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World Health Organizations Surgical Safety Checklist Project

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Abstract

Medical error, especially in the operating room, claims the lives of patients and contributes to complications. A project was conducted to investigate the effectiveness of the World Health Organizations Surgical Safety Checklist. Communication, teamwork, and the readiness of use by the operating room team was measured. The project design was descriptive utilizing the Surgical Safety Checklist and a modified version of the Safety Attitudes Questionnaire Operating Room. Post-implementation responses to the Safety Attitudes Questionnaire Operating Room survey revealed a significant improvement in the surgical teams' perception of teamwork and communication. Results show the World Health Organizations Surgical Safety Checklist improves teamwork and communication, and improves awareness of patient safety factors when consistently implemented before each operation.

Keywords

patient safety, checklist, operating room, teamwork, communication

Disciplines

Nursing | Perioperative, Operating Room and Surgical Nursing

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Avoidable medical error, according to the Institute of Medicine's 1998 report "To Err is Human," claims the lives of 44,000-98,000 hospitalized patients every year. The World Health Organization (WHO) further estimates an additional 7 million complications and 1 million patient deaths occur during the perioperative and postoperative period (Schlack & Boermeester, 2010). Many institutions have adapted a culture of safety to mitigate these events. The culture of safety is the culmination of knowledge, attitudes, and behaviours that staff share and the systems that support those beliefs in order to prioritize patient safety and improve outcomes (Nagelhout, 2016; O'Connor et al., 2013).

The WHO published the Surgical Safety Checklist (SSC) to improve the operating room's (OR) culture of safety (2008). The SSC is a unique surgical time-out checklist that requires the OR team to pause during three defined breaks in the surgery. The three breaks include the "sign in" period, which occurs before anesthetic induction; a "time out" period before surgical incision; and a "sign out" period at the end of the procedure and before exiting the operating room (Mahajan, 2011). The elements addressed in each period are standard safety items checked and discussed daily by the individual members in surgery, anesthesia, and nursing, but the SSC explicitly requires all members of the interdisciplinary surgical team to be present and communicate as a team, not as individual disciplines (Yu et al., 2017).

Several studies report the benefits of the WHO SSC. Patient morbidity and mortality is decreased 1.5% to 0.8% (Haynes et al., 2009), surgical complications decrease 11% to 7%

(Haynes et al., 2009) and staff communication and overall patient satisfaction improve (Russ et al., 2013; Sewell et al., 2011; Takala et al 2011; Weiser et al., 2010). Furthermore, Pronovost et al. (2009), reports checklist utilization can save the institution over 1.2 million dollars elucidating the possible cost savings benefit of the checklist.

The WHO encourages local adaption of the SSC and many institutions such as Ariadne Labs have added some variables to the checklist; specifically, a time for briefing and for debriefing (Safe Surgery Implementation Guide, 2015; Patient Safety Primer, 2014). Led by Atul Gawande, Ariadne Labs Safe Surgery Campaign offers a comprehensive implementation guide of a modified WHO SSC incorporating the Joint Commission's National Patient Safety Goal for improved teamwork and communication among surgical teams (Hospital Accreditation Program, 2016). Their adaptation of the WHO SSC is supported by the Institute of Healthcare Improvement (IHI) and incorporates measures from the Surgical Care Improvement Project (SCIP) (Safe Surgery Implementation Guide, 2015). The WHO SSC and modified versions have been widely adopted throughout the United States, but at our local institution it was not utilized. Our hospital is located in an urban area in the northeast United States. This 397-bed general medical and surgical facility performs 6,834 inpatient and 13,087 outpatient surgeries annually. Prior to our project, our hospital utilized the Joint Commission's Universal Protocol "time out for patient safety" process, yet our patient safety metrics were concerning. The year before our project, 204 patient safety events in the perioperative period occurred. The safety events were incorrect specimen labels (n=72), inaccurate consent site marking (n=61), missed communication opportunities (n=58) and patient safety errors (n=13).

To determine the extent of the problem at our local institution, the staff were given a pre-intervention culture survey. While 91% (n=88) of respondents agree that everyone in the OR team wants to participate in efforts to improve safety, 77% (n=88) feel that the pressure to move quickly between cases hinders safety. Additionally, only 63% (n=88) feel that there is adequate discussion about patient management and recovery, and only 44% (n=88) feel that the team adequately discusses key patient safety concerns. The pre-culture survey demonstrated the interdisciplinary teams' desire and interest to participate in patient safety improvement measures while expressing concerns related to current practices and potential patient safety events.

Aims

1. To replace the current Joint Commission "time out for safety" with Ariadne Labs modified version of the WHO SSC.

2. To measure communication and perception of teamwork after implementation of the modified WHO SSC using the modified Safety Attitudes Questionnaire-Operating Room version.

