

Clinical Science

Can old dogs learn new “transfusion requirements in critical care”: a survey of packed red blood cell transfusion practices among members of The American Association for the Surgery of Trauma



Vasiliy Sim, M.D.^a, Lillian S. Kao, M.D.^b, Jessica Jacobson, M.D.^c, Spiros Frangos, M.D.^c, Susan Brundage, M.D.^d, Chad T. Wilson, M.D.^c, Ron Simon, M.D.^c, Nina E. Glass, M.D.^c, H. Leon Pachter, M.D.^c, S. Rob Todd, M.D.^{c,*}

^aDepartment of Surgery, Brookdale University Hospital and Medical Center, Brookdale Plaza, Brooklyn, NY 11212, USA; ^bDepartment of Surgery, UTHHealth, 7000 Fannin Street, Houston, TX 77030, USA; ^cDepartment of Pathology, New York University School of Medicine, 550 First Avenue, New York, NY 10016, USA; ^dDepartment of Surgery, Queen Mary University of London, Mile End Road, London E1 4NS, UK

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Survey methodology

Abstract

BACKGROUND: The objective of this study was to characterize variations in packed red blood cell (PRBC) transfusion practices in critically ill patients and to identify which factors influence such practices. We hypothesized that significant variation in transfusion triggers exists among acute care surgeons.

METHODS: A survey of PRBC transfusion practices was administered to the American Association for the Surgery of Trauma members. The scenarios examined hemoglobin thresholds for which participants would transfuse PRBCs.

RESULTS: A hemoglobin threshold of less than or equal to 7 g/dL was adopted by 45% of respondents in gastrointestinal bleeding, 75% in penetrating trauma, 66% in sepsis, and 62% in blunt trauma. Acute care surgeons modified their transfusion trigger significantly in the majority of the modifications of these scenarios, often inappropriately so.

CONCLUSIONS: This study documents continued evidence-practice gaps and wide variations in the PRBC transfusion practices of acute care surgeons. Numerous clinical factors altered such patterns despite a lack of supporting evidence (for or against).

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* Corresponding author. Tel.: +1-212-263-6509; fax: +1-212-263-8640.

E-mail address: srtodd@nyumc.org

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In 1999, the landmark Transfusion Requirements in Critical Care (TRICC) trial documented that a restrictive packed red blood cell (PRBC) transfusion practice (hemoglobin transfusion trigger <7.0 g/dL with a target range of

7.0 to 9.0 g/dL) was as effective as and possibly superior to a liberal transfusion practice (hemoglobin transfusion trigger <10.0 g/dL with a target range of 10.0 to 12.0 g/dL) in critically ill patients.¹ The Canadian Critical Care Trials Group that performed this study administered 2 scenario-based surveys before and after the publication of the TRICC trial.^{2,3} The results of the post-TRICC trial survey in 2005 demonstrated that Canadian critical care physicians had adopted lower transfusion triggers and an increase in the use of single-unit PRBC transfusion.³ However, the 2004 prospective observational CRIT study in the United States documented that less than 10% of critically ill patients were transfused at a hemoglobin level less than or equal to 7.0 g/dL with a mean pretransfusion hemoglobin of 8.6 ± 1.7 g/dL.⁴ More recent prospective observational studies (international) show improvement with pretransfusion hemoglobin levels being 7.4 ± 1.1 and 7.9 ± 1.1 g/dL.^{5,6} An assessment of transfusion practices among North American critical care physicians is lacking.

While the TRICC trial examined critically ill patients with euolemia after initial treatment, there were many exclusion criteria to study entry including active blood loss at the time of enrolment, chronic anemia, and admission after a routine cardiac surgical procedure. As such, the generalizability of a restrictive transfusion practice across patient comorbidities, physiological states, and disease

processes remains unclear. Physician surveys from Europe, Australia, and Canada that have assessed transfusion practices among critical care physicians have also examined how such practices are affected by certain comorbidities.⁷⁻¹⁰ However, there is a surprising lack of similar studies from the United States. The few published surveys were performed among anesthesiologists and focused primarily on perioperative transfusion practices.^{11,12}

The objective of this study was to characterize variations in PRBC transfusion practices among acute care surgeons (members of The American Association for the Surgery of Trauma [AAST]) in critically ill patients and to identify which factors influence such practices. We hypothesized that there is still use of liberal transfusion triggers, and significant variation in transfusion triggers exist among acute care surgeons.

