PeaceHealth SW Medical Center
Transfusion Guidelines

For Questions Regarding Blood Products,
Please Contact the Transfusion Service at (360) 514-2043

Rationale: Both overuse and under use of blood component therapy can adversely affect patient outcomes. Although the risk associated with blood product transfusion is low, serious and even fatal complications can occur. Unnecessary use also reduces the inventory available for the patient with real need. Prospective review of blood product orders is performed by the Transfusion Service.

These guidelines were developed to aid clinicians in appropriate use of blood products. They are not intended to replace clinical judgment, and it is understood that some patients will not fit the clinical conditions contemplated in these guidelines.

The following documentation is required for all blood product transfusions (all three required):

1. **Indication:** completion of the Transfusion of Blood Components order form, including the indication for transfusion.
2. **Consent:** Transfusion consent form, or surgical consent form, unless emergent situation.
3. **Follow-up:** repeat lab testing within 24 hours, or symptomatic improvement documented.

(No consent form or follow-up is required for the following: Rho immune globulin, albumin, plasmanate.)

**RED BLOOD CELL TRANSFUSION**

**General Considerations**

1. **The Purpose of RBC Transfusion Is To Improve O2 Delivery.** RBC transfusion is used only to increase oxygen-carrying capacity, and should not be used for volume expansion, etc.

2. **Treat Reversible Causes of Anemia.** All patients should have an evaluation for reversible causes of anemia, and appropriate therapy should be initiated when available (e.g., iron, vitamin B12, an erythropoietin stimulatory agent). Patients with chronic onset of anemia are more likely to tolerate low hemoglobin levels due to compensatory mechanisms.
3. **Transfuse One Unit at a Time.** Except in the case of patients who are actively bleeding, red blood cells should be transfused in one unit increments. Additional RBC transfusions should be based on symptom response and resulting hemoglobin.

4. **The Use of Hemoglobin Triggers for Transfusion is Discouraged.** The decision to transfuse red blood cells should be based on clinical assessment of the patient’s symptoms and medical conditions, and not based on a “trigger” level of hemoglobin.

5. **The Restrictive Use of Transfusions Improves Outcomes.** A restrictive policy of transfusion with a goal of minimizing blood transfusion has been shown to have no detrimental effect on patient outcomes, and in many situations to improve outcomes.

6. **Patient Symptoms and Clinical Situation Should Guide Transfusion Decisions.** Very few patients with a hemoglobin >10 will benefit from transfusion, even when actively bleeding. In most clinical situations, patients will safely tolerate a hemoglobin as low as 6 g/dL, and transfusion has not been shown to improve clinical outcomes. Transfusion for a hemoglobin >7 g/dL may be indicated in patients with active bleeding, cardiovascular risk factors, cardiac symptoms, or hemodynamic compromise unresponsive to fluid resuscitation.

**RBC Transfusion in Specific Clinical Situations**

1. **Acute and Chronic Anemia, not actively bleeding:**
   a. In hospitalized hemodynamically stable patients, consider transfusion at Hgb <7 g/dL.
   b. In symptomatic postoperative patients, consider transfusion at Hgb <8 g/dL.
   c. In hospitalized patients with significant preexisting cardiovascular disease consider transfusion at Hgb <8 g/dL.
   d. In patients with the Acute Coronary Syndrome, consider transfusion at Hgb <9 g/dL.
   e. In the presence of one or more of the following documented symptoms, consider transfusion at Hgb <10 g/dL
      - chest pain
      - heart failure
      - orthostatic hypotension unresponsive to fluid resuscitation
      - tachycardia unresponsive to fluid resuscitation.
2. **Acute Anemia, actively bleeding:**

   a. In hemodynamically stable patients with EBL<25-30% of blood volume (<1500 ml), consider transfusion at Hgb <7 g/dL.
   
   b. In patients with significant cardiovascular disease, consider transfusion at Hgb <8 g/dL.
   
   c. In patients with rapid bleeding and/or EBL>25-30% of blood volume, consider transfusion at Hgb <9 g/dL.
   
   d. In patients with massive bleeding and hemodynamic instability unresponsive to fluid resuscitation, transfuse at any hemoglobin.

