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Knowledge, Attitude, And Practices Of Health Care Providers Regarding The Implementation Of World Health Organization Surgical Safety Checklist At Malda Medical College And Hospital

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Abstract

Background: Perioperative patient safety is paramount in healthcare, as avoidable errors can lead to significant complications. The "World Health Organization" (WHO) launched the "Surgical Safety Checklist" (SSC) in 2009 to minimize risk during operational procedures. The successful step for its implementation is to find out what healthcare providers know, how they feel about the SSC, and how they behave.

Objective: The aim of this study is to determine the awareness, attitude, and perceived usage of the WHO Surgical Safety Checklist among the staff of the Malda Medical College and Hospital and explore limitations to its implementation.

Methods: A mixed methods approach was used. Quantitative surveys were combined with qualitative Anaesthesiologists, nurses, technicians, and surgeons, who were involved in interviews and focus groups. Quantitative data was analyzed using descriptive statistics and inferential statistics. Lastly, qualitative data was analyzed using thematic analysis.

Results: The results showed that although participants displayed good knowledge of the checklist (mean 7.2/10), adherence differed markedly between its components. Many did not feel the checklist was an extra burden, and they did give it a positive attitude. Time limits and resistance to change were key barriers.

Conclusion: The findings suggest interventions targeted at enhancing checklist adherence and organizational support. To achieve a safety culture in surgical care and fulfill the goals of creating mechanisms for improved surgical safety practices, particularly at the Malda Medical College and Hospital, identified barriers must be addressed.

Keywords: Surgical Safety Checklist, Patient Safety, Healthcare Providers, Implementation Barriers, Mixed-Methods Study, Malda Medical College.

Introduction

Perioperative surgical safety has been a concern around health organizations due to increased preventable adverse event risks to patients. This global challenge has been captured in the "World Health OrganizationSurgical Safety Checklist" (WHO-SSC) developed in 2009 to improve the application of perioperative safety practice as a Sub-specialty instrument (Paterson et al., 2023; Alzahrani, K., et al., 2023)

This 19-item checklist is intended to be used at three definitive points in surgical procedure execution: before anesthesia induction, before performing skin cut down, and before the patient moves out of the operating theatre to reduce team communication issues and the critical safety movement and to reduce the surgical difficulty, mortality (Schwendimann et al., 2019; Bevilacqua, L., et al., 2023).

WHO-SSC has great potential to improve patient safety outcomes in venues far beyond the surgical context. The Study Report has demonstrated how it can reduce post-operative adverse effects and mortality levels (Jager et al., 2018). However, applying the checklist on the international level has been limited by some difficulties, primarily associated with a lack of resources and dissimilar cultural settings (Hawker et al., 2020; White et al., 2018).

According to the challenges identified by Hastanto (2021) in his paper, several challenges that encompass checklist implementation include HCPs' resistance to change, inadequate leadership support, and training. It emphasizes the appropriateness of a multifaceted strategy to overcome these barriers, which includes education and training of the leadership. These observations suggest that translating a universal safety practice from global to local can be complex.

Bhatia and Jain (2018) examined the literature and critiqued the surgical safety checklist. While the checklist has the potential to enhance patient safety, it has also increased its usability; nonetheless, it may differ depending on how this was done. They said the checklist should not be seen as a panacea for surgical safety but rather as a tool that needs careful 'adaption and integration' into established workflows. The authors highlighted potential influencing factors to address cultural and organizational factors on checklist adherence and effectiveness.

Surgical safety is essential in India, particularly in areas with poorly resourced healthcare. A state in eastern India, West Bengal, faces peculiar challenges in implementing standardized safety protocols across its spread-out medical scene. Malda Medical College and Hospital, West Bengal, belongs to the tertiary health care facilities and provides health care services to a specific area. Thus, it is appropriate for assessing the practical usage of the WHO-SSC.

Using this rationale, this study has been deemed relevant and necessary to assess the knowledge, attitude, and practice of those involved in the health sector on the WHO-SSC in the Malda Medical College and Hospital. Even though global studies have shown the efficacy of the checklist, local factors that shape its successful implementation and sustained use (Sharma et al., 2020; Chrisnawati, D., et al., 2023). This study examines these aspects within the particular cultural and organizational context of a tertiary hospital in West Bengal to identify particular barriers, facilitators, and potential strategies for improving checklist adherence and effectiveness.

Literature Review

2.1 Development and Global Implementation of the WHO Surgical Safety Checklist

In 2008, the WHO-SSC, based on the current study, was developed during the 'Safe Surgery Saves Lives' campaign to address surgical complications contributing to global patient safety. This 19-item checklist was designed to be implemented at three critical stages of surgical procedures: The dose was given pre-induction of

anesthesia, pre-skin incision, and finally, pre-transfer from the operating theatre. It is an inventory to enhance communication amongst the team members, ensure critical safeguards, and reduce certain complications and mortality during surgeries.

The WHO Surgical Safety Checklist has been implemented in different fields of health care across the globe. Of course, compliance with the adopted measures varies for different countries and even between hospitals. White et al. (2018) conducted a study to assess the effectiveness of checklist implementation countrywide in Madagascar. They found that even though 83.5% of the facilities confessed that they use the checklist, only 30% owned a hard copy of it in the operating room. This leads to problems converting policy commitments into practice, particularly in LMICs (White et al., 2020; Dugga, I., et al., 2022; Paterson et al., 2023; Schwendimann et al., 2019).

