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## ORIGINAL ARTICLE

# The effect of lower socioeconomic status insurance on outcomes after primary shoulder arthroplasty

Larry D. Waldrop II, MD, Joseph J. King III, MD, John Mayfield, BS, Kevin W. Farmer, MD, Aimee M. Struk, MEd, ATC, Thomas W. Wright, MD, Bradley S. Schoch, MD\*

Department Orthopaedic Surgery and Rehabilitation, University of Florida, Gainesville, FL, USA

**Background:** Patient-reported outcomes (PROs) are becoming increasingly important to define successful outcomes. With the potential transition toward quality-based reimbursement, identifying risk factors for poor surgical outcomes becomes increasingly important. This study compared functional and PROs of primary shoulder arthroplasty in patients aged younger than 65 years with lower socioeconomic insurance compared with those with private insurance.

**Methods:** A retrospective review of all primary shoulder arthroplasties in patients aged younger than 65 was performed at a single institution. Patients were stratified according to insurance type (private vs. Medicare/Medicaid) with 2-year minimum follow-up. Preoperative, postoperative, and improvements in range of motion, visual analog scale (VAS) pain, and PROs were compared.

**Results:** We evaluated 143 shoulders (64 Medicare/Medicaid, 79 private insurance). Age, race, diagnosis, and type of arthroplasty were similar between groups. Patients with Medicare/Medicaid insurance demonstrated worse PROs before and after surgery, despite similar range of motion at both assessments. Despite poorer PROs postoperatively, both groups demonstrated similar improvements after surgery. Complications and reoperation were more common in the socioeconomically disadvantaged group (14% vs. 9%,  $P = .3$ ; 11% vs. 6%,  $P = .2$ , respectively).

**Discussion:** Medicaid and Medicare patients aged younger than 65 years undergoing shoulder arthroplasty demonstrate poorer preoperative and postoperative PRO measures compared with similar patients with private insurance. However, both groups demonstrate similar improvements in scores from baseline.

**Level of evidence:** Level III; Retrospective Cohort Design; Treatment Study

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\*Reprint requests: Bradley S. Schoch, MD, Department Orthopaedic Surgery and Rehabilitation, University of Florida, 3450 Hull Rd, Gainesville, FL 32611, USA.

E-mail address: [schochs@ortho.ufl.edu](mailto:schochs@ortho.ufl.edu) (B.S. Schoch).

As health care payment models continue to evolve, patient-reported outcome (PRO) measures are becoming increasingly important to document postoperative improvement and evaluate successful outcomes. Health care insurance in the United States has traditionally operated on a fee-for-service reimbursement model. More recently, there has been a movement

to alter physician payments based on quality of care.<sup>19</sup> With shoulder arthroplasty volumes expected to increase by upwards of 750% in the next 2 decades, identifying risk factors for poor outcomes measures is important for surgeons because these may affect future reimbursement rates.<sup>16</sup>

Multiple PROs have been used to evaluate shoulder arthroplasty<sup>2,5,12,14,18</sup> and to quantify and compare patient outcomes across populations.<sup>3</sup> Socioeconomic status was shown to be an independent predictor of poorer functional outcomes after total knee arthroplasty (TKA). In a study of 316 TKAs, Feldman et al<sup>7</sup> demonstrated that patients living in lower socioeconomic neighborhoods, as defined by home address, were more likely to have higher pain scores and worse function than those with a higher economic profile. Higher pain and poorer function may play a role in lower PRO scores seen in socioeconomically disadvantaged patients.<sup>9</sup>

Identifying patients at risk for lower PRO scores is important for patient counseling and establishing postoperative expectations. The relationship between socioeconomic status and outcomes after hip and knee arthroplasty has consistently demonstrated poorer PRO.<sup>7,15</sup> Whether similar results are true after shoulder arthroplasty remains unclear. The goal of this study was to compare functional and PROs in patients with lower socioeconomic status (based on insurance status) with a control group of private insurance after primary shoulder arthroplasty. We hypothesized that low socioeconomic status patients undergoing primary shoulder arthroplasty would have lower PROs compared with their noneconomically disadvantaged peers but similar improvements in functional scores at a minimum of 2-year follow-up.

