surgical safety checklist in a tertiary hospital (Schoenberg *et al.*, 2016:115).

## **1.2 SIGNIFICANCE OF THE PROBLEM**

The study investigated the barriers OR staff encounter during the implementation of the surgical checklist in the Cape Metropole tertiary hospitals.

The findings of this study will assist policy makers and peri-operative managers and staff to address any issues that may hamper effective implementation of the checklist, as it has the potential to increase peri-operative safety by avoiding a multitude of adverse events.

## **1.3 RATIONALE**

An initial analysis reveals that the WHO adopted a safety checklist from the aviation industry (Perry & Kelly, 2014:59). Following an aviation crash in 1935, a root cause analysis was carried out which showed that the incident was a result of human error (Perry & Kelly, 2014:59). In response to this accident, the aviation industry created a checklist with checks for leaving the ground, the flight, returning to the ground and when driving down a taxiway to the end of the runway or terminal. Once the checklist was implemented pilots flew millions of miles through different conditions without a single accident (Alnaib, Al-Samarrae & Bhattacharya, 2012:289). These positive outcomes were reflected as a main breakthrough in the advancement of safety checklists within the aviation business (Emerton, Panesar & Forres, 2009:377). Further improvement in the safety culture within aviation after implementing the checklist along with briefing and debriefing sessions.

After the launch of the second global patient safety challenge, a group of experts studied the unsafe practices in surgery, gathered data and compiled the current WHO Surgical Safety

Checklist (SSC). The tool consists of 19 items tested in eight different countries, it is intended to promote patient safety and reduce major surgical complications in patients undergoing surgical procedures. In 2006, the first checklist was introduced into healthcare with the aim of reducing central line infections (Perry & Kelly, 2014:59).

The World Alliance for Patient Safety (2008) introduced ten objectives for safe surgery, which later shaped the foundation of the recognised 19 item tool (Perry & Kelly, 2014:59). O'Connor, Reddin, O'Sullivan, O'Duffy, and Keogh (2013:14) recommended institutions to adapt the WHO SSC to suit the need of local practices. This may be resulting in some of the wording being altered in the checklist, for example from time out to sign in.

In 2008, the WHO published the SSC which consisted of a three-step process, which is the sign in before induction of anesthetic, time out started directly before skin incision and sign out at the end of the surgical procedure before the patient leaves the Surgical Suite (Alnaib *et al.*, 2012:290). During these phases, surgical team members should pause and pay attention and actively participate in the checks (Alnaib *et al.*, 2012:290).

Kieffer, Quaye, Chotai and Ricketts (2013:288), suggest that the WHO SSC is a trustworthy instrument for decreasing surgical morbidity and mortality percentages. However, it is not executed collectively with full compliance. In health care institutions where the WHO SSC was implemented, a reduced rate of morbidity (11% - 7%) and mortality (1.5% - 8%) was observed. However, regardless the identified benefits of the WHO SSC in surgery, OR staff still experience barriers with the practical implementation (Mahajan, 2011:161).

OR is a complex area and implementation of new practices are being highly challenging. The Department of Health (DOH) in the Western Cape implemented the SSC in 2009, and the South African National DOH has made conformity with the checklist as part of the measurable criteria in the nationwide fundamental benchmarks of government health institutions (Gordon & Reed, 2012:7).

Regardless the recognized benefits, several health institutions have not implemented the WHO SCC (Kieffer *et al.*, 2013:288). The health department as a whole has been condemned for being delayed to implement the WHO SSC worldwide. (Alnaib *et al.*, 2012:289) mentioned that healthcare institutions across several countries found the implementation of the WHO SSC as the main obstacle.

## 1.4 PROBLEM STATEMENT

Safe and effective peri-operative patient care requires group participation and communication to prevent adverse events (Einav, Gopher, Kara, Ben-Yosef, Lawn, Laufer, Liebergal & Donchin, 2010:444). However, despite the known benefits of peri-operative team work, theatre staff may view the surgical safety checklist as a tick-box exercise, rather than active team participation whilst conducting the peri-operative checks (O'Conner *et al.*, 2013:14). Thus, effective implementation of the surgical checklist is hampered, and the intended benefits are lost if OR staff only "tick the boxes", for auditing purposes.

## 1.5 RESEARCH QUESTION

What are the barriers that prevent the implementation of the SSC in the OR in tertiary hospitals in the Cape Metropole?

## 1.6 RESEARCH AIM

The aim of the study was to investigate the barriers that prevent the implementation of the surgical safety checklist in the operating room in two tertiary hospitals in the Cape Metropole.

## 1.7 RESEARCH OBJECTIVES

The objectives of the study were to determine:

- The attitude of the staff towards the implementation of the checklist
- Communication amongst surgical team members, related to the checklist
- Beliefs of surgical team members about the checklist
- Support from surgical team members, implementing the checklist
- Feedback on potential barriers
- Any statistical associations between the biographical data and the barriers preventing the implementation of the checklist

## 1.8 CONCEPTUAL FRAMEWORK

The conceptual framework explains the theoretical foundation for a research study. This outline is based on phenomena, assumptions and viewpoints (Burns & Grove, 2007:167). The theoretical framework, on which this research was based, is Donabedian's framework. Avis Donabedian introduced a theoretical framework in 1966 on quality care, with specific reference to structural, process and outcome standards. These standards are essential for effective functioning in quality improvement in peri-operative care (Schoenberg *et al.*, 2016:116).

### **Structure Standards**

The structure standards refer to what is required to ensure safe quality care. These include the building, the operating room, staff, equipment, protocols, guidelines and the availability of the checklist. The “concept” structure standards would therefore include the qualification, the years of experience and the training of staff in the operating room. The quality of care depends on the conditions under which the care is given. Safety is seen as one part of quality in healthcare. Default in the structure may result in failure and unsuccessful outcomes (Schoenberg *et al.*, 2016:116).

### **Process Standards**

According to Donabedian, process standards refer to the actual implementation of the policies, protocols and procedures (Schoenberg *et al.*, 2016:116). For the purpose of this study, the process standards are the activities staff carry out during the implementation of the checklist; the level of co-operation, communication, awareness of safety and teamwork amongst OR staff involved in the implementation of the checklist. The process in which the health care is provided is dependable on the configuration of the healthcare organization, and the process can also be a self-determining element in patient outcome (Schoenberg *et al.*, 2016:116).

### **Outcome Standards**

The outcome is the effect the health care has on the patient (Schoenberg *et al.*, 2016:116), and may be either positive or negative. However, when evaluating the outcome of care rendered, the quality of care has been assessed (Schoenberg *et al.*, 2016:116). The outcome of implementing the surgical safety checklist improves team communication (Haynes *et al.*, 2009:491). The checklist further improves consistency in OR staff performances at critical times, improves team work and a culture of safety. In healthcare settings where the WHO SSC is implemented, there is a reduction in the rate of morbidity (11% - 7%) and mortality 1.5% - 8%, (Kieffer *et al.*, 2013:288). Specific indicators to measure the outcome of the standards will indicate whether safe quality care was provided. For example: how many adverse events, such as instruments retained in patients, wrong identification, and wrong site surgery and wrong surgical procedures.

## **1.9 RESEARCH METHODOLOGY**

The research methodology will be briefly described, followed by a detailed description of the research methodology in chapter three.

### **1.9.1 Research design**

The study followed a quantitative approach with a descriptive correlational design to investigate the barriers preventing the implementation of the SSC in the operating room in

tertiary hospitals in the Cape Metropole. A correlational study was applied to determine whether there were any statistical associations between the participants.

### **1.9.2 Study setting**

The study was conducted in two tertiary public hospitals in the Cape Metropole.

### **1.9.3 Population and sampling**

For this study, the target population (N=600) from both health institutions included the full population of surgeons, anaesthesiologists OR nurses and theatre technicians, as they are the key staff implementing the checklist. Nursing and medical students were excluded from this study.

### **1.9.4 Data collection tool**

The researcher downloaded the instrument used, and adapted it to measure all the components based on the objectives of the study, literature search, the clinical knowledge and skills of the researcher.

The questionnaire comprised of 30 questions, a demographics and a barriers section divided into five subscales (Appendix E).

The Likert scale methods with a five-point scale: 1 strongly disagree, 2 disagree, 3 agree, 4 strongly agree and -88, "I don't know" were used for scoring.

### **1.9.5 Pilot study**

A pilot study was conducted to determine the feasibility of the study and to pre-test the data collection tool.

### **1.9.6 Validity**

Validity refers to the degree to which an instrument measures the attributes of a concept accurately (LoBiondo-Wood & Haber, 2010:286). The instrument used in this study was used in a previous study where an alpha score of 0.7 indicated an acceptable level of internal consistency.

### **1.9.7 Reliability**

Reliability is the ability of an instrument to measure the quality of a concept or construct in a consistent manner (LoBiondo-Wood & Haber, 2010:286). A pilot study was done to test the methodology and the data collection tool. Two people independently categorized the comments with the inter-rater reliability using the Cohen's Kappa with a measurement of 0.88.

### **1.9.8 Data collection**

A self-administered questionnaire was utilised to collect the data for this study. The data collection for this study occurred over a period of two weeks in two tertiary healthcare institutions.

### **1.9.9 Data analysis**

Data analysis is conducted to reduce, organise and summarise the data (Burns, Grove & Gray, 2012:691). In this study, Statistical Packages for Social Science (SPSS) Statistics 24 software was used to analyse the data with the assistance of a qualified biostatistician from the Centre for Statistical Consultation at Stellenbosch University.

## **1.10 ETHICAL CONSIDERATIONS**

Before the study commenced, the researcher obtained approval from the Health Research Ethics Committee (HREC) at Stellenbosch University and the health facilities where the study was conducted; Ethics reference 0557 (Appendix A). The researcher practised the ethical principle of veracity, disclosed the true purpose and the effects of research before consent was obtained and continued after results were obtained. The researcher has done the study outside her working environment to exclude bias.

This article is distributed under the terms of the Creative Commons Attribution License, is open and accessible, allows the use of unrestricted circulation, and duplication in any method, providing the initial article is accurately quoted (O'Conner *et al.*, 2013:14). Although the author permitted unrestricted use of the questionnaire, the researcher informed the author via an email of the intent to use the questionnaire.

### **1.10.1 Right to self-determination**

Essential information about the study was given to the participants before consent was obtained. Each study participant was given autonomy to participate. The researcher explained that participation in the study is completely voluntary and that participants could withdraw at any time they wished without being penalised. No money or incentive was given for participating.

### **1.10.2 Right to confidentiality and anonymity**

Each questionnaire had a number but the participants' names were not written on the questionnaire in order to ensure their anonymity and privacy. Furthermore, to ensure the institutions' anonymity, none of the official documents was used. Confidentiality and privacy was maintained since questionnaires were deposited into two sealed boxes marked consent and second box questionnaire. These boxes were allocated to the reception area of the operating room. In addition, with information governance, all initial data collected will be stored in a locked file cabinet for a minimum period of five years for possible inspection, thereafter it will be destroyed. The data will also be stored online with an encrypted folder, access and availability only to the Health Research Ethical Committee at the Stellenbosch University, the researcher, supervisor and co-supervisor appointed by Stellenbosch University for inspection and auditing purposes.

### **1.10.3 Right to protection from discomfort and harm**

Beneficence and non-maleficence were ensured since no harm or discomfort was anticipated during the study.

## **1.11 OPERATIONAL DEFINITIONS**

### **Checklist**

Checklists create an independent verification for critical steps in the work process (Winters *et al.*, 2014:1).

### **The World Health Organisation Surgical Safety Checklist (WHO SSC)**

The WHO SSC is a tool that consists of 19-items, intended to improve a patient's safety when undergoing surgical procedures (Perry & Kelly, 2014:59).

### **Briefing**

Before induction of anaesthesia, briefing must be completed by the entire surgical team in the operating room, to ensure safety of the patient. The process anticipates risk, which helps staff to be prepared when something goes wrong (WHO, 2008:18).

### **Time out**

Time out is done prior to the skin incision. The surgical team will pause to confirm aloud the identification of the patient, the correct operation, and the correct site if applicable. Several essential safety checks are undertaken and involve everyone on the team (WHO, 2008:18).

**Debriefing**

Postoperative debriefing is a process that is done at the end of the procedure before the patient leaves the operating room. Debriefings are done in order to identify and learn from mistakes that happened during the procedure with the intent of preventing the same mistakes. The goal is to endorse critical information to the receiving personnel responsible for the care of the patient post-operative (WHO, 2008:18).

**Adverse events**

Un-intended events or harm that may result in outcomes that may require additional care or hospitalisation. Harm indicates the dysfunction of a structure or functioning of the body, which is inclusive of diseases, injuries, suffering, disabilities and death. Harm could be physical, social or mentally (WHO, 2007:12).

**Scrub Nurse**

Scrub nurses are sterile team members. They prepare and control instrumentation, swabs and sharps for the operation to be performed (Phillips & Berry, 2013:457).

**Circulating Nurse**

Circulating nurses are non-sterile team members. They supply the scrub nurse / technician with all the sterile items needed during the operation (Phillips & Berry, 2013:457).

**Anaesthetic nurse**

Anaesthetic nurses are non-sterile team members who assist the anaesthetist during the peri-operative stages.

**Operating room technicians**

Operating room technicians are staff members who function as scrub, circulating or anaesthetic assistants and are not registered as nursing or medical practitioners.

**Surgical team members**

The surgical team members are operating room staff directly involved with the use of the checklist and peri-operative patient care. For the purpose of this study, surgical team members include sterile and un-sterile surgical members. The sterile team involve the surgeons, assistant surgeons, scrub nurses and scrub technicians. Anaesthetists, anaesthetic assistants (nurses or technicians) and circulating nurses or technicians are members of the non-sterile team.

## 1.12 DURATION OF THE STUDY

The timeframe for the study is explained in Table 1.

**Table 1 Study timeframe**

Year	Month	Activity
2017	07 May	MTUT
2017	11 July	Submission to Ethics
2017	30 August	Feedback from Ethics
2017	August	Writing Chapter 1 and 2
2017	1 September	Request Institutional Approval
2017	11 September	Institutional Approval
2017	18 September	Pilot study
2017	19 September	Data collection
2017	October	Data Analysis and writing of thesis
2017	October	Writing of thesis with continuous review by supervisor
2017	November	Technical and grammar editing
2017	4 December	Submission of thesis

## 1.13 CHAPTER OUTLINE

The chapters of the thesis will be as follow:

- **Chapter 1: Foundation of the study**  
The topic was introduced, the rationale and a brief overview of the methodology were discussed.
- **Chapter 2: Literature review**  
Information regarding the literature review that was conducted to obtain a global perspective of the study topic will be evident.
- **Chapter 3: Research methodology**  
The research methodology was discussed.
- **Chapter 4: Results**  
The results of the study were analysed and made known.
- **Chapter 5: Discuss, conclusions and recommendations**  
The researcher discussed the limitations of the study, provided recommendations and concluded the study.

#### **1.14 SUMMARY**

Chapter one described the context, research methodology and the ethical principles that were maintained throughout the study process. Information regarding the literature review that was conducted to obtain a global perspective of the study topic will be presented in chapter two.

#### **1.15 CONCLUSION**

Patient safety is a fundamental aspect of the quality of care in an operating room. Thus, the surgical safety checklist has the potential to be a very effective system for avoiding a variety of possible adverse events intra-operative. In order to facilitate improvement, the SSC is to be implemented with rigour, all team members need to be involved to adhere and abide by the checklist process. However, barriers may exist that may hinder the effective implementation of the surgical checklist. The study identified barriers unknown and strategies to enhance successful implementation.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 INTRODUCTION

Chapter two provides a detailed summary of the relevant international literature over a period of ten years. Although numerous studies describe various points that are fundamental in ensuring safe and correct use of the SSC, further studies emphasize operational and cultural barriers which hamper the implementation thereof (Vats, Vincent, Nagpal, Davies, Darzi & Moorthy, 2010:503).

Surgical care plays a progressively leading role in health care, and globally attention is paid to safety and quality of patient care. Results shown roughly 40% of errors happen in the OR, most of these incidents result from preventable mistakes (Levy, Casey, Senter, Russell, Hawkins, Jane, Zhao, Doody, Kao, Lally & Tsao, 2012:331). Thus, quality improvement and prevention of adverse events are important aspects of surgical care in the OR (Levy *et al.*, 2012:331). Increasingly, research associated with teamwork, a safety culture climate and patient outcomes to surgical post-surgery quality care is done. Yet, peri-operative patient safety and patient outcomes still need more attention (Haynes, Weiser, Berry, Lipsitz & Breizat, 2011:102).

