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Reporting Surgical Site Infections Following Total Hip and Knee Arthroplasty: Impact of Limiting Surveillance to the Operative Hospital

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Background. Public reporting of surgical site infections (SSIs) by hospitals is largely limited to infections detected during surgical hospitalizations or readmissions to the same facility. SSI rates may be underestimated if patients with SSIs are readmitted to other hospitals. We assessed the impact of readmissions to other facilities on hospitals' SSI rates following primary total hip arthroplasty (THA) or total knee arthroplasty (TKA).

Methods. This was a retrospective cohort study of all patients who underwent primary THA or TKA at California hospitals between 1 January 2006 and 31 December 2009. SSIs were identified using *ICD-9-CM* diagnosis codes predictive of SSI assigned at any California hospital within 365 days of surgery using a statewide repository of hospital data that allowed tracking of patients between facilities. We used statewide data to estimate the fraction of each hospital's THA and TKA SSIs identified at the operative hospital versus other hospitals.

Results. A total of 91 121 THA and 121 640 TKA procedures were identified. Based on diagnosis codes, SSIs developed following 2214 (2.3%) THAs and 2465 (2.0%) TKAs. Seventeen percent of SSIs would have been missed by operative hospital surveillance alone. The proportion of hospitals' SSIs detected at nonoperative hospitals ranged from 0% to 100%. Including SSIs detected at nonoperative hospitals resulted in better relative ranking for 61% of THA hospitals and 61% of TKA hospitals.

Conclusions. Limiting SSI surveillance to the operative hospital caused varying degrees of SSI underestimation and substantially impacted hospitals' relative rankings, suggesting that alternative methods for comprehensive postdischarge surveillance are needed for accurate benchmarking.

Keywords. surgical wound infection; orthopedic surgical procedures; infection control; value-based purchasing.

The US Department of Health and Human Services has targeted surgical site infection (SSI) prevention as a national priority [1], and SSI prevention efforts have been led by the Centers for Disease Control and Prevention (CDC), the Centers for Medicare and Medicaid Services (CMS), and the Agency for Health Research and Quality, as well as other quality improvement organizations such as the Institute for Healthcare Improvement. To highlight the importance of SSI prevention for patient safety and cost containment, CMS now requires all acute care hospitals to report SSI data for selected surgical procedures to receive their full annual market basket reimbursement updates as part of the CMS Inpatient Prospective Payment System [2]. Future value-based purchasing is expected to include SSI performance metrics. In addition, many states have legislatively mandated public reporting of SSIs, most commonly after cardiac surgery and total hip and knee arthroplasty procedures.

Conventional SSI surveillance largely focuses on SSIs detected at the hospital where the operation was performed (subsequently referred to as the operative hospital). SSIs diagnosed and treated at other healthcare facilities (nonoperative hospitals) can consequently be missed by conventional surveillance, and this selective surveillance deficit may produce inconsistent SSI capture across hospitals and lead to inaccurate assessments of performance.

In our previous work, we evaluated the use of a diagnosis code–based screening algorithm to identify SSIs following total hip arthroplasty (THA) and total knee arthroplasty (TKA) procedures and found that diagnosis code–based screening had significantly higher sensitivity than routine prospective SSI surveillance by hospital infection prevention programs (89% vs 56% for THA and 81% vs 39% for TKA) [3]. Diagnosis code– based screening also had high positive predictive value (79% for THA and 84% for TKA) for detecting SSIs [4].

The goal of this study was to estimate the proportion of THA and TKA SSIs that would be missed by limiting surveillance to SSIs detected during the initial surgery admission and readmissions to the operative hospital. We applied the previously validated claims-based algorithm to a comprehensive statewide administrative dataset.

PATIENTS AND METHODS

This was a retrospective cohort study utilizing data submitted to the California Office of Statewide Health Planning and Development (OSHPD) from all acute care hospitals in California. California hospitals are required to report line-item data to the OSHPD on all inpatient admissions, including patient demographics and *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) diagnosis and procedure codes, using an unique encrypted patient identifier that is consistent for each individual over time and between admitting healthcare facilities [5]. For this study, we included all patients ≥18 years of age who received an *ICD-9-CM* procedure code for THA (81.51, 81.52) or TKA (81.54) between 1 January 2006 and 31 December 2009. To minimize uncertainty of SSI estimates associated with small sample sizes, we excluded data from hospitals that performed <20 THA or TKA procedures during the study time period; this was consistent with the minimum hospital procedure volume used by the CDC for interhospital SSI comparisons [6]. Additional descriptive information was obtained for each patient from OSHPD data including age, sex, *ICD-9-CM* diagnosis code–based comorbidities, and insurer. This study was approved at the institutional review boards of Harvard Pilgrim Health Care, the UC Regents, and the California Committee for the Protection of Human Subjects.

