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AABB Recommends a Restrictive Approach to RBC Transfusion

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According to the Healthcare Cost and Utilization Project (HCUP), "blood transfusion occurred in over 10% of all hospital stays that included a procedure and was the most frequently performed procedure in 2009," the most recent year for which data are reported.[1] From 1997 to 2009, the rate of transfusion during hospital stays has more than doubled. [2] At present, it is estimated that 15 and 85 million units of red blood cells (RBCs) are transfused each year in the United States and in the world, respectively.[2] It should be noted, however, that more recent surveys may not support this trend (unpublished National Blood Collection and Utilization Survey data). Mindful of the implications of the increase in demand, as well as transfusion risks, the AABB directed the Clinical Transfusion Medicine Committee (CTMC) in 2011 to prepare guidelines for RBC transfusion. The group was comprised of CTMC members, as well as experts from other relevant medical specialties including anesthesiology, cardiology, hematology, and trauma. They convened in Bethesda, Md. once and worked online for several months prior to finalizing the document, which was published in 2012.[2]

These guidelines incorporated data solely from randomized clinical trials (RCTs) so as to use the highest quality evidence, and used the GRADE (Grading of Recommendations Assessment, Development, and Evaluation)[3] methodology to make indisputable recommendations that would improve practice standardization. The RCTs were identified through a recent review of the Cochrane database[4,5.] Overall, the patient population consisted of more than 6,200 patients enrolled in 19 trials. Unfortunately, high-quality data do not exist regarding many clinical situations for which transfusions are often considered. Thus, the recommendations were limited by the availability of published evidence. Hemoglobin thresholds and clinical variables were used as guides for transfusion decisions in hemodynamically stable adults and children.

Key Points

- The AABB recommends adhering to a restrictive transfusion strategy (7 to 8 g/dL) in hospitalized, stable patients (Grade: strong recommendation; high-quality evidence).
- The AABB suggests adhering to a restrictive strategy in hospitalized patients with preexisting cardiovascular disease and considering transfusion for patients with symptoms or a hemoglobin level of 8 g/dL or less (Grade: weak recommendation; moderate-quality evidence).
- The AABB cannot recommend for or against a liberal or restrictive transfusion threshold for hospitalized, hemodynamically stable patients with the acute coronary syndrome (Grade: uncertain recommendation; very low-quality evidence).
- The AABB suggests that transfusion decisions be influenced by symptoms as well as hemoglobin concentration (Grade: weak recommendation; low-quality evidence).

The two largest RCTs contributing data for the AABB guidelines were the TRICC[6] and the FOCUS[7] trials[7]. The first, published in 1999, remains the largest and most definitive set of evidence that a restrictive transfusion approach in critically ill patients is as safe as a more liberal approach. TRICC data have been confirmed in other trials since then. Based on the hemoglobin trigger studied in TRICC, the AABB's only strong recommendation therefore reads, "In adult and pediatric intensive care unit patients, transfusion should be considered at hemoglobin concentrations of 7 g/dL or less." FOCUS followed randomized elderly orthopedic surgery patients to determine how fewer transfusions (restrictive arm) compared with more transfusions; its findings formed the basis for the statement that "In

postoperative surgical patients, transfusion should be considered at a hemoglobin concentration of 8 g/dL or less, or for symptoms (chest pain, orthostatic hypotension or tachycardia unresponsive to fluid resuscitation, or congestive heart failure)."

The combination of data from 11 RCTs that reported mortality showed that patients in the restrictive transfusion groups had a lower 30-day mortality (relative risk, 0.85 [95% confidence interval, 0.7 to 1.03]), although this did not reach statistical significance. Other outcomes, such as myocardial infarction, pulmonary edema, cerebrovascular accident, thromboembolism, infection, inability to walk or death at 60 days, and hospital length of stay, were not different between both groups of patients. No evidence was found to suggest that a restrictive transfusion strategy was unsafe.

The recommendations are meant to apply to most medical and post-operative patients (including those with autologous units available), except those with acute coronary syndrome (ACS). Since no randomized clinical trial of adequate size has studied transfusion triggers in such patients, the authors were unable to make any recommendation regarding them. On the other hand, they suggest it is appropriate to adhere "to a restrictive transfusion strategy in hospitalized, hemodynamically stable patients with preexisting cardiovascular disease." The authors' rationale for this was based mainly on the FOCUS trial, in which 63% of patients had coronary artery or cardiovascular disease. Therefore, they suggested that for these patients also, "transfusion should be considered at a hemoglobin concentration of 8 g/dL or less, or for symptoms (e.g., chest pain, orthostatic hypotension or tachycardia unresponsive to fluid resuscitation, or congestive heart failure)."

The single outcome specifically studied between patients with cardiovascular disease vs. those with only cardiovascular risk factors in the FOCUS trial was walking independently or death at 60 days, and there was no difference between the two groups. Despite low quality evidence, the authors also suggested that transfusion decisions for hospitalized, hemodynamically stable patients, be guided by symptoms and not hemoglobin concentration. Unfortunately, only the FOCUS trial included symptoms in the transfusion decision process. Based on physiologic reasoning, the authors postulated that symptomatic patients benefit from RBC transfusion, despite limited data. Therefore, a useful trial would compare patients being transfused because of low hemoglobin values vs. symptoms of anemia. However, such a trial is unlikely to be performed, as it would probably require blinding physicians to their patients' hemoglobin results. In addition, the two groups would most likely lack clinical equipoise, an essential characteristic of randomized clinical trials.

The AABB guidelines focused mainly on hemoglobin values that might trigger a RBC transfusion order. However, they recognized that practice guidelines are not meant to be standard of care for all patients, independent of their unique clinical characteristics or the physicians' judgment and choices. Thus, transfusing above the suggested hemoglobin concentration, or withholding a transfusion for a patient with a hemoglobin value below it, may be warranted depending on the clinical context.

In summary, if a restrictive transfusion strategy were widely followed in lieu of a liberal approach, patients would be 40% less likely to be exposed to RBC transfusions [95% confidence interval, 0.52 to 0.72]. This effect would certainly impact the demand for – and by extension, ultimately the supply of – blood, as well as the risks of short- and long-term complications, both those known and yet to be described.

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