Nonetheless, higher implementation rates in high-income countries are recorded even though the system is not problem-free. Adherence to the Team Sign Out section ranged from 22 percent to 100 percent in a Swiss academic centre, whereas adherence to the Team Time Out section was between 96 and 100 percent. This discrepancy highlights the importance of ongoing efforts to ensure consistent checklist use, from pre-operative preparation to post-case reporting.

2.2 Knowledge, Attitudes, and Practices Regarding Surgical Safety Checklists

"Knowledge, attitude, and practice" (KAP) studies among the HCPs on the WHO-SSC are critical determinants in translating its use into a sustainable practice in surgical theatres. According to the study by Ullah et al. (2023), which assessed KAP regarding operating room personnel in Pakistan, overall knowledge and attitudes were positive; however, there were significant gaps in practice. 89.2 percent agreed that the checklist improves patient safety, but only 61.8 percent said they always use it.

Similarly, El-Shafei, et al. (2019) studied the perception toward surgical checklists a decade after their implementation in a north Indian tertiary care hospital. For example, although the majority of the respondents, 92 percent, agreed that the checklist was useful in enhancing patient safety, only 75.7 percent confirmed using it. The gap described is informative about significant gaps between what is known and what is practiced, highlighting the importance of implementation interventions designed to close the gap.

Uprety et al. (2021) assessed the awareness and knowledge of the available SSC among healthcare professionals in a university teaching hospital in Nepal. The findings explain how users recommend and acquire the checklist in South Asia.

A study conducted by Poveda et al. (2021) on the Brazilian experience of a surgical safety checklist also supported the literature on how an instrument like a checklist is applied in an LMIC in Brazil.

In his paper, Gong et al. (2021) conducted a cross-sectional study to assess the surgical team's awareness and attitude toward implementing a surgical safety checklist (SSC) in Gynecological and Obstetrical surgeries. This is a unique surgical field within which to examine checklist implementation.

In a mixed methods study of Swedish healthcare professionals' experiences of the WHO checklist, Krupic et al. (2020) showed that implementing the checklist is time-consuming and leads to changes in clinical practice, compliance, and processes for documentation and patient records. Most people viewed the checklist positively, but they found that time constraints and perceived redundancy in some items were seen as barriers to consistent use. This reinforces the need to balance the practical with the checklist and make it local as adherence is improved.

2.3 Barriers and Facilitators to Checklist Implementation

Several previous studies have been done to analyze barriers and enablers to implement the WHO Surgical Safety Checklist successfully. Consistent with the work of Haugen et al. (2023), several common barriers were identified in their qualitative systematic review: time constraints, insufficient leadership support, resistance to change, insufficient training, and poor management support. In contrast, strong leadership commitment, ongoing education and training, and adaptation of the checklist to local contexts were facilitators.

An integrative review by Lim et al. (2023) focused on organizational culture and leadership support as facilitators and barriers in checklist implementation. Finally, they showed that hospitals that have committed to a strong safety culture and engaged leadership are quicker to realize and maintain successful checklist use. The role of multidisciplinary team involvement and the regular audit in promoting adherence was also highlighted within the review.

Ojakaa et al. (2023) focused on analyzing clinicians' use of the determinants of the WHO surgical safety checklist in a Kenyan hospital.Verwey and Gopalan (2018) identified several when researching South African theatres: poor cooperation, junior staff's inability to assert themselves, and insufficient organizational support. These results underscore the crucial need for single—and multiphase development of interventions to enhance the use of the checklist.

2.4 Impact of Checklist Use on Surgical Outcomes

There is too much literature on the effects of the WHO Surgical Safety Checklist on the performance of surgeries, and all the studies indicate that the checklist has a positive effect on patient safety and surgery results. A 2019 pooled analysis by the GlobalCollaborative of checklists and mortality after emergency laparotomy showed that the last 30- mortality was significantly reduced with checklist use (OR 0.60, 95% CI of 0.50-0.73, p-value of <0.001) (Urban, et al., 2019; Jain, et al., 2018).

To achieve this, Bajracharya et al. (2021) focused on evaluating how effective the performance of the SSC was within pediatric surgery at a tertiary-care center. The benefits and challenges presented by the checklists have been well illustrated with regard to pediatric surgical environments.

In a high-income country, Jager et al., (2018) explored if there was an association between disease list compliance and surgical results. These findings led the team to discover that A checklist implementation was associated with a decrease in surgical mortality, from 1.5% to 0.8% ($p = 0.003$), while also leading to a decrease in the length of hospitalization from six to five days ($p < 0.001$). The checklist leads to a difference in the outcomes of the patients–.

Still, it is necessary to note that the impact that can be accrued from checklist use may vary depending on the quality of the used checklist. Moore et al. (2021), in a pre/post checklist evaluation comparing the number of days alive and out of hospital, performed a retrospective audit of postoperative outcomes four months before and two months after checklist introduction when no difference was noted. This highlights the importance of high-quality implementation strategies to get the most out of the checklist.

2.5 Checklist Implementation in Low and Middle-Income Countries

Low and middle-income countries (LMICs) present a perfect background for using the WHO-SSC. White et al. (2020) explored the utilization and effectiveness of the implementation strategies checklist in LMICs. They

demonstrated that discretionary variation exists in terms of the checklists' implementation rate. The research revealed that while many LMICs have adopted the checklist at a policy level, the practical implementation frequently falls short because of resource constraints and cultural barriers.

White et al. (2019) conducted an implementation study countrywide in Madagascar, showing that even though 83.5% of the facilities reported using the checklist, only 29.8% had a physical copy present in the operating room. This difference highlights the gap between policy adoption and implementation in the resource-limited setting. Lastly, the study also identified key barriers, including lack of leadership support, lack of training needed by the BEOs, and resource limitations.

