Site Applicability

Neonatal Intensive Care Unit

Practice Level/Competencies

Administration of blood components in the NICU is performed by Registered Nurses.

- NICU orientation
- Completion of the “Administration of Blood Products in NICU” module on the Learning Hub.

Policy Statement(s)

Refer to Transfusion Standards in ePOPS

Equipment & Supplies

- Patient chart with prescriber’s order and consent for blood transfusion
- Personal Protective Equipment (PPE): gloves, goggles, +/-gown, mask
- Chlorhexidine/alcohol swabs (CHG/ALC swab)
- Injection cap (for post transfusion CVC cap change)
- 10 mL 0.9% Normal Saline for priming & flushing the line
- Sterile green towel
- Injection cap
- Small-bore extension set with clamp
- Infusion pump “brain”
- Syringe pump
- Sterile white cap

From Transfusion Medicine Laboratory (TML)

- Pre filtered blood component in a syringe
- Transfusion tag attached to syringe
- Transfusion record

<table>
<thead>
<tr>
<th>STEPS</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>ENSURE</strong> order for blood component exists. For neonatal dosage guidelines, see table 1 below.</td>
<td>Blood component s shall be prescribed by a health care provider with blood prescribing privileges.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1: Dosage</th>
<th>Typical Dose</th>
<th>Maximum Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood component</td>
<td>10 to 15 mL/kg</td>
<td>20 mL/kg</td>
</tr>
<tr>
<td>Red Blood Cells</td>
<td>10 to 15mL/kg</td>
<td>20 mL/kg</td>
</tr>
<tr>
<td>Platelets</td>
<td>10 to 15mL/kg</td>
<td>20mL/kg</td>
</tr>
<tr>
<td>Plasma</td>
<td>10 to 15mL/kg</td>
<td>20mL/kg</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>1 unit up to 10 kg body weight</td>
<td></td>
</tr>
</tbody>
</table>

2. **CONFIRM** that informed consent for blood transfusion is complete and current.

*Informed consent need not be obtained:*

- When urgent treatment is necessary to preserve a patient’s life and continuing health, *and*
- When it is not reasonably possible to obtain consent, *and*
- When there is no substitute decision maker

| 3. **ENSURE** that the guardian is aware of the planned transfusion. Explain the reason for transfusion and transfusion procedure to guardian. Provide guardian with the information pamphlet “Blood Transfusion Answers to Some Common Questions” if necessary. | Allow the guardian to prepare for the procedure. To ensure that the guardian understands the reason for transfusion and the transfusion procedure. |
4. **DETERMINE** if a Group & Screen/Cross Match is required. **Refer** to blood component fact sheet. A cross match is required for red blood cell transfusion. **Ensure** that Transfusion Medicine Laboratory has a current Group & Screen/Cross Match sample, if required.  
   To avoid the transfusion of an incompatible blood component.  
   To avoid unnecessary delay in transfusion.

5. **PREPARE** the:  
   - Group & Screen Crossmatch Request, **or**  
   - Blood Component/ Derivative/ Factor Concentrate Request Form, **and**  
   - Blood Release Request Form  
   To avoid unnecessary delay in transfusion.

6. **Send to TML**  
   - Group & Screen Crossmatch Request, **or**  
   - Blood Component/ Derivative/ Factor Concentrate Request Form  
   **⚠️ Do not send** the Blood Release Request Form TML at this point.  
   The Blood Release Request Form is sent to TML **after** TML call to say the blood component is ready for pick up.

7. **ENSURE** that a patient identification band is in place. **No identification band No Transfusion**  
   A missing identification band is a significant factor in patient misidentification and wrong blood to patient incidents. Blood components should not be administered to patients who lack positive identification.

8. **ENSURE** peripheral intravenous catheter (PIV), central venous catheter (CVC) access or umbilical venous catheter (UVC) of sufficient gauge is established for the transfusion of blood components) based on clinical status of patient and urgency of transfusion, see table 2 below.  
   Gauge or lumen size should be large enough to allow the flow of the blood component within the specified administration time and to prevent cell damage.