Since the WHO introduced the Surgical Safety Checklist (SSC) in 2008, the adoption thereof becomes increasingly widespread. Mahajan (2011:161), reported significant positive results after the implementation of the WHO SSC in improving the safety of peri-operative patients. In the same way Molina, Jiang, Edmondson, Gibbons, Huang, Kiang, Haynes, Gawande, Berry and Singer (2015:725), reported a remarkable reduction in morbidity and mortality after commencing of the WHO SSC. A pilot study of 7,688 patients in eight hospitals in both well-resourced and poor resourced counties, demonstrated that the SSC contributed to the reduction in mortality from 1.5% to 0.8%. Similarly, the study reported a decrease in inpatient surgical complications from 11% to 7% (Haynes *et al.*, 2009:492). These findings were not supported by all studies. A study conducted in Canada conveyed no changes in the postoperative results after implementation of the SSC (Urbach, Govindarajan & Saskin, 2014:1029). This study further stated that the manner in which hospitals implement the SSC influences the outcome. Subsequently, the implementation of the SSC was met with mixed reactions in different institutions, and many countries have still not adopted the SSC (Mahajan, 2011:161).

However, the use of the SSC following the WHO SSC implementation in 2008, became mandatory in UK hospitals in 2010 (Mahajan, 2011:161). Similarly, the South African National Department of Health made conformity with the SSC, a part of its calculated national requirements in public hospitals and it was adopted for implementation by the Western Cape Department of Health in 2009 (Gordon & Reed, 2012:7).

## **2.2 ELECTING AND REVIEWING THE LITERATURE**

A literature review was conducted via electronic databases using the following sources:

- American College of Surgeons, Elsevier, PubMed, PubMed- Medline, CINAHL, Google Scholar, CLINICAL FEATURE, EBSCOhost, and British Journal of Anesthesia, Annals of surgery, Clinical Key, Ovid Medline, Science Direct and the WHO website
- Relevant electronic journals
- Textbooks

The literature search included studies dating from January 2007 to June 2017 and only those published in English.

## **2.3 SAFETY CULTURE**

Safety culture refers to the attitude of staff, including the way they think and behave within an organization (Haugen *et al.*, 2013:808). Mahajan (2008:162), reported that the SCC, along with briefing and debriefing sessions has been influential in improving safety principles in the military. The SSC reminded the team pre-operatively of crucial patient details to prevent intra operative errors. Haugen, Søfteland, Eide, Sevdalis, Vincent, Nortvedt and Harthug (2013:807), agreed that the SSC serves as a reminder to the surgical team, similar to a pilot's preflight check.

According to Borchand, Schwappach, Barbir and Bezzola (2012:925), the implementation of team briefings and a SSC require considerable cultural changes in the way surgeons, anaesthetists and nursing staff perform their duties. Opposed to an entirely hierarchical surgeon led system, this cultural change is required for all surgical team members to improve patient safety.

The implementation of team briefing sessions and SSCs in the peri-operative environment are a major step towards enhancing a culture safety (Allard, Bleakley, Hobbs & Coombes, 2011:711). Using a SSC to detect system failures, such as the absence of the patient's identification band, incomplete consent forms and a lack of equipment before a patient comes

into the operating room, are some of the benefits of a good safety culture (Allard *et al.*, 2011:711).

Patient safety should be established within a general safety culture since it is fundamental to all activities and actions in medical care (Haugen *et al.*, 2013:807). A reduction in morbidity and mortality rates after the WHO SSC was implemented was ascribed to the positive changes made in the culture of safety in the operating theatre (Haugen *et al.*, 2013:807).

The influence of the SSC on safety culture was further investigated in a study on safety perceptions of operating theatre personnel, conducted in a Norwegian University Hospital. The study design was a prospective controlled intervention study using pre- and post-intervention surveys with intervention and control groups (Haugen *et al.*, 2013:808). The target population of peri-operative personnel included surgeons, anaesthetists, operating theatre nurses, nurse anaesthetists, and ancillary personnel from two different sites. One group being from the central hospital and another group from the peripheral hospital. The results from this study described an improvement in staff perceptions of patient safety in the operating theatre after the implementation of the WHO SCC (Haugen *et al.*, 2013:808). Overall, the participation group scored higher on some basic cultural factors, but even taking this in consideration, positive outcomes were found on two aspects of patient safety. Firstly, a convincing decrease in adverse events was reported. Secondly improved safety processes were noticed after the implementation, such as increase patient safety consciousness and anticipating mistakes in the OR. Haugen *et al.* (2013:811), asserted that the decrease in reported incidents could be due to the timeous identification of near misses that prevented errors after the introduction of the WHO SSC. Two limitations were reported for this study. Firstly, the response rate when started was 10% higher than at the post-intervention and it might have influenced the sample size. Secondly, the variation in the educational backgrounds of the participants and non-participants could have indicated study weaknesses. However, the ultimate strength of this research is the use of a controlled strategy and matching the evaluation of safety principles at the individual level (Haugen *et al.*, 2013:814).

## 2.4 TEAM APPROACH

Surgical care in the peri-operative environment is considered a team effort, where communication, team cohesion, and coordination of care are fundamental to safe patient care (Weaver, Rosen, DiazGranados, Lazzara, Lyons, Salas, Knych, McKeever, Adler, Barker & King, 2010:133). Watson (2009:123), supported that the goal of the OR team is to promote the quality of care rendered to the patient and that teamwork-aimed interventions enhance patient safety and practical standards.

Various studies emphasise the importance of peri-operative teamwork to improve patient safety. As team performance is important for rendering quality patient care, the implementation of the SSC cannot be accomplished by individual OR staff (Haugen *et al.*, 2013:663). Atul Gawande (2010:137), author of *The Checklist Manifesto*, also reported that surgical care is a team approach and that peri-operative patient safety should be promoted by the entire surgical team. Not only are surgical teams using the SSC better prepared, but they are also more competent, which in turn promotes responsibility and respect for the roles of team members (Rayner, 2009:3).

Although most studies reported positive outcomes after implementation of the SSC, some healthcare institutions did not benefit from the improved outcomes. In the event where operating room staff were merely ticking the boxes and completing the forms for auditing purposes, improved peri-operative outcomes were not reported (Vijayasekar & Steele, 2009:260). In addition, the incorrect use of the SSC may lead to an increase in operating time, resulting in increased surgical safety risks (Panesar, Cleary & Sheikh, 2009:256). According to the WHO (2009), for the SSC to be beneficial to the patient, it requires a particular sequence of checks by the surgical team. Therefore, effective use of the SSC involves a multi-team approach, moving through a logical sequence of steps to ensure the safe and uneventful transit of a patient through the operating theatre. Teamwork plays a major role in surgical care and has been emphasised as key to the successful implementation of the SSC. Sparkes and Rylah (2010:276), similarly argue that effective systems to minimise surgical risks require teamwork between multiple professionals.

Yet, implementation of the SSC has been slow. Perry and Kelly (2014:59) identified poor participation by management, lack of teamwork, no training and feedback as the main contributing factors for this slow implementation. Similarly, a study by Vijayasekar and Steel (2009:260) reported that teams that have not been trained on how to use the SSC, may show a lack of interest in its implementation. Therefore, they may view the SSC as a tick-box exercise, which may impact on the outcome of its implementation. In another study, O'Conner

*et al.* (2013:14) affirmed that the lack of rigour in the implementation phase could result in a negative feeling of security and compromise patient safety.

The importance of an organized training session before the use of the SSC was recognised in a study undertaken in Spain (Bliss, Ross-Richard, Sanzari, Shapiro, Lukainoff, Berstein & Ellner, 2012:776). This study was undertaken in a tertiary hospital, calculated patient outcomes over a thirty-day period following the implementation of the SSC, and reported an excellent decrease in a thirty-day morbidity.

Following the WHO implementation manual, Korkiakangas (2017:177) and Haynes *et al.* (2009:491) explained the use and the elements of the SSC to improve team communication during the implementation stages.

Sign-in happens before induction of anaesthesia, in which surgical members verbally confirmed the following elements:

- The patient has verified his or her identity, surgical site, procedure and consent
- The pulse oximeter is on the patient and functioning
- Team members confirm the allergy status of the patient
- Team members confirm with the anaesthetist if he or she anticipates any anaesthesia risk
- Team members confirm with surgeon if he or she anticipates any increased risk blood loss

During timeout, before skin incision, all surgical team members verbally confirm the following elements that:

- All team members have been introduced by name and role
- The patient's identity, surgical site and procedure are identified
- The anticipated critical events are reviewed
- The surgeon reports critical and unanticipated actions, surgical time and anticipated blood loss
- The anaesthetist reports specific concerns related to the patient
- The scrub and circulating nurse reports the sterility and availability of equipment
- The prophylactic antibiotic be given 60 minutes before incision
- X-ray images are available

Sign out is performed before the patient leaves the operating room with the following procedures:

- The scrub nurse discusses and reviews the following items with the surgeon
- Operative procedure performed
- Needle, sponge, instruments counts are correct
- Specimen is labelled correctly
- Equipment concerns or malfunction during the procedure
- The surgeon and anaesthesiologist confirm the post-operative care of the patient
- Reviewing of the above by the scrub nurse must be clear and audible

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

**Figure 2.1 World Health Organizations Surgical Safety Checklist**

Korkiakangas (2017:178), recommended that surgeons take the lead, with all team members present during the execution stages. An audit cycle study performed at two different hospitals in the United Kingdom revealed that assigning at least one team member to conduct the team briefings, significantly increased adherence to the WHO SCC (Kieffer *et al.*, 2013:288).

## 2.5 COMMUNICATION

Communication among surgical team members in health care became a major concern in healthcare settings as communication breakdowns were recognised as the main reason of

medical mistakes (Kleiner, Link, Maynard & Carpenter, 2014:358). According to The Joint Commission on Accreditation of Healthcare Organization, almost 66% of all registered sentinel events from 1995 to 2005 occurred as a result of ineffective communication. In addition, between 2010 and 2013, communication breakdown ranked as one of the top three causes of registered sentinel events (Hudson, 2016:112). In the same way Einav *et al.* (2010:444), documented that communication breakdown between the healthcare providers led to the information being misinterpreted and it had a negative impact on the outcome of patient care. In addition, Rayner (2009:32) reported that patient care and safety is not entirely dependent on the content of the communication, rather also on the method of communication.

The WHO (2009) also emphasized that both the transfer of information and the method of communication are crucial to safe patient care (Jones, 2011:273). Communication must be open, standardised, short, understood and prompt. (Einav *et al.*, 2010:445). The peri-operative phase due to its complexity involves multidisciplinary team members to provide patient care. Communication and teamwork is of the essence to ensure effectiveness of the OR. Poor or lack in communication among the health care providers can lead to adverse events.

In addition, the majority of adverse events are not related to clinical performance, but rather communication failures (Hudson, 2016:112). Thus, an improved quality of communication in the OR is fundamental to reduce the number of errors and increase patient safety in the operating room (Kleiner *et al.*, 2014:358). In the OR the demand for cooperation, exchange of information among the healthcare workers in conjunction with organised planning, foresight, and good judgement will improve the competence in the OR environment (Einav *et al.*, 2010:445).

### **2.5.1 Briefing and debriefings**

With the intent to maximise communication amongst surgical team members, a randomised quantitative study by Nundy, Mukherjee, Sexton, Pronovost, Knight, Rowen and Makary (2008:1068), produced an operating room briefing tool. Briefings take place before the start of the surgical procedure to ensure surgical team members understand the expectations of the day and to prevent unexpected incidents. Debriefing is done on completion of the surgery and before the patient is taken out of the OR by the surgical team to discuss performance of the team and unanticipated occurrence during the surgery.

Briefings and debriefings are not intended as a substitute for the SSC, but rather to complement one another. The use of the briefing tool improves communication which results in a decrease in OR delays (Jones, 2011:273), while the use of the SSC promotes teamwork,

enhances communication, and decreases adverse events in operating rooms (Carney, West, Neilly, Mills & Bagain, 2010:723).

Carney *et al.* (2010:723) agreed that using the SSC with briefings improved communication among surgical team members, minimized OR delays and decreased adverse events during surgery. Lingard, Regeh and Orser (2008:12), came to the conclusion that communication errors decrease following the use of the SSC and team briefings. However, the understanding of teamwork and implementation of briefings and debriefings vary between surgeons and nurses in the peri-operative area (Carney *et al.*, 2010:723).

## **2.6 COMPLIANCE WITH THE WHO SSC**

Together with the increased focus on surgical morbidity and mortality (Alnaib *et al.*, 2012:289) and the positive outcomes of the SSC (Perry & Kelly, 2014:59), authors identified accomplishments to a degree that reduced peri-operative department mortality and morbidity in the different environments (Haynes *et al.*, 2011:102). Nonetheless, the entire medical profession has been condemned for being unhurried in the implementation of the WHO SSC globally, although the evidence could not pinpoint one specific reason (Alnaib *et al.*, 2012:290).

The acceptance of the WHO SSC has been met with diverse acknowledgement worldwide. Accepting WHO SSC was met with various recognition globally. Some reasons for partial compliance with the SSC include negative remarks, absent team members, hasty completion and awkwardness during implementation (Vats *et al.*, 2010:504). Even though awkwardness or not knowing could hamper implementation, there is not enough evidence to suggest that the age and seniority of the surgeon and anaesthetist affect compliance (Kieffer *et al.*, 2013:288). Literature does suggest that adherence with the recommendations of the checklist is affected due to OR teams merely completing the document to get it over and done with. Yet, results of compliance provide limited awareness into how the SSC is truly adopted, and it does not correlate with observational data (Perry & Kelly, 2014:59).

When the WHO SSC was introduced in 2008, the WHO provided a document to emphasize the importance of healthcare workers recognizing and adapting the SSC to the different aspect of work, e.g. training, education and leadership (Perry & Kelly, 2014:59). Compliance with the five steps of the WHO SSC has been shown to reduce adverse events (Kieffer *et al.*, 2013:288). A subsequent study performed by Harvard University discovered that participation of the leadership, team involvement, feedback and on the spot teaching were key to the positive outcome of the SCC (Perry & Kelly, 2014:59).

## 2.7 BARRIERS

The first group of health care institutions that implemented the SSC experienced many challenges and barriers. The WHO is aware of these challenges, especially the challenges that low and middle-income facilities face due to lack of resources, and patient safety structures (Perry & Kelly, 2014:59). Globally, approximately 4 000 hospitals adopted the revised version of the SSC (Levy *et al.*, 2012:331), although it is known to be a huge challenge across several countries and healthcare institutions.

Previous studies recognized a number of barriers implementing the SCC. One observational study at the Children's Memorial Hermann Hospital identified several implementation barriers. These barriers included a lack of understanding of critical points, the timing of execution and confusion about the roles and names of team members. They also claimed that the lack of education resulting in an unsuccessful implementation process could contribute to the barriers (Levy *et al.*, 2012:332). The authors identified some limitations in the study. Firstly, the roles of the observers were not clearly identified, and secondly, outcome measures to correspond the SSC compliance were absent (Levy *et al.*, 2012:336).

Mahajan (2011:163) described some of the barriers and challenges in implementing the SCC as follows:

Anxiety of unfamiliarity and face to face introductions of the team may cause awkwardness. On the other hand, it allows team members to communicate and discuss potential concerns and equipment required during surgery.

Hierarchy of staff is common in an OR setting globally, for example when the SSC is led by the nurse instead of the surgeon. Evidence is prevalent that the SSC is more effective when the surgeons and anaesthetists are supportive and when the nurses are self-assured.

The logistics and timing of SSC implementation are potential barriers, as the surgeon may not be in the room when the sign in and sign out are performed. Several reasons may be stated for the absence of the surgeon, such as seeing other patients in between cases or writing operative notes.

According to Fourcade, Blache, Grenier, Bourgain and Minvielle (2012:192), OR staff in France found the SSC time consuming and did not experience the additional benefit of using the SSC. Duplication of safety checks might have been done by the surgeon, anaesthetist and nurses before the patient entered the OR. However, these checks are done individually and the SSC requires all team members to be present to execute the crucial steps of the SSC.

Since the WHO SSC is very comprehensive and relevant, institutions are urged to accept it, but adapt it according to their needs. However, it is vital to maintain the important elements of the SCC. According to Fourcade *et al.* (2012:192), the most prevalent barrier identified in a study in eighteen cancer centres in France implementing the SSC, is duplication with existing processes already covering the steps in the SSC. Thus, to avoid duplication, the adapted SSC needs to be carefully compared with the WHO SSC to minimise duplication.

In another study at the Brighton and Sussex University Hospitals and the Sussex and the Queen University Alexandria Hospital in Hampshire, an audit cycle study was performed (Kieffer *et al.*, 2012:288). In the first audit cycle, trauma and orthopaedic doctors in training from each area collected the data from thirty orthopaedic surgeries where they assisted. The operating room staff was not informed that their practice was being audited, and to prevent bias, doctors in training did not start the WHO SSC. Upon completion of the audit, there was a lower than expected level of compliance with the WHO SSC at one of the sites. The team felt that the staff had not really taken ownership of the WHO SSC. To remedy the situation, they decided that adequate team briefings had to take place. Thus, they appointed the theatre coordinator as the dedicated person to ensure that it happened. The study showed a significant difference in performance once a re-audit was completed. This study highlights that a significant increase in adherence to the WHO SCC is achieved when at least one team member is assigned to conduct team briefings (Kieffer *et al.*, 2013:288).

