

Red Blood Cells, Leukocyte Reduced

Class: Human blood component, derived from whole blood

OTHER NAMES: Packed red blood cells, Packed cells

ROUTES	INTRAVENOUS			OTHER		
	DIRECT IV	Intermittent Infusion	Continuous Infusion	SC	IM	OTHER
Acceptable Routes*	No	Yes	No	No	No	No

*** Professionals performing these restricted activities have received authorization from their regulatory college and have the knowledge and skill to perform the skill competently.**

DESCRIPTION OF PRODUCT:

Red Blood Cell (RBC) concentrates are prepared from approximately 480mL whole blood usually collected in 70mL of anticoagulant. The unit is plasma reduced by centrifugation, platelet reduced by either centrifugation or filtration and leukocyte reduced by filtration. RBCs are typically resuspended in approximately 110mL of nutrient.

- Collected from volunteer donors by the Canadian Blood Services (CBS).
- Donor is screened and blood is tested for:
 - i. Hepatitis B Surface Antigen (HBsAg)
 - ii. Syphilis
 - iii. Antibodies to Hepatitis B core antigen (HBcore), Hepatitis C Virus (HCV), Human T-cell Lymphotropic Virus (HTLV-1 and 2), Human Immune Deficiency Virus (HIV-1 and 2)
 - iv. Nucleic Acid Testing (NAT) for presence of HCV RNA, HIV-1 RNA and West Nile Virus (WNV) RNA
- CBS also tests blood for ABO/Rh and clinically significant antibodies.
- Some donors are tested for CMV status.
- RBCs do *NOT* contain any coagulation factors or platelets.

AVAILABILITY:

- Contact your local transfusion service/laboratory for ABO and Rh types stocked at your site.
- ABO compatible (not always identical) may be required if the transfusion service cannot provide sufficient quantities of the patient's blood group (See ABO compatibility chart at: <http://www.albertahealthservices.ca/assets/wf/lab/wf-lab-clin-tm-abo-compatibility.pdf>).
- Rh positive patients may receive Rh positive or Rh negative blood.
- Rh negative patients should receive only Rh negative red cells if available. If necessary, Rh negative females >50 years of age and males may receive Rh positive red cells.
- The transfusion service/laboratory may, where possible, remove most of the plasma (also referred to as concentrated or volume reduced red cells) for neonates/pediatric patients. Plasma reduction may also be done for patients at risk of volume overload.

INDICATIONS FOR USE:

- Red cell transfusions should be administered primarily to prevent or alleviate symptoms, signs or morbidity due to inadequate tissue oxygen delivery.
- There is no single value of hemoglobin concentration that justifies or requires transfusion.
- An evaluation of the patient's clinical situation should be the major factor in the decision to transfuse.

CONTRAINDICATIONS:

- Red Blood Cells are not suitable for clinical situations where limited oxygen-carrying capacity is not due to red blood cell deficiency or dysfunction
- Red blood cells should **not** be given for volume replacement or for any other reason other than correction of acute or chronic anemia when non-transfusion alternatives have been assessed and excluded.
- Patients with anemia due to Hematinic (iron, vitamin B12, folic acid) deficiency should only be transfused in the setting of severe symptoms or organ dysfunction. The Hematinic deficiency should be treated aggressively.

DOSE:

- Clinical signs and symptoms of hypoxia, ongoing blood loss and risk of anemia to the patient need to be considered when determining the number of units to transfuse
- Evaluate the patient for further transfusion after each unit
- One unit of RBCs will increase hemoglobin approximately 10g/L in a hemodynamically stable 70kg adult
- Common pediatric dosing is 10-15mL per kg body weight. Alternatively, the following formula could be used:

$$\text{Volume to transfuse (mL)} = 0.5 \times (\text{desired Hb (g/L)} - \text{current Hb (g/L)}) \times \text{patient weight (kg)}$$

(Volume in mL; Hb in g/L; weight in kg)

ADMINISTRATION:

Ensure written (signed) patient consent has been obtained prior to requesting blood component from lab/transfusion service where possible.

Perform required pre-transfusion checks.

Administration Set:

- Administer through a standard blood transfusion set (170 – 260 micron filter) and change every 8 hours or per manufacturers recommendation.
- Use intravenous catheter at a minimum of 18 to 20 gauge where possible, taking into account the condition and the size of the vein. RBCs may be transfused through a 14 to 24 gauge short peripheral catheter. Transfusion for neonate/pediatric/elderly populations is usually given using 22 to 24 gauge peripheral venous access device. Smaller gauge catheters may require decreased infusion rates.