<table>
<thead>
<tr>
<th>Intravenous Access</th>
<th>Lumen Size</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral Intravenous</td>
<td>≥ 26 Gauge</td>
<td>Can be used for transfusion of all blood components</td>
</tr>
<tr>
<td>Umbilical Venous Catheter</td>
<td>≥ 3.5 French</td>
<td></td>
</tr>
<tr>
<td>Cuffed &amp; uncuffed Central Venous Catheter</td>
<td>≥ 3 French</td>
<td></td>
</tr>
<tr>
<td>Cuffed &amp; uncuffed Peripherally Inserted Central Catheter</td>
<td>≥ 3 French</td>
<td></td>
</tr>
<tr>
<td>Cuffed &amp; uncuffed Peripherally Inserted Central Catheter</td>
<td>&lt; 3 French</td>
<td><strong>DO NOT</strong> use for blood component transfusion.</td>
</tr>
</tbody>
</table>

9. **ENSURE** a dedicated line for the administration of blood products.  
   Blood components are compatible with 0.9% Normal Saline only.  
   Co-administration of morphine with red blood cells can be considered as a last resort for optimal pain management. If approved by a physician, co-infusion of morphine in 0.9% Normal Saline and connected with a blood component is acceptable. Use a Bifuse Ext set with clamp (Y-site) and connect the morphine infusion line to the blood component.  
   To avoid inadvertent co-administration of incompatible fluids or medications. Electrolyte and colloid solutions containing calcium should not be administered with blood components as they may cause clotting in the infusion line. D5W or hypotonic sodium solutions may cause red cells to hemolyze.
10. **PERFORM** a pre transfusion patient assessment within 30 minutes of commencing the transfusion and document findings.

**Measure:**
- Heart rate
- Blood pressure
- Temperature
- Respiratory rate & O₂ Saturation level

**Include:**
- Chest auscultation - shift assessment is an acceptable baseline.
- A check for positive fluid balance

**Identify any clinical manifestations that may be cause for delaying the transfusion e.g. fever.**
**Identify any preexisting clinical manifestations that may be confused with a transfusion reaction e.g. fever or pre-existing rash.**
**Identify any existing clinical manifestations that may predispose the patient to a transfusion reaction e.g. Transfusion Associated Circulatory Overload.**
Establish baseline levels so that any transfusion-related deviations in patient’s clinical condition will be recognized.

11. When TML phone to state that the blood component is ready:
- **Arrange** for transport of the blood component using transport tracking.
- **Send** the blood release request form to TML.
- If collecting the blood component in person take the blood release request form with you.

To alert TML that you have arranged for the transport of the component.
Ensure that the person transporting the blood component obtains the right blood component for the right patient.

⚠️ All transfusions must be initiated within 20 minutes of issue.
⚠️ **Consult** TML if there are concerns about completing the transfusion within the four hour time limit. If the transfusion cannot be started return the blood component to TML immediately.

12. **PERFORM** the pre-transfusion check with second RN.

**a. Visual Inspection**
The integrity of the blood component is checked for:
- Leaks at syringe cap
- Clots
- Abnormal colour
- Clumping
- Excessive air or bubbles
- Turbidity

Blood components that appear abnormal should not be transfused without further investigation. Contact TML @ 7388 for an explanation of abnormal appearance.

**b. Confirm** that Informed Consent has been obtained.
Consent is required for transfusion of all blood components.

**c. Check** that the patient details on all documentation match:
- First and last name
- DOB
- MRUN
- Admission summary in the patient chart
- Blood component order
- Product Tag
- Transfusion record

The intended recipient must be properly identified prior to transfusion.