Misuse of the SSC and incorrect execution thereof, may be detrimental to patient safety and actually compromise team work in the operating room. Thus, if not addressed cautiously, interdisciplinary dynamics may cause tension amongst surgical team members.

## **2.8 RECOMMENDATION GUIDELINES TO THE IMPLEMENTATION OF THE SSC**

In 2011 Conley, Singer, Edmondson, Berry and Gawande (2011:873), conducted a survey in five Washington hospitals implementing the SSC. They discovered the main factor for successful implementation is for team members to understand the reason behind the use and display of the SSC. Thus, Conley *et al.* (2011:874) recommended the following guidelines to implement the surgical SSC in the operating room:

- Start implementation by selecting team members led by surgeons and nurse managers
- Acquire support from senior management
- Schedule meetings for the selected team members to meet two to three times per week to plan and discuss

- Have chief of surgeons be in charge of the initiative because OR staff will listen easily to known surgeons than to surgeons they do not know
- Have individual conversations with surgeon surrounding the implementation of the SSC
- Pilot test the SSC implementation, using one team and make modifications depending on the feedback
- Establish SSC implementation teams and give thorough training to all surgical team members in the OR
- Extend support to all peri-operative team members during the implementation process
- Choose SSC champions who monitor the implementation process, and give constant feedback to all surgical team members
- Be open to feedback and reply to the team members
- Acknowledge and discuss barriers to the implementation of the SSC

## 2.9 SUMMARY

In this chapter, qualitative and quantitative studies were utilised to describe the researcher's understanding of the literature relevant to the objectives of the study.

A large number of these studies displayed that the SSC and team briefing methodology improve communication, awareness of safety culture and mutual respect amongst operating room team members (Nundy *et al.*, 2008:1068; Lingard *et al.*, 2008:12 & Allard *et al.*, 2011: 711). Vats *et al.* (2010:502) and O'Conner *et al.* (2013:15) advised health institutions to fully acknowledge and address operational barriers that could hamper the implementation.

The following chapter provides an in-depth discussion of the research methodology, study setting, population and sampling, the data collection tool and data analysis. The literature in chapter two and the study methodology in chapter three will be elaborated upon in the study findings.

## 2.10 CONCLUSION

In conclusion, literature suggests a decrease in the rate of morbidity (11% - 7%) and mortality 1.5% - 8%, where the WHO SSC is performed (Kieffer *et al.*, 2013:288).

Through engagement with the literature, the researcher identified that peri-operative teamwork improves patient safety. In addition, a general safety culture should be promoted since it is the foundation of all activities and actions in medical care and the environment in which patient

safety should be established. Of critical importance, to significantly increase adherence to the WHO SSC, is assigning at least one team member to conduct team briefings. Several barriers were identified - lack of understanding of critical points, the timing of execution and confusion about the roles and names of team members, and the lack of education resulting in an unsuccessful implementation process.

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 INTRODUCTION**

In chapter one and two a description of the background of the study and a detailed literature review were presented. Chapter three will provide a comprehensive description of the methodology that was followed to answer the objectives of the study.

The research methodology is a blue print of the techniques used by the researcher to collect and analyse the data (Burns & Grove, 2011:253). In this study, a quantitative correlational approach was followed to investigate the barriers OR staff encounters during the implementation of the surgical checklist in the Cape Metropole tertiary hospitals.

#### **3.2 RESEARCH AIM AND OBJECTIVES**

The aim of the study was to investigate and determine the barriers that prevented the implementation of the surgical safety checklist in the operating rooms in two tertiary hospitals in the Cape Metropole.

##### **3.2.1 Research objectives**

- The objectives of the study were to determine:
- The attitude of the staff towards the implementation of the checklist
- Communication amongst surgical team members, related to the checklist
- Beliefs of surgical team members about the checklist
- Support from surgical team members, implementing the checklist
- Feedback on potential barriers
- Any statistical associations between the biographical data and the barriers preventing the implementation of the checklist

#### **3.3 RESEARCH DESIGN**

According to De Vos, Strydom, Fouche and Delport (2011:109), a research design is a plan or blueprint used to conduct a study. In addition, Burns and Grove (2007:38), explain that the choice of research design depends on the researcher's knowledge, the problem and purpose of the study, and the intentions to simplify the study's findings.

Descriptive quantitative studies are structured, and are used to determine the extent of the problem and to describe a phenomenon. (De Vos *et al.*, 2009:63). Descriptive designs are

used since they provide a picture of what is happening in a specific situation and may be applied to develop theories and identify gaps in practice (Burns & Grove, 2011:256), whereas descriptive correlational studies examine the relationship between two or more entities (Burns & Grove, 2011:256).

To reach the objectives of this study, a non-experimental, descriptive design with a quantitative correlational approach was selected. For the purpose of this study, cross tabulations between the dependent and independent data were done for occupation of participants, roles of the nurses in the OR, years of OR experience, gender, age and level of experience of the participants, however the two clinical facilities were not compared. Correlations between the biographical data and the barriers to the implementation of the SSC, allowed the researcher to report who is more likely to implement the SSC. A quantitative approach enabled the collection of statistically reliable information that was obtained through a self-completed questionnaire.

### **3.4 STUDY SETTING**

The study was done in two tertiary hospitals in the Cape Metropole. The healthcare facilities have a combined total of 35 operating rooms with a combined staff complement of 600. The staff include surgeons, surgical assistants, anesthesiologists, nurses and theatre technicians. The surgical procedures performed in both these settings ranged from complex to minor surgery, namely orthopedic, neuro, cardiac, thoracic, vascular, general, plastic, urology, ear, nose and throat, gynecology and ophthalmology procedures, trauma and obstetrics. The emergency theatre at one clinical facility has three operating rooms, and was selected for the pilot study.

### **3.5 POPULATION AND SAMPLING**

According to Burns and Grove (2007:40), a study population are individuals who meet certain criteria for inclusion into a specific study. A sample is a subset chosen from the population that is selected for the specific study.

The researcher conducted the study in the Cape Metropole, outside her working environment, to exclude bias, and consulted a biostatistician from the University of Stellenbosch regarding the population and sampling.

In this study, the total population of the surgical team was included in the study, as surgeons, surgical assistants, anaesthetists, nurses and theatre technicians are key staff implementing the checklist. Registered nurses with or without a postgraduate OR qualification, enrolled

nurses, enrolled nursing assistants or theatre technicians may be allocated to scrub, circulate or assist the anaesthetist. By including the total population, each staff member had an equal chance to participate in the study. This had the effect that potential bias in the selection process, as well as resultant bias in the collected data and findings were excluded.

The total target population was 600 staff members across all surgical specialities. However, n=400 accepted to complete the questionnaire, with a return rate of n=304(76%), n=184 (60.5%) from institution one and n=120 (39.5%) from institution two. For the purpose of this study hospitals were not compared, but the researcher tried to obtain a large enough sample to address the research question. To reach the study objectives, as presented in Table 3.1 the sample included the following participants:

**Table 3.1 Sample**

Participants	Clinical facility one	Clinical facility two	Combined
Surgeons	40	25	65
Surgical assistants	3	0	3
Anaesthetists	31	24	55
PNs	61	41	102
ENs	19	13	32
ENAs	28	16	44
Theatre technicians	2	1	3
Total number of participants	184	120	304

The researcher collected data over a two-week period that included night shifts and weekends. Those individuals who were unable to participate in this study were those who were absent, or not available when data was collected due to annual vacation leave or sick leave, or who were from the agencies.

### 3.5.1 Inclusion criteria

The researcher included all surgeons, anaesthesiologists, nurses and theatre technicians working in the operating room.

### 3.5.2 Exclusion criteria

Due to the operating room being a complex area to work in and new employees who are still in an orientation programme possibly not having sufficient knowledge about the subject, all the nursing and medical students working in the operating room were excluded from this study.

### 3.6 DATA COLLECTION TOOL

De Vos *et al.* (2012:186) describe a questionnaire as a document presenting questions and other elements used to gather information pertaining analysis. The main aim of a questionnaire is to obtain information from respondents who are familiar on the particular subject. A questionnaire was seen as an acceptable data collection tool to reach the objectives of the study, due to the descriptive research design that was chosen for the study.

The researcher downloaded the instrument used in this study, and adapted it to measure all the components based on the objectives of the study. Cronbach's Alpha was used since it measures reliability, or internal consistency. "Reliability" is how well a test measures what it should. According to the alpha score it measured 0.7 which indicates an acceptable level and reliable to use.

After consultation with the biostatistician, supervisor and co-supervisor, the format of the questionnaire was changed, a demographic and a barrier section were added, and questions were grouped in five sub-scales according to the objectives of the study. Objective 1, question 1 was restructured, number 2 and 3 combined and four questions on communication were added according the objectives.

The questionnaire consisted of 30 questions, with a demographics and a barriers section divided into five subscales (Appendix E).

- Objective 1: Attitudes of staff toward implementation of the surgical checklist, 1.1- 1.5
- Objective 2: Communication amongst surgical team members related to the checklist, 2.6 – 2.9
- Objective 3: Beliefs of surgical team members about the checklist, 3.10 -3.15.
- Objective 4: Support from the surgical team members implementing the checklist, 4.16 – 4.23
- Objective 5: Feedback on potential barriers, 5.24 – 5.29
- The last question (question number 30), allowed participants to add further comments about the use of the surgical checklist in the open space provided.

A Likert scale contains declarative statements, and can be used to determine participants' opinion on a subject (Grove, Burns & Gray, 2013:699). In this study, a five-point Likert scale was used. Numerical values were assigned to determine the frequency responses which included: (1) strongly disagree, (2) disagree, (3) agree, (4) strongly agree and (-88) "I don't know", were used for scoring questions. Statistical tests were performed on each sub-section

of the instrument to reach the study objectives. Demographic variables were measured at the nominal and ordinal levels and analysed with frequencies and percentages.

Before data collection, permission was obtained from the participants and institutions where the study was being conducted. Each questionnaire was numbered and did not reflect the participants' names to ensure their anonymity. The estimated duration of completing the questionnaire was twenty minutes and completed questionnaires were placed in a sealed container.

### **3.7 PILOT STUDY**

Burns and Grove (2011:49) describe a pilot study as a smaller size of the proposed study, used to refine the methodology and help to determine reliability and validity. Furthermore, De Vos *et al.* (2009:73) defines a pilot study as a sub-scale study of the suggested investigation, to clarify any discrepancies. The most common reason for a pilot study is to assess the feasibility and to test the measuring instrument.

Grove, Burns and Gray (2013:343) state that ten to twenty participants is an adequate sample to meet the objective of a pilot study, and it should be conducted in settings similar to those in the proposed study. In this study, a pilot study was conducted at one tertiary hospital that was also selected for the main study. After consultation with a biostatistician, a sample size of 15 participants was used in the pilot study. The purpose of the pilot test was to ensure clarity, regarding the questions in the instrument, to the participants, as the questionnaire was used in a previous study in a different country and setting (O'Conner *et al.*, 2013:14).

Convenience sampling includes research participants who are available at the time (Grove, Burns & Gray, 2013:362). The researcher applied convenient sampling for the pilot study by selecting all the staff allocated to the emergency OR. Thus, the setting and participants in the pilot study were similar to the main study, and included surgeons, anaesthesiologists and nurses who were available on that day.

The researcher met individually with the staff and explained the study objectives and data collection procedure. All the staff on duty on the day of the pilot study were willing and available to participate. Thereafter, written consent was obtained and the questionnaire was distributed. The questionnaire was completed in approximately 20 minutes. All the questions were clear and understandable to the participants; however, a few typing errors were detected. The researcher corrected the identified typing errors before the main study. The results of the pilot study were not included in the data analysis of the main study.

The data collected in the pilot study was captured onto a Microsoft Excel spreadsheet and sent to the biostatistician for analysis with the SPSS version 24 (IBM) program. Cronbach's alpha coefficient calculates internal consistency for interval and ratio level data, and can range between 0.00, indicating no internal reliability, and 1.00, indicating perfect internal reliability (Grove, Burns & Gray, 2013:391). To test the internal consistency of the instrument used in the pilot study, a Cronbach Alpha test was done on each the subscales. As shown in Table 3.2 subscale one measured low reliability, however four of the subscales measured average to very good reliability.

**Table 3.2 Cronbach Alpha scores for the subscales in the pilot study**

Subscale	Cronbach Alpha	Comments
1	0.474	Low reliability
2	0.743	Acceptable reliability
3	0.920	Very good reliability
4	0.785	High reliability
5	0.620	Average reliability

### 3.8 VALIDITY AND RELIABILITY

#### 3.8.1 Validity

Validity refers to the degree to which an instrument measures the attributes of a concept accurately (LoBiondo-Wood & Haber, 2010:286). Grove *et al.* (2013:393), state that validity, as reliability, is not an "all or nothing" event, but rather measures the degree of validity. Although no instrument is hundred percent valid, validity should be pursued.

Face validity, although a subjective judgement, indicates whether the instrument appears to measure the concept that it is designed to measure, whereas content validity refers to the extent to which all the major elements of the construct is included (Grove, Burns & Gray, 2013:394). In this study, validity was increased through the pilot study and with the clinical knowledge and experience of the researcher, and the suggestions made by the supervisor, co-supervisor, and the biostatistician.

Content validity and face validity were applied in this study as discussed below:

### **Content validity**

The instrument was used in a previous study and appeared to measure the data required. For the purpose of this study a pilot test was done and content validity was confirmed by obtaining expert advice from the following experts:

- The biostatistician analysed the data, using the Cronbach Alpha, to test the internal consistency of the subscales, which measured acceptable ranges, except the first subscale measured low reliability as mentioned in the pilot study 3.7.
- Furthermore, the content of the instrument was evaluated by the supervisor and co-supervisor.

### **Face validity**

According to Burns *et al.* (2013:394) face validity confirms that the instrument appears to be valid and measuring the design it intended to measure. However, it is a subjective evaluation, with no specific guidelines resulting in an undependable validity.

Operating room managers of one tertiary healthcare institution who participated in the pilot study reviewed the questionnaire, to determine whether it was relevant to those participants who were to complete it. The OR managers confirmed that the questionnaire appeared relevant to those who would participate, thus the face validity was enhanced.

### **3.8.2 Reliability**

Reliability is the ability of an instrument to measure the quality of a concept or construct in a consistent manner (LoBiondo-Wood & Haber, 2010:286).

The instrument was previously used. The Cronbach's alpha coefficient test was applied to test the internal consistency of each subscale of the data collection tool. An alpha score of a previous study was 0.7, which indicated an acceptable level of internal consistency (O'Conner *et al.*, 2013:3).

Thus, the internal consistency of the instrument for this study was calculated using the Cronbach's alpha coefficient. Objective one measured low reliability; however, the other objectives measured average to very good reliability as shown in Table 3.1. Furthermore, the 15 participants of the pilot study were experienced and familiar with the safety checklist. They found that the questions were clear and no correction or clarifications were required.

**Table 3.3 Cronbach Alpha scores for each objective in the main study**

Objective	Cronbach Alpha	Comments
1. Attitude of staff ,1-5	0.290	Low reliability
2. Communication, 6-9	0.711	Acceptable reliability
3. Belief, 10 – 15	0.843	Very good reliability
4. Support, 16 – 23	0.805	High reliability
5. Feedback, 4-29	0.620	Average reliability
Open-ended questions, 30		

### 3.9 DATA COLLECTION

Before data collection, permission was obtained from the institutions where the study was being conducted. Each questionnaire was numbered and did not reflect the participants' names to ensure their anonymity and privacy. All participants were assured of their anonymity during the study. Furthermore, to ensure the institutions' anonymity, no official documents were used. Confidentiality and privacy were maintained since questionnaires and consent forms were deposited into two separately sealed boxes, marked "consent forms" and "questionnaires".

The researcher conducted the research project with honesty and integrity after obtaining ethical and institutional approval. Approval was granted from institution one for a two-week period starting 18 September 2017 until 30 September 2017, and the researcher commenced and ended on the assigned dates. The researcher distributed questionnaires during this period, and received the completed questionnaires. However, approval from the second institution was granted on 2 October 2017, and the researcher could only do one week of data collection, as she had to return back to work. Even though data collection was over one-week period questionnaires were distributed at the second clinical facility, and completed questionnaires were collected.

The researcher scheduled a meeting with the management of the operating room, followed by a meeting with the staff. During these meetings, the researcher explained information about the study, voluntary participation, and participants' right to withdraw from the research at any time without any explanation.

