

# Attitude and Beliefs About Surgical Safety Checklist in a North Indian Tertiary Care Hospital a Decade Later of WHO Checklist

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## Research

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# Abstract

Avoidable surgical complications account for a large proportion of preventable medical injuries and deaths globally. Surgical Safety Checklist is evidence-based, internationally accepted valid instrument, which has been found to reduce postoperative morbidity and mortality; the benefits of which are most striking in low- and middle-income countries (LMICs) Despite implementation in many hospitals throughout the country, there is still lack of awareness and concern in many LMICS health care facilities towards SSCL and its use, even after a decade of WHO checklist. We conducted a survey to assess the knowledge, attitudes and beliefs about the WHO-surgical checklist in which 65.4% (138) surgeons, 25.1% (53) anaesthetists and 9.5% (20) nurses participated. Majority believed that use of SSCL improves the safety of procedures, improves communication amongst theatre staff and will result in a reduction in errors in theatre yet there was no commitment for use of SSCL. Although all theatre personnel support implementation and use of SSCL however hierarchical issues, lack of administrative support, lack of training, logistics and timing, high patient volume and overburdened residents, lack of co-ordinator or leadership role and shortage of man power can be impediment to effective use. Nurses and junior doctors play a crucial role. Commitment rather than compliance and teamwork will be the key, ably supported by education and training which should be mandatory for all OT stake holders. Therefore, any measure that can potentially improve patient safety should be embraced and benefits of SSCL be told to motivate them and enhance participation for patient safety. Committed leadership, knowledge sharing and periodic trainings, interdisciplinary communication, feedback and regular audits can define and determine effective implementation process.

## Background

The global volume of major surgery was between 187.2 and 281.2 million cases per year in 2004. Major morbidity still complicates 3–16% of all surgical procedures in developed countries, with mortality rates of about 0.4–0.8%. In developing countries, death rates are estimated to be between 5–10% for major surgeries and studies suggest that at least half of these complications are avoidable. Lancet commission has suggested 143 million additional surgical procedures are needed in LMICs each year to save lives and prevent disability. Only 6% of the 313 million procedures happening worldwide each year are performed in the poorest countries, which house a third of the world's population. Despite low operative volumes, high case-fatality rates from common, treatable surgical conditions are noted in them. Unmet surgical need is expected greatest in eastern, western, and central sub-Saharan Africa, and south Asia. The complexity of the surgical operation and application of advanced technologies is increasing parallel with increasing burden of patients' comorbidities, which makes achievement and maintenance of clinical excellence challenging. Aviation industry is one which has taught many lessons where checklists have largely contributed to decrease in the incidence of accidents and strengthen safety culture.

One such thing is Surgical Safety Checklist. There is evidence that the WHO SSCLL can reduce postoperative morbidity and mortality; the benefits of which are most striking in low- and middle-income countries (LMICs). A study found that death rate declined to 0.8% from 1.5% whereas complications decreased to 7% from 11.0% of patients after introduction of the checklist. In another study, the complication rate was 18.4% and decreased to 11.7% after the checklist was introduced. Death rates declined from 3.7–1.4% after checklist introduction. Despite implementation in many hospitals throughout the country, there is still lack of awareness and concern

in many LMICS health care facilities towards SSCL and its use. Surgical errors still keep happening but never reported unless it is picked up by media. Recently Government of India through National Patient Safety Implementation Framework (2018–2025) is looking for adoption of SSCL by 80% of health care facilities to enhance patient safety protocols throughout the country. We conducted a survey to assess knowledge, attitudes and beliefs about the WHO-surgical checklist among the surgical teams before a modified SSCL could be implemented formally in our hospital.

## Methods

The single centre survey was conducted to assess the knowledge, attitudes and beliefs about the WHO-surgical checklist. It was developed on the basis of review of the literature about SSCL. The survey was created with google forms and consisted of three essential parts. First part referred to general details (profession, years of experience, designation, discipline). Second part referred to the awareness of the existence of the WHO SSCL and current practices in various surgical departments and hospital. Third part referred to existing safety culture beliefs towards SSCL and its implementation. The parameters in second and third parts were rated on a 5-point-Likert-scale ranging from “strongly disagree” to “strongly agree” or simply yes/no/don't know. The survey URL to the online-questionnaire was emailed and shared through social media (WhatsApp groups) to the surgical personnel (nurses, anaesthetists, and surgeons) and during meetings or academic activities of the hospital. Every URL could only be used once per email; hence, participation was only possible once per person. Two reminders were sent by email/social media with an interval of 1 month and 3 months, especially to non-responders. The participation was totally voluntarily, and completion of the questionnaire was regarded as informed consent. The data was collected on to google forms and converted to excel sheet (Microsoft® Excel®) where distribution of responses to each statement were analysed and corresponding data recorded.

