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Medicaid payer status is linked to increased rates of complications after treatment of proximal humerus fractures

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Background: Low socioeconomic status and Medicaid insurance as a primary payer have been associated with major disparities in resource utilization and risk-adjusted outcomes for patients undergoing total joint arthroplasty. With the expansion of Medicaid through the Affordable Care Act in 2014, examination of these disparities has become increasingly relevant for the treatment of proximal humerus fracture (PHF).
Methods: The Healthcare Cost and Utilization Project Nationwide Inpatient Sample database was used to identify patients who were treated for PHF from 2002 to 2012. Primary outcomes included treatment type, surgical fixation method, in-hospital complications, mean length of stay, and mean total charges for Medicaid patients vs. a matched privately insured cohort. In an effort to minimize confounding variables, each Medicaid patient was matched to a privately insured patient on the basis of gender, race, year of procedure, and age.
Results: Of the 678,831 patients treated with PHF, 4.9% (33,263) had Medicaid as the primary payer during the 10-year period. Medicaid patients were found to have a significantly higher risk ($P < .05$) of postoperative in-hospital complications, including postoperative infection (odds ratio [OR], 2.00 [1.37-2.93]), wound complications (OR, 1.69 [1.04-2.75]), and acute respiratory distress syndrome (OR, 1.34 [1.15-1.59]).
Conclusions: Medicaid patients have a significantly higher risk for certain postoperative hospital complications and consume more resources after treatment for PHFs. Additional work is needed to understand the optimal treatment type for Medicaid patients and to understand the complex interplay between socioeconomic status and outcomes to ensure appropriate resource allocation and risk stratification.
Level of evidence: Level III; Retrospective Cohort Design Using Large Database; Treatment Study

Keywords: Medicaid; proximal humerus; fracture; payer status; outcomes; resource utilization; orthopedic trauma

Institutional Review Board approval was not required. The data are deidentified and commercially available online.

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Although the Medicaid program began as a health coverage program for individuals on welfare, it has since grown into the largest public health insurance program in the United States, covering more than 60 million patients.[5,9] The

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creation of the Affordable Care Act further expanded the Medicaid program by creating a national Medicaid minimum eligibility level of 133% of the federal poverty level beginning in 2014, which has been estimated to increase the number of eligible individuals by approximately 12 million.[5] Low socioeconomic status and Medicaid insurance as a primary payer have been shown to influence resource utilization and risk-adjusted outcomes in many different medical disciplines.[6,8] These disparities highlight the complex interactions among patient factors, access to care, socioeconomic status, and outcomes.[10,19] Studies have identified that Medicaid patients undergoing total joint arthroplasty are more likely to be younger, black, and smokers, with multiple medical comorbidities, higher body mass index, and lower preoperative and postoperative patient-reported outcome scores.[13] Little is known about the relationship of payer status to resource utilization and outcomes in the orthopedic trauma population.

Payer status can influence patient outcomes after orthopedic procedures. Recently, several studies have used the National Inpatient Sample (NIS) database to examine the effect of payer status on patient outcomes. One study, for example, reported that privately insured patients had a 53% reduction of in-hospital mortality after total knee arthroplasty compared with Medicare patients, whereas patients insured by Medicaid had a 34% increased risk of major in-hospital complications.[17] Furthermore, studies have highlighted possible reasons for the poor short-term outcomes suffered by Medicaid patients. One such study found that opioid misuse was more prevalent in Medicaid-insured patients and that it was associated with increased morbidity and mortality after orthopedic procedures.[14] In addition, another study found that Medicaid patients are more likely to develop surgical site infections after shoulder arthroplasty.[20] Thus, payer status appears to have a significant impact on outcomes for orthopedic patients.

Clearly, traumatic injuries can occur across all payer types and socioeconomic spectra. Proximal humerus fracture (PHF) is the third most common fragility fracture after hip and distal radius fractures, accounting for 4% to 5% of all fractures and 50% of humerus fractures in the United States.[1] The incidence is projected to increase during the next 20 years. Kim et al projected that by 2030, there will be 275,000 visits annually to the emergency department for PHF vs. 184,000 in 2008.[11] One study identified associations between specific risk factors in patients with PHF and inpatient adverse events, mortality, and discharge to short-term or long-term care facilities. Whereas there are many well-known risk factors for adverse outcomes after orthopedic surgeries,[2,15,18] their role in influencing outcomes after PHF are nonetheless interesting. Specifically, older age, concomitant femur or femoral neck fractures or head trauma, congestive heart failure, and chronic alcoholism were associated with increased inpatient adverse events.[16] Obesity, congestive heart failure, and dementia were associated with discharges to short-term or long-term care facilities.[16] Thus, given the significant epidemiology of PHF, it is important to identify factors that may influence patient outcomes and the overall health care cost associated with managing these common fractures.

Because the incidence of PHF is projected to increase nearly 1.5-fold in the next 20 years and current evidence suggests that more of these fractures are being treated surgically than ever before, we wanted to further evaluate factors that may influence outcomes and overall health care cost in patients with PHF. The purpose of this study was to examine the impact of primary payer status on patients being treated for PHF, specifically differences in outcomes and health care cost for Medicaid patients vs. those who are privately insured. We predicted that Medicaid patients will have a higher complication rate and use more resources after PHF even when differences in demographics and comorbid conditions are controlled for.

Methods

The Healthcare Cost and Utilization Project (HCUP), sponsored by the Agency for Healthcare Research and Quality, conducts an annual survey to create a sample of discharges from all hospitals called the NIS.[12] The NIS database is derived from billing data that hospitals submit to statewide data organizations and represents a 20% sample of discharges from all hospitals taking part in the HCUP.[12] Because the sample represents one-fifth of all discharges, weighted estimates are calculated to analyze data on a national scale. The NIS includes information from discharged patients insured by Medicare, Medicaid, or private insurance as well as from those who are uninsured. Along with patient demographics, information of up to 25 medical conditions and 15 procedures can be included, allowing in-depth analysis of factors that influenced treatment patterns and outcomes.[12] The NIS uses the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) codes to allow convenient analysis of the discharges. Because of the large size of the database, the NIS is particularly well suited for epidemiologic studies related to specific procedures or diseases in the national population.[3,4]

Using a design described by Browne et al,[5] we obtained discharge data from the NIS to conduct a retrospective study of comorbidities, treatment patterns, and complications following hospitalization for PHFs in relation to payer status. We identified PHFs from 2002 to 2012 by using the ICD-9 codes 812.0 (closed fracture of upper end of humerus) and 812.1 (open fracture of upper end of humerus). The NIS uniform primary payer variable was used to identify payer status. Using Comorbidity Software (version 3.7) provided by HCUP,[12] we processed data for 29 independent comorbidities. In an effort to minimize confounding variables, these comorbidities were used within the Coarsened Exact Matching algorithm to match Medicaid and privately insured patients on the basis of both comorbidities and the demographic characteristics of gender, race, year of procedure, and age.

Primary outcomes of interest included surgical fixation method, in-hospital complications, mean length of stay, and mean total charges. We used ICD-9 codes to identify the following complications in secondary diagnosis fields: respiratory, hematoma/seroma, wound complication, infection, anemia, venous thrombotic event, acute respiratory distress syndrome, device complication, and mortality. We investigated 4 PHF surgical treatments, including open reduction–internal fixation, hemiarthroplasty, reverse shoulder arthroplasty, and