

## Patient Safety Culture: The Key to Sustained Quality Improvement

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### Introduction

Research conducted in industries outside of medicine demonstrates a strong association between safety culture and outcomes. In surgery, however, few studies have assessed this important relationship. Safety culture is defined as “the product of the individual and group values, attitudes, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization’s health and safety management” [1].

Historically, analysis of surgical safety culture proved difficult to quantify with solid methodology and scientific rigor. The landscape surrounding patient safety culture changed with the Institute of Medicine’s (IOM) 1999 report “To Err is Human: Building a Safer Health System” [2]. The IOM found a significant level of morbidity and mortality related to medical errors and concluded that healthcare organizational leaders have a mandate to work to create a patient-centered culture of safety. Shortly after the publication of the IOM report, the Agency for Healthcare Research and Quality published a validated survey tool to better define and characterize safety culture called the “Hospital Survey on Patient Safety Culture” [3]. Understanding safety culture is central to reducing medical errors and delivering high quality patient care.

Safety culture properties include leadership, communication, teamwork, management support, continuous learning, and patient-centered care [3,4]. Early descriptive studies show significant inter- and intra-hospital variation in safety culture [5]. Low safety culture scores are associated with many adverse metrics such as increased length of stay, hospital mortality, increased staff burnout, and higher hospital-associated infections such as ventilator-associated pneumonia (VAP), central-line-associated bloodstream infections (CLABSI), and catheter-associated urinary tract infections (CAUTI) [6-8]. A 2016 study published in the Journal of the American College of Surgeons found an association between lower surgical site infection (SSI) rates and a positive safety culture [9]. In this short communication, we discuss the development and implementation of an evidenced-based quality improvement initiative with a focus on safety culture to achieve sustained quality outcome improvement at our institution.

In 2012, American College of Surgeons National Surgical Quality Improvement Project (ACS NSQIP) data identified our institution as a high outlier (i.e., bottom decile) for colorectal SSIs. Our first attempt to address this issue involved a project in conjunction with the Pennsylvania Patient Safety Authority and the Pennsylvania NSQIP

Consortium that included visiting high-performing institutions to examine their successful efforts [10]. The site visits revealed practice differences in multiple areas including surgeon-level (e.g. lack of a standardized bowel preparation and wound closure technique) and system-level (e.g. unfamiliarity with workflow of other team members, non-standardized antibiotic re-dosing protocols). Although we had a clear aim, a measurable outcome, and identified areas for improvement, there was no clear implementation plan developed to accomplish change. In addition, poor communication with administration and operating room personnel, lack of surgical team engagement, and the absence of an evidence-based protocol lead to low levels of buy-in from the administration, nursing staff, and surgeons. As a result, we were unable to achieve a significant, sustained reduction in colorectal SSIs.

In response, our Quality Based Improvement Resident Team (QBIRT) group selected colorectal SSI reduction as our quality improvement project. QBIRT is a resident-championed quality improvement program initiated at our general surgery program in 2013. Resident teams, consisting of 1 resident from each postgraduate year of training, choose a quality improvement or patient safety project, perform a literature review, analyze NSQIP data, and develop recommendations for implementation. The aim of our project was to decrease colorectal SSIs by 33% within 12 months. In order to achieve sustained quality improvement, we addressed properties of patient safety culture including leadership, communication, teamwork, management support, continuous learning, and patient-centered care. We performed an extensive review of the literature to identify patient-centered, evidence-based interventions to reduce SSIs. Changes in the surgical management of colorectal patients consisted of standardized preoperative oral antibiotics, referral to a smoking cessation program (if a current smoker), changing gowns and gloves prior to fascial closure and instituting a separate surgical instrument closure tray [11].

The full bundle can be seen in Figure 1. After discussion with the colorectal surgical attendings and finalization of the colorectal SSI bundle, we presented our initiative to hospital administration and completed the required approval process to ensure that all protocols were in compliance with institutional policy. Next, an open forum was held with the operating room staff, including surgical technologists, operating room nurses, and the operating room nurse manager, to discuss workflow issues and collaborate on the implementation process.

