Postoperative Complications, Resource Utilization, and Management in Ballistic and Non-Ballistic Humerus Fractures: A Tale of Two ZIP Codes

***Anna P. Meyer, MD**; Helyn G. Fraser, MD; Roberto Hernandez-Irizarry, MD; Donnyell Roberson, BS; Jesse Seilern und Aspang, MD*

Purpose: Our objective was to determine the impact of distressed communities index (DCI) scores and mechanism of injury (MOI) on postoperative complications, resource utilization, and management in patients sustaining ballistic and non-ballistic humerus fractures.

Methods: This retrospective analysis included 292 consecutive patients age ≥15 years who underwent treatment of ballistic and non-ballistic humerus fractures between 2016 and 2020 at a Level I trauma center. DCI scores at the ZIP code level were obtained for each patient. The effect of these scores were assessed using postoperative complications and resource utilization, including number of emergency department (ED) visits 1 year postoperatively, outpatient clinic compliance, and length of hospital stay (LOS). Patients were stratified into 5 categories including prosperous, comfortable, mid-tier, at-risk, and distressed based on DCI scores of 0-19.9, 20-39.9, 40-59.9, 60-79.9, and 80-100, respectively. Patients were divided by MOI, ballistic and non-ballistic, and effects were evaluated as previously described. Statistical analyses were performed to investigate the association of DCI scores and MOI with outcomes. R values and odds ratios (ORs) were reported with 95% confidence intervals (CIs).

Results: Of 292 patients, 50 sustained ballistic and 242 sustained non-ballistic humerus fractures. Of these, 28 patients (9.6%)were from prosperous, 45 (15.4%) from comfortable, 57 (19.5%) from mid-tier, 83 (28.4%) from at-risk, and 79 (27.1%) were from distressed communities. DCI categories were not associated with a difference in complication rates ($P = 0.58$), LOS ($P = 0.845$), number of ED visits ($P = 0.564$), outpatient clinic compliance ($P = 0.258$), or operative vs nonoperative treatment ($P = 0.52$). A lower percentage of patients with ballistic fractures underwent operative treatment (36.0%) than those with non-ballistic fractures (70.7%) ($P<0.001$). Ballistic patients had a decreased LOS (5.72 days vs. 17.2 days) ($P = 0.002$) and a lower ratio of attended clinic visits to visits scheduled (0.47 vs 0.64) ($P<0.001$). When controlling for gender, race, body mass index, and employment status, patients sustaining non-ballistic humerus fractures had significantly higher odds of undergoing operative treatment (OR: 3.683, CI: 1.89, 7.16, $P<0.001$). There was a negative linear relationship between ballistic fractures and length of stay (R: 0.057, CI: –12.45, 0.73, $P = 0.028$) as well as outpatient compliance fraction (R:0.054, CI: –0.31, –0.040, $P = 0.012$).

Conclusion: Data suggest that the distressed communities index is not predictive of postoperative complications, resource utilization, or choice of management of humerus fractures. However, mechanism of injury demonstrated a correlation with resource utilization and fracture treatment.