3. **Chronic Transfusion-Dependent Anemia**

   a. In patients with anemia due to bone marrow failure disorders or chemotherapy, when treatable causes have been excluded and continuing hemoglobin decline is anticipated, consider transfusion at Hgb <8 g/dL, and in symptomatic patients at Hgb <10 g/dL.

**Autologous Transfusion**

1. While use of autologous transfusion reduces some transfusion-related diseases, it is not entirely risk-free, due to risks of clerical errors, bacterial contamination, perioperative anemia leading to higher rates of transfusion, and volume overload. It is expensive, and wastes at least 50% of blood collected, since it cannot be used for patients other than the donor.

2. Most experts recommend using the same criteria for reinfusion of autologous blood as for transfusion of allogeneic blood.

3. The appropriateness of perioperative autologous donation depends on the procedure involved. Current guidelines should be consulted (e.g., Surgical Blood Order Form).

4. The advantage of autologous donation has decreased as the risk of viral-induced diseases from allogeneic blood continues to fall. Current infection estimates per allogeneic unit transfused are:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Estimate</th>
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<tbody>
<tr>
<td>HIV</td>
<td>1:1,500,000</td>
</tr>
<tr>
<td>Hepatitis C</td>
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<tr>
<td>Hepatitis B</td>
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</tr>
<tr>
<td>HTLV I&amp;II</td>
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</table>
Platelet Transfusion

1. General Considerations

   a. Platelets are derived by separation from donor whole blood or by platelet pheresis. One “dose” of platelets (one pheresis unit, approximately equivalent to 6 whole blood platelets) will usually increase the platelets by 30-40,000 in an average adult.

2. Indications for platelet transfusion

   a. Platelet transfusion is used to control or prevent bleeding associated with deficiencies of platelet number or function.

      • Consider transfusion to prevent bleeding at counts below 10,000 in otherwise stable non-surgical patients, and below 20,000 in medically unstable patients or patients with platelet dysfunction due to medication or disease.

      • Consider platelet transfusion to control active and significant bleeding in patients with platelet counts below 50,000, in association with correction of other hemostatic defects.

      • For patients undergoing major surgery or invasive procedures with no other coagulation defects, platelet transfusion is rarely required above 50,000. Exceptions may include patients undergoing central nervous system (CNS) or eye surgery, and those with sepsis, other coagulation defects, or platelet dysfunction due to medication or disease.

   b. Platelet transfusion is generally contraindicated in Thrombotic Thrombocytopenic Purpura (TTP) (may fuel ongoing platelet agglutination) and is generally not used in Immune Thrombocytopenic Purpura (ITP) unless there is life-threatening bleeding, as the transfused platelets will be rapidly destroyed.

Plasma Products

1. General Considerations

   a. A unit of plasma (approximately 250 ml) is the plasma taken from one donor unit of whole blood, and contains all coagulation factors in normal concentrations. One unit of plasma raises the levels of the stable coagulation factors by 2-3% in a 70 kg adult.

   b. Plasma transfusion is most often used to correct deficiencies of one or more coagulation factors. Hemostasis is generally normal until factor levels fall below.
30% of normal, corresponding to an increase in the prothrombin time (PT) to at least 1.5 times the normal value (INR of approximately 1.7).

2. Indications for Plasma

a. Plasma transfusion is indicated in the management of patients with coagulation factor deficiencies, documented by an INR >1.7 (PT >20 seconds) or PTT of >1.5 x normal value, who have active bleeding or are about to undergo an invasive procedure. This includes:

- Patients on warfarin who are bleeding or need to undergo an invasive procedure before vitamin K therapy can be effective (see Use of Vitamin K below.)
- Massively transfused patients with a documented dilutional coagulopathy.
- Selected coagulation defects for which no concentrates are available.
- Multiple factor deficiencies, most often seen in patients with severe liver disease and in disseminated intravascular coagulation.

b. Other Indications

- Thrombotic thrombocytopenic purpura (TTP)
- Rare specific plasma protein deficiencies such as C-1-esterase
- Trauma patients receiving massive transfusions

c. Plasma Transfusion is Not Indicated in the following situations

- To achieve volume expansion
- As a routine after a set number of RBC transfusions unless lab or clinical findings indicate a coagulopathy.
- In patients with a coagulopathy who are not bleeding and do not have an impending invasive procedure
- Treatment or prevention of bleeding when INR <1.7
- To reverse heparin

d. Use of Vitamin K

- In patients with vitamin K deficiency or receiving warfarin, administration of vitamin K (phytonadione) is effective in 6-8 hours. Vitamin K administration is the preferred treatment for reversal of warfarin coagulopathy in patients without serious bleeding or urgent need for an invasive procedure. When reversal is urgent, vitamin K given as an
adjunct to coagulation factor infusion is useful in maintaining the INR correction and decreasing the need for subsequent product transfusions.