Among patients meeting our study criteria, we identified SSIs based on the presence of at least 1 previously validated *ICD-9-CM* diagnosis code suggestive of SSIs (998.5, 998.51, or 998.59 for postoperative infection or 996.66 for prosthetic joint infection) [4] within the 365-day postsurgery surveillance period required during the study time period by the CDC's National Healthcare Safety Network (NHSN) SSI definitions for procedures involving implantation of prosthetic material [7]. To avoid uncertainty about SSI attribution, we excluded patients who underwent other surgical procedures targeted by the CMS Surgical Care Improvement Project (SCIP), including coronary artery bypass graft, colorectal, vascular, and hysterectomy procedures, within the 60 days before arthroplasty. For patients undergoing other SCIP procedures within the 365 days following THA or TKA, surveillance for SSI codes was truncated at the time of the subsequent SCIP procedure. If 2 THA or TKA procedures occurred during the same hospitalization, only the second procedure was included in the analysis. We used date of discharge when SSI codes were assigned during the index surgery hospitalization or date of readmission when SSI codes were assigned during readmissions as an estimate for the date of SSI detection.

Data Analysis

Clinical and demographic features of patients with and without SSIs were compared using Fisher's exact test or the Wilcoxon ranksum test for nonparametric data. Time to readmission for SSI was compared for readmissions to the operative hospital versus readmissions to other hospitals using the Wilcoxon rank-sum test.

The percentages of hospital-specific SSIs identified during the index surgery hospitalization, readmissions to the same hospital, and readmissions to other hospitals were calculated. Hospitals with at least 1 SSI were grouped into 4 categories based on the percentage of SSIs detected at nonoperative hospitals: 0%, 1%–49%, 50%–99%, and 100%. Characteristics of hospitals within these groups were compared using 1-way analysis of variance or the Kruskal-Wallis test. All tests were 2-tailed with statistical significance set at $P = .05$.

Finally, we ranked hospitals by SSI rates using 2 SSI measures: (1) SSIs detected at the operative hospital (SSI-operative) and (2) SSIs detected at any California hospital (SSI-all). We produced a risk-adjusted ranking of hospitals using a generalized linear mixed model with hospital random effects developed by our group [8]. We risk-adjusted for individuals' ages in 10-year increments, sex, race, ethnicity, payer, and the presence of 30 *ICD-9-CM*–based comorbidity measures as described by Elixhauser et al [9]. Hospitals were ranked based on their empirical Bayes estimators, or predicted random effects; this results in hospitals with low procedure volumes being drawn away from the extremes. Rankings were used to classify hospitals into quartiles based on SSI-operative rates and SSI-all rates. Statistical testing was performed using SAS statistical software, version 9.3 (SAS Institute).

RESULTS

A total of 91 121 THA and 121 640 TKA procedures were performed between 1 January 2006 and 31 December 2009 in California hospitals, excluding data from hospitals that performed ≤20 procedures during the study period. Among the 327 acute care hospitals in California that performed any THA procedures, 291 (89%) performed at least 20 procedures during the study time period, with a median of 226 procedures per hospital (range, 22– 1832 procedures; interquartile range [IQR], 106–442.5). Among the 319 hospitals that performed any TKA procedures, 286 (90%) performed at least 20 TKA procedures, with a median of 311 procedures per hospital (range, 21–2035 procedures; IQR, 124–588.5).

Demographic information is summarized in Table 1. Among THA patients, 61% were female and mean age at the time of surgery admission was 70.5 years. Among TKA patients, 62% were female and mean age was 67.7 years. Medicare was noted as the payer for 64% and 59% of THA and TKA admissions, respectively, and Medi-Cal (California Medicaid) represented 3% of patients for both procedures. The mean length of stay for the index surgery hospitalization was 5.6 and 4.6 days for THA and TKA, respectively. Patients who developed SSI differed significantly from those who did not develop SSI by index surgery hospitalization length of stay, insurer type, and presence of medical comorbidities including diabetes mellitus, renal failure, liver disease, and congestive heart failure (Table 1).

