

Jan O Jansen 

To cite: Jansen JO. Transfusion, mortality, and hemorrhage control. *Trauma Surg Acute Care Open* 2024;9:e001350. doi:10.1136/tsaco-2023-001350

This edition of *Trauma Surgery & Acute Care Open* contains an article by Mitra *et al*, which describes a 5-year, retrospective, registry-based cohort study of transfusion practices in an Australian trauma center.¹ The aim of the study was to evaluate the association of two ‘modifiable risk factors’—the time to blood component transfusion, and the volume of blood components transfused—with hospital mortality.

The authors hypothesized that a short time to blood component transfusion, and lower volumes of blood components during acute resuscitation, would be associated with lower mortality. They found that the time to initiating blood transfusion was indeed short, and not associated with mortality. This is a sign of a well-functioning trauma center, and the authors should be congratulated on running an effective trauma service that is able to quickly deliver blood products when needed.

The authors also found that, after adjusting for injury and shock severity, the volume of blood components transfused was associated with hospital mortality. This makes intuitive sense. For every unit of blood component transfused, the adjusted odds of death increased by 8%. Their key message is that ‘reducing the need for blood component transfusion should be the target for future interventions’.

This finding, despite the adjustment, and the resulting conclusion, need to be interpreted with caution. Transfusion volume, as the authors point out, is a marker for injury severity and mortality. Patients who bleed more have higher mortality—and require more transfusions. Minimizing the need for transfusion, through rapid control of hemorrhage (the *sine qua non* of trauma surgery) and correction of coagulopathy, is a valid goal. However, transfusion per se, especially when it is needed, may not be harmful,² and advocating for a ‘restrictive transfusion strategy’ (a term that is typically used to describe the approach to addressing anemia in hemodynamically stable patients, often in the critical care setting^{3–4}) in the context of the acute resuscitation of bleeding trauma patients risks sending the wrong message.

The past two decades have seen several large, prospective, multicenter randomized clinical trials of transfusion strategies in trauma patients, that have improved outcomes, and shaped our practice.^{5–6} An important lesson from these studies has been that transfusing blood early (as was done in this study), avoiding the use of crystalloids, and balanced resuscitation saves lives.⁷ The conclusion by Mitra *et al* that ‘these findings suggest

investigation into strategies to achieve earlier control of hemorrhage’, to reduce the need for transfusion—rather than limiting transfusion per se—is the correct one.

Collaborators Not applicable.

Contributors JOJ conceived and wrote the commentary.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests JOJ has received grants from NHLBI, NIH, DoD, and MTEC. He has received study support from Infrascan, RevMedX, and CSL Behring, and consulting fees from CSL Behring, Infrascan, Octapharm, and Cellphire.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Commissioned; internally peer reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Jan O Jansen <http://orcid.org/0000-0001-8863-4398>

REFERENCES

- Mitra B, Singh B, Mathew J, Stewart C, Koolstra C, Hendel S, *et al*. Timing and volume of transfusion for adult major trauma patients with Haemorrhagic shock: a Registry-based cohort study. *TSACO* 2024;9:e001248.
- Gelbard RB, Griffin RL, Reynolds L, Abraham P, Warner J, Hu P, Kerby JD, Uhlich R, Marques MB, Jansen JO, *et al*. Over-transfusion with blood for suspected hemorrhagic shock is not associated with worse clinical outcomes. *Transfusion* 2022;62 Suppl 1:S177–84.
- Carson JL, Guyatt G, Heddle NM, Grossman BJ, Cohn CS, Fung MK, Gernsheimer T, Holcomb JB, Kaplan LJ, Katz LM, *et al*. Clinical practice guidelines from the AABB: red blood cell transfusion thresholds and storage. *JAMA* 2016;316:2025–35.
- Hébert PC, Wells G, Blajchman MA, Marshall J, Martin C, Pagliarello G, Tweeddale M, Schweitzer I, Yetsis E. A multicenter, randomized, controlled clinical trial of transfusion requirements in critical care. *N Engl J Med* 1999;340:409–17.
- Holcomb JB, Tilley BC, Baraniuk S, Fox EE, Wade CE, Podbielski JM, del Junco DJ, Brasel KJ, Bulger EM, Callcut RA, *et al*. Transfusion of plasma, platelets, and red blood cells in a 1:1:1 vs a 1:1:2 ratio and mortality in patients with severe trauma: the PROPPR randomized clinical trial. *JAMA* 2015;313:471–82.
- Sperry JL, Guyette FX, Brown JB, Yazer MH, Triulzi DJ, Early-Young BJ, Adams PW, Daley BJ, Miller RS, Harbrecht BG, *et al*. Prehospital plasma during air medical transport in trauma patients at risk for hemorrhagic shock. *N Engl J Med* 2018;379:315–26.
- Lammers DT, Holcomb JB. Damage control resuscitation in adult trauma patients: what you need to know. *J Trauma Acute Care Surg* 2023;95:464–71.



► <http://dx.doi.org/10.1136/tsaco-2023-001248>

© Author(s) (or their employer(s)) 2024. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

Center for Injury Science, University of Alabama at Birmingham, Birmingham, Alabama, USA

Correspondence to

Dr Jan O Jansen; ljansen@uabmc.edu