Published in final edited form as:

J Trauma Acute Care Surg. 2015 June ; 78(6): 1237. doi:10.1097/TA.0000000000000537.

“Hemostatic resuscitation is neither hemostatic nor resuscitative in trauma hemorrhage” – but did they in fact test the effect of hemostatic resuscitation?

Jakob Stensballe, MD, PhD^{1,2} and John B. Holcomb, MD, FACS³

Jakob Stensballe: Stensballe@rh.dk; John B. Holcomb: John.Holcomb@uth.tmc.edu

¹Department of Anesthesia, Centre of Head and Orthopedics, Copenhagen University Hospital, Rigshospitalet, Blegdamsvej 9, DK-2100 Copenhagen, Denmark

²Section for Transfusion Medicine, Capital Region Blood Bank, Copenhagen University Hospital, Rigshospitalet, Blegdamsvej 9, DK-2100 Copenhagen, Denmark

³Department of Surgery, Division of Acute Care Surgery, Center for Translational Injury Research (CeTIR), University of Texas Medical School at Houston, TX, US

To the editor

Khan et al¹ report an observational study of 106 trauma hemorrhage patients from the Royal London and Oxford in the UK and Oslo in Norway, receiving at least 4 RBC after arrival. The patients were severely injured with median Injury Severity Score 34, and 43% were coagulopathic on arrival. Their purpose was to address if hemostatic resuscitation corrected coagulopathy during trauma hemorrhage.

Resuscitation was done with an average FFP/RBC-ratio of 0.5 during the first phase of 0–4 RBC's transfused, slowly catching up to a ratio 0.7 after 12 hours treatment. Furthermore, the PLT/RBC-ratio was very low 0.125. The time to start of FFP and/or PLT transfusion as well as time to bleeding control was not accounted for. According to the largest prospective study on this topic, the The Prospective, Observational, Multicenter, Major Trauma Transfusion (PROMTT) Study of 1,245 patients², these factors have a major impact on coagulopathy and mortality. Additionally, Khan et al administered a median of 2,500 mL crystalloids (IQR 1,300 – 4,000) and a median of 875 mL of colloids (IQR 0 – 1,688) in the first 12 hours. Surprisingly, 25% of the patients received more crystalloids pre-hospital (>3,000 mL) than what was accepted by the inclusion criteria i.e. < 2000 mL. In addition to survival, it is critically important to report morbidity endpoints such as ARDS, AKI and MOF. Without these data it is difficult for clinicians to compare results between different approaches to resuscitation.

Correspondence and reprints: Jakob Stensballe, MD PhD, Department of Anesthesia, Centre of Head and Orthopedics, Copenhagen University Hospital, Rigshospitalet, Blegdamsvej 9, DK-2100 Copenhagen, Denmark & Section for Transfusion Medicine, Capital Region Blood Bank, Copenhagen University Hospital, Rigshospitalet, Blegdamsvej 9, DK-2100 Copenhagen, Denmark, Tel.: +4535458587; Fax +4535390038.

The authors declare no conflicts of interest

The clinical practice evaluated in the study by Khan et al¹ does not qualify as hemostatic resuscitation and, we therefore agree, their practice is neither hemostatic nor resuscitative. Patients received large volumes of crystalloids and colloids both in the pre- and the early in-hospital phase. This dilution at least partially explains the increase in coagulopathy from 43% of patients at arrival to 68% after 12 administered RBC's while with true hemostatic resuscitation this rarely occurs. Higher quality studies on hemostatic resuscitation are needed to understand the essence of ratio's, time, fluids, and hopefully this can be captured in randomized trials.³ Meanwhile, the PROMMTT² study sets the standard of aiming for 1:1:1 high ratio's and early availability of FFP/PLT's and RBCs as the primary resuscitative fluids for trauma hemorrhage in order to secure the best outcome for our patients.^{4,5}

Reference List

1. Khan S, Brohi K, Chana M, Raza I, Stanworth S, Gaarder C, Davenport R. on behalf of the International Trauma Research Network (INTRN). Hemostatic resuscitation is neither hemostatic nor resuscitative in trauma hemorrhage. *J Trauma Acute Care Surg.* 2014 Mar; 76(3):561–7. [PubMed: 24553520]
2. Holcomb JB, del Junco DJ, Fox EE, Wade CE, Cohen MJ, Schreiber MA, Alarcon LH, Bai Y, Brasel KJ, Bulger EM, et al. The Prospective, Observational, Multicenter, Major Trauma Transfusion (PROMTTT) Study: Comparative Effectiveness of a Time-Varying Treatment With Competing Risks. *Arch Surg.* 2012 Oct.15:1–10.
3. Baraniuk S, Tilley BC, del Junco DJ, Fox EE, van BG, Wade CE, Podbielski JM, Beeler AM, Hess JR, Bulger EM, et al. Pragmatic Randomized Optimal Platelet and Plasma Ratios (PROPPR) Trial: Design, rationale and implementation. *Injury.* 2014 Sep; 45(9):1287–95. [PubMed: 24996573]
4. Johansson PI, Sorensen AM, Larsen CF, Windelov NA, Stensballe J, Perner A, Rasmussen LS, Ostrowski SR. Low hemorrhage-related mortality in trauma patients in a Level I trauma center employing transfusion packages and early thromboelastography-directed hemostatic resuscitation with plasma and platelets. *Transfusion.* 2013 Dec; 53(12):3088–99. [PubMed: 23614333]
5. Johansson PI, Stensballe J, Oliveri R, Wade CE, Ostrowski SR, Holcomb JB. How I treat patients with massive hemorrhage. *Blood.* Epub 2014 Oct 7.