## Results

The survey was sent to 302 surgical personnel and of them, 211 responded it (69.86% response rate): 65.4% (138) surgeons, 25.1% (53) anaesthetists and 9.5% (20) nurses. The participating departments were general and minimal access surgery 36% (76), anaesthesia 25.12% (53), ENT surgery 11.9% (25), gynaecology and obstetrics 10.4% (22), paediatric surgery 7.1% (15), orthopaedics 5.7% (12) and plastic surgery 3.8% (8), depending on their workforce. Since all questions were essential, complete responses were recorded from each individual.

Resident doctors form the 65–75% of the workforce hence maximum participation (71.58%) was obtained from them, junior residents 42.18% (89) and senior residents 29.4% (62), respectively whereas 18.96% (40) was consultant participation and nurses' participation was 9.47% (20). Majority of the respondents 59.7% (126) had less than 5 years of experience, 21.3% (45) had 5–10 years, 10.4% (22) had 11–15 years, 3.8% (8) had 16–20 years and 4.8% (10) had more than 20 years of experience. It was important to catch younger participants in order to realise the importance of SSCL which they can incorporate into their practise from an early surgical career.

Of all respondents, 89.1% were aware of the existence of the WHO SSCL (91.4% of surgeons, 86.4% of anaesthetists, and 80% of nurses). WHO-SSCL was being followed by only 36.9% whereas majority 63.1% were

either not following or not aware about being followed. Out of this, 49.76% was being followed voluntarily or informally. 44% were optimistic about that SSCL will be officially implemented. As a matter of their practise without SSCL it was found that 47.39% checked side and site regularly, 22.2% occasionally and 12.7% only for extremities whereas others opined it was not required in their procedure or practice. 57.3% checked regularly for implant material and the functioning of the equipment in the OT and 21.8% did occasionally.

90.9% believed that use of SSCL improves the safety of procedures (an aesthetic and surgical, improvement in communication (90.5%) amongst theatre staff and will result in a reduction in errors in theatre (91.9%). This will bring positive change in team behavior (84.8%) and help develop a safety culture in surgical teams (89%). 3.3% considered it as a waste of time, 11.8% believed that it brings no extra value to existing safety procedures while 7.5% believed that it has not demonstrated its efficacy in the scientific literature. More than half (62.5%) have heard about wrong site surgery through peers and media; it was surprising to notice that 27.4% (not as a part of surgical team) and 10.9% (as a part of surgical team) have seen some kind of error happening in front of them.

78.1% agreed that the staff needs to be trained in using the checklist and further periodic trainings should be held for new joined and re-orientation. Despite 89.5% awareness about SSCL, only 36% were using the checklist but 83.4% agreed to the checklist in future. Among the factors for this, 13.7% believed that the checklist takes too long to complete and 26% believed that it is difficult to find a coordinator for the checklist. Even 18.4% % agreed that it was unnecessary to use a surgical safety checklist.

<b>Impediments to use of SSCL:</b>	<b>For successful implementation of SSCL:</b>
<ul style="list-style-type: none"> <li>· Lack of administrative attitude</li> <li>· Hierarchical issues</li> <li>· Lack of proper printed SSCL</li> <li>· Additional work as perceived by few</li> <li>· Not my job to check</li> <li>· Lack of training</li> <li>· Logistics and timing</li> <li>· High patient volume and overburdened residents</li> <li>· Lack of co-ordinator or leadership role</li> <li>· Shortage of man power</li> </ul>	<ul style="list-style-type: none"> <li>· Early engagement of staff</li> <li>· Active leadership and identification of local champions</li> <li>· Extensive discussion and education</li> <li>· Periodic training</li> <li>· Multidisciplinary involvement</li> <li>· Early incorporation into surgical training for residents</li> <li>· Feedback</li> <li>· Audit</li> </ul>

Table 1  
Factors affecting implementation of SSCL

## Discussion

Approximately 42.7 million adverse events happen annually which result in 23 million DALYs lost per year. The DALYs lost from approximately two-thirds of all adverse events, occurred in low-income and middle-income countries. This study was based on analytic modelling of observational studies which provided early evidence that adverse events due to medical care represent a major source of morbidity and mortality globally. The data from India is also unpromising with 5.2 million medical errors happening in India annually. From July 2004 through September 2016, (n = 717), Wrong side 60%, wrong site (32%), wrong procedure (8%) formed the wrong surgery events reported by ambulatory surgical facilities whereas Joint Commission reports surgical procedure related events were 262 (n = 801) in 2018 and 109 (n = 168) till Q2 of 2019.

