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ORIGINAL ARTICLE

Use of Medicare Diagnosis and Procedure Codes to Improve Detection of Surgical Site Infections following Hip Arthroplasty, Knee Arthroplasty, and Vascular Surgery

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OBJECTIVE. To evaluate the use of routinely collected electronic health data in Medicare claims to identify surgical site infections (SSIs) following hip arthroplasty, knee arthroplasty, and vascular surgery.

DESIGN. Retrospective cohort study.

SETTING. Four academic hospitals that perform prospective SSI surveillance.

METHODS. We developed lists of International Classification of Diseases, Ninth Revision, and Current Procedural Terminology diagnosis and procedure codes to identify potential SSIs. We then screened for these codes in Medicare claims submitted by each hospital on patients older than 65 years of age who had undergone 1 of the study procedures during 2007. Each site reviewed medical records of patients identified by either claims codes or traditional infection control surveillance to confirm SSI using Centers for Disease Control and Prevention/National Healthcare Safety Network criteria. We assessed the performance of both methods against all chart-confirmed SSIs identified by either method.

RESULTS. Claims-based surveillance detected 1.8–4.7-fold more SSIs than traditional surveillance, including detection of all previously identified cases. For hip and vascular surgery, there was a 5-fold and 1.6-fold increase in detection of deep and organ/space infections, respectively, with no increased detection of deep and organ/space infections following knee surgery. Use of claims to trigger chart review led to confirmation of SSI in 1 out of 3 charts for hip arthroplasty, 1 out of 5 charts for knee arthroplasty, and 1 out of 2 charts for vascular surgery.

CONCLUSION. Claims-based SSI surveillance markedly increased the number of SSIs detected following hip arthroplasty, knee arthroplasty, and vascular surgery. It deserves consideration as a more effective approach to target chart reviews for identifying SSIs.

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The Centers for Disease Control and Prevention (CDC) has estimated that nearly 300,000 surgical site infections (SSIs) occur annually in US hospitals, leading to several billion dollars in direct medical costs that are potentially preventable.[1,2] These numbers may be an underestimate for several reasons. First, individual hospitals commit varying degrees of effort and resources to SSI surveillance, leading to inconsistent and incomplete identification of SSIs. Second, the majority of SSIs occur after hospital discharge, with the result that many are neither reported nor linked in a surveillance system to the original procedure.[3,4]

These inconsistencies in SSI detection make interhospital comparisons of SSI rates problematic, and a more standardized approach to SSI surveillance is needed in light of the increasing number of legislative mandates for the public reporting of SSIs. Payer-based claims data containing diagnosis and procedure codes are standardized and routinely collected. In addition, payer claims track the full spectrum of healthcare utilization, regardless of where care is sought. While the value of claims data varies widely by the outcomes being studied, evidence continues to mount about the usefulness of these data for SSI detection. Surveillance based on routinely col-

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lected health data, including inpatient and outpatient claims, has repeatedly been shown to increase identification of SSIs when compared with traditional surveillance by hospital infection prevention programs.[5-10] These demonstrations of increased detection include the use of Medicare claims data to identify SSI following coronary artery bypass graft (CABG) surgery.[11,12]

We explored the potential usefulness of coded diagnoses and procedures captured in claims as the primary trigger for chart review aimed at identifying SSIs after hip arthroplasty, knee arthroplasty, and vascular surgery. These are 3 of the 7 high-volume procedures targeted by the Surgical Care Improvement Project (SCIP), a national partnership of public and private organizations focused on the reduction of surgical complications.

METHODS

We conducted retrospective cohort studies at 4 hospitals to evaluate the performance of diagnosis and procedure codes used to trigger chart review for SSI detection following hip, knee, and vascular surgery. The cohorts included non–health maintenance organization (HMO) Medicare recipients older than 65 years of age who underwent 1 of the SCIP-targeted hip arthroplasty, knee arthroplasty, or vascular surgery procedures between January 1, 2007, and December 31, 2007.[13] We excluded HMO (Medicare Advantage) participants because claims are not required for reimbursement in this group. We used 2007 Medicare data to assure that greater than 99% of relevant Medicare claims had been finalized when we accessed the data in November 2010.

