Effect of Pre-hospital Treatment Times on Clinical Outcomes in Pediatric Trauma Patients

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Introduction
It is accepted that decreasing response times, time at the scene, and transit times when caring for traumatically-injured patients will improve health outcomes. Significant financial and resource allocation have been dedicated to improving systems to expedite transport of these patients to appropriate treatment facilities. Despite this, very little is known about the exact relationship between response, treatment and transit times on clinical outcomes in pediatric trauma patients.

Objectives
The objective of this study was to examine the relationship between response, transit times and clinical outcomes of pediatric trauma patients.

Methods
We performed a retrospective data analysis performed at a tertiary care, Level I pediatric hospital. Our trauma registry was queried to obtain data on all patients from January 1, 2011 to December 31, 2013. Data collected included sex, race, paramedic response time, time at scene, transit times to the hospital, mode of transport, type of injury and injury severity score (ISS). Clinical outcomes were length of hospital stay and length of intensive care unit (ICU) stay in days. Cross-correlation of transport data was done to determine relationships with clinical outcomes and where warranted, was followed up with multiple linear regression. Welch t-test (WTT) was used to analyze categorical data.

Results
The charts of 323 trauma patients were reviewed. While controlling for ISS and type of injury, response time and mode of transport did not correlate with clinical outcomes. Time spent at scene had a moderate correlation with length of ICU stay (adjusted $R^2 = 0.4$, $p=0.007$). There was a significant increase in hospital stay for patients admitted to the ICU when transit time was greater than 50 minutes (<50 min = 4.7±4.3 days, >50min = 10.3±2.5 days, $p=0.04$ (WTT)) but no affect on number of hospital days when less critical patients were included (<50 min = 2.4±3.3 days, >50 min = 4.0±3.8 days, $p=0.07$).

Conclusions
For a given injury, the time spent at the trauma scene correlates with length of ICU stay. Transit times to the hospital only correlated with length of hospital stay for patients admitted to the ICU when times were greater than 50 minutes. Response time to scene and mode of transport does not correlate with clinical outcomes. Intervention strategies and resources should be targeted towards decreasing transit time and time spent at the scene for critical patients.