Guidelines for Transfusion of Blood and Blood Components

Note: When in doubt on the type and/or quantity of blood components necessary to treat a patient, telephone consultation with a Blood Bank Physician is readily available 24 hours a day by calling the Blood Bank at extension 772-1525.

I. The subsequent conditions are considered to be reasonable indications for the use of the following blood component(s). Documentation in the medical record of clinical and laboratory response to transfusion of blood components is required (see individual blood components).

A. Transfusion of Packed Red Blood Cells (PRBC). The Transfusion Committee generally supports the transfusion of red cells WHEN CLINICALLY INDICATED if hemoglobin measures <7g/dL or hematocrit measures <21%. For non-life threatening bleeding or anemia, single unit orders are strongly recommended along with a reassessment after the initial transfusion to evaluate the need for additional RBC's.

The transfusion committee also recognizes the need for transfusion of red cells in the following conditions:

1. Hemorrhagic shock due to:
   - Surgery
   - Trauma
   - Invasive procedure
   - Medical conditions (i.e. GI hemorrhage)

2. Rapid active bleeding not responding to appropriate volume resuscitation or with hemodynamic compromise attributable to anemia.

3. Hemoglobin <8 g/dL or hematocrit <24% with compromise in medical condition attributable to anemia, or hypovolemia when administration of crystalloids/colloids will be expected to result in a hemoglobin less than 7 g/dL

4. Hemoglobin of 8-10 g/dL in high risk patients, such as those with:
   - CNS symptoms
   - Sepsis or sepsis like conditions with low peripheral vascular resistance
   - Pre-operative hemoglobin decreased to a level such that anticipated surgical blood loss would require certain intra operative transfusion

Note: One unit of packed red blood cells in an adult and 10 mL/kg in a pediatric patient will increase the hematocrit by approximately 3% and hemoglobin by 1g/dL in a normovolemic patient. Documentation of clinical and laboratory response to transfusion of PRBC is recommended within 24 hours after the transfusion is completed.
B. **Transfusion of Random Donor Platelets or Plateletapheresis Units.** The Transfusion Committee generally supports the transfusion of platelets in the following conditions:

1. **Prophylactic Platelet Transfusions to prevent bleeding in the patient with Thrombocytopenia** and platelet count equal to or less than 10,000 per microliter blood.  
   *Platelets are not to be transfused when thrombocytopenia is due to platelet destruction (e.g. antibody mediated thrombocytopenia such as ITP or drug induced, TTP, HUS, HELLP syndrome, etc), unless the patient has life threatening bleeding not treatable by other means.*

2. **Bleeding associated with pharmacological or mechanical platelet dysfunction.**

3. **Platelet transfusions MAY be given to patients who have platelet counts equal to or less than 50,000 per microliter blood AND active hemorrhage or have a potential for bleeding from an invasive procedure such as surgery, placement of a subclavian venous access, lumbar spinal puncture, etc.**

4. **Platelet transfusions MAY be given to patients who have platelet counts equal to or less than 100,000 per microliter blood AND intracranial hemorrhage, neurosurgical procedures or ophthalmic surgical procedures.**

5. **Platelet count greater than 100,000 and evidence of bleeding due to platelet dysfunction not responsive to DDAVP or cryoprecipitate (consultation with a Hematologist and/or a Blood Bank Physician is mandatory)**

**Note:** A single dose of platelets (adult: 6 unit pool or one pheresis unit; pediatric: 5-10 mL/kg) will usually increase the platelet count by 25K – 35K/microliter. **Documentation of clinical and laboratory response to transfusion of platelets is recommended within 10-60 minutes after the transfusion is completed.**

C. **Transfusion of Plasma**

1. Dilutional coagulopathy (i.e. massive transfusion), active bleeding, surgery or invasive procedure and at least one of the following:
   - Prothrombin Time (PT) greater than 20 seconds
   - Activated Partial Thromboplastin Time (aPTT) greater than 57 seconds
   - Specific clotting factor deficiency (<25% of normal) for which other safer replacement product is not available.

2. The Transfusion committee does not support the use of plasma to reverse the anticoagulant effects of Coumadin.

**Note:** A dose of 10-15 mL/kg is usually adequate to correct a coagulopathy (1 unit of FFP = 250 mL). **Documentation of clinical and laboratory response to transfusion of fresh frozen plasma is recommended within 1 hour after the transfusion is completed.**

D. **Transfusion of Cryoprecipitate.** The Transfusion Committee supports the transfusion of cryoprecipitate for:

- Bleeding and/or potential for bleeding associated with surgery or an invasive procedure and Fibrinogen levels less than 100 mg/dL
- Fibrinogen levels less than 150 mg/dL with active hemorrhage or in patients with acute promyelocytic leukemia
- Factor XIII deficiency (less than 25% of normal)
- Platelet count greater than 100,000 with evidence of platelet dysfunction and no response to DDAVP

**Note:** A dose of one unit per 10 kg is usually adequate when cryoprecipitate is required. **Documentation of clinical and laboratory response to transfusion of cryoprecipitate is recommended within 1 hour after the transfusion is completed.**
### E. Transfusion Reactions/Adverse Outcomes and Blood Bank Reporting

Any actual or suspected transfusion reaction or adverse outcome must be reported to the UTMB Blood Bank regardless of degree of suspicion, time of onset, or ability to clinically manage. Transfusion reaction reporting and subsequent investigation is critical to maintain the quality and safety of our blood supply.