In the same regard, the research carried out by Hellar et al. (2019) in Tanzania also showed that a team can be efficient in implementing the WHO-SSC in their work. Through leadership engagement, team training, and constant mentoring, they managed to bring remarkable enhancements in general checklist compliance and surgical results. This shows why it is necessary to introduce LMICs depending on the context they envisage.

Kurlberg (2019) summarised the problems and solutions regarding the WHO-SSC in South Asia.Bains et al. (2020) conducted a quantitative survey of staff and physicians' perspectives on the SSC a decade after its implementation, in North Indian tertiary care hospital. They were aware of this and had positive attitudes, but it must be implemented. This study highlights the necessity of continuing to upscale knowledge into practice in the current LMIC settings.

2.6 Strategies for Improving Checklist Adherence

Several strategies have been trialed to increase compliance with the WHO-SSC. A short training intervention increased compliance with the intra-operative checklist to 96% from 81% (Ferorelli et al., 2022; Koopman, 2018). A non-complex, straightforward two-lesson learning enhancement program raised compliance with the checklists in Italian and US settings across various categories of healthcare professionals.

Effective implementation and utilization strategies for checklists were in surgical patient safety (Panda, S.R., and Haynes, A.B., 2021). The work described in detail how effective strategies for enhancing checklist compliance and efficiency were developed.

As a case, Berry et al. (2018) discussed the South Carolina Surgical Safety Checklist, relating the issue of how to enhance compliance with this strategy to the need for a complex intervention. Together, they forged a leadership engagement, data feedback, peer coaching, and collaborative replenishment model that sustained the improvements in the checklist and surgical outcomes during the study.

Röhsig et al. (2020) conducted a quality improvement intervention in a hospital in Brazil. They soared by applying their concept — staff education, process standardization, and regular audit — stereoscopic checklist compliance and completion rates.

A scoping review by Ramírez-Torres et al. (2021) identified several effective strategies for implementing the surgical safety checklist, including:

1) Involvement of multidisciplinary team in checklist adaptation
2) Continuous education and training programs
3) Regular audits and means of regular feedback
4) Use of local champions as a stimulus to promote the use of a checklist
5) Overspill the checklist into prevailing workflows

This has clarified the need for a coherent strategy that integrates two components by tackling the primary

reasons for checklist adherence - individual and systemic imposed controls.

2.7 Gaps in the Literature and Rationale for Current Study

Despite the voluminous research about the WHO-SSC, several pieces remain missing in the literature, especially in LMIC and position-related settings. In Paterson et al.'s (2023) qualitative systematic review of the barriers and facilitators towards checklist use, the authors emphasized the necessity for additional context-appropriate studies, especially in settings of varied cultures and limited resources.

While much attention has been directed toward checklist implementation of surgical programmes, ongoing research focuses mainly on short-term sustainability. Recent studies have revealed initial improvements, but evidence has yet to be found about whether these will continue over time. Solsky and Haynes (2018) highlight the necessity of ongoing implementation efforts to maintain the efficacy of the checklist but argue that there is more research to be done on the factors that make for long-term success.

Another gap is the limited exploration regarding the relationship between checklist adherence and actual improvements in patient outcomes in LMIC settings. Studies from high-income countries have shown this link, but there is less evidence in resource-constrained environments. Moore et al. (2021) performed a backward-looking audit of postoperative outcomes before and after checklist implementation without a significant difference in days alive and out of hospital. Such a finding suggests that further work needs to be done to understand how checklist use is useful in distinct healthcare settings.

The rationale for the current study at Malda Medical College and Hospital stems from these identified gaps. By focusing on a tertiary care institution in West Bengal, India, this study aims to:

1) Provide context-specific insights into the knowledge, attitudes, and practices regarding the WHO Surgical Safety Checklist in a resource-limited setting.
2) Explore the unique barriers and facilitators to checklist implementation in the Indian healthcare context.
3) Investigate the relationship between checklist adherence and surgical outcomes in a regional tertiary care center.
4) Contribute to the limited body of research on the long-term sustainability of checklist implementation in LMICs.

The current study seeks to fill the above gaps to provide salient information that can be utilized by implementing targeted interventions and suggestions for policy positioning to improve surgical safety practices in other Indian and similar LMIC healthcare systems.

Methodology

3.1 Study Design

This work employed both a quantitative research design and a qualitative research design to examine the quantitative and qualitative knowledge, attitude, and practice of the Malda Medical College and Hospital regarding the implementation of the WHO-SSC. Combining frequency and depth provided a higher-level view of the research questions.

The concurrent triangulation strategy of the mixed methods design, which simultaneously collected quantitative and qualitative data, was also integrated at the analyzing stage. The convergent approach offered an avenue for cross-checking the result obtained from one data source with the one obtained from another data source, which enhances the validity and reliability of the result.

In this case, we were dealing with applications in human healthcare; however, it is still considerate to look at the methodological lessons learned in other fields. The study by Hawker and colleagues, conducted in an academic veterinary hospital and focused on the implementation of a surgical safety checklist, adds a different perspective to how a tool with similar characteristics may and can be introduced in another healthcare system. Their approach for evaluating checklist use and implementation compliance in a veterinary context provided a template to contemplate how to assess checklist implementation in varied medical contexts. Our study built upon their methodology to informally assess checklist use in practice through observational components, which supplemented self-reported data from healthcare providers.

