Allostatic Load and Trauma Outcomes Based on Social Determinants of Health

Introduction

Allostasis is the body's ability to regulate itself via physiologic changes in response to real or perceived environmental alterations. *Allostatic load* is the chronic cost of repeated exposure to stressful environments. In the allostatic load model, the process of physiologic regulation can accumulate wear and tear and eventual dysfunction. Poor socioeconomic status is associated with higher measures of allostatic load. Data on the impact of allostatic load on clinical outcomes following trauma is limited. The objective of this study is to correlate social determinants of health (SDOH), allostatic load, and clinical outcomes in trauma patients requiring emergency surgery.

Methods

Over a six-year period, 277 trauma patients undergoing emergent laparotomy at Grady Memorial Hospital in Atlanta, Georgia were enrolled in the Tissue and Data Acquisition Protocol (TDAP) study within the larger Surgical Critical Care Initiative (SC2i). Biospecimens were banked from these patients for future analysis. SDOH was measured using the Social Deprivation Index (SDI); patients' home ZIP codes were used to obtain SDI values. Demographics, injury, and management characteristics were measured. Correlations were identified using Pearson's r and linear regression.

Results

Our cohort was 78% male, 60% Black, 34% White. Injuries were 52% blunt. Mortality was 3%. Average age was 37.1 ($\pm$14.7) years, SDI was 65.0 ($\pm$23.5), ISS was 20.8 ($\pm$13.4), number of complications was 1.1 ($\pm$1.8), hospital days was 20.6 ($\pm$23.3), ICU days was 8.7 ($\pm$13.9), ventilator days was 4.8 ($\pm$9.37), number of procedures was 3.5 ($\pm$3.1). Pearson's r for correlation between SDI and ISS was -0.138 ($p=0.021$). However, multiple linear regression analysis of ISS as influenced by SDI, age, gender, race, ethnicity, and mechanism of injury showed no significant contribution from SDI.

Conclusions

Preliminary results show a negative correlation between ZIP code level SDI and ISS, which is not consistent in multiple linear regression, probably due to the large geographic area being covered. Future analysis will utilize 12-digit FIPS codes, which approximate "neighborhoods" more closely than ZIP codes, to obtain Area Deprivation Index values (a more comprehensive measure of SDOH than SDI). We anticipate a more informative analysis when utilizing these metrics. We will subsequently proceed with retrospective allostatic load quantification by utilizing banked specimens from TDAP patients to test the hypothesis that allostatic load mediates or modulates the relationship between SDOH and trauma outcomes.

One-liner

Social determinants of health may impact trauma outcomes, which may be understood via the allostatic load model.