Table 1. Baseline Characteristics of the Study Population

Characteristic	All THAs	Surgical Site Infection No	Surgical Site Infection Yes	*P* Value	All TKAs	Surgical Site Infection No	Surgical Site Infection Yes	*P* Value
No. of procedures	91 121	89 007	2114		121 640	119 175	2465	
Age, mean (SD)	70.5 (13.8)	70.5 (13.8)	70.2 (14.2)	.4	67.7 (10.4)	67.7 (10.3)	67.2(11.0)	.01
Female, No. (%)	55 574 (61)	54 323 (61)	1251 (59)	.1	75 582 (62)	74 206 (62)	1376 (56)	<.001
Race, No. (%)				.001				<.001
White	78 737 (86)	76 930 (86)	1807 (85)		100 392 (83)	98 423 (83)	1969 (80)	
Black	4024 (4)	3910 (4)	114 (5)		6237 (5)	6066 (5)	171 (7)	
Other	3885 (4)	3782 (4)	103 (5)		8508 (7)	8313 (7)	195 (8)	
Asian/Pacific Islander	3432 (4)	3367 (4)	65 (3)		4962 (4)	4864 (4)	98 (4)	
Unknown	852 (1)	839 (1)	13 (1)		1129 (1)	1105 (1)	24 (1)	
Native American	191 (0)	179 (0)	12 (1)		429 (0)	421 (0)	8 (0)	
Hispanic ethnicity, No. (%)	7122 (8)	6905 (8)	217 (10)	<.001	17 166 (14)	16 781 (14)	385 (16)	.024
Insurer type, No. (%)				<.001				<.001
Medicare	58 079 (64)	56 643 (64)	1436 (68)		71 459 (59)	69 988 (59)	1471 (60)	
Private coverage	27 708 (30)	27 223 (31)	485 (23)		39 688 (33)	38 982 (33)	706 (29)	
Medi-Cal	2991 (3)	2854 (3)	137 (6)		3819 (3)	3697 (3)	122 (5)	
Workers' compensation	999 (1)	972 (1)	27 (1)		5314 (4)	5188 (4)	126 (5)	
Other	951 (1)	927 (1)	24 (1)		1152 (1)	1117 (1)	35 (1)	
Self-pay	383 (0)	378 (0)	5 (0)		208 (0)	203 (0)	5 (0)	
Unknown	10 (0)	10 (0)	0 (0)					
Length of stay, d, mean (SD)	5.6 (4.1)	5.5 (3.9)	8.0 (8.1)	<.001	4.6 (1.9)	4.6 (1.7)	5.8 (5.0)	<.001
Elixhauser comorbidities, No. (%)								
Diabetes w/o chronic complications	10 807 (12)	10 463 (12)	344 (16)	<.001	20 108 (17)	19 646 (16)	462 (19)	.003
Diabetes w/ chronic complications	1987 (2)	1907 (2)	80 (4)	<.001	2422 (2)	2328 (2)	94 (4)	<.001
Congestive heart failure	6052 (7)	5834 (7)	218 (10)	<.001	3132 (3)	3008 (3)	124 (5)	<.001
Renal failure	5564 (6)	5362 (6)	202 (10)	<.001	3525 (3)	3399 (3)	126 (5)	<.001
Lymphoma	472 (1)	459 (1)	13 (1)	.5	264 (0)	252 (0)	12 (0)	.004
Metastatic cancer	844 (1)	810 (1)	34 (2)	.001	114 (0)	104 (0)	10 (0)	<.001
Solid tumor without metastasis	912 (1)	883 (1)	29 (1)	.08	586 (0)	570 (0)	16 (1)	.2
Liver disease	1174 (1)	1110 (1)	64 (3)	<.001	1239 (1)	1171 (1)	68 (3)	<.001
Rheumatoid arthritis/collagen vascular diseases	3127 (3)	3008 (3)	119 (6)	<.001	3923 (3)	3816 (3)	107 (4)	.002
Obesity	8636 (9)	8332 (9)	304 (14)	<.001	22 988 (19)	22 433 (19)	555 (23)	<.001

Abbreviations: SD, standard deviation; THA, total hip arthroplasty; TKA, total knee arthroplasty.

