PURPOSE
To provide guidelines for the administration of blood products (red blood cells, platelets, plasma and cryoprecipitate) via volumetric infusion

SITE APPLICABILITY
BC Children’s Hospital and BC Women’s Hospital and Health Centre

⚠️ This procedure is not applicable in NICU

EQUIPMENT
- Patient chart with physicians order and consent for blood transfusion
- Patient identification band
- Personal Protective Equipment (PPE): gloves, goggles, +/-gown, mask
- Blood Infusion Set (has 180 Micron Filter)(2477-0007)
- Infusion Set (2420-0007)
- Chlorhexidine/alcohol swabs
- 0.9% Normal Saline bag of appropriate volume
- Infusion pump “brain”
- Y connector (if used)

From Transfusion Medicine Laboratory
- Blood product
- Transfusion tag
- Transfusion record

<table>
<thead>
<tr>
<th>PRE-TRANSFUSION</th>
<th>PROCEDURE</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ENSURE a blood product order exists.</td>
<td></td>
<td>Blood products shall be prescribed by a health care provider with blood prescribing privileges.</td>
</tr>
<tr>
<td>Note: Pre-printed order forms are available for specific conditions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ENSURE that informed consent for blood product transfusion is complete.</td>
<td></td>
<td>Informed consent is required by law for the transfusion of all blood products.</td>
</tr>
<tr>
<td>Informed consent need not be obtained:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- When urgent treatment is necessary to preserve a patient’s life and continuing health, and</td>
<td></td>
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<tr>
<td>- When it is not reasonably possible to obtain consent, and</td>
<td></td>
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<tr>
<td>- When there is no substitute decision maker</td>
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<tr>
<td>3. DETERMINE if a Group &amp; Screen / Cross Match is required. Refer to blood product fact sheet. A Cross Match is required for red blood cell transfusion. Ensure that Transfusion Medicine Laboratory (TML) has a current Group &amp; Screen / Cross match sample, if required.</td>
<td></td>
<td>To avoid the transfusion of an incompatible blood product. To avoid unnecessary delay in transfusion</td>
</tr>
<tr>
<td>4. ENSURE that TML is aware of the planned transfusion. Complete/Send the Group &amp; Screen Cross match Request or Blood Component/Derivative/Factor Concentrate Request form to TML.</td>
<td></td>
<td>To avoid unnecessary delay in transfusion.</td>
</tr>
<tr>
<td>5. ENSURE that the patient/guardian is aware of the planned transfusion. Explain reason for transfusion and transfusion procedure to patient/guardian.</td>
<td></td>
<td>Allows the patient to prepare for the procedure. To ensure that the patient understands the reason for transfusion and the transfusion</td>
</tr>
</tbody>
</table>
**Provide** patient with the information pamphlet “Blood Transfusion Answers to Some Common Questions” if necessary.

6. **ENSURE** that a patient identification band/card is in place.
   **No identification band/card, No Transfusion**

A missing identification band is a significant factor in patient misidentification and wrong blood to patient incidents. Transfusion should not be administered to patients who lack positive identification.

7. **ENSURE** peripheral vascular access or central vascular access line of sufficient gauge is established based on clinical status of patient and urgency of transfusion. See table 1 below:

Gauge or lumen size should be large enough to allow the flow of the blood product within the specified administration time and to prevent cell damage.

<table>
<thead>
<tr>
<th>Table 1: Intravenous Access for Administration of Blood Products (Volumetric)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peripheral Intravenous Access</strong></td>
</tr>
<tr>
<td>Patient Group</td>
</tr>
<tr>
<td>Adult</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Pediatric</td>
</tr>
<tr>
<td>Neonatal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Central Venous Access Devices</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Group</td>
</tr>
<tr>
<td>All</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Cuffed &amp; Uncuffed Peripherally Inserted Central Catheter (PICC)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Group</td>
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<tr>
<td>All</td>
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<tr>
<td>All</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Uncuffed Double Lumen 4 French PICC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Group</td>
</tr>
<tr>
<td>All</td>
</tr>
<tr>
<td>All</td>
</tr>
</tbody>
</table>

8. **ENSURE** a dedicated line for the administration of blood product. Blood products are compatible with 0.9% Normal Saline and Plasma-Lyte only.

