Risk stratification in trauma and haemorrhagic shock: Scoring systems derived from the TraumaRegister DGU

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ABSTRACT
Scoring systems commonly attempt to reduce complex clinical situations into one-dimensional values by objectively valuing and combining a variety of clinical aspects. The aim is to allow for a comparison of selected patients or cohorts. To appreciate the true value of scoring systems in patients with multiple injuries it is necessary to understand the different purposes of quantifying the severity of specific injuries and overall trauma load, being: (1) clinical decision making; (2) triage; (3) planning of trauma systems and resources; (4) epidemiological and clinical research; (5) evaluation of outcome and trauma systems, including quality assessment; and (6) estimation of costs and allocation of resources. For the first two, easy-to estimate scores with immediate availability are necessary, mainly based on initial physiology. More sophisticated scores considering age, gender, injury pattern/severity and more are usually used for research and outcome evaluation, once the diagnostic and therapeutic process has been completed. For score development large numbers of data are necessary and thus, it appears as a logical consequence that large registries as the TraumaRegister DGU of the German Trauma Society (TR-DGU) are used to derive and validate clinical scoring systems. A variety of scoring systems have been derived from this registry, the majority of them with focus on hospital mortality. The most important among these systems is probably the RISC score, which is currently used for quality assessment and outcome adjustment in the annual audit reports. This report summarizes the various scoring systems derived from the TraumaRegister DGU over the recent years.

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Introduction
"If you have never felt the need for any type of severity scoring system, then you probably have never had to explain how it is that survival rate of 85% in your trauma center is actually better than the survival rate of 97% in some other hospital where the patients are much less seriously injured" (S. Baker, J Trauma 1983) [28].

Probably quoted over a million times, this statement perfectly characterizes the basic idea behind scoring systems. In this regard many attempts have been made to further specify the entity "Trauma patient", e.g. by the well known Abbreviated Injury Scale (AIS) [18] and the Injury Severity Score (ISS) derived from this injury classification [2]. To appreciate the true value of scoring systems in patients with multiple injuries, we have to understand the different purposes of quantifying the severity of specific injuries and overall trauma load: (1) clinical decision making; (2) triage; (3) planning of trauma systems and resources; (4) epidemiological and clinical research; (5) evaluation of outcome and trauma systems, including quality assessment; and (6) estimation of costs [13,28]. For the first two, easy-to estimate scores with immediate availability are necessary, mainly based on the initial physiologic response. More sophisticated scores considering age, gender, injury pattern/severity and more are usually used for research and outcome evaluation, once the diagnostic and therapeutic process has been completed.

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