Implementation of the Surgical Safety Checklist in South Carolina Hospitals Is Associated with Improvement in Perceived Perioperative Safety

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BACKGROUND: Previous research suggests that surgical safety checklists (SSCs) are associated with reductions in postoperative morbidity and mortality as well as improvement in teamwork and communication. These findings stem from evaluations of individual or small groups of hospitals. Studies with more hospitals have assessed the relationship of checklists with teamwork at a single point in time. The objective of this study was to evaluate the impact of a large-scale implementation of SSCs on staff perceptions of perioperative safety in the operating room.

STUDY DESIGN: As part of the Safe Surgery 2015 initiative to implement SSCs in South Carolina hospitals, we administered a validated survey designed to measure perception of multiple dimensions of perioperative safety among clinical operating room personnel before and after implementation of an SSC.

RESULTS: Thirteen hospitals administered baseline and follow-up surveys, separated by 1 to 2 years. Response rates were 48.4% at baseline (929 of 1,921) and 42.7% (815 of 1,909) at follow-up. Results suggest improvement in all of the 5 dimensions of teamwork (relative percent improvement ranged from +2.9% for coordination to +11.9% for communication). These were significant after adjusting for respondent characteristics, hospital fixed-effects, multiple comparisons, and clustering robust standard errors by hospital (all $p < 0.05$). More than half of respondents (54.1%) said their surgical teams always used checklists effectively; 73.6% said checklists had averted problems or complications.

CONCLUSIONS: A large-scale initiative to implement SSCs is associated with improved staff perceptions of mutual respect, clinical leadership, assertiveness on behalf of safety, team coordination and communication, safe practice, and perceived checklist outcomes. (J Am Coll Surg 2016;222: 725−736. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

The World Health Organization Surgical Safety Checklist (SSC) is a simple and scalable innovation aimed at improving the safety of surgical care. The original study evaluating the implementation of the World Health Organization SSC demonstrated that its use was associated with significant reductions in postoperative morbidity and mortality in diverse hospital settings.[1] Multiple subsequent studies have also found reductions in postoperative complications[2-5] and/or postoperative mortality[6,7] after implementation of an SSC. Additionally, studies have demonstrated that perceptions of safety at the hospital level are associated with outcomes.[8-10] However, not all studies support the former findings; Urbach and colleagues[11] reported no change in postoperative outcomes in Ontario, Canada, after evaluating the impact of regionally mandated implementation of an SSC.

Abbreviations and Acronyms

CRNA = certified registered nurse anesthetist
OR   = operating room
SSC   = surgical safety checklist

These discrepant findings suggest that the way hospitals implement SSCs is key to their ability to effect clinically significant changes. Some explanations offered by one of the commentators for why investigators observed no change in postoperative outcomes in Ontario include that the provincial government mandated the SSC, that hospitals' implementation initiatives were ineffective, and that the majority of reported hospitals did not modify the SSC to meet their specific needs.[12] In order for an SSC to reduce postoperative complications and mortality, previous research suggested that hospitals need to intentionally implement the checklist using a structured approach, most often led by implementation leaders who persuasively convey the rationale and effectively demonstrate methods for using it.[13]

As part of the Safe Surgery 2015 initiative to implement SSCs in South Carolina, we sought to measure how statewide implementation of an SSC affects operating room (OR) personnel perceptions of the safety of surgery. We administered a validated survey before and after implementing the SSC. To our knowledge, this is the first study to evaluate the impact of a statewide initiative to implement an SSC at multiple hospitals with pre- and post-implementation analysis.

METHODS
Sample
The Safe Surgery 2015: South Carolina initiative is a statewide collaborative designed to promote implementation of SSCs in South Carolina hospitals. The initiative targeted all 67 hospitals performing surgery in South Carolina. As part of the initiative, we invited participating hospitals to administer surveys before and after their active participation in the implementation program. The SSC implementation program included a live webinar series and support in the form of educational training materials and tools to evaluate ongoing SSC implementation. Hospitals were invited to perform a follow-up survey when they indicated that their SSC implementation program was complete. On average, the follow-up survey was administered 1 to 2 years after the baseline survey. As described elsewhere,[14] 38 hospitals administered baseline surveys; 13 of these hospitals believed they had completed the SSC implementation

program and also administered follow-up surveys. There were no statistically significant differences in baseline perceptions of perioperative safety between the 13 hospitals that completed baseline and follow-up surveys and the 25 hospitals that completed only the baseline survey. This study included only the 13 hospitals that completed the baseline and follow-up surveys.

At each hospital, the target sample was 100% of clinical OR personnel, including surgeons, anesthesiologists, certified registered nurse anesthetists (CRNAs), surgical nurses, and surgical technicians. In order to keep participation anonymous we did not collect information that would enable matching pre- and post-test responses for individual respondents.

Survey instruments
Development and validation of the survey instrument, which drew from AHRQ's Hospital Survey of Patient Safety Culture, the Patient Safety Climate in Healthcare Organizations Survey, the Operating Room Brief Assessment Tool, and the Safety Climate Sub-Scale from the Safety Attitudes Questionnaire, has been described elsewhere.[14] The survey instrument used in this study, however, differed from its predecessors in that it was a survey created specifically for health care personnel working in the OR environment.

Surveys administered in the initial and follow-up periods differed slightly. Both surveys included items representing the 5 teamwork factors we defined as respect, clinical leadership, assertiveness, coordination, and communication, which collectively comprised an interpersonal dimension. The initial and follow-up surveys also included the following factors: supportive context and adherence to safe practice (constituting a practical dimension), and impact of safe practice, eg, "I would feel safe being treated here as a patient" (forming a consequential dimension). However, because the initial survey was intended to determine how well prepared surgical teams were for checklist implementation, the pre-test version of the survey also measured readiness (a contextual dimension; data not presented here). In contrast, the post-test version of the survey sought to assess how well implementation had gone after hospitals had completed their active participation in the Safe Surgery South Carolina implementation program (approximately 1 year after the baseline survey). The post-test version of the survey therefore omitted the readiness items and instead added measures of implementation process and implementation effectiveness. The post-test survey also added to the consequential dimension items assessing the perceived impact of checklist use.