Following completion of the consent forms, printed copies of the questionnaire were distributed by hand to the participants over a two-week period to allow staff working shifts to participate in the study. The estimated duration to complete the questionnaire was twenty minutes. The

researcher met the staff individually who were not present in the meeting, the procedure was explained and consent were obtained before the questionnaire was distributed. On several occasions when the researcher approached the staff they were busy with patient care. The researcher then returned later during the day to approach the staff. However, some staff indicated that they were not interested to participate.

Two sealed separate boxes were marked "Consent Forms" and "Questionnaire" and placed in the OR receptions. Participants completed the questionnaires in their own time and dropped the consent and questionnaire in the assigned boxes. In the same way staff on night duty were approached, consent was signed, questionnaires completed then dropped in the assigned boxes. In total, the researcher distributed four hundred questionnaires, and collected 304 completed questionnaires.

### **3.10 DATA ANALYSIS**

Quantitative data analysis is the technique by which data is converted to a numerical system and analysed statistically (De Vos *et al.*, 2012:249). Descriptive statistics are commonly used in quantitative research studies and report the distribution of the sample over multiple variables, through frequencies, measures of central tendency and measure of dispersion (De Vos *et al.*, 2012:250).

In this study, data collected from the questionnaires was captured on an excel sheet and analysed by a qualified statistician from the University of Stellenbosch using the SPSS version 24 (IBM) program.

#### **3.10.1 Steps of analysis**

The raw data was captured on an Excel spreadsheet using the number assigned to each questionnaire for easy reference during the capturing process.

The variables on the questionnaire were pre-coded in consultation with the biostatistician and entered in the columns of the spreadsheet. Each row on the spreadsheet represented one questionnaire. The researcher personally entered each individual response on the spreadsheet and verified each entry twice to ensure that it was captured correctly. Missing data was pre-coded and entered, in the same way incomplete questionnaires, were included for the data analysis process to ensure sufficient data collection. The completed excel sheet was sent to the biostatistician for analysis. Analyses were performed with the Statistical Package for the Social Sciences (SPSS) version 24 (IBM) program provided by the University of Stellenbosch.

The individual response to the Likert scale questionnaire items were used to calculate the sub-scores. The five sub-scale scores were extracted from calculating the mean scores of the item included in each sub scale. Cronbach Alpha was then used to assess the internal consistency of each subscale. Descriptive analysis was done on the data to determine the frequencies which are presented in tables and histograms. Cross tabulation calculations were completed between the occupational category, roles of the nurses in the OR, years of OR experience, gender, age and level of experience of the participants and independent variable applying the Kruskal-Wallis statistical test to determine any association between occupation, roles, experience, gender and independent variables on a 95% confidence level with a significant level of  $p=0.05$ , in which the hypothesis was either accepted or rejected. The Mann Whitney U test was used to compare the age (ordinal data) of the participants with their responses to the barriers implementing the SSC in OR.

In the open-ended question (Question 30), the respondents were requested to add any further comments about the use of the checklist in the theatre not mentioned in the questionnaire. The data obtained from the open-ended question was not analysed qualitatively. The responses were grouped and summarised as discussed in chapter four.

### **3.11 ETHICAL CONSIDERATIONS**

Ethics approval from the Faculty of Medicine and Health Sciences at Stellenbosch University was granted. This is confirmed by the Ethic committee approval number 0557 (Annexure A). A detailed discussion of the ethical considerations may be found in chapter 1 (paragraph 1.9).

### **3.12 SUMMARY**

A comprehensive description of the methodology that was followed to investigate the barriers OR staff encounters during the implementation of the surgical checklist in the Cape Metropole tertiary hospitals, was outlined. This was followed by the data collection and analysis processes. In chapter four, the results of the data analysis are discussed.

## CHAPTER 4

### FINDINGS

#### 4.1 INTRODUCTION

This chapter outlines the data analysis and interpretation of the data collected during the research study. De Vos *et al.* (2012:248) characterized quantitative data analysis and translation thereof as a phase in the research process, by which data is statistically analysed and frequently used. Quantitative analysis can be added to the process of interpretation in which the researcher presents raw data in an expressive format (De Vos *et al.*, 2012:249).

The aim of the study was to investigate the barriers that prevent the implementation of the surgical safety checklist in the operating room in two tertiary hospitals in the Cape Metropole.

#### 4.2 DATA ANALYSIS

Data analysis was analysed with the Statistical Package for the Social Sciences (SPSS) version 24 (IBM) program with the support of an assigned qualified statistician from the University of Stellenbosch.

##### 4.2.1 Descriptive statistics

According to De Vos *et al.* (2012: 251) descriptive statistics describe numerical data in a way by organising, summarising and interpreting collected data in frequencies, central tendency and dispersion.

Descriptive analysis presents a picture of a situation and focusses on the how and why questions. Therefore, the researcher starts off with a well-known topic, undertakes the study and presents the outcome in detail. In this chapter, descriptive data will be outlined in the form of tables, bar graphs or histograms (De Vos *et al.*, 2012:251). Demographic variables were measured at the nominal and ordinal levels and analysed with frequency and percentages.

##### 4.2.2 Inferential statistics

Inferential statistics are designed to address objectives, questions and hypothesis in studies to allow inferences from the study sample to the target population. Inferential analyses are conducted to identify relationships, examine predictions and determine group differences in the study (Grove, Gray & Burns, 2015:319).

Cross tabulation calculations were completed, specifically between the occupational category, roles of the nurses in the OR, years of OR experience, age and level of education of the participants and independent variable applying the Kruskal-Wallis statistical test to determine any association between dependent and independent variables on a 95% confidence level, with a significant level of  $p=0.05$ , in which the hypothesis was either accepted or rejected.

The Kruskal-Wallis test, is a nonparametric analysis technique to determine statistically significant differences between two or more groups (Grove *et al.*, 2013:586). Statistical significance is referred to as the extent to which the observed results are likely not due to chance (Burns & Grove, 2011:549). For the purpose of this study a p-value ( $p < 0.05$ ) was used to determine statistically significant differences between variables.

Grove *et al.* (2013:583) refer to the Mann-Whitney U test as a non-parametric test that is 95% as powerful as the t-test, useful for determining differences between two groups of ordinal or continuous data. The Mann-Whitney U test was used to determine any association between the gender (ordinal data) of the participants and independent variables on a 95% confidence interval with a significant level ( $p < 0.05$ ), in which the hypothesis was either accepted or rejected.

### **4.3 RESPONSES**

The target population were the full population of surgeons, assistant surgeons, anaesthesiologists, nurses and theatre technicians, N=600 from both healthcare institutions. However, n=400 accepted in both institutions to complete the questionnaire, with a return rate of n=304(76%); n=250 were distributed at institution one, n= 184 (60.5%) returned; institution two n=150 were distributed and n=120 (39.5%) returned. For the purpose of this study hospitals were not compared; the researcher tried to obtain a large enough sample to address the research question.

According to Gray *et al.* (2015:355) the questionnaire acceptance rate is calculated by dividing the number of returned questionnaires by the number of the study population. In this research study, the number of returned questionnaires, n=304 (76%) was divided by the number of the total questionnaires accepted, n=400 to reveal a return rate.

### **4.4 DEMOGRAPHIC PROFILE**

In the first section of the questionnaire from question one to eight, participants were requested to complete their demographical data which included occupation, nurse category, nurse roles,

years of experience, gender, age, service at current employer and level of education. Question two and three were not applicable to surgeons, anaesthesiologist and assistant surgeons.

#### 4.4.1 What is your occupation?

The majority of questionnaires were completed by the nursing group n=178 (58.6%), followed by the surgeons n=65(21.4%). In Table 4.1, the occupation selection of the participants is illustrated.

**Table 4.1 Occupation of participants**

Category	Frequency	Percentage (%)
Surgeon	65	21.4%
Asst. Surgeon	3	1.0 %
Anaesthetist	55	18.0%
Nurse	178	58.6%
OR technician	3	1.0%
Total	N=304	100 %

#### 4.4.2 If you marked nurse in question 1, please identify your category

The response rate to this question was n=176(57.9%). Table 4.2 indicates that the RN OR qualified n=71(23.4%) was the highest followed by the ENA n=43(14.1%). Question 2 in the demographic section was not applicable to surgeons, assistant surgeons and anaesthesiologist.

**Table 4.2 Categories**

Category	Frequency	Percentage (%)
RN OR Qual.	71	23.4%
RN OR Exp.	31	10.2 %
EN	31	10.2%
ENA	43	14.1%
Total	N=176	100 %

#### 4.4.3 If you are a nurse/ OR technician nurse/ OR technician, indicate the role you perform most often in the OR.

Table 4.3 shows the role of the participants, nurse/OR technician, n=156(51.3%), excluding the surgeons, assistant surgeons and anaesthesiologist, n=148 (48.7%) of n=304. The

majority of participants role were scrub nurse/technician n=74 (47.4%) followed by the circulating roles n=50 (32.1%).

**Table 4.3 Roles of the nurse categories**

Category	Frequency	Percentage
Scrub nurse/technician	74	47.4%
Circulating nurse	50	32.1 %
Anaesthetic nurse	32	20.5%
Total	N= 156	100 %

#### 4.4.4 Indicate your years of OR experience.

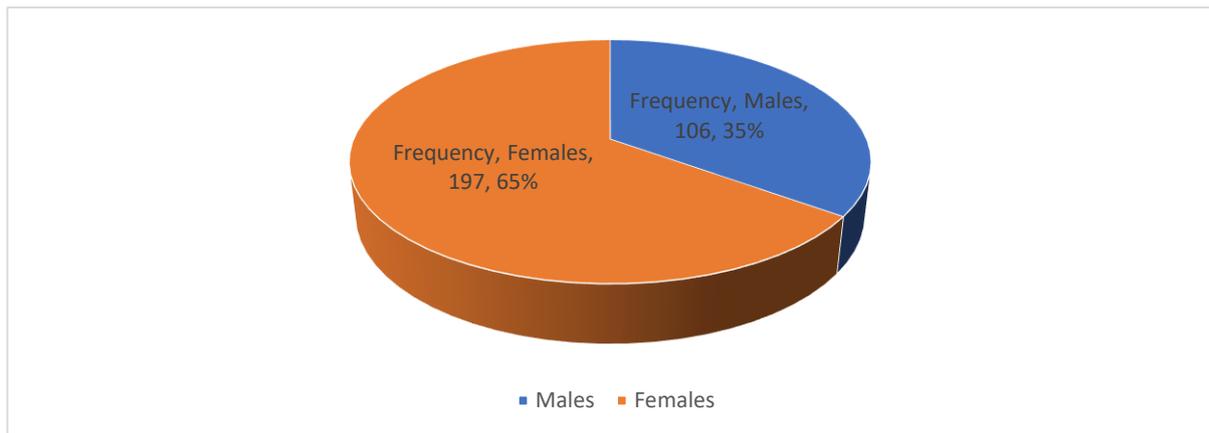
Table 4.4 shows the respondents with over 10 years' experience n=142 (47.2%) is the largest, followed by 5-10 years n=77 (25.6%), then 1-5 years n= 73 (24.0%) the group with the least experience n=9 (3.0%) have less than one-year experience.

**Table 4.4 Experience of participants in the OR**

Category	Frequency	Percentage
<1	9	3.0%
1-5 years	73	24.3 %
5-10 years	77	25.6%
>10 years	142	47.2%
Total	N= 301	100.0 %

#### 4.4.5 Gender

The majority of participants was females n=197(65 %) and the males were n=106(35%) as shown in Figure 4.1.



**Figure 4.1 Gender**

#### 4.4.6 Indicate your age

Table 4.5 shows the majority  $n=141$  (46.5%) of respondents were between the ages 30-39 followed by the over 50 years  $n=85$  (28.1%). The youngest group 20-29 years was the least  $n=25$  (8.3%).

**Table 4.5 Age of participants**

Category	Frequency	Percentage (%)
20-29	25	8.3%
30-39	141	46.5%
40-49	52	17.2%
50+	85	28.1%
Total	N=303	100.0%

#### 4.4.7 Years of service at current employer

As shown in Table 4.6 the highest number of participants  $n=134$  (44.2%) have 1-5 years' service at the current employer, followed by more than 10 years of experience  $n=97$  (32%) at current employer.

**Table 4.6 Years at current employer**

Category	Frequency	Percentage (%)
<1 year	27	8.9%
1-5 years	134	44.2%
5-10 years	45	14.9%
>10 years	97	32.0%
Total	N=303	100 %

#### 4.4.8 Level of Education

Participants with a diploma n=83 (27.5%) is the highest followed by the degree qualification n=80 (26.5%) as shown in Table 4.7. Participants with a doctorate qualification is the lowest n=13 (4.3%).

**Table 4.7 Level of education**

Category	Frequency	Percentage (%)
Certificate	71	23.5%
Diploma	83	27.5%
Degree	80	26.5%
Masters	55	18.2%
Doctorate	13	4.3%
Total	N= 302	100.0 %

### 4.5 OBJECTIVE 1: ATTITUDES OF STAFF TOWARD IMPLEMENTATION OF THE SURGICAL SAFETY CHECKLIST

#### 4.5.1 Question 1.1: The checklist was implemented in the theatres I worked.

As shown in Table 4.8, the response to whether the checklist was implemented in the theatres where the participants worked, was positive as the majority n=244 (81.9%) indicated strongly agreed. Only n=38 (12.8%) slightly disagreed. Statistical significant differences on a 95% confidence interval applying the Kruskal-Wallis test were identified between experience  $p=0.007$ , age  $p=0.017$ , education  $p=0.001$  and whether the checklist was implemented in the theatres where participants worked. The null hypotheses were rejected.

**Table 4.8 The checklist was implemented in the theatres**

Category	Frequency	Percentage (%)
Strongly disagree	5	1.7%
Slightly disagree	38	12.8%
Slightly agree	11	3.7%
Strongly agree	244	81.9%
Total	N=298	100 .0%

#### 4.5.2 Question 1.2: The complete checklist is used for every surgical procedure you were worked in.

The majority of the participants n=196 (66.7%) strongly agreed that the complete checklist was used for every surgical procedure they were exposed too, however n=69 (23.5 %) slightly

disagreed as shown in Table 4.9. A further analysis identified that there was a significant difference between occupation  $p=0.028$ , age  $0.017$  and the use of the complete checklist for every procedure based on a 95% confidence interval applying the Kruskal-Wallis test. The null hypothesis was rejected.

**Table 4.9 The complete checklist is used for every surgical procedure**

Category	Frequency	Percentage (%)
Strongly disagree	10	3.4%
Slightly disagree	19	6.5%
Slightly agree	69	23.5%
Strongly agree	196	66.7%
Total	N=294	100.0 %

**4.5.3 Question 1.3: When the checklist is being carried out, everyone in the OR stops what they are doing and listen until it is completed.**

Results show that  $n=130$  (43.5%) of the participants strongly agreed that when the checklist is being carried out, everyone in the OR stops what they were doing and listened until it was completed,  $n=110$ (36.7%) slightly agreed as shown in Table 4.10. Thus, most agreed that when the checklist is being carried out, everyone in the OR stops what they were doing and listened until it was completed. A significant difference  $p=0.004$  based on a 95% confidence level applying the Kruskal-Wallis test was identified between age and when the checklist was carried out that everyone in theatre would stop what they were doing and listened until it was completed. The null hypothesis was rejected.

**Table 4.10 Everyone in the OR stops what they are doing, when the checklist is being carried out and listen until it is completed**

Category	Frequency	Percentage (%)
Strongly disagree	28	9.4%
Slightly disagree	31	10.4%
Slightly agree	110	36.7%
Strongly agree	130	43.5%
Total	N=299	100.0 %

#### 4.5.4 Question 1.4: Sometimes sections of the checklist are not completed.

According to Table 4.11 the respondents with the highest  $n=115$  (38.6%) slightly agreed followed by  $n=74$  (24.8%) strongly agreed that sometimes sections of the checklist were not completed. Applying the Kruskal-Wallis test, statistically significant differences were identified between occupation  $p=0.028$ , education  $p=0.005$  and sometimes sections of the checklist were not completed on a 95% confidence level. Null hypotheses were rejected.

**Table 4.11 Sometimes sections of the checklist are not completed**

Category	Frequency	Percentage (%)
Strongly disagree	43	14.4%
Slightly disagree	66	22.2%
Slightly agree	115	38.6%
Strongly agree	74	24.8%
Total	N= 298	100.0 %

#### 4.5.5 Question 1.5: The individual who signs the checklist personally ensures that the relevant steps have been completed.

