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## Reasons for Ninety-Day Emergency Visits and Readmissions After Elective Total Joint Arthroplasty: Results From a US Integrated Healthcare System

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## ABSTRACT

**Background:** Previous studies evaluating reasons for 30-day readmissions following total joint arthroplasty (TJA) may underestimate hospital-based utilization of healthcare resources during a patient's episode-of-care. We sought to identify common reasons for 90-day emergency department (ED) visits and hospital readmissions following primary elective unilateral TJA.

**Methods:** Patients from July 1, 2012 through June 30, 2015 having primary elective TJA and at least one 90-day postoperative ED-only visit and/or readmission for any reason were identified using the Kaiser Permanente Total Joint Replacement Registry. Chart reviews for ED visits/readmissions included 13 surgical and 11 medical reasons. The 2344 total hips and 5520 total knees were analyzed separately.

**Results:** Incidence of at least one ED visit following total hip arthroplasty (THA) was 13.4% and 4.5% for readmissions. The most frequent reasons for ED visits were swelling (15.6%) and pain (12.8%); the most frequent reasons for readmissions were infection (12.5%) and unrelated elective procedures (9.0%). The incidence of at least one ED visit following total knee arthroplasty (TKA) was 13.8%, and the incidence of readmission was 5.5%. The most frequent reasons for ED visits were pain (15.8%) and swelling (15.6%); the most common readmission reasons were gastrointestinal (19.1%) and manipulation under anesthesia (9.4%).

**Conclusion:** Swelling and pain related to the procedure were the most frequent reasons for 90-day ED visits after both THA and TKA. Readmissions were most commonly due to infection or unrelated procedures for THA and gastrointestinal or manipulation under anesthesia for TKA. Modifications to discharge protocols may help prevent or alleviate these issues, avoiding unnecessary hospital returns.

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The demand for total joint arthroplasty (TJA) continues to rise, with surgical rates that outpace the number of orthopedic surgeons [1]. Projected estimates suggest an increase in the United States (US) of approximately 35% for total hip arthroplasty (THA) from 378,089 in 2015 to 511,837 in 2020, and an estimated 48% increase in total knee arthroplasty (TKA) from 926,527 in 2015 to 1,375,574 in 2020 [2]. The increasing demand for TJA will similarly make

financial demands on healthcare delivery systems. In 2010, 1.05 million joint arthroplasties were performed with a total approximate cost of \$19,000 per joint for a total of \$20 billion in healthcare expenditure [3]. The anticipated rise in surgical volume makes it imperative for surgeons to control costs within the episode-of-care, while maintaining a high standard of quality and patient satisfaction.

In the US, the Centers for Medicare and Medicaid Services initiated the Bundled Payments for Care Improvement Initiative (BPCI), with the proposed goals of controlling costs while rewarding quality of care. Under model 2 of the BPCI, the episode of TJA includes the inpatient stay in an acute care hospital plus the postacute care and all related services up to 90 days after hospital discharge [4]. This bundle includes all hospital and outpatient care,

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including any related readmissions. Hospital admissions in this patient population have been shown to be high at baseline, and to increase further in the 365 days after the arthroplasty procedure. Bohm et al [5] found the frequency of admissions in the preoperative year to increase in the 1-year postoperative period for both elective THA (12.9%-14.8%) and elective TKA (10.2%-15.5%) patients, representing a 15% and 52% increase, respectively, illustrating both the importance and challenge of finding ways to decrease hospital readmissions.

The current emphasis on readmission following TJA in the US is understandable given the risk in penalty of up to 3% of annual hospital Medicare payments for excessive readmissions under the Affordable Care Act. However, this focus on readmission underestimates hospital-based utilization of healthcare resources [6]. It is estimated that 5.6%-13.9% of hospital discharges following TJA present to the emergency department (ED) only within 30 days of discharge [7,8]. An accurate assessment of the impact to our healthcare system must therefore also include ED visits.

