

Development and Validation of a Geriatric Trauma Triage Score

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Purpose: Current injury severity indices (ISIs) (eg, Injury Severity Score [ISS], Trauma Score-Injury Severity Score [TRISS]) were developed in a high-energy, young adult population that translates poorly to the geriatric population. We sought to develop a novel, easy-to-use triage tool to identify inpatient mortality risk in geriatric trauma patients upon arrival in the emergency department.

Methods: The patient population consisted 2940 and 1605 low-energy and high-energy geriatric (≥ 55 years old) trauma patients (LE-GTPs and HE-GTPs, respectively) treated at a single Level I trauma center from 2008-2011 that were identified from Trauma Registry. Low-energy was defined as a ground-level fall and high-energy was defined as trauma resulting from a fall from height, motor vehicle or motorcycle accident, or pedestrian struck. In phase 1, we evaluated the ability of current ISIs to predict mortality for LE- and HE-GTPs using area under the receiver operating characteristic curve (AUROC). In phase 2, a backwards stepwise regression analysis (using <0.05 as the significance threshold) was used to create a novel low-energy and high-energy geriatric trauma triage score (LE-GTTS and HE-GTTS, respectively) using 4 core-host variables (age, preexisting conditions via the Charlson Comorbidity Index (CCI), anatomic injuries via the Abbreviated Injury Scale (AIS), and physiologic status via vital signs). We compared the ability of the new scores versus current ISIs to detect inpatient mortality. In phase 3 we validated these scores using AUROC analysis with 37,474 LE-GTPs and 97,034 HE-GTPs from the National Trauma Databank (NTDB).

Results: LE-GTPs were 9.1 years older than HE-GTPs (75.8 ± 11.0 vs. 66.7 ± 9.2 , $P < 0.01$). The overall mortality rate for LE-GTPs vs. HE-GTPs was 7.9% vs. 7.0% ($P < 0.01$) Phase 1: TRISS was found to be the most predictive existing ISI for both cohorts and was deemed to have moderate predictive capacity in the low-energy cohort and excellent predictive capacity in the high-energy cohort (LE-GTP AUROC: 0.82 vs. HE-GTP AUROC: 0.91; $P < 0.01$). Phase 2: The LE-GTTS was found to have the following variables included in the final model (data type, odds ratio): age (continuous, odds ratio [OR]: 1.05), CCI (ordinal, OR: 1.28), Glasgow Coma Scale (GCS) (ordinal, OR: 0.72), AIS-Head & Neck (ordinal, OR: 1.67), and AIS-Chest (ordinal, OR: 1.52). The predictive capacity of the LE-GTTS was significantly better than TRISS (AUROC 0.89 vs. 0.82, $P < 0.01$). The HE-GTTS was found to have the following variables included in the final model: age (continuous, OR: 1.12), GCS (ordinal, OR: 0.69), AIS-Head & Neck (ordinal, OR: 1.77), AIS-Chest (ordinal, OR: 1.51), and AIS-Extremity (ordinal, OR: 1.59). The predictive capacity of the HE-GTTS was significantly better than TRISS (AUROC 0.96 vs. 0.91, $P < 0.01$). Phase 3: In the NTDB, the LE-GTTS and HE-GTTS were both found to be significantly more predictive of mortality than TRISS (LE-GTTS AUROC: 0.82 vs. 0.79, $P < 0.01$; HE-GTTS AUROC: 0.86 vs. 0.85, $P < 0.01$).

Conclusion: The LE-GTTS and HE-GTTS are novel triage scores developed specifically for geriatric trauma patients. They are intended to triage patients to lower or higher levels of

care / monitoring from the emergency department setting. These scores have been validated in the NTDB and should therefore be valid to use prospectively in the clinical setting. Future work will focus on the development of clinical guidelines to improve triage decision-making.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an “off label” use). For full information, refer to page 600.