**d. Check physician order for:**
- Specific blood component required
- Volume in mLs required
- Date on the order form
- Rate or duration of infusion
- Any modification/special requirements e.g. irradiation
- Intra/post transfusion medication orders

To ensure that you are aware of the infusion rate, special requirements, any modifications, pre or post medications etc. that have been ordered for the transfusion.
### ADMINISTRATION OF BLOOD COMPONENTS: NICU
#### DOCUMENT TYPE: PROCEDURE

<table>
<thead>
<tr>
<th>e. Compare details and match information on the label, the product tag &amp; transfusion record for the following:</th>
<th>To ensure that patient information and component details on the transfusion record and product tag are identical.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient information:</strong></td>
<td></td>
</tr>
<tr>
<td>✓ First &amp; last name</td>
<td></td>
</tr>
<tr>
<td>✓ DOB</td>
<td></td>
</tr>
<tr>
<td>✓ MRUN</td>
<td></td>
</tr>
<tr>
<td>✓ ABO &amp; Rhesus factor</td>
<td></td>
</tr>
<tr>
<td><strong>Component information:</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Component type e.g. red cells or platelets.</td>
<td></td>
</tr>
<tr>
<td>✓ Unit number</td>
<td></td>
</tr>
<tr>
<td>✓ Expiry date &amp; time*</td>
<td></td>
</tr>
<tr>
<td>✓ ABO &amp; Rhesus factor</td>
<td></td>
</tr>
<tr>
<td>✓ Any modification &amp;/or special requirements e.g. irradiation, washing, or CMV negative</td>
<td></td>
</tr>
<tr>
<td>✓ Sticker to indicate that the component has been filtered</td>
<td></td>
</tr>
<tr>
<td>☢ Check for any TML comments</td>
<td></td>
</tr>
<tr>
<td>☢ If you have any questions or concerns about the expiry time, contact TML.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>f. Final check in the presence of the patient</th>
<th>To ensure that the component/product has not expired.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Ask</strong> parent/guardian, where possible, to state their infant’s full name and date of birth and compare to patient details on patient identification band.</td>
<td>To ensure donor/patient compatibility.</td>
</tr>
<tr>
<td>2. <strong>Compare</strong> the patient details:</td>
<td>To ensure that required special requirements and/or modifications have been met.</td>
</tr>
<tr>
<td>• First and last name</td>
<td></td>
</tr>
<tr>
<td>• DOB</td>
<td></td>
</tr>
<tr>
<td>• MRUN</td>
<td></td>
</tr>
<tr>
<td>3. With patient details on:</td>
<td>To ensure that the component has been pre-filtered.</td>
</tr>
<tr>
<td>• Patient identification band</td>
<td></td>
</tr>
<tr>
<td>• Product Tag</td>
<td></td>
</tr>
<tr>
<td>• Transfusion Record</td>
<td></td>
</tr>
<tr>
<td>☢ <strong>If you find any discrepancies DO NOT proceed.</strong></td>
<td></td>
</tr>
<tr>
<td>☢ <strong>Contact TML @ 7388 immediately.</strong></td>
<td></td>
</tr>
<tr>
<td>☢ The product tag must remain attached to the component for the duration of the transfusion.</td>
<td></td>
</tr>
</tbody>
</table>

The majority of transfusion-associated mortality is due to patients receiving the wrong blood product, or blood intended for another patient. The bedside check is a vital step in preventing serious transfusion error. Vigilance in checking to ensure that the right blood is given to the right patient is mandatory.

If this is not the intended component for your patient another patient may be at risk i.e. another patient may be about to receive the wrong blood component. Traceability requirements.

Right click here to watch a short video on the Pre-Transfusion Checking Process for NICU

<table>
<thead>
<tr>
<th>13. DOCUMENT the checking procedure by signing the transfusion record.</th>
<th>To confirm that the pre transfusion checking procedure has been completed.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Record:</strong></td>
<td></td>
</tr>
<tr>
<td>• Signature of two RNs who carried out the pre transfusion check</td>
<td></td>
</tr>
<tr>
<td>• Date of transfusion</td>
<td></td>
</tr>
<tr>
<td>• Start time</td>
<td></td>
</tr>
</tbody>
</table>

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14. Immediately after the verification checks have been completed INITIATE the transfusion:
   - **Wash** hands; apply personal protective equipment and prepare field and equipment.
   - **Prime** the small-bore extension tubing with blood component, see image 1.
   - **Load** syringe into syringe pump
   - **Program volume** and **rate** on the pump, see table 3 for appropriate infusion rates.
   - **Prime** using prime option on pump.
   - **Label** pump channel.
   - **Double-check** the programmed rate and volume to be infused.

