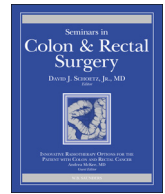




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Using NSQIP Data for Quality Improvement: The Cleveland Clinic SSI Experience



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A B S T R A C T

Prevention of surgical site infection (SSI) has become one of the primary objectives of national quality improvement programs in U.S. hospitals. This article would discuss the impact of participation in the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) on the outcomes and our experience for SSI reduction. Since 2005, our institution has been an active participant of the ACS-NSQIP, and our SSI rates have been compared with other NSQIP centers; in 2006, we were found to be a high outlier institution for SSI. ACS-NSQIP greatly facilitated our understanding of the reasons for high SSI rates and patient profile that is associated with high risks for SSIs and how we can make improvements. Thus, our department initiated an SSI reduction strategy program called the “CORS SSI Prevention Bundle Project” in 2014. This effort was resulted in a statistically significant decrease in overall SSI rates from 11.8% to 6.5% after colorectal surgery. In conclusion, participation in the ACS-NSQIP offers the opportunity to compare institutional SSI rates with those of other and recognize the facts for improvement. By using this data, a bundled approach improved clinical outcomes in our experience and this was attributed to multifaceted initiatives stemming from multiple team members and comprehensive data utilization.

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Introduction

In recent years, surgeons have found themselves increasingly under the microscope with regard to quantifying the delivery of quality care and maintenance of certain standards of practice. This is certainly true for colon and rectal surgery.¹ Several different quality measurement and improvement programs have been devised and implemented in colorectal surgery.^{2,3}

Hospitals' highest priority is to promote the safest care and best outcomes for its patients. That includes championing surgical teams to work together toward continuous improvement in the quality of care. It also means the smart use of hospital resources—treating complications typically requires longer hospital stays and higher costs that cut into hospital profitability. When complications happen, patients also pay a price in discomfort, potentially poorer outcomes, days lost from work, and more.⁴ At the same time, payers including Medicare, increasingly refuse to pay for treating what they deem as preventable complications, such as surgical site infections (SSIs). In addition, there is a growing movement to tie reimbursements to outcomes, and to publicly

report the results of these quality assessments. In these challenging times, hospitals nationwide face staffing shortages and financial pressures, and must try to do more with less.

SSIs are a common postoperative complication associated with patient discomfort and prolonged recovery time and may affect a patient's quality of life significantly.⁵ In addition, the occurrence of an SSI substantially increases the risk of readmission and postoperative morbidity and has contributed to increased healthcare costs.⁶ Colorectal surgery is a major contributor to institutional SSI rates with inherent risk rates ranging from 5% to 30%.^{7,8}

Therefore, prevention of SSI has become one of the primary objectives of national quality improvement programs in U.S. hospitals. This article would discuss the impact of participation in the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) on the outcomes and our experience for SSI reduction.

Using Nsqip Data For Quality Improvement

In 1994, the Veterans Health Administration (VHA) established the ACS-NSQIP for monitoring and improving the quality of surgical care across all VHA medical centers where major surgery is performed.⁹ The impact of NSQIP on the quality of care was

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substantial in 1991–2006, with a 47% decrease in the 30-day postoperative mortality and a 43% reduction in the postoperative complications.¹⁰ Encouraged by the VA NSQIP success, the private sector hospitals became interested in participating to measure and improve the quality of surgical care. Today, more than 586 hospitals across the country internationally participate in the ACS-NSQIP, the first nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care across surgical subspecialties. It provides a prospective, peer-controlled, validated database of preoperative to 30-day postoperative surgical outcomes based on clinical data, not claims data extracted from medical bills. The program's nationally benchmarked, peer-controlled database allows hospitals to compare 30-day patient outcomes to hospitals of all sizes and types across the country, leading to better information, care, and outcomes.

Data Collection/Interpretation

ACS-NSQIP collects data that provide fair, in-depth and insightful analysis, helping surgeons and hospitals gain a complete and accurate understanding of their quality of care compared to similar hospitals with similar patients. It provides a prospective, peer-controlled, validated database of preoperative to 30-day postoperative surgical outcomes based on clinical data, not claims data extracted from medical bills. Most other quality programs today rely on claims or administrative data that are easy to obtain. But studies show administrative and claims data are limited, inconsistent, and subject to misinterpretation when used to measure quality.¹¹

ACS-NSQIP data are collected by a trained and certified Surgical Clinical Reviewer (SCR) who obtains information for each patient using a variety of methods, including medical record abstraction. ACS provides SCR training for participating hospitals, ongoing education opportunities, and auditing to ensure data reliability. Data are entered online in a Health Insurance Portability and Accountability Act (HIPAA)-compliant, secure web-based platform that can be assessed 24 h a day. Preoperative through 30-day postoperative data are collected on randomly assigned patients. Each hospital assigns a “Surgeon Champion” to lead and oversee the program implementation and quality initiatives. The reviewers use strict variable definitions when collecting data to ensure uniformity across participating centers, and periodic auditing of participating centers is performed to ensure that the data contained within the database are accurate.