Methods

Study Design

The project was deemed exempt by the University's Institutional Review Board and was comprised of a single-group, pre-test, post-test design. The authors utilized the Ariadne Labs adapted version of the WHO SSC by the Safe Surgery Implementation Guide (2015) and administered the modified Safety Attitudes Questionnaire Operating Room version (SAQ-OR) as our survey tool (Sexton et al., 2016). Prior to data collection, a sample size of 19 was determined

by G*Power 3.1 (Faul et al., 2013) for a two-tail paired *t*-test with a significance level or alpha of .05, a medium effect size of 0.68 calculated using the means and standard deviations from previous literature for a power of 0.807 (Cabral et al., 2015; Hill et al., 2015). The project was conducted in two elective otorhinolaryngology (ENT) rooms for a 10-week period May through July 2018. The service was selected because of the enthusiastic support from the otorhinolaryngology surgeons, the high number of surgical cases, variety of procedures, and a supportive and interested staff. The potential sample consisted of all staff that were currently employed in the ORs, including 4 surgeons, 92 nurses, 24 scrub technicians, and 104 nurse anesthetists/anesthesiologists. Exclusion criteria were those staff who never rotated through the ENT ORs. The final sample size was 48 people.

Implementation

The first phase of the program was the administration of the pre-intervention modified version of the SAQ-OR culture survey (see Appendix 1). The survey was distributed through Qualtrics via email to all OR staff (n=224). Three reminder emails were sent to non-respondents. A total of 88 surveys were completed by the OR staff. Our final pre-checklist intervention sample size was 48 after staff who never rotated through the ENT ORs were excluded. This survey was completed before any educational sessions specific to the WHO SSC.

After the pre-test survey was completed, the primary investigator presented educational sessions about the WHO SSC to all ENT surgical teams. The checklist was transcribed onto several large posters. The posters were strategically placed in highly utilized and visible

otorhinolaryngology rooms (see Appendix 2). The lead investigator circulated throughout the two rooms 14 days before implementation to heighten awareness of the educational plan.

The third phase of the program occurred after the pre-culture survey and educational sessions. The investigators used the modified WHO SSC checklist for all ENT procedures in which one of the three trained investigators were present as part of the surgical team in the two ENT rooms during a 10-week period (Safe Surgery Implementation Guide, 2015). The checklist was utilized in a total of 96 observed surgeries. The investigators kept a log of all procedures that utilized the checklist.

The post-intervention culture survey was in the last phase and administered after the 10-week intervention (phase III). The survey was emailed through Qualtrics. Three reminder emails were sent to non-respondents. A total of 30/48 post intervention surveys were completed. The results of the pre-/post-intervention SAQ-OR culture survey were compiled and analyzed using R version 3.1.3 (2018-07-02) – "Feather Spray" software to measure the outcomes of the program. The following additional Likert scale (Strongly agree =7-Strongly disagree = 1) survey responses related to checklist satisfaction were included (Safe Surgery Implementation Guide, 2015).

- "I was given a strong explanation for why it is important to use the safe surgery checklist"
- "The training I received about how to use the safe surgery checklist allowed me to use it effectively during the surgical procedure"
- "If I were having an operation, I would want the safe surgery checklist to be used"

Data Analysis

The modified SAQ-OR survey responses were collected, and the individual item responses were converted into a numerical scale (Strongly agree =7-Strongly disagree = 1), and all negatively-worded items (e.g., "In the OR it is difficult to discuss errors" and "It is difficult to speak up if I perceive a problem with patient care") were reverse scored (Safe Surgery Implementation Guide, 2015). Cronbach's alpha, the internal consistency of the chosen items for each domain, was 0.73 for teamwork and 0.69 for communication and patient safety (Haynes et al., 2011). The domain scores were calculated by taking the mean score across the items in the domain subscale, subtracting 1, and multiplying it by 16.667 to give scores on a 0–100 scale. Differences between the pre- and post-intervention safety attitudes questionnaire domain scores were tested for normality. The average domain scores for teamwork and contextual readiness were normally distributed, and the means for the pre and post culture survey were compared using a two-sided paired *t*-test. The average domain scores for patient safety and communication were not normally distributed. The means for the pre and post culture survey were compared using the Mann-Whitney U test. The mean SAQ-OR scores reported the safety perceptions among staff after the WHO SSC intervention tool was implemented.

Results

The WHO SSC was utilized in 42% of all ENT surgeries in both observed rooms. A total of 78 SAQ-OR surveys were included in the sample (pre-intervention n=48; post-intervention n=30). There was significant improvement ($p<0.01$) in the pre- and post- scores in the teamwork and communication SAQ domain categories (see Table 1). The differences between the pre- and post-SAQ-OR means among providers for the teamwork and communication domains is reported

in Figure 2 and Figure 3. Communication scores among surgeons had significant improvement (24%) and nurses had the most improved teamwork scores (16.7%).

