

In response to: Helicopter versus ground ambulance: review of national database for outcomes in survival in transferred trauma patients in the USA

Michaels D, Pham H, Puckett Y, *et al*
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We read with interest the impressive study by Michaels *et al* on helicopter versus ground transport survival in trauma patients. We commend the authors for their work but have some concerns.

Our first issue is semantic, the authors' state in the title that "Helicopter vs ground ambulance; review of...*transferred* trauma patients..." However, in the methods section the authors' state, "All *transferred* patients...were excluded." Italics and underline added for emphasis. Instead, it may be more appropriate to use the word "transported" instead of transferred as a description of the mode of arrival for the study groups.

The study utilized the National Trauma Data Bank (NTDB) to examine the impact of helicopter transport vs ground on mortality. The authors state "...after adjusting for confounders (age, ISS, gender), trauma patients who were transferred by helicopter were 57.0% less likely to die than

those transferred by (ground ambulance)." A limitation is the lack of a multivariate regression analyses. While the authors used a univariate analysis, the impact of the results would benefit from multivariate analysis. The authors controlled for some individual confounders; however, this does not fully adjust for mortality. The use of an adjusted mortality calculation, such as Trauma and Injury Severity Score (TRISS) methodology, which brings together the Revised Trauma Score with the Injury Severity Score (ISS), resulting in an observed/expected mortality ratios, would control for multiple confounders (BP, Glasgow Coma Score (GCS), respiratory rate, ISS, mechanism, and age) and more appropriately reflect adjusted mortality expectation. The authors also did not report comorbidities, which can play an important role and this variable is available through the NTDB.

The authors report did not provide a breakdown of the Abbreviated Injury Score by body region. This description can be important in analyzing trauma patient outcomes, especially when comparing the outcomes of emergently transported patients.

Moreover, cumulating national data on transporting patients by either ground or air is problematic because different regions may have differing Emergency Medical Services resuscitation protocols. In addition, the combination of urban and rural regions of transport would be affected by geographic distribution of trauma centers, traffic, and weather, all of which would play a significant role in transport time and patient outcomes.

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