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Hip Fracture Does Not Belong in the Elective Arthroplasty Bundle: Presentation, Outcomes, and Service Utilization Differ in Fracture Arthroplasty Care

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ABSTRACT

Background: Center for Medicare and Medicaid Services reimbursement is the same for hip arthroplasty performed electively for arthritis and urgently for femoral neck fracture.
Methods: An analytic report of hip arthroplasty for a 5-hospital network identified 2362 cases performed from January 2014 to May 2016. Resource utilization was determined using 90-day charges.
Results: The fracture population (623 hips) was older ($P < .01$), had more medical comorbidities (28.3% vs 3.8%, $P < .01$), and was more likely to be anemic and malnourished ($P < .01$), and had longer hospital stay (5.7 vs 3.0 days, $P < .0001$), more frequent intensive care unit admission (4.5% vs 0.5%, $P < .01$), less frequent discharge to home (16.2% vs 83.6%, $P < .01$), more emergency department visits (26.5% vs 10.7%, $P < .01$), and more readmissions after hospital discharge (25.2% vs 12.2%, $P < .01$). Utilization of services ($50,875 vs $38,705, $P < .0001$) and the standard deviation of these services ($22,509 vs $9,847, $P < .0001$), from 90-day charges, were significantly greater in the fracture population.
Conclusion: This study supports exclusion of fracture care from the Comprehensive Care for Joint Replacement bundled payment program.

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The Medicare Access and CHIP Reauthorization Act has led to rapid institution of alternative payment models by the Center for Medicare and Medicaid Services (CMS), including the current Comprehensive Care for Joint Replacement (CJR) bundled payment program [1]. Rather than bundling payment by common diagnoses, the current CJR program has bundled payment to conveners based on surgical procedure. In the example of hip arthroplasty, the same surgical procedure is performed for 2 disparate diagnoses: chronic insidious arthritis vs acute femoral neck fracture. Whereas CJR was created in an effort to decrease variability in quality and cost of care, concern has been raised that the uncontrolled variation in patient presentation for the hip fracture population is far greater than the variation in care under the control of the medical providers, which creates an inequitable transfer of risk to the providers [2–4].

Recent reports on discordant outcomes between hip arthroplasty for arthritis and fracture have employed both claims report databases and national surgical registries [2,3]. These reports are noted to have inherent biases created by data collection techniques, either by trained coders or registry reviewers. Recent reports highlight the underreporting of comorbidities in administrative claims data and the underreporting of surgical complications in prospective surgical registries [2,3]. While suggesting differences exist in postoperative complications and readmission rates between these 2 hip arthroplasty groups, the differences and occurrence rates likely are grossly underrepresented in the surgical registries reports.

In contrast to insurance claims data and surgical registries that require human interpretation of the medical record, analytical reports provide automated queries of the electronic medical record (EMR). In the present study, the entirety of a 5-hospital network EMR database was queried to extract a large cohort of hip arthroplasty patients performed for either arthritis or acute fracture from January 2014 to May 2016. In this study, analytical reporting

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determined the variation in clinical presentation, differences in surgical outcomes, and the relative financial impact for these 2 diagnostically different groups of patients undergoing the same surgical procedure. Whereas few would argue with the concept that hip fracture and hip arthritis populations are different in their clinical presentation and outcomes, the purpose of this study was to document and quantify these differences in support of recent American Academy of Orthopaedic Surgeons and American Association of Hip and Knee Surgeons efforts to separate these 2 diagnoses from a common payment bundle.

Methods

An analytic report of lower-extremity joint arthroplasty care (Diagnosis-Related Group [DRG] 469/470) was generated to analyze the EMR for all patients of a 5-hospital network from January 2014 to May 2016. This analytic report allows unrestricted real-time analysis of the entire EMR held in a relational database management system. Database tables are created and then updated by an ETL process in which EMR data are **E**xtracted daily, **T**ransformed to fit relational databases, and then **L**oaded into database tables. This ETL process provides a real-time view of patient care providing actionable data for analysis.

The arthroplasty analytic report extracted data from multiple fields that were categorized for:

(1) Patient presentation characteristics, including age, gender, presence of major complications or comorbidities (MCC) as well as 6 modifiable medical risk factors selected by hospital network orthopedic leadership (anemia [Hgb < 10.0 g/dL]; malnutrition [serum albumin < 3.4 g/dL]; obesity [BMI > 50 kg/m^2]; uncontrolled diabetes [glucose > 180 mg/dL or Hgb A1C > 8.0%]; tobacco use [month before admission]; and narcotic use [prescription filled month before surgery]).
(2) Difference in surgical outcomes including surgeon name and surgical day of week, number of patients who required intensive care unit (ICU) admission during the incident procedure, hospital length of stay (LOS), discharge destination, and incidence and total number of both network emergency department (ED) visits and network hospital readmissions during the first 90 days after surgery was documented.
(3) Total charges incurred across the 5-hospital network during the 90 days following all initial procedures. Charges were determined by applying a standard "Chargemaster"; a consistent list of charges for any service or product offered across the hospital network, and represent an estimate of services and costs for labor, facility use and improvement, current and projected technology, and the provision of underinsured care. While not representing actual dollars billed or collected, charges provide a common metric to compare utilization of medical services.