Patients and Methods

An on-line scenario-based survey (SurveyMonkey, Palo Alto, CA) of PRBC transfusion practices was administered to acute care surgeons (AAST members). The AAST is a premiere organization for surgeons dedicated to the fields of trauma, emergency general surgery, and surgical critical care. At the time of the survey, there were a total of 1,181 AAST members, of which 551 accepted surveys. The study

Table 1 PRBC transfusion survey stem scenarios and modifications

Scenario 1: A 61-year-old woman presents to the ICU following a significant episode of hematemesis (1 L) accompanied by melena. She undergoes endoscopic therapy and is appropriately resuscitated. She is now hemodynamically stable and appears to be euolemic. Despite these findings, her hemoglobin continues to trend down at a rate of 1 U of PRBCs every 12 hours. Your packed PRBC transfusion threshold would be as follows:

Hgb = 10 g/dL Hgb = 9 g/dL Hgb = 8 g/dL Hgb = 7 g/dL Hgb = 6 g/dL Other

Modifications: (1) Hypoxia; (2) significant comorbidities (excluding cardiac disease); and (3) ongoing coronary ischemia

Scenario 2: A 54-year-old man sustains a thoracoabdominal gunshot wound. Upon arrival he is hemodynamically unstable and taken emergently to the operating room. He is found to have a left lung injury, left diaphragm injury, injury to the hilum of the spleen, and through and through injury to the stomach. He undergoes a left lung wedge resection, left diaphragm repair, splenectomy, and gastrorrhaphy twice. His injury severity score is 41. He is postoperative day 7 and hemodynamically stable. He remains mechanical ventilator dependent. Your PRBC transfusion threshold would be as follows:

Hgb = 10 g/dL Hgb = 9 g/dL Hgb = 8 g/dL Hgb = 7 g/dL Hgb = 6 g/dL Other

Modifications: (1) Stable coronary artery disease; (2) preoperative for a minor procedure (ie, tracheostomy); and (3) preoperative for a major procedure (ie, thoracotomy with decortication)

Scenario 3: A 68-year-old woman underwent a colostomy reversal. On postoperative day 6, she returns to the ICU in septic shock. She is diagnosed with an anastomotic breakdown requiring surgery and is managed subsequently via the Surviving Sepsis Campaign guidelines. She is currently hemodynamically stable, not requiring vasopressors, and her central venous pressure is 12 mm Hg. Your PRBC transfusion threshold would be as follows:

Hgb = 10 g/dL Hgb = 9 g/dL Hgb = 8 g/dL Hgb = 7 g/dL Hgb = 6 g/dL Other

Modifications: (1) Persistent lactic acidosis; (2) a history of congestive heart failure; and (3) evidence of shock (hemodynamically unstable)

Scenario 4: A 22-year-old otherwise healthy man is involved in a motor vehicle collision. He is diagnosed with a Grade 3 liver laceration with arterial extravasation (successfully managed by interventional radiology) and bilateral superior and inferior pubic rami fractures on computed tomography of the abdomen and pelvis. His injury severity score is 24. He is admitted to the ICU. He is hemodynamically stable with good urine output. What would your PRBC transfusion threshold be during the first 24 hours?

Hgb = 10 g/dL Hgb = 9 g/dL Hgb = 8 g/dL Hgb = 7 g/dL Hgb = 6 g/dL Other

Modifications: (1) Gradual hemoglobin drift without evidence of volume depletion; (2) 65 years of age; and (3) persistent sinus tachycardia

Hgb = hemoglobin; ICU = intensive care unit; PRBC = packed red blood cell.

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