# Encouraging single-unit transfusions: a superior patient blood management strategy?

Since the Transfusion Requirements in Critical Care (TRICC) trial published in 1999 demonstrated equivalent or improved outcomes when using a restrictive versus a liberal transfusion threshold in critically ill patients,[1] providers and institutions have sought to decrease utilization of allogeneic red blood cells by promoting restrictive transfusion practices. Since that landmark trial, multiple other studies in different populations, including patients undergoing cardiac surgery,[2,3] elderly patients undergoing hip replacement,[4] medical patients with gastrointestinal bleeds,[5] and patients with traumatic brain injury,[6] have redemonstrated the equivalence or superiority of restrictive over liberal transfusion thresholds with regard to patient outcomes. However, despite a growing body of evidence supporting this practice, individuals and institutions have found it surprisingly difficult to adhere to these guidelines. Nonetheless, there remain multiple motivations for reducing superfluous transfusion; blood products are a finite resource subject to shortage, there are numerous risks associated with transfusion, and transfusion is an expensive endeavor from both direct (acquisition) and indirect (materials, labor, administration) costs.

With the rising costs of health care, particular attention has been paid to areas of potential waste, including unnecessary transfusion. Blood transfusion remains one of the most common procedures performed in hospitals, with nearly 21 million blood components transfused in the United States each year.[7] At the Joint Commission's National Summit on Overuse in 2012, blood transfusion was listed as the number one most overused procedure[8]; and, although it is difficult to retrospectively determine the appropriateness of all transfusions, studies have demonstrated significant variability in the transfusion practices of different providers,[9,10] suggesting the potential for substantial waste. One single-institution study found that nearly half (47.8%) of transfusions had an inadequate indication, leading to a direct, five-figure cost to the center.[11] With an acquisition cost of approximately $300 per unit of red blood cells and greater than 10 million units transfused in the United States alone, the economic impact of transfusions with questionable indications may be greater than $3 billion annually.[12] Furthermore, these costs do not include either the indirect costs, which are estimated to drive the total cost of transfusion three to four times the acquisition cost,[13] or the cost associated with treating any one of the numerous complications that can occur with transfusion.

With this significant potential to reduce waste and cost, attention has focused on how different patient blood management (PBM) programs can help hospitals to decrease blood utilization. Although most of the emphasis has remained on hemoglobin triggers with regard to transfusion, the recently published "Choosing Wisely" guidelines from the AABB include a recommendation for single-unit transfusions in stable, anemic patients.[14]

In this month's issue of **TRANSFUSION**, Dr Yang and colleagues describe the success of these two different PBM strategies to reduce transfusion across three community hospitals.[15] The first strategy, encouraging restrictive hemoglobin triggers, had modest success. Fewer units of blood were ordered when the most recently measured hemoglobin was greater than 8 g/dL; however, in multivariate analysis, hemoglobin trigger was not significantly associated with decreased blood utilization. The second strategy focused on the dose of blood transfused, treating to a target hemoglobin level rather than using a trigger for transfusion by encouraging providers to order only single-unit transfusions in hemodynamically stable, nonbleeding patients. Coined "Why Give 2 When 1 Will Do," this PBM measure met with superior success and had a significantly greater impact on decreasing blood utilization that remained a major influence after multivariate analysis. The authors speculate that providers may feel more comfortable with decreasing the amount transfused while still ordering a unit when they believe the patient requires it instead of adhering to stricter hemoglobin threshold guidelines. For decades, providers have been taught that, "If you are going to give one, you might as well give two," stemming from a desire to avoid infectious risks of human immunodeficiency virus and hepatitis during the 1980s, when it was largely believed that single-unit transfusions were unnecessary. Ironically, this policy, which was intended to decrease unneeded transfusions, likely resulted in increased blood utilization; because, rather than doing away with superfluous transfusions (which could be avoided by using restrictive transfusion thresholds), it encouraged over-transfusion in patients who would have benefited sufficiently from a

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single unit. However, with education on the effectiveness of single-unit transfusions, providers have been able to change this practice. So, given these results, it begs the question: when it comes to decreasing blood product utilization, have we been going at it the wrong way?

There are some limitations to this study, as the authors mention. The study took place among three community hospitals and excluded the two teaching hospitals, because some PBM measures had already been implemented at these institutions before the study period. Only one of the three study hospitals performed cardiac surgery, and there were very few massive transfusions at any of the locations. Therefore, academic teaching hospitals and tertiary referral centers with a different patient population may expect to see different results from the implementation of this type of PBM program. Furthermore, hospitals that already dispense relatively few two-unit transfusions may not see a significant decrease in blood utilization from encouraging a single-unit transfusion policy.

Despite the noted limitations, encouraging single-unit transfusion is an inexpensive measure to implement and has potential for meaningful benefits to the patient, hospital, and society as a whole. Even if the clinician anticipates that several units of red blood cells will be required, it is still prudent practice to administer a single unit and reassess the patient before proceeding with a subsequent unit. Although the relative efficacy and long-term impact of posters, order sets, education campaigns, "hard stops," and other strategies at behavior modification remain unclear, the cost-benefit ratio clearly supports wide use of this PBM measure, which could easily be adopted nationwide.

### CONFLICT OF INTEREST

The authors report no conflicts of interest.

**Nicole R. Guinn, MD**
*e-mail: nicole.guinn@dm.duke.edu*
*Department of Anesthesiology*
*Duke University Medical Center*
*Durham, NC*
**Cory Maxwell, MD**
*Department of Anesthesiology*
*Duke University Medical Center*
*Durham, NC*
*Department of Anesthesiology*
*Durham Veterans Affairs Hospital*
*Durham, NC*

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