The arthroplasty analytical report is an ongoing hospital network–directed initiative. Institutional review board approval was obtained to present these data. Primary analyses of data focused on differences in measures between elective and fracture hip arthroplasty patients. Statistical analysis was done by employing 2-tailed Fisher exact test for categorical outcome measures (ICU, ED visit, hospital readmission), and analysis of variance for continuous variables (LOS, charges). Significance was defined as $P < .05$.

Table 1
Comparison of Fracture vs Elective Hips.

Variable	Fracture (N = 623 Hips)	Elective (N = 1739 Hips)	*P* Value
Female	443 (71.1%)	945 (54.3%)	<.01
Mean LOS	5.7	3.0	<.0001
Discharged to home	101 (16.2%)	1454 (83.6%)	<.01
DRG 469 (with MCC)	176 (28.3%)	66 (3.8%)	<.01
Patient ICU	28 (4.5%)	8 (0.5%)	<.01
Patient ED visits	165 (26.5%)	186 (10.7%)	<.01
Patient readmissions	157 (25.2%)	213 (12.2%)	<.01
Malnourished (serum albumin < 3.4 g/dL)	242 (38.8%)	106 (6.1%)	<.01
Anemic (Hgb < 10 g/dL)	61 (9.8%)	23 (1.3%)	<.01
Obese (BMI > 50 kg/m^2)	1 (0.2%)	15 (0.9%)	.07
Diabetic (glucose > 180 mg/dL/Hgb A1C > 8%)	36 (5.8%)	34 (2.0%)	<.01
Narcotic	56 (9.0%)	413 (23.7%)	<.01
Smoker	172 (27.6%)	586 (33.7%)	<.01
Mean charges	$50,875	$38,705	<.0001
Standard deviation of charges	$22,509	$9847	<.0001

P values: Fisher exact test or independent samples *t* test of patients with risk factors vs those without, as appropriate. Significance $P < .05$.
LOS, length of stay; DRG, Diagnosis-Related Group; MCC, major complications or comorbidities; ICU, intensive care unit; ED, emergency department; Hgb, hemoglobin; BMI, body mass index.

Results

Hip arthroplasty was performed for 623 acute femoral neck fractures and 1739 elective cases. Significant differences in clinical presentation, surgical outcomes, and medical resource utilization were noted between the 2 groups (Table 1). Patient age was normally distributed for the elective population while skewed toward older age in the hip fracture population, $P < .01$ (Fig. 1). Although few elective patients had MCC (3.8%), nearly one-third (28.3%) of the fracture population had MCC (DRG 469), $P < .01$. Comparison of modifiable risk factors between the 2 groups indicated a higher prevalence of both anemia (9.8% vs 1.3%, $P < .01$) and malnutrition (38.8% vs 6.1%, $P < .01$) in the hip fracture population (Table 1).

Surgical outcomes data also were statistically significantly different between the groups, with the fracture population requiring greater hospital LOS (5.7 days vs 3.0 days, $P < .0001$), increased need for ICU care during the incident hospitalization (4.5% vs 0.5%, $P < .01$), and additional inpatient hospital care after initial discharge (Table 1). While 83.6% of the elective patients were discharged home, only 16.2% of fracture patients were discharged home, $P < .01$. During the first 90 days after hip arthroplasty, fracture patients required significantly more hospital services than the elective population: more ED visits (26.5% vs 10.7%, $P < .01$) and an increased percentage of hospital readmission (25.2% vs 12.2%, $P < .01$) compared with the elective hip arthroplasty patients.

Total hospital network medical service utilization was statistically significantly greater in the fracture population, with 90-day mean charges of $50,875 in the fracture population compared with $38,705 for the elective arthroplasty population ($P < .0001$). The standard deviation in charges was significantly greater in the fracture population than in the elective population ($22,509 vs $9,847, $P < .0001$), demonstrating the greater variability in service utilization by the fracture population.

Discussion

All lower-extremity arthroplasty procedures are grouped into a common bundled payment program under the recent CJR alternative payment model; however, two distinctly different patient populations undergo hip arthroplasty: patients with arthritis

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