**Exception:**
Co-administration of morphine or hydromorphone with red blood cells can be considered as a last resort for optimal pain management. If approved by a physician, co-infusion of morphine or hydromorphone in 0.9% Normal Saline Y-connected with a blood product is acceptable. The morphine or hydromorphone infusion line should be connected to the port most proximal to the patient and distal from the blood product. A Y-connector with back check valves must be used to prevent backflow.

To avoid inadvertent co-administration of incompatible fluids or medications. Electrolyte and colloid solutions containing calcium should not be administered with blood products as they may cause clotting in the infusion line.

D5W or hypotonic sodium solutions may cause hemolysis.

9. **PERFORM** a pre transfusion patient assessment within 30 minutes of commencing the transfusion and **PRIOR** to spiking the blood product bag.

**Measure** baseline vital signs:

Identify any clinical manifestations that may:
- be cause for delaying the transfusion e.g. fever
- be confused with a transfusion reaction e.g. fever or pre-existing rash
### ADMINISTRATION OF BLOOD PRODUCTS
(RED CELLS, PLATELETS, PLASMA, & CRYOPRECIPITATE)

**VOLUMETRIC METHOD**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td><strong>ADMINISTER</strong> pre medications as ordered.</td>
</tr>
<tr>
<td></td>
<td>Any pre medication prescribed for the patient should be administered at a suitable time before infusion begins to allow for effectiveness.</td>
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<tr>
<td>11.</td>
<td><strong>DOCUMENT</strong> findings of pre transfusion assessment including any pre-medication related to transfusion preparation, e.g. diuretics or antihistamines.</td>
</tr>
<tr>
<td></td>
<td>Establish baseline levels so that any transfusion-related deviations in patient’s clinical condition will be recognized.</td>
</tr>
<tr>
<td>12.</td>
<td>Arrange for the <strong>TRANSPORT</strong> of blood product immediately prior to initiation of planned infusion. Refer to Transport of Blood Reference guide on ePOPS. Complete the Blood Release Request Form. Avoid delays in initiating the transfusion. Ensure that the person transporting the blood product obtains the right blood product for the right patient. Avoid wastage of blood products.</td>
</tr>
<tr>
<td>13.</td>
<td><strong>ASSEMBLE</strong> required equipment:</td>
</tr>
<tr>
<td></td>
<td>- Prime the administration set and the rescue / standby line with 0.9% Normal Saline.</td>
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<tr>
<td></td>
<td>- The rescue line is for emergency situations.</td>
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<tr>
<td></td>
<td>- A straight administration set is used.</td>
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<tr>
<td></td>
<td><strong>Children’s Hospital method:</strong></td>
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<tr>
<td></td>
<td>- The rescue line can be Y connected to the blood product line, see image 1, <strong>OR</strong></td>
</tr>
<tr>
<td></td>
<td>- A completely separate line which is readily available.</td>
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<tr>
<td></td>
<td><strong>Women’s Hospital method:</strong></td>
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<tr>
<td></td>
<td>- The blood product line can be connected to the normal saline rescue line at the port distal from the patient, see image 2.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Connect</strong> primed line to patient’s IV access.</td>
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<tr>
<td></td>
<td>- <strong>Start infusion</strong> at ordered rate or to keep vein open.</td>
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<tr>
<td></td>
<td><strong>Additional Equipment</strong> may be required:</td>
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<tr>
<td></td>
<td>- Rapid infusion or external pressure devices, or</td>
</tr>
<tr>
<td></td>
<td>- Blood warmer</td>
</tr>
<tr>
<td>14.</td>
<td><strong>START</strong> the transfusion within 20 minutes of issue.</td>
</tr>
<tr>
<td></td>
<td>To avoid unnecessary wastage of an expensive and scarce resource. If a blood product is out of temperature controlled storage for greater than 30 minutes it cannot be returned.</td>
</tr>
<tr>
<td></td>
<td>To decrease the risk of bacterial contamination.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong></td>
</tr>
<tr>
<td></td>
<td>- If the transfusion cannot be started return the blood product to TML immediately.</td>
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<tr>
<td></td>
<td>- The transfusion must be completed within 4 hours of issue.</td>
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<tr>
<td></td>
<td>- Consult TML if there are concerns about completing the transfusion within the four hour time limit.</td>
</tr>
<tr>
<td></td>
<td><strong>Blood products must be stored in special</strong></td>
</tr>
</tbody>
</table>