Sadly, there is no proper platform in India for surgery related adverse event reporting in India apart from media reports, therefore it is difficult to provide a true estimate of surgical adverse events in the country. Avoidable surgical complications account for a large proportion of preventable medical injuries and deaths globally. Adverse events have been estimated to affect 3–16% of all hospitalized patients, and more than half of such events are known to be preventable.<sup>1</sup> At least half of the events occur during surgical care, despite dramatic improvements in surgical safety knowledge and monitoring.<sup>2</sup> With an assumption of 3% perioperative adverse event rate and a 0.5% mortality rate globally, almost seven million surgical patients suffer significant complications each year out of which one million die during or immediately after surgery. Surgical safety has emerged as a significant global public health concern in the last decade. In our study, only 47.39% checked side and site regularly and 57.3% checked regularly for implant material and the functioning of the equipment in the OT, rest did occasionally or rarely. This can leave a space for surgical errors or adverse events. 18.9% suggested a patient's operation was delayed or suspended after induction of anaesthesia, because of lack of materials and/or other requirements which points that essential and mandatory checking of equipment and things should be a norm.

One of the key elements in prevention of errors in the hospitals and operation theatres is the use of a surgical safety checklist (SSCL). This structured communication tool, inspired by aviation, fragments complex tasks into more watertight steps, in order to reduce the chances of forgetting a key item for the quality and safety of the whole care. The WHO Surgical Safety Checklist is a simple tool that when used properly is an effective instrument to promote patient safety and ensure that the right patient receives the right intervention. The high complication rates in the surgeries worldwide prompted the World Health Organization (WHO) to launch the Save Surgery Saves Lives Initiative in 2007. The purpose of this initiative was to define standards for the safe delivery of surgical care and as a result to improve the safety of surgery around the world. In 2008, following the publication of their surgical safety guidelines the WHO Surgical Safety Checklist (SSCL) was developed.<sup>3</sup> The WHO SSCL has 19 items and is checked at three distinct checkpoints, however, the effect of adaption with respect to compliance remains unclear.<sup>4</sup> The checklist identified three phases in the natural flow of an operation, (i) before the induction of anesthesia (sign in), (ii) before incision of the skin (time out) and (iii) before the patient leaves the operating room (sign out). The idea is that a member of the team or a coordinator checks that the surgical team has completed the listed tasks before proceeding.<sup>7</sup> Time-out is the last opportunity to correct a mistake. Everyone needs to stop what they're doing, identify the mark, everyone must respond before the operation proceeds in order to close the gaps.

The main objective of this study was to assess the knowledge and attitude of the surgical fraternity and anesthesiologists of our hospital. We had a response rate of 69% to our survey and WHO SSCL awareness of

89.5%; this shows high awareness of the WHO SSCL among surgery and anesthesiology members however implementation was lacking for one or the another reason. The response rate was similar to other studies like 67% by Nugent et al<sup>23</sup>, and better than study by Cullati et al.<sup>4</sup> WHO-SSCL was being followed by only 36.9% whereas majority 63.1% were either not following or not aware about being followed. GlobalSurg Consortium found that LMICS reported use of the checklist over 50%, not available in 25% and the remaining of procedures had the checklist but did not use it during the surgery. This echoed with the recent African Surgical Outcomes Study, which reported checklist use in 57% of surgical procedures. In LMICS, the checklist is known and often available, but its use is still not universally promoted or implemented, indicating a substantial opportunity for advocacy and education in the use of this critical safety tool.

90.9% believed that use of SSCL improves the safety of procedures (an aesthetic and surgical, improvement in communication (90.5%) amongst theatre staff and will result in a reduction in errors in theatre (91.9%). This will bring positive change in team behavior (84.8%) and help develop a safety culture in surgical teams (89%). The findings are similar to a study in which 84.8% of clinicians thought the checklist improved operating room safety and communication after its implementation, and 78.6% thought the checklist helps prevent errors in the operating room. Another study found that 97% of surgical staff thought that adopting a time out checklist could prevent mistakes. A recent meta-analysis found that patients exposed to a surgical safety checklist experience better postoperative outcomes with reduced postoperative mortality (OR 0.75) and reduced complication rates (OR 0.73).