We excluded patients who had another SCIP procedure on the day of their index surgery or in the 60 days before surgery to reduce uncertainty in attributing an SSI to a specific procedure. SCIP has targeted high-volume surgeries with a significant risk of surgical complication, including the 3 procedures in our study plus CABG, other cardiac surgery, colon surgery, and hysterectomy. Patients with multiple surgical dates for the same SCIP procedure during their index hospitalization were also excluded. For patients who underwent another SCIP procedure within the postoperative surveillance period, we looked for evidence of SSI through the date of the second surgery. Finally, we excluded patients who had diagnosis or procedure codes suggestive of infection at the surgical site on the day of surgery or in the 30 days before surgery.

We developed lists of procedure-specific SSI indicator codes to identify possible SSIs following each procedure (appendix). To maximize sensitivity and to account for differential use of codes by hospitals, these lists were intended to include all codes that might be used in the presence of an SSI, even if the specificity of certain individual codes was expected to be low. We did, however, remove cellulitis codes (ICD-9 682.x) due to low discriminatory values, since they flagged a high enough proportion of charts to suggest detection of infection due to other sources. In addition, CDC/National Healthcare Safety Network (NHSN) criteria specifically state that cellulitis is not sufficient to qualify as an SSI. We included International Classification of Diseases, Ninth Revision (ICD-9), and Current Procedural Terminology (CPT) diagnosis and procedure codes submitted under Medicare Part A from inpatient and outpatient facilities as well as Medicare Part B physician claims.

We applied the list of vascular SSI indicators to the period of 60 days following a vascular procedure and the lists of hip and knee SSI indicators to the period of 365 days following hip and knee arthroplasty. CDC recommends SSI surveillance for 30 days following surgeries without prosthetic material and 365 days following surgeries with prosthetic material. This longer surveillance window of 365 days applies to the diagnosis of deep incisional and organ/space SSIs, while superficial incisional SSIs are included only if they occur within 30 days following surgery. While some vascular surgeries do use prosthetic material (eg, non-human-derived graft), there is no way to infer this information from the procedure code. We chose a 60-day rather than a 30-day window for vascular SSI surveillance, since healthcare utilization may occur after the onset of symptoms. We opted not to screen beyond 365 days following hip and knee arthroplasty, on the basis of data showing that the majority of SSIs following these procedures occur within 90 days.[14]

The study was performed in collaboration with the Oklahoma Foundation for Medical Quality acting in its capacity as a national hospital quality resource center for Medicare's Quality Improvement Organization Program. The Oklahoma Foundation for Medical Quality identified Medicare patients at each participating hospital who had undergone a qualifying procedure, and it further identified those with an SSI indicator code in the surveillance period following that procedure.

This study was conducted through an interagency agreement between the Centers for Medicare and Medicaid Services and the CDC. Institutional Review Board approval was received at all participating CDC Prevention Epicenter sites.

The infection prevention program at each hospital was sent a list of Medicare patients who had undergone a study procedure at their hospital and who had been flagged by a procedure-specific SSI indicator code. Personnel at the receiving hospital compared these patients with their own cases captured by traditional infection control surveillance. An experienced infection control researcher then reviewed the full-text medical record for all cases identified by either traditional surveillance or claims-based surveillance, using CDC/NHSN criteria to confirm the presence of an SSI.[15] While the researchers were not blinded as to whether each case was identified by traditional surveillance or claims-based surveillance, the same criteria were used to assess all cases. Each hospital reviewed all inpatient records and any available outpatient records from their medical center.

We assessed the sensitivity of both traditional infection

TABLE 1. Patient Characteristics by Procedure

	Hip arthroplasty	Knee arthroplasty	Vascular surgery
No. of eligible procedures	576	724	366
Age, median (IQR)	76 (70–82)	74 (69–78)	75 (70–79)
Sex, male	224 (39)	269 (37)	237 (65)
Comorbidities			
Diabetes	67 (12)	115 (16)	46 (13)
Diabetes with end organ damage	41 (7)	53 (7)	77 (21)
Renal disease	68 (12)	48 (7)	79 (22)
Coronary artery disease	74 (13)	61 (8)	73 (20)
Congestive heart failure	155 (27)	127 (18)	132 (36)
Romano score[a]			
0	173 (30)	262 (36)	7 (2)
1–4	236 (41)	352 (49)	178 (49)
≥5	167 (29)	110 (15)	181 (49)

