Association of Surgical Care Improvement Project Infection-Related Process Measure Compliance with Risk-Adjusted Outcomes: Implications for Quality Measurement

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BACKGROUND: Facility-level process measure adherence is being publicly reported. However, the association between measure adherence and surgical outcomes is not well-established. Our objective was to determine the degree to which Surgical Care Improvement Project (SCIP) process measures are associated with American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) risk-adjusted outcomes.

STUDY DESIGN: This cross-sectional study included hospitals participating in the ACS NSQIP and SCIP (n = 200). ACS NSQIP outcomes (30-day overall morbidity, serious morbidity, surgical site infections [SSI], and mortality) and adherence to SCIP SSI-related process measures (from the Hospital Compare database) were collected from January 1, 2008, through December 31, 2008. Hospital-level correlation coefficients between compliance with 4 process measures (ie, antibiotic administration within 1 hour before incision [SCIP-1]; appropriate antibiotic prophylaxis [SCIP-2]; antibiotic discontinuation within 24 hours after surgery [SCIP-3]; and appropriate hair removal [SCIP 6]) and 4 risk-adjusted outcomes were calculated. Regression analyses estimated the contribution of process measure adherence to risk-adjusted outcomes.

RESULTS: Of 211 ACS NSQIP hospitals, 95% had data reported by Hospital Compare. Depending on the measure, hospital-level compliance ranged from 60% to 100%. Of the 16 correlations, 15 demonstrated nonsignificant associations with risk-adjusted outcomes. The exception was the relationship between SCIP-2 and SSI ($p = 0.004$). SCIP-1 demonstrated an intriguing but nonsignificant relationship with SSI ($p = 0.08$) and overall morbidity ($p = 0.08$). Although adherence to SCIP-2 was a significant predictor of risk-adjusted SSI ($p < 0.0001$) and overall morbidity ($p < 0.0001$), inclusion of compliance for SCIP-1 and SCIP-2 caused only slight improvement in model quality.

CONCLUSIONS: Better adherence to infection-related process measures over the observed range was not significantly associated with better outcomes with one exception. Different measures of quality might be needed for surgical infection. (J Am Coll Surg 2010;211:705–714. © 2010 by the American College of Surgeons)

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Abbreviations and Acronyms

ACSNSQIP = American College of Surgeons National Surgical Quality Improvement Program
CPT = Current Procedural Terminology
O/E = observed-to-expected ratio
SCIP = Surgical Care Improvement Project
SSI = surgical site infection

The best mechanism to evaluate surgical quality of care has not been definitively established. Considerable debate surrounds the appropriate utilization of process compliance versus outcomes measures.[1,2] During the past several years, measure development has focused, to a considerable extent, on processes of care, primarily because these measures are often evidence-based, mutable, nonthreatening, have wide applicability, and lack requirements for risk adjustment of patient- and perioperative-related factors.[3]

In 2003, the Surgical Care Improvement Project (SCIP) was instituted. SCIP is a national partnership of >40 organizations, the aim of which was to reduce preventable surgical mortality and morbidity by 25% by 2010.[4] Process measures were developed to address 3 of the most common surgical complications: surgical site infection (SSI), venous thromboembolism, and cardiac events. Specific to SSI, 6 process measures have been developed based on evidence in the literature and expert panels. These include such things as the administration of the appropriate prophylactic antibiotic within 1 hour before incision. Although all 6 SSI process measures have been endorsed by the National Quality Forum, 4 are publicly reported.[5]

Recently, reports have surfaced that have questioned the validity of quality evaluation using process measures.[6,7] To this end, the current study examines the relationship of the SCIP process measures with clinical, risk-adjusted, audited outcomes data from the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP). By evaluating the relationship between these 2 measures of surgical quality at the hospital level, more informed public and health policy decisions can be made about surgical quality improvement. The specific objective was to assess the association between SCIP infection-related process measure compliance and risk-adjusted outcomes, as measured by the ACS NSQIP.

METHODS

Process measure performance

The Hospital Compare Web site was developed by the Centers for Medicare and Medicaid Services, the Department of Health and Human Services, and members of the Hospital Quality Alliance. Through the Hospital Compare database and Web site, public reports are offered on a quarterly basis showing the compliance of >4,000 hospitals with SCIP, among other, process measures.[8,9] Process measure compliance was determined for each hospital using data released in September 2009 (for hospital discharges between January 2008 and December 2008). From this dataset, all available SSI hospital performance measures were obtained. These include the 4 publicly reported infection-related SCIP process measures: antibiotic administration within 1 hour before incision (SCIP-1), administration of the appropriate prophylactic antibiotic (SCIP-2), discontinuation of prophylactic antibiotics within 24 hours after the end of surgery (SCIP-3), and appropriate hair removal (SCIP-6). Compliance with the control of 6 AM postoperative blood glucose levels in cardiac surgery patients (SCIP-4) was not added to the Hospital Compare database until December 2008. Similarly, at the time of this study, the rate of postoperative wound infection diagnosed during index hospitalization (SCIP-5) and compliance in maintaining normothermia after colorectal surgery (SCIP-7) had not yet been included in the Hospital Compare database. Thus, comparisons with SCIP-4, -5, and -7 could not be evaluated. It should be noted that all hospitals included in this study submitted process measure compliance data for at least 25 eligible patients per measure, which is consistent with Hospital Compare's minimum number of patients for calculating comparative results.

Obtaining risk-adjusted outcomes

Data acquisition

To be consistent with the primary criteria established for patients to be accrued into the SCIP database, patients were identified from the ACS NSQIP database from January 1, 2008, through December 30, 2008, based on the following criteria: at least 18 years of age, inpatient status, and a total hospital length of stay ≤120 days. Patients were also excluded if they had not undergone one of the primary surgical procedures that patients were required to undergo to be accrued into the SCIP database (Table 1); this was accomplished by matching ACS NSQIP Current Procedural Terminology (CPT) codes to International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9 CM) codes using the Ingenix 2008 Procedural Cross Coder Data File (Ingenix, 2008). Patients from hospitals that submitted <25 cases to ACS NSQIP in 2008 were also excluded.

The ACS NSQIP abstracts data, including patient demographics, risk factors, and perioperative 30-day outcomes through review of medical records and communications with patients and providers. The ACS NSQIP sampling strategy, data abstraction methods, variables, and outcomes have been documented previously.[10-12] Data