A total of 11 patient safety events were identified from the use of the checklist. Staff identified one wrong-sided consent during the sign in period. Additionally, during the sign in period the staff discovered and removed incorrect patient labels from a patient's chart. Lastly, during the sign out period, 9 mislabelled and unknown specimens were identified. The mislabelled specimens were re-labelled, and the newly identified specimens were correctly labelled and sent for analysis.

The post-intervention SAQ-reported 79% of staff members (n=24/30) agreed that they would want the SSC to be used if they or a loved one were having a procedure done. Some staff members expressed hesitation toward the checklist in general, stating they thought it slowed down the surgery and the repetition was burdensome. However, the same staff did state they believed the checklist could improve patient care. Only 63% of the staff (n=19/30) felt that they were given a strong explanation as to the importance of the checklist, and 63% (n=19/30) felt that the SSC helped the cases run more smoothly.

Table 1 Pre- and Post- SAQ-OR mean (SD) domain scores.

	Pre SAQ Mean n=30	Post SAQ Mean n=30	p-value
Communication Climate*	59.5 (19.5)	71.5 (13.9)	<0.01
Contextual Readiness	65.2 (10.3)	65.7 (14.2)	0.88
Patient Safety*	64.5 (13.5)	71.2 (14.2)	0.54
Teamwork	56.7 (13.8)	67.8 (8.8)	<0.01

SD=Standard Deviation; *non-normal data

Figure 1

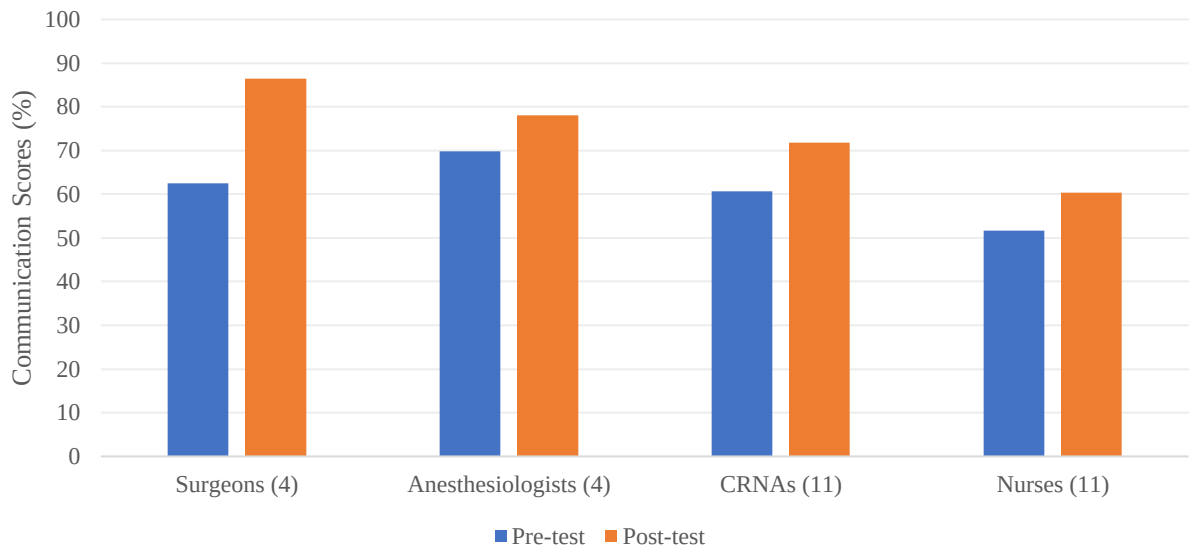
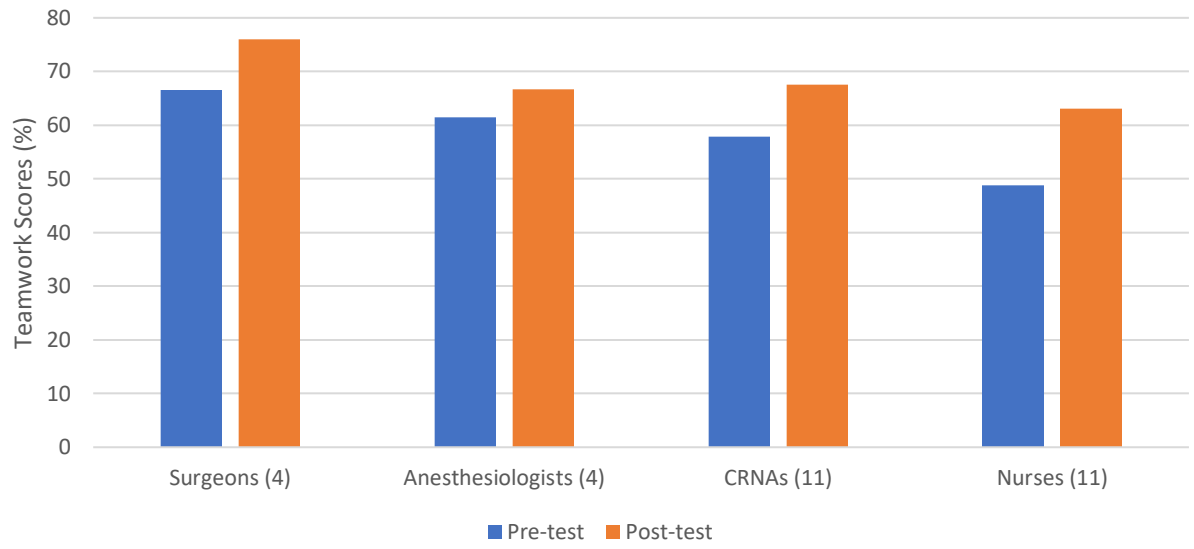

