THE SEQUENTIAL TRAUMA SCORE – A NEW INSTRUMENT FOR THE SEQUENTIAL MORTALITY PREDICTION IN MAJOR TRAUMA*

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Abstract
Background: There are several well established scores for the assessment of the prognosis of major trauma patients that all have in common that they can be calculated at the earliest during intensive care unit stay. We intended to develop a sequential trauma score (STS) that allows prognosis at several early stages based on the information that is available at a particular time.
Study Design: In a retrospective, multicenter study using data derived from the Trauma Registry of the German Trauma Society (2002-2006), we identified the most relevant prognostic factors from the patients basic data (P), prehospital phase (A), early (B1), and late (B2) trauma room phase. Univariate and logistic regression models as well as score quality criteria and the explanatory power have been calculated.
Results: A total of 2,354 patients with complete data were identified. From the patients basic data (P), logistic regression showed that blood pressure, pulse rate, Glasgow coma scale (GCS), and anisocoria were significant predictors (AUCmodel p = 0.76; AUCmodel p + A = 0.82). Logistic regression of the early trauma room phase (B1) showed that peripheral oxygen saturation, GCS, anisocoria, base excess, and thromboplastin time to be significant predictors of survival (AUCmodel B1 = 0.78; AUCmodel p + A + B1 = 0.85). Multivariate analysis of the late trauma room phase (B2) detected cardiac massage, abbreviated injury score (AIS) of the head ≥3, the maximum AIS, the need for transfusion or massive blood transfusion, to be the most important predictors (AUCmodel B2 = 0.84; AUCfinal model p + A + B1 + B2 = 0.90). The explanatory power – a tool for the assessment of the relative impact of each segment to mortality – is 25% for P, 7% for A, 17% for B1 and 51% for B2. A spreadsheet for the easy calculation of the sequential trauma score is available at:
www.sequential-trauma-score.com

Conclusions: This score is the first sequential, dynamic score to provide a prognosis for patients with blunt major trauma at several points in time. With every additional piece of information the precision increases. The medical team has a simple, useful tool to identify patients at high risk and to predict the prognosis of an individual patient with major trauma very early, quickly and precisely.

Key words: Major trauma; outcome; prognosis; scoring; score; severely injured patients; polytrauma; dynamic score; ISS; TRISS; RISC; STS

INTRODUCTION

Trauma is one of today’s most relevant health issues. In 2005 for example, a total of 173,753 deaths in the US were classified as injury-related. With a rate of 196.8 deaths/100,000 population it was the leading cause of death up to the age of 54 in 2005 [1]. The incidence has constantly increased over past years [1].

Characterization of the severity of injury is crucial for the scientific study of trauma, triage, classification of patients, quality management and the assessment of prognosis (prediction of mortality of an individual patient) [2-4]. In the scoring of the severity of trauma, mortality is the outcome that is of the most interest. Scores try to summarize and integrate a patient’s condition into a one-dimensional value depending on many independent factors. More than 50 score systems have been published for the classification of injured patients in emergency or intensive care medicine. This large number indicates that prediction of outcome is and never will be perfect because severity of injury is complex and difficult to quantify [3].

There are several well established scores for the assessment of the prognosis of patients with major trauma [2, 4]. In 1974 the injury severity score (ISS) was introduced,[5] based on an anatomic classification, the abbreviated injury scale (AIS) introduced in 1971 [6]. It can be stated that the ISS is one of the most commonly used trauma score [2, 4].

The trauma score (TS) of 1981 and its further development, the revised trauma score (RTS, 1989) included physiologic variables such as the Glasgow coma

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