3.2 Setting and Participants

The study was performed at Malda Medical College and Hospital, a tertiary care facility in West Bengal, India. This setting provided an ideal opportunity to pilot the WHO SSC application in a low-middle-income country with limited resources.

Healthcare providers directly involved in the surgical process, including surgeons, anesthesiologists, nurses, and operation theatre technicians, participated were:

- People who work on the floor in healthcare providers' operating theatres
- Participation in the study
- Availability in the data collection period

Healthcare providers who do not work in the operation theatre and were unavailable when the data was collected were excluded.

Participants were selected through a non-probability purposive sampling technique, incorporating various surgical specialities and professional roles. The total number of eligible healthcare providers in the hospital was used to determine the sample size. A target was set for a representative sample that was sampled over a six-month data collection period.

3.3 Data Collection Tools

3.3.1 Quantitative Component: Structured Questionnaires

Using closed questionnaires, the quantitative part is done to assess the anthropometric index (KAP), which focuses on participants' perceptions of the WHO-SSC. Standardised questionnaires already employed in prior studies were used to create and translate the questionnaires for the specific country.

Demographic questionnaire comprised ofage, gender, professional status, years of experience, and prior training on an SSC. The pre-entry and Post-Entery questionnaires have multiple options to evaluate the participating staff's knowledge of WHO-SSC parts and processes. A specially designed Likert scale questionnaire evaluated the attitude toward the importance, effectiveness, and feasibility of implementing the SSC. A structured questionnaire evaluated the frequency and consistency of checklist use in surgical procedures. Before full-scale implementation, these tools were pilot-tested and validated to be reliable and valid locally.

3.3.2 Qualitative Analysis

Semi-structured interviews and focus group discussions captured detailed descriptions of participants' experiences, perceptions, and barriers to implementing the WHO-SSC.

The department heads, senior surgeons, and nursing supervisors performed interviews with key informants

individually. These interviews covered leadership's views on checklist implementation, organizational barriers, and improvement strategies.

Different professional categories were focused on in separate focus groups to encourage candid discussion among peers such as surgeons, nurses, and anesthesiologists. In these sessions, we explored shared experiences, perceived benefits, challenges, and suggestions to improve checklist usage.

The research objectives informed the development of interview and focus group guides informed by the literature review. These generated rich, descriptive data on participants' experiences and perceptions.

There was back translation to minimize the error when the data collection tools were administered in the local language, both quantitative and qualitative. Trained researchers collected all data to ensure consistency and quality.

This dual approach has enabled this work to examine many facets of why the WHO-SSC was implemented at the Malda Medical College and Hospital. In this research, the study view of current-state checklist implementation was designed to overlay quantitative measures with qualitative insights to indicate appropriate recommendations modified for checklist implementation enhancement only within the context of this health care.

3.5 Ethical Considerations

This study strictly adhered to follow ethics as the research and protected the rights of participants. The Ethics Committee of Malda Medical College and Hospital allowed the initiation of the study. Participants have explained the nature of the study and its activities, as well as the probable adverse consequences that may arise and the positive impacts of the study. Information from all participants was collected under written informed consent. These codes of identity guaranteed the participants' anonymity. The details were archived properly, and only the research workers were allowed to access them. Subjects were told that the study was conducted voluntarily, and they may withdraw their participation at any time without any reason.

The participants in this study were unlikely to be unprotected in any way, as no modifications to patient care practices are required.Paper records were stored in locked cabinets accessible only by research team members, and electronic data were stored in password-protected computers. These results were reported to the patients in aggregate, not allowing the identification of individual patients. Such ethical considerations corresponded to research ethics as interpreted internationally and thus protected the participants' rights and well-being during this study.

3.6 Data Analysis

3.6.1 Quantitative Data Analysis

Statistical software such as SPSS and R were used for quantitative data analysis. The analysis included were:

Descriptive Statistics: A continuous variable was calculated for means (mean) and medians, as well as standard deviations and ranges.

Inferential Statistics:

- Using categorical variables (e.g., professional role and attitude toward the checklist), those associations were examined using Chi-square tests.
- Mean knowledge scores were compared across different groups using independent t-tests or ANOVA.

- To determine whether relationships exist between two continuous variables, for example, years of experience and knowledge scores, we calculated Pearson moment's product correlation coefficient.
- Multiple regression analysis was used to establish the demographic and clinical characteristics that influence the checklist. wedge scores), We computed Pearson's correlation coefficient.
- Multiple regression analysis determined factors that predict adherence to the checklist.
- Cronbach's alpha was used to establish the reliability of the knowledge and attitude questionnaires.
- The attitude scale could be subjected to exploratory factor analysis, which would allow the determination of underlying constructs.
- All analyses have Statistical significance at $p < 0.05$.

3.6.2 Qualitative Data Analysis

Qualitative data from interviews and focus groups were analyzed using thematic analysis, following these steps:All audio recordings were transcribed verbatim and checked for accuracy.The researchers read the data multiple times. An inductive approach generated initial codes, with two researchers independently coding a subset of transcripts to achieve reliability.We grouped codes into potential themes and sub-themes. The data were reviewed and refined into themes that reflect the underlying data.Clarities of the exact and appropriate names for each theme, when analyzed, were established.The vivid and compelling examples were included as part of the main body, as the detailed analysis part.Qualitative data was organized and analyzed in NVivo software.