Almost all believed that surgeons (83.8%), anesthesiologists (68.7%) and nursing staff (49.7%) will support the use of SSCL in regular practice and the benefits of the SSCL will outweigh the time (74.4%) and financial costs (72%) of implementation. It must be remembered that data was obtained from 65.4% surgeons, 25.1% anesthesiologists, and 9.5% nurses. Although the SSCL has been accepted as evidence-based, internationally accepted valid instrument to promote a safer environment for the patient, there are barriers hindering the success of implementation. This may be due to a number of reasons including unwillingness to change, the need for comprehension, and a lack of awareness of the SSCL.<sup>30</sup> Almost all believed that surgeons (83.8%), anaesthesiologists (68.7%) and nursing staff (49.7%) will support the use of SSCL in regular practice and the benefits of the SSCL will outweigh the time (74.4%) and financial costs (72%) of implementation. Despite the knowledge and evidence, widespread adoption of the checklist has been erratic.

Surgical team's attitude toward the Surgical Safety Checklist is important since it might reflect their intent on using this instrument, facilitating or impeding its implementation. Determining personnel's awareness and knowledge of the checklist might help us assess the effectiveness of the implementation process. Among the factors, 13.7% believed that the checklist takes too long to complete and 26% believed that it is difficult to find a coordinator for the checklist. 18.4% % agreed that it was unnecessary to use a surgical safety checklist. With such odds, 87.2% wanted checklist to be used when their kin are being operated and 89% wanted checklist to be used when they are being operated. This is in stark contrast as majority wanted checklist to be used on them despite few not agreeing to statements and having reservations about SSCL.

The team has a shared understanding and vision about safety issues; everyone is equally valued and feels free to contribute (70.6%) however there is a blame culture (39.8%) to fix responsibility which is usually the junior most person of the team who has to check all. This leads to inadvertent errors not being reported. The modified

SSCL can take care of this by ensuring that a senior member signs the checklist or is completed in his/her supervision. In general, there is a lack of understanding of the overall intent of the checklist. Most team members don't see the checklist as a team tool to ensure patient safety and facilitate team communications, rather they see it as a compliance document that individuals and teams are accountable for. Even overwhelmingly positive attitudes by staff may not ensure compliance. It is important to address various sociocultural issues in an individual set up, e.g. workload of particular team, coordinator, support from seniors and timing of carrying out SSCL etc.

71.5% was the resident force in our survey with 59.7% had less than 5 years of experience which underlines the importance of knowledge and usage of SSCL in early surgical career to reap the benefits of reducing errors in OT. It came as surprise that two senior surgeons with more than 15 years of experience were not aware of SSCL. It stresses for periodic updates or meetings regarding safety initiatives and proper dissemination of information to all. Despite repeated campaigns by the WHO and other organisations, our study suggests there is a lack of awareness regarding the usefulness of the WHO SSCL specifically in LMICs, even in tertiary care teaching hospital and junior members of the surgical team. A major barrier identified in our study appears to be perception of its benefits despite adequate awareness. A strategy to improve education by integration of the benefits of the WHO SSCL in both under- and post-graduate training programmes and identifying and supporting local champions and leadership in LMICs, maybe necessary to further improve patient safety during surgery. The effective implementation of a checklist requires a coordinated approach of which nurses play a crucial role.

Effective implementation, consistent and correct use of the checklist has been associated with team effort which requires complete knowledge of how the checklist has to be used and its implications. A factor described for successful implementation is the encouragement and support of local measures of effectiveness. Key to implementation will be education and training which should be mandatory for all staff working in the operating department. 78.6% of our participants were in favour of training and periodic update. Quality and safety in surgical care require more than just a checklist. A checklist by itself cannot achieve much and does not mean that patient safety is being adequately addressed. For a checklist to be truly successful it requires many other ingredients including teamwork, the opening of communication channels, resources, feedback and audit.<sup>22</sup>

