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Comment on "Impact of Red Blood Cell Transfusion on In-hospital Mortality of Isolated Coronary Artery Bypass Graft Surgery"

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We read with interest the work by Colson et al[1] on the relationship between red blood cell (RBC) transfusion and in-hospital mortality following coronary artery bypass graft (CABG) surgery. Their work corroborates the conclusions of earlier research that also underscored the adverse outcomes linked with RBC transfusion.[2] The authors concluded that RBC transfusion was an independent factor of in-hospital mortality after CABG. However, we urge careful interpretation of their results, given the potential limitations of the administrative database and analytical approaches employed. Several key issues regarding their methodology and data interpretation warrant further scrutiny, which we will elucidate as follows.

The authors utilized data from the French National Uniform Hospital Discharge Database which contains the French counterpart of the International Classification of Diseases 10 coding system (Classification Commune des Actes Médicaux). They acknowledged the inherent shortcomings of these data, particularly regarding patient disease severity, specifics of the surgery, and RBC transfusion, which is only tracked as a 3-tier categorical variable.[3] Misset, et al.[4] previously pointed out considerable discrepancies in medical diagnosis coding across reporting physicians, which would limit the coding system's inter-rater reliability and the dataset's research validity. The underestimation of transfusion rates was also likely, considering the sensitivity of billing data to document transfusion was as low as 0.716 when cross-verified with electronic medical records.[5] Moreover, the 9.4% RBC transfusion rate in this study contrasts with the considerably higher 40% rate found in the authors' separate cardiac surgical study.[6]

Second, isolating the risk of mortality associated with transfusion relies heavily on controlling for the severity of the patient's preoperative and intraoperative conditions. While the authors made adjustments for the Charlson Comorbidity Index they failed to directly account for the severity of the patient's cardiovascular condition in the study. This limitation can lead to confounding by indication, as critically ill CABG patients are more likely to receive RBC transfusions, thereby increasing the risk of in-hospital mortality.[7] Similarly, in the case of adult patients undergoing cardiac operations, those with preoperative anemia are more frequently administered RBC transfusions during the surgery. In a propensity-matched analysis, Ranucci, et al.[8] identified preoperative anemia as an independent risk factor for postcardiac surgery mortality.[8] The authors of the study also reported a notably high adjusted odds ratio for patients aged 80 years and above.[1] Additionally, besides being more prone to receiving red blood cell transfusions, patients with preoperative anemia also receive increased amounts of fresh frozen plasma and platelet concentrates compared to nonanemic patients.[8] The use of other types of blood products further complicates the assessment of mortality risk associated with RBCs in patients with anemia.

The overall robustness of the final model raises some questions. The model does not measure or adjust for the many known risk factors. The semiquantitative nature of the RBC transfusion data further hinders any reliable calculation of mortality risk. Furthermore, this study does not account for the total length of the CABG procedure nor the time on cardiopulmonary bypass. Santos et al.[9] demonstrated that mortality rates significantly increase when patients are on cardiopulmonary bypass for more than 115 minutes.

The lack of comprehensive adjustment for the risk profile in the model, as well as the omission of established risk factors such as other blood products, present real concerns about the model's validity. While the authors assessed the model's adequacy using the c-statistic and Hosmer-Lemeshow tests, these tests do not account for the unaddressed risk factors. Further focused studies are warranted to provide a more accurate understanding of the risks associated with RBC transfusion in specific clinical contexts, such as anemia versus bleeding.

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The authors declare that they have nothing to disclose.

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