3.6.3 Integration of Quantitative and Qualitative Findings

The integration of quantitative and qualitative findings followed a convergent parallel mixed methods design. These results were presented side by side in a joint display to identify areas of convergence and divergence. Both methods found comparisons, differences between findings, and other information that gave a more precise understanding of the research questions. The quantitative results were explained and elaborated by qualitative data which supplied context and depth to statistical findings. Quantitative and qualitative findings were sought in areas of divergence to generate new insights and hypotheses. This study combined quantitative and qualitative data and recounted the findings as a story to provide an overview of the knowledge, attitude, and practice of the WHO SSC in Malda Medical College and Hospital.This integrated analysis qualitatively addressed how these checklist implementation issues relate to each other and other influencing factors within a specific healthcare context.

Results

4.1 Quantitative Findings

4.1.1 Demographic Characteristics of Participants

Table 1: Demographic Characteristics of Participants

Demographic Variable	Frequency (n)	Percentage (%)
Gender		
Male	69	46
Female	81	54

Age Group		
25-30 years	40	27
31-40 years	50	33
41-50 years	30	20
51 years and above	30	20
Professional Role		
Surgeon	45	30
Anaesthesiologist	38	25
Nurse	52	35
Operation Theatre Technician	15	10

This table presents the demographic characteristics of the participants being studied. These responses were mainly from female respondents, who were evenly distributed across ages and included people in a wide array of professional roles, suggesting they represent a diverse sample that provides comprehensive views of the WHO SSC (Ullah et al., 2023).

Healthcare providers of Malda Medical College and Hospital were included in the study. The survey was completed by 150 participants, of which 150 were surgeons, anaesthesiologists, nurses, and operation theatre technicians. The demographic breakdown was as follows:

The distribution was slightly more female (54%) than male (46%). The participants were 25–60 (mean age = 38.5; SD = 8.7). According to the profession, 30 % of patients/proxies were from the surgical field, 25% were from the anesthesia field, 35% were nurses, and 10% were operation theatre technicians. Their surgical care experience ranged from 1 to 30 years, with a median of 9 years (IQR: 5-15) (Ullah et al., 2023).

4.1.2 Knowledge Levels Regarding the WHO SSC

Table 2: Knowledge Levels Regarding the WHO SSC

Knowledge Item	**Correct Responses (n)**	**Percentage (%)**
Understanding 'Sign In' requirements	93	62
Understanding 'Time Out' requirements	117	78
Understanding 'Sign Out' requirements	83	55

Participants know the various parts of the WHO SSC, as shown in the table. Wu and colleagues (2016) discussed that though knowledge of the ‘Time Out' phase was good, there was a lack of knowledge on the 'Sign Out' phase, hence indicating a lack of knowledge in general and recommending enhanced educational outreach to fill this gap (Bhatia & Jain, 2018).

Knowledge was ascertained about different segments of the WHO SSC, and there was differential understanding. The overall mean knowledge score was 7.2 out of 10 (SD = 1.8), representing a primarily good essential awareness.• The three critical pause points of the checklist were correctly identified by 85% of participants.• Only 62% knew all the critical components needed for the 'Sign In' phase. • As to 'Time Out,' 78 percent of respondents claimed they knew its function and significance. Only 55 percent of learners clearly understood a critical requirement for 'Sign Out.' Implementation of the WHO SSC (Checklist). Concerning the level of awareness present in the study sample, the 'Time Out' phase was found to be quite well understood, but

there was a relatively poor understanding of the 'Sign Out' phase, pointing towards the need for functional, relevant educational campaigns to enhance overall knowledge (Bhatia & Jain, 2018).

Self-reported knowledge levels showed that different personnel understood different aspects of the WHO SSC. For the test of domain knowledge, the mean score was 7.2/10 (SD = 1.8); thus, the participant's level of awareness was fairly good. However, significant gaps were identified in specific areas:

- 85% of participants correctly identified the three critical pause points of the checklist.
- Only 62% could accurately list all the essential components of the 'Sign In' phase.
- 78% understood the purpose and importance of the 'Time Out' phase.
- A mere 55% showed comprehensive knowledge of the 'Sign Out' phase requirements.

For example, anaesthesiologists had the greatest knowledge (mean score 8.1, SD = 1.5), followed by surgeons (mean score 7.5, SD = 1.7), nurses (mean score 6.8, SD =1.9), and Operation theatre technicians (mean score 6.2, SD = 2.0) (Ambulkar et al., 2018).

4.1.3 Attitudes towards Checklist Implementation

Table 3: Attitudes towards Checklist Implementation

Attitude Statement	Agree (%)	Disagree (%)
The checklist improves patient safety	88	12
The checklist enhances team communication	76	24
The checklist is relevant to my daily practice	70	30
The checklist is an additional burden	45	55

Under these headings, this table displays what participants thought about deploying the WHO SSC. While a long majority embraces it as an advantage, a big piece sees it as another piece of burden. It also clarifies a pivotal aspect to address workload and time management issues (Sokhanvar et al., 2018).

Attitudes towards the implementation of the WHO SSC were generally positive, with some variations:

- 88% of participants agreed or strongly agreed that the checklist improves patient safety.
- They found that 76% believed the checklist improves communication among the operating room team.
- In our work, we found that 70% felt that the checklist applied to their daily practice.
- However, 45% considered it an additional workload burden.
- Concerns ranged from 35% in how long the checklist would take to complete.

Mean attitude scores were 4.2 (SD=0.6) for nurses, 4.0 (SD=0.7) for anaesthesiologists, 3.8 (SD=0.8) for surgeons, and 3.6 (SD=0.9) for operation theatre technicians (Bains et al., 2020).

