CHILDREN'S MINNESOTA

GUIDELINES FOR THE TRANSFUSION OF BLOOD COMPONENTS

Introduction:

These guidelines have been developed in conjunction with the hospital Transfusion Committee. They are based on widely accepted transfusion practices and reflect current literature and experience. The guidelines provide general clinical indications for transfusion therapy of each blood component, but may not be all-inclusive. Patients who receive blood components according to the guidelines may or may not actually benefit. Alternatively, some transfusions that are not included in the guidelines may be justified under special circumstances. These guidelines may be revised under appropriate circumstances and will be reviewed on a biennial basis. Note: The term neonate is used to refer to infants less than 44 weeks corrected gestational (post menstrual) age.

These guidelines incorporate the transfusion criteria used in ongoing quality assurance blood utilization review as required by The Joint Commission. It is important that the provider documents the patient's need for transfusion on the transfusion request order with each new order and specifies the indication for transfusion.

All RBC components (excluding autologous collection) and platelet components are leukoreduced pre-storage. These products are considered CMV safe. Therefore, CMV seronegative blood products do not need to be specifically ordered. Leukoreduced blood products are not equivalent to irradiated blood products in preventing Graft vs. Host Disease (GVHD). Irradiated blood products must be ordered for patients with specific conditions placing them at risk for GVHD as specified in this document.

The provider should discuss the risks, benefits and alternatives to transfusion with the patient, parent or guardian for all non-emergency transfusions and provide an opportunity to ask questions, and to accept or refuse transfusion. Consent for transfusion must be obtained for non-emergency transfusion episodes. The Circular of Information as well as local blood center pamphlets are available to assist the provider in this role. Additional questions may be referred to the hospital Transfusion Service, Minneapolis campus 612-813-6824, St Paul campus 651-220-6550. Information is also available on the following Internet sites: http://www.aabb.org/, http://www.americasblood.org/, http://www.mybloodyourblood.org/, and http://www.redcross.org/.

I. LEUKOCYTE REDUCED RED BLOOD CELL CONCENTRATES (includes packed red blood cells, washed red blood cells, frozen deglycerolized cells)

Indications:

A. Acute blood loss (hemorrhage, surgery or iatrogenic) greater than 15% total blood volume (estimated blood volume = 70 mL/kg body weight) or 10% total blood volume in neonates (estimated blood volume 85 mL/kg) associated with:

1. Signs and symptoms of hypovolemia (e.g., tachycardia, tachypnea, hypotension) unresponsive to crystalloid infusion.

2. Signs and symptoms of cerebral or coronary hypoxia, fatigue, weakness, dizziness or respiratory distress.

3. In neonates < 7 days old when the cumulative blood volume removed over a one-week period due to laboratory testing exceeds 10% of the infant's estimated blood volume.

B. Patients with present symptoms of anemia (e.g., tachycardia, orthostatic hypotension, dyspnea) or at high risk to develop symptoms of anemia with any of the following.

1. Hemoglobin less than 7 gm/dL

2. Hemoglobin less than 10 gm/dL and:
   - Shock

3. Neonates:
   - 0-7 days, requiring respiratory support: Hgb <11.5 gm/dL
   - 8-14 days, requiring respiratory support: Hgb <10.0 gm/dL
   - >14 days, requiring respiratory support: Hgb <8.5 gm/dL
   - 0 -7 days, NOT requiring respiratory support: Hgb <10 gm/dL
   - 8-14 days, NOT requiring respiratory support: Hgb <8.5 gm/dL
   - >14 days, NOT requiring respiratory support: <7.5 gm/dL
   - Preoperative: Hgb <10.0 gm/dL
   - Shock: Hgb 11.5 gm/dL

4. Hemoglobin less than 15 gm/dL and:
   - Cardiac disease
   - Cardiovascular bypass
   - ECMO

C. Exchange transfusion

D. To prime medical devices used during:
   - ECMO
   - Cardiopulmonary bypass
   - Apheresis
   - Hemofiltration

E. Hemoglobinopathy

1. Acute treatment of patients with sickle cell disorders who are symptomatic (cerebral symptoms, splenic, pulmonary or hepatic sequestration, priapism, or other sickle cell crisis).

2. Asymptomatic sickle cell disease if scheduled to undergo general anesthesia for surgical or therapeutic procedures.

3. Transfusion dependent (thalassemias)

4. Scheduled erythrocytapheresis, hypertransfusion, or exchange transfusion for prevention of stroke, or in-patients with history of significant sickle cell complications.

AVOID UNNECESSARY TRANSFUSION

There are risks to transfusion. Transfusion should generally be avoided for:

- Patients who are asymptomatic or have mild symptoms of anemia that can be corrected with medical therapy such as deficiencies of iron, vitamin B12 or folate, or autoimmune hemolytic anemia.

- Patients with signs of hypovolemia that can be corrected readily with crystalloid or colloid infusion.

II. LEUKOCYTE REDUCED PLATELET PHERESIS

NOTE: A single donor platelet pheresis (containing greater than 3 X 10^{11} platelets) is equivalent to 5-6 random donor platelet units (each containing greater than 5.5 x 10^{10} platelets).

Indications:

A. Active bleeding or at high risk of life threatening bleed with qualitative platelet defect regardless of platelet count due to:

- < 48 hours post Cardiac bypass or ECMO
- Medication (e.g. Aspirin)
- Known congenital or acquired disorder of platelet function.
  - consider using fibrinolytic inhibitors, desmopressin or concentrates enriched in von Willebrands factor, based on patient's underlying condition.

