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Hospital-Based Acute Care After Total Hip and Knee Arthroplasty: Implications for Quality Measurement

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ABSTRACT

Background: Although hospital readmissions are being adopted as a quality measure after total hip or knee arthroplasty, they may fail accurately capture the patient's postdischarge experience.**Methods:** We studied 272,853 discharges from 517 hospitals to determine hospital emergency department (ED) visit and readmission rates.**Results:** The hospital-level, 30-day, risk-standardized ED visit (median = 5.6% [2.4%–13.7%]) and hospital readmission (5.0% [2.6%–9.2%]) rates were similar and varied widely. A hospital's risk-standardized ED visit rate did not correlate with its readmission rate ($r = -0.03$, $P = .50$). If ED visits were included in a broader "readmission" measure, 246 (47.6%) hospitals would change perceived performance groups.**Conclusion:** Including ED visits in a broader, hospital-based, acute care measure may be warranted to better describe postdischarge health care utilization.

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Osteoarthritis is a common and debilitating condition for which total joint arthroplasty can improve a patient's quality of life [1]. In the Medicare population alone, over 1 million total hip and knee arthroplasties were performed in 2010 at a cost of nearly \$20 billion [2]. Medicare and Medicaid were the largest payers, accounting for

more than 80% of reimbursements for patients aged >65 years [3]. These procedures are often completed safely with a reported short-term complication rate for either procedure of 4%–6% and mortality rates of <1% [4,5]. However, there has been growing concern that patients may experience adverse events after home discharge resulting in the need for subsequent hospital readmission. Patients who are readmitted have often experienced complications from their surgical procedure, such as joint dislocation or surgical site infections, or have had an exacerbation of a comorbid medical condition [6,7]. As such, the Centers for Medicare and Medicaid Services will now measure and report hospital readmission rates after total hip and knee arthroplasties [8].

Although current efforts are focusing specifically on hospital readmissions, this may underestimate a patient's hospital-based health care utilization after discharge [9]. Currently, the readmission rate after elective total hip and knee arthroplasties has been reported at 5.0%–6.0% [10,11]. However, patients may also have experienced adverse events after discharge prompting a

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presentation to the emergency department (ED) but not requiring a hospital admission [9]. In this case, patients may have experienced pain, nausea or vomiting, or local wound complications. These also represent clinically meaningful events for patients, add costs to care, and can be influenced by modifiable factors including the availability of a health care provider after discharge [12]. Failing to account for these events in a “readmission” measure may misrepresent a hospital’s perceived performance and could ultimately impact their reimbursement [13].

Despite the import of ED utilization after discharge to patients and policy makers, there is a paucity of data regarding the frequency of ED visits after total joint arthroplasty. Understanding the full spectrum of hospital-based acute care needs is important for capturing the patient experience after discharge and may provide additional information for quality measurement. Therefore, we conducted this study of patients undergoing elective total hip or knee arthroplasty in 4 states. Using methods based on currently proposed measures [14], we sought to estimate the frequency of hospital readmissions and ED visits after discharge for total joint arthroplasty, describe the timing and most common diagnoses associated with these events, evaluate variation in risk-standardized ED visit and hospital readmission rates across hospitals, and determine whether including ED visits in existing “readmission” measures would impact a hospital’s perceived quality.

Methods

We conducted a retrospective cohort study using discharge data from the 2009–2010 California, Florida, Nebraska, and New York inpatient [15] and ED [16] databases. These data are collected at the state level and made available to researchers through the Agency for Healthcare Research and Quality’s Healthcare Cost and Utilization Project (HCUP). The inpatient databases are a census of discharges from all acute care, nonfederal, community hospitals. Each discharge abstract contains up to 21 International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) procedure codes and 15 diagnostic ICD-9-CM codes, as well as information about patient demographics, anticipated payer, and discharge disposition. The ED databases provide comparable data for ED visits that do not result in hospital admission. These states were chosen for study because of their large size accounting for nearly 25% of the adult population in 2010 [17], geographic diversity, and the availability of unique variables that allow patients to be followed over time and across the inpatient and ED settings. Except where noted, the following patient selection process, definition of outcome, and risk adjustment strategy were based on the Center for Medicare and Medicaid Services’ proposed total joint arthroplasty readmission measure [14].

