

# Economic and Education Disparities are Associated with an Increased Risk of Revision Surgery Following Shoulder Arthroplasty

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## INTRODUCTION:

There is limited literature exploring how non-medical factors such as, social, educational, or other economic disparities influence post-operative outcomes following shoulder arthroplasty. Accordingly, the objective of the present study was to assess the impact of these social determinants of health disparities (SDHD) on postoperative outcomes and costs, following both anatomic and reverse total shoulder arthroplasty. Additionally, this study aims to determine which, if any of the SDHD categories, have the greatest impact on surgical outcomes. We hypothesized that patients with a history of SDHD would have an increased risk for adverse outcomes following shoulder arthroplasty.

## METHODS:

A retrospective cohort review of Mariner Claims Database was used to capture patients undergoing either a primary anatomic total or reverse shoulder arthroplasty from 2015 to 2019Q3 with at least one year of active longitudinal follow up. Patients with proximal humerus fractures, stress fractures, or septic arthritis were excluded. Patients were then divided into two cohorts based on the presence of a current or previous history of SDHD. The SDHD cohort was comprised of four non-mutually exclusive categories: economic, educational, social, and environmental disparities. Subsequently a control cohort was matched at 1:1 ratio to the SDHD cohort. Primary outcomes measures were the following 90-day postoperative complications: minor and major medical complications, emergency department visits, readmission, and infection. Additionally, the following one year outcomes were assessed: aseptic loosening, instability, and revision arthroplasty. Surgical costs and 90-day postoperative costs were collected using averaged insurance reimbursements for both the control and SDHD cohorts.

## RESULTS:

There were 5,190 patients in each cohort. Economic disparities made up the largest portion of the SDHD cohort (n=4,631, 89.2%), followed by social (n=741, 14.3%), environmental (n=417, 8.0%), and educational (n=99, 1.9%). Compared to the control cohort, SDHD were associated with an increased risk of major complications (2.3% vs. 1.4%, OR 1.55, 95% CI 1.29-1.87, p<0.001), minor complications (5.7% vs. 3.8%, OR 1.62, 95% CI 1.21-1.95, p=0.001), readmission (4.3% vs. 2.8%, OR 1.56, 95% CI 1.26-1.84, p<0.001), and ED visits (15.2% vs. 11.0%, OR 1.45, 95% CI 1.29-1.63, p<0.001) within 90 days following surgery. Additionally, SDHD were associated with an increased risk of aseptic loosening (1.1% vs. 0.6%, OR 1.85, 95% CI 1.20-2.65, p=0.006), instability (4.0% vs. 2.2%, OR 1.80, 95% CI 1.43-2.28, p<0.001), and ipsilateral revision (9.2% vs. 7.6%, OR 1.24, 95% CI 1.08-1.43, p<0.001) at one year postoperatively compared to the control cohort.

## DISCUSSION AND CONCLUSION:

SDHDs are associated with increased rates of adverse outcomes following shoulder arthroplasty including revision surgery, ED visits, length of stay, and overall cost compared to matched controls without SDHDs. Specifically, economic and educational disparities are associated with increased rates of adverse outcomes following surgery including revision surgery, ED visits, length of stay, and overall cost.

	Control n = 5,190	Shoulder Arthroplasty w/ SDHD n = 5,190	p-value
Age Yrs	66	66	1.00
45-54	4.0%	4.0%	
55-64	10.1%	10.1%	
65-74	30.3%	30.3%	
75-84	39.3%	39.3%	
85-94	16.3%	16.3%	
Gender Female	29.8%	29.8%	1.00
Obesity (BMI > 30 kg/m <sup>2</sup> )	33.1%	33.1%	1.00
Drug Abuse	0.4%	0.4%	1.00
Tobacco	10.1%	10.1%	1.00
Charlson Comorbidity Index (CCI)			
CCI(0)	33%	33%	1.00
CCI(1)	22.9%	22.9%	1.00
CCI(2)	11.6%	11.6%	1.00
CCI(3)	5.0%	5.0%	1.00
CCI(4)	2.5%	2.5%	1.00
CCI(5)	1.4%	1.4%	1.00
CCI(6)	0.9%	0.9%	1.00
CCI(7)	0.9%	0.9%	1.00
CCI(8)	0.9%	0.9%	1.00
CCI(9)	0.9%	0.9%	1.00

	Control n = 5,190	SDHD by Cohort n = 5,190	p-value
Male	48.2%	48.2%	1.00
Female	51.8%	51.8%	1.00
Age Yrs	66	66	1.00
45-54	4.0%	4.0%	1.00
55-64	10.1%	10.1%	1.00
65-74	30.3%	30.3%	1.00
75-84	39.3%	39.3%	1.00
85-94	16.3%	16.3%	1.00
Gender Female	29.8%	29.8%	1.00
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CCI(7)	0.9%	0.9%	1.00
CCI(8)	0.9%	0.9%	1.00
CCI(9)	0.9%	0.9%	1.00

	Control n = 5,190	SDHD by Cohort n = 5,190	p-value
90-day postoperative cost	\$2,387,812.00	\$2,387,812.00	1.00
Length of Stay (LOS)	11.21	11.21	1.00

	Economic n = 4,631 (89.2%)	Social n = 741 (14.3%)	Education n = 417 (8.0%)	Environment n = 99 (1.9%)
Major Complications (90-day)	10.2%	14.3%	14.3%	14.3%
Minor Complications (90-day)	5.7%	5.7%	5.7%	5.7%
Readmission (90-day)	4.3%	4.3%	4.3%	4.3%
ED Visits (90-day)	15.2%	15.2%	15.2%	15.2%
Aseptic Loosening (1-year)	1.1%	1.1%	1.1%	1.1%
Instability (1-year)	4.0%	4.0%	4.0%	4.0%
Ipsilateral Revision (1-year)	9.2%	9.2%	9.2%	9.2%

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SDHD: Social, Medical, Education, Social, Environmental; BMI: Body Mass Index; CCI: Charlson Comorbidity Index; LOS: Length of Stay