   **If the dedicated access is a CVC or PICC:**
   - **Clamp** CVC or PICC. **Delay** existing infusion for the duration of the transfusion.
   - **Clean** connection with CHG/ALC swab, **detach** and **cap** existing infusion from CVC or PICC using a sterile white cap, see image 2.
   - **Set** aside in sterile green towel for post transfusion reconnection.
   - **Clean** CVC cap with CHG/ALC and **flush** with 1mL of 0.9% Normal Saline using push-pause action and **clamp**.
   - **Connect** blood component line directly onto cap and **start** transfusion.

   **If dedicated access is PIV:**
   - **Clean** connection with CHG/ALC
   - **Convert** PIV to saline lock.
   - **Connect** blood component line to patient’s IV access and **start** transfusion.
   - ▶️ If the transfusion is cancelled return the component, transfusion record and product tag to TML.

   **Table 3**  
   **Infusion Rates for non emergency situations only**

<table>
<thead>
<tr>
<th>Blood component</th>
<th>Infusion Rates</th>
<th>Maximum Rates</th>
<th>Expiry Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Blood Cells</td>
<td>2-5 mL/kg/h</td>
<td>150 mL/h</td>
<td>Infuse within 4 hours of issue from TML</td>
</tr>
<tr>
<td>Platelets</td>
<td>10 to 20 mL/kg/h</td>
<td>20 mL/kg/h</td>
<td>Check expiry time on transfusion record*</td>
</tr>
<tr>
<td>Plasma</td>
<td>5 to 10 mL/kg/h</td>
<td>20 mL/kg/h</td>
<td>Infuse within 4 hours of issue from TML</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>10 to 20 mL/kg/h</td>
<td>20 mL/kg/h</td>
<td>Infuse within 4 hours of issue from TML</td>
</tr>
</tbody>
</table>

   ▶️ **Contact TML if you have questions/concerns about the expiry time.**

   *Platelets issued in a syringe have a short expiry time. **Check** the transfusion record for the expiry time.

15. **MONITORING**, see table 4 below.

   **Table 4**:  
   **Patient Monitoring during Blood Component Transfusion**

   Remain with, or be in a position to closely observe the patient for the first 15 minutes following the start of each transfusion and observe for signs and symptoms of a transfusion reaction.

   ▶️ Serious and life threatening reactions can occur unpredictably and progress rapidly therefore patients must be closely monitored throughout the transfusion.

   ▶️ If a major ABO incompatibility exists or a severe allergic reaction such as anaphylaxis occurs, symptoms usually appear early in the transfusion.
**Measure Vital signs:**

- 15 minutes after the start of the transfusion
- 30 minutes after the start of the transfusion
- 60 minutes after the start of the transfusion
- Hourly for remainder of the transfusion
- Within 60 minutes of completion of the transfusion

**Vital signs include:**

- Heart rate
- Blood Pressure
- Temperature
- Respiration Rate
- O2 Saturation level

⚠️ Temperature monitoring may be done from the incubator/overhead infant temperature probe provided that the pre-transfusion patient assessments 1 and 2 were measured by axilla thermometer and the infant probe can be trended.

⚠️ Axilla temperatures must be obtained whenever there is an atypical reading e.g. suspect possible transfusion reaction.

Right click here to watch a short video on the initiation of the transfusion process for NICU

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16. If a second syringe of the blood component is required:

- NOTIFY TML one hour before it is required.
- Repeat steps 10 to 14.
- Flush intravenous access with 1 to 2 mL of 0.9% Normal Saline in between transfusion.
- Change the small-bore extension tubing.

To ensure TML staff have sufficient time to prepare the required blood component.