B. Life or organ threatening bleeding during surgery, regardless of platelet count

C. With massive blood replacement of greater than 50% of total blood volume within 8 hours

D. Platelet count less than 150,000 per mm^3 for patients on ECMO. (See specific ECMO guidelines)

E. Platelet count less than 100,000 per mm^3 under the following conditions:

1. CNS bleed
2. Neonate major surgery
3. Associated with neurologic, cardiovascular, ophthalmologic, or other surgical procedures with potentially life or organ threatening blood loss during the perioperative time. (preoperative, intraoperative, up to 7 days postoperative)

F. Platelet count less than 50,000 per mm^3 under the following conditions:

1. Critical Neonate Sepsis/NEC/DIC
2. Neonate <32 weeks gestational age and <7 days old
3. Active bleeding or invasive procedure

G. Platelet count less than 30,000 per mm^3 in low risk preterm neonate.

H. Platelet count less than 20,000 per mm^3 in term neonate, no other risk factors.

I. Platelet count less than 10,000 per mm^3 with consumption and decreased production.

III. FROZEN PLASMA (FP) / FRESH FROZEN PLASMA (FFP)

Indications:

A. Documented coagulopathy: PTT greater than 50 seconds (>60 seconds in <6 month old patients) and/or an INR greater than 1.5 due to deficiency of soluble coagulation factors or anticoagulation therapy in patients for whom a specific factor concentrate is not available, with one or more of the following:

- Active bleeding
- Within 24 hours of an invasive procedure

B. Patients with suspected coagulopathy and excessive bleeding and coagulation studies are pending (or unable to obtain) at the time of the transfusion.

C. Patients undergoing cardiopulmonary bypass surgery or ECMO at risk for coagulopathy and bleeding.

D. Massive blood loss (greater than 50% blood volume).

E. Replacement therapy during therapeutic plasma exchange for disorders in which Frozen Plasma is beneficial (HUS/TTP).

F. Exchange transfusions (with packed RBCs)

G. Replacement therapy with one of the following:

- >25 mL/kg/day chylous loss
- Patients with protein C or S, or Antithrombin III deficiencies including premature infants with thrombosis. Consider use of antithrombin III concentrate or activated protein C concentrates for specific deficiencies.
- Thrombolytic therapy (to increase plasminogen and augment thrombolysis)
- Coagulation factor disorders in which specific factor concentrates are not available.

AVOID UNNECESSARY TRANSFUSION

There are risks to transfusion. Transfusion of FFP should generally be avoided for:

- Non-critically ill patients who are **NOT** bleeding or perioperative, merely because of a prolonged INR or PTT.

IV. CRYOPRECIPITATE

NOTE: Cryoprecipitate contains coagulation Factor VIII:C, Factor XIII, von Willebrand factor (factor VIII:vWf) and fibrinogen.

Indications:

A. Fibrinogen <200 mg/dL and <48 hours post cardiovascular bypass or ECMO.

B. Fibrinogen < 100 mg/dL with one of the following:

- Active bleeding
- Critically ill neonate
- Within 24 hours of invasive procedure

C. Dysfibrinogenemia (abnormal fibrinogen) with active bleeding or within 24 hours of invasive procedure

D. Patients with factor VIII deficiency or von Willebrand's disease, although specific factor concentrates are preferred.

E. Patients with factor XIII deficiency and active bleeding or within 24 hours of invasive procedure.

F. Use as topical ingredient for invasive procedures, although proprietary products may be available.

G. Massive blood loss (greater than 50% blood volume)

V. WHITE BLOOD CELLS

NOTE: The use of white blood cell products is controversial. All granulocyte product transfusions require pathology consultation and must be ordered 24 hours in advance for donor preparation and product processing.

Granulocyte concentrates contain considerable numbers of lymphocytes, platelets and red cells. Red cell compatibility testing is to be performed prior to transfusion.

VI. ALBUMIN

5% and 25% albumin is available through Children's Pharmacy. Indications may include hypoalbuminemia or hypovolemia in some circumstances; however, administration is to follow policies and procedures established by the pharmacy.

VII. FACTOR CONCENTRATES IN PATIENTS WITH HEMOPHILIA AND OTHER HEREDITARY BLEEDING DISORDERS

Factor products are available through Children's Pharmacy. Administration is to follow policies and procedures established by the pharmacy and typically requires consultation with a pediatric Hematologist/Oncologist.

VIII. OTHER PRODUCTS

Immune globulin preparations are available through Children's Pharmacy. Immunoglobulin may be indicated in certain patients with immunodeficiency or autoimmune disorders; however, administration is to follow policies and procedures established by the pharmacy and may require consultation with an appropriate specialist.

GUIDELINES FOR SELECTION OF SPECIAL BLOOD COMPONENTS

I. IRRADIATED COMPONENTS

Required only for cellular products including leukocyte reduced Red Blood Cells, Platelet concentrates, and Granuloctyes. Irradiation of blood products is not required for patients pending solid organ transplant or diagnosed with AIDS due to HIV.

Indications:

A. Documented or suspected, acquired or congenital immunodeficiency disorders

B. Infants < 4 months old throughout the admission period

C. Therapy induced immunosuppression (aggressive chemotherapy, immunotherapy, or extensive radiation therapy)

D. Granulocyte concentrates/buffy coats

E. Directed donations from blood relatives

F. HLA-matched apheresis platelets/crossmatch compatible platelets

G. Exchange transfusion in newborns

II. FROZEN DEGLYCEROLIZED RED BLOOD CELLS

Indications:

A. Patients with unusual antigenic phenotypes

III. WASHED BLOOD COMPONENTS

Indications:

A. Severe transfusion reactions related to plasma proteins

B. Patients with IgA deficiency and antibodies to IgA

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