Revalidation and update of the TASH-Score: a scoring system to predict the probability for massive transfusion as a surrogate for life-threatening haemorrhage after severe injury

M. Maegele,1,2 R. Lefering,2 A. Wafaisade,1 P. Theodorou,3 S. Wutzler,2 P. Fischer,2 B. Bouillon,1 T. Paffrath1 & the Trauma Registry of the Deutsche Gesellschaft für Unfallchirurgie (TR-DGU)

1Department of Traumatology and Orthopedic Surgery, University of Witten/Herdecke, Cologne-Merheim Medical Center (CMMC), Cologne, Germany
2Institute for Research in Operative Medicine (IFOM), University of Witten/Herdecke, Cologne-Merheim Medical Center (CMMC), Cologne, Germany
3Department of Plastic and Reconstructive Surgery, University of Witten/Herdecke, Cologne-Merheim Medical Center (CMMC), Cologne, Germany

Background The Trauma Associated Severe Haemorrhage (TASH)-Score has been recognized as an easy-to-calculate scoring system to predict the probability for massive transfusion (MT) as a surrogate for life-threatening haemorrhage after injury. Changes with respect to management and outcome of these patients over time prompted a revalidation and an update of the TASH-Score.

Methods The performance of the TASH-Score developed from the 1993–2003 TR-DGU database (Trauma Registry Deutsche Gesellschaft für Unfallchirurgie/German Trauma Society) was revalidated on 5834 datasets from the 2004–2007 TR-DGU database with respect to discrimination, precision and calibration. The performance of the TASH-Score applied onto the 2004–2007 TR-DGU database was compared to its initial performance, and the logistic function to calculate the probability for MT was modified for score adjustment.

Results/Conclusions When the original TASH-Score was applied onto the 2004–2007 TR-DGU database, a slight increase in discrimination was observed while precision was considerably lower. The predicted rate for MT within the development dataset was 13.9% while the observed incidence was 14.1%. In contrast, the predicted rate for MT within the revalidation dataset was 11.7%, while the observed rate was 8.4%. The logistic function to calculate MT probability was modified, and the TASH-Score was again evaluated against the most recent TR-DGU 2004–2007 database. The high performance of the score was not only restored but enhanced reflected by an increased ROC/AUC of 0.905. The score can be calculated quickly upon arrival of the patient in the emergency department and may be supportive to correct coagulopathy, to activate logistics and for research.

Key words: coagulopathy, risk stratification, score, transfusion, trauma.

Introduction

Trauma is the leading cause of death worldwide in persons aged 5–44 [1] and accounts for approximately 10% of all deaths in general [2]. Despite substantial improvements in acute trauma care, uncontrolled haemorrhage is responsible for more than 50% of all trauma-related deaths within the first 48 h after hospital admission [3]. Clinical observations together with recent research highlighted the central role of coagulopathy in acute trauma care [4–10] but rapid identification of patients with active ongoing bleeding requiring massive transfusion (MT) remains unsatisfactory. Substantial problems include turn-around times for global