Thus, adherence to checklist depends on having positive attitudes and perceptions regarding its usefulness and applicability, inserted, preferably, in institutions that emphasize safety culture, because it is believed to be an essential requirement to reduce the occurrence of adverse events affecting rates security and entail reduction of patients' morbidity and mortality.<sup>25</sup> However, it was not fully understood why the introduction of the checklist resulted in such dramatic results. It was postulated that the checklist encouraged a greater degree of teamwork and better interdisciplinary communication thus accounting for a reduction in adverse events. In a study, patients were found to have increased odds of complications or death when the following behaviors were exhibited less frequently: information sharing during intraoperative phases, briefing during handoff phases, and information sharing during handoff phases. This theory has been supported by results from previous studies that have examined the effects of the surgical pause and debriefing.<sup>29,39,40</sup>

Surgical safety checklists were associated with increased detection of potential safety hazards, decreased surgical complications and improved communication among operating room staff.<sup>41</sup> Experts have contemplated that implementing checklists in health care is not as easy as had been thought. Some studies have suggested junior doctors may have an important role as agents of change<sup>28</sup> and others described substantial support for the checklist from anesthesiologists and nurses.<sup>32,34</sup> Though the awareness was close to 90% and poor usage of SSCL, it was nice to find that 98% of them wanted the checklist to be used when they or their kin were being operated. It stresses that they acknowledge its usefulness and chances of reducing errors.

Many governments and institutions worldwide now endorse the use of the WHO SSCL in the operating room. Implementation of a surgical checklist remains an important task for many health care institutions in India. Investment in improving patient safety can lead to significant monetary savings and definitely better patient outcomes. We recognize that the Government of India new patient safety framework with adoption of use of SSCL will set up enhanced awareness, compliance and reduction in surgical errors promoting a safety culture along with better communication among the surgical staff. By acknowledging that perfection was impossible, but committing to the goal of pursuit of perfection, excellence becomes attainable. Safety is the avoidance of negative outcome and quality is the achievement of positive outcome.

The present study has some limitations.

First, it was based essentially on WHO SSCL. The assessment of use and knowledge of other checklists or similar mechanism used by different departments was not assessed. The use may be underestimated. Second, our response rate was only moderate however this response rate is in accordance with similarly designed studies in health care. Thirdly, nursing personnel participation was poor. Only general and minimal access surgery OT nurses participated as rest OT nurses cited the absence of official order from their seniors and hospital administration, whereas a few also pointed it as additional work. Also surgeons and anesthesiologists formed 65.4% and 25.1% of survey participants respectively which may skew the data as per their beliefs. Fourthly, the survey was limited to a single government institute where checklist was not mandatory. The healthcare facilities which have a NABH accreditation are mostly using WHO or own version of SSCL and other have their own institutional policies about safety mechanisms and SSCL use. Fifth, the reporting of most sentinel events to The Joint Commission is voluntary and represents only a small proportion of actual events. No such mechanism is known in our country. Sixth, the potential benefits of implementing SSCL in the absence of a formal audit the impact of the checklist can be under-rated or over-rated, henceforth periodic audit with suggestions for improvement should be mandatory

## Conclusion

The SSCL is an inexpensive tool capable of shifting the hierarchical culture in the operating room and fostering patient safety attitudes. WHO SSCL has shown the potential to be effective at reducing complication and mortality rates. The overall opinion from our survey was that the use of SSCL can lead to positive changes in patient safety and safety culture in the operating department however there was lack of commitment from administration and some staff members. Therefore, any measure that can potentially improve patient safety should be embraced and benefits of SSCL be told to motivate them and enhance participation for patient

safety. Committed leadership, knowledge sharing and periodic trainings, interdisciplinary communication, feedback and regular audits can define and determine effective implementation process.

## **Abbreviations**

SSCL Surgical Safety Checklist

WHO World Health Organization

OT operation theatre

ENT ear, nose, throat

LMICs low- and middle-income countries

DALY Disability Adjusted Life Years

NABH National Accreditation Board for Hospitals & Healthcare Providers

## **Declarations**

### **Ethics approval and consent to participate**

The study was exempted by the Institutional Ethics Committee. Participation was voluntary and completion of the questionnaire was taken as consent to participate.

### **Consent for publication**

All participants were informed about the publication of this study.

### **Data sharing statement**

Extra data is available on reasonable request by email to corresponding author.

### **Patient and Public Involvement**

No patient was involved; survey participants were surgeons, anaesthetists and nurses of the OR.

### **Funding**

None.

### **Conflict of interest**

The authors declare that they have no conflicting interests.