3. **Thawed Plasma (Fresh Frozen Plasma that has been thawed and stored >24 hr.)**

   a. Thawed plasma may be transfused up to 5 days after thawing. However, levels of Factor V and Factor VIII decrease over time. The indications for thawed plasma are the same as FFP except that it should not be used in situations where correction of F. VIII or F. V deficiency is required.

   b. When FFP is ordered, thawed plasma will be issued if it is available unless the patient has a Factor VIII deficiency or a Factor V deficiency.

4. **Cryoprecipitate-reduced plasma** is the depleted product remaining after cryoprecipitate is separated from plasma. Cryo-poor plasma is indicated for TTP patients undergoing plasma exchange.

**Cryoprecipitate**

1. **General Considerations**

   a. Cryoprecipitate is a plasma-derived product containing fibrinogen, von Willebrand factor, factor VIII, factor XIII, and fibronectin. Because it carries the risk of transmission of infectious agents, purified factor concentrates are generally preferred for the treatment of specific factor deficiencies.

   b. Cryoprecipitate is available as a pool of 6 donors (1 dose). One dose will increase an average weight (70 kg, Hct 24-40%) adult patient’s fibrinogen level by 45 mg/dl.

2. **Indications**

   a. Cryoprecipitate is used to treat congenital or acquired fibrinogen deficiency and is usually used in the face of active bleeding when the fibrinogen level is below 100 mg/dl.

   b. Clinical situations for appropriate use include DIC or massive transfusion, and Factor VIII deficiency or von-Willebrand’s disease when purified Factor VIII concentrates are unavailable.

   c. Cryoprecipitate may be used to make fibrin glue for topical use, though commercially prepared fibrin sealants are available.
d. Cryoprecipitate may be used to improve platelet function in uremia and some other acquired disorders of platelet function when desmopressin is not an option.

**Special Products – Indications for use**

1. Cytomegalovirus (CMV) safe blood and components are indicated for CMV- negative recipients in the following situations:

   a. Infants who are under 4 weeks of age, or are premature
   b. Pregnancy, and for intrauterine transfusion
   c. Bone marrow or organ transplant patients, or potential candidates for transplants (if the marrow or organ donor is also CMV negative)
   d. AIDS or HIV-infected patients, or those with congenital immune deficiency
   e. Patients undergoing splenectomy

   Note: CMV seronegative (tested) and leukoreduced blood components are considered CMV safe. Cryoprecipitate and FFP are cell-free, and have not been implicated in CMV transmission.

2. **Irradiated blood and components**

   a. Gamma irradiation of blood inactivates lymphocytes and prevents transfusion related graft-versus-host-disease. Irradiated blood products are indicated for the following clinical situations:

   - Bone marrow transplant (BMT) recipients (allogeneic, autologous)
   - BMT or stem cell donors if allogeneic transfusion must be given prior to completing the harvest
   - Cellular (T-cell) Immune Deficiency (congenital or acquired)
   - Intrauterine transfusion, neonatal exchange transfusion, premature infants
   - Transfusions from family members, any degree, or directed donors who may be family members
   - Human Leukocyte Antigen (HLA)-matched platelet transfusions
   - Leukemia, Hodgkin’s Disease, and non-Hodgkin’s Lymphoma
   - Certain solid tumors (neuroblastoma, glioblastoma) Note: Not considered indicated for AIDS, most solid tumors, non-myeloablative chemotherapy recipients, routine immunosuppressive drugs such as prednisone, solid organ transplant patients, aplastic anemia (except BMT), humoral immunodeficiency.
3. Leukoreduced blood and components

a. Leukocyte depletion by filtration reduces febrile transfusion reactions, CMV transmission, and platelet alloimmunization. Currently, all cellular blood products at PHSW undergo leukodepletion prior to storage.

References


Desborough M, Stanworth S. Plasma transfusion for bedside, radiologically guided, and operating room invasive procedures. Transfusion 2012;52:20-29S.