



# Forecasting the need for blood transfusions in non-cardiac thoracic surgery

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Comment on: Galata C, Roessner ED, Dette F, *et al.* An update on red blood cell transfusion in non-cardiac thoracic surgery. *J Thorac Dis* 2023. doi: 10.21037/jtd-22-1581.

**Keywords:** Blood transfusion; thoracic surgery; outcomes; decision aids

Submitted Jan 21, 2023. Accepted for publication Mar 10, 2023. Published online Apr 13, 2023.

doi: 10.21037/jtd-2023-03

View this article at: <https://dx.doi.org/10.21037/jtd-2023-03>

Patterns of perioperative blood transfusion have been an evolving paradigm in modern surgery as there has been a wide variation in practice (1,2). Historically, thoracic surgery had been associated with high rates of transfusion (3,4). This is no longer the case, as refinement of surgical techniques, widespread adoption of thoracoscopic and robotic thoracic surgery, and the increasing safety profile of thoracic operations has resulted in decreased transfusion rates (5-8). In addition, restrictive transfusion strategies have been associated with better outcomes (9). However, thoracic surgery is still not without risk and some patients undergoing certain operations are at an increased risk for needing a transfusion. To this end, the Society of Thoracic Surgeons (STS) recommends early identification of high-risk patients who may require blood transfusions in the operating room (10).

Galata and colleagues (11) sought to identify patient risk factors associated with a higher risk of transfusion. They conducted a detailed retrospective review of 379 consecutive patients undergoing non-cardiac thoracic surgery at a single tertiary institution in Germany over the course of one year. The primary outcome was whether the patient received one unit or more of red blood cells between the start of the operation and postoperative day 3. Only 28 patients or 7% of their patients received at least one unit of red blood cells within this time frame (median 2 units). This low transfusion rate is consistent with other studies. The

authors found that open operations and decortications for empyema carried the highest risk for needing a transfusion, with transfusions rates of 20% and 45%, respectively. Other risk factors for transfusions were lower preoperative hemoglobin levels, and older age. It is noteworthy to say that lung resections had lower rates of transfusion compared to all other procedures (2.4% *vs.* 11.4%). The authors are congratulated on their study and outcomes.

The findings of this study are not surprising. Thoracic surgery has evolved rapidly, and most operations nowadays are performed in a minimally invasive fashion with very low risks of bleeding, and exemplar outcomes (5,6). The results are likely generalizable and are supported by a growing body of evidence in the literature. What was surprising in this study; however, was the author's own institutional practice of routinely ordering two cross-matched units of blood prior to all elective thoracic operations. This practice is overly cautious and expensive. The authors acknowledge this and report their "cross-matched blood" to "transfused blood" ratio of 13.5. This highlights poor utilization of blood product resources and inefficiency. The authors realize this and do advocate for more restrictive practices for preoperative ordering of blood products in thoracic surgery. It would be very interesting and informative to see how they roll that out in their institution, and what challenges or facilitators they identified in that process. Although a cost analysis on the unused crossmatched blood was not

performed in this study, other studies in the literature have demonstrated the cost benefit to more judicious preparation of crossmatched blood (12).

In a separate study, we have shown that routine type and screen tests before elective thoracic surgery are not necessary in most cases, and we have developed a nomogram to aid in identifying patients at high risk for transfusion (13). The risk factors identified in the present study are congruent with those identified in our study. Namely, increasing age, preoperative anemia, and open *vs.* minimally invasive approach. In addition to the specific procedure performed, where we also found that decortications are associated with higher risk of transfusions. One factor not mentioned in the present study is body mass index, which has an inverse risk or a paradox. In our study, we designed a simple, easy to use decision aid, as a nomogram, to predict the need for an intraoperative transfusion and a preoperative type and screen. In our study we estimate annual savings of nearly \$20 million/year should a decision aid, such as ours, is implemented widely. The present study further supports this with similar risk factors, studied in a thoracic department in Germany.

Taking the present study and the available literature in concert, it is probably time for a specialty-wide shift in practice patterns regarding preparing blood products for thoracic surgery. The risk factors identified in this study and others support the ability to forecast the need of a blood transfusion with non-cardiac thoracic surgery, which in turn would support abandoning the age-old practice of having two units in the fridge. We even dare go further and selectively order type and screen blood tests guided by data to identify high risk patients.

## Acknowledgments

*Funding:* None.

## Footnote

*Provenance and Peer Review:* This article was commissioned by the editorial office, *Journal of Thoracic Disease*. The article did not undergo external peer review.

*Conflicts of Interest:* Both authors have completed the ICMJE uniform disclosure form (available at <https://jtd.amegroups.com/article/view/10.21037/jtd-2023-03/coif>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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## References

1. Abdelsattar ZM, Hendren S, Wong SL, et al. Variation in Transfusion Practices and the Effect on Outcomes After Noncardiac Surgery. *Ann Surg* 2015;262:1-6.
2. Ferraris VA, Davenport DL, Saha SP, et al. Surgical outcomes and transfusion of minimal amounts of blood in the operating room. *Arch Surg* 2012;147:49-55.
3. Gwin JL, Keller SM. Blood transfusion practices after resection of intrathoracic neoplasms. *J Surg Oncol* 1993;54:34-7.
4. Griffiths EM, Kaplan DK, Goldstraw P, et al. Review of blood transfusion practices in thoracic surgery. *Ann Thorac Surg* 1994;57:736-9.
5. Tong BC, Hanna J, Toloza EM, et al. Outcomes of video-assisted thoracoscopic decortication. *Ann Thorac Surg* 2010;89:220-5.
6. Abdelsattar ZM, Allen MS, Shen KR, et al. Variation in Hospital Adoption Rates of Video-Assisted Thoracoscopic Lobectomy for Lung Cancer and the Effect on Outcomes. *Ann Thorac Surg* 2017;103:454-60.
7. Fernandez FG, Shahian DM, Kormos R, et al. The Society of Thoracic Surgeons National Database 2019 Annual Report. *Ann Thorac Surg* 2019;108:1625-32.
8. Azizgolshani NM, Porter ED, Fay KA, et al. Preoperative Type and Screen is Unnecessary in Elective Anatomic Lung Resection and Esophagectomy. *J Surg Res* 2020;255:411-9.
9. Dougenis D, Patrino V, Filos KS, et al. Blood use in lung resection for carcinoma: perioperative elective anaemia does not compromise the early outcome. *Eur J Cardiothorac Surg* 2001;20:372-7.

10. Tibi P, McClure RS, Huang J, et al. STS/SCA/AmSECT/SABM Update to the Clinical Practice Guidelines on Patient Blood Management. *Ann Thorac Surg* 2021;112:981-1004.
11. Galata C, Roessner ED, Dette F, et al. An update on red blood cell transfusion in non-cardiac thoracic surgery. *J Thorac Dis* 2023. doi: 10.21037/jtd-22-1581.
12. Bawazir WM, Dakkam FM. Enhancing the utilization of packed red blood cells stock in maternity hospitals. *Saudi Med J* 2020;41:628-34.
13. Abdelsattar ZM, Joshi V, Cassivi S, et al. Preoperative Type and Screen Before General Thoracic Surgery: A Nomogram to Reduce Unnecessary Tests. *Ann Thorac Surg* 2023;115:519-25.

**Cite this article as:** Verm RA, Abdelsattar ZM. Forecasting the need for blood transfusions in non-cardiac thoracic surgery. *J Thorac Dis* 2023;15(5):2374-2376. doi: 10.21037/jtd-2023-03