

# **ANEMIA PRACTICE MANAGEMENT GUIDELINE**

## **DIVISION OF TRAUMA-VANDERBILT MEDICAL CENTER**

### **I. INTRODUCTION**

Anemia is a common clinical problem seen in critically ill trauma patients for a variety of reasons including bleeding, phlebotomy, decreased red blood cell production, premature destruction, and sequestration. As many as 85% of patients in the United States who have an ICU length of stay greater than one week receive at least one blood transfusion during their stay and 14% of ICU patients are transfused daily. Of patients receiving blood transfusions, only one third of the transfusions were associated with acute blood loss. Blood transfusions are associated with increased infection rates, increased risk of organ failure, increased length of stay in the ICU, and increased mortality. Finally, with the exception of patients with acute myocardial infarction, the literature has not identified a population of patients (including traumatic brain injury) that benefit from transfusion thresholds higher than that of the general ICU population.

### **II. PURPOSE**

Blood transfusions in and of themselves are not benign interventions and have the potential to cause serious morbid, and potentially even fatal events. With this in mind, the Anemia Practice Management Guideline (PMG) for the Division of Trauma has been established to (1) provide target hemoglobin levels based on best available evidence in the trauma and critical care literature, (2) designate appropriate transfusion triggers, and (3) insure that transfusion practices for the trauma population are conducted in a consistent manner.

It is critical, however, to understand that this PMG and its supporting literature are intended solely for the patient that is post-resuscitation and not undergoing treatment guided by the Trauma Exsanguination Protocol (TEP). Please see this separate guidance with regards to the massive transfusion/exsanguinating hemorrhage population (TEP and Damage Control Hematology).

### **III. INTERVENTIONS**

#### **A. Ensure normovolemia.**

#### **B. Identify reasons for anemia:**

1. Bleeding (GI Bleed, Hemorrhage)
2. Phlebotomy
3. Chronic disease
4. Inflammatory response
5. Impaired erythropoietic response
6. Nutritional deficiencies
7. Hemodilution

**C. Assess hemodynamic stability and signs of adequate organ perfusion:**

1. Normotension and/or normal heart rate
2. Urinary output > 0.5 cc/kg
3. Mental status / level of consciousness
4. Skin perfusion
5. Invasive hemodynamic parameters such as  $SVO_2 \geq 65\%$ ,  $SV > 0.7$  cc/kg,  $EDVI > 100$  if a pulmonary catheter is in place

**D. Assure normal coagulation profile and status.**

**E. Transfusion threshold for trauma patients with ischemic heart disease or acute ischemic syndromes such as those listed below is Hgb <10 g/dl:**

1. Unstable angina
2. Myocardial infarction

**F. Transfusion threshold for critical care patients who are “stable”, based on the parameters listed above, is Hgb < 7 g/dl if they do not meet the criteria listed above or do not have the following:**

1. Evidence of impaired O<sub>2</sub> delivery
2. Shock
3. Ongoing blood loss

**G. Wait three (3) hours after transfusion before drawing Hgb/Hct to allow equilibration unless patient is clinically unstable or has ongoing blood loss.**

**H. Monitor the patient being transfused carefully; as many as 20% of patients receiving PRBC have an adverse reaction.**

**I. If the patient is anemic in the presence of chronic renal failure, consider therapy with Epogen (40,000 units Q week) and iron as an alternative to increase Hgb.**

**J. When the patient is able, enterally add FeSO<sub>4</sub> 325 mg TID and multivitamin QD to the medication regimen in all anemic patients. The patient should have a bowel regimen initiated concurrently.**

**K. Attempt to minimize blood loss by decreasing the frequency of phlebotomy.**

1. Consider change of labs to prn
2. Consider Q Monday & Thursday labs for subacute patients
3. Serial labs unnecessary in monitoring solid organ injury

