

Hamilton Regional Laboratory Medicine Program - HRLMP (effective at Hamilton Health Sciences, St. Joseph's Healthcare and Associated Health Care Facilities)			
Initial Issue Date: Revision Date:	Administration Guidelines	Section: Sub-Section:	Laboratory Medicine Transfusion Medicine
<i>Title:</i> RED CELL CONCENTRATE (RCC)		<i>Document Number:</i>	
<i>Approved By:</i> Director, Laboratory Medicine Chair, Regional Transfusion Committee Head, Transfusion Medicine, HRLMP Manager, Transfusion Medicine, HRLMP Technical Specialist, Transfusion Medicine, HRLMP Chief of Nursing Practice, Hamilton Health Sciences Chief of Nursing Practice, St. Joseph's Healthcare		Page 1 of 6	

Purpose: To Establish the Indications and Administration of Red Cell Concentrate

Scope: All patient care areas Across HHS and St. Joseph's Healthcare

Definitions: Red Cell Concentrate – Commonly available concentrated with plasma removed.
This component increases the oxygen circulating red blood cell mass.

Other Names: RCC	Date Approved:	Pages: 1 of 6
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<p>INDICATIONS:</p> <ul style="list-style-type: none"> – Symptomatic deficit of oxygen-carrying capacity – Restoring blood volume following significant hemorrhage – Exchange transfusions
<p>DOSAGE:</p> <ul style="list-style-type: none"> – Volume: 240-340 mL and hematocrit less than 0.80 g/L – One unit red cells will raise hemoglobin 10 g/L or the hematocrit 3-4% – Pediatric dose 10 mL/Kg – Newborn infant in emergency 10-20 mL/Kg – Newborn infant for “top-up” transfusion using this formula: – Volume (in mL of RCC) = [(desired Hb (g/l)] – [current Hb] x infant weight (Kg) x .4

SUPPLIED:

- All red blood cell products are leukoreduced
- CP2D/AS-3 Red Cell Concentrate stored for 42 days (between 1°C and 6°C) – Hematocrit approximately 0.60 g/L
- CPDA-1 Red Blood Cells stored for 35 days (between 1°C and 6°C) – Hematocrit approximately 0.70 g/L
- Whole Blood stored for 35 days (between 1°C and 6°C) – Hematocrit approximately 35 – 40% usually only available for autologous collection

RECONSTITUTION AND STABILITY:

- Red Cell Concentrate must be transfused within 4 hours from the time it leaves the laboratory unless in a validated Transfusion Medicine cooler
- If blood is out of a 4°C monitored environment for 30 minutes or more, it must be transfused within 4 hours from the time the blood left the laboratory or returned to Transfusion Medicine to be discarded
- AS-3 red cells are used most frequently and do not require dilution with saline to increase flow rate

ADMINISTRATION:

- Prior to administration a recipient and product identification must be made.
- Red Cell Concentrate must be administered through a standard blood administration filter 170-260 microns (80 micron filter for Neonates)
- Rate of infusion after initial slow drip should be as fast as tolerated, maximum infusion time 4 hours from the time it leaves the laboratory
- AS-3 Red Cell Concentrate will have flow rate similar to whole blood
- ABO and Rh compatibility of Red Cell Concentrate is summarized below:

<u>Recipient Group</u>	<u>Compatible Donor Group(s)</u>
O	O
A	A,O
B	B,O
AB	AB,A,B,O
Rh Positive	Rh Positive, Rh Negative
Rh Negative	Rh Negative

- In shortage situations, Rh-Negative recipients may have to receive Rh positive red cells. Physician must be informed
- For neonates refer to neonatal ICU procedure for red cell concentrates and blood product (44-06-02 Blood Transfusion: Neonatal Procedure)

METHOD	WHOWHERE	DILUTION	HOW TO ADMINISTER	INFUSION PUMP	PRECAUTIONS AND MONITORING
IV PUSH	N/A	N/A	N/A	N/A	N/A
MINIBAG/ BURETROL	No	No	No	No	No
PRIMARY IV BAG	RN	No	- Administer by infusion through standard blood administration set with filter (170-260 microns)	Yes	- Observe and monitor for adverse reactions
IM or SC	N/A	N/A	N/A	N/A	N/A

COMPATIBILITIES/INCOMPATIBILITIES:

- Intravenous solutions administered with red cell concentrate component must be isotonic and must not contain calcium or glucose
- Calcium binds to citrate in the anticoagulant and promotes clotting. Do not add Lactated Ringers, injection (USP) solution to red cell concentrate
- Excess glucose shortens survival of the red cell concentrate and can cause hemolysis
- Solutions compatible with red cell concentrates includes saline; 5% albumin; or group compatible plasma

ADVERSE EFFECTS:

