VUMC Multidisciplinary Surgical Critical Care

Best Practice Guidelines for Transfusion of PRBC in Critically Ill Patients:

No active bleeding *without* evidence of active cardiac ischemia:

- **Hgb <7 g dl:** Transfuse 1 units PRBC's and reassess patient's clinical status and Hgb level. Maintain Hgb level at 7-9 g/dl. Reassess Hgb as needed to be determined by patient's clinical status.
- **Hgb 7 to 9 g/dl:** limit transfusions to patients with inadequate tissue O_2 delivery (e.g., shock, SvO_2<60, elevated lactate) and possibly to patients with significant comorbid heart disease.
- **Hgb >9:** RBC transfusion is not indicated.

No active bleed *with* known active cardiac ischemia:

- **Hgb <9 g dl with evidence of cardiac ischemia, new onset tachycardia, shortness of breath/chest pain, or decline in O2 saturation:** Transfuse 1 units PRBC's and reassess patient's clinical status and Hgb level. Maintain Hgb level at 9-10 g/dl. Reassess Hgb after administration.

Active bleeding:

- **Acute Hemorrhage in hemodynamically unstable patient:** RBC transfusion should be guided by rate of bleeding and hemodynamic parameters rather than Hgb level. Consider activating the Massive Transfusion Protocol (MTP) for patients with ongoing exsanguination (attending anesthesiologist or surgeon only).
- **Acute Hemorrhage in hemodynamically stable patient:** Restrictive transfusion strategy unless inadequate tissue O_2 delivery is documented (SvO_2<60, elevated lactate, or hypotension or tachycardia unresponsive to crystalloid resuscitation).
- **Presence of co-morbid factors –** Consider transfusion with lesser degrees of blood loss.

*Rapid acute hemorrhage requires emergent control of bleeding source.

Background: Anemia can lead to inadequate oxygen delivery to tissues. The deleterious effect of severe postoperative anemia on mortality was shown in a study of patients with a postoperative Hgb ≤8.0 g/dL who refused blood transfusion for religious reasons [3]. Mortality rates increased as Hgb levels decreased below 7.1 g/dL. In a large retrospective study of VA patients, transfusion was associated with decreased adjusted hospital mortality in patients without comorbid heart disease when Hgb was <7-8 g/dl, but transfusion increased mortality above this Hgb level. Corresponding Hgb level thresholds were <8-9 g/dl when comorbid heart disease was present and <9-10 g/dl when the ICU admission diagnosis was acute myocardial infarction. Transfusion of blood, however, carries a significant risk of transfusion reactions, transmission of infectious agents, transfusion related acute lung injury, and immunomodulation [1]. In addition, Transfusion is independently associated with higher nosocomial infection rates, risk for sepsis, multiple organ failure, SIRS, longer ICU and hospital length of stay, complications, and increased mortality [8].

Hebert's landmark study published in 1999 compared a restrictive vs. liberal transfusion strategy in critically ill patients. The authors demonstrated that patients restricted to a transfusion trigger of Hgb 7.0 g/dL with a target of 7.0 to 9.0 had lower in-hospital mortality than patients transfused at 10.0 with a target of 10.0 to 12.0 [2]. Overall, 30-day mortality was similar in the two groups, but the rates were significantly lower with the restrictive transfusion strategy among patients who were less acutely ill (APACHE II score of ≤20) and among patients who were less than 55 years of age.

Restrictive transfusion strategies may be used for hemodynamically stable patients with pre-existing cardiovascular disease [9]. A recent study in post-operative hip surgery patients with high cardiovascular risk factors showed there was no difference in recovery, mortality, or hospital complications of MI, CHF, CVA, infection, or thromboembolism with liberal or restrictive transfusion strategies [10]. Patients with recent history of an acute MI or unstable angina, however, may benefit from a higher transfusion threshold (trigger of Hgb 10 g/dL) [11], and patients with active hemorrhagic shock (i.e., trauma) benefit from protocolized blood product resuscitation vs. primary crystalloid resuscitation [12].

Thus, no single criterion should be used as an indication for red cell component therapy. Multiple factors related to the patient's clinical status and oxygen delivery need should be considered. Accordingly, the decision to transfuse erythrocytes must be based upon an assessment of the risks of anemia versus the risks of transfusion [4].

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TRANSFUSION PROTOCOL REFERENCES

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