Results have shown that participants  $n=149$  (51.7%) strongly agreed the person who signs the checklist ensures that the relevant steps have been completed, followed  $n=90$  (31.3%) slightly agreed as indicated in Table 4.12. Statistical significant difference were identified between roles,  $p=0.024$ , experience  $p=0.040$ , education  $p=0.044$  and whether the individual who signs the checklist personally ensured that the relevant steps were completed applying the Kruskal-Wallis test on a 95% confidence interval. The null hypotheses were rejected.

**Table 4.12 Individual who signs the checklist personally ensures that the relevant steps have been completed**

Category	Frequency	Percentage (%)
Strongly disagree	12	4.2%
Slightly disagree	36	12.5%
Slightly agree	90	31.3%
Strongly agree	149	51.7%
Did not know	1	0.3%
Total	N=288	100.0%

## 4.6 OBJECTIVE 2: COMMUNICATION AMONGST SURGICAL TEAM RELATED TO THE CHECKLIST

### 4.6.1 Question 2.6: The language of the checklist is clear and understandable.

As shown in Table 4.13 most participants  $n=261$  (86.7%) strongly agreed followed by  $n=40$  (13.3%) slightly agreed that the language of the checklist is clear and understandable. Thus, the majority agreed that the language of the checklist was clear and understandable. A significant difference was however identified between gender  $p=0.002$  on a 95% confidence interval applying the Mann-Whitney U statistical test and the language of the checklist being clear and understandable. Null hypothesis was rejected.

**Table 4.13 The language of the checklist is clear and understandable**

Category	Frequency	Percentage (%)
Slightly agree	40	13.3%
Strongly agree	261	86.7%
Total	N=301	100.0 %

### 4.6.2 Question 2.7: The language the checklist is printed in is clear and understandable.

The majority of the responses  $n=265$  (89.2%) strongly agreed that the language the checklist is printed in is clear and understandable however  $n=31$  (10.4%) slightly agreed as presented in Table 4.14. Applying the Kruskal-Wallis statistical test no significant differences were identified between the biographical data and the language the checklist was printed in is clear and understandable on a 95% confidence level. The null hypothesis was accepted.

**Table 4.14 The language the checklist printed is clear and understandable**

Category	Frequency	Percentage (%)
Slightly agree	1	.4%
Slightly agree	31	10.4%
Strongly agree	265	89.2%
Total	N=297	100.0 %

### 4.6.3 Question 2.8: The checklist enhances teamwork and communication amongst multidisciplinary healthcare providers.

Results show most participants  $n=207$  (70.9%) strongly agreed that the checklist enhances teamwork and communication amongst multidisciplinary healthcare providers followed by  $n=62$  (21.2%) slightly agreed as displayed in Table 4.15. A significant difference was identified between gender  $p=0.029$  on a 95% confidence interval and the checklist which enhances

teamwork and communication amongst multidisciplinary healthcare providers applying the Mann-Whitney U test. Null hypothesis was rejected.

**Table 4.15 The checklist enhances teamwork and communication amongst multidisciplinary healthcare providers.**

Category	Frequency	Percentage (%)
Strongly disagree	6	2.1%
Slightly disagree	17	5.8%
Slightly agree	62	21.2%
Strongly agree	207	70.9%
Total	N=292	100.0 %

#### **4.6.4 Question 2.9: The completion of the checklist involves the multidisciplinary team**

Most of participants n=224(75.1%) strongly agreed completion of the checklist involves the multidisciplinary team followed by n=64 (21.5%) slightly agreed as shown in table 4.16. Applying the Kruskal-Wallis statistical test no significant differences were identified between the biographical data and the completion of the checklist involves the multidisciplinary team. The null hypothesis was accepted.

**Table 4.16 The completion of the checklist involves the multidisciplinary team**

Category	Frequency	Percentage (%)
Slightly disagree	10	3.4%
Slightly agree	64	21.5%
Strongly agree	224	75.1%
Total	N=298	100.0 %

### **4.7 OBJECTIVE 3: BELIEFS OF THE SURGICAL TEAM ABOUT THE CHECKLISTS**

#### **4.7.1 Question 3.10: I believe that failing to use the checklist is poor professional practice.**

Results presented in Table 4.17 show that most responses n=216 (73.7%) strongly agreed that failing to use the checklist is poor professional practice however n=44 (15.0%) slightly disagreed. Applying the Kruskal-Wallis statistical test no significant differences were identified

between the biographical data and the completion of the checklist involves the multidisciplinary team. The null hypothesis was accepted.

**Table 4.17 Failing to use the checklist is poor professional practice**

Category	Frequency	Percentage (%)
Strongly disagree	16	5.5%
Slightly disagree	17	5.8%
Slightly agree	44	15.0%
Strongly agree	216	73.7%
Total	N= 293	100.0 %

#### 4.7.2 Question 3.11: I believe using the checklist reduces the likelihood of human error.

The majority of the responses n=217 (73.6%) strongly agreed using the checklist reduces the likelihood of human error, followed by n=46 (15.6%) slightly agree, as presented in Table 4.18. Applying the Kruskal-Wallis statistical test no significant differences were identified between the biographical data and the completion of the checklist involves the multidisciplinary team. The null hypothesis was accepted.

**Table 4.18 Using the checklist reduces the likelihood of human error**

Category	Frequency	Percentage (%)
Strongly disagree	9	3.1%
Slightly disagree	23	7.8%
Slightly agree	46	15.6%
Strongly agree	217	73.6%
Total	N=295	100.0 %

#### 4.7.3 Question 3.12: I believe using the checklist improves patient safety.

As shown in Table 4.19 majority of responses n=250 (83.1%) strongly agreed using the checklist improves patient safety in the OR followed by n=40 (13.2%) slightly agreed. Applying the Kruskal-Wallis statistical test no significant differences were identified between the biographical data and the completion of the checklist involves the multidisciplinary team. The null hypothesis was accepted.

**Table 4.19 Using the checklist improves patient safety**

Category	Frequency	Percentage (%)
Strongly disagree	3	1.0%
Slightly disagree	8	2.7%
Slightly agree	40	13.2%
Strongly agree	250	83.1%
Total	N=301	100.0%

**4.7.4 Question 3.13: I believe using the checklist improves teamwork in theatre.**

Results show in Table 4.20 most responses n=227 (75.4%) strongly agreed followed by n=62 (20.6%) slightly agreed that using the checklist improves teamwork in OR. A statistical significant difference was identified between education  $p=0.003$  using the checklist improves teamwork. The null hypothesis was rejected.

**Table 4.20 Using the checklist improves teamwork in theatre**

Category	Frequency	Percentage (%)
Strongly disagree	6	2.0%
Slightly disagree	6	2.0%
Slightly agree	62	20.6%
Strongly agree	227	75.4%
Total	N=301	

**4.7.5 Question 3.14: I believe that the checklist should be mandatory for every case.**

The majority of responses n=260 (87.0%) strongly agreed that the checklist should be mandatory for every case followed by n=31 (10.3%) slightly disagreed as shown in Table 4.21. A further analysis identified that there were significant differences between education  $p=0.009$ , roles 0.014 and the belief that the checklist should be mandatory for every case, based on a 95% confidence interval applying the Kruskal-Wallis test. The null hypotheses were rejected.

**Table 4.21 The checklist should be mandatory for every case**

Category	Frequency	Percentage (%)
Strongly disagree	6	2.0%
Slightly disagree	2	0.7%
Slightly agree	31	10.3%
Strongly agree	260	87.0%
Total	N=299	100%

#### 4.7.6 Question 3.15: I believe that the implementation of the checklist has contributed to a decrease in adverse events.

As shown in table 4.22 the majority of the responses n=185(63.6%) strongly agreed that the implementation of the checklist has contributed to a decrease in adverse events followed by n=76(26.1%) slightly agreed.

**Table 4.22 The implementation of the checklist has contributed to a decrease in adverse events**

Category	Frequency	Percentage (%)
Strongly disagree	6	2.1%
Slightly disagree	24	8.2%
Slightly agree	76	26.1%
Strongly agree	185	63.6%
Total	N=291	100.0 %

## 4.8 OBJECTIVE 4: SUPPORT FROM SURGICAL TEAM MEMBERS TOWARDS IMPLEMENTATION OF THE CHECKLIST

### 4.8.1 Question 4.16: Surgical personnel support the use of the checklist.

As shown in Table 4.23 the majority responses n=177 (59.2%) strongly agreed that the surgical personnel support the use of the checklist followed by n=91 (30.4%) slightly agreed. Applying the Kruskal-Wallis statistical test significant differences were identified between occupation  $p=0.000$ , roles  $p=0.034$  and surgical personnel support the checklist. Null hypotheses were rejected.

**Table 4.23 Surgical personnel support the use of the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	2	0.7%
Slightly disagree	29	9.7%
Slightly agree	91	30.4%
Strongly agree	177	59.2%
Total	N=299	100.0 %

**4.8.2 Question 4.17: Anaesthetic personnel support the use of the checklist.**

Table 4.24 show the responses n=241(79.8%) who strongly agreed that anaesthetic personnel support the use of the checklist followed by n=50 (16.5%) slightly agreed.

**Table 4.24 Anaesthetic personnel support the use of the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	2	0.7%
Slightly disagree	9	3.0%
Slightly agree	50	16.5%
Strongly agree	241	79.8%
Total	N=302	100.0%

**4.8.3 Question 4.18: Nursing staff supports the use of the checklist.**

As shown in Table 4.25 the majority responses n=210 (69.8%) strongly agreed followed by n=77(25.5%) slightly agreed nursing staff supports the checklist. Applying the Kruskal-Wallis statistical test significant differences based on a 95% confidence interval between occupation  $p=0.007$ , roles  $p=0.023$ , education  $p=0.042$  and nursing staff support the checklist were identified. The null hypothesis was rejected.

**Table 4.25 Nursing staff supports the use of the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	2	0.7%
Slightly disagree	12	4.0%
Slightly agree	77	25.5%
Strongly agree	210	69.8%
Total	N=301	100%

**4.8.4 Question 4.19: Senior theatre personnel support the use of the checklist.**

Results show in Table 4.26 that the most responses  $n=227$  (76.9%) strongly agreed that senior OR personnel support the use of the checklist followed by  $n=54$  (18.3%) slightly agreed. The null hypothesis was accepted.

**Table 4.26 Senior theatre personnel support the use of the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	5	1.7%
Slightly disagree	9	3.1%
Slightly agree	54	18.3%
Strongly agree	227	76.9%
Total	N=295	100.0 %

**4.8.5 Question 4.20: Junior theatre personnel support the use of the checklist.**

Results show that the majority of responses  $n=174$  (58.4%) strongly agreed followed by  $n=93$  (31.2%) slightly agree that junior OR personnel support the use of the checklist. However, there were statistical significant differences identified between occupation  $p=0.016$ , roles  $p=0.013$  and experience  $p=0.010$  on a 95% confidence interval and that junior theatre personnel support the checklist applying the Kruskal-Wallis test. The null hypotheses were rejected.

**Table 4.27 Junior theatre personnel support the use of the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	2	0.7%
Slightly disagree	29	9.7%
Slightly agree	93	31.2%
Strongly agree	174	58.4%
Total	N=298	100.0 %

**4.8.6 Question 4.21: Management supports the use of the checklist.**

The majority of respondents  $n=249$  (83.8%) strongly agreed followed by  $n=37$  (12.5%) slightly agree that management supports the checklist as shown in Table 4.28. A statistical significant difference was identified between education  $p=0.002$  and management support the use of the checklist applying the Kruskal-Wallis test. The null hypothesis was rejected.

**Table 4.28 Management supports the use of the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	5	1.7%
Slightly disagree	6	2.0%
Slightly agree	37	12.5%
Strongly agree	249	83.8%
Total	N=297	100.0 %

**4.8.7 Question 4.22: I have initiated the use of the checklist in the past.**

As shown in Table 4.29 the majority of respondents n=194 (64.9%) strongly agreed followed with n=54 (18.1%) slightly agreed that participants initiated the use of the checklist in the past. Statistical significant differences were identified between occupation  $p=0.001$ , experience  $p=0.047$ , age  $p=0.000$ , education  $p=0.003$  and initiating the use of the checklist in the past. In addition, a significant difference was also shown between gender  $p=0.000$  on a 95% confidence interval applying the Mann-Whitney U test. The null hypotheses were rejected.

**Table 4.29 initiated the use of the checklist in the past**

Category	Frequency	Percentage (%)
Strongly disagree	22	7.4%
Slightly disagree	29	9.7%
Slightly agree	54	18.1%
Strongly agree	194	64.9%
Total	N=299	100.0 %

**4.8.8 Question 4.23: I intend to use the checklist in the future.**

The majority of responses n=244 (82.2%) strongly agreed followed by n=30 (10.1%) who slightly agreed that participants intend to use the checklist in the future as shown in Table 4.30. Statistical significant differences were identified between the roles  $p=0.022$ , experience  $p=0.001$ , age  $p=0.000$ , education  $p=0.031$  on a 95% confidence interval and participants who intend to use the checklist applying the Kruskal-Wallis statistical test. The null hypotheses were rejected.

**Table 4.30 Use of the checklist in the future**

Category	Frequency	Percentage (%)
Strongly disagree	23	7.7%
Slightly agree	30	10.1%
Strongly agree	244	82.2%
Total	N=297	100.0 %

#### 4.9 OBJECTIVE 5: FEEDBACK ON POTENTIAL BARRIERS

##### 4.9.1 Question 5.24: Is the requirement for signatures relevant to you.

As shown in Table 4.31 most responses  $n=164$  (56.6%) strongly agreed followed by  $n=74$  (25.5%) slightly agreed that the requirements for signatures were relevant. Significant differences between occupation  $p=0.002$ , age  $p=0.020$ , education  $p=0.018$  and the requirements for the relevance of signatures applying the Kruskal-Wallis test on the 95% confidence interval were identified. In addition, a statistical difference was identified between gender and the requirements for the relevance of signatures applying the Mann-Whitney U test on the 95% confidence interval. The null hypotheses were rejected.

**Table 4.31 The requirement for signatures relevant to you**

Category	Frequency	Percentage (%)
Strongly disagree	22	7.6%
Slightly disagree	30	10.3%
Slightly agree	74	25.5%
Strongly agree	164	56.6%
Total	N=290	100.0 %

##### 4.9.2 Question 5.25: Do you feel the checklist is an added responsibility.

Results shown in Table 4.32 responses  $n=105$  (35.1%) strongly agreed that the checklist is an added responsibility, however  $n=70$  (23.4%) strongly disagreed followed by  $n=69$  (23.1%) slightly disagreed that the checklist is an added responsibility. Statistical significant differences were identified between occupation  $p=0.004$ , age  $p=0.030$ , education  $p=0.006$  and that the checklist is an added responsibility applying the Kruskal-Wallis test. Null hypotheses were rejected.

**Table 4.32 The checklist is an added responsibility**

Category	Frequency	Percentage (%)
Strongly disagree	70	23.4%
Slightly disagree	69	23.1%
Slightly agree	55	18.4%
Strongly agree	105	35.1%
Total	N=299	100.0 %

**4.9.3 Question 5.26: Do you feel that completing the checklist is time consuming.**

Table 4:33 indicate respondents n=138 (46.2%) who strongly disagreed followed by n=88 (29.4%) who slightly disagreed that completing the checklist is time consuming. A significant difference was identified between age  $p=0.017$  and whether completing the checklist is time consuming based on a 95% confidence interval applying the Kruskal-Wallis test. The null hypothesis was rejected.

**Table 4.33 Completing the checklist is time consuming**

Category	Frequency	Percentage (%)
Strongly disagree	138	46.2%
Slightly disagree	88	29.4%
Slightly agree	49	16.4%
Strongly agree	24	8.0%
Total	N=299	100.0 %

**4.9.4 Question 5.27: Do you feel that you were properly trained about the implementation of the checklist.**

As presented in Table 4.34 responses n=114 (38.2%) strongly agreed followed by n=96 (32.2%) slightly agreed that they were properly trained about the implementation of the checklist. A significant difference  $p=0.010$  between years of experience and whether the participant was properly trained about the implementation of the checklist was identified. The null hypothesis was rejected.

**Table 4.34 Training about the implementation of the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	19	6.4%
Slightly disagree	69	23.2%
Slightly agree	96	32.2%
Strongly agree	114	38.2%
Total	N=298	100.0 %

**4.9.5 Question 5.28: In your experience have you observed pre-and post-operative briefings required by the checklist.**

As shown in Table 4.35 most respondents n=101 (35.5%) strongly agreed followed by n=88 (31.0%) slightly agreed that they have experienced pre-and post-operative briefings required by the checklist. Applying the Kruskal-Wallis statistical test significant differences based on a 95% confidence interval level between occupation p=0.000, education p=0.000 and whether the participants observed pre-and post-operative briefings required by the checklist were identified. Null hypotheses were rejected.

