APPENDIX 1

The Trauma-related Scores

Shock index (SI)

SI = HR/SBP. Normal value = 0.5 – 0.7. (HR = Heart rate; SBP = systolic blood pressure) Olaussen et al.[1] demonstrated SI as a predictor of critical bleeding in the injured patient. This finding was supported by Vandromme et al.[2] who found that a SI of ≥ 0.9 predicted an increased risk of requiring a massive blood transfusion. Regarding mortality, Montoya et al.[3] discovered that a SI >0.9 worsened this outcome at 24-hours.

Reversed shock index (RSI)

RSI = SBP / HR. An RSI < 1 is significant in trauma patients.[4-6] Shock refers to an unstable haemodynamic status whereby the SBP is lower than the HR and this is incongruous to the manner in which SI is measured. Hence the RSI is frequently favoured to the SI, with RSI < 1 being used as a cut-off point to evaluate the haemodynamic condition of trauma patients.[4-6] Kuo et al.[4] and Chuang et al.[5] found that an RSI<1 correlates with greater injury severity and in-hospital mortality, along with a longer ICU and hospital LOS.
Conversely, Barnes et al.[7] evaluated various vital sign based scores (incl. SBP, mean arterial pressure (MAP) and SI) proposed to estimate shock severity in SA trauma patients. He concluded that these parameters performed poorly as predictors of mortality and need for critical care in the population he studied.

Abbreviated Injury Scale (AIS)

This score assigns severity (ranging from 1 (mild) to 6 (unsurvivable)) to injuries within nine anatomical regions. It's the basis for the ISS and TRISS.

Injury severity score (ISS)

This is calculated as the sum of the squares of the highest AIS score in each of the three most severely injured anatomical areas.

Baker et al.[8] established that patients scoring <10 on ISS rarely demise, while those scoring >50 die before they can be treated. Scores between 10 and 50 therefore indicate treatment necessity. However, only one injury per body region is reflected in this score. This led to the development of the New Severity Injury Score (NISS) by Osler et al.[9] This score adds the three highest scores, regardless of the anatomical area.
The NISS and ISS have been compared in multiple studies, but no difference in outcome prediction could be demonstrated.[10-12] Hence, the ISS was chosen for this study.

Revised Trauma Score

In the RTS the Glascow Coma Scale (GCS), SBP and respiratory rate (RR) are assigned values ranging from 0-4, depending on the patient's condition. The sum of these values is used to prioritize victims of trauma. A coded form of the RTS, called aRTS, is used in outcome analysis, for the purpose of quality assurance. The scores in each clinical category of the RTS are assigned a certain weight, based on logistic regression (aRTS = 0.9368GCS+0.736SBP+0.2908RR) to allow for more accurate outcome prediction.[13] It is heavily weighted toward the GCS to compensate for severe head injury without major physiological changes. The aRTS ranges from 0 (worst) to 7.84 (best) and it has been shown to predict the probability of survival well in trauma victims.[13-15]

Trauma injury severity score (TRISS)

TRISS combines the ISS and aRTS while also including patient age and whether injuries were blunt or penetrating. A logarithmic regression equation is used to compute survival prognosis: Survival probability = 1/(1+ e-b), where b = b0 + b1 x RTS + b2 x ISS + b3 x Age Index. The coefficients b0 – b3 depend on the type of trauma, while the Age Index is 0 if <55years and 1 if ≥55years. The probability of survival is then calculated as a percentage. It's proven to be a useful prognostic tool of trauma outcomes in developed countries.[16] Various studies have demonstrated TRISS to be superior to other trauma scores, in predicting mortality.[17-19] However, Hariharan et al.[20] found that TRISS did not perform consistently in a developing country.

Rapid Emergency Medicine Score (REMS)

Due to the need for rapid assessment of EC patients' prognosis, the REMS was derived from the validated Acute Physiology and Chronic Health Evaluation (APACHE) II scale.[21] The idea was to establish a similar prognostic tool in the EC as was used in the ICU. It combines the GCS, RR, oxygen saturation (SPO2), MAP, HR and age. To calculated the REMS, age is allocated a value from 0 – 6, while the remaining five variables each get a score from 0 – to 4. These values are added to calculate the REMS. The maximum composite score is 26, with higher values indicating a worse prognosis. Imhoff et al.,[22] the first to research REMS in the trauma population, found REMS equivalent to RTS in the prediction of mortality in trauma patients. It appeared to outperform ISS and SI and was shown to be a good prognostic tool in the prediction of mortality in hospitalized patients.[23-24] However, the fact that REMS do not incorporate the injury type is considered a limitation by some traumatologists.

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