

Choice of Intravenous Antibiotic Prophylaxis for Colorectal Surgery Does Matter

Rhiannon J Deierhoi, MPH, Lillian G Dawes, MD, FACS, Catherine Vick, MS, Kamal MF Itani, MD, FACS, Mary T Hawn, MD, MPH, FACS

BACKGROUND: The Surgical Care Improvement Program endorses mandatory compliance with approved intravenous prophylactic antibiotics; however, oral antibiotics are optional. We hypothesized that surgical site infection (SSI) rates may vary depending on the choice of antibiotic prophylaxis.

STUDY DESIGN: A retrospective cohort study of elective colorectal procedures using Veterans Affairs Surgical Quality Improvement Program (VASQIP) and SSI outcomes data was linked to the Office of Informatics and Analytics (OIA) and Pharmacy Benefits Management (PBM) antibiotic data from 2005 to 2009. Surgical site infection rates by type of IV antibiotic agent alone (IV) or in combination with oral antibiotic (IV + OA) were determined. Generalized estimating equations were used to examine the association between type of antibiotic prophylaxis and SSI for the entire cohort and stratified by use of oral antibiotics.

RESULTS: After 5,750 elective colorectal procedures, 709 SSIs (12.3%) developed within 30 days. Oral antibiotic + IV (n = 2,426) had a lower SSI rate than IV alone (n = 3,324) (6.3% vs 16.7%, $p < 0.0001$). There was a significant difference in the SSI rate based on type of preoperative IV antibiotic given ($p \leq 0.0001$). Generalized estimating equations adjusting for significant covariates of age, body mass index, procedure work relative value units, and operation duration demonstrated an independent protective effect of oral antibiotics (odds ratio [OR] 0.37, 95% CI 0.29 to 0.46), as well as increased rates of SSI associated with ampicillin/sulbactam (OR 2.21, 95% CI 1.37 to 3.56) and second generation cephalosporins (cefotixin, OR 2.50, 95% CI 1.83 to 3.42; cefotetan, OR 2.70, 95% CI 1.72 to 4.22) when compared with first generation cephalosporin/metronidazole.

CONCLUSIONS: The choice of IV antibiotic was related to the SSI rate; however, oral antibiotics were associated with reduced SSI rate for every antibiotic class (J Am Coll Surg 2013;217:763–769. © 2013 by the American College of Surgeons)

Surgical site infections (SSI) are one of the most common hospital acquired infections, and reduction of SSI is a national priority.¹ Infections after surgery are presumed

Disclosure Information: Dr Itani received institutional research support in a grant from Merck and Trius and is on the advisory board of Forrest Pharmaceuticals. All other authors have nothing to disclose.

Funding Source: VA Health Services Research & Development Grant# PPO 10-296.

Presented at the Academic Surgical Congress, New Orleans, LA, February 2013.

Received May 1, 2013; Revised May 30, 2013; Accepted July 1, 2013.

From The Center for Surgical, Medical Acute Care Research and Transitions (C-SMART), Birmingham Veterans Administration Hospital (Deierhoi, Hawn), and the Section of Gastrointestinal Surgery, Department of Surgery, University of Alabama at Birmingham (Deierhoi, Vick, Hawn) Birmingham, AL; the Phoenix VA Healthcare System, Phoenix, AZ (Dawes); and the Department of Surgery, VA Boston Health Care System, Boston University and Harvard Medical School, Boston, MA (Itani).

Correspondence address: Mary T Hawn, MD, MPH, FACS, Department of Surgery, Section of Gastrointestinal Surgery, University of Alabama at Birmingham, 1922 7th Ave South, KB 428, Birmingham, AL 35294-0016. email: mhawn@uab.edu

to be preventable, and SSI process and outcomes measures are used as metrics of surgical quality.^{2,3} Colorectal operations are frequently complicated by SSI, with reported rates ranging from 6% to 30%.^{4,5} Furthermore, SSI after colorectal surgery leads to increased hospital readmissions, costs, and mortality.⁶

In 2002, through a joint effort of the Centers for Disease Control and the Centers for Medicare and Medicaid Services (CMS), the Surgical Improvement Project was developed to reduce preventable SSIs. This program created 3 measures to improve antibiotic prophylaxis: appropriate timing for administration, appropriate choice of antibiotic agent, and discontinuation within 24 hours after surgery. These measures were included in the Surgical Care Improvement Project (SCIP), which was implemented in 2006 with the objective of reducing surgical complications by 25% by 2010.⁷

Few studies have shown that adoption of SCIP prophylactic antibiotic measures have reduced SSI; however,