ACUTE REACTIONS

a) Acute Hemolytic Reaction

- Severe reactions: In most adult patients manifested by shock, chills, fever, dyspnea, chest pain, backpain, headache, and/or abnormal bleeding, hypotension and disseminated intravascular coagulation (DIC), possible renal failure
- In most Newborn infants manifested by apnea, tachycardia, mottled colour, restlessness, hypoglycemia occurs when donor red cells and recipient plasma are incompatible – ABO mismatch
- Must ensure proper patient and unit identification

Treat

- Stop transfusion, manage shock, administer fluids and diuretics
- Perform clerical check to ensure patient is receiving correct product
- Notify Transfusion Medicine

b) Non Hemolytic Reaction Improper Handling of Blood

- Causing Hemolysis
- Overheating or freezing
- Addition of hypotonic fluid

(c) Allergic Reaction

- Manifested by cutaneous urticaria, wheezing
- If only a cutaneous reaction occurs, product should be stopped temporarily, antihistamine administered and transfusion can usually be resumed
- Subsequent reactions may be prevented by premedication with an antihistamine

(d) Bacterial Contamination

- Manifested by chills, high fever, hypotension, rigors
- Symptoms usually appear early in the transfusion

(e) Anaphylactic Reaction

- Manifested by bronchospasm, dyspnea, hypotension and shock
- Occurs in IgA deficient recipient, who has antibody to IgA
- Usually occurs after a small volume of blood (10 to 15mL) infused
- Immediate treatment with adrenaline and corticosteroids indicated
- Discontinue product immediately

(f) Transfusion Related Acute Lung Injury (TRALI)

- Usually occurs 2 to 8 hours post transfusion
- Usually caused by a potent white cell antibody in the donor product that reacts with the patient's white cells
- Manifested by fever, pulmonary edema without evidence of cardiac failure, tachycardia,
- Treat symptoms; Report to Transfusion Medicine (as donor must be removed from the donor pool)

(g) Febrile Reactions

- Manifested by temperature rise of $<1.5^{\circ}\text{C}$ with or without chills
- Usually due to cytokines released by leukocytes

(h) Circulatory Overload

- Manifested by pulmonary edema
- Particular risk in elderly patients of small stature or in patients with chronic severe anemia
- Can be avoided by slowing the rate of infusion or administering diuretic

(i) Passive Alloimmune Thrombocytopenia

- Manifested by abrupt onset of Thrombocytopenia within hours after plasma infusion
- Caused by donor plasma alloantibodies that destroy patient's platelets
- Report to Transfusion Medicine (as donor must be removed from the donor pool)

(j) Metabolic Complications

- Hypothermia - Massive Transfusion of cold blood
 - Hyperkalemia - Associated with transfusion stored blood
 - Citrate toxicity - Massive infusion, prevent by administration of calcium
 - Hypoglycemia - In neonates, monitor using chemstrip mid transfusion
 - Apnea
- Stop infusion immediately
 - Return product to Transfusion Medicine for culture
 - Perform blood culture on the patient
 - Aggressive supportive care and antibiotic treatment

DELAYED REACTIONS

a) Delayed Hemolytic Reaction

- Antibodies undetectable at time of compatibility testing
- Progressive unexplained fall in hemoglobin, fever, hemoglobinuria 4 to 14 days after transfusion
- Usually benign
- In newborn infants may include bruising, bleeding, apnea, tachycardia, mottled colour, restlessness, hypoglycemia

b) Graft vs. Host Disease (GVHD)

- Manifested by fever, diarrhea, liver function abnormalities and rash
- GVHD is a result of the transfused lymphocytes
- May occur in patients that receive blood from direct family members (eg. parents)
- May occur in children and adults with underdeveloped or impaired immune competence
- Irradiate blood prior to administration to susceptible patients
- Transfusion associated GVHD is usually fatal

c) Transmission of Infectious Agents – (Malaria, Chagas)

d) Transmission of Infectious Disease – (HIV, HBV, HCV)

e) Post Transfusion Purpura

Dramatic sudden, thrombocytopenia 5-10 days after blood transfusion

MANAGEMENT OF ADVERSE EFFECTS

Notify physician

Report all Suspected Transfusion Reactions to Transfusion Medicine

- Management is variable dependent on type of reaction and the patient's clinical history
- If severe reaction is suspected, stop transfusion immediately, keep IV line open
- Do a clerical check with blood product, patient and requisition checking identifying names, numbers and armbands
- Follow Transfusion Reaction Policy
- Treat symptoms
- Consult patient's physician

NOTES:

Distributed by Canadian Blood Services

Documentation:

Issue Transfusion sheet or requisition with unit number must be included in patient's chart.
Written consent for transfusion must be obtained prior to administration

References:

1. Circular of information, Canadian Blood Services, November 2002
2. Blood Transfusion Therapy, A Physician's Handbook, 7th Edition, American Association of Blood Banks, 2002

Developed By In Consultation With:

Transfusion Medicine Operations Group
Clinical Educators Group

REVIEW DATES:

REVISION DATES: