The Social Vulnerability Index Identifies High-Risk Populations in Metabolic Surgery

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Background:

Social determinants of health strongly impact surgical outcomes but are difficult to quantify. The Social Vulnerability Index (SVI) is a census-tract level population-based measure generated from 16 socioeconomic and demographic variables on a scale from 1 (least) to 100 (most) vulnerable being used to study surgical populations. We sought to assess the ability of SVI to accurately predict high-risk patients and explore associations with surgery type and outcomes in metabolic surgery (MBS).

Methods:

We retrospectively identified adults undergoing MBS (Roux-en-Y gastric bypass and gastric sleeve) in 2013-2018 National Surgical Quality Improvement Program data from a single academic center. We assigned SVI using patient address. High SVI was defined as >75th percentile. We first conducted an analysis comparing the highest SVI quartile (>75th percentile) to the lowest quartile (<25th percentile), then dichotomizing SVI to >75th percentile and <75th percentile. Chi-square and Mann-Whitney U tests were utilized for categorical and continuous variables, respectively. Multivariable regression models were performed comparing SVI to marginalized status as a predictor for type of metabolic surgery.

Results:

We identified 436 patients undergoing metabolic surgery with a low overall morbidity (6.1%). Despite high SVI patients having more comorbidities, complication rates and overall morbidity in both groups were similar, as well as readmission rate. We conducted logistic regression models to compare the performance of SVI, a population-level measure, to marginalized status, an individual-level measure. When comparing dichotomous pairs of SVI and minority status, the models had similar area under the curve, supporting SVI as a proxy for individual measures of marginalization. The model comparing the high SVI to lowest quartile performed better than comparing high SVI to the combination of the 3 lower quartiles (<75th vs. >75th percentile).

Conclusions:

While SVI was successful in identifying the high-risk metabolic surgery patients, it was not predictive of surgical outcomes. The patients undergoing this type of surgery have a multidisciplinary team that addresses patient care holistically to mitigate the potential socioeconomic barriers to good outcomes, although disparities in MBS care persist. This suggests the validity of using SVI to identify high risk patients for other surgical procedures as well, particularly those that do not currently operationalize on the same multidisciplinary scale. By providing a single, quantitative score encompassing many individual social determinants of health, SVI is a useful tool in targeting resources to patients with the greatest health disparities.

Table: Comorbidities by SVI; Comparison of Model Using SVI versus Individual Marginalized Status

Bivariate – Patient Comorbidities						
	Model 1			Model 2		
	Lowest Quartile (n=57) %	Highest Quartile (>75th %tile) (n=120) %	p	<75th %tile n=316	>75th %tile n=120	p
Smoker	5.3	15.0	0.061	7.9	15	0.027
COPD	0	5.8	0.063	0.63	15	0.001
Multivariable Regression - Odds of Roux-en-Y Bypass versus Gastric Sleeve						
	Model using SVI alone			Model using Marginalized Status (MS)		
BMI Class 2	2.1		0.053	1.68		0.027
SVI	0.95		0.882			
Marginalized				0.82		0.351
AUC	**0.61**			**0.57**		