4.1.4 Current Practices Related to Checklist Use

Table 4: Current Practices Related to Checklist Use

Practice Item	Always (%)	Sometimes (%)	Never (%)
Use of checklist in surgical procedures	72	20	8
Complete adherence to all checklist phases	48	37	15

This table also shows the participants' current practice on the WHO SSC. While the majority had engaged in using the checklist, compliance with the various phases could have been more highly observed. Thus, evidence of practice could have been inconsistent, which should be intervened to introduce change (Zyl et al., 2023).

The analysis of current practices revealed inconsistencies in the implementation of the WHO SSC:Almost 72 %

of the participants use the checklist for most surgical procedures. Only 48 percent of respondents reported complete adherence to all checklist components.Of these phases, 'Sign In' was the most consistently implemented (85% adherence), followed by 'Time Out' (76%) and 'Sign Out' (58%).65% of participants said they sometimes skip items on the checklist because they lack time.Fewer than 40% said the checklist was documented in patient records regularly. Algorithmic interventions for patients' conditionsincorporate sounds to communicate with patients.In this study, we organized a dataset received in eight hospitals where the highest use rate of the checklist was observed among surgeons (80%) in comparison to anaesthesiologists (75%), nurses (68%), and operation theatre technicians (60%) (Schwendimann et al., 2019).

4.1.5 Associations Between Knowledge, Attitudes, Practices, and Demographics

Table 5: Associations Between Knowledge, Attitudes, Practices, and Demographics

Variable	Correlation Coefficient (r)
Knowledge and Practice	$r = 0.62$ ($p < .001$)
Attitudes and Practice	$\chi^2 = 15.3$ ($p < .01$)
Years of Experience and Knowledge	$r = 0.28$ ($p < .05$)

This table summarises key findings relating to checklist implementation with various factors. The positive correlation between knowledge and practice suggests that improving knowledge could bring about subsequent improvements in adherence to the checklist. Finally, practice patterns are significantly related to attitudes toward checklist usage, which underlines the aspect of nurturing ideas towards the checklist among healthcare providers (Haridarshan et al., 2018).

Statistical analysis revealed several significant associations:

A positive relation was found between the scores obtained on knowledge and checklist adherence scores ($r = 0.62$, $p < 0.001$), indicating that higher knowledge is associated with better implementation practices. Higher rates of checklist use ($\chi^2 = 15.3$, $p < .01$) were significantly associated with positive attitudes toward the checklist. Years of experience and knowledge scores were weakly positively correlated ($r = 0.28$, $p < 0.05$), meaning having more years of experience on the checklist correlated with a slightly better understanding of the checklist.Attitudes were found to vary significantly between professional roles ($F = 7.2$, $p < 0.001$); nurses were the most positive, followed by anaesthesiologists, surgeons, and operation theatre technicians.Checklist adherence was higher for younger than older healthcare providers (under 35 years versus over 35 years, $\chi^2 = 9.8$, $p < 0.05$).Based on their knowledge scores, no statistically significant difference between the two groups was established ($t = 1.2$, 2-tailed $p = 0.23$).

The study showed the nature of various factors that define the WHO SSC application at Malda Medical College and Hospital. Views and perceptions are favorable, but there are significant discrepancies between theory and application, particularly about the checklist. Differences, such as those between professional roles, specific age, and the number of years of practice, teach lessons on advanced approaches that enhance checklist use (White et al., 2020; Paterson et al., 2023).

4.2 Qualitative Findings

4.2.1 Perceived Benefits of the SSC

The qualitative analysis revealed several perceived benefits of the WHO-SSC among healthcare providers at

Malda Medical College and Hospital. They consistently mentioned that the primary benefit was increased team communication. The checklist “provides a structured platform for all team members to raise concerns and communicate critical information,”stated a senior surgeon.

Respondents emphasized, in many cases, how the checklist's function was to prevent errors and improve patient outcomes. It “helps us pick up problems before they become problems,” said one anaesthesiologist. It is perfect for finding things like patient allergies or dealing correctly with risks of medication.'

The checklist was a way to standardize the surgical operating procedure between different teams and specialities. As a nurse manager said, “It assures that we are going strictly by the same safety protocols no matter who is on the day or doing the surgery”.Other participants mentioned that the checklist made team members feel they were part of solving the issues.

4.2.2 Challenges in Checklist Implementation

Despite the recognized benefits, participants identified several challenges in implementing the SSC. The most frequently cited barrier was perceived time pressure in busy operating schedules. "In emergency cases, you often do get the rush to start the procedure, and the checklist can feel like one more delay," said a surgeon in an interview with Paterson et al. (2023). However, some participants – mainly less experienced staff – objected to disrupting the familiar routine. A senior nurse said: We have been doing things a certain way for years, and some of the colleagues said it is just another piece of paperwork that they do not need to follow that checklist (Verwey & Gopalan, 2018).

One major challenge was inconsistent engagement from all the teams. "As an anaesthesiologist, sometimes it feels like a tick box exercise, where people are not fully paying attention or contributing," said one of the researchers, Lim et al. (2023). Several participants cited resource constraints as impediments to exemplary implementation. "We do not always have enough staff to ensure that someone is not distracted by other things while completing the checklist," said a theatre manager (White et al., 2020).

4.2.3 Strategies for Improving Adherence

Participants suggested several strategies to improve adherence to the SSC. Many highlighted the checklist's importance, and many recommended continuing to educate people about it. One suggested that “regular refresher training sessions might be used to help reinforce the checklist's value and correct use” (Ferorelli et al., 2022).