## Authors' contributions

LB conceptualized the manuscript. LB and AM reviewed the literature, analyzed data, and made major contribution to the writing of the manuscript. LB, AM, DK, PL, LG, VM performed final review and editing of the of the manuscript. All authors have read and approved the final version of the manuscript.

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## Figures

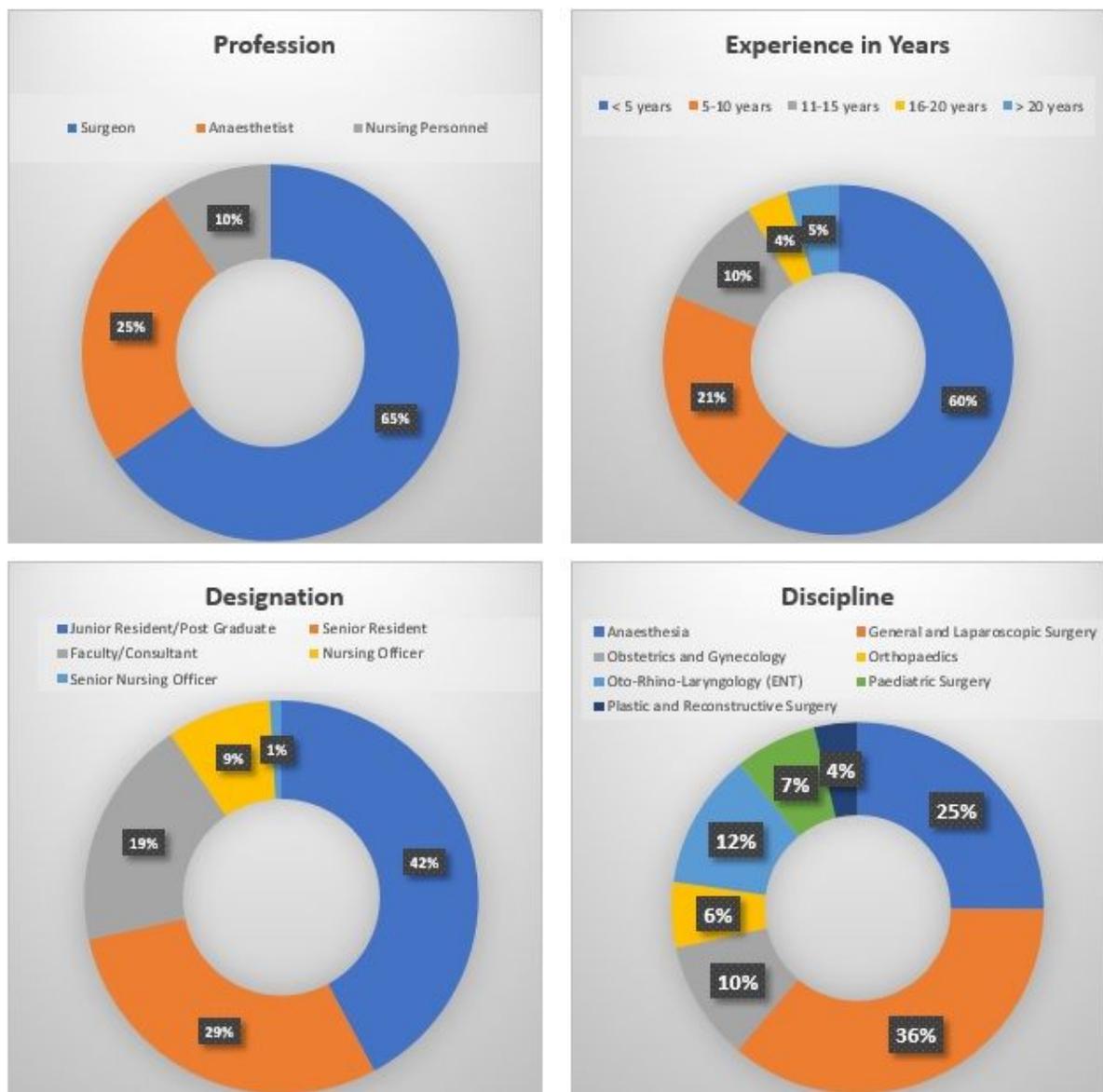


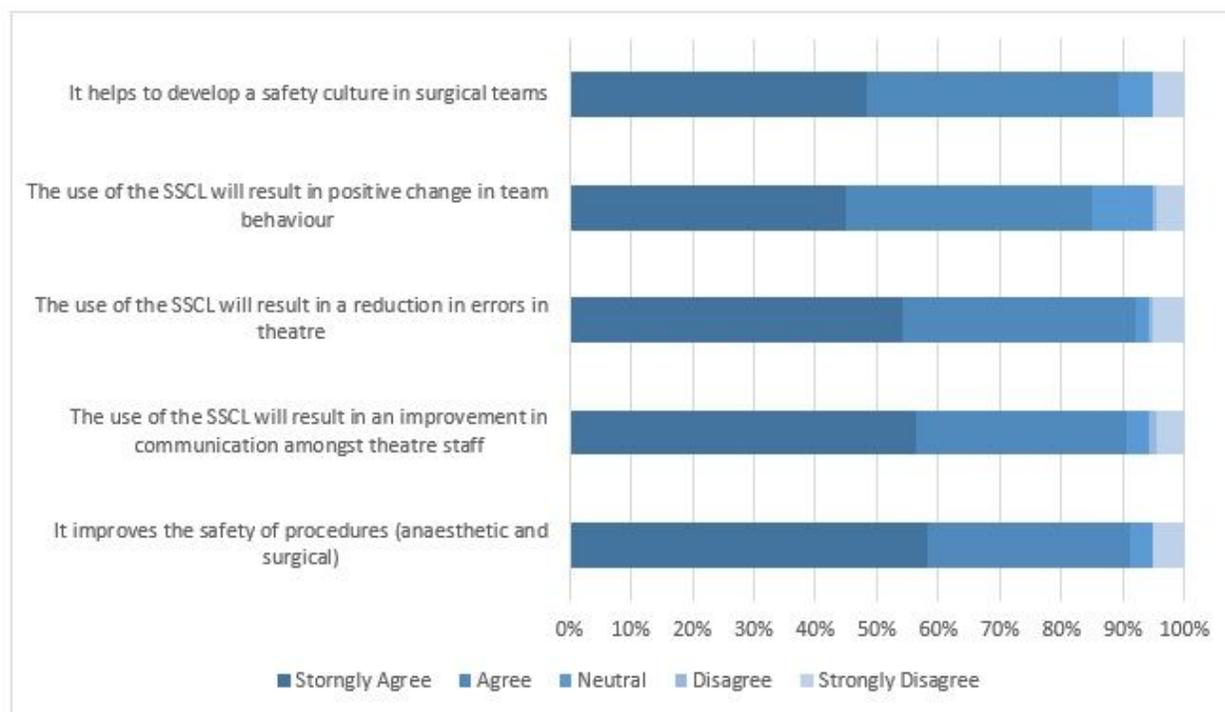
Figure 1

Demographics of survey participants



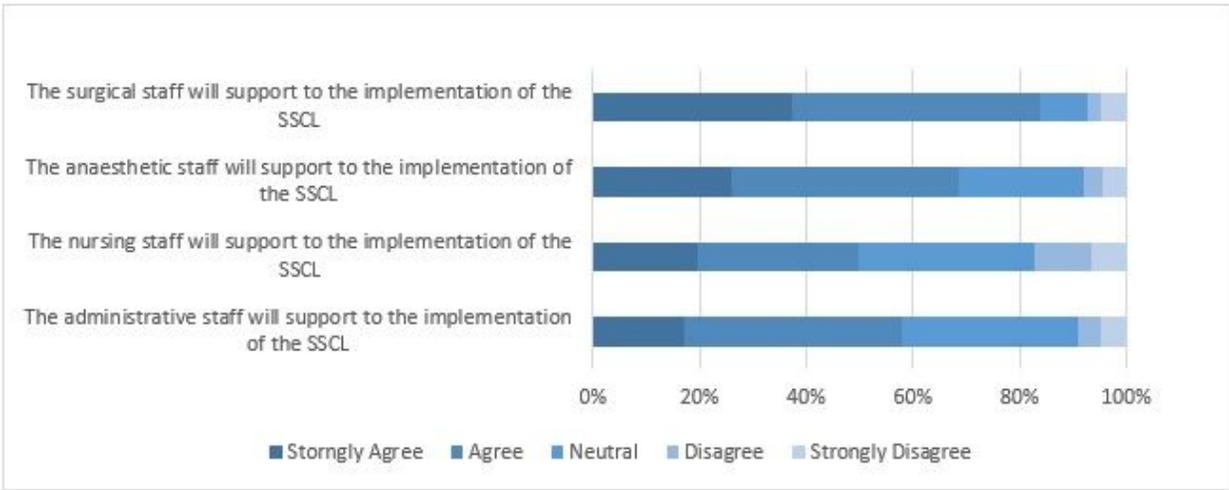
**Figure 2**

Awareness about SSCL as per designation and department



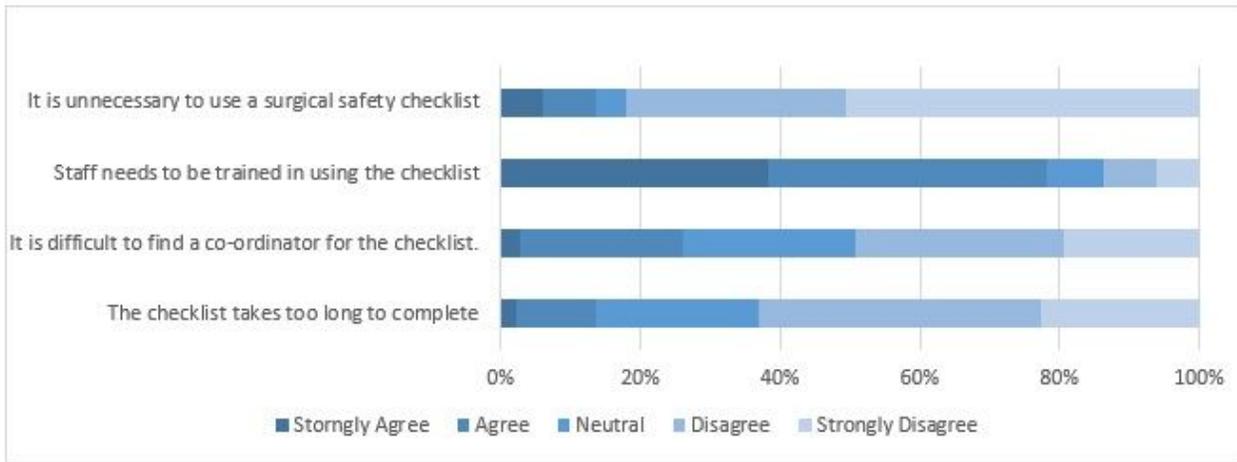
