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Implementation of the surgical safety checklist at a tertiary academic center: Impact on safety culture and patient outcomes

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ABSTRACT

Background: The impact and efficacy of the World Health Organization Surgery Safety Checklist (SSC) is uncertain. We sought to determine if the SSC decreases complications and examined the attitudes of the surgical team members following implementation of the SSC.

Methods: A 28-question survey was developed to assess perspectives of surgical team members at the University of Vermont Medical Center (UVMC). The University Health System Consortium database was examined to compare the rates of nine complications before and after SSC implementation using Chi square analysis and Fisher's exact test.

Results: There was no significant decrease in any of the nine complications 2 years after SSC implementation. There was overall agreement that the SSC improved communication, safety, and prevented errors in the operating room. However, there was disagreement between nursing and surgeons over whether all three parts of the SSC were always completed.

Conclusions: Implementation of the SSC did not result in a significant decrease in perioperative morbidity or mortality. However, it did improve the perception of safety culture by operating room staff.

1. Introduction

Four percent of the world's population has a major surgical procedure each year; a total of 187–281 million major procedures annually.[1] Unfortunately, surgery carries a risk for complications, half of which are thought to be avoidable.[2,3] In 2008, the World Health Organization (WHO) launched the Surgery Saves Lives initiative, which demonstrated that the Surgery Safety Checklist (SSC) effectively reduced morbidity and mortality.[4] Shortly thereafter, nearly 6,000 hospitals worldwide supported the implementation of the checklist with almost 1,800 hospitals that started to actively utilize it.[5] However, data on the efficacy of checklist implementation on reducing complications is mixed.[6–9]

The exact mechanism by which a checklist may reduce surgical complications is uncertain. Studies showing improved outcomes attributed these changes to the checklist's positive effect on the operating room team dynamic and safety culture.[4,10,15] However, there are hypothesized barriers to successful implementation that include lack of perceived benefit of the operating room staff, as well as lack of support from hospital systems. Data on staff satisfaction with implementation of the SSC and perceived improvement in safety culture is limited.[11,12,18,20]

At the University of Vermont Medical Center (UVMC), the SSC was adopted in February 2012. This checklist was intended to improve outcomes, team dynamics, and patient safety. We created a comprehensive 28-question survey instrument to examine attitudes of the operating room staff regarding how implementation of the checklist affected team dynamics and patient safety. We then compared the rates of nine complications before and after checklist implementation to assess the impact on patient outcomes. We hypothesized that while there would be an improvement in perceived safety culture among staff, there would be no improvement in the complication rates.

2. Materials and methods

2.1. Survey instrument

A systematic literature search was performed using PUBMED to

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identify survey questions assessing attitudes towards the SSC. Search terms included "surgical safety checklist", "implementation", "safety culture", and "attitude". Papers that were included were survey questionnaire studies, observational studies, interviews, and review articles. A total of 15 articles were included, and underwent review by the PI (AZ), the vice chair of quality, and the director of perioperative services at UVMC.[15–29] Twenty questions were abstracted that were perceived to capture unique aspects of the impact of checklists. Three questions were added from a previous survey conducted at UVMC in 2012 before the implementation of the checklist. Five additional questions were created to clarify the demographics of each respondent. Responses were recorded on a five-point Likert Scale (1-disagree strongly, 2-disagree slightly, 3-neutral, 4-agree slightly, 5-agree strongly). Responses were counted as "agree" if scored as a 4 or above. Blank answers were not scored. The non-response rate was measured and documented.

3. Data collection

The survey was distributed to surgeons from all specialties and operating room staff. Surgical specialties that contributed to the study included general surgery, orthopedic surgery, neurosurgery, urology, otolaryngology, ophthalmology, and obstetrics and gynecology (OB/GYN). Distribution of the survey consisted of in-person distribution at regularly scheduled staff meetings or surgical specialty events such as grand rounds conferences and journal clubs, as well as an electronic distribution through email. No incentives were provided for completion of the survey. Participation in the survey was voluntary and all respondents remained anonymous. Confidential bins were designated for respondents to submit their surveys upon completion. Instructions were given to only complete the survey once. Surveys were collected between January 2014 and August 2014. The study was approved by the Institutional Review Board of the University of Vermont College of Medicine.

The Universal Health System Consortium (UHC) database was then queried to compare complication rates at UVMC before and after checklist implementation. Briefly, the UHC is a consortium of over 100 medical centers and affiliate hospitals that provides risk-adjusted, patient-level data on surgical complications back to hospitals to use for performance improvement.[13] A time period of two years before and two years after checklist intervention was evaluated. The checklist was implemented at UVMC in February 2012 and is displayed in Table 1. The pre-intervention time period selected was from January 2010 to January 2012, and the post-intervention time period was from June 2012 to June 2014 to allow time for checklist implementation before measurement. Nine risk-adjusted complications were included for analysis. Five complications defined by the American College of Surgeons National Surgical Quality Improvement Project (ACS NSQIP) as major post-surgical complications, which were mortality, wound dehiscence, sepsis, respiratory failure, and venous thromboembolism (VTE).[14] Four more complications were included from the UHC database that we felt were particularly apt to be impacted by process improvement, which included postoperative hemorrhage or hematoma, retained foreign body, transfusion reaction, and death among surgical inpatients with serious treatable complications (i.e., deep vein thrombosis, pulmonary embolism, pneumonia, sepsis, shock, cardiac arrest, gastrointestinal hemorrhage, and acute ulcer). The surgical cases evaluated for seven of the complications

Table 1
The University of Vermont Medical Center surgery safety checklist.

Attending surgeon and attending anesthesiologist or any credentialed provider of anesthesia **Sign In** (to be read out loud) Before Induction of Anesthesia/While Patient Awake "Patient Huddle"	**Time Out** (to be read out loud) Before start of surgical intervention For example, skin incision	**Sign Out** (to be read out loud) Before any member of the team leave the operating room
❑ Confirm patient identity, surgical site, procedure and consent	Attending Surgeon, Anesthesia Care Service Staff Member, and Circulating Nurse verbally confirmed	Attending Surgeon, Anesthesia Care Service Staff Member, and Circulating Nurse
❑ Confirm surgical site marked (if applicable)	❑ Confirm patient's name	❑ Verify procedure(s) performed (cross reference surgical consent)
❑ Confirm all allergies	❑ Confirm procedure, site and laterality	❑ Confirm counts complete and correct
❑ Ask all team members to introduce themselves by name and role	❑ Confirm antibiotic prophylaxis within the last 60 min (if applicable)	❑ Address Anesthesia concerns
❑ Confirm sterility of instrumentation	Anesthesia Care Service Staff Member: Anesthesiology Attending, Anesthesiology Resident, CRNA, or AA. MD should be present if there are any intraoperative events	❑ Address Nursing concerns
❑ Confirm equipment availability		❑ Address Surgeon concerns
❑ Address anticipated blood requirement		❑ Verify specimens (if applicable) • Correct patient • Correct specimen • Correct transmittal • Correct disposition
❑ Confirm antibiotic order (if applicable)		
❑ Address anesthesia equipment/medication readiness, and critical anesthesia steps		❑ Verify Implants (if applicable) • Correct type • Correct site • Expiration date
❑ Address critical surgical steps		
❑ Address DVT prophylaxis/sequential compression devices (if applicable)		❑ Confirm patient id bracelet present
❑ Confirm essential imaging		Anesthesia Care Service Staff Member: Anesthesiology Attending, Anesthesiology Resident, CRNA, or AA. Anesthesiology Attending should be present if there are any intraoperative events or postoperative patient issues
❑ Address patient warming (if applicable)		