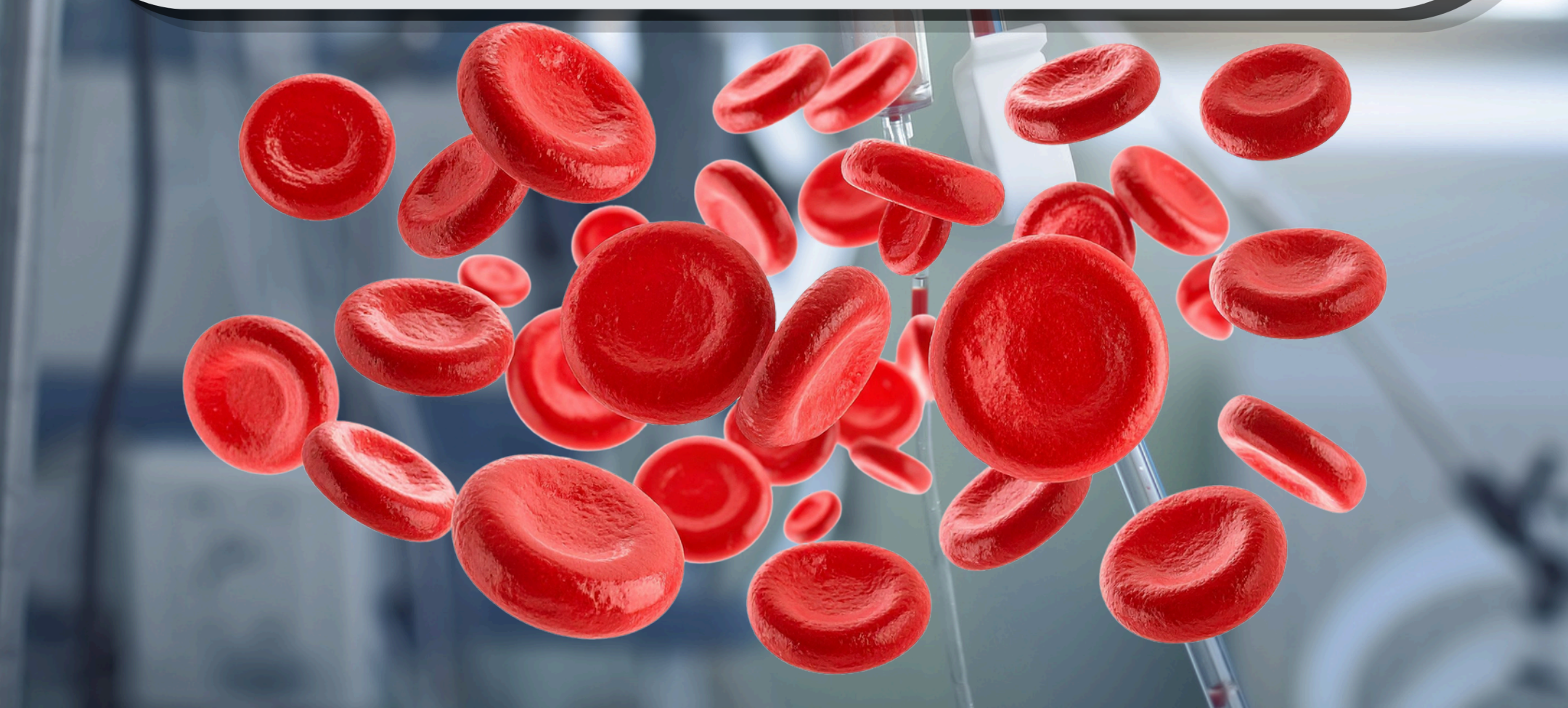
Neonatal pRBC Transfusion Protocol

Clinical Thresholds, Product Specifications, and Administration Pathways

Distilled insights from the Toronto Resident's Handbook of Neonatology



Neonatal Anemia

1. Underproduction

- Focus: Anemia of prematurity
- Mechanism: Immature erythropoiesis and inappropriately reduced hepatic EPO production (less sensitive to hypoxia than renal EPO).

2. Blood Loss

- Fetal/Maternal: Vasa previa, placenta previa, cord accidents, TTTS
- Internal/Neonatal: IVH, pulmonary hemorrhage
- Iatrogenic: Frequent blood draws

Key Metric: Total term newborn blood volume is only ~85ml/kg

3. Hemolysis

- Immune: ABO, Rh, or Kell incompatibility (DAT positive)
- Non-immune: Membrane defects (spherocytosis), enzyme defects (G6PD deficiency), sepsis, DIC

The Decision Matrix: Transfusion Thresholds

	Week 1	Week 2	Week 3
Respiratory Support	115 g/L | 35%	100 g/L | 30%	85 g/L | 25%
No Respiratory Support	100 g/L | 30%	85 g/L | 25%	75 g/L | 23%

Definition: Respiratory Support
An inspired oxygen requirement in excess of 25% OR the need for mechanical increase in airway pressure.