**Heart rate**
- Blood pressure
- Temperature
- Respiratory rate

**Note:**
Include O₂ saturation level; chest auscultation, and a review of fluid balance for patients who are considered high risk e.g. patients with coexisting medical conditions such as renal failure or cardiovascular disease or patients who have experienced previous transfusion reactions.

**Image 1: BC Children’s Hospital Method**

**Image 2: BC Women’s Hospital Method**
Never store blood products in unapproved fridges such as ward or medication fridges.

Improvised warming such as putting pack in hot water or in a microwave oven must never be used.

15. PERFORM the pre transfusion check.

The pre transfusion check must be completed by two health care providers, with required competencies, one of whom shall initiate the transfusion.

Initial check:

Visual Inspection:
The integrity of the blood product is checked for:
- Leaks at ports or seams
- Clots
- Abnormal colour
- Clumping
- Excessive air or bubbles
- Turbidity
- Any evidence of hemolysis

Return the blood product bag to TML if there are leaks at the ports or seams.

Blood products that appear abnormal should not be transfused without further investigation.

Contact TML @ 7388 for an explanation of abnormal appearance.

CONFIRM that Informed Consent has been obtained and is current.

COMPARE the patient details:
- First and last name
- DOB
- MRUN

on
- Front sheet of the patient chart
- Blood product order
- Product Tag
- Transfusion Record

CHECK the blood product order for:
- Specific blood product required
- Number of units or volume in mLs required
- Date of the transfusion
- Rate or duration of infusion
- Any modification /or special requirements e.g. irradiation.
- Use of a blood warmer or rapid infusion device
- Pre/post transfusion medication orders

The information on the product bag label (unit number only), the product tag & transfusion record must match.

COMPARE details on product bag label, product tag & transfusion record.

Patient information:
- First & last name
- DOB
- MRUN
- ABO & Rhesus factor

To ensure that the Right Patient receives the Right Product.

To detect any abnormalities that may indicate that the transfusion should not proceed.

A leaking bag poses a serious risk for bacterial contamination of product and patient.

Consent is required for transfusion of all blood products.

The intended patient must be properly identified prior to transfusion.

To ensure that you are aware of the infusion rate, special requirements, any modifications, and pre or post medications etc. that have been ordered for the transfusion.

To ensure that patient information and product details on the transfusion record and product tag are identical.

To ensure donor/patient compatibility.
ADMINISTRATION OF BLOOD PRODUCTS
(RED CELLS, PLATELETS, PLASMA, & CRYOPRECIPITATE)
VOLUMETRIC METHOD

Product information:
- Product type e.g. red cells, platelets etc.
- Unit number
- Expiry date & time
- ABO & Rhesus factor
- any modification &/or special requirements e.g. irradiation, washing, or Anti-CMV negative
- Check for any TML comments (transfusion record)

Final check, in the presence of the patient.
Ask patient/guardian, where possible, to state their full name and date of birth and compare to patient details on patient identification band/card.

**COMPARE the patient details:**
- First and last name
- DOB
- MRUN

With patient details on:
- Patient identification band/card
- Product Tag
- Transfusion Record

⚠️ If you find any discrepancies DO NOT proceed.
Contact TML @ 7388 immediately.

To ensure that the product has not expired.

To ensure that required special requirements and/or modifications have been met.

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 product is not the intended product for your patient another patient may be at risk i.e. another patient may be about to receive the wrong product.