Decrease the risk of bacterial contamination.

17. In the event of a suspected transfusion reaction:

- STOP the transfusion immediately:
  - Disconnect transfusion tubing from cap.
  - Flush catheter with 1 to 2 mL 0.9% Normal Saline.
  - Start 0.9% Normal Saline infusion
  - Reassess patient vital signs
  - Reconfirm unique identifiers on both patient and blood component.
  - Seek assistance and notify physician.
  - Refer to Transfusion Reaction Procedure & Reference Guide.
  - Complete the Transfusion reaction report form.

To minimize patient harm.
To keep the vein open.
To seek direction for patient management.
To ensure correct procedure is followed.
To report the transfusion reaction.

18. COMPLETION of transfusion.

STOP the infusion when the prescribed volume is infused.

Volume issued in the syringe allows for some discard in the small-bore extension tubing.

19. REESTABLISH intravenous access:

**If the dedicated access is a CVC:**

- Clean the connection between the small-bore extension tubing IV access.
- Disconnect the small-bore extension tubing and syringe line.
- Change injection cap
- Flush the catheter with 1 mL of 0.9% Normal Saline using pre filled syringe and clamp.
- Reconnect and start previously set aside existing infusion(s).

To ensure all the component is cleared from the connection.

**If dedicated access is PIV:**

- Clean the connection between the small-bore extension tubing IV access.
- Change injection cap
- Flush the catheter with 1 mL of 0.9% Normal Saline using pre filled syringe and clamp.
- Convert saline lock to PIV and start existing infusion(s).
20. **DISCARD** syringe and the small-bore extension tubing in biohazard container.

**Universal precaution.**

21. **PERFORM** post transfusion blood work if ordered.

**To monitor the response to the transfusion.**

22. **DOCUMENT**

**Complete the transfusion record:**
- Volume transfused
- End time
- Transfusion reaction noted: yes or no

**Complete the blood product tag:**
- Date/Time transfused
- Transfused by
- Transfusion reaction noted: yes or no

**Complete patient notification tag section:**
- Date of transfusion

**Record in patients chart:**
- Vital signs
- Volume transfused
- Patient’s response to transfusion
- All interventions related to transfusion
- If a transfusion reaction occurred record all signs and symptoms experienced by the patient

23. **FILE** transfusion record in patient’s chart.

**To ensure full traceability of the component.**

24. **GIVE** the guardian the patient notification tag. The notification tag may be filed in the patient’s chart and given to the guardian at discharge.

**All patients who receive a blood component should receive notification of the transfusion in writing.**

25. **RETURN** the completed product tag to TML.

**To ensure full traceability of the blood component.**

26. **OBSERVE** patient for signs and symptoms of a transfusion reaction post transfusion.

**Transfusion reactions can occur after the completion of the transfusion.**

**Documentation**
- The transfusion record and product tag must be completed to ensure full traceability of blood components.
- The transfusion record is retained in the patient chart.
- The product tag is returned to transfusion medicine once the transfusion is complete.
- The recipient notification tag is given to the parent/guardian.

**References**

Ontario Regional Blood Coordinating Network. (2016). *bloody easy 4.* (4<sup>th</sup> ed.) Toronto, ON.


Canadian Society for Transfusion Medicine. *Standards for Hospital Transfusion Services* (Ver. 4.0). (2017). Ottawa, ON.


Definitions

Blood Component: A therapeutic component of blood intended for transfusion (e.g., red cells, granulocytes, platelets, cryoprecipitate, plasma) that can be prepared using the equipment and techniques available in a blood supplier centre (e.g., by centrifugation, filtration, or freezing).

Version History

<table>
<thead>
<tr>
<th>DATE</th>
<th>DOCUMENT NUMBER and TITLE</th>
<th>ACTION TAKEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-Mar-2019</td>
<td>C-06-12-60135 Administration of Blood Components: NICU</td>
<td>Approved at: Transfusion Safety Committee</td>
</tr>
</tbody>
</table>

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