The UTMB Blood Bank investigates and reports all transfusion reactions and/or adverse outcomes according to the CDC Hemovigilance module. It is the responsibility of the Blood Bank to determine the classification and imputability of any reported event. The Blood Bank physicians perform this investigation as a consultant to the clinical team, and as such, may request additional clinical information and/or order pertinent laboratory testing. Please see the following chart for information about the clinical signs and symptoms associated with transfusion associated events.

<table>
<thead>
<tr>
<th>Transfusion Reaction</th>
<th>Definition</th>
<th>Supporting Data</th>
<th>Etiology</th>
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</thead>
<tbody>
<tr>
<td>Transfusion Associated Circulatory Overload (TACO)</td>
<td>Acute onset or exacerbation of respiratory distress, fluid overload, pulmonary edema, evidence of left heart failure.</td>
<td>↑BNP, ↑CVP, Chest x-ray showing pulmonary edema, positive fluid balance, dyspnea, orthopnea, cough</td>
<td>Excessive volume or rapid infusion in patients with limited cardiac reserve, renal failure or impaired tolerance to fluids.</td>
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<tr>
<td>Transfusion Related Acute Lung Injury (TRALI)</td>
<td>Acute lung injury and hypoxemia resulting within 6 hours of transfusion with evidence of bilateral lung infiltrates and no evidence of circulatory overload. <strong>NOTE:</strong> Delayed TRALI has been reported in 6-72 hours after blood transfusion¹</td>
<td>PaO₂/FiO₂ less than or equal to 300 mm Hg , Oxygen saturation less than 90% on room air, bilateral infiltrates on x-ray</td>
<td>Immune: Donor antibodies the HLA and neutrophil antigens. Non-immune: Cytokine mediated. Most commonly occurs with plasma components (platelets and FFP).</td>
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<tr>
<td>Transfusion Associated Dyspnea (TAD)</td>
<td>Acute respiratory distress occurring within 24 hours of transfusion without evidence of TACO, TRALI, or allergic reaction.</td>
<td>Dyspnea</td>
<td></td>
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<tr>
<td>Allergic Reaction</td>
<td>Allergic sequelae within 4 hours of transfusion.</td>
<td>Rash, urticaria, pruritis, bronchospasm/respiratory distress, angioedema, flushing, and or edema of lips/tongue/conjunctiva</td>
<td>Antibodies to plasma components. IgA deficiency.</td>
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<tr>
<td>Hypotensive Reaction</td>
<td>Hypotension during or within one hour of transfusion that does not meet criteria for other hypotensive reactions.</td>
<td>Adults: Drop in systolic BP of greater than or equal to 30 mmHg and systolic BP less than or equal to 80 mmHg. Children: Greater than 25% drop from baseline.</td>
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<td>Febrile Non-Hemolytic Transfusion Reaction (FNHTR)</td>
<td>Fever OR chills and rigors occurring within 4 hours of transfusion.</td>
<td>Fever (greater than or equal to 38°C/100.4°F oral and a change of at least 1°C/1.8°F from pre-transfusion value) or chills/rigors.</td>
<td>HLA antibodies and cytokines.</td>
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<tr>
<td>Acute Hemolytic Transfusion Reaction (AHTR)</td>
<td>Hemolysis occurring within 24 hours of transfusion.</td>
<td>Back/flank pain, chills/rigors, DIC, epistaxis, fever hematuria, hypotension,</td>
<td>Incompatible blood components (usually ABO incompatibility).</td>
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<tr>
<td></td>
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<td>oliguria/anuria, pain and/or oozing at IV site, renal failure, ↓fibrinogen, ↓</td>
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<td>haptoglobin, ↑bilirubin, ↑LDH, hemoglobinemia, hemoglobinuria, hemolysis of lab</td>
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<td>specimens, spherocytes</td>
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<td>Delayed Hemolytic Transfusion Reaction (DHTR)</td>
<td>Positive direct antiglobulin test (DAT) for antibodies developed between 24 hours and 28 days after cessation of transfusion</td>
<td>+ DAT, new red blood cell alloantibody in recipient plasma, inadequate rise of</td>
<td>Stimulation of a new or undetectable recipient alloantibody.</td>
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<td>post-transfusion hgb level or rapid fall in hgb back to pre-transfusion levels,</td>
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<td>spherocytes</td>
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<tr>
<td>Transfusion Associated Graft vs. Host Disease (TAGVHD)</td>
<td>Rare clinical syndrome occurring 2 days to 6 weeks after transfusion resulting from engraftment of donor lymphocytes in susceptible patients.</td>
<td>Characteristic rash, diarrhea, fever, hepatomegaly, elevated liver enzymes, pancytopenia, marrow aplasia, characteristic skin biopsy findings.</td>
<td>Proliferation of viable donor CD8 T-cells resulting in destruction of recipient cells. See indications for irradiated blood components.</td>
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<tr>
<td>Post-Transfusion Purpura</td>
<td>Thrombocytopenia occurring 5-12 days post-transfusion with antibodies to human platelet antigens (HPA).</td>
<td>Thrombocytopenia (less than 80% of pre-transfusion value), HPA alloantibodies.</td>
<td>Recipient has platelet specific alloantibodies.</td>
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<tr>
<td>Transfusion Transmitted Infection</td>
<td>Evidence of a pathogen in the transfusion recipient as a direct result of transfusion.</td>
<td>Pathogen detected in patient blood/plasma, pathogen in transfused component, temporally associated clinical illness.</td>
<td>Contamination of blood components (most commonly platelets) or undetected infection in donor.</td>
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</tbody>
</table>


1. Lancet 2013; 382:984-94

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