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ORIGINAL ARTICLE

The AdHOC (age, head injury, oxygenation, circulation) score: a simple assessment tool for early assessment of severely injured patients with major fractures

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Abstract

Purpose We sought to develop a simple, effective and accurate assessment tool using well-known prognostic parameters to predict mortality and morbidity in severely injured patients with major fractures at the stage of the trauma bay.

Methods European Data from the TraumaRegister DGU® were queried for patients aged 16 or older and with an ISS of 9 and higher with major fractures. The development (2012–2015) and validation (2016) groups were separated. The four prognostic aspects Age, Head injury, Oxygenation and Circulation along with parameters were identified as having a relevant impact on the outcome of severely injured patients with major fractures. The performance of the score was analyzed with the area under the receiver operating characteristics curve and compared to other trauma scores.

Results An increasing AdHOC (Age, Head injury, Oxygenation, Circulation) score value in the 17,827 included patients correlated with increasing mortality (0 points = 0.3%, 1 point = 5.3%, 2 points = 15.6%, 3 points = 42.5% and 4 points = 62.6%). With an AUROC of 0.858 for the development ($n = 14{,}047$) and 0.877 for the validation ($n = 3780$) group dataset, the score is superior in performance compared to the Injury Severity Score (0.806/0.815).

Conclusion The AdHOC score appears to be easy and accessible in every emergency room without the requirement of special diagnostic tools or knowledge of the exact injury pattern and can be useful for the planning of further surgical treatment.

Keywords Mortality prediction · Score · Trauma · Severely injured

Background

In severely injured patients, early assessment of the patient is crucial for acute care and general management [1, 2]. Existing scoring systems validated for pre-hospital use regularly include parameters of circulation, respiration and head injury [Trauma Score (TS) [3], Revised Trauma Score (RTS) [4], and physiologic trauma score [5]].

In contrast, most scores developed for in-house use require the complete set of diagnoses, including an analysis of lab data of multiple systems. This has been described for the Trauma Score and Injury Severity Score (TRISS) [6], Injury Severity Score (ISS) [7], New Injury Severity Score (NISS) [8], A Severity Characterization of Trauma (ASCOT) [9], and Hospital Trauma Index (HTI) [10]. Moreover, the Trauma Associated Severe Hemorrhage (TASH) score [11] and the Revised Injury Severity Classification (RISC) score [12], which was later revised further to allow for ease of application (RISC II [13]), still require a sustained set of parameters. De Munter et al. reviewed numerous trauma scores established for the prediction of mortality [14]. Most of the published trauma scores are based on the TRISS, Acute Physiology and Chronic Health Evaluation (APACHE) [15] or ASCOT, and represent modifications of these or new combinations with other variables. They postulated that the most accurate trauma score should be

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