COMMONSPIRIT HEALTH BLOOD THERAPEUTICS
CLINICAL GUIDELINE

Effective Date: January 8, 2020 **Original Effective Date:** October 9, 2019
Applies To: Acute Care Entities

Guideline:

A. It is the policy of CommonSpirit to promote safe approaches to blood transfusion for all patients by providing guidelines for utilization of blood products pursuant to evidence-based practice.

B. A restrictive transfusion strategy is at least as effective as more liberal transfusion approaches in most patients. In many patient populations, a restrictive approach to transfusion therapy improves patient outcomes and reduces harm.

C. Alternatives to transfusions should be strongly considered in all patients regardless of laboratory values.

D. Transfusion decisions are clinical judgments that should be based on the overall clinical assessment of the individual patient. Transfusion decisions should not be based on laboratory parameters alone.

E. Routine premedication is not advised unless the patient has a history of previous transfusion reactions. Premedication has not been shown to reduce the risk of transfusion reactions.

F. Patients should be made fully aware of risks, benefits, and alternatives and be included in the decision whether to transfuse whenever the clinical situation allows.

AFFECTED DEPARTMENTS: Medical Staff

PROCEDURE:

INDICATIONS FOR TRANSFUSION

A. Transfusion of Red Blood Cells (RBC)

1. Adult **inpatients** - In stable patient's RBCs should be transfused on a unit by unit basis with reassessment prior to further transfusion. Consider transfusion of RBC when:
    a. Hemoglobin < 7 grams/deciliter (g/dL).
    b. Acute hemorrhage with evidence of hemodynamic instability or inadequate oxygen delivery regardless of hemoglobin (Hgb) level.
    c. Hemoglobin < 8 g/dL and severe symptoms of anemia or anticipated significant blood loss.
    d. Transfusion or exchange transfusion for hemoglobinopathies.
    e. Acute ischemic heart disease (acute myocardial infarction or unstable angina) with hemoglobin less than 8 g/dL.
    f. Hemoglobin < 7.5 g/dl for post-op cardiovascular surgery patients.
2. RBC Transfusion in the Premature Infant
    a. Hemoglobin < 8 g/dL without symptoms.
    b. Hemoglobin < 9 g/dL when requiring supplemental oxygen and with any of the following:
        1) > 24 hours of tachycardia (Heart rate (HR) > 180) or tachypnea (Respiratory Rate (RR) > 60).
        2) Doubling of oxygen requirement from previous 48 hours.
        3) Serum lactate >2.5 milliequivalents/Liter (mEq/L) or an acute metabolic acidosis (pH <7.2).

4) Weight gain < 10 grams(g)/kilogram(kg)/day over the previous four (4) days while receiving >120 kilocalories (kcal)/kg/day.
5) If the infant will undergo major surgery within 72 hours.

c. Requiring respiratory support (ventilator, continuous positive airway pressure (CPAP), or high flow nasal cannula greater than two (2) liters per minute) with Hgb less than 10 g/dL.
d. Cyanotic heart disease, persistent pulmonary hypertension of the newborn requiring nitric oxide or extracorporeal membrane oxygenation (ECMO) with Hgb less than 13 g/dL.
e. Requiring major surgery with Hgb less than 12 g/dL.
f. Hypovolemic shock due to acute blood loss.

NOTE: Do not reflexively transfuse to replace blood removed for laboratory tests without clinical indications.

3. RBC Transfusion in the Term Infant to Less than four (4) Months of Age
   a. Clinical manifestation of anemia and low reticulocyte count with Hgb less than 7 g/dL.
   b. Preoperative anemia, major surgery, or respiratory support (ventilator, continuous positive airway pressure or nasal cannula) with Hgb less than 12 g/dL.
   c. Cyanotic heart disease, hypoxia or extracorporeal membrane oxygenation with Hgb less than 13 g/dL.
   d. Acute or surgical blood loss greater than 15% of the blood volume with Hgb less than 10 g/dL.
   e. Exchange transfusion for hemolysis or hyperbilirubinemia.
4. RBC Transfusion in all Children Greater than four (4) Months of Age
   a. Chronic anemia not responsive to medical therapy with Hgb less than 7 g/dL.
   b. Acute, surgical or potential blood loss greater than 15% of blood volume with Hgb less than 10 g/dL.
   c. Severe cardiopulmonary disease with Hgb less than 13 g/dL.
   d. Patients receiving chemotherapy or irradiation with Hg less than 7 g/dL.
   e. Complications of Sickle Cell disease (cerebrovascular accident or acute chest syndrome), chronic transfusion regimen for thalassemia or other red cell disorders.
   f. Circuit prime for therapeutic apheresis, ECMO, or stem cell collection.

