BLOOD ADMINISTRATION

MODULE 1 – TRANSFUSING THE PATIENT

Content derived from
Bloody Easy Blood Administration Handbook Version 2, 2015 and the
NL Provincial Blood Coordinating Program Transfusion Medicine Policies

Prepared by Jenna Williams, LGH Transfusion Safety Officer
Learning Objectives

• Identify the importance of informed consent
• Discuss the process for verifying the transfusion order
• List the steps required to prepare the patient
• Describe the importance of accurate identification of patient, blood samples and blood components/products
• Review the process for safe blood administration including appropriate monitoring and assessments
• Indicate what documentation is required with transfusion
Pre-Transfusion Process

- Informed Consent
- Transfusion orders
- Requesting the blood component/product
- Pre-transfusion sample
- Preparing the patient
- Blood tubing
Informed Consent

• Consent for administration of blood/blood products is obtained by the health care professional prescribing the treatment.

• Must be documented on the patient’s chart prior to transfusion.

• Transfusion consent usually remains in effect for the entire admission or course of treatment, to a maximum of 180 days.

• The health care professional starting the transfusion must verify that consent has been obtained.

• Transfusion can be given without consent ONLY if the following conditions exist:
  - Urgent transfusion is needed to preserve life or continuing health AND
  - Patient is unable to consent and substitute decision maker is not available AND
  - No evidence of prior wishes refusing transfusion for personal or religious reasons
Transfusion Orders

- Transfusions must be ordered by a physician or authorized practitioner.

- All orders must include:
  - Patients first and last name and at least one unique identifier
  - Type of blood component or product
  - Number of units or amount
  - Rate of infusion
  - Special requirements if any (e.g. irradiated)
  - Premedication or diuretic, if required

- Non-urgent transfusions should occur during daytime hours for increased patient safety.

John Doe
Hospital number 2345678

March 10, 2015
21:30

In AM transfuse 1 unit irradiated red blood cells over 3 hours.
Furosemide 20mg IV pre-transfusion
Repeat CBC and contact physician to assess for further transfusion needs.

Dr. J. Stevens
Requesting Blood Component/Product

Prior to requesting the blood component/product:

- Review the most recent laboratory values appropriate to the component/product
- Assess the patient’s symptoms
- Know the indications and appropriate dosage to verify that the transfusion is appropriate - Refer to Module 2

<table>
<thead>
<tr>
<th>Blood Component/Product</th>
<th>Laboratory Blood Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Blood Cells (RBC)</td>
<td>Hemoglobin</td>
</tr>
<tr>
<td>Platelets</td>
<td>Platelet count</td>
</tr>
<tr>
<td>Frozen Plasma (FP) and Prothrombin Complex Concentrate (PCC)</td>
<td>INR (International Normalized Ratio)</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>Fibrinogen</td>
</tr>
</tbody>
</table>
Requesting Blood Component/Product

- When requesting blood from the Transfusion Medicine Laboratory (TML), the following items are required:
  - Patients first and last name and at least one unique identifier
  - Location
  - Diagnosis
  - Blood component/product required
  - Amount/Dose
  - Time required
  - Prescriber’s name

- Additional information required:
  - History of recent blood transfusion or pregnancy (within the last 3 months)
  - Indication or reason for transfusion

- If requesting by Order Entry, ensure correct blood component/product is entered for the correct patient. If processing is manual, ensure legible and appropriate paperwork is sent to the TML to prevent delays.
PCI (Patient Care Inquiry)

- **Blood Bank History** will give you any transfusion history or reactions.

- **Blood Banks Products** is where you can see the status of a crossmatch.

- **Blood Bank Tests** is where you can see if a Type and Screen is done.
Meditech Order Entry (for blood bank)

- Category: BB
- Under “Procedure” press F9 to search for the requested testing and/or blood products
Order Entry (cont’d)

• Please answer all of the questions correctly. The answers determine:
  - Specific testing requirements
  - Selection of blood products
Ordering
Type & Screen vs. Crossmatch

• Type & Screen
  • Blood type and Antibody Screen
  • Blood sample is kept on hand for 96 hours and can be crossmatched anytime within that period if needed urgently.

