

RBC Products: General Transfusion Indications
Shan Yuan, MD
(Last Updated March 29, 2011)

Packed Red Blood Cell (pRBC)

A. Indications:

- o To increase oxygen carrying capacity in the following settings:
 - ◆ Treatment of chronic, symptomatic anemia in patients unresponsive to conservative therapy or when medical necessity does not allow time for conservative therapy (hemolysis, marrow failure)
 - ◆ Treatment of an actively bleeding patient (i.e. from trauma, surgery, spontaneous hemorrhage)
- o In most patients, a hemoglobin level of 7-8 g/dL is sufficient to maintain an adequate oxygen carrying capacity.
- o Rarely need to transfuse patient with Hgb>10g/dL
- o If Hgb is between 7 and 10g/dL: need to assess patient. Transfusion threshold should be patient-specific.
- o Factors such as age, degree of anemia, intravascular volume, and underlying cardiac, pulmonary, or vascular disease should be used to assess the need for transfusion.

B. Dose response:

- o In an average adult (70kg): one pRBC unit increases Hgb by 1 g/dL (Hct by 2 – 3%)
- o Infant: 10-15ml/kg to achieve the same response

C. Contraindications:

- o Transfusion of RBCs is not indicated when restoration of blood volume and symptomatic relief can be accomplished using crystalloids or colloids alone (generally when blood loss is less than 20% of blood volume).

D. Compatible fluids: ONLY the following can be infused in the same line as RBCs

- o Normal Saline (0.9%)
- o ABO compatible plasma
- o 5% Albumin
- o Plasmalyte

E. Incompatible fluid: Everything else! Blood should not contact Lactated Ringer's solution, 0.45% NS, antibiotics/other drugs, or TPN

F. Frozen Red RBCs

- Preparation: freeze with 40% glycerol, store at -65C for 10 years (or at -120C if 20% glycerol used)
- Thaw at 37C for 30min, then deglycerolization (essentially the same of washing) performed to remove glycerol prior to transfusion. Must use within 24 hrs of deglycerolization.
- Deglycerolize: wash with solution of decreasing osmolarity (NaCl solutions, 12%, 1.6%, 0.9% with 0.2% dextrose). Deglycerolization removes glycerol, WBC fragments, and

plasma.. Should recover >80% of RBC in original unit after deglycerolization. Final hematocrit should be <80%

- Indications for preparing frozen cells:
 - o Phenotyped units
 - o Rare units
 - o Autologous units if compatible allogeneic units are difficult to find

Whole Blood

- A. A unit of WB (whole blood) has ~500mL of blood, 70 ml of anticoagulant-preservative
- B. Hematocrit is usually 36-44%
- C. One unit of WB should increase the hgb by 1g/dL and hct by 3% in an adult. In an infant, the same response can be achieved at a dose of ~15ml/kg.
- D. Store at 1-6°C. Shelf life depends on the preservative used.
- E. WB stored longer than 24 hours has few viable platelets, or granulocytes. Levels of Factor V and VIII also decrease with storage. Other clotting factor levels are well maintained.
- F. Indications: because WB provides both RBC and plasma, WB is primarily indicated for patients with large blood loss and need both RBC and clotting factor/volume replacement. The use of WB limits donor exposure.
- G. However, if volume replacement is not needed, use of WB increases the risk of volume overload
- H. Fresh whole blood (WB collected within the last 48-72hours) are rarely needed. Some evidence that use of fresh WB may improve the outcomes of infants undergoing complex cardiac surgeries, and in trauma patients.
- I. Because of the limited indications for WB, this product is unavailable at most places.