Pre-test and Post-test Mean Communication Scores Disaggregated by Positions
Communication Scores (%)
100
90
80
70
60
50
40
30
20
10
0
Surgeons (4)
Anesthesiologists (4)
CRNAs (11)
Nurses (11)
Pre-test
Post-test

Figure 2 Pre-test and Post-test Mean Teamwork Scores Disaggregated by Positions



Discussion

The WHO SSC implemented in the ENT ORs improved communication and teamwork among staff. There was no significant improvement in patient safety or the contextual readiness dimension. However, while the domain scores for patient safety did not improve significantly, Pronovost et al. (2009) proposed that aiming for a 10% increase in the climate score average is an acceptable way to determine the benefit of an intervention. Applying Pronovost et al. (2009) methodology, the increase in the patient safety score from 64.5% to 71.2% would be a meaningful improvement as well. Anecdotally, the staff reported that they were happy with the new SSC. The staff further commented that the checklist was easy to use and that it contributed to a safe environment. Additional comments made by team members included how much they enjoyed introducing new members of the team during the pre-procedure introductions, especially with a large number of residents rotating within the service. Residents, though not included in the pre- and post-test data, remarked how the sign-out period debriefing gave them a chance to discuss post-operative orders and concerns with the entire team before the surgeon left the room. These further substantiate the value of using this checklist and the effect on promoting an OR culture of safety.

Additional education and publicity may improve team compliance and adherence. The checklist is also dependent on all team members' endorsement. If, for example, one surgeon did not want to use the checklist, the implementation was hampered. Other studies show that in order to ensure future success of the checklist cultural issues that may obstruct checklist utilization need to be addressed (Cabral et al., 2016; Hill et al., 2015). Improving education could address the fact that only 63% (n=19/30) felt they had received a strong explanation as to why the

checklist was being implemented. Continuing education focusing on patient safety data and events can help mitigate future events, improve group dynamics and increase compliance.

Limitations

There were several limitations to the project. Firstly, it is not possible to be certain that the improvement in communication and teamwork perception resulted directly from the WHO SSC, positive results could be due to the Hawthorne effect. Other confounding variables such as decreased case load and higher staffing numbers could contribute to the improvement. The survey results were self-reporting as well as there were limited survey responses. The project did not attempt to assess an improvement in patient outcomes, and further work is required to investigate the effect on patient outcomes associated with the introduction of the WHO SSC. As demonstrated by Russ et al (2015) data regarding compliance is essential when interpreting any observed outcomes, and there is a need for reporting compliance consistently, because if not, the checklist can endanger patient safety by introducing complacency and a false sense of security.

Lastly the results are limited in their generalizability. It was a single project lead from a single speciality within the institution one project lead limited the amount of buy-in from frontline providers and undermined the importance of team members' ownership of the change. Only one speciality (ENT) involvement limited the number of possible survey responses and staff involvement. A cultural shift is important and necessary if you want to improve patient outcomes. The engagement of frontline staff and their commitment to the process is more important than the completion of individual steps on the checklist (Hill et al., 2015).

Conclusion

Our project using the WHO SSC showed the checklist improved teamwork and communication while identifying potential safety incidents which ultimately improved team members' participation and endorsement of the checklist. Our hospital leadership is committed to a department wide program implementation. The results also allowed our institution to identify unique institutional variables that needed to be addressed to ensure adoption and compliance with the WHO SSC hospital wide implementation. Our results further show that institutional checklists reduce perioperative complications and our modified version of the WHO SSC does and will improve our hospitals culture of safety.

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