The combined demands of an increasing number of patients undergoing TJA and increasing pressures for cost containment make it imperative to address all aspects of patients' recovery and resource utilization. The goal of this study is to identify reasons for visits to the ED and for readmissions in the first 90 days following THA and TKA separately. In evaluating the reasons for events, we hope to establish baseline numbers for future comparison and guide preventative efforts.

## Materials and Methods

### Study Setting and Population

We conducted a descriptive study including patients who underwent an elective primary unilateral THA or TKA at 3 high-volume Southern California hospitals within our integrated healthcare

system between July 1, 2012 and June 30, 2015 and subsequently had at least one event within 90 days of the primary procedure. An event was defined as an ED-only visit and/or a readmission. Only patients with an event to a hospital within our integrated healthcare system were included since ED visit and readmission information from outside hospitals was not available in the electronic health record (EHR). Events where the patient left without being seen, and care not documented in the EHR were excluded. Patients younger than the age of 18 and those who underwent a same-day bilateral TJA or revision surgery were excluded.

### Data Collection

TJA patients from the 3 participating medical centers were identified using the Kaiser Permanente Total Joint Replacement Registry (TJRR). Detailed information on TJRR coverage, data collection procedures, and quality assurance has been detailed previously [9,10]. Information extracted from the TJRR included patient characteristics (age, gender, and American Society of Anesthesiologists [ASA] classification) and primary procedure characteristics (diagnosis, date of procedure, and in-hospital length of stay [LOS]).

The institutional EHR was used to identify events within 90 days of the TJA and the reasons for events. ED-only visits occurring within the 90-day time frame were identified as an "Emergency" admission to the hospital, while readmissions were identified as an "Inpatient" stay. For readmissions, the admit source was classified as either through the ED or outside the ED. The reasons for events were reviewed and classified by orthopedic surgeon investigators. The surgeon reviewers classified the primary cause of each 90-day event using 24 prespecified reasons for return. These reasons were either surgically related or medically related (Table 1). Surgical-related causes included cellulitis, constipation, deep infection, deep vein thrombosis (DVT), dislocation, hematoma drainage,

**Table 1**  
Prespecified ED Visit and Readmission Cause Categories.

Relation to the Surgical Procedure	Primary Cause Category	Category Inclusion Examples
Surgical	Cellulitis	
	Constipation	
	Deep infection	
	Deep vein thrombosis	
	Dislocation	
	Hematoma/drainage	
	Manipulation under anesthesia	
	Pain related to the primary procedure	Operative leg pain, including med refills
	Pulmonary embolism	
	Serous drainage	
Swelling of the operative extremity	Echymosis, edema, incisional concerns, patient or family concern about swelling, wound appearance	
Medical	Wound dehiscence	
	Other related to the primary procedure	Neuropraxia
	Cardiovascular	Anemia, chest pain, hypertension, hypotension, vascular
	Elective procedure unrelated to the primary procedure	Elective TJA for the opposite side
	Endocrine	Diabetes mellitus, thyroid disorders
	Fever of unknown origin	
	Gastrointestinal not including constipation	Cholecystitis, diarrhea, gastrointestinal bleed, small bowel obstruction, sore throat
	Genitourinary	Dehydration/dizziness, electrolytes, fluids, hematuria, renal failure, retention, urinary tract infection
	Neurological	Altered mental status, headache, migraine, stroke, syncope, transient ischemic attack, vertigo
	Pain unrelated to the primary procedure	Nonoperative leg musculoskeletal pain/injury, operative leg pain away from surgical site (eg, calf pain, compression hose issues)
Pulmonary		Cough, hematemesis, pneumonia, shortness of breath
	Other medical unrelated to the primary procedure	Allergic reaction, anxiety, failure to thrive/cope, general health concerns, medication reaction/overdose
	Other musculoskeletal complaints	Ankle sprain, back pain, cervicalgia, chest wall pain

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