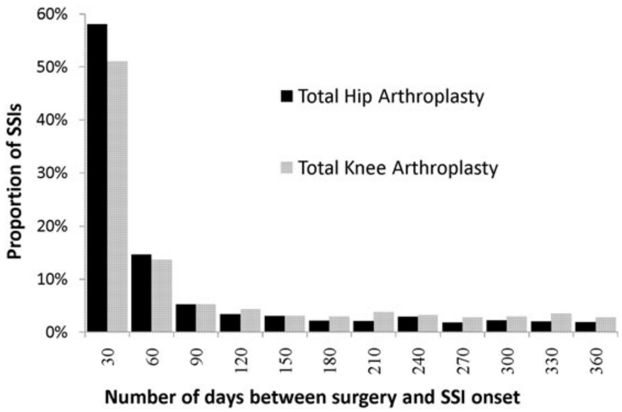


Figure 1. Distribution of the number of days between total hip or knee arthroplasty procedures and surgical site infection diagnosis during the 365 days following surgery. Abbreviation: SSI, surgical site infection.

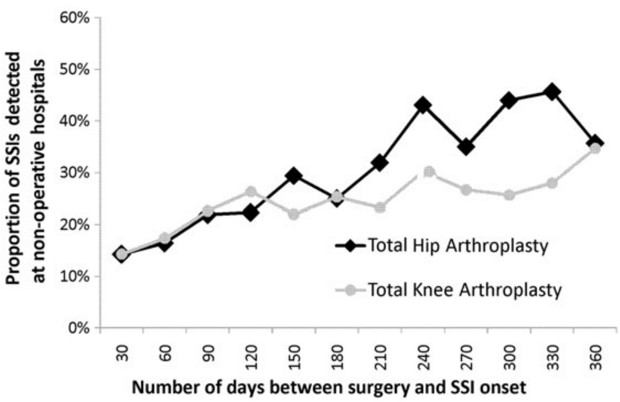


Figure 2. Distribution of the proportion of surgical site infections detected at nonoperative hospitals during the 365 days following surgery. Abbreviation: SSI, surgical site infection.

A total 2114 (2.3%) THA and 2465 (2.0%) TKA procedures were assigned a previously validated *ICD-9-CM* diagnosis code for SSIs within the 365 days following arthroplasty [3, 4]. Sixty percent of THA and 54% of TKA SSIs occurred within 30 days following surgery, 76% of THA and 68% of TKA SSIs occurred within 60 days, and 81% of THA and 74% of TKA SSIs occurred within 90 days (Figure 1). After 90 days, SSI risk was stably low, with an additional 2%–4% of SSIs occurring each subsequent month. When we extended surveillance for SSI codes over a 2-year postprocedure time period, we observed a continued low rate of accrual of additional SSI cases.

Among THA procedures with SSI codes, 15.0% were first assigned during the index surgery hospitalization, 68.2% during a readmission to the operative hospital, and 16.8% during a readmission to a facility that was not the operative hospital. Among TKA procedures with SSI codes, 12.2% were first assigned during the index surgery hospitalization, 70.9% during a readmission to the operative hospital, and 16.9% during a readmission to another hospital.

SSI readmissions to the operative hospital occurred significantly earlier than SSI readmissions to other hospitals. For THA, SSI readmission to the operative hospital occurred at a median of 26 days after surgery (interquartile range [IQR], 16–59 days) and readmissions to nonoperative hospitals at a median of 47.5 days after surgery (IQR, 19–212 days). For TKA, SSI readmissions to the operative hospital occurred at a median of 29 days (IQR, 14–99.5 days) and readmissions to nonoperative hospitals at a median of 58.5 days (IQR, 16.5–199.5 days). Time to SSI readmission was significantly longer for patients readmitted to nonoperative compared to operative hospitals ($P < .001$; Figure 2).

Among THA and TKA procedures performed at each hospital, the proportion of each hospital's SSI detected at nonoperative hospitals ranged from 0% to 100% across California hospitals.

Characteristics of healthcare facilities within groupings based on percentages of SSI readmissions detected at nonoperative hospitals were compared (Table 2). Facilities with higher proportions of SSI detected at nonoperative hospitals performed fewer procedures per year than facilities where most SSIs were detected by the operative hospital. This resulted in a greater discrepancy between SSI-operative and SSI-all rates among lower-volume hospitals.