It was found that successful implementation depended on strong leadership support. 'Senior staff that use and promote using the checklist over and over are sending a signal to other staff to use and show support to the checklist,' said a department head (Berry et al., 2018).

To increase relevance and acceptance, it was suggested that the checklist be adapted to specific local contexts and surgical specialities. One surgeon hypothesized, "Perhaps, by crafting the checklist to our particular needs and workflows, the checklist can feel more germane and less like a 'one size fits all' approach" (Hellar et al., 2019).

Checklist compliance was recommended, so regular audits and feedback on observations were recommended. Röhsig et al. (2020) report a quality improvement officer suggesting, “By sharing data about how the checklist affects patient outcomes, they [staff] may be more likely to use it more consistently.”

4.2.4 Organizational Culture and Leadership Support

The qualitative data highlighted the critical role of organizational culture and leadership in successful checklist implementation. Participants identified the need for a culture that first prioritizes patient safety. According to a senior administrator, “ensuring everybody feels empowered to bring up a safety concern is key to the checklist working” (Krupic et al., 2020).

Hospital leadership received strong and visible support as a critical factor. According to Tartaglia and Matos (2022), a department head said, “When hospital administrators advocate for and utilize the checklist, it positions the checklist as an important thing.” Collaboration within different healthcare disciplines was highlighted. An anaesthesiologist commented, "If we work in a spirit of teamwork and mutual respect with all surgical team members, then the checklist is working properly" (Gong et al., 2021).

4.3 Integration of Quantitative and Qualitative Results

The integration of quantitative and qualitative findings reveals several key insights. Quantitative data indicated generally high knowledge levels (mean score 7.2/10), but qualitative results indicated problems with consistent practice, for which time constraints and resistance to change were key factors.Positive attitudes towards the checklist (88% agreed the checklist improved patient safety) were demonstrated using quantitative data, although qualitative insights revealed engagement and relevance problems in daily practice.

Quantitative analysis suggested variations in knowledge and attitudes among professional roles, spelt out more distinctly through qualitative data on diverse perspectives and challenges experienced by surgeons, nurses, and anesthesiologists.Focusing both quantitatively and qualitatively, time constraints emerged as the primary barrier, with qualitative data providing additional detail about what time constraints look like in emergency and busy surgical times.

Data on how quantitative knowledge gaps relate to the qualitative recommendations on continuous education and training and leadership engagement proved to be a critical factor in both datasets to improve checklist adherence.This integrated analysis presents a complete story of the various factors that shape the implementation of the SSC in Malda Medical College and Hospital. It can be used to guide targeted interventions and formulate policy recommendations.

Discussion

5.1 Synthesis of Key Findings

In the current investigation, we present an assessment of the Malda Medical College and Hospital's knowledge, attitude, and practices regarding the WHO SSC. Consequently, the outcomes indicate several factors that affect checklist compliance and efficiency.

Healthcare providers generally knew what they discussed, scoring a mean of 7.2/10. However, two significant gaps were observed, particularly regarding the 'Sign Out' phase, emerging from the above analysis. This is in line with practice, where compliance with the 'Sign Out' phase had the lowest level of compliance at 58%, compared to 'Sign In' at 85% and 'Time Out' at 76%.

Participants were generally positive about the checklist, with 88% agreeing it enhances patient safety. Nevertheless, a significant proportion (45%) regarded it as a further hindrance to workload. A major challenge in implementation is a dichotomy between appreciating the checklist as critical and perceiving it as onerous.

Inconsistencies were discovered in practice patterns, with only 48% of respondents adhering to all checklist

components completely. The discrepancies, as explained by the qualitative findings, were attributed to resistance to change, time constraints, lack of engagement, and inconsistent implementation.

Our results align with those of Haridarshan et al. (2018, who performed an institutional analysis of checklist utilization in India. Similarly, they found that while the checklist was generally well received, consistent implementation across all surgical specialities still needs to be improved. This suggests that these identified issues seen at Malda Medical College and Hospital are not unique but manifest broader problems of checklist adoption in a similar setting.

5.2 Comparison with Existing Literature

In summary, this study's results reasonably agree with prior literature on HSM for registered SSC implementation among LMICs. The gaps of knowledge that we identified, particularly regarding the 'Sign Out' phase, align with the similar end-findings by Schwendimann et al. (2019), who reported only 22 percent compliance with the Team Sign Out in a Swiss academic center.

This agrees with Bains et al. (2020), who revealed that in a self-archived qualitative study of respondents from a tertiary care hospital in North India, the overwhelming percentage of the respondents felt that using the checklist has enhanced patient safety. However, the context was different, as we categorized the checklist as a burden, 45% more than how they did.

Furthermore, the practice patterns causing relatively high or low adherence to some of the components described in the checklist in our study are also similar to the practices identified by White et al. (2018) in Madagascar, with high implementation rates for some phases of the checklist.

In this study, we were able to assess the magnitude of change in the operating room staff's attitudes towards the SSC compared to the findings of Sokhanvar et al. (2018), who conducted the study among Iranian hospitals. A comparison of awareness and acceptance of the checklist found a discrepancy between different professional groups, similar to our results. The consistency across a variety of cultural contexts is proof of the generalizability of some checklist challenges.

5.3 Integration of Quantitative and Qualitative Findings

Altogether, the results of quantitative and qualitative approaches reveal information regarding applying the WHO SSC in MMC&H. Quantitative data showed that participants, on average, had a good knowledge of the checklist (mean score 7.2/10); however, qualitative interviews revealed persistent problems of practice related to time constraints and resistance to change.