## Materials and methods

A retrospective comparative review of our institution's prospectively collected shoulder arthroplasty database was performed to identify all patients aged less than 65 years undergoing primary shoulder arthroplasty with an anatomic or reverse prosthesis between 1997 and 2015 with a minimum of 2 years of follow-up. All patients who undergo shoulder arthroplasty at our institution are electively enrolled into this database. The study excluded patients who underwent arthroplasty for acute fractures, proximal humeral nonunion/malunion, and tumors. Operations were performed by 1 of 3 fellowship-trained shoulder surgeons at a single hospital.

From this population, shoulder arthroplasty patients were stratified according to their insurance provider at the time of surgery. Patients with Medicare (disability) or Medicaid were considered economically disadvantaged. Patients in Florida are eligible for Medicaid based on household size and relatively low income (<https://www.benefits.gov/benefits/benefit-details/1625>). Similarly, patients younger than 65 may qualify for Medicare insurance if their mean monthly income is less than \$1,170 and they have qualified for Social Security disability for more than 24 months. Medicare coverage is also available for patients with end-stage renal disease on dialysis, kidney transplant recipients, patients with amyotrophic lateral sclerosis, and retired railroad workers. The cutoff of 65 years of age was chosen to allow this socioeconomically disadvantaged group to be identified because Medicare coverage is available for all United

States citizens after the age of 65. The senior surgeon (T.W.W.) performed a similar percentage of operations on patients in both groups (85% of socioeconomically disadvantaged patients and 93% of patients with private insurance), with no preference for lower-income patients to be treated by more junior surgeons ( $P = .14$ ).

Patient medical records were retrospectively reviewed to verify preoperative insurance status. Prior surgery and comorbidities at the time of surgery were also recorded. Comorbidities routinely kept in our database include hypertension, heart disease, diabetes, tobacco use, kidney disease, and liver failure. Range of motion and PROs from preoperative and postoperative visits were collected via a prospective research database. Active forward elevation, abduction, and external rotation were measured in degrees using a goniometer through our routine data collection process in accompaniment with our physical therapy department. Active internal rotation was recorded as the most cephalad vertebral segment reached by the thumb in an attempt to reach behind the back. Functional outcome scores evaluated included the Shoulder Pain and Disability Index (SPADI), the 12-item Simple Shoulder Test (SST-12), the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES), the 12-item Short Form Health Survey (SF-12), and the Constant Shoulder Score.<sup>2,5,12,14,18</sup> All postoperative complications and reoperations were recorded.

Descriptive statistics are described as mean (standard deviation) for continuous measures and number (percentage) for discrete variables. Statistical analysis was performed using SPSS 24 software (IBM, Armonk, NY, USA). Patient groups were compared using a paired *t* test for normally distributed data. The Mann-Whitney *U* test was used for nonparametric data. Nominal data were assessed using the  $\chi^2$  test. Statistical significance for all tests was set at  $\alpha = 0.05$ .

## Results

### Clinical outcomes

Of 443 primary shoulder arthroplasties performed during the study period, 143 shoulders met inclusion criteria. There were 64 patients in the socioeconomically disadvantaged insurance group and 79 in the private insurance group. Women represented a larger portion of the socioeconomically disadvantaged group compared with the private insurance shoulders ( $P = .04$ ). Both groups were similar in age, race, preoperative diagnosis, comorbidities, prior surgery, and distribution of anatomic vs. reverse shoulder arthroplasty (RSA). Demographic data are reported in [Table I](#).

Preoperatively, both groups demonstrated similar forward elevation, abduction, and external rotation ([Table II](#)). Internal rotation was significantly greater in the private insurance group (SI joint vs. L5), but the clinical significance of this is unknown. The socioeconomically disadvantaged group had significantly higher pain (7.3 vs. 6,  $P < .001$ ) and significantly poorer PROs (SF-12, SPADI, SST-12, ASES, University of California Los Angeles Shoulder Rating Scale, and Constant scores). After surgery, both groups independently demonstrated significant improvements in all range of motion and outcome scores ( $P < .001$ ). Similar to preoperative measures, postoperative range of motion measurements were

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