Patient Selection

Using the inpatient databases, we identified all discharges for state residents who underwent total hip (ICD-9-CM 81.51) or total knee arthroplasty (ICD-9-CM 81.54) between July 1, 2009 and September 30, 2010 (N = 284,768). Next, we sequentially excluded discharges associated with a principal diagnosis of a femur, hip, or pelvic fracture; mechanical complications; malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, bone or bone marrow; or metastatic neoplasm (N = 281,983). Then, we excluded discharges with concurrent procedure codes for partial hip arthroplasty, revision, resurfacing procedures, or those with >2 total hip or knee arthroplasty procedure codes (N = 277,924). Finally, we excluded discharges where the patient was transferred in to the index hospital or had a discharge disposition of transfer to another

acute care facility, left against medical advice, or death. For this study, we also excluded hospitals having 70 or fewer discharges for total joint arthroplasty (25th percentile) meeting the above criteria within the study time frame (N = 277,237). This was done to focus the analysis on centers routinely performing elective total joint arthroplasty, to exclude cases that may have been miscoded, and to allow a more stable estimate of outcome rates (See Appendix 1).

Assessment of Outcomes

The primary outcomes for this study were hospital readmission, ED visits, and a composite measure (hospital

Table 1
Description of Patients Undergoing Total Hip or Knee Arthroplasty Between January 2009 and September 2010.

Variable	N	%
Discharges	272,853	100.0
Age (y), median (SD)	67.0	(10.8)
Sex		
Male	104,968	38.5
Female	165,559	60.7
Missing	2,326	0.9
Race and ethnicity		
White	207,939	76.2
Black	16,431	6.0
Hispanic	20,419	7.5
Other	10,444	3.8
Missing	17,620	6.5
Primary payer		
Medicare	159,835	58.6
Medicaid	7,648	2.8
Private	93,694	34.3
Self-pay	11,676	4.3
State of residence		
California	113,436	41.6
Florida	81,391	29.8
Nebraska	10,106	3.7
New York	67,920	24.9
Procedure		
Total knee arthroplasty	181,809	66.6
Total hip arthroplasty	91,044	33.4
Skeletal deformities	1,720	0.6
Posttraumatic osteoarthritis	1,875	0.7
Morbid obesity	12,862	4.7
History of infection	3,494	1.3
Metastatic cancer and acute leukemia	385	0.1
Cancer	4,368	1.6
Diabetes and diabetes with complications	51,647	18.9
Protein-calorie malnutrition	982	0.4
Disorders of fluid/electrolyte/acid-base	9,079	3.3
Rheumatoid arthritis and inflammatory connective tissue disease	12,241	4.5
Severe hematological disorders	816	0.3
Dementia and senility	3,215	1.2
Major psychiatric disorders	6,368	2.3
Hemiplegia, paraplegia, paralysis, functional disability	740	0.3
Polyneuropathy	7,861	2.9
Congestive heart failure	2,712	1.0
Chronic atherosclerosis	36,119	13.2
Hypertension	178,606	65.5
Arrhythmias	5,683	2.1
Stroke	324	0.1
Vascular or circulatory disease	4,081	1.5
Chronic obstructive pulmonary disease	20,010	7.3
Pneumonia	1,569	0.6
End-stage renal disease or dialysis	140	0.1
Renal failure	2,677	1.0
Decubitus ulcer or chronic skin ulcer	616	0.2
Cellulitis, local skin infection	2,146	0.8
Other injuries	10,871	4.0
Major symptoms, abnormalities	25,471	9.3

SD, standard deviation.

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