High Acuity Polytrauma Centers in Orthopaedic Trauma: Decreased Patient Mortality and Increased Resource Utilization

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Purpose: There are a select number of massive-volume, high-acuity trauma centers (HACs) in the US. Expertise in polytrauma care has been shown to improve mortality in patients with abdominal injuries and metabolic shock, cardiovascular injury, and liver damage. Along with polytrauma expertise comes the burden of high rates of complications, increased length of stay (LOS) and cost of care, without a commensurate increase in allocated resources. The purpose of this study was to compare mortality, complications, and LOS in polytraumatized patients treated at HACs versus low-acuity trauma centers (LACs).

Methods: The 2014 National Trauma Data Bank was queried for orthopaedic injuries with ISS >15 and mortality, complications, hospital LOS, ICU LOS, ventilation duration, and demographics. Hospitals where at least 13% (the median percentage of patients with ISS >15 admitted to all hospitals) of total admissions had an ISS >15 were classified as HAC; all other hospitals were deemed LACs. Logistic regression was performed to determine association between acuity and outcomes of interest, adjusted for demographic factors and comorbidities.

Results: HACs admitted 86.8% of all 28,314 patients with ISS >15; 13.2% were admitted to LACs. The average age was 46.3 years; 66.6% of patients were male, and 71.2% were Caucasian. Those arriving to HACs have 12% decreased odds of in-hospital mortality than those in LACs (P = 0.048, odds ratio [OR] = 0.88, 95% confidence interval [CI] 0.78-0.99). Patients at HACs have 64% greater odds of ICU admission (P <0.001, OR = 1.64, 95% CI 1.52-1.77), and 48% higher odds of ventilatory support (P <0.001, OR = 1.48, 95% CI 1.37-1.59). Patients admitted to HACs have 41% increased odds of unplanned reoperation (P = 0.044, OR 1.41, 95% CI 1.01-1.96). Patients have a 52% increased odds of medical complications at HACs (P <0.001, OR 1.52, 95% CI 1.37-1.70). In addition, patients at HACs had 2.8 days longer LOS than those at LACs (P <0.001).

Conclusion: Severely injured orthopaedic trauma patients have decreased mortality at HACs, which may be attributable to better anticipation of critical need via ICU admission and ventilator support. The decrease in mortality, however, comes at the financial cost of prolonged ICU-level care and intubation, more surgery, and longer inpatient stays. HACs are optimal destinations for polytrauma orthopaedic patients, although caring for these patients is expensive and reflects poorly on typical hospital metrics.