NOTE. Data are no. (%), unless otherwise indicated. IQR, interquartile range.
[a] The Romano score is derived from the Charlson index, with higher scores indicative of more comorbid illnesses.[22] This score has been revised to predict mortality in Medicare patients.[23,24]

control surveillance and medical record review triggered by diagnosis and procedure codes. Our gold standard for detection was all confirmed SSIs identified by either method. We also assessed the performance of each individual code, with the goal of removing codes that identified no confirmed SSIs in our pilot study and either consistently captured conditions other than SSI or were felt on further review to be unrelated to SSI. In addition, we tested the performance of more restricted code lists, on the basis of prior work (ICD-9 diagnosis codes 996.66, 998.5, 998.51, and 998.59 for hip and knee arthroplasty and 996.62, 998.5, 998.51, and 998.59 for vascular surgery).[16,17]

RESULTS

Four hospitals evaluated hip and knee arthroplasty, and 3 hospitals evaluated vascular surgery. The nonparticipating hospital for vascular surgery had not performed prospective SSI surveillance for this procedure during the study period. Table 1 shows the patient characteristics for hip arthroplasty, knee arthroplasty, and vascular surgery.

The numbers of eligible procedures and confirmed SSIs are shown in Table 2 along with the sensitivity of both traditional surveillance and claims-based surveillance. We were able to review flagged inpatient records on 71% of admissions for hip arthroplasty, 76% of admissions for knee arthroplasty, and 90% of admissions for vascular surgery. The remainder of flagged inpatient records were at other hospitals. We were able to review flagged outpatient/physician office records for 23% of visits following hip arthroplasty, 52% of visits following knee arthroplasty, and 57% of visits following vascular surgery. Overall, 85% of vascular, 62% of hip, and 35% of knee flags were submitted from inpatient admissions.

For hip arthroplasty, claims-based surveillance yielded a 4.7-fold increase in case detection for all SSIs and a 5-fold increase in case detection of deep incisional and organ/space SSIs. For knee arthroplasty, claims-based surveillance yielded

TABLE 2. Comparison of Surgical Site Infection (SSI) Surveillance Sensitivity Using Traditional Surveillance versus Claims-Based Surveillance

	All identified SSIs (rate, %)	SSIs identified by traditional surveillance (sensitivity, %)	SSIs identified by claims-based surveillance (sensitivity, %)
Hip arthroplasty (n = 576)			
Superficial SSI	4 (0.7)	1 (25)	4 (100)
Deep and organ space SSI	10 (1.7)	2 (20)	10 (100)
Total SSI	14 (2.4)	3 (21)	14 (100)
Knee arthroplasty (n = 724)			
Superficial SSI	3 (0.4)	0 (0)	3 (100)
Deep and organ space SSI	4 (0.6)	4 (100)	4 (100)
Total SSI	7 (1.0)	4 (57)	7 (100)
Vascular surgery (n = 366)			
Superficial SSI	15 (4.1)	7 (47)	15 (100)
Deep and organ space SSI	14 (3.8)	9 (64)	14 (100)
Total SSI	29 (7.9)	16 (55)	29 (100)

TABLE 3. Flag Rates and Surgical Site Infection (SSI) Confirmation Using Claims-Based Surveillance

	No. of procedures flagged at index hospital/no. of eligible procedures (%)	No. of confirmed SSIs/no. of procedures flagged at index hospital
Hip arthroplasty		
Hospital A	12/248	4/12
Hospital B	8/160	3/8
Hospital C	17/127	5/17
Hospital D	5/41	2/5
Hospitals combined	42/576 (7.3)	14/42 (1 : 3)
Knee arthroplasty		
Hospital E	20/302	2/20
Hospital F	8/266	2/8
Hospital G	6/126	3/6
Hospital H	0/30	NA
Hospitals combined	34/724 (4.7)	7/34 (1 : 5)
Vascular surgery		
Hospital I	30/172	14/30
Hospital J	16/80	10/16
Hospital K	8/114	5/8
Hospitals combined	54/366 (14.8)	29/54 (1 : 2)

NOTE. NA, not applicable.

a 1.8-fold increase in case detection for all SSIs, with no increase in case detection of deep incisional and organ/space SSIs. Even though we used a surveillance window of 365 days for hip and knee arthroplasty, the median time from surgery until deep incisional or organ/space SSI was 27 days for hip arthroplasty and 18 days for knee arthroplasty, with 80% and 100% of deep incisional and organ/space SSIs captured within 60 days of surgery for hip arthroplasty and knee arthroplasty, respectively. For vascular surgery, claims-based surveillance yielded a 1.8-fold increase in case detection for all SSIs and a 1.6-fold increase in case detection of deep incisional and organ/space SSIs. The median time from surgery until deep incisional or organ/space SSI was 18 days for vascular surgery. In all 3 procedures, claims-based surveillance did not miss any cases that had been captured by traditional surveillance.