B. <u>Transfusion of Platelets</u>

1. Indications for transfusion of platelets
   a. In stable patients' platelets should be transfused on a ***unit by unit*** basis with reassessment prior to further transfusion.
   b. Platelet count less than 10K/mm^3 in stable non-bleeding patients.
   c. Platelet count of 20K/mm^3 in patients with planned procedures with low bleeding risk.
   d. Platelet count less than 30K/mm^3 in neonates.
   e. Platelet count less than 50K/mm^3 in a patient with active hemorrhage, or a planned or in progress invasive procedure with high risk of bleeding.
   f. Platelet count less than 100K/mm^3 in patients undergoing neurosurgical, neuraxial or ophthalmologic surgery.
   g. Massive transfusion, replacement of more than one (1) estimated blood volume.
   h. Platelet transfusion may be indicated for any patient with active bleeding and suspected platelet dysfunction
2. Relative **contraindications** to platelet transfusion, regardless of platelet count include:
   a. Evidence of hypercoaguability by viscoelastic testing,
   b. Thrombotic thrombocytopenic purpura,
   c. Hemolytic uremic syndrome,
   d. Heparin induced thrombocytopenia,

e. Immune thrombocytopenic purpura,
f. Severe alloimmune transfusion refractoriness when matched units are unavailable.

C. Transfusion of Plasma

1. Active hemorrhage and multiple coagulation factor deficiency with International Normalized Ratio (INR) greater than 2.0 or viscoelastographic evidence of factor deficiency.
2. Planned invasive procedure with high bleeding risk and multiple coagulation factor deficiency with INR greater than 2.0.
3. Massive transfusion protocol.
4. Thrombotic thrombocytopenic purpura.
5. Vitamin K is first line therapy for reversal of warfarin in non-emergent instances. Plasma may be given to reverse warfarin in a patient with active bleeding or an emergent invasive procedure if prothrombin complex concentrates (PCC) are not available.
6. Hemorrhage with single coagulation factor deficiency when specific coagulation concentrates are unavailable.

D. Transfusion of Cryoprecipitate

1. Hypofibrinogenemia (fibrinogen less than 150 mg/dL) with active bleeding. There is evidence that certain populations, such as obstetrics and cardiac surgery, may require a higher fibrinogen threshold.
2. Viscoelastographic evidence of hypofibrinogenemia.
3. Massive transfusion protocol.
4. Control of uremic bleeding only after other modalities have failed.

CLINICAL CONSIDERATIONS IN TRANSFUSION DECISION MAKING

A. Potential adverse events associated with blood product transfusions include:

1. Death
2. Graft vs. host disease
3. Hospital acquired infection
4. Acute lung injury
5. Cancer recurrence
6. Immunosuppression
7. Hemolysis
8. Allergic reactions
9. Febrile reactions
10. Volume overload
11. Iron overload
12. Systemic inflammatory response syndrome (SIRS)
13. Multiple organ system failure (MOSF)
14. Cardiac events
15. Blood born infections - bacterial, viral, parasitic

B. Considerations in ordering RBC transfusions include:

1. In chronic anemia physiologic compensation may result in significant volume expansion and tolerance of very low Hgb levels. Aggressive transfusion may harm the patient with longstanding anemia due to volume overload.

2. When low oxygen delivery is encountered causes other than anemia, such as low cardiac output, should be considered.
3. If blood loss is ongoing or likely then transfusion may be indicated at a higher hemoglobin.

4. Expected hemoglobin recovery due to hematopoiesis and hematinics (IV iron, erythroid stimulating agents etc.)
5. Transfusions should not be used solely for volume expansion.

C. Considerations in ordering platelets include:

1. Body size: Patients with body surface area greater than $2m^2$ may require a larger platelet dose.
2. Spleen size: Splenomegaly for any reason will significantly decrease the effectiveness of platelet transfusions.
3. Kidney function: Uremia may impair platelet function and response to platelet transfusion; administration of DDAVP and/or antifibrinolytics should be considered to improve hemostasis.
4. Alloimmunization to platelet or HLA antigens may dramatically decrease response to platelet transfusion. Following two platelet transfusions with poor response consider evaluation for alloimmunization.
5. Antiplatelet medications: Antiplatelet agents other than aspirin and ibuprofen may contribute to hemorrhage risk. Factors influencing bleeding risk include dose, time since last dose, and individual response or drug resistance and may be clarified by platelet function testing.
6. A post-transfusion platelet count should be obtained 10 minutes to one (1) hour after transfusion for best assessment of transfusion effectiveness. Transfusion of one (1) unit of apheresis platelets will typically increase the platelet count of an adult by 20,000 – 40,000/microliter (µL).

D. Plasma

1. A plasma dose of 10-15 ml/kg will typically provide sufficient coagulation factors to achieve hemostasis. Factor levels in donor plasma are variable, but can be assumed to be approximately one (1) International Unit (IU)/mL.
2. Plasma transfusion has no effect on mild coagulopathies (INR ≤ 1.8).

E. Cryoprecipitate

1. Cryoprecipitate or "cryo" contains Factor VIII, von Willebrand factor, fibrinogen, and Factor XIII.

DEFINITIONS: None

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