SCIENTIFIC ARTICLE

Current Quality Measurement Tools Are Insufficient to Assess Complications in Orthopedic Surgery

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Purpose The American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) is a clinically-derived, validated tool to track outcomes in surgery. The Agency for Healthcare Research and Quality Patient Safety Indicators (AHRQ-PSI) are a set of computer algorithms run on administrative data to identify adverse events. The purpose of this study is to compare complications following orthopedic surgery identified by ACS-NSQIP and AHRQ-PSI.

Methods Patients between 2010 and 2012 who underwent orthopedic procedures (arthroplasty, spine, trauma, foot and ankle, hand, and upper extremity) at our tertiary-care, academic institution were identified (n = 3,374). Identification of inpatient adverse events by AHRQ-PSI in the cohort was compared with 30-day events identified by ACS-NSQIP. Adverse events common to both AHRQ-PSI and ACS-NSQIP were infection, sepsis, venous thromboembolism, bleeding, respiratory failure, wound disruption, and renal failure. Concordance between AHRQ-PSI and ACS-NSQIP for identifying adverse events was examined.

Results A total of 729 adverse events (21.6%) were identified in the cohort using ACS-NSQIP methodology and 35 adverse events (1.0%) were found using AHRQ-PSI. Only 12 events were identified by both methodologies. The most common complication was bleeding in ACS-NSQIP (18.1%) and respiratory failure in AHRQ-PSI (0.53%). The overlap was highest for venous thromboembolic events. There was no overlap in adverse events for 5 of the 7 categories of adverse events.

Conclusions A large discrepancy was observed between adverse events reported in ACS-NSQIP and AHRQ-PSI. A large percentage of clinically important adverse events identified in ACS-NSQIP were missed in AHRQ-PSI algorithms. The ability of AHRQ-PSI for detecting adverse events varied widely with ACS-NSQIP.

Clinical relevance AHRQ-PSI algorithms currently are insufficient to assess the quality of orthopedic surgery. *(J Hand Surg Am. 2016;■(■):■−■. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Quality, American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP), Agency for Healthcare Research and Quality Patient Safety Indicators (AHRQ-PSI).

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To deliver cost-effective health care to patients, there is an increasing emphasis on defining patient outcomes and examining quality improvement in orthopedic surgery.[1] A number of studies have utilized national outcomes databases to study patient outcomes and quality of care in several areas of orthopedics including arthroplasty, spinal surgery, hand surgery, and sports medicine.[2–5] Despite this, some controversy exists on what measurements are ideal for measuring outcomes and adverse events.[6] As reimbursement becomes increasingly based on the quality of care provided, it is important for orthopedic surgeons and their institutions to establish not only quality standards with regards to patient outcomes but also tools that accurately reflect quality of care.[7]

The Agency for Healthcare Research and Quality (AHRQ) is the health services research arm of the U.S. Department of Health and Human Services. The Agency for Healthcare Research and Quality's official charge is to examine patient outcomes, effectiveness of care, health care cost, and quality improvement. As part of this effort, AHRQ released the AHRQ Patient Safety Indicators (AHRQ-PSI). The Agency for Healthcare Research and Quality Patient Safety Indicators consist of a set of computer algorithms that utilize International Classification of Diseases—9th Revision, Clinical Modification (ICD-9-CM) diagnosis or procedure codes to identify inpatient adverse events from adult hospital discharge abstracts.[8,9] This is done by identifying secondary ICD-9-CM codes indicative of an adverse event that were not present at the time of admission. As part of the effort to improve quality of care, the Center for Medicare and Medicaid Services is reporting hospital-level performance measures including AHRQ-PSI to reflect surgical quality.[8,10]

The American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) was established to provide institutions and providers with an outcomes database that examined 30-day postoperative risk-adjusted outcomes with rigorous oversight, external validation, and national benchmarking. In contrast to AHRQ-PSI, ACS-NSQIP assigns a trained surgical clinical reviewer using well-defined criteria to identify 30-day surgical outcomes in randomly selected surgical patients. This is in contrast to the AHRQ-PSIs that are based upon administrative codes or claims data, which can be inaccurate because there are no nationally agreed-upon criteria for coding adverse events. In addition, for examining quality in surgery, diagnostic codes are often less accurate than procedural codes and are not directly linked to reimbursement.[11–13] Furthermore, AHRQ-PSIs are limited to only the duration of the patient's hospitalization, thus missing postdischarge complications. A recent study comparing ACS-NSQIP to the United Health System Consortium program showed that 26% more inpatient complications were identified in ACS-NSQIP including 11% more surgical site infections.[14]

Given these limitations, the use of AHRQ-PSI to establish performance measures for hospitals is concerning. A previous study by Cima et al[8] showed that AHRQ-PSI was a poor measure of complications in comparison with ACS-NSQIP for general surgery and vascular surgery patients. The accuracy of AHRQ-PSI for tracking adverse events in orthopedic surgery has not been described. The purpose of this study was to compare the rate of adverse events following orthopedic surgery identified with the AHRQ-PSI algorithms with the outcomes measured by ACS-NSQIP at a single tertiary-care academic institution.

METHODS

Data source

An institutional review board–approved study was conducted analyzing the outcomes of patients who underwent orthopedic surgery at a single academic institution between 2010 and 2012. Current Procedural Terminology codes were used to identify a large variety of procedures including arthroplasty, spine, trauma, foot and ankle, hand, and upper extremity procedures (see Appendix A—available on the *Journal*'s Web site at www.jhandsurg.org—for a list of codes used).

The ACS-NSQIP contains data abstracted by trained surgical clinical reviewers at over 400 institutions nationwide. Random sampling is done from a set of Current Procedural Terminology codes. Preoperative data including patient demographics, comorbidities, and laboratory values are collected. Several well-defined complications are examined within 30 postoperative days including major complications such as death, cardiac arrest, and bleeding and minor complications such as urinary tract infection and wound disruption.[15] American College of Surgeons National Surgical Quality Improvement Project institutions are subject to regular oversight and auditing to ensure accuracy and validity of the submitted data.[16,17] Clinical abstractors receive and are trained using data dictionaries that define the required clinical elements to code an adverse event. At high-volume centers where it is not possible to collect data for all operations meeting program criteria, cases are selected utilizing a systematic sampling process to ensure unbiased collection of 20%