**Table 4.35 Experience about observing pre-and post-operative briefings required by the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	30	10.6%
Slightly disagree	65	22.9%
Slightly agree	88	31.0%
Strongly agree	101	35.5%
Total	N=284	100.0%

**4.9.6 Question 5.29: In your experience have you observed that nurses just complete the checklist.**

Results have shown in Table 4.36 respondents n=110 (36.2%) slightly agreed followed by n=72 (24.1%) strongly agreed that they observed that the nurse just completed the checklist. Applying the Kruskal-Wallis statistical test statistical significant differences were identified between occupation p=0.002, education p=0.002 based on a 95% confidence interval and completing the checklist is time consuming. The null hypotheses were rejected.

Results have shown in table 4.36 respondents n=110 (36.2%) slightly agreed followed by n=72 (24.1%) strongly agreed that they observed that the nurse just completed the checklist. Applying the Kruskal-Wallis statistical test statistical significant differences were identified between occupation  $p=0.002$ , education  $p=0.002$  based on a 95% confidence interval and completing the checklist is time consuming. The null hypotheses were rejected.

**Table 4.36 Experience observed that nurses just complete the checklist**

Category	Frequency	Percentage (%)
Strongly disagree	60	20.1%
Slightly disagree	57	19.1%
Slightly agree	110	36.8%
Strongly agree	72	24.1%
Total	N=299	100.0 %

**4.9.7 Question 5.30: You may add any further comments about the use of the checklist in theater not mentioned above**

This was an open-ended question, with a response rate as shown in table 4.37, n=50 (16%) participants indicated further comments about the checklist in the operating room that were not mentioned in the questionnaire. Comments were grouped in themes and sub-themes as presented in Table 4.37.

**Table 4.37 Comments about the use of the checklist not mentioned in questionnaire**

Themes	Sub-themes	Frequency	Percentage
Team approach	• Lack of team approach	3	6.0%
	• Useful for tool for teamwork and communication	3	6.0%
	• Involve anesthetic nurse	1	2.0%
	• Nurse responsibility	3	6.0%
	• Do when patient is awake	1	2.0%
	• Require attention of entire team	3	6.0%
	Training	• No formal training	3
Surgeons	• Reluctant to sign	3	6.0%
	• Refuse to participate in time out	2	4.0%
	• Non-participative surgeons	3	6.0%
Signatures	• Non-compliance to signatures	3	6.0%
	• Missing signatures	2	4.0%
	• Signed without being checked	2	4.0%
Checklist	• Duplication	3	6.0%
	• Should be short and summarized	1	2.0%
	• Not completed	3	6.0%
	• Incorrect completion	2	4.0%
	• Unnecessary paperwork	2	4.0%
	• Very important	3	6.0%
	• Should be formally introduced in OR	1	2.0%
	• Understanding the concept	3	6.0%
	Total		50

#### 4.10 Summary

The data collected from the questionnaires were statistically analysed and interpreted then presented in tables and graphs, responding to the objectives and the goal of the study.

In conclusion the study has successfully answered the research question, what are the barriers that prevent the implementation of the SSC in the OR and the objectives were successfully explored.

In chapter 5 a more detailed report will be presented, including a description of the study aim, conclusion of the findings, restraints of the study and recommendations.

## CHAPTER 5

### DISCUSSION, CONCLUSION AND RECOMMENDATIONS

#### 5.1 INTRODUCTION

In this chapter the conclusions, based on the findings as reported in chapter four, are discussed according to the objectives of the study and supported by the literature review in chapter two. Limitations of the study and recommendations for further research will also be discussed in this chapter.

#### 5.2 DISCUSSION

The aim of the study was to investigate the barriers that prevent the implementation of the surgical safety checklist in the OR in tertiary hospitals in the Cape Metropole through a quantitative correlational approach. A comprehensive discussion of the results is based on the conceptual framework and the study objectives to determine:

- The attitude of the staff towards the implementation of the checklist
- Communication amongst surgical team members, related to the checklist
- Beliefs of surgical team members about the checklist
- Support from surgical team members, implementing the checklist
- Feedback on potential barriers
- Statistical associations between the biographical data and the barriers preventing the implementation of the checklist

##### 5.2.1 Objective 1: Attitude of the staff towards the implementation of the checklist

The attitudes of staff, including the way they think and behave, contribute to the safety culture within an organization (Haugen *et al.*, 2013:808). The attitudes of staff may be instrumental in effective implementation of the SSC, as noncompliance to the SSC may relate to amongst others, negative remarks by team members and awkwardness during its implementation (Vats *et al.*, 2010:504).

Thus, participants in this study answered five questions to determine their attitude toward the implementation of the SSC and identified statistically significant differences among participants with reference to their attitude about implementing the SSC.

### **5.2.1.1 Implementation of the SSC**

The majority (85.6%) of participants in this study agreed that the checklist was implemented in the theatres where they have worked. Even if Kieffer *et al.* (2013:288), reported that the age and seniority of the surgeon and anaesthetist do not affect compliance to the SSC, this study found a statistical significant difference in participants over 50+ (23.8%), with more than 10 years' experience (19.4%) and doctorate level of education (30.8%) who disagreed that the SSC was implemented in the OR they worked. Statistical significant differences were identified between experience  $p=0.007$ , age  $p=0.017$ , education  $p=0.001$  and whether the checklist was implemented in the theatres where participants worked. Thus, based on a 95% confidence interval applying the Kruskal-Wallis test, the null hypotheses were rejected.

The SSC is used to detect system failures, such as the absence of the patient's identification band, incomplete consent forms and a lack of equipment before a patient comes into the operating room (Allard *et al.*, 2011:711). Literature emphasise that adverse events increase when the SSC is omitted; 9.9% of participants in this study indicated that the checklist was omitted in some surgical procedures where they worked.

The SSC allows team members to communicate and discuss potential concerns and equipment required during surgery (Mahajan, 2011:163). In this study, even if the SSC was used, surgeons, followed by nurses, then anaesthetists acknowledged that the checklist was not always completed as intended.

### **5.2.1.2 Complete use of the SSC**

Misuse of the SSC, and incorrect execution thereof, may be detrimental to patient safety and compromise team work in the operating room (Mahajan, 2011:163). This study identified that there was a significant difference between occupation  $p=0.028$ , age 0.017 and the use of the complete checklist for every procedure based on a 95% confidence interval applying the Kruskal-Wallis test. The null hypothesis was rejected.

Guidelines on safe surgery using the SSC given by the WHO, recommended that surgical teams should not memorize the steps of the checklist, but follow them step by step (WHO, 2014:8). For the SSC to be beneficial to the patient, all sections of the checklist must be completed by following a particular sequence of checks (WHO, 2009:2). In this study, statistical significant differences were identified between roles,  $p=0.024$ , experience  $p=0.040$ , education  $p=0.044$  and whether the individual who signs the checklist personally ensured that the relevant steps were completed.

According to the WHO, surgical team members should stop and listen when the checklist is carried out and adhere to the surgical pause (time-out) process (WHO, 2008:14). In this study, most participants (80.2%) agreed that everyone in the OR stops. However, the 50+ age (19.8%) group indicated that everyone does not stop and pay attention while the checklist is carried out. A significant difference  $p=0.004$  based on a 95% confidence level applying the Kruskal-Wallis test was identified between age and when the checklist was carried out that everyone in theatre would stop what they were doing and listened until it was completed. The null hypothesis was rejected. The actions of OR staff who do not pay attention during the SSC, was described in literature as "ticking the boxes", and improved peri-operative outcomes were not reported (Vijayasekar & Steele, 2009:260).

Previous literature highlighted that assigning a team member to lead the team briefing, will increase adherence to the completion of the WHO SSC (Kieffer *et al.*, 2013:288). In this study, scrub roles (20.6%) and anaesthetic nurses (13%), staff with 5-10 (17.4%) and >10 years' experience (15.6%) in the OR, with a doctorate (30.8%) and diploma education (22.7%) disagreed that the individual who signed the checklist checked all relevant steps. This may be prevented if a designated healthcare professional participating in the time out procedure is made responsible for the process (WHO, 2008:6).

In conclusion, the participants in this study indicated that the SSC was used for most surgical procedures. The majority (87%) believed that the SSC should be mandatory for all surgical procedures. However, it was omitted in some procedures, and if it was used, it was not always completed in full. The study identified that there was a significant difference between occupation  $p=0.028$ , age 0.017 and the use of the complete checklist for every procedure. In addition, participants reported that the SSC was sometimes completed without having the attention of all the staff involved, and without following the required steps. Applying the Kruskal-Wallis test, statistically significant differences were identified between occupation  $p=0.028$ , education  $p=0.005$  and sometimes sections of the checklist were not completed on a 95% confidence level. Null hypotheses were rejected.

Thus, the first objective, to determine the attitudes of staff toward the implementation of the surgical checklist were successfully explored and reached. Significant differences were found among participants with reference to their attitude when implementing the SSC.

### **5.2.2 Objective 2: Communication amongst surgical team members, related to the checklist**

Surgical care is a team approach and peri-operative patient care should be promoted by the entire surgical team (Gawande, 2010:137). Therefore, communication amongst surgical team members are of fundamental importance.

The second objective of the study was to determine the communication amongst surgical team members, related to the checklist. The WHO SCC was designed to be clear, brief and easy to use (WHO, 2008:5). Most participants (86.7%) strongly agreed that the language of the checklist is clear and understandable as they all speak English. However, a significant difference was identified, as male participants (21.7%) disagreed on the clarity of the language. A statistical difference between gender  $p=0.002$ , based on a 95% confidence interval, was identified applying the Mann-Whitney U statistical test, and the null hypothesis was rejected.

The findings show that participants (92.1%) agree that the checklist enhances teamwork and communication amongst multidisciplinary healthcare providers, three respondents in the open-ended comments also indicated that the checklist is a useful tool to improve teamwork and communication.

To benefit from the SSC, completion thereof involves the entire multidisciplinary team. In this study, most participants (96.6%) agreed that the checklist involves the multidisciplinary team. However, male participants (21.7%) disagreed on the clarity of the language and female participants (8.4%) disagreed the checklist enhance team work teamwork.

In conclusion, the study findings are congruent with literature in that implementation of the SSC cannot be accomplished by individual OR staff, but requires a team approach (Haugen *et al.*, 2013:123). The communication amongst team members related to the SSC were thoroughly explored and found statistically significant difference amongst male and female participants related to the SSC. Thus, the second objective of the study, to determine the communication amongst team members when using the SSC, was reached.

### **5.2.3 Objective 3: Beliefs of surgical team about the checklists**

The safety culture in an organization is influenced by the way people think and behave (Haugen *et al.*, 2013:808). Evidently, patient safety is of crucial importance, as approximately 40% of adverse events occur in the OR, most of which are avoidable (Levy, Casey, Senter, Russell, Hawkins, Jane, Zhao, Doody, Kao, Lally & Tsao, 2012:331). Haynes *et al.* (2011:102)

reported surgical teams believe that the checklist contributes to patient safety. Similarly, participants in this study agreed that the SSC contribute to patient safety.

### **5.2.3.1 The surgical team believes that the SSC improves patient safety**

The findings of this study support literature that reported improved safety processes after the implementation of the SSC, such as increased patient safety awareness and anticipating mistakes in the operating room (Haugen *et al.*, 2013:811).

Using the complete checklist for every procedure will remind surgical teams to follow important safety steps and thereby reducing the most preventable human errors (WHO, 2014:8). Congruent with other studies, the participants (89.2%) in this study also believe using the checklist reduces the likelihood of human error. Correspondingly, (97.3%) agreed that the checklist should be mandatory for every surgical procedure. The null hypotheses were rejected, as significant differences between education  $p=0.009$ , roles 0.014 and the belief that the checklist should be mandatory for every case, based on a 95% confidence interval were found applying the Kruskal-Wallis test.

While the study found differences between education, roles and the belief that the checklist should be mandatory for every case, participants (89.7%), agreed that the implementation of the checklist contributed to a decrease in adverse events. Congruently, Kieffer *et al.* (2013:288), reported a 4% decrease in the morbidity and a 6.5% decrease in mortality in organisations where the WHO SSC is performed.

### **5.2.3.2 The surgical team believes that the SSC improves team work**

Teamwork aimed interventions enhance patient safety and standards (Watson, 2009:123). In this study, participants (96%) agreed that the use of the SSC improves team work in the OR. Yet, statistical significant differences were identified between education  $p=0.003$  using the checklist improves teamwork, and the null hypothesis was rejected. Participants with a diploma education (8.4%) disagreed using the checklist improves teamwork.

Literature suggests that adherence with the recommendations of the checklist is affected if OR teams merely complete the document to get it over and done with. Congruently, some participants (59.9%) in this study observed that nurses just tick off the checklist, and others (33.5%) indicated they have not observed the required pre-and post-briefings. In other studies, where operating room staff were merely ticking the boxes for auditing purposes, improved patient safety, teamwork and decrease in adverse events were not reported (Vijayekar &

Steele, 2009:260). In addition, the incorrect use of the SSC may lead to an increase in adverse events and surgical safety risks (Panesar *et al.*, 2009:256).

In conclusion, Mahajan (2011:165) recommended implementation of the checklist to be maintained as an essential aspect of patient safety and not as a separate project. In this study, OR staff in both institutions agreed that the SSC improves peri-operative patient safety and team work. However, participants (63.4%) indicated that sections of the checklist are sometimes not completed, or just ticked off (59.9%) or completed without the required team related pre- and post-briefings (33.5%).

In conclusion, participants with a diploma (8.4%) disagreed using the checklist improves teamwork, while surgeons with a degree (15.4%) and scrub nurses (7.2%) believe that the checklist should not be mandatory for every case. This study identified statistical significant differences among participants related to their education and roles, and their beliefs regarding the SSC. Thus, the beliefs of the surgical team about the SSC was successfully explored.

#### **5.2.4 Objective 4: Support from surgical team members towards implementation of the checklist.**

The implementation of team briefings and a SSC require considerable cultural changes in the way surgeons, anaesthetists and nursing staff perform their duties (Borchard *et al.*, 2012:925). This cultural change is required for all surgical team members to improve patient safety, opposed to an entirely hierarchical surgeon led system.

Evidence is widespread that the SSC is more effective when the surgeons and anaesthetists are supportive (Mahajan, 2011:163). During time-out, before skin incision, all surgical team members verbally confirm the team members' names and role, patient's identity, surgical site and the procedure are identified. The surgeon reports critical and unanticipated actions, surgical time and anticipated blood loss (Korkiakangas, 2017:177). In this study, participants (89.6%) agreed that surgical team members support the use of the SSC. However, anaesthetists (14.5%), and circulating nurses (16%) disagree that surgeons are fully supportive of the SSC. Applying the Kruskal-Wallis statistical test, significant differences based on a 95% confidence interval between occupation  $p=0.007$ , roles  $p=0.023$ , education  $p=0.042$  and nursing staff support the checklist were identified. The null hypothesis was rejected.

Literature reported that anaesthetists may be unable to participate if the SSC is performed during the induction phase of anaesthetics, and as a result, they may seem unsupportive to

the use of the checklist (O`Conner *et al.*, 2013:5). Conversely, participants (96.3%) in this study agreed that anaesthetic personnel support the use of the checklist.

Previous studies reported that nurses are predominantly inclined to be supportive of the checklist (O`Conner *et al.*, 2013:5). However, by applying the Kruskal-Wallis statistical test, significant differences based on a 95% confidence interval between occupation  $p=0.007$ , roles  $p=0.023$ , education  $p=0.042$  and nursing staff support the checklist were identified. In this study, participants with diploma education (12%) and in circulating roles (8%), disagree nurses support the checklist, while anaesthetists (29.1%), those with a masters education (14.5%) and 5-10 years' experience in OR (16 %) indicated junior (circulating) personnel do not support the checklist.

Consistent use of the checklist requires support of senior leadership within each health institution (Mahajan, 2011:165). While participants (95.2%) viewed senior staff as supportive of the SSC in this study, there were statistical significant differences identified between occupations, roles and experience that junior theatre personnel and nurses support the checklist.

#### **5.2.4.1 Initiating the SSC**

Statistical significant differences were identified between occupation  $p=0.001$ , experience  $p=0.047$ , age  $p=0.000$ , education  $p=0.003$  and initiating the use of the checklist in the past. In addition, a significant difference was also shown between gender  $p=0.000$  on a 95% confidence interval applying the Mann-Whitney U test, and the null hypotheses were rejected. Participants (83.0%) indicated that they have initiated the checklist in the past. However, significant difference in nurses (23.3%), with >10 years 'experience in OR (21.7%), age 50+ (28.3%), certificate education (28.2%) and the female gender (28.3%), failed to initiate the checklist in the past.

Thus, in this study, nurses with a certificate education, who are circulating nurses have not initiated the checklist in the past. Congruently, other studies found that nurses oppose initiating the checklist. Literature identified hierarchy as a global barrier in OR settings, specifically when the SSC is led by nurses, instead of the surgeon or anaesthetist (Mahajan, 2011:163).