Click here to watch a short video on the Pre-Transfusion Checking Process for a CHILD:
Click here to watch a short video on the Pre-Transfusion Checking Process for an ADULT:

Right click and select "open in a new tab", works in CHROME only

16. **DOCUMENT** the checking procedure by signing the transfusion record.

   **Record:**
   - Signature of both staff members who carried out the pre transfusion check
   - Date of transfusion
   - Start time

To confirm that the pre transfusion checking procedure has been completed.

Transfusion

**PROCEDURE**

17. Immediately after the verification checks have been completed INITIATE the transfusion
- **Clamp** the line.
- **Invert** product bag gently 5 to 10 times.
- **Insert** spike into port using aseptic technique.
- **Completely** cover the filter with the product.
- **Program** the pump to deliver the required volume at the prescribed/appropriate rate, see table 2 below.
- **Confirm** the programmed rate and volume to be infused.

To prevent the blood product backing up the standby line.
To prevent contamination of the product.
To ensure maximum benefit of the filter.

Prevent errors in the rate of infusion.

If it is difficult to spike the blood product bag:
- **Do not** use heavy force to spike the bag.
- **Change** administration sets and try spiking the second port.
- **If** a second port is not available (port covered with a DO NOT USE label), **then** change administration

May result in piercing the bag.

A pierced bag poses a **serious risk for bacterial contamination of product and patient**
set and try spiking the bag using the same port.

- Return the bag to TML, if interventions fail.

⚠️ If the blood product bag is pierced during the spiking procedure:
- DO NOT PROCEED with the transfusion.
- Discard the bag in a biohazard container.
- Inform TML.
- Return Transfusion Record and Product Tag to TML.
- Do not use ports marked “Do not Use/Do not Remove”, see image 3.

Click here on link to watch a short video: Right click and select “open in a new tab” works in CHROME only

Table 2: Infusion Rate Table for Non-Emergency situations

<table>
<thead>
<tr>
<th>Product</th>
<th>Neonatal / Pediatric</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>Maximum Rate</td>
</tr>
<tr>
<td>Red Blood Cells</td>
<td>2-5 mL/kg/h</td>
<td>150 mL/h</td>
</tr>
<tr>
<td>Platelets</td>
<td>10 to 20 mL/kg/h</td>
<td>20 mL/kg/h</td>
</tr>
<tr>
<td>Plasma</td>
<td>10 to 20 mL/kg/h</td>
<td>20 mL/kg/h</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>10 to 20 mL/kg/h</td>
<td>20 mL/kg/h</td>
</tr>
</tbody>
</table>

- The infusion rate should be adjusted to individual requirements, based on initial assessment and monitoring of the patient’s status.
- For Red Blood Cells only, an increased rate of infusion (to a maximum rate of 200 mLs/h) can be considered for specific patients e.g. frequently transfused adolescent patients upon consultation with the patient’s physician and with a written order indicating the maximum rate of infusion for the patient.
- These rates may be exceeded in emergency situations.
- If a major ABO incompatibility exists or a severe allergic reaction such as anaphylaxis occurs, symptoms usually appear early in the transfusion

18. MONITORING see table 3 below.

- Instruct the patient/guardian to inform a HCP immediately if they experience:
  - Hives or itching
  - Feeling feverish or chilled
  - Difficulty in breathing
  - Back pain or pain at the IV site
  - Any feeling different from usual

Patients will be aware of the:
- S&S of a transfusion reaction
- actions to take should they experience a transfusion reaction

Table 3: Patient Monitoring During Blood Product Transfusion

Remain with, or be in a position to closely observe, the patient for the first 15 minutes following the start of each unit (when product reaches the patient) and observe for signs and symptoms of a transfusion reaction.
### Neonatal (less than 4 months old)

