A Comparison of Socioeconomic Deprivation Measurement Indices Association with Extended Length of Stay Following Revision Total Hip and Knee Arthroplasty

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INTRODUCTION: Length of stay (LOS) has been extensively reviewed as a marker for healthcare utilization, functional outcomes, and cost of care for patients undergoing arthroplasty. The notable patient-to-patient variation in LOS following revision hip and knee total joint arthroplasty (TJA) suggests an opportunity to reduce preventable discharge delays. Previous studies have investigated the impact of social determinants of health (SDOH) on orthopaedic conditions and outcomes by utilizing deprivation indices with inconsistent findings, and no prior study compared the utility of different deprivation indices in revision TJA outcomes. The aim of the study is to compare the association of three publicly available national deprivation indices with prolonged LOS in this patient population.

METHODS: 1,047 consecutive patients who underwent a revision TJA at a teritary institution were included in this retrospective study. The primary outcome of interest was postoperative LOS. Patient demographics, comorbidities, and behavioral characteristics were extracted. Area deprivation index (ADI), social deprivation index (SDI), and social vulnerability index (SVI) were recorded for each patient according to the most recent database. Multivariate logistic regression was performed to determine the relationship between deprivation measures and LOS.

RESULTS: 193 patients had a LOS greater than five days following surgery. ADI both as a continuous (OR=1.01, p=0.019) and categorical (OR=2.14, p=0.003) variable was positively associated with prolonged LOS following surgery. No association with LOS was found using SDI and SVI as area deprivation measures. When accounting for other covariates, age and ASA scores were independently associated with prolonged LOS. Other previously reported determinants of prolonged LOS, such as race and insurance, were not significantly associated in this study.

DISCUSSION: Higher ADI ranking, ASA scores, and older age were found to be independently associated with prolonged LOS following revision TJA. SDI and SVI were not significantly associated with extended LOS, potentially due to the difference in variables considered in each area index. This finding supports the incorporation of ADI as a metric of social determinants of health in developing attainable interventions to address disparities in preventable prolonged LOS following revision TJA.

SIGNIFICANCE/CLINICAL RELEVANCE: The ADI is an important metric of social determinants of health in developing attainable interventions to address disparities in preventable prolonged LOS following revision TJA.

Table 1. Multivariate logistic regression analysis for the association between ADI and extended LOS in patients undergoing revision hip and knee TJA

	OR (95% CI)	P-values
Sex (Female)	0.83 (0.59 –1.17)	0.282
Race (White)	1.21 (0.57–2.57)	0.623
Ethnicity (Non-Hispanic)	1.13 (0.22– 5.77)	0.885
Insurance (Private)		0.368
Public	1.08 (0.73–1.60)	0.692
No insurance	2.44 (0.71–8.40)	0.159
Age	1.03 (1.00–1.05)	**0.025**
BMI	1.00 (0.98–1.03)	0.774
ASA score	3.44 (2.35–5.04)	**<.001**
Depression	1.22 (0.74–2.03)	0.436
Drug Abuse	0.74 (0.20–2.74)	0.648
Alcohol Use	0.72 (0.50–1.03)	0.074
CCI score	0.96 (0.87–1.07)	0.505
Area Deprivation Index	1.01 (1.00–1.02)	**0.019**

BMI=body mass index; ASA=American Society of Anesthesiologists; CCI= Charlson Comorbidity Index

Table 2 Multivariate logistic regression analysis for the association between SDI and extended LOS in patients undergoing revision hip and knee TJA

	OR (95% CI)	P-values
Sex (Female)	0.84 (0.59–1.18)	0.304
Race (White)	1.12 (0.52–2.41)	0.776
Ethnicity (Non-Hispanic)	1.19 (0.23–6.16)	0.838
Insurance (Private)		0.3
Public	1.06 (0.71–1.56)	0.788
No insurance	2.68 (0.77–9.30)	0.121
Age	1.02 (1.00–1.05)	0.042
BMI	1.01 (0.98–1.04)	0.656
ASA score	3.45 (2.35–5.05)	<.001
Depression	1.16 (0.70–1.92)	0.572
Drug Abuse	0.71 (0.19–2.62)	0.607
Alcohol Use	0.73 (0.51–1.05)	0.09
CCI score	0.96 (0.86–1.07)	0.482
Social Deprivation Index	1.01 (1.00–1.01)	0.159

BMI=body mass index; ASA=American Society of Anesthesiologists; CCI= Charlson Comorbidity Index

Table 3 Multivariate logistic regression analysis for the association between SVI and extended LOS in patients undergoing revision hip and knee TJA

	OR (95% CI)	P-values
Sex (Female)	0.84 (0.59–1.18)	0.310
Race (White)	1.20 (0.56–2.55)	0.643
Ethnicity (Non-Hispanic)	1.16 (0.23–5.98)	0.856
Insurance (Private)		0.277
Public	1.06 (0.72–1.57)	0.772
No insurance	2.76 (0.80–9.56)	0.109
Age	1.02 (1.00–1.05)	0.044
BMI	1.01 (0.98–1.04)	0.644
ASA score	3.43 (2.34–5.02)	<0.001
Depression	1.17 (0.70–1.93)	0.551
Drug Abuse	0.74 (0.20–2.73)	0.654
Alcohol Use	0.73 (0.51–1.05)	0.090
CCI score	0.96 (0.86–1.07)	0.495
Social Vulnerability Index	1.00 (1.00–1.01)	0.488

BMI=body mass index; ASA=American Society of Anesthesiologists; CCI= Charlson Comorbidity Index