Data regarding index procedures include three demographic variables, 12 preoperative risk factors, 17 operative variables, 12 preoperative laboratory values, 10 postoperative laboratory values, and 33 other variables related to death and major complications. A logistic regression model is then applied to the data to determine a predicted 30-day morbidity and mortality. This information is then used to develop an observed to expected ratio (O/E) for morbidity and mortality at each hospital for quality assurance and improvement purposes.

In addition, the novel ACS-NSQIP Surgical Risk Calculator was developed using NSQIP data collected from nearly 400 hospitals and 1.4 million patients. This tool provides accurate, patient-specific risk information to guide both surgical decision-making and informed consent. The clinician can input 21 patient-specific variables, in addition to the Current Procedural Terminology (CPT) code, to generate a predicted risk for a series of outcomes and the overall average risk for that CPT code. Its ability to accurately predict data for a single institution or surgeon has not been evaluated.¹² Ultimately, the recently developed procedure-targeted ACS-NSQIP database offers a novel opportunity to directly evaluate the specific surgeries including colectomy, hepatectomy, and pancreatectomy.¹³

Participation in Quality Measurement Nationwide

Hospitals participating in ACS-NSQIP find patients' benefit from improved outcomes reduced the risk of complications and length of stay with greater satisfaction.¹⁴ To help achieve these results, NSQIP provides hospitals with detailed reports using clinical, risk-adjusted data annually. A study has shown that each hospital participating in ACS-NSQIP, on average, prevents 250–500 complications, saves 12–36 lives, and reduces costs by millions of dollars annually.¹⁵ A recent report showed that a large center could conservatively avoid 14 deaths annually and prevent 300 complications, which includes 132 SSIs.¹⁶ On the other hand, a study comparing postoperative outcomes and Medicare payments during hospitalization between participating and non-participating ACS-NSQIP hospitals showed a slight improvement in surgical outcomes in both hospital groups over time. In a comparison of matched hospitals, there was no independent association of hospital participation in the quality program, and the authors concluded that feedback on outcomes may not be sufficient to improve surgical outcomes.¹⁷

Preventable complications decrease the quality of patient care and increase hospital length of stay and costs. One study using ACS-NSQIP data concluded that, on average, each SSI added \$10,497 to treatment costs and 4.3 additional days in the hospital.¹⁸ Hospital-acquired infections remain a significant challenge.

Participation in NSQIP can identify areas of increased hospital morbidity and mortality as compared with peer hospitals on a national basis.^{14,16} For instance, one hospital reduced its general and vascular surgery SSI rate by 5.7% and its breast surgery SSI rate by 13.3% over 2 years, saving more than \$2.7 million. Meanwhile, a hospital from Miami used ACS-NSQIP to reduce SSIs for general and vascular procedures, cutting its mortality index for those surgeries in half and saving about \$1.6 million over 3 years.

Preventing complications not only protects health and saves lives but also saves money. Recent studies have shown that surgical complications are associated with excess cost and ultimately lower profit margins for hospitals. Specifically, complications can raise the median cost of hospitalization for major surgical procedures up to fivefold,¹⁹ and a major surgical complication generates \$11,626 in average extra costs.²⁰

The Cleveland Clinic SSI Experience

Implementation of CORS SSI Prevention Bundle Project

Since 2005, our institution has been an active participant of the NSQIP, and our SSI rates have been compared with NSQIP data; in 2006, we were found to be a high outlier institution for SSI, with an observed to expected ratio of 1.27. This was due to the high proportion of colorectal procedures we perform compared to other centers, which carries an inherent risk of SSI.⁸ Colorectal procedures represented 17% of all surgical cases at our institution, compared to a nationally reported average of 9% in 2006. Indeed for colorectal procedures reported SSI rate was 14.3% and higher than the SSI rate of 9.4% for general and vascular procedures.

This previous published report from our institution comparing SSIs between our department and all NSQIP centers motivated us to conduct further study to develop unique risk-adjusted SSI model that is specific to colorectal surgery in a tertiary care center.²¹ For this further study, ACS-NSQIP data collected between 2005 and 2010 were queried for all patients who underwent colorectal surgery, and Cleveland Clinic Foundation (CCF) cases were discriminated from all NSQIP data according to case identifier. Patient demographics, preoperative comorbidities, and postoperative

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