<table>
<thead>
<tr>
<th>Measure Vital signs:</th>
<th>Pediatric / Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>● 15 minutes after the start of the transfusion</td>
<td>● 15 minutes after the start of the transfusion</td>
</tr>
<tr>
<td>● 30 minutes after the start of the transfusion</td>
<td>● 60 minutes after the start of the transfusion</td>
</tr>
<tr>
<td>● 60 minutes after the start of the transfusion</td>
<td>● Hourly for remainder of the transfusion</td>
</tr>
<tr>
<td>● Hourly for remainder of the transfusion</td>
<td>● Within 60 minutes of completion of the transfusion</td>
</tr>
<tr>
<td>● Within 60 minutes of completion of the transfusion</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vital signs include:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>Heart rate</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Blood Pressure</td>
</tr>
<tr>
<td>Temperature</td>
<td>Temperature</td>
</tr>
<tr>
<td>Respiration Rate</td>
<td>Respiration rate</td>
</tr>
<tr>
<td>O2 Saturation level</td>
<td></td>
</tr>
</tbody>
</table>

- Increase observation for high risk patient’s e.g. unaccompanied infants / children, clinically unstable or unconscious patients.
- Monitor O₂ saturation level & fluid balance in patients who are at risk of fluid overload.

**Serious and life threatening reactions (anaphylaxis, transfusion-related acute lung injury, hemolysis, and bacterial contamination) can occur unpredictably and progress rapidly therefore patients must be closely monitored throughout the transfusion.**

**19. If a second bag of the blood product is required:**
- **NOTIFY** TML one hour before it is required
- **REPEAT** steps 12 to 18

**Note:**
- Change the blood administration set after administrating 2 units or every 4 hours, whichever comes first, when changing to a different blood product or if the set becomes occluded.
- Platelets shall not be transfused through an administration set which has been used for red cells.

**20. In the event of a suspected transfusion reaction:**
- **STOP the transfusion immediately:**
  - **Administer** 0.9% Normal Saline
  - **Reassess** patient vital signs
  - **Reconfirm** unique identifiers on both patient and blood product
  - **Seek** assistance and **notify** physician.
  - **Refer** to Transfusion Reaction Procedure & Quick Reference Guide and **complete** the Transfusion Reaction Report Form

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

**Decrease the risk of bacterial contamination.**

**Red cell debris may trap the platelets.**

**21. COMPLETION of infusion.**

- If the full unit is ordered, **Flush** the administration set with 0.9% Normal Saline when the transfusion is complete and disconnect the line. **OR,** **STOP** the infusion when the prescribed volume is infused.
- **Disconnect** the line and **flush** connection tubing with 0.9% Normal Saline.
- **Use minimum volume flush for fluid restricted patients.**

**To ensure all the product is cleared from the administration set.**

**22. RETURN** to previously ordered intravenous solution, saline/heparin lock vascular access or discontinue IV as per prescriber’s orders.
ADMINISTRATION OF BLOOD PRODUCTS
(RED CELLS, PLATELETS, PLASMA, & CRYOPRECIPITATE)
VOLUMETRIC METHOD

DO NOT de-access CVC or remove IV until the post transfusion vital signs are recorded. IV access may be required if signs of a transfusion reaction are detected.

23. DISCARD product bag and administration line in biohazard container. Universal precautions.

24. PERFORM post transfusion blood work if ordered. To monitor the response to the transfusion.

25. 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 S&S experienced by the patient
   At the time of the transfusion the patient’s medical chart shall be updated.

26. FILE transfusion record in patient’s chart. To ensure full traceability of the product.

27. GIVE the patient/guardian the patient notification tag section of the blood product tag. The notification tag may be filed in the patient’s chart and given to the patient/guardian at discharge. All patients who receive a blood product should receive notification of the transfusion in writing.

28. RETURN the completed product tag to TML. To ensure full traceability of the product.

29. OBSERVE in-patients for signs & symptoms of a transfusion reaction post transfusion. Transfusion reactions can occur after the completion of the transfusion.

30. For outpatients, REVIEW post transfusion care and Give the “Heading Home after a Transfusion” form to the patient/family. Discharge when clinically stable. Patient/guardian should be aware of the potential of transfusion reactions and post transfusion care.

REFERENCES