Blood Transfusions in the Intensive Care Unit

What are the current recommendations for blood transfusions in the intensive care unit?

Carol A. Rauen is an independent critical care clinical nurse specialist and education consultant, and a staff nurse at Washington Hospital Center in Washington, DC.

This excellent question is simple and specific. It is also a very important question that critical care clinicians face daily. I wish I could offer a simple and specific answer. The first documented human-to-human blood transfusion took place in 1818 and today packed red blood cell (PRBC) infusions are a cornerstone therapy in modern critical care practice. The procedure known as bloodletting has a much longer history in medical practice: 2500 years. Ironically, thought to be the major treatment for “all that ails you,” bloodletting was actually proven to be detrimental to health. We can only hope that our current practice of blood administration does more good than harm.

In the absence of a simple answer to this simple question, let me share what the current body of evidence has to offer. The first trigger or threshold recommendation was proposed in 1942, which commonly became known as the “10/30” rule. This rule suggested that if the hemoglobin level fell below 10 g/dL or if the hematocrit level fell below 30%, the patient would probably benefit from a red cell transfusion. Despite the lack of research support for this recommendation it lasted in clinical practice for more than 40 years. In the early 1980s, when human immunodeficiency virus was identified and found to be transmitted via blood, the risk/benefit analysis of PRBC transfusions came into question. From the subsequent changes in transfusion practices and clinical outcome evaluation data, much has been learned about the benefits and risks of blood administration.

Anemia

Anemia is very common in critically ill patients, and is detrimental to recovery. As many as 95% of patients admitted to intensive care units are likely to be anemic. The causes are varied and include blood loss, decreased erythrocyte production or increased destruction, malnutrition, and hemodilution. Cellular oxygen delivery is essential for aerobic metabolism. Hemoglobin is the carrier of oxygen and its importance cannot be overstated. Simply put, anemia is bad.

Risks Associated With Blood Administration

What is worse—anemia, cellular hypoxia, or the potential side effects of blood administration? The first documented hepatitis transmission from PRBC took place 1943. Since then, infection transmission, sepsis, and transfusion reactions have been the primary concerns of clinicians administering blood. During the last decade, blood transfusions have been implicated and associated with infections, transfusion-related acute lung injury or acute respiratory distress syndrome, transfusion-associated circulatory overload, transfusion-associated immunomodulation—a down regulation of immune function or immunosuppression—and the cause of nosocomial infections, ventilator-associated pneumonia, decreased outcome in acute coronary...
syndrome and cardiac surgery, and increased mortality after subarachnoid hemorrhage. There have been reports that using leukodepleted blood might decrease some of these risks. There is a plethora of anecdotal, observational, and research literature outlining the potential dangers of blood administration. Simply put, blood transfusions are bad.

Evidence-Based Practice Guidelines

Transfusion requirements in critical care have been studied, but more randomized control studies are needed to definitively answer this simply question. In 1999 the New England Journal of Medicine published what has become the landmark study that all subsequent studies have been based on or compared to. The investigators concluded that restrictive transfusion practices, hemoglobin 7 to 9 g/dL, are possibly superior to the traditional transfusion trigger of 10 g/dL. The Surviving Sepsis Campaign based their recommendations for blood administration in sepsis on this study.

Further, the 2004 CRIT study was an observational study that looked at transfusion practices in the United States. The investigators found that despite the known risks, blood administration practices have not changed much in the last decade. They found that transfusion was an independent predictor of worse clinical outcome in critically ill patients. An earlier European study, the Anemia and Blood Transfusion in Critical Care Study (ABC study), reached the same conclusion. A recent analysis of blood administration using the Sepsis Occurrence in Acutely Ill Patients (SOAP) data set from European critical care units had a different finding. This observational study did not find that blood transfusions were associated with increased mortality in critically ill patients. Simply put, clear research-based evidence does not exist to make a definitive statement regarding transfusion safety or a specific transfusion trigger.

Summary

It is clear that more research is needed as to the transfusion trigger for critically ill patients. In the absence of ischemic heart disease, age over 65 years, pulmonary disease, or acute hemorrhage, most critically ill patients can “tolerate” a hemoglobin level of 7 to 9 g/dL. The physiologic effects of anemia and blood administration are both potentially problematic. Like many bedside questions, the answer will depend on the patient, that is, his or her unique situation and presentation. In addition to the hemoglobin and hematocrit values, clinicians need to evaluate oxygen delivery, transport/perfusion variables, hemodynamic stability, weaning ability from the ventilator, and/or vasoactive drugs on an individual level. The decision to administer a blood transfusion, like most treatment decisions in critical care, can not be made on one piece of assessment data. The goal is to give the patient what he or she needs. Our challenge is to determine what that is while doing the least harm.

References


Do you have a clinical, practical, or legal question you’d like to have answered? Send it to us and we’ll pass it on to our “Ask the Experts” panel. Call (800) 394-5995, ext. 8839, to leave your message. Questions may also be faxed to (949) 362-2049; mailed to Ask the Experts, Critical Care Nurse, 101 Columbia, Aliso Viejo, CA 92656; or sent by e-mail to ccn@aacnjournals.org.

Questions of the greatest general interest will be answered in this department each and every issue.

To access previous Ask the Experts articles that have been published in Critical Care Nurse, go to our Web site, http://ccn.aacnjournals.org and type in “ask the experts” in the keyword search field.
Blood Transfusions in the Intensive Care Unit
Carol A. Rauen

Crit Care Nurse 2008;28 78-80
Copyright © 2008 by the American Association of Critical-Care Nurses
Published online http://ccn.aacnjournals.org/

Personal use only. For copyright permission information:
http://ccn.aacnjournals.org/cgi/external_ref?link_type=PERMISSIONDIRECT

Subscription Information
http://ccn.aacnjournals.org/subscriptions/

Information for authors
http://ccn.aacnjournals.org/misc/ifora.xhtml

Submit a manuscript
http://www.editorialmanager.com/ccn

Email alerts
http://ccn.aacnjournals.org/subscriptions/etoc.xhtml