Although some participants (10%) indicated that they intend to initiate the SCC in the future, some nurses /technicians (18.9%) and staff with more than 10 years' experience (17.2%) and older than 50 years (16.9%) and staff with doctorate education (15.4%), are not interested to

initiate the checklist in the future. Results clearly show senior surgical team members and circulating nurses are unlikely to implement the checklist in the future.

In conclusion, this study identified significant differences amongst participants regarding their support towards implementation of the SSC. Thus, the fourth objective, on the support from the surgical team members implementing the checklist were thoroughly explored and reached.

### **5.2.5 Objective 5: Feedback on potential barriers**

Previous studies recognized a number of barriers implementing the SCC that included a lack of training or understanding of critical points, the timing of execution and confusion about the roles and names of team members (Levy *et al.*, 2012:332). Process standards refer to the actual implementation of policies, protocols and procedures (Schoenberg *et al.*, 2016:116).

For the purpose of this study, the conceptual framework described process standards as activities that staff carry out during the implementation of the checklist. The study found the SSC process is not used as intended by the WHO, and reported as barriers.

#### **5.2.5.1 Signatures relevant to you**

In the open-ended comments participants indicated that the barriers are - missing signatures, non-compliance to signatures, surgeons reluctant to sign the SSC and the checklist that is signed with-out being checked. Mahajan (2011:163) mentioned the reason the surgeon might not have been in the room when the sign in and sign out are performed and this might be one of the reasons why surgeons are not signing the checklist. In this study, the responses to: "are the requirements for signatures relevant to you?" participants (82.1%) in all categories agreed. However, the study found significant differences between occupation  $p=0.002$ , age  $p=0.020$ , education  $p=0.018$  and the requirements for the relevance of signatures. In addition, a statistical difference was identified between gender and the requirements for the relevance of signatures applying the Mann-Whitney U test in this study, anaesthetists (30%) and surgeons (29%), aged 30-39 (26.1%) with doctorate education (46.2%), disagreed with the relevance of signatures.

O'Conner *et al.* (2013:5) reported that nurses, more than surgeons or anaesthetists, experienced that the requirement for signatures, lack of time and assertiveness of staff were barriers to the completion of the SSC. Congruently, this study found significant differences between occupation, age, education and gender regarding the requirements and the relevance of signatures on the SSC.

### **5.2.5.2 Completing the checklist is an added responsibility and time consuming**

OR staff in France found the SSC time consuming and did not experience the additional benefit of using the SSC (Fourcade *et al.*, 2012:192). In this study, a significant difference was identified between age  $p=0.017$  and whether completing the checklist is time consuming, based on a 95% confidence interval applying the Kruskal-Wallis test. Specifically, nurses (63.1%) surgeons (46.6%) and anaesthetists (45.5%) agreed the SSC is an added responsibility and age group 40-49 (88.1%) find the checklist time consuming.

In this study, statistical significant differences were identified between occupation  $p=0.004$ , age  $p=0.030$ , education  $p=0.006$  and that the checklist is an added responsibility applying the Kruskal-Wallis test. Yet, literature have shown using the complete checklist takes a few minutes, and reported no decrease in the number of surgical procedures when completing the checklist (WHO, 2014:8). Therefore, a designated person should be assigned to ensure the completion of the SSC, ensure that crucial steps are not omitted, and that the SSC is not completed in a hurry (WHO, 2008:8).

### **5.2.5.3 Training about the implementation of the SSC**

Perry and Kelly (2014:59) identified insufficient training and feedback as main contributing factors to the slow implementation of the SSC. In this study, participants (35.1%) with 5-10 years of experience at current employer indicated that they were not properly trained. Furthermore, in the open-ended comments participants indicated no formal training received and lack of understanding the concept of the checklist. Teams that have not been trained on how to use the SSC may show a lack of interest in its implementation (Vijayasekar & Steele, 2009:260). Levy *et al.* (2012:332) mentioned lack of education resulting in an unsuccessful implementation process could contribute to barriers.

Structure standards refer to what is required to ensure safe quality care. These standards are essential for effective functioning in quality improvement in peri-operative care (Schoenberg *et al.*, 2016:116). The conceptual framework of the study described the qualification, the years of experience and the training of staff in the operating room, as structure standards. The quality of care depends on the conditions under which the care is given, and a default in the structure may result in unsuccessful patient outcomes (Schoenberg *et al.*, 2016:116). The findings on the demographic and professional profile of the respondents were illustrated in chapter four. In this study, 32% of participants have over 10 years', and 14.9%, have between 5 and 10 years' experience at their current employer. As the Department of Health (DOH) in

the Western Cape adopted and implemented the SSC in public hospitals in 2009 (Gordon & Reed, 2012:7), these participants were likely employed at these institutions during the implementation of the SSC.

A significant difference  $p=0.010$  between years of experience and whether the participant was properly trained about the implementation of the checklist was identified, and the null hypothesis was rejected. This may have resulted in a tick-box exercise and lack of interest using the checklist, in the same way participants indicated they do not intend to initiate the SSC in the future.

#### **5.2.5.4 In your experience have you observed pre-and post-operative briefings?**

Results shown on pre- and postoperative briefing - most of the anaesthetists (58.5%) followed by surgeons (39.6%) and nurses (22.8%) and doctorate education (66%) indicated they have not observed briefings required by the checklist. Carney *et al.* (2010:723), agreed that the use of the SSC with briefings improved communication among surgical team members, minimizing OR delays and decrease adverse events during surgery. Understanding of teamwork and implementation of briefings vary between surgeons and nurses in the peri-operative area (Carney *et al.*, 2010:723). Further, literature in a Canadian pilot study indicated that pre- and post-operative briefings were inconsistent performed at different times and areas (McDowell, 2014:126). However, performing pre- and post-operative briefings contributed to better patient outcomes and decrease in wrong site surgery (McDowell, 2014:126).

The SSC improves outcome standards referring to the effect that health care has on the patient, and as such, it may be either positive or negative (Schoenberg *et al.*, 2016:116). Specific indicators to measure the outcome of the standards, such as the number of adverse events, were not measured in this study, although it can be concluded that most respondents believe implementation of the checklist resulted in less adverse events, taking into consideration the checklist was implemented in 2008 and the response can be seen as reliable. Yet, 59.9% of participants indicated that the nurse just completed the checklist for auditing purposes.

#### **5.2.5.5 In your experience have you observed that nurses just complete the checklist.**

Most of the times nurses take the responsibility of leading the SSC process. Thus, nurses are more exposed to the barriers completing the SSC than surgeons and anaesthetists.

Anaesthetist (51.5%) followed by surgeons (46.8%) agreed nurses just complete the checklist. Applying the Kruskal-Wallis statistical test, statistical significant differences were identified between occupation  $p=0.002$ , education  $p=0.002$  based on a 95% confidence interval and completing the checklist is time consuming.

The SSC serves as a reminder to the surgical team about the condition and anticipated risks for each patient (Haugen *et al.*, 2013:807). However, literature identified various barriers to the implementation of the SSC. Congruently, this study confirmed that participants experience barriers to the implementation of the SSC, and identified significant statistical differences regarding the occupation, education and roles regarding the barriers. Thus, the objective to explore feedback of the checklist were reached, and thoroughly described.

### **5.3 LIMITATIONS OF THE STUDY**

The available time for data collection was impacted due to prolonged time to obtain institutional consent from one institution. Yet, the study population and return rate allowed for sufficient data collection in both institutions.

### **5.4 RECOMMENDATIONS**

The intention of the SSC was to provide healthcare professionals with a brief and easy guide to use during pre-intra and post-surgery to improve patient safety, minimize surgical risk and increase outcomes, improve team work and communication amongst surgical team members (Haynes *et al.*, 2009:491). Despite the evidence that the checklist reduces surgical morbidity and mortality, some barriers are still prevalent implementing the checklist in healthcare institutions. The researcher recommends the following:

#### **5.4.1 Make patient safety a priority**

O'Conner *et al.* (2013:6) recommended that directors in the OR should set the example, support the use of the checklist and be visible through safety leadership rounds, where they encourage surgical team members to be constant in using the SSC.

##### **5.4.1.1 Quality improvement initiatives**

Institutional leadership needs to be involved in all quality improvement and patient safety initiatives to promote a culture of safety in the peri-operative area. Surgical team leaders supporting the use of the SSC are paramount. Conley *et al.* (2011:874) found that the engagement of leadership was the main aspect in the positive outcome of the SSC implementation.

#### **5.4.1.2 Identify local champions**

Local champions should be identified and trained to represent management. Select clinical SSC champions who are influential in their hospital, explaining and demonstrating the benefits of the correct use of the checklist to old and new staff.

#### **5.4.1.3 Assign dedicated team members to lead the SSC**

Assigning a dedicated team member for leading the sections of all components of the SSC is key to successful implementation. Thus, it is often a circulating nurse; however, it can be any surgical team member participating in the surgical procedure. The role of the team leader is to prevent the team from continuing to the next section of the surgery before completing each phase.

### **5.4.2 Training**

In the majority of reported studies that assessed the effectiveness of the SSC team, training was important (Haynes *et al.*, 2009:492).

#### **5.4.2.1 Orientation of new staff**

Training is an important element in introducing any patient safety initiative. Tertiary institutions have a high turnover for new staff, thus the introduction on the use of the SSC should take priority during orientation sessions. Surgeons, anaesthetists and nursing staff should become involved in training sessions. As per guidelines of the WHO (2008), all members of the surgical team checklist need to be fully engaged in bringing about changes to the SCC and the implementation.

#### **5.4.2.2 Inter-professional in-service training of existing staff**

The result of this study has indicated that staff with ten years and more experience in the OR were not properly trained. Thus, continuous training on existing and new staff is recommended.

Another well-known used evidence-based programme for team training is the TeamSteps programme, excellent for inter-professional team training. The implementation of this programme has resulted in improved team performance and outcomes.

## **5.5 FUTURE RESEARCH**

Observational research regarding the implementation of the SSC may provide additional insight into the role of staff members, and their participation during the SSC.

## **5.6 DISSEMINATION**

The study will be published according to the requirements of a master's degree thesis of Stellenbosch University. It will be further disseminated on academic platforms, such as presentations, journals or workshops.

## **5.7 CONCLUSION**

The SSC involves a multi-team approach, moving through a logical sequence of steps to ensure the safe and uneventful transit of a patient through the operating theatre. To achieve successful implementation and full adherence, it takes time and a change in the safety culture (Perry & Kelly, 2014:61). The SSC was introduced in 2009 in the health institutions where this study was conducted; however, this study found areas for improvement on the process completing the SSC by the surgical team. Congruent with other studies examining attitudes towards a surgical checklist (O' Conner *et al.*, 2013:5), these institutions and patients might not have experienced all the benefits associated with proper implementation of the SSC.

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## APPENDICES

### APPENDIX A: ETHICAL APPROVAL FROM STELLENBOSCH UNIVERSITY

Approved  
New Application

Ethics Reference #: 0557

Title: An investigation into the barriers preventing the implementation of the surgical safety checklist in the operating room in tertiary hospitals in the Cape Metropole.

Dear Gerda Koopman

Your New Application received on 14/07/2017 09:45, was reviewed by members of the Health Research Ethics Committee via the Minimal Risk Review procedures on 30 August 2017 and was approved.

Please note the following information about your approved research protocol:

Protocol approval period: This project has been approved for a period of one year from the date of this approval letter,

Please remember to use your protocol number (0557) on any documents or correspondence with the HREC concerning your research protocol.

Please note that this decision will be ratified at the next HREC full committee meeting. HREC reserves the right to suspend UREC approval and to request changes or clarifications from student applicants. The UREC coordinator will notify the applicant (and if applicable, the supervisor) of the changes or suspension within 1 day of receiving the notice of suspension from HREC. HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:

Please note a template of the progress report is obtainable on <https://applyethics.sun.ac.za/Project/Index/619> and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Translation of the consent document to the language applicable to the study participants should be submitted.

Federated Assurance Number: 00001372

Institutional Review Board (IRB) Number: IRBC005239

The Health Research Ethics Committee complies with the SA National Health Act No.61/2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles, Structures and Processes 2015 (Department of Health).

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are Ms Claudette Abrahams at Western Cape Department of Health

([healthres@pgwc.gov.za](mailto:healthres@pgwc.gov.za) Tel: +27 21 483 9907) and Dr Helene Visser at City Health ([HeleneMsser@capetown.gov.za](mailto:HeleneMsser@capetown.gov.za) Tel: +27 21 400 3981). Research that be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We Wish you the best as you conduct your research.

For standard HREC forms and documents please visit: <https://applyethics.sun.ac.za/Project/Index/619>

If you have any questions or need further assistance, please contact the HREC office at 0219389207,

Sincerely

Franklin

Coordinator

Health Research Ethics Committee



Weber

**INVESTIGATOR RESPONSIBILITIES****Protection of Human Research Participants**

Some of the responsibilities investigators have when conducting research involving human participants are listed below:

I. Conducting the Research: You are responsible for making sure that the research is conducted according to the HREC approved research protocol. You are also responsible for the actions of all your co-investigators and research staff involved with this research.

- **Participant Enrolment:** You may not recruit or enrol participants prior to the HREC approval date or after the expiration date of HREC approval. All recruitment materials for any form of media must be approved by the HREC prior to their use. If you need to recruit more participants than was noted in your HREC approval letter, you must submit an amendment requesting an increase in the number of participants.
- **Informed Consent:** You are responsible for obtaining and documenting effective informed consent using only the HREC approved consent documents, and for ensuring that no human participants are involved in research prior to obtaining their informed consent. Please give all participants copies of the signed consent document. Keep the originals in your secured research files for at least fifteen (15) years.
- **Continuing Review.** The HREC must review and approve all HREC approved research protocols at intervals appropriate to the degree of risk but not less than once per year. There is no grace period. Prior to the date on which the HREC approval of the research expires, it is your responsibility to submit the continuing review report in a timely fashion to ensure a lapse in HREC approval does not occur. If HREC approval of your research lapses, you must stop new participant enrolment, and contact the HREC Office immediately.
- **Amendments and Changes:** If you wish to amend or change any aspect of your research (such as research design, interventions or procedures, number of participants, participant population informed consent document, instruments, surveys or recruiting material), you must submit the amendment to the HREC for review using the current Amendment Form. You may not initiate any amendments or changes to your research without first obtaining written HREC review and approval. The only exception is when it is necessary to eliminate apparent immediate hazards to participants and the HREC should be immediately informed of this necessity.
- **Adverse or Unanticipated Events:** Any serious adverse events, participant complaints, and all unanticipated problems that involve risks to participants or others, as well as any research-related injuries, occurring at this institution or at other performance sites must be reported to the HREC within five (5) days of discovery of the incident. You must also report any instances of serious or continuing problems, or non-compliance with the HREC's requirements for protecting human research participants. The only exception to this policy is that the death of a research participant must be reported in accordance with the Stellenbosch University Health Research Ethics Committee Standard Operating Procedures.

[www.sun.ac.za/portal/page/portal/Health\\_Sciences/English/Centres%20and%20Institutions/Research\\_Development\\_Support/Ethics/Application\\_package](http://www.sun.ac.za/portal/page/portal/Health_Sciences/English/Centres%20and%20Institutions/Research_Development_Support/Ethics/Application_package).

All reportable events should be submitted to the HREC using the Serious Adverse Event Report Form.

- **Research Record Keeping:** You must keep the following research-related records, at a minimum, in a secure location for a minimum of fifteen years; the HREC approved research protocol and all amendments; all informed consent documents; recruiting materials; continuing review reports; adverse or unanticipated events; and all correspondence from the HREC.
- **Reports to the MCC and Sponsor:** When you submit the required annual report to the MCC or you submit a required report to your Sponsor, you must provide a copy of that report to the HREC. You may submit the report at the time of continuing HREC review.
- **Provisions of Emergency Medical Care:** When a physician provides emergency medical care to a participant without prior HREC review and approval to the extent permitted by law, such activities will not be recognized as research nor will the data obtained by any of such activities be used in support of research.
- **Final Reports:** When you have completed (no further participant enrolment, interactions, interventions or data analysis) or stopped work on your research, you must submit a Final Report to the HREC.
- **On-Site Evaluations, MCC Inspections, or Audits:** If you are notified that your research will be reviewed or audited by the MCC, the Sponsor, any other external agency or any internal group, you must inform the HREC immediately of the impending audit/evaluation.

**APPENDIX B: PERMISSION OBTAINED FROM INSTITUTION**

E-mail

Ms G. Koopman  
University of Stellenbosch

E-mail: [koopman\\_899@hotmail.com](mailto:koopman_899@hotmail.com)

Dear Ms Koopman

**RESEARCH PROJECT: An Investigation Into The Barriers Preventing The Implementation Of The Surgical Safety Checklist In The Operating Room In Tertiary Hospitals In The Cape Metropole.**

Your recent letter to the hospital refers.