The use of claims to trigger chart review led to confirmation of SSI in 1 out of 3 charts for hip arthroplasty, 1 out of 5 charts for knee arthroplasty, and 1 out of 2 charts for vascular surgery (Table 3). In contrast, infection preventionists at the hospitals participating in this study reported an average of 16 charts reviewed for every 1 confirmed SSI (range, 9–50) based on traditional surveillance practices.

Use of the more restricted code lists (ICD-9 diagnosis codes 996.66, 998.5, 998.51, and 998.59 for hip and knee arthroplasty and 996.62, 998.5, 998.51, and 998.59 for vascular surgery) resulted in identification of all of the SSIs detected by the more inclusive lists (Table 4). Applying these restricted lists of diagnosis codes, we found that the use of claims to trigger chart review led to confirmation of SSI in 1 out of 2 charts for hip arthroplasty, 1 out of 4 charts for knee arthroplasty, and 2 out of 3 charts for vascular surgery.

After assessing the performance of each individual code, we removed 9 of the 70 codes on the hip arthroplasty list, 11 of the 76 codes on the knee arthroplasty list, and 6 of the 29 codes on the vascular surgery list. This included the removal of codes for incision and drainage that were used for dermatologic issues (eg, carbuncle) for all procedures, as well as codes associated with peritonitis (removed from vascular surgery SSI code list) and codes associated with bone infections already classified elsewhere (removed from arthroplasty SSI code lists). Our final procedure-specific SSI indicator codes are shown in the appendix. Since we removed both low-yield codes that did not flag any cases as well as infrequent codes that flagged conditions other than SSI, these revisions had a minimal impact on the number of charts that need to be reviewed for each confirmed SSI. We believe that the larger list of codes deserves further evaluation.

DISCUSSION

Review of charts flagged by diagnosis and procedure codes from Medicare claims identified more patients with chart-validated SSI than routine surveillance following hip arthroplasty, knee arthroplasty, and vascular surgery. Given that this study evaluated hospitals with significant resources dedicated to surveillance, it is possible that the differences might be even greater in hospitals with fewer resources.

We attribute the improved detection of our approach to the fact that traditional surveillance by hospital infection prevention programs relies on a variety of unproven screening strategies to identify patients to evaluate for SSI, such as screening of readmissions, review of daily microbiology results, and surgeon self-report. Often, hospitals do not have an automated method for assessing whether wound cultures

TABLE 4. Sensitivity and Surgical Site Infection (SSI) Confirmation Using a Restricted List of Codes

	Sensitivity (%)	No. of confirmed SSIs/no. of procedures flagged at index hospital
Hip arthroplasty		
ICD-9 codes 996.66, 998.5, 998.51, 998.59	14/14 (100)	14/26 (1 : 2)
Knee arthroplasty		
ICD-9 codes 996.66, 998.5, 998.51, 998.59	7/7 (100)	7/27 (1 : 4)
Vascular surgery		
ICD-9 codes 996.62, 998.5, 998.51, 998.59	29/29 (100)	29/44 (2 : 3)

NOTE. ICD-9, International Classification of Diseases, Ninth Revision.

are derived from a surgical patient, with the result that infection preventionists must review records on all patients with a positive wound culture. Other infection prevention programs have opted to review records on all hospital readmissions following surgery; however, this approach misses infections diagnosed only in the outpatient setting. In addition, traditional surveillance requires review of an average of 16 records for every confirmed SSI, 3–8 times more than what we found for claims-based surveillance. Review of only charts with specific coded diagnoses or procedures increased case detection and limited chart review.

Our code lists were purposefully inclusive in order to maximize sensitivity and account for the possibility that other codes would be preferentially used if certain codes were linked to SSI surveillance. It is important to note, however, that this strategy is associated with lower positive predictive values in this and other studies.[16-19] In fact, the low positive predictive value of diagnosis and procedure codes has been used as an argument against the use of administrative data for SSI surveillance.[18,19] Nevertheless, in practicality, this approach translates to a more efficient chart reviewed to confirmed SSI case ratio and a higher capture of SSI compared with traditional surveillance. While we found that more restricted code lists performed better, it was important to assess code lists that would not be affected by intentional use of alternative codes and thus would provide a sustainable method for SSI surveillance. The inclusiveness of our codes may also help account for variation in hospital coding practices.