Compatible Solutions:

- The fluid of choice is 0.9% NaCl (normal saline). 5% Albumin and ABO-compatible plasma are also approved for use.

Only isotonic, calcium-free IV solutions should be added to, or come in contact with blood products. Calcium may bind with the citrate anticoagulant and promote clotting in the tubing. Excess glucose and/or dextrose causes hemolysis and shortens red cell survival. Studies have shown other IV solutions to be compatible with citrated blood components. However, these solutions should only be considered compatible in situations where the use of 0.9% NaCl would lead to undesirable metabolic abnormalities*. They are:

- Plasma-Lyte A® - Contains Sodium 140mEq/L, Potassium 5mEq/L, Magnesium 3mEq/L and Chloride 98mEq/L at pH 4.0
- Other isotonic, calcium and glucose/dextrose free commercial electrolyte solutions (i.e. Normosol®-R)
- Ringer's Lactate (LR). **Note:** Studies have shown LR to be compatible with citrated blood components. However, additional studies around the safe use of LR as a citrated blood component diluent are needed.
- **MEDICATIONS MUST NOT BE ADDED TO BLOOD PRODUCTS.** If it is necessary to administer medications simultaneously with blood, it is safest to use an alternate site for the drug. If this is not possible, the blood line can be clamped, the IV line flushed with normal saline and the drug administered through the line. Flush the line with normal saline again before running the blood. The use of a Y connector at the IV site may assist with flushing the line or administration of drugs.

Infusion Rate:

- Infusion rates depend on the patient's blood volume, cardiac status and hemodynamic condition and are predetermined by the patient's authorized prescriber.
- Start the transfusion slowly, 1-2mL/min. for first 15 minutes. Typical infusion is over 2 hours in an adult.
- Transfusion of each unit must be completed within 4 hours of removal from a cold storage device approved by the Transfusion Service/laboratory.
- In **non-urgent/non-bleeding/inpatient settings** red blood cells should be transfused during **daytime hours** (for patient safety) and transfused **one unit at a time.**

*Studies in Alberta have shown compatibility with the listed IV solutions and therefore their inclusion within this document is in compliance with CSA Standards. This information does differ from that contained in the Canadian Blood Services circular of information.

POTENTIAL HAZARDS WITH PARENTERAL ADMINISTRATION:

- Potential adverse events related to a blood transfusion range in severity from minor with no sequelae to life-threatening.
- All adverse events occurring during a transfusion should be evaluated to determine whether or not the transfusion can be safely continued/restarted.
- All adverse events suspected to be related to a transfusion (whether during or after a transfusion) should be reported to your local transfusion service and documented as required.

NURSING IMPLICATIONS:**Patient Monitoring:**

	Pre Transfusion Vitals?	Stay At Patient Bedside?			Vital Signs During Transfusion		Post Transfusion Monitoring
		First 5 min	First 10 min	First 15 min	After 15 min	Remainder of transfusion	
ADULTS (in patients)	Yes		NO, but must be immediately available*		Yes	q1h	Set of V/S then monitor prn
ADULTS (out patients)	Yes		NO, but must be immediately available*		Yes	q1h	Set of V/S. Monitor for minimum of 15 min post**
PEDIATRICS & NEONATES	Yes	YES			Yes	1st hour→q15 min 2 nd and 3 rd hours→ q30 min then q1h until complete	For 30-60 minutes following

* Defined as performing non-dedicated tasks with the patient in view.

**If patient has had a previous adverse reaction to component transfusion, or this is the first transfusion patient has had for component, monitor for 30-60 minutes.

Note: Vital signs/patient monitoring may be conducted more frequently as determined by clinical condition of patient.

Patients receiving blood component transfusions must be observed closely for signs of any unexpected or untoward reactions. These reactions may occur during or after the infusion of blood or blood products. For follow up instructions to a transfusion reaction, refer to the following link: <http://www.albertahealthservices.ca/4240.asp> . Notify the transfusion service as soon as possible that an adverse reaction has occurred.

Documentation:

- Ensure documentation is completed as per the AHS Transfusion of Blood Components and Products procedure.
- **Recipients of blood components are to be notified in writing of the transfusion.**

STORAGE & STABILITY of PRODUCT:

- RBCs are stored at 1-6°C and have a shelf life of up to 42 days from date of collection.
- Product manipulation may alter shelf life (i.e. irradiation, washing)
- Do not place in a medication or unapproved cold storage device.

COMMENTS:

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For questions or comments, about this document please contact Transfusion.SafetyTeam@albertahealthservices.ca

REFERENCES

Canadian Blood Services Circular of Information

CSA Standards

AABB Transfusion Therapy Clinical Principles and Practice