Including SSI detected during hospitalizations at any California hospital resulted in assignment to a better relative rank for 61% (median improvement of 17 positions) of hospitals performing THA and 61% (median improvement of 15 positions) of hospitals performing TKA, and a poorer rank for 38% (median worsening of 25 positions) of THA hospitals and 37% (median worsening of 24 positions) of TKA hospitals. Ten percent of hospitals with improvements in relative ranking based on all-hospital data improved by at least 47 positions for THA and 44 positions for TKA. Similarly, among hospitals with worsened ranking, 10% of rankings worsening by at least 87 positions for THA and 86 positions for TKA (Figure 3). Limiting this analysis to SSI detected within 90 days of surgery reduced the variation in ranking to some extent; among the 65% of hospitals with improvements in relative ranking based on all-hospital data, there was a median improvement of 14.5 positions for THA and 13 positions for TKA, and among the 33% of hospitals with poorer ranking, there was a median worsening of 28 positions for THA and 18 positions for TKA.

Inclusion of SSIs detected at nonoperative hospitals caused 14 (4.8%) THA and 11 (3.9%) TKA hospitals to be reclassified into the highest (worst) SSI quartile compared to hospital rankings based only on SSI-operative rates. Similarly, including nonoperative hospital SSI resulted in reranking of 16 (5.5%) THA and 15 (5.2%) TKA hospitals into the lowest (best) SSI quartile, mainly among hospitals with the highest percentage of SSIs detected at the operative hospital.

DISCUSSION

The state and national focus on hospital-specific SSI risk and prevention has made SSI reduction an important target for patient safety and quality improvement programs. Utilizing SSI surveillance definitions and methods that objectively and completely ascertain SSI cases across all hospitals will be increasingly important as hospital-specific SSI outcome measures are used to assess the quality of care that those hospitals provide. As hospital-specific SSI risk becomes a component of value-based purchasing, inaccuracies in assessing performance will have important financial ramifications, especially if the impact of those inaccuracies on reported SSI rates is greater for some types of hospitals. Our results suggest that limiting SSI surveillance to infections detected at the operative hospital causes varying degrees of SSI underestimation, leading to substantially flawed relative ranking of hospitals. In general, limiting surveillance to the hospital where the operative procedure was performed appears to disadvantage hospitals with larger surgical volumes for which SSI ascertainment may be more complete. This finding may reflect a higher likelihood that patients are readmitted to larger hospitals that serve as referral centers when infectious complications occur.

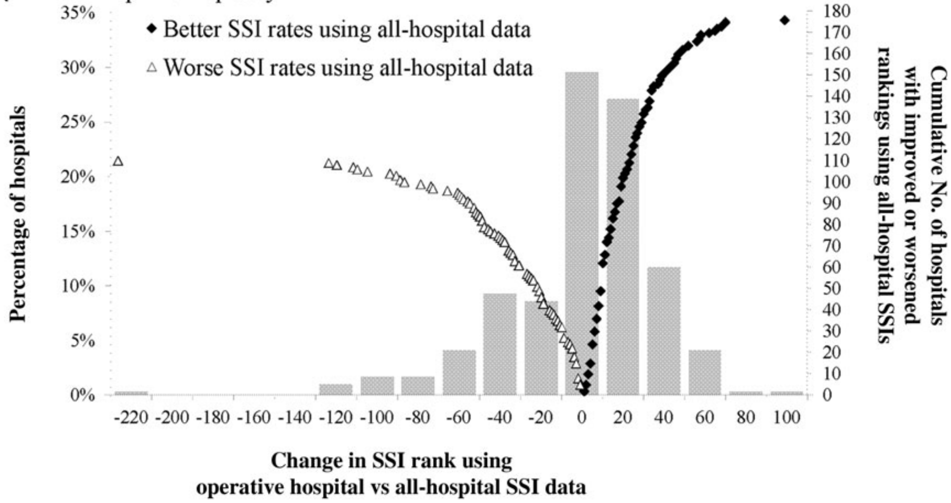
We also found that the majority of THA and TKA SSIs were detected using a surveillance period of 90 days following surgery, supporting the change made by NHSN in January of 2013 to a 90-day surveillance time period for these procedures. Although the CDC NHSN SSI definition [6] during the study time period specified a surveillance period of 365 days following procedures that involve implantation of prosthetic material, we found that SSI risk was low after 90 days and that new SSIs continued to be detected at a low rate up to 2 years after arthroplasty.