These data support the use of coded diagnoses and procedures captured in claims to trigger chart review as the primary method of SSI surveillance for these 3 procedures. While the inclusion of postoperative antibacterial use improves case capture for some procedures, prior work by our team has also shown that diagnosis and procedure codes alone can detect SSIs in these procedures with a high sensitivity.[16,17,20] Similar work has demonstrated the usefulness of this surveillance method for detecting SSI following CABG.[11,12] It is important to note, however, the limitations of this study, which include the use of claims from a single payer. While only half of patients undergoing these procedures are insured by Medicare,[20,21] claims-based approaches to SSI surveillance have been shown to work well when applied across payers in individual hospital settings.[11,16,20] Additional limitations include reviewing flagged records limited to the index institution where the surgery was performed and the fact that coding practices in the 4 evaluated hospitals may not be representative of other US hospitals. It will be important to assess further the performance of our more inclusive lists of SSI indicator codes on a national scale, including evaluation of claims submitted from other hospitals and practices beyond the institution where the surgery was performed.

The performance of these codes may vary depending on the case mix of the patients. The tertiary care nature of the hospitals in this study may have influenced the positive predictive value of our SSI indicator codes. It is possible that the number of charts that would need to be reviewed for each positive result could be different at institutions with lower risk patient populations. Nevertheless, we do note that our prior work on post-CABG SSIs showed a similar positive predictive value in our pilot study in these same hospitals as it did on the national scale.[12]

Finally, the utility of this method is reliant on the speed at which codes are available at both the hospital and national level; however, the required surveillance period for surgical procedures that include prosthetic material includes 365 days postoperatively, allowing ample time for coding, particularly since the majority of SSI occur in the first 90 days.[14]

In summary, use of diagnosis and procedure codes to identify charts for review provides an efficient, labor-saving, and improved method for primary SSI surveillance. This surveillance strategy greatly improves capture of SSIs following arthroplastic and vascular surgery, 3 SCIP procedures that are a focus of national attention and public reporting for reducing healthcare-associated infections. The use of routinely available diagnosis and procedure codes for surveillance has the potential to improve SSI detection and reporting on a local level and allow for more standardized interhospital comparisons on a national level.

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The content is solely the responsibility of the authors and does not necessarily represent the official views of the Agency for Healthcare Research and Quality.

APPENDIX

SUPPLEMENTAL TABLES

TABLE A1. Hip Surgical Site Infection Indicator Codes

Code	Code text
ICD-9 procedure	
84.56	Insertion of cement spacer
86.01	Aspiration of skin and subcutaneous tissue (abscess, hematoma, seroma)
86.04	Other incision with drainage of skin and subcutaneous tissue
86.22	Excisional debridement of wound, infection, or burn
86.28	Nonexcisional debridement of wound, infection, or burn
ICD-9 diagnosis	
686.8	Other specified local infections of skin and subcutaneous tissue
686.9	Unspecified local infection of skin and subcutaneous tissue
711.00	Pyogenic arthritis, site unspecified
711.05	Pyogenic arthritis, pelvis and thigh
711.08	Pyogenic arthritis, other specified sites
711.09	Pyogenic arthritis, multiple sites
711.40	Arthropathy associated with other bacterial diseases, site unspecified
711.45	Arthropathy associated with other bacterial diseases, pelvis and thigh
711.48	Arthropathy associated with other bacterial diseases, other specified sites
711.49	Arthropathy associated with other bacterial diseases, multiple sites
711.90	Unspecified infective arthritis, site unspecified
711.95	Unspecified infective arthritis, pelvis and thigh
711.98	Unspecified infective arthritis, other specified sites
711.99	Unspecified infective arthritis, multiple sites
730.00	Acute osteomyelitis, site unspecified
730.05	Acute osteomyelitis, pelvis and thigh
730.08	Acute osteomyelitis, other specified site
730.09	Acute osteomyelitis, multiple sites
730.10	Chronic osteomyelitis, site unspecified
730.15	Chronic osteomyelitis, pelvis and thigh
730.18	Chronic osteomyelitis, other specified site
730.19	Chronic osteomyelitis, multiple sites
730.20	Unspecified osteomyelitis, site unspecified
730.25	Unspecified osteomyelitis, pelvis and thigh
730.28	Unspecified osteomyelitis, other specified site
730.29	Unspecified osteomyelitis, multiple sites
730.90	Unspecified infection of bone, site unspecified
730.95	Unspecified infection of bone, pelvis and thigh
730.98	Unspecified infection of bone, other specified site
730.99	Unspecified infection of bone, multiple sites
996.60	Infection and inflammatory reaction due to unspecified device, implant
996.66	Infection and inflammatory reaction due to internal joint prosthesis
996.67	Infection and inflammatory reaction due to internal orthopedic device, implant
996.69	Infection and inflammation due to internal prosthetic implant
998.5	Postoperative infection, not elsewhere classified
998.51	Infected postoperative seroma
998.59	Other postoperative infection
998.6	Persistent postoperative fistula