• Crossmatch
  • Blood Type and Antibody Screen
  • RBC units are tested and assigned to that patient.

NOTE: If a Type & Screen has already been performed and units of RBC’s are requested, it takes ~15-20 minutes during regular working hours and ~30 minutes if a Technologist had to be called back after hours.

IMPORTANT: Please call the Lab to add on units to a Type & Screen, DO NOT place a new order. Creating a new order prompts a new sample number to be generated in Meditech, which causes a new sample to be UNNECESSARILY collected from the patient.
Pre-Transfusion Samples

- Pre-transfusion samples are used to:
  - Determine ABO and Rh blood groups
  - Detect and identify antibodies acquired from previous blood exposure or pregnancy
  - Crossmatch suitable units of blood when a transfusion is ordered

**ALERT**

Once collected, it needs inverting about 8-10 times to mix the sample with the EDTA. It should contain at least 1ml of blood, but more is preferred by the labs if at all possible.
Pre-Transfusion Samples

Patient Identification:

- Even if you know your patient, check your patient’s arm band or identification to make sure.
  - Assuming you know the patient can greatly increase the risk of wrong patient identification
- When possible, include your patient/parent in the identification process by asking specific questions:
  - ‘How do you spell your name?’
  - ‘What is your date of birth?’
  - **Do Not** ask questions that require only a ‘Yes’ or ‘No’ answer such as “Are you John Smith?”
- If any discrepancies are discovered they must be resolved prior to collecting a pre-transfusion sample.

**Alert**

Errors in sample labeling and patient identification are the leading cause of Acute Hemolytic Transfusion Reactions – a potentially fatal complication of transfusion.
Pre-Transfusion Sample

4 Steps for labeling samples:

1. Take sample labels with you to the patient’s bedside
2. Verify that the labels match the patient’s armband/identification and any accompanying paperwork
3. After collecting the sample(s), label the tubes before leaving the patient’s bedside
   Never label samples away from the patient as this greatly increases the risk of mislabeling
4. Write the collection date and time, and initial the label of any blood samples collected
Preparing the Patient

- Explain the purpose and procedure for the transfusion.
- Ensure that the patient’s questions are addressed.
- Determine if your patient has had any problems or reactions with previous transfusions. If so, orders from a physician for premedication may be required.

- IV route: administer immediately pre-transfusion
- PO route: administer 30 min pre-transfusion

<table>
<thead>
<tr>
<th>Indication</th>
<th>Premedication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated febrile reactions</td>
<td>antipyretic</td>
</tr>
<tr>
<td>Repeated allergic reactions</td>
<td>antihistamine and/or steroid</td>
</tr>
</tbody>
</table>
## IV Access

<table>
<thead>
<tr>
<th>Component/Product</th>
<th>Category</th>
<th>IV Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Blood Cells</td>
<td></td>
<td>18-22G</td>
</tr>
<tr>
<td>Other Blood Components/Products</td>
<td>Pediatrics</td>
<td>Any size adequate</td>
</tr>
<tr>
<td>All Blood Components/Products</td>
<td>Pediatrics</td>
<td>22-25G</td>
</tr>
</tbody>
</table>

- Transfusing rapidly and under pressure through too small an IV access can cause hemolysis of red blood cells.

- Ensure that the IV access is dedicated to the transfusion.
  - Medications and solutions other than normal saline can cause hemolysis or clotting of the blood component

- IV pumps and blood warmers must be suitable for transfusion and not damage the blood component/product.
Blood Tubing - Components

**Blood components** must be transfused through blood tubing containing a 170-260 micron filter to capture any fibrin debris:

- Red blood cells (RBCs), platelets, plasma, and cryoprecipitate

- Flush blood tubing with normal saline (0.9% NaCl) completely wetting filter.

- Blood tubing must be changed every 4 hours and if it is greater than 