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.

Table 1. Patient Demographics								Table 1 and Shifting Control						Table 3. Average Cost and Learth of Star (Ann SDHD vs. Control-					Table 5. Complication by SD0D subsystem						ration by SDHD				
						4 F		Gar		SDED	SOLD vs. Compil			Cated	3(2)(1)	SDED vs Control	n salar	These is competential	Economic	Social	Education	Environmenta)	OR (92)			Social	Education	Environmental	
		Control							1.00		sceno a = 1.199	Adjusted CR (1974	p-value				Admini (B-1975 CD			a = 4631 (88,2%)	a=741(14,25)	a = 417 (8.9%)	p=99(1.9%)	p-value			n = 741 (14.3%)	a = 417 (8.0%)	1-92(1.95)
				and S		p-value	I - F		PE 101		48.79	cŋ		Surgical Cost			5402 (5-530 - 51,126)	0.274	Major Complications			21(5.0%)	0.0250					2.0518.78-4.491	-
	n=5,190			n = 5,190				More	PNA 62.63		110,454	-		98-day poroperative cost			854 (5851 - \$1,056)	-0.001	(99-001)					(90-days) a	.004	0.659	6.095	
≤44	66	56	1.3%	66	1.3%		1 1	Complications		63%0	32(64%)	1.62(1.21-1.99)	6.004	Longth of Stay (days)	32+21	4.1 + 4.2	0.8 days (0.6 - 1.2)	<0.001	Minor Complications	245 (5.2%)	29 (5.2%)	43 (10.3%)	5 (5.1%)					195 (1.05-3.30)	2.95 (8.68-8.74)
45-54	4 44	40	8.5%	440	8.5%				Sapsis 14 (0) M1 14 (0)			-							(90-days)					(90-deps		/002	0.785	6.022	0.084
			1.1%	1613	31.1%	1.00	1 H		MI 1485	63%	17(6.9%)									68 (1.5%)	7 (0.9%)	7 (1.7%)	3 (3.0%)	Infection			0.47 (0.97-1.52)		2.33 (0.12-11.40)
						1.00		Meer	00 19.0	1.5%	179-0.4%	-							(90-days)					(90-deys		158	6.301	6.462	4.412
65-74			9.3%	2042	39.3%		L P	Complications		6.8%	30-364764	1.55 (1.25-1.47)	-0.001						Admission	215 (4.8%)	29 (3.9%)	30 (7.2%)	4 (4.0%)	Admissio			0.61 (0.24-1.28)		1.00 (8.05-4.81)
75-84	4 100	109 1	9.8%	1029	19.8%					6.3%	14(6.2%)	-							(90-days)					(90-days		0.001	0.250	8.627	4.995
Gender (Female)	299	260 4	7.6%	2989	57.6%	1.00	1 H	Matin 1		1.05	40/1704	1.00.0555.1.00	6.145						ID-Vist (Shdeat)	687 (14.8%)	131 (17.7%)	108 (25.9%)	27 (27.3%)	ED-Visit (R)-Jers		39 (1.23-1.54)	1.25 (0.89-1.72) 0.165	149 (1.10-2.51)	2.07(8.81-4.64) 4.095
			chilities			1100	- E	Administra	(22-Sec) 147 (2	0.8%	22614.9%	1.5811.25-1.841	-6.00						(96-days) Acettic Leosening	51.0.150	6-00,8%0	\$(1.25)	0.0251	CO-deps Asseries			1.94(0.57-6.97)	2.23 (8.35-2.56)	4.099
							4 F	ED-Vale ((%-de) 22103	11.0%0	T88.018.250	1401120-140	-10-000						Alleptic Loosening	21 (1.1%)	e (0064)	8 (1.9%)	0 (05)	G-Year)		007	6212	8.274	
bosity (BMI>30 kg/n			5.0%	1817	35.0%	1.00	J H	Anatic Longs	ing (99-days) 31 (5)	6.450	2711.09	1.8511.20-2.451	1006						(ve-days) Instability	191 (4.25)	28 (3.8%)	22 (8.4%)	215.150	Intabilit			643 (E22-L4D	2.29(1.34-5.19)	1.33 (8.07-6.36)
Drug Abuse	15	19	0.4%	19	0.4%	1.00	I F	Induktion		1.8%	20714.0%								(Lorer)	Differing	210.010	20020	2000	(L.Yest)			6.121	8.002	0.777
Tobacco	191	913 3	2.9%	1913	36.9%	1.00	1 C	Spelanud Keri	nina (1-piac) 390 (1 mbolina (77) Personanie (73)	(7.6%)	480 (9.2%)	1.24(1.06-1.45)	220.3						Redutent Revision	428 (9.2%)	69 (5.3%)	46 (11.0%)	22 (18.15)	Instation	Ecvision L	22 (1.06-1.41)	117(0.26-1.69)	1.09/15/0-1.841	1.71(8.50-4.42)
Charlson Cornerbidity Inc				a (OCI)			1	Palaonery Er			Accident (CTA). Moscardia To Oson Exis Thrombooky		e Kidny						(l-year)					(I-Yest)		.065	0.414	8,747	0.316
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CCI(I)	122		3.6%	1226	23.6%	1.00	-																						
001(2)			2.1%	1149	22.1%	1.00	-																						
					14.6%		-																						
CCI (3)	76		4.6%	760		1.00																							
CCI (4)	50		9,8%	510	9.8%	1.00																							
CCI (5)	25		5.5%	284	5.5%	1.00																							
CCI (6)	14		2.9%	145	2.9%	1.00																							
CCL(7)	75	79	1.5%	79	1.5%	1.00	1																						
CCI (8)	41		0.9%	47	0.9%	1.00]																						
CC1 29	54		1.0%	54	1.0%	1.00																							
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