TABLE A1 (*Continued*)

Code	Code text
CPT	
10140	Incision and drainage of hematoma, seroma, or fluid collection
10160	Puncture aspiration of abscess, hematoma, bulla, or cyst
10180	Incision and drainage, complex, postoperative wound infection
12021	Treatment of superficial wound dehiscence; with packing
13160	Secondary closure of surgical wound or dehiscence, extensive or complicated
20000	Incision of soft tissue abscess, superficial
20005	Incision of soft tissue abscess, deep
26990	Incision and drainage, pelvis or hip joint area; deep abscess or hematoma
26991	Incision and drainage, pelvis or hip joint area; infected bursa
26992	Incision, bone cortex, pelvis and/or hip joint (osteomyelitis or bone abscess)
27030	Arthrotomy, hip, with drainage (eg, infection)
27070	Partial excision (eg, osteomyelitis or bone abscess); superficial (wing of ilium, greater trochanter of femur)
27090	Removal of hip prosthesis
27091	Removal of hip prosthesis, complicated, with or without spacer
27122	Acetabuloplasty, resection femoral head (girdlestone)
27301	Incision and drainage, deep abscess, bursa or hematoma, thigh or knee region
27303	Incision, deep, with opening of bone cortex, femur or knee (eg, osteomyelitis or bone abscess)
35860	Exploration for postoperative hemorrhage, thrombosis or infection, extremity

NOTE. CPT, Current Procedural Terminology; ICD-9, International Classification of Diseases, Ninth Revision.

TABLE A2. Knee Surgical Site Infection Indicator Codes

Code	Code text
ICD-9 procedure	
84.56	Insertion of cement spacer
86.01	Aspiration of skin and subcutaneous tissue (abscess, hematoma, seroma)
86.04	Other incision with drainage of skin and subcutaneous tissue
86.22	Excisional debridement of wound, infection, or burn
86.28	Nonexcisional debridement of wound, infection, or burn
ICD-9 diagnosis	
686.8	Other specified local infections of skin and subcutaneous tissue
686.9	Unspecified local infection of skin and subcutaneous tissue
711.00	Pyogenic arthritis, site unspecified
711.05	Pyogenic arthritis, pelvis and thigh
711.06	Pyogenic arthritis, lower leg
711.08	Pyogenic arthritis, other specified sites
711.09	Pyogenic arthritis, multiple sites
711.40	Arthropathy associated with other bacterial diseases, site unspecified
711.45	Arthropathy associated with other bacterial diseases, pelvis and thigh
711.46	Arthropathy associated with other bacterial diseases, lower leg
711.48	Arthropathy associated with other bacterial diseases, other specified sites
711.49	Arthropathy associated with other bacterial diseases, multiple sites
711.90	Unspecified infective arthritis, site unspecified
711.95	Unspecified infective arthritis, pelvis and thigh
711.96	Unspecified infective arthritis, lower leg
711.98	Unspecified infective arthritis, other specified sites
711.99	Unspecified infective arthritis, multiple sites
730.00	Acute osteomyelitis, site unspecified
730.05	Acute osteomyelitis, pelvis and thigh
730.06	Acute osteomyelitis, lower leg
730.08	Acute osteomyelitis, other specified site
730.09	Acute osteomyelitis, multiple sites
730.10	Chronic osteomyelitis, site unspecified
730.15	Chronic osteomyelitis, pelvis and thigh

TABLE A2 (*Continued*)