**L. Optimize nutrition.**

**M. Monitor continuously for signs of under perfusion in anemic patients**

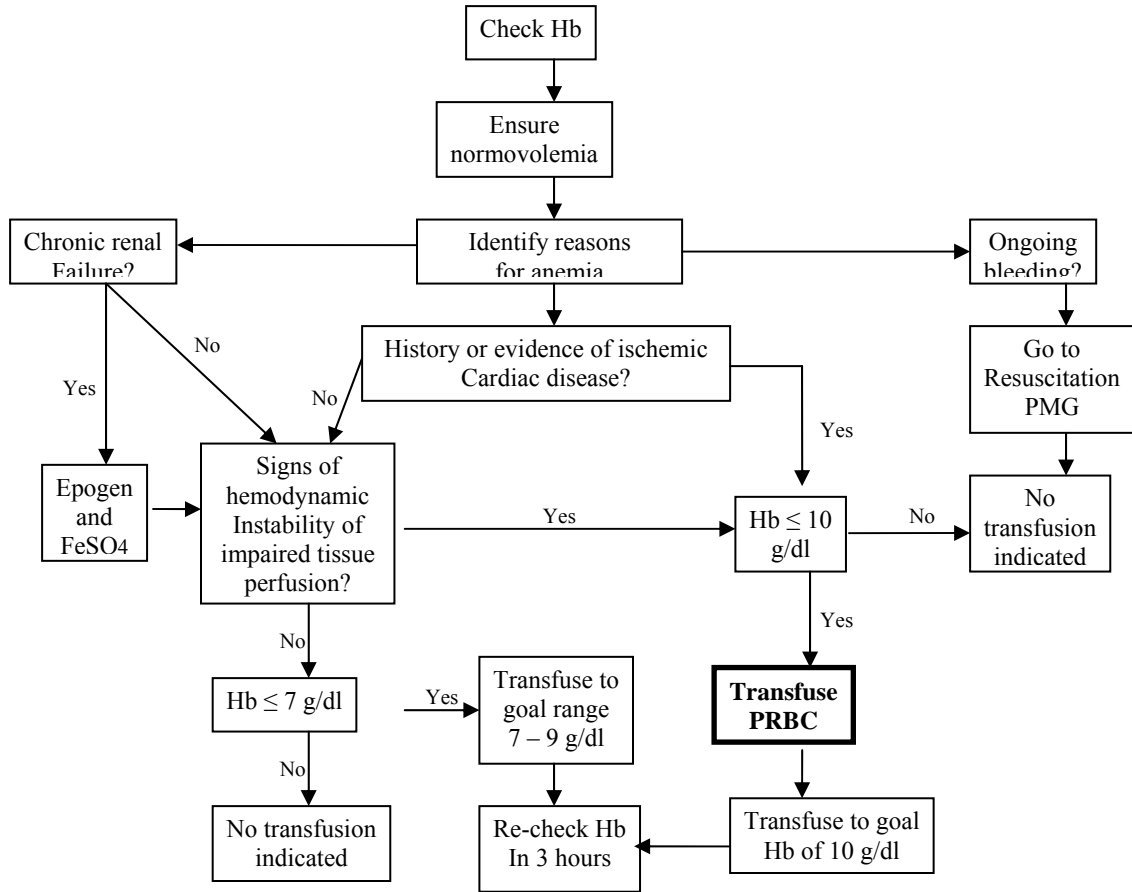
1. Follow neuro/mental status, urine output, HR, BP
2. Invasive monitoring indicated by physiology and co-morbidities, *not* by anemia

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Check Hb

Ensure normovolemia

Identify reasons for anemia

Chronic renal Failure?

Ongoing bleeding?

History or evidence of ischemic Cardiac disease?

Epogen and FeSO4

Signs of hemodynamic Instability of impaired tissue perfusion?

Go to Resuscitation PMG

No transfusion indicated

Hb ≤ 10 g/dl

Transfuse to goal range 7-9 g/dl

**Transfuse PRBC**

Hb ≤ 7 g/dl

No transfusion indicated

Transfuse to goal Hb of 10 g/dl

Re-check Hb In 3 hours

#### IV. BIBLIOGRAPHY

1. Earley AS, Gracias VH, Haut E, et al. Anemia management program reduces transfusion volumes, incidence of ventilator-associated pneumonia, and cost in trauma patients. *J Trauma* 2006; 61:1-7.
2. Corwin HL, Krantz SB: Anemia of the critically ill: "Acute anemia of chronic disease. *Crit Care Med* 2000; 28:3098-3099.
3. Corwin HL, Gettinger A, Rodriguez RM, et al.: Efficacy of recombinant human erythropoietin in the critically ill patient: A randomized, double blind, placebo-controlled study. *Crit Care Med* 1999; 27:2346-2350.
4. Corwin HL, Parsonnet KC, Gettinger A.: RBC transfusion in the ICU: Is there a reason? *Chest* 1995; 108:767-771.
5. Herbert PC, Wells G, Blajchman MA, et al.: A Multicenter, randomized, controlled clinical trial of transfusion requirements in critical care. *N Engl J of Med* 1999; 340:409-417.
6. Taylor RW, Manganaro L, O'Brien J, et al.: Impact of allogenic red blood cell transfusion on nosocomial infection rates in the critically ill patients. *Crit Care Med* 2002; 30:2249-2254.
7. van Iperen CE, Gaillard CA, Kraaijenhagen RJ, et al.: Response of erythropoiesis and iron metabolism to recombinant human erythropoietin in intensive care unit patients. *Crit Care Med* 2000; 28:2773-2778.
8. Vincent JL, Baron JF, Reinhart K, et al.: Anemia and blood transfusion in critically ill patients. *JAMA* 2002; 288:1499-1507.
9. Carlson AP, Schermer CR, Lu SW. Retrospective evaluation of anemia and transfusion in traumatic brain injury. *J Trauma* 2006; 61: 567-571.