Table 2. Characteristics of Hospitals Grouped by the Proportion of Each Hospital's Surgical Site Infections Detected at Non–Index Surgery Hospitals

Characteristic	Proportion of SSIs Detected at Non–Index Surgery Hospitals				
	0%	1%–49%	50%–99%	100%	*P* Value
Total hip arthroplasty					
No. of hospitals	88	128	32	17	
Proportion of SSI readmissions at nonoperative hospitals, median (IQR)	0% (0%–0%)	20% (13.8%–28.6%)	60% (50%–66.7%)	100% (100%–100%)	
No. of procedures, median (IQR)	174 (100–321.5)	409 (235.5–608)	135 (86–221.5)	58 (38–164)	<.001
Readmission SSI rate, using only operative hospital data, median (IQR)	1.7% (0.9%–2.6%)	1.8% (1.2%–2.6%)	0.9% (0.5%–1.3%)	0% (0%–0%)	<.001
Readmission SSI rate, using all CA hospital data median (IQR)	1.7% (0.9%–2.6%)	2.2% (1.7%–3.2%)	2.2% (1.5%–3.2%)	1.9% (1.1%–2.6%)	.002
Insurer type, median (IQR)					
Medicare	68.8% (62.2%–75.2%)	66.4% (58%–73.9%)	60.9% (52.9%–71.3%)	72% (63.6%–82.1%)	.03
Private coverage	22.3% (13.6%–28.6%)	26.3% (19.7%–35.5%)	25.4% (11.9%–40.9%)	15.2% (8.3%–31.9%)	.002
Medi-Cal	2.7% (1.2%–9.6%)	1.6% (0.7%–4.1%)	2.3% (1.1%–5%)	3.4% (1.1%–5.3%)	.1
Workers' compensation	0.8% (0%–1.5%)	0.9% (0.3%–1.5%)	0.7% (0%–1.8%)	0% (0%–2.1%)	.2
Other	0.6% (0%–2%)	0.4% (0%–1.3%)	0.6% (0%–2.8%)	0% (0%–0%)	.7
Self-pay	0% (0%–0.6%)	0.3% (0%–0.6%)	0.3% (0%–1.2%)	0% (0%–1%)	.04
Unknown	0% (0%–0%)	0% (0%–0%)	0% (0%–0%)	0% (0%–0%)	1.0
Age, median (IQR)	75 (71–77)	72 (69.8–75.5)	73 (66.5–76.5)	77 (72–80.5)	.01
Length of stay, d, for index hospitalization, median (IQR)	5 (5–6)	5 (4–5)	5 (4–5.8)	6 (5–6)	<.001
Total knee arthroplasty					
No. of hospitals	93	136	32	8	
Proportion of SSI readmissions at nonoperative hospitals, median (IQR)	0% (0%–0%)	20% (14.3%–33.3%)	57.5% (50%–66.7%)	100% (100%–100%)	
No. of procedures, median (IQR)	226 (102–446)	483 (297.5–766)	192 (127–274)	113 (83–205)	<.001
Readmitted SSI rate, using only operative hospital data, median (IQR)	1.6% (1.0%–2.4%)	1.6% (1.1%–2.3%)	0.8% (0.5%–1.5%)	0% (0%–0%)	<.001
Readmitted SSI rate, using all CA hospital data, median (IQR)	1.6% (1.0%–2.4%)	2.0% (1.4%–2.7%)	2.1% (1.1%–3.2%)	0.9% (0.7%–1.2%)	<.001
Insurer type, median (IQR)					
Medicare	58.5% (52.7%–66%)	59.5% (53.7%–66.1%)	58.5% (52.9%–65%)	61.7% (52.6%–68.3%)	.9
Private coverage	27.7% (19.6%–36.3%)	30.8% (23.9%–36.1%)	28.2% (14.5%–38.9%)	21.3% (14.1%–27.4%)	.1
Medi-Cal	1.8% (0.3%–5.6%)	1% (0.2%–5.2%)	1.6% (0%–8.3%)	7.4% (1.2%–18.4%)	.3
Workers' compensation	3% (0.3%–6.3%)	3.5% (1.3%–5.8%)	5.3% (2.7%–8.4%)	2.5% (0.7%–3.5%)	.04
Other	0.2% (0%–2%)	0.5% (0%–1.5%)	0.7% (0%–1.8%)	0.4% (0%–1.7%)	.7
Self-pay	0% (0%–0.2%)	0% (0%–0.2%)	0% (0%–0.1%)	0% (0%–0.8%)	.6
Unknown	0% (0%–0%)	0% (0%–0%)	0% (0%–0%)	0% (0%–0%)	1.0
Age, median (IQR)	68 (66–70)	68 (67–70)	67 (66–68.8)	68 (67.3–70)	.2
Length of stay, d, for index hospitalization, median (IQR)	4 (4–5)	4 (4–5)	4 (4–5)	4 (4–5)	.3

Abbreviations: CA, California; IQR, interquartile range; SSI, surgical site infection.