<b>A. Patient evaluation</b>				
1. Concurrent infection?	Yes	No	If yes, where _____	
2. Current Smoker?	Yes	No	Quit date _____	
		Yes	No	
If yes, did patient receive smoking cessation information?				
<b>B. Preparation</b>				
1. Did patient take preoperative oral antibiotics the day before surgery?		Yes	No	
2. Chlorhexidine gluconate 2% wipe preparation the night before surgery?		Yes	No	
<b>C. Day of surgery chlorhexidine wipes to surgical site?</b>				
		Yes	No	
<b>D. Patient temperature upon SPU arrival</b>				
		_____		
If < 36° C was heating device used?	Yes	No	N/A	
<b>III. Intraoperative</b>				
<b>A. Bair hugger?</b>				
		Yes	No	
If yes, which type:		Upper	Lower	Full body
<b>B. Clip hair?</b>				
	Yes	No		
<b>C. Skin preparation by:</b>				
Chlorhexidine?		Resident	Fellow	Attending
How many 26 ml applicators?		Yes	No	Betadine
		1	2	3
<b>D. IV antibiotic dosed by patient weight?</b>				
1. Redose IV antibiotic at 4 hour		Yes	No	N/A
<b>E. Patient temperature</b>				
Incision		_____		
2 hours into case		_____		
Closure		_____		
<b>F. Glycemic recordings &gt; 200?</b>				
	Yes	No		
<b>G. Barrier wound protection?</b>				
		Yes	No	
<b>H. Closing fascia/skin</b>				
1. Abdomen irrigated with Genlarmycin/Clindarmycin solution?		Yes	No	
2. Gown and gloves changed prior to fascia closure?		Yes	No	
3. Clean instruments prior to fascia closure?		Yes	No	
4. Saline irrigation after fascia closure?		Yes	No	
5. Redrape?		Yes	No	
<b>I. Intraop FiO2 maintained at least 80%?</b>				
		Yes	No	
<b>IV. Postoperative</b>				
<b>A. ≥ 3 blood glucose recordings ≥ 200?</b>				
		Yes	No	
<b>B. Dressing down within 40 hrs of closure?</b>				
		Yes	No	
<b>C. Discontinue perioperative antibiotics within 24 hours of OR</b>				
		Yes	No	
<b>D. Wound care/ostomy consult?</b>				
		Yes	No	N/A

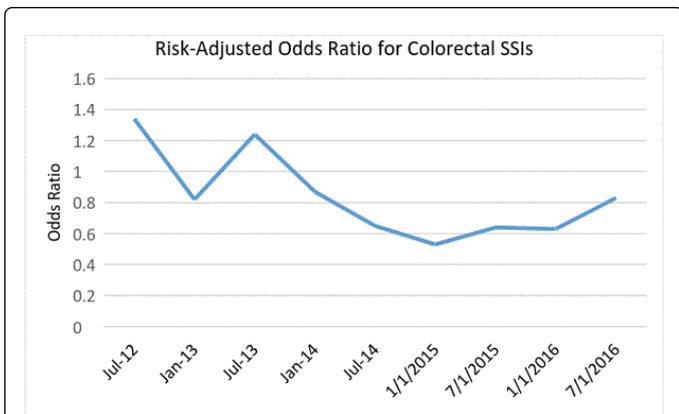
Figure 1: Colorectal care bundle recording sheet.

Throughout the implementation process, an effort was made to level the authority hierarchy and empower staff to speak out regarding workflow issues or other difficulties with the implementation process. At 6 months post bundle implementation we met with the surgical staff and presented the most recent data on colorectal SSIs. By providing objective data demonstrating improvement in our SSI rates, we achieved greater buy-in from the surgical staff. This information was also presented to hospital administrators.

In the two years prior to bundle implementation, our aggregate colorectal SSI rate was 13.9%. One year after bundle implementation the SSI rate decreased to 4.7%, a 66% reduction [11]. Furthermore, our institution transitioned from high outlier status to low outlier (top

decile) status in colorectal SSIs. As recorded in the most recent report from ACS-NSQIP published over 2 years after bundle implementation, we have maintained our exemplary status in the top decile (Figure 2).

We have achieved sustained improvement of our SSI rates through implementation of an evidence-based, patient-centered bundle created within the framework of safety culture. We approached the administration early, empowered health care professionals at all levels to speak up when they noticed inefficiencies with implementation, and provided team members specific feedback on the success of the initiative. Quality improvement initiatives should focus on organizational safety culture and obtain buy-in from multiple caregivers in order to achieve excellence in patient outcomes.



**Figure 2:** The risk-adjusted odds ratio for colorectal surgical site infections produced every 6 months from the NSQIP semi-annual report from July 2012 through July 2016. We began developing the bundle in July 2013. The bundle started on March 1<sup>st</sup>, 2014. Since July 2014, we have performed in the top decile regarding colorectal SSI rates.

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