Code	Code text
730.16	Chronic osteomyelitis, lower leg
730.18	Chronic osteomyelitis, other specified site
730.19	Chronic osteomyelitis, multiple sites
730.20	Unspecified osteomyelitis, site unspecified
730.25	Unspecified osteomyelitis, pelvis and thigh
730.26	Unspecified osteomyelitis, lower leg
730.28	Unspecified osteomyelitis, other specified site
730.29	Unspecified osteomyelitis, multiple sites
730.90	Unspecified infection of bone, site unspecified
730.95	Unspecified infection of bone, pelvis and thigh
730.96	Unspecified infection of bone, lower leg
730.98	Unspecified infection of bone, other specified site
730.99	Unspecified infection of bone, multiple sites
996.60	Infection and inflammatory reaction due to unspecified device, implant
996.66	Infection and inflammatory reaction due to internal joint prosthesis
996.67	Infection and inflammatory reaction due to internal orthopedic device, implant
996.69	Infection and inflammation due to internal prosthetic implant
998.5	Postoperative infection, not elsewhere classified
998.51	Infected postoperative seroma
998.59	Other postoperative infection
998.6	Persistent postoperative fistula
CPT	
10140	Incision and drainage of hematoma, seroma, or fluid collection
10160	Puncture aspiration of abscess, hematoma, bulla, or cyst
10180	Incision and drainage, complex, postoperative wound infection
12021	Treatment of superficial wound dehiscence; with packing
13160	Secondary closure of surgical wound or dehiscence, extensive or complicated
20000	Incision of soft tissue abscess, superficial
20005	Incision of soft tissue abscess, deep
27301	Incision and drainage, deep abscess, bursa or hematoma, thigh or knee region
27303	Incision, deep, with opening of bone cortex, femur or knee (eg, osteomyelitis or bone abscess)
27310	Arthrotomy, knee, with exploration, drainage or removal of foreign body (eg, infection)
27488	Removal, total knee prosthesis, with or without spacer placement
27603	Incision and drainage, leg or ankle, deep abscess or hematoma
27604	Incision and drainage, leg or ankle, infected bursa
27607	Incision (eg, osteomyelitis or bone abscess), leg or ankle
35860	Exploration for postoperative hemorrhage, thrombosis or infection, extremity

NOTE. CPT, Current Procedural Terminology; ICD-9, International Classification of Diseases, Ninth Revision.

TABLE A3. Vascular Surgical Site Infection Indicator Codes

Code	Code text
ICD-9 procedure	
54.0[a]	Incision of abdominal wall (drainage of abscess)
54.19[a]	Other laparotomy (drainage of intraperitoneal abscess or hematoma)
86.01	Aspiration of skin and subcutaneous tissue (abscess, hematoma, seroma)
86.04	Other incision with drainage of skin and subcutaneous tissue
86.22	Excisional debridement of wound, infection, or burn
86.28	Nonexcisional debridement of wound, infection, or burn
ICD-9 diagnosis	
686.8	Other specified local infections of skin and subcutaneous tissue
686.9	Unspecified local infection of skin and subcutaneous tissue
996.60	Infection and inflammatory reaction due to unspecified device, implant, graft
996.62	Infection and inflammatory reaction due to vascular device, implant, graft
998.51	Infected postoperative seroma

TABLE A3 (*Continued*)

Code	Code text
998.59	Other postoperative infection
998.6	Persistent postoperative fistula
CPT	
10140	Incision and drainage of hematoma, seroma, or fluid collection
10160	Puncture aspiration of abscess, hematoma, bulla, or cyst
10180	Incision and drainage, complex, postoperative wound infection
12021	Treatment of superficial wound dehiscence; with packing
13160	Secondary closure of surgical wound or dehiscence, extensive or complicated
20000	Incision of soft tissue abscess, superficial
20005	Incision of soft tissue abscess, deep
35840[a]	Exploration for postoperative hemorrhage, thrombosis or infection, abdomen
35903	Excision of infected graft; extremity
35907[a]	Excision of infected graft; abdomen

NOTE. CPT, Current Procedural Terminology; ICD-9, International Classification of Diseases, Ninth Revision.

[a] Used only for central vascular procedures (ICD-9 procedure codes 38.14, 38.16, 38.34, 38.36, 38.37, 38.44, 38.64, 39.25, 39.26, and any combination of vascular procedures that include 1 of these codes).

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