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Surgical site infection: comparing surgeon *versus* patient self-report

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ABSTRACT

Background: To compare the rate of surgical site infection (SSI) using surgeon *versus* patient report.

Materials and methods: A prospective observational study of surgical patients in four hospitals within one private health-care system was performed. Surgeon report consisted of contacting the surgeon or staff 30 d after procedure to identify infections. Patient report consisted of telephone contact with the patient and confirmation of infections by a trained surgical clinical reviewer.

Results: Between February 2011 and June 2012, there were 2853 surgical procedures that met inclusion criteria. Surgeon-reported SSI rate was significantly lower (2.4%, P value < 0.01) compared with patient self-report (4.3%). The rate was lower across most infection subtypes (1.3% *versus* 3.0% superficial, 0.3% *versus* 0.5% organ/space) except deep incisional, most procedure types (2.3% *versus* 4.4% general surgery) except plastics, most patient characteristics (except body mass index < 18.5), and all hospitals. There were disagreements in 3.4% of cases; 74 cases reported by patients but not surgeons and 21 cases vice versa. Disagreements were more likely in superficial infections (59.8% *versus* 1.0%), C-sections (22.7% *versus* 17.7%), hospital A (22.7% *versus* 17.7%), age < 65 y (74.2% *versus* 68.3%), and body mass index ≥ 30 (54.2% *versus* 39.9%).

Conclusions: Patient report is a more sensitive method of detection of SSI compared with surgeon report, resulting in nearly twice the SSI rate. Fair and consistent ways of identifying SSIs are essential for comparing hospitals and surgeons, locally and nationally.
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1. Introduction

Prevention, accurate detection, and treatment of surgical site infections (SSIs) are important for patient safety. Approximately 27 million surgical procedures are performed each year in the United States [1]. Among surgical patients, SSI accounts for about 40% of all hospital-acquired infections [2]. Among patients with SSI, 77% of all deaths are related to the infection [1].

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Patients with SSIs incur approximately twice the health-care costs as those without SSIs [3]. The additional cost of managing SSI ranges less than $400 (superficial SSI) to more than $30,000 per case (organ/space SSI) [4], with the potential increased length of hospital stay by 7 d [2].

Reducing the rate of SSI is a priority for quality and safety initiatives in the United States. In 2002, the Centers for Medicare & Medicaid Services (CMS), in collaboration with the Center for Disease Control (CDC) implemented the Surgical Infection Prevention Project to decrease the morbidity and mortality associated with SSI [5]. In 2003, the CMS and the CDC partnered with a number of other professional organizations nationally in the Surgical Care Improvement Project (SCIP) [5,6]. The SCIP focuses on measurement of quality in four broad areas in which the incidence and cost of surgical complications is high: prevention of SSI, venous thromboembolism, adverse cardiac events, and respiratory complications [5,6].

For a variety of reasons, knowing the true SSI rate is important. Surrogates for SSI such as SCIP process measures do not correlate well with surgical outcomes [7–9]. SSI data are essential to quality improvement efforts [10]. Hospital reputation and prestige are tied to these rates because they are publicly reported as part of CMS's Hospital Inpatient Quality Reporting Program [11]. Hospitals are compensated based on SSI rates as part of pay-for-performance programs such as the CMS's Hospital Value-Based Purchasing program [12].

There are concerns that different sources of clinical data (e.g., medical record review, patient report, or surgeon report) may yield different SSI rates [13–18]. A recent review comparing the CDC-National Healthcare Surveillance Network (CDC/NHSN) and the American College of Surgeons–National Surgical Quality Improvement Project (ACS-NSQIP) found an average 8.3% difference in SSI rates within the same hospitals [19]. Despite this potential source of variability, the CDC/NHSN program allows for significant variability and discretion in the surveillance methodology used to determine the SSI rate. These biases call into question the validity of the data when comparing SSI rates across health-care facilities.

The purpose of this study was to identify the difference in SSI rates achieved through patient report *versus* surgeon report. We hypothesize that patient report is a more sensitive source for identifying SSIs.

2. Methods

This study was approved by the institutional review board of the Hawaii Pacific Health System.

2.1. Study design and population

We performed a prospective observational study between February 2011 and June 2012 of the SSI rate within one health-care system consisting of four hospitals in the state of Hawaii: A specialty women/children's 207 bed hospital with approximately 17,000 admissions/y, 7500 surgical cases/y, a case mix index (CMI) of 0.93, approximately 600 physicians, and 69 private–practice surgeons (hospital A). A suburban community 126 bed-hospital with approximately 6500 admissions/y, 7500 surgical cases/y, a CMI of 1.57, 400 private-practice physicians, and 24 private–practice surgeons (hospital B). An urban tertiary care 159 bed-hospital with approximately 7500 admissions/y, 5000 surgical cases/y, a CMI of 1.80, 350 employed physicians, and 22 employed surgeons (hospital C). A rural 72 bed-hospital with approximately 4000 admissions/y, 6000 surgical cases/y, a CMI of 1.10, 192 physicians (private–practice and employed), and 12 employed surgeons (hospital D). Data collection for hospital D ended on May 2012. Hospitals A and C are affiliated with a medical school.

2.2. Identification of surgical cases

All surgical cases performed were identified by methodologies outlined by CDC/NHSN and the American College of Surgeons–National Surgical Quality Improvement Project (ACS-NSQIP) [20,21]. SSI surveillance is one patient safety metric reported to the CDC/NHSN. Surgical cases are identified by International Classification of Diseases–9 procedure codes provided by CDC/NHSN [22]. ACS-NSQIP is an open subscription nationally validated surgical outcomes database. Surgical cases are identified by Current Procedural Terminology codes [20]. Eight of the 10 surgical subspecialties from the ACS-NSQIP "Essentials" program were included (i.e., general surgery, vascular surgery, orthopedic surgery, otolaryngology, plastic surgery, gynecologic surgery, neurosurgery, and urology) [21]. Cardiac and thoracic surgery cases were excluded because they are followed through the Society for Thoracic Surgery National Database. Cesarean sections (C-sections) were included in addition to the eight surgical specialties. ACS-NSQIP identifies cases by a sampling methodology where a trained surgical reviewer [23] abstracts data on an 8-d cycle that allows for case selection with equal representation [20,21]. High-volume, low-risk procedures are limited in this sampling methodology [20,21].

2.3. Definition of SSI

SSI was classified according to the CDC/NHSN or ACS-NSQIP definition as an infection that develops within 30 d after an operation or within 1 y if an implant was placed and the infection seems to be related to the surgery (Appendix 1) [24]. Although both definitions are essentially identical, they varied in the surveillance methodology. SSIs are classified as being either superficial, deep space, or organ/space. Superficial infections involve only the skin and subcutaneous tissue. Deep space infections involve the deeper soft tissues of the incision. Organ/space infections involve any part of the organ or space other than the incised body wall layers that are opened or manipulated during the operation.

2.4. Surgeon-reported SSI

Surgeons or their staff were sent a monthly list of procedures fulfilling CDC/NHSN criteria that they had performed in the preceding month (Fig. 1). All qualifying procedures were included. Surgeons were asked to review the list and identify and provide details for patients that had experienced an SSI. CDC/NHSN criteria for the diagnosis of SSI were included on every form. Surgeons were free to use any source of data available to them to recall whether their patients had had an

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