**Figure 3**

Beliefs toward safety concerns and behaviour



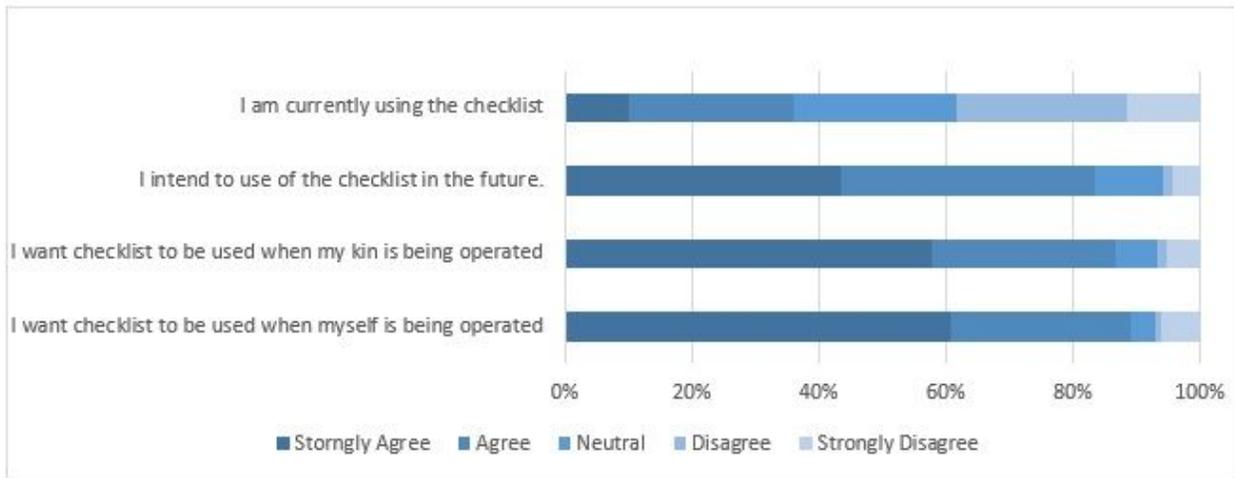
**Figure 4**

Beliefs toward implementation of SSCL



**Figure 5**

Current impediments to use of SSCL



**Figure 6**

SSCL use for patients, kin and self

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