

Clinical Science

Readmission after delayed diagnosis of surgical site infection: a focus on prevention using the American College of Surgeons National Surgical Quality Improvement Program



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Abstract

BACKGROUND: Surgical site infection (SSI) is a costly complication leading to increased resource use and patient morbidity. We hypothesized that postdischarge SSI results in a high rate of preventable readmissions.

METHODS: We used our institutional American College of Surgeons National Surgical Quality Improvement Program database to identify patients undergoing general surgery procedures from 2006 to 2011.

RESULTS: SSIs developed in 10% of the 3,663 patients who underwent an inpatient general surgical procedure. SSI was diagnosed after discharge in 48% of patients. Patients with a diagnosis of SSI after discharge were less likely to have a history of smoking (15% vs 28%, $P = .001$), chronic obstructive pulmonary disease (3% vs 9%, $P = .015$), congestive heart failure (0% vs 3%, $P = .03$), or sepsis within 48 hours preoperatively (17% vs 32%, $P = .001$) compared with patients diagnosed before discharge. Over 50% of the patients diagnosed with SSI after discharge required readmission.

CONCLUSIONS: A diagnosis of SSI after discharge is associated with a high readmission rate despite occurring in healthier patients. We propose discharge teaching improvements and a wound surveillance clinic within the first week may result in a decreased readmission rate.

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Hospital-acquired infections account for a significant amount of morbidity associated with postoperative complications.¹ Surgical site infections (SSIs) are costly and represent the second most common hospital-acquired

infection.² In October 2011, the Centers for Disease Control and Prevention Division of Healthcare Quality Promotion put forth the “National Action Plan to Prevent Healthcare-Associated Infections: Roadmap to Elimination,”³ which includes a 5-year national prevention target of a 25% reduction in admission and readmission SSIs. Beginning in 2013, according to the Hospital Readmission Reduction Program within the Patient Protection and Affordable Care Act, hospitals will be penalized by Medicare for a higher than expected readmission rate for acute

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Table 1 Descriptive table comparing SSI versus no SSI

	No SSI (%)	SSI (%)	P value
Totals	3,274 (90.12)	359 (9.88)	
Characteristic			
Age	54.45 (SD = 16.9)	56.35 (SD = 15.94)	.05
BMI	29.78 (SD = 8.95)	30.79 (SD = 9.27)	.01
Race			.0855
White	2,921 (89.22)	327 (91.09)	
Black	156 (4.76)	20 (5.57)	
Other	197 (6.02)	12 (3.34)	
Female sex	1,805 (55.13)	161 (44.85)	.000226
Diabetes	226 (6.9)	30 (8.36)	.32
Smoker	572 (17.47)	80 (22.28)	.295
Dyspnea	324 (9.90)	50 (13.93)	.05
Partial/total functional dependence	316 (9.65)	57 (15.88)	.00046
Ventilator	76 (2.32)	16 (4.46)	.02
COPD	138 (4.22)	23 (6.41)	.059
Ascites	64 (1.96)	12 (3.34)	.11
CHF	47 (1.44)	6 (1.67)	.64
HTN	1,421 (43.4)	173 (48.19)	.09
ARF	19 (.58)	3 (.84)	.47
Dialysis	43 (1.31)	5 (1.39)	.89
Disseminated cancer	156 (4.76)	22 (6.13)	.24
Open wound	182 (5.56)	39 (10.86)	.00025
Steroids	266 (8.12)	19 (5.29)	.062
Weight loss >10% 6 mo preoperatively	165 (5.04)	27 (7.52)	.0609
Bleeding d/o	208 (6.35)	33 (9.19)	.0444
Transfusions within 72 h preoperatively	43 (1.31)	6 (1.67)	.62
Sepsis within 48 h preoperatively	519 (15.93)	91 (25.35)	.00015
Wound class			4.06E-13
Clean	879 (26.85)	39 (10.86)	
Clean/contaminated	1,541 (47.07)	193 (53.76)	
Contaminated	514 (15.7)	60 (16.71)	
Dirty/infected	340 (10.38)	67 (18.66)	
ASA category			6.26E-06
No disturbance	247 (7.55)	12 (3.34)	
Mild	1,766 (53.97)	163 (45.4)	
Severe	1,086 (33.19)	156 (43.45)	
Life-threatening or moribund	173 (5.29)	28 (7.8)	
LOS days	6.79 (SD = 10.35)	12.88 (SD = 14.85)	<.0001
Days before surgery	1.09 (SD = 5.73)	1.35 (SD = 4.99)	.0627
Days after surgery	5.71 (SD = 7.67)	11.52 (SD = 12.90)	<.0001

ARF = acute renal failure; ASA = American Society of Anesthesiologists; BMI = body mass index; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disorder; d/o = disorder; HTN = hypertension; LOS = length of stay; SD = standard deviation; SSI = surgical site infection.

myocardial infarction, congestive heart failure, and pneumonia. The list of conditions that will be monitored for readmission is expected to expand over the upcoming years. SSI is one postoperative complication associated with increased readmissions.^{4,5} Postdischarge complications constitute a large proportion of all complications, with SSI, urinary tract infections, pulmonary embolism, and deep vein thrombosis occurring frequently (34% to 66%) after discharge.⁶ The rate of SSIs has remained stable; however, with a decreasing length of stay, the rate of postdischarge diagnosis of SSI has increased.^{7,8} We sought to characterize patients diagnosed with SSI infection after discharge and readmission rates of this patient population

with the intention of improving surveillance to prevent readmission and the associated complications.

Methods

This is a retrospective analysis of data collected for the National Surgical Quality Improvement Program (NSQIP). The data were collected from January 1, 2006, to June 30, 2011, for the University of Wisconsin by surgical clinical reviewers using an American College of Surgeons–validated 8-day sampling system according to NSQIP guidelines. The data set was filtered to include only

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