A Total Hip Arthroplasty



B Total Knee Arthroplasty

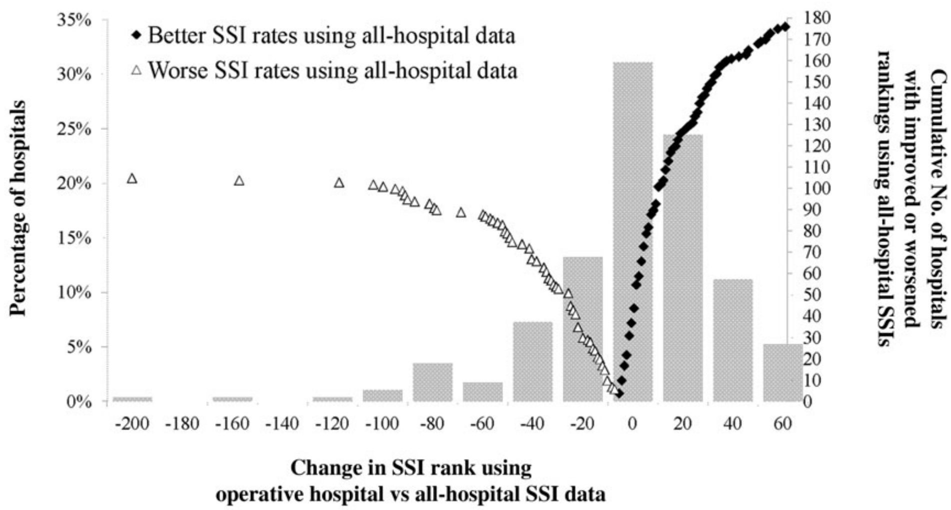


Figure 3. Distribution of the change in each hospital's adjusted surgical site infection (SSI) ranking based on SSI codes from the operative hospital versus any California hospital following total hip (*A*) and total knee (*B*) arthroplasty. Dotted lines show the cumulative number of hospitals with lower (better) and higher (worse) SSI rankings using all-hospital SSI codes. Abbreviation: SSI, surgical site infection.

This suggests that the majority of SSIs presenting after 90 days may be unrelated to perioperative contamination of surgical site and are more likely a consequence of subsequent events (eg, local trauma or bacteremia associated with other infections leading to prosthetic joint infection) rather than perioperative practices. As SSIs detected at nonoperative hospitals occurred later than those detected at the operative hospitals, restricting SSI surveillance to a 90-day window may have the added advantage of reducing the variation in SSI capture when limiting surveillance to the operative hospital.

There are several limitations to this study. First, the use of diagnosis codes to identify SSIs may have over-or-underestimated SSI rates. SSIs that were detected and treated solely in the ambulatory setting would have been missed. Nevertheless, serious SSIs following THA and TKA typically require rehospitalization and would likely have been captured by inpatient diagnosis codes. In addition, prior studies have shown that these codes perform markedly better than routine hospital surveillance, with higher sensitivity and comparable positive predictive value for detecting SSIs following THA and TKA [4, 5]. Second, this study only included data from California hospitals and did not assess the generalizability of these findings to hospitals located in other states.

These results suggest that routine SSI surveillance methods that focus solely on SSIs detected during hospitalizations at facilities where these orthopedic procedures take place may differentially impact the completeness of SSI data among hospitals and lead to inaccurate interhospital, state, and national comparisons. Utilizing large administrative datasets and applying validated *ICD-9-CM* codes for SSI detection allows tracking of healthcare encounters for specific patients across multiple healthcare facilities. This methodology may provide a more complete and accurate picture of SSI risk for public reporting and validation. Until claims-based surveillance can be widely adopted, restricting SSI surveillance to the first 90 days after surgery captures the majority of SSIs and may reduce variation in the completeness of SSI data associated with relatively late-onset infections that are more likely to be detected at other hospitals.

Notes

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All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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