1. **Principle**

Exchange red cell transfusion may be indicated in hyperbilirubinemia in newborn infants. It may also be used to remove toxins from circulation. By removing the plasma and additive solution from packed red cells and adding back a diluent, a hematocrit similar to that of whole blood can be obtained and be used to replace circulating blood in the affected infant.9.1

1. **Scope and Related Policies**
   1. For exchange transfusions washed cells are reconstituted with AB plasma to a final HCT of 0.45-0.60 L/L, or as requested by the physician. The donor unit(s) must be less than seven days old, Group O Rh Negative, CMV low risk and irradiated.9.1 See Procedural Notes 8.1.
   2. Red blood cells negative for hemoglobin S should be selected for exchange transfusion. 9.2
   3. In the case of Hemolytic Disease of the Newborn (HDN), red blood cells lacking the antigen corresponding to the antibody causing red cell destruction should be selected for exchange transfusion.9.2
2. **Specimen – N/A**
3. **Materials**

**Equipment:** Heat Sealer/hand sealer

Laminar Flow Hood or designated clean area

**Supplies:** Isotonic Intravenous Saline or GroupAB plasma

Transfer pack

Metal clips

Scissors

Clean gloves

1. **Quality Control**

5.1 Policies, processes and procedures shall be established for the use of the laminar flow hoods including: 9.2

* + - * Approved uses
      * Instructions for use
      * Decontamination after each use

5.2 Follow manufacturer’s instructions for the use of all equipment required.

1. **Procedure**

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| * 1. Select donor unit(s) to prepare for exchange transfusion. | |
| * 1. Wash red cell units to remove the additive solution and to reduce the potassium levels in the supernatant. See CSP.008 – Preparing Washed Red Cells. | |
| * 1. The HCT of the washed packed red cells should be approximately 0.90 L/L. For the exchange transfusion a final HCT of 0.55 L/L is required. The unit of washed packed red blood cells is diluted with Group AB fresh frozen plasma or frozen plasma. | |
| * 1. Thaw unit of group AB fresh frozen or frozen plasma. | |
| * 1. Add calculated volume of plasma to washed red cell unit using transfer set to achieve the final desired HCT. | * + 1. Determine the volume of blood in each unit.   The formula for conversion of gram to mL is:  mL = g – x ÷ 1.07  g = total weight of bag, segments and red cells  x = weight of empty transfer pack  See CSP.008 Table 1 for Calculated Conversion of g   to mL. |
| * + 1. Calculate the volume of plasma to be added to the washed packed red cells to achieve the desired final HCT. See Procedural Notes 8.3.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | A = RC Unit (g) after hard centrifugation  B = Plastic bag (g) ~37g    Pre HCT packed red cell = 0.900 L/L  Post HCT = 0.550 L/L  Weight (g) of plasma to add:   |  |  |  | | --- | --- | --- | | (g)= | Pre HCT | X (A-B) – (A-B) | | Post HCT | |   Example:    Initial HCT 0.900 L/L, desired 0.550 L/L  A = 237 g (total weight of blood bag)  B = 37 g (weight of plastic)   |  |  |  | | --- | --- | --- | | (g) = | 0.900 | X (237-37) – (237-37) | | 0.550 |   Weight of plasma to add to washed red cells is 127 g for a total weight of 364 g. |
| * + 1. Using aseptic technique, insert spike of one end of transfer set tubing into the port of the washed red cell unit (ensuring one port remains untouched for administration of component) and the other end spike into the port of the group AB thawed plasma. |
| * + 1. Place the red cell unit on the weigh scale and using gravity allow the required volume of plasma to run into the red cells until the final desired weight is reached. |
| * + 1. Place the red cell unit on the weigh scale and using gravity allow the required volume of plasma to run into the red cells until the final desired weight is reached. |
| * 1. Close the clamp valve on the transfer set. | |
| * 1. Seal tubing. Make three segments, approximately 0.5 inch apart using heat sealer or manual sealer. | |
| * 1. Retain segment from the reconstituted red cell unit labeled with the modified unit number for 7 days post transfusion. | |

1. **Reporting** 
   1. Record donor unit number of the plasma used on the patient’s record, the compatibility label and issue voucher. If applicable enter information into computer.
2. **Procedural Notes**
   1. The ABO Group of the donor selected is most often Group O and in most cases Rh negative (exception is if maternal antibody is anti-c or anti-e).
   2. If a known maternal antibody is present, the unit selected for crossmatching must be phenotyped to confirm it is negative for the antigen corresponding to the maternal antibody in question.
   3. The physician might request that the unit be reconstituted to a specific hematocrit. If this is the case, use this hematocrit as the Post HCT in the formula shown in 6.5.2.

1. **References**
   1. Fung MK editor. Technical Manual 18th edition. Bethesda MD, AABB Press; 2014: 564, 579-580.
   2. Standards for Hospital Transfusion Services ver 3. Canadian Society for Transfusion Medicine; February 2011: 5.9.2.6.2; 5.9.3.4; 5.9.3.1.
2. **Revision History**

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| **Revision Date** | **Summary of Revision** |
| September 1, 2014 | * Revised name of manual * Revised wording of Principle 1.0 * Added procedural steps in section 6.0 to complete separation of red cell unit from plasma * Updated all references to include the most recent version/edition and adjusted the page numbers cited as necessary |