You are granted permission to proceed with your research, which is valid until **30 September 2017**, subject to the approval of Professor G. Fieggen: HOD:-Surgery.

Please note the following:

- a) Your research may not interfere with normal patient care.
- b) Hospital staff may not be asked to assist with the research.
- c) No additional costs to the hospital should be incurred i.e. Lab, consumables or stationary.
- d) **No patient folders may be removed from the premises or be inaccessible.**
- e) Please provide the research assistant/field worker with a copy of this letter as verification of approval.
- f) Confidentiality must be maintained at all times.
- g) Should you at any time require photographs of your subjects, please obtain the necessary indemnity forms from our Public Relations Office (E45 OMB or ext. 2187/2188).
- h) Should you require additional research time beyond the stipulated expiry date, please apply for an extension.
- i) Please discuss the study with the HOD before commencing.
- j) Please introduce yourself to the person in charge of an area before commencing.
- k) On completion of your research, please forward any recommendations/findings that can be beneficial to use to take further action that may inform redevelopment of future policy / review guidelines.
- l) Kindly submit a copy of the publication or report to this office on completion of the research.**

I would like to wish you every success with the project.

Yours sincerely

A handwritten signature in black ink, appearing to read 'B Eick', written over a light blue horizontal line.

**DR BERNADETTE EICK**  
**CHIEF OPERATIONAL OFFICER**  
**Date:** 11 September 2017

C.C. Mr L. Naidoo  
Dr A. Krajewski

**APPENDIX C: PERMISSION OBTAINED FROM FACILITY**

[REDACTED]

Research Projects

ENQUIRIES: Dr GG

Marinus

TELEPHONE:021 938 5752

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Ethics Reference: 0557

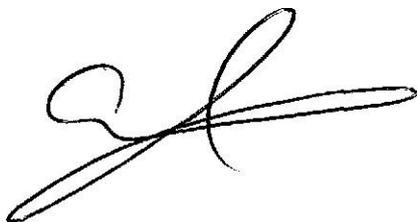
TITLE: An investigation into the barriers preventing the implementation of the surgical safety checklist in the operating room in tertiary hospitals in the Cape Metropole.

Dear Gerda Koopman

PERMISSION TO CONDUCT YOUR RESEARCH AT [REDACTED]

1. In accordance with the Provincial Research Policy and [REDACTED] Notice No 40/2009, permission is hereby granted for you to conduct the above-mentioned research here at [REDACTED] Hospital.

2. Researchers, in accessing Provincial health facilities, are expressing consent to provide the Department with an electronic copy of the final feedback within six months of completion of research. This can be submitted to the Provincial Research Co-Ordinator ([Health.Research@westerncape.gov.za](mailto:Health.Research@westerncape.gov.za)).



[REDACTED]

[REDACTED]

[REDACTED]

Date: z

[REDACTED]

Ethics Reference: 0557

TITLE: An investigation into the barriers preventing the implementation of the surgical safety checklist in the operating room in tertiary hospitals in the Cape Metropole.

BY  \_\_\_\_\_

An authorized representative [REDACTED]

NAME Dr DS Erasmus

TITLE ceo

\_\_\_\_\_  
DATE z Oc.k<sup>o</sup>.:ær -z-o

## **APPENDIX D: PARTICIPANT INFORMATION LEAFLET AND DECLARATION OF CONSENT BY PARTICIPANT AND INVESTIGATOR**

### **PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM**

**TITLE OF THE RESEARCH PROJECT:** An investigation into the barriers preventing the implementation of the surgical safety checklist in the operating room in tertiary hospitals in the Cape Metropole.

**REFERENCE NUMBER:** 1427249

**PRINCIPAL INVESTIGATOR:** Gerda Koopman

**ADDRESS:** 43 Jakaranda Street, Rustdal, Blackheath 7580

**CONTACT NUMBERS:** Ms. Gerda Koopman 0847573376. Supervisor Ms. Loraine Schutte 021938-9825; Co-supervisor 0219389297

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied and that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

**What is this research study all about?**

- This study will be conducted at the Cape Metropole tertiary hospitals. Participants will include all staff, population [N180].
- The aim of this study is to investigate the implementation of the surgical safety checklist in the operating room in two tertiary hospitals in the Cape Metropole.
- You will be given a consent form to complete before your participation in the research project. Participation is entirely voluntary and anonymous. On completion of the consent form you will be required to place the consent form in a sealed envelope and slot it into a special locked box marked “Consent Forms” provided by the researcher. The questionnaire will be distributed once the consent form has been completed. No names or hospital names will be attached to the consent or questionnaire. The questionnaire will take approximately 20 minutes to complete. Once the questionnaire has been completed, you are required to place it in a sealed box provided to you and place into a second box marked “Questionnaires” also provided by the researcher. All questionnaires will be completed in the department where you are working. The researcher will deliver and collect all the consent forms and questionnaires in person.

**Why have you been invited to participate?**

- As a registered professional doctor, anaesthesiologist, OR nurse and technician currently working in the operating room, your input is valuable to determine the barriers affecting the implementation of the surgical safety checklist in your hospital.

**What will your responsibilities be?**

- You will be requested to complete a consent form and a questionnaire.

**Will you benefit from taking part in this research?**

- The data generated through your participation in this research project may benefit both staff and patients as it might lead to the improvement on the implementing of the checklist in the operating room. Perioperative management will have an indication on the barriers preventing the effective implementation of the surgical checklist.

**Are there any risks involved in your taking part in this research?**

- No risks have been identified by means of your participation in this project.

**If you do not agree to take part, what alternatives do you have?**

- Your participation in this research project is entirely voluntary, and if you select not to participate, you will not be penalized in any way.

**Will you be paid to take part in this study and are there any costs involved?**

- No, you will not be paid to take part in the study. There will be no costs involved for you, if you do take part.

**Is there anything else that you should know or do?**

- You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

**Declaration by participant**

By signing below, I ..... agree to take part in a research study entitled (*insert title of study*).

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... On (*date*) ..... 2017.

.....

**Signature of participant**

.....

**Signature of witness**

**Declaration by investigator**

I (*name*) ..... declare that:

- I explained the information in this document to .....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*)

Signed at (*place*) ..... On (*date*) ..... 2017.

.....

**Signature of investigator**

.....

**Signature of witness**

**APPENDIX E: QUESTIONNAIRE****Questionnaire**

Instrument Questionnaire Number:

Please answer the following questions on the implementation of the surgical safety checklist in the operating room.

**DEMOGRAPHIC PROFILE** Please insert a (x) in the box next to the answer of your choice.

**1. What is your occupation?**

- 1 Surgeon  
 2 Assistant Surgeon  
 3 Anaesthetist
- 4 Nurse
- 5 Operating room technician (Non- nursing / non-medical)

**2. If you marked Nurse in question 1, please identify your category**

- 1 Registered Nurse OR qualified  
 2 Registered Nurse OR experienced  
 3 Enrolled Nurse  
 4 Enrolled Nursing Auxiliary

**3. If you are a nurse/OR technician, indicate the role(s) you perform most often in the OR**

- 1 Scrub nurse/technician (member of the sterile team)  
 2 Circulating nurse/technician  
 3 Anaesthetic nurse/technician (assist the anaesthetist)

**4. Indicate your years of OR experience.**

- 1 Less than 1 year
- 2 1 – 5 years
- 3 5 – 10 years
- 4 More than 10 years

**5. Gender**

- 1 Male
- 2 Female

**6. Indicate your age**

- 1 20 - 29
- 2 30 - 39
- 3 40 - 49
- 4 50 +

**7. Years of service at current employer**

- 1 Less than 1 year
- 2 1 – 5 years
- 3 5 – 10 years
- 4 More than 10 years

**8. Level of Education**

- 1 Certificate
- 2 Diploma
- 3 Degree

4 Master's Degree

5 Doctorate Degree

<b>Barriers</b>		Disagree Strongly	Disagree Slightly	Agree Slightly	Agree Strongly	Don't Know
<b>Objective 1: Attitude of staff toward implementation of the surgical checklist</b>						
1.	The checklist was implemented in the theatres I worked.	1	2	3	4	-88
2.	The complete checklist is used for every surgical procedure you were exposed to.	1	2	3	4	-88
3.	When the checklist is being carried out, everyone in theatre stops what they are doing and listens until it is completed.	1	2	3	4	-88
4.	Sometimes sections of the checklist are not completed.	1	2	3	4	-88
5.	The individual who signs the checklist personally ensures that the relevant steps have been completed.	1	2	3	4	-88
<b>Objective 2: Communication amongst the surgical team related to the checklist.</b>						
6.	The language of the checklist is clear and understandable.	1	2	3	4	-88
7.	The language the checklist printed is clear and understandable.	1	2	3	4	-88
8.	The checklist enhances teamwork and communication amongst multidisciplinary healthcare providers.	1	2	3	4	-88

9.	The completion of the checklist involves the multidisciplinary team.	1	2	3	4	-88
<b>Objective 3: Beliefs of surgical team about the checklists.</b>						
10.	I believe that failing to use the checklist is poor professional practice.	1	2	3	4	-88
11.	I believe using the checklist reduces the likelihood of human error.	1	2	3	4	-88
12.	I believe using the checklist improves patient safety.	1	2	3	4	-88
13.	I believe using the checklist improves teamwork in theatre.	1	2	3	4	-88
14.	I believe that the checklist should be mandatory for every case.	1	2	3	4	-88
15.	I believe that the implementation of the checklist has contributed to a decrease in adverse events.	1	2	3	4	-88
<b>Objective 4: Support from surgical team member's implementation the checklist.</b>						
16.	Surgical personnel support the use of the checklist.	1	2	3	4	-88
17.	Anaesthetic personnel support the use of the checklist.	1	2	3	4	-88
18.	Nursing staff supports the use of the checklist.	1	2	3	4	-88
19.	Senior theatre personnel support the use of the checklist.	1	2	3	4	-88
20.	Junior theatre personnel support the use of the checklist.	1	2	3	4	-88
21.	Management supports the use of the checklist.	1	2	3	4	-88

22.	I have initiated the use of the checklist in the past.	1	2	3	4	-88
23.	I intend to initiate the use of the checklist in the future.	1	2	3	4	-88

<b>Objective 5: Feedback on potential barriers</b>		Disagree Strongly	Disagree Slightly	Agree Slightly	Agree Strongly	Don't Know
24.	Is the requirement for signatures relevant to you?	1	2	3	4	-88
25.	Do you feel that the checklist is an added responsibility?	1	2	3	4	-88
26.	Do you feel that completing the checklist is time consuming?	1	2	3	4	-88
27.	Do you feel that you were properly trained about the implementation of the checklist?	1	2	3	4	-88
28.	In your experience have you observed pre-and post-operative briefings required by the checklist?	1	2	3	4	-88
29.	In your experience have you observed that nurses just complete the checklists?	1	2	3	4	-88

**30. You may add any further comments about the use of checklist in theatre not mentioned above.**

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**APPENDIX F: DECLARATION BY LANGUAGE EDITOR**



English/Afrikaans  
Afrikaans/English

3 Beroma Crescent Beroma Bellville  
Tel 0219514257  
Cell 0782648484  
Email [illona@toptutoring.co.za](mailto:illona@toptutoring.co.za)

\* Translations \* Editing \* Proofreading  
\* Transcription of Historical Docs  
\* Transcription of Qualitative Research  
\* Preparation of Website Articles

***TO WHOM IT MAY CONCERN***

This letter serves to confirm that the undersigned

**ILLONA ALTHAEA MEYER**

has proofread and edited the document contained herein for language correctness.

Signed

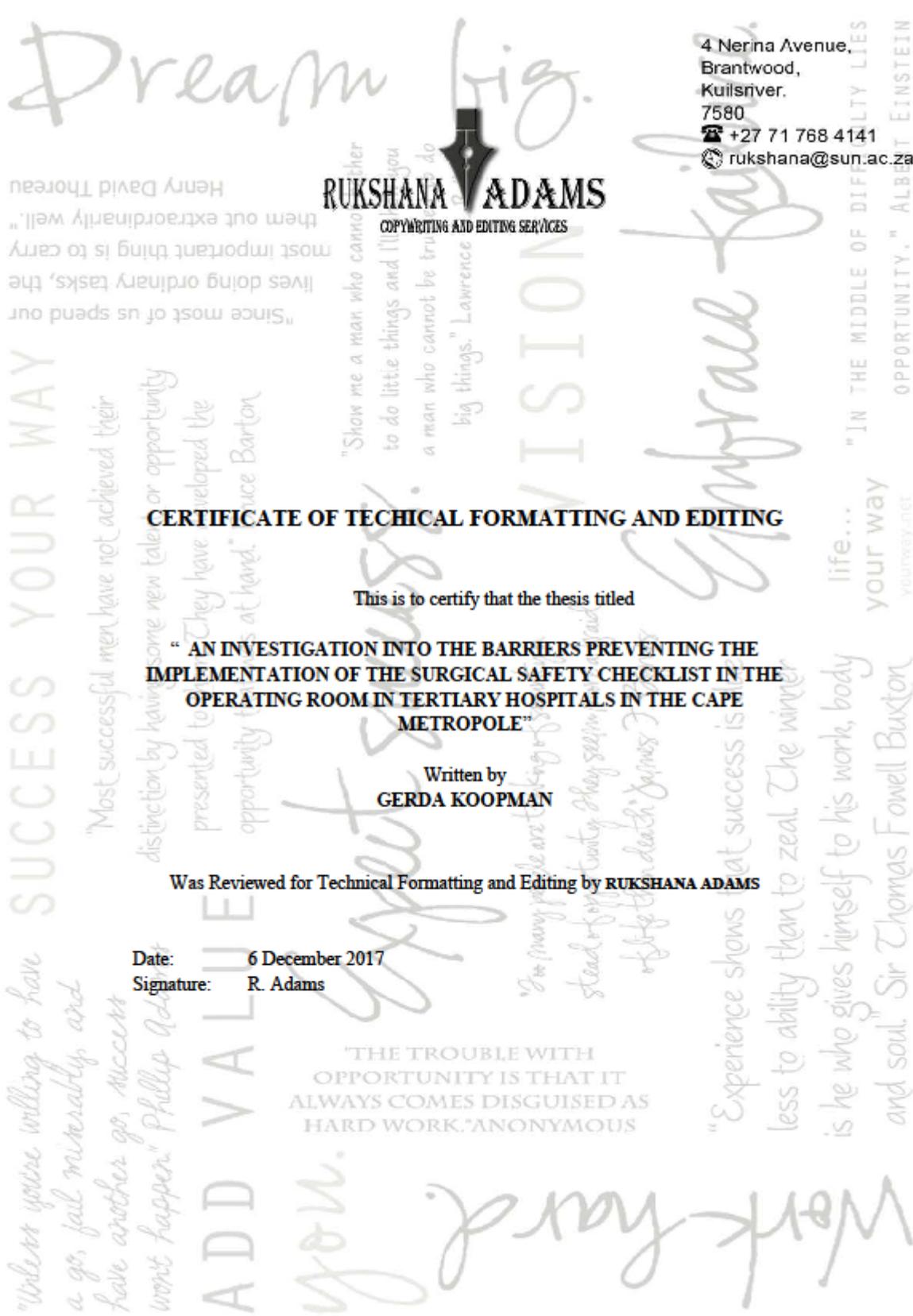
Ms IA Meyer

29 November 2017

**FOR: GERDA KOOPMAN**

**TITLE: AN INVESTIGATION INTO THE BARRIERS PREVENTING THE IMPLEMENTATION OF THE SURGICAL SAFETY CHECKLIST IN THE OPERATING ROOM IN TERTIARY HOSPITALS IN THE CAPE METROPOLE**

**APPENDIX G: DECLARATION BY TECHNICAL EDITOR**



4 Nerina Avenue,  
 Brantwood,  
 Kuilsriver,  
 7580  
 +27 71 768 4141  
 rukshana@sun.ac.za

**RUKSHANA ADAMS**  
 COPYWRITING AND EDITING SERVICES

**CERTIFICATE OF TECHNICAL FORMATTING AND EDITING**

This is to certify that the thesis titled

**“AN INVESTIGATION INTO THE BARRIERS PREVENTING THE IMPLEMENTATION OF THE SURGICAL SAFETY CHECKLIST IN THE OPERATING ROOM IN TERTIARY HOSPITALS IN THE CAPE METROPOLE”**

Written by  
**GERDA KOOPMAN**

Was Reviewed for Technical Formatting and Editing by **RUKSHANA ADAMS**

Date: 6 December 2017  
 Signature: R. Adams

“THE TROUBLE WITH OPPORTUNITY IS THAT IT ALWAYS COMES DISGUISED AS HARD WORK.” ANONYMOUS