

with lower gastrointestinal tumors in the restrictive group can better explain the differences in outcomes between the groups than the quantity of transfused erythrocytes per patient. These data do not support preoperative erythrocyte transfusion for anemic patients undergoing cancer surgery; if a higher preoperative hemoglobin concentration is desired, then consider iron therapy.

Competing Interests

The authors declare no competing interests.

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Association of Postoperative Transfusion Strategy with Short-term Outcomes in Surgical Oncology Patients

To the Editor:

In a controlled, randomized clinical trial assessing the effect of postoperative transfusion strategy on the short-term outcomes in the intensive care unit (ICU) high-risk patients undergoing abdominal oncological surgery, Pinheiro de Almeida *et al.*¹ showed that a liberal transfusion strategy with a hemoglobin trigger of 9 g/dl was associated with fewer major postoperative complications and decreased short-term mortality compared with a restrictive strategy with a hemoglobin threshold of 7.0 g/dl. Their results are different from the findings of the recent two large controlled, randomized clinical trials by Carson *et al.*,^{2,3} in which reduced severe complications and short- or long-term mortality after hip fracture surgery in a high-risk group of elderly patients with cardiovascular disease or risk factors are not demonstrated when comparing a postoperative liberal transfusion strategy with a restrictive transfusion strategy. Other than slightly higher transfusion triggers (liberal strategy with a hemoglobin of 10 g/dl and restrictive strategy with a hemoglobin of 8 g/dl) used in the studies by Carson *et al.*,^{2,3} several important issues of the study by Pinheiro de Almeida *et al.*¹ should be clarified and discussed before adoption of their results into routine practice.

First, comparing preoperative albumin levels between groups is barely meaningful. Preoperative hypoalbuminemia is a common problem in cancer patients and has been independently associated with the postoperative complications and mortality.^{4,5}

Second, we were not provided with detail of anesthesia and intraoperative managements. It has been shown that intraoperative hypoxemia, hypotension, tachycardia, and hypertension are independently associated with morbidity and mortality after noncardiac surgery.^{6–8} Furthermore, the authors did not provide intraoperative blood loss and transfusion hemoglobin triggers although they are important for postoperative short-term outcomes. Among elderly patients undergoing major noncardiac surgery, intraoperative blood transfusion has been associated with decreased mortality risk in patients with preoperative hematocrit levels of less than 24% or in patients with mild to no preoperative anemia (hematocrit of 30% or greater) when there is substantial blood loss (500 to 999 ml). However, intraoperative transfusion is not helpful for patients with hematocrit levels of 24% or greater when the estimated blood loss is less than 500 ml, and it may be harmful if their preoperative hematocrit levels are between 30 and 35.9%.⁹

Third, most patients included in this study were classified as American Society of Anesthesiologists physical status 2 or 3 and had a good performance status and localized disease. The mean hemoglobin levels at ICU admission were 11.0 to 11.2 g/dl. However, the mean hemoglobin levels before transfusion in ICU decreased to 6.8 to 7.9 g/dl, and most transfusions were given after the third day of the ICU stay.

The authors did not provide the reasons for ICU admission of patients. It was also unclear what reasons resulted in such significant decreases in postoperative hemoglobin levels within a short 3-day period after ICU admission. We are concerned that any imbalance in these factors would have confounded interpretation of their results.

Finally, a limitation of this study design is that the decision to perform postoperative transfusions is mainly based on the hemoglobin levels rather than on a patient's status. In clinical practice, it may be unrealistic to use the hemoglobin threshold as the only endpoint to guide decisions regarding transfusion. The coexisting morbidities (e.g., coronary artery disease) also are major determinants of the need for transfusion.¹⁰ In the studies by Carson *et al.*,^{2,3} the restrictive transfusion strategy allows transfusion for symptoms of anemia, which are chest pain thought to be cardiac in origin, symptoms and signs of congestive heart failure, or hypotension or tachycardia unresponsive to fluid challenge. Thus, we consider that for ICU patients with physiological instability, this study limitation may be one of the reasons for poorer short-term outcomes with a restrictive transfusion strategy.

Competing Interests

The authors declare no competing interests.

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Adding a New Piece to the Transfusion Puzzle in Oncologic Surgery Patients

To the Editor:

We read with interest the recent article by Pinheiro de Almeida *et al.*¹ regarding transfusion requirements in patients undergoing surgery for intraabdominal malignancies.

In contrast to the results from multiple other large-scale, randomized controlled trials, which did not show substantial differences in outcomes between restrictive and liberal blood transfusion strategies in a variety of different patient cohorts, the current study reports improved outcomes in patients that were transfused at a higher hemoglobin threshold (9 g/dl).^{2–4} It is unclear whether this improvement is unique to this particular patient population (patients undergoing surgical resection for solid intraabdominal tumors) or whether the results could be generalized to all patients undergoing surgery for resection of solid tumors.

The authors suggest that the improved outcomes could be related to utilization of leukodepleted blood as well as shorter duration of blood storage compared with other studies. However, there are no convincing data to date that transfusion of leukodepleted blood is associated with improved mortality or reduced incidence of cancer recurrence.^{5,6} Similarly, an association between the duration of erythrocyte storage and meaningful clinical outcomes such as increased mortality or long-term morbidities remains uncertain at this time.^{7–9} It is noteworthy that the mortality difference was driven by the incidence of septic shock (24 of 31 patients), suggesting the possibility that higher hemoglobin concentrations may protect against septic shock physiology. However, the larger prospective trial by Holst *et al.*,³