The Order Set: Blood Product Specifications

1

Irradiated

Absolutely required to prevent transfusion-associated Graft-versus-Host Disease (GVHD).

2

CMV-Safe

Must be pre-storage leukoreduced and/or CMV-negative donor to prevent severe viral transmission.

3

Calculated Volume

Standard Dose: 10-20 ml/kg

Preterm Exception: Use higher volumes if tolerated to reduce the infant's exposure to multiple different donors over time.

The Execution Protocol: Administration Timeline

Administer Slowly

Run transfusion over 3-4 hours.

Resume Feeds

Safely resume enteral feeds 4 hours post-transfusion.

T=0 — **T=4 Hours** — **T=8 Hours**

Consider Holding Feeds

Specifically if the infant is at an increased risk of Necrotizing Enterocolitis (NEC).

Volume Management

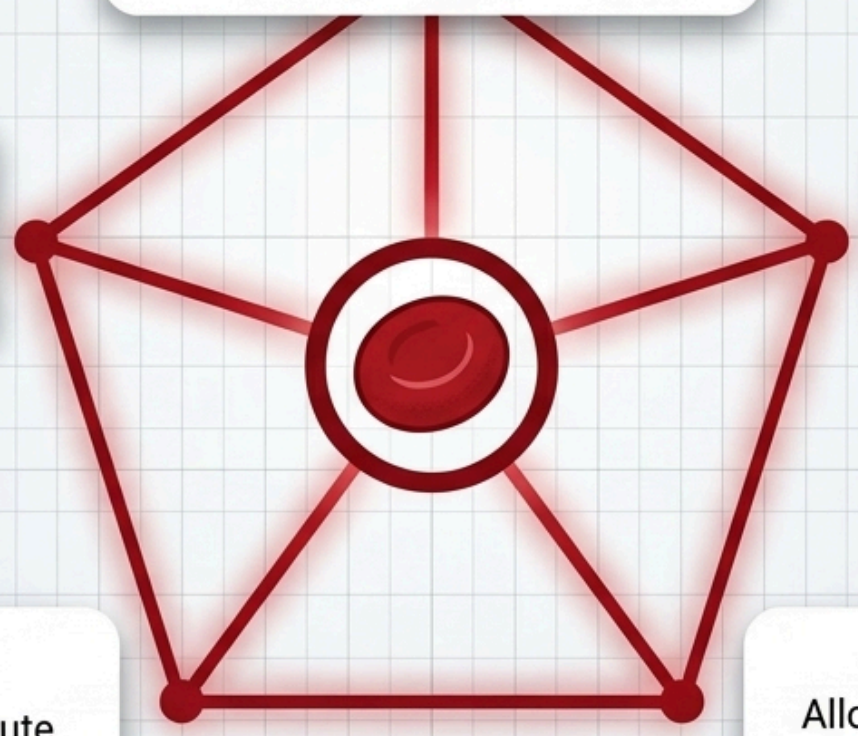
Assess need for Lasix (furosemide) for volume management. Specifically indicated for: chronic lung disease, hemodynamically significant PDA, renal failure, or general volume overload.

The Safety Protocol: Systemic Risk Weighting

Gastrointestinal
Necrotizing Enterocolitis (NEC) - exacerbated by feeding during transfusion.

Infectious
Bacterial contamination/sepsis and transmitted infections (CMV).

Cardiovascular
Acute volume overload.



Respiratory
Transfusion-related acute lung injury (TRALI).

Immunologic
Alloimmunization and Donor leukocyte immunomodulation (GVHD).

Risk Radar

The Exception: Exchange Transfusion

Standard Top-Up Transfusion

- **Goal:** Correct anemia.
- **Volume:** 10-20 ml/kg.

Double Volume Exchange

- **Goal:** Rapidly reduce bilirubin and clear hemolytic antibodies.
- **Indications:** Severe ABO incompatibility, Total Serum Bilirubin (TSB) > exchange threshold, or signs of kernicterus (decreased LOC, arching, hypotonia).

Formula: 80 ml x Infant Weight (kg) x 2

Complications to monitor:
- Thrombocytopenia
- Dilutional coagulopathy
- Arrhythmia
- Electrolyte disturbances

Pre-Transfusion Safety Checklist

- [x] **1. Threshold Verified?**
  Has the Hb dropped below the specific postnatal/respiratory threshold?
- [x] **2. Product Specified?**
  Is the blood bank dispensing Irradiated and CMV-Safe pRBCs?
- [x] **3. Dose Calculated?**
  Is the volume strictly 10-20 ml/kg (optimized for preterms)?
- [x] **4. Gut Protected?**
  Are enteral feeds held (for 4 hours) if the patient has high NEC risk?
- [x] **5. Volume Managed?**
  Has Lasix been considered for infants with PDA, CLD, or renal impairment?