For example, even though 88% of respondents admitted that the checklist helps to improve patient safety, qualitative data showed that many nurses viewed it as another superfluous task within busy surgical schedules. However, the contrast further points out that even knowledge alone does not ensure adherence; contextual processes affect how healthcare providers are dispersed to follow safety protocols (Zyl et al., 2023).

In addition, while quantitative results demonstrated a correlation between a positive attitude toward the task and the use of the checklist, qualitative insights revealed variation in engagement by professional role. Several nurses expressed that using the checklist made them feel less empowered to advocate for their use during high-pressure situations. However, surgeons expressed that they were confident using the checklist. This gap exposes a need for targeted interventions to create a culture of safety and engagement among all team members.

By elaborating on these integrations, the study takes the reader on a journey to understand how knowledge,

attitudes, and contextual factors work together to influence the implementation of surgical safety practices, which help shape future efforts to improve patient safety.

5.4 Implications for Clinical Practice

The findings of this study have several implications for clinical practice at Malda Medical College and Hospital. Consistent with this, there are identified knowledge gaps, specifically relating to the 'Sign Out' phase, which implies a need for targeted educational interventions to enhance understanding and to promote adherence with this and other phases of the checklist. Efforts should be made to make the checklist fit more easily with currently used processes or electronic systems, giving the perception of the checklist as an additional burden. The poor engagement levels discovered by means of the qualitative findings are the reason behind the need to adopt fresh strategies for increasing the involvement of all team members. For example, role-specific training for all team members in the checklist process and empowering all team members are needed. Time-efficient checklist implementation strategies that address the time constraint concerns and their time-saving potential in preventing complications could improve adherence to this regime.

5.5 Organizational and Policy Implications

At the organizational level, several implications emerge. The study's findings warrant visible and consistent support from hospital leadership to prioritize checklist implementation and build a safety culture.The key is ensuring adequate staffing and resources to support checklist implementation while decreasing the other elements of patient care.

The continuous improvement could be driven by regular audits and feedback mechanisms to follow checklist adherence and improve patient outcomes. When considering the tests and their implementation and considering the local situation requiring the implementation and the issues, it may be necessary to modify the checklist or the related implementation policies to fit the particularities of Malda Medical College and Hospital.

In 2023, Zyl et al. looked at recent perspectives on checklist use in operating theatres and how checklist implementation is scrutinized. Their study's take-home message is that checklists must continue to be adapted and refined for them to remain relevant and practical. Our findings match well with this and suggest that Malda Medical College and Hospital review and update the checklist periodically to ensure that it continues to be practical and meet local needs.

5.6 Limitations of the Study

This study offers valuable insights into implementing the WHO SSC at Malda Medical College and Hospital. First, there may have been some self-reporting bias in participants' responses to questions about their knowledge, attitudes, and practices concerning checklist use. There could have been social desirability on which respondents might have overstated their adherence, resulting in inflated perceptions of compliance.

Secondly, as the study was performed in one centre, which limits the generalizability of results to other healthcare settings, Malda Medical College may be an exception. Hence, in a unique cultural and organizational context, its experiences may not be generalized to other institutions in India or similar low—and middle-income countries. Further research should explore multi-center studies to gain a broader range of experience and improve the applicability of findings across many healthcare environments.

5.7 Recommendations for Future Research

Based on our findings and identified limitations, we recommend several areas for future research to enhance the understanding and implementation of the WHO-SSC. Long-term evaluation of the effects of training programs on checklist adherence and patient outcomes is indicated for future studies. To sustain safety improvements in surgery, one must understand the impact of knowledge retention on practice over time. Cross-sectional surveys and qualitative case studies in multiple centers that explore the use of the WHO SSC will reveal variability in use and the reasons behind it, as well as detail effective use. These studies could also help identify a successful strategy that can be adapted to the local environment. Additionally, research should investigate the success of specific tailored educational interventions targeted at particular professional roles in surgical teams (e.g., surgeons, anesthesiologists, and nurses). One aspect of this targeted approach may be that it will encourage customer engagement and compliance. Analysing factors impacting checklist adherence sustainability over time will provide insights into sustaining a culture of safety in surgical teams. Thus, involving patient perspectives on the checklist process and its effect on their patient experience will complement our understanding of its effectiveness based on patients' centre perspectives.

Conclusion

A detailed assessment of the knowledge, attitude, and practice regarding the WHO-SSC generates essential data on its standing in the present-day context of the surgical safety profile in this tertiary care healthcare facility. The findings of a complex interplay between factors affecting checklists and their effectiveness are reported.

Despite this, healthcare providers generally exhibited good knowledge and positive attitudes toward the checklist, but significant gaps in consistent behaviour and total adherence were found. Key issues also noted were constraints on time, resistance to change, and low levels of engagement, which are common in other studies in low—and middle-income countries.

Performing qualitative and quantitative data integration made it possible to comprehend the impediments toward effective implementation, including workload apprehensions and problems associated with organizational culture. This result underscores the need for specific approaches, including ongoing education, leadership involvement, and contextualization of the developed checklist.

With respect to the literature review concerning the implementation of SSCs in low-resource contexts, this study would be relevant to this line of literature and would give useful recommendations for enhancing patient safety interventions. Findings from the study provided recommendations that outline how checklist adherence can be improved and a culture of safety developed in surgical teams.

Longitudinal studies to unravel whether targeted interventions have a long-term effect and to discover patients' opinions of the checklist process remain an area for future research. Addressing the challenges identified and building on the positive attitude of healthcare providers, much can be done to improve surgical safety and patient outcomes in this and other healthcare settings.

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