Full Thickness Rotator Cuff Tear Repair Outcomes Based on Geocoding and Socioeconomic Factors

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INTRODUCTION: Investigating outcome disparities in orthopedics has garnered substantial interest[1]. The purpose of our study was to investigate potential disparities in outcomes following RTC repair within the Philadelphia metropolitan area.

METHODS: 251 patients who underwent RTC repair for full thickness tear between 2014 and 2021 were retrospectively analyzes. Patients were stratified based upon their zip code's median household income and Social Deprivation Index (SDI) as proxies of socioeconomic status (SES). We referenced the Federal Reserve and Federal Housing and Urban Development agency's income limits to group patients: extremely low/very low income (EVL), low income, middle income, and high income. Patients were also stratified based on their SDI quartile. A higher SDI correlates with an increasingly disadvantaged area. Primary outcomes included ASES, SANE, and patient satisfaction scores at 12 months. Secondary variables included age, race, BMI, smoking status, Charlson comorbidity index (CCI), tear size, ROM, and VAS pain scores. One-way ANOVA, Kruskall Wallis, and Chi-Squared tests were performed to detect differences in primary and secondary outcomes. Linear regressions were performed to examine the correlation between ASES/SANE scores with median household income classifications and SDI quartiles.

RESULTS: There was no difference between average age, CCI, tear size, number of tendons involved, pain scores, complication rate, or retear rate between groups (Figure 1). Patients from EVL and high SDI areas had a higher average BMI, were majority African American and Hispanic, and had a lower rate of return to work. EVL and high SDI area patients had significantly decreased ASES, SANE, and satisfaction scores compared to higher income groups. Linear regression revealed a statistically significant positive correlation between ASES and SANE scores with median household income and a statistically significant negative correlation between ASES and SANE scores with SDI (Figure 2).

DISCUSSION AND CONCLUSION:

Our results suggest that individuals from underserved demographics do worse functionally and have lower satisfaction following RTC repair. We urge health care systems and orthopaedic physicians to identify ways in which they can improve access to care for low-income communities. We also recommend that risk-adjusted compensation models should be considered by healthcare systems to eliminate provider hesitation secondary to compensation concerns[2].

Figure 1. Results Table

	Median Household Income Categories				P-Value	SDI Quartiles				P-Value
	EVL	Low	Middle	High		1	2	3	4	
Gender (F)	57.4%	47.7%	55.2%	42.9%	0.480	49.3%	50.0%	44.0%	60%	0.363
Age	57.55 ±8.24	59.20 ±9.02	58.48 ±8.69	57.54 ±7.54	0.109	60.66 ±9.34	58.27 ±7.33	59.52 ±9.94	57.63 ±8.04	0.184
BMI	31.06 ±6.19	31.01 ±6.13	31.69 ±7.28	27.10 ±4.72	0.013*	28.93 ±6.20	31.16 ±6.05	31.13 ±7.01	32.01 ±6.37	0.034*
CCI	3.17 ±1.67	3.27 ±1.70	3.06 ±1.65	3.75 ±1.56	0.322	3.51 ±1.76	2.88 ±1.36	3.22 ±1.65	3.29 ±1.77	0.170
Tendons Involved	1.53 ±0.65	1.71 ±0.74	1.55 ±0.66	1.82 ±0.82	0.185	1.70 ±0.73	1.59 ±0.75	1.68 ±0.68	1.60 ±0.70	0.757
Tear Size (cm)	2.33 ±1.14	2.02 ±1.04	2.13 ±1.34	2.67 ±1.61	0.125	2.36 ±1.39	1.95 ±1.26	2.00 ±1.12	2.35 ±1.06	0.189
Return to Work	60.9%	83.3%	92.5%	82.5%	<0.001*	87.3%	89.1%	88%	61.9%	<0.001*
ASES	68.87 ±28.05	81.77 ±21.73	86.22 ± 18.81	85.12 ±19.52	<0.001*	86.96 ±18.77	81.64 ±20.56	87.17 ±17.57	69.10 ±27.84	<0.001*
SANE	73.98 ±26.38	82.85 ±20.76	89.22 ±16.20	82.82 ±24.28	0.003*	86.80 ±20.00	82.86 ±21.66	89.30 ±12.44	74.22 ±26.2	<0.001*
Patient Satisfaction										
Extremely Satisfied	45.7%	76.1%	76.1%	67.9%		77.5%	76.6%	80%	45.3%	
Satisfied	32.6%	11.9%	16.4%	17.9%	0.012*	14.1%	9.4%	20%	28.1%	<0.001*
Somewhat Satisfied	8.7%	8.3%	6.0%	7.1%		5.6%	10.9%	0%	12.5%	
Not Satisfied at All	13.0%	3.7%	1.5%	7.1%		2.8%	3.1%	0%	14.1%	

BMI, body mass index, CCI, Charlson Comorbidity Index, ASES, American Shoulder and Elbow Surgeon's score, SANE, Single Numeric Evaluation score, SDI, social deprivation index.
*Statistical significance (P<0.05).
▼ Statistics performed via One Way ANOVA test.
Ⓒ Statistics performed via Chi Square Test

Figure 2. Linear Regression of Median Household Income Compared with Shoulder Scores

ASES Scores= β=0.236 (p=.0002, 95% CI [.115, 0.357]), y=67.68 + 1.66E-4x, R²=0.056.
SANE Scores= β =0.153 (p=.015, 95% CI [.030, 0.277]), y=74.69 + 1.03E-4x, R²=0.024.