Abbreviations and Acronyms

OR	= odds ratio
SCIP	= Surgical Care Improvement Project
SSI	= surgical site infection
VASQIP	= Veterans' Affairs Surgical Quality Improvement Project

these reports do not specifically link SCIP measure compliance and SSI at the patient level.⁸⁻¹⁰ In contrast, 3 large cohort studies with patient level data on SCIP adherence and SSI have failed to link SCIP adherence with SSI reduction.¹¹⁻¹³ Each of these studies identified trends approaching significance for appropriate antibiotic selection and SSI, suggesting that the agent selected may be more important than timing of administration and discontinuation. Furthermore, 2 recent large cohort studies have identified a significant reduction in colorectal SSI with the use of oral antibiotics as part of a bowel preparation regimen.^{14,15} Within the guidelines provided by the SCIP, several intravenous antibiotic agents are acceptable and oral antibiotics are discretionary. The purpose of this study was to examine the comparative effectiveness of approved intravenous antibiotics and the use of oral antibiotics on SSI risk for colorectal surgery.

METHODS

This is a retrospective cohort study linking the Veterans Affairs Surgical Quality Improvement Program (VASQIP) preoperative risk and SSI outcomes and the VA Decision Support Systems pharmacy data from 112 hospitals on patients undergoing elective colorectal resections from 2005 to 2009. The study protocol was reviewed and approved by the local VA Research and Development Committee and the Institutional Review Board at the institution of each coauthor, as well as by the Surgical Quality Data Use Group (SQDUG) and the Office of Informatics and Analytics in the VA Central Office, Washington, DC.

Data sources

The VHA Office of Information and Analytics External Peer Review Program contracts with the West Virginia Medical Institute to collect VA hospital SCIP measures. The process began in 2005 according to guidelines set forth by the Joint Commission on Accreditation of Healthcare Organizations and the Centers for Medicaid and Medicare Services. Frequent assessment of the abstracted information to assure reliability is performed.¹⁶ The Veterans' Affairs Surgical Quality Improvement Program (VASQIP) was started in 1991 to analyze risk-adjusted 30-day postoperative morbidity and mortality

data within the VA health care system.^{17,18} The VASQIP collects demographics, preoperative risk and laboratory data, operative data, and 30-day postoperative morbidity and mortality outcomes on a majority of patients undergoing major surgery in the VA health care system. Clinical nurse reviewers, trained in clinical medicine and quality assurance, complete in-depth training on the data collection procedures and detailed definitions of each of the variables. A report of the quality of the data at a sample of VA medical centers showed that the VASQIP data are highly reliable.¹⁶ The VA Decision Support System was queried for prescriptions for oral antibiotic agents of erythromycin, neomycin, and metronidazole within 60 days of surgery.

Study cohort

The study cohort included all elective colorectal operations based on Current Procedural Terminology (CPT) codes with SCIP measure on appropriate antibiotic with matched VASQIP records. We excluded operations for which prophylactic antibiotic agent information was missing ($n = 2,562$) and cases in which an SCIP-approved antibiotic was not used ($n = 1,635$), resulting in a final cohort of 5,750 operations.

Study variables

The independent variable of interest was the specific SCIP-approved prophylactic antibiotic agent. We summarized the choice of intravenous antibiotic or combination as cefoxitin; cefotetan; ertapenem; ampicillin/sulbactam; cefazolin plus metronidazole; and fluoroquinolone plus clindamycin or metronidazole. We also classified whether the patient was prescribed an oral antibiotic in preparation for surgery based on query of the pharmacy data, as previously published.¹³ The dependent variable of interest was the occurrence of a superficial or deep incisional SSI within 30 postoperative days as reported by VASQIP, following the Centers for Disease Control definition. Superficial and deep incisional SSI were combined to create a composite SSI outcomes variable. The VASQIP did not consistently collect organ space SSI during our study period, so we did not include it in our outcomes.

Patient level covariates known to predict the occurrence of SSI, including demographics, lifestyle variables (eg, tobacco and alcohol use), cardiovascular, pulmonary, renal, hepatobiliary, nutritional, and immune comorbidities, were obtained from VASQIP. Surgery characteristics considered in our analyses include type of colectomy (partial, total, rectal, and ileocectomy), approach (laparoscopic or open), American Society of Anesthesiologist (ASA) status, wound classification, and duration of the operation (incision to surgery end time).

Download English Version:

<https://daneshyari.com/en/article/6253081>

Download Persian Version:

<https://daneshyari.com/article/6253081>

[Daneshyari.com](https://daneshyari.com)