Do Socioeconomic Factors Affect Outcomes Following Total Shoulder Arthroplasty?

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INTRODUCTION: While there has been a significant increase in total shoulder arthroplasty (TSA) since 2000, there is a lack of comprehensive research on socioeconomic factors affecting TSA outcomes. The purpose of this study is to determine the effects of socioeconomic factors on patient outcomes following aTSA and rTSA.

METHODS: All aTSA and rTSA cases from the National Inpatient Sample (NIS; N=128,376) database from 2011-2019 as well as the Nationwide Readmission Database (NRD; N=103,023) from 2010-2019 were analyzed. Self-identified ethnicities assessed in NIS included Caucasian (CC), African American (AA), and Hispanic (H). Ethnicities were compared to Caucasians. NRD cases were assessed by insurance status (Medicare, Medicaid, self- pay, and private) and zip code income Quartiles (Q1-4, with Q1 being the lowest). Insurance types and Q1-3 were compared to private insurance and Q4, respectively. TSA cohort parameters studied included ethnicity, income, and insurance status and were analyzed by assessment of comorbidity score, length of stay (LOS), extended LOS (LOS > 2 days), discharge locations, readmission, mortality, revisions, and any complication up to 180 days of follow up. Demographic data, quantitative variables, and binary categorical variables were analyzed using Chi-square test of independence, one-way ANOVA with Tukey-Kramer post hoc analyses, and binary logistic regression, respectively. Independent variables used in regression analysis were age, sex, race, primary insurance type, income quartile, Charlson Deyo comorbidity score, congestive heart failure, chronic pulmonary disease, diabetes mellitus, hypertension, obesity, peripheral vascular disorders, and coagulopathies.

RESULTS: For NIS, AA had the highest percent Q1 and comorbidities of all ethnicities ($p<.001$), increased lengths of stay ($p<.001$), increased discharge to a new facility or with home health ($p<.001$), and a 20% increased risk of complications or revisions ($p<.001$). Assessing only Q1 patients, AA still had the highest comorbidities and lengths of stay ($p<.001$). The majority of H were Q1 ($p<.001$) with increased comorbidities ($p<.001$), lengths of stay ($p<.001$), discharge to new facility or with home health ($p<.001$) and complications ($p=.003$). In Q1 patients, H had increased length of stay ($p<.001$) compared to CC. For NRD, Medicare patients had increased comorbidities, the highest length of stay of all insurance types, and increased discharges with home health or to a new facility (all $p<.001$). Medicare patients also had a 20% increased risk of complication or LOS > 2 days (both $p<.001$), increased risk of readmission ($p<.001$), and a 30% increased risk of revision ($p<.001$). Medicaid patients had the highest mean comorbidity score, and a 60% increased mean comorbidity score ($p<.001$), mean length of stay ($p<.001$), and proportion of patients discharged to a new care facility ($p<.001$). Medicaid patients also had the highest risk of length of stay extension, complication, and readmission. They had a 60% increased risk of complication ($p<.001$), a 40% increased risk of readmission ($p<.001$), and an 80% increased risk of LOS > 2 days ($p<.001$). Self-pay patients had increased discharge to a new care facility ($p<.001$) and 50% increased risk of LOS > 2 days ($p=.006$). The majority of Medicare and self-pay were Q3, and the majority of Medicaid were Q1 ($p<.001$). As far as quartiles, Q1 had the highest increased comorbidities and risks of all quartiles, increased LOS ($p<.001$), discharges to new care facilities or with home health ($p<.001$), increased LOS >2 days ($p=.02$), a 30% increased risk of complication or revision ($p<.001$, $p=.002$), a 20% increased risk of readmission ($p<.001$), and an 80% increased risk of mortality ($p=.02$). Q2 and Q3 had increased comorbidities, discharge to a new facility or with home health, complication (all $p<.001$), and a 20% increased risk of revision ($p=.003$, $p=.002$) and readmission ($p=.001$, $p=.002$).

DISCUSSION AND CONCLUSION: The socioeconomic factors studied - ethnicity (AA, H, NA), zip code income (Q1, Q2, Q3), and insurance status (Medicare, Medicaid, or self-pay) - were all shown to have significantly increased risk for adverse outcomes following TSA. These included higher rates of comorbidities, increased complication rates, readmission rates and revision rates, higher rates of discharge to another facility, increased length of hospital stay and higher mortality. Private insurance status, CC and zip code income Q4 were all predictive of significantly less adverse outcomes. Further study is needed to assess the education status, cultural norms, and opportunities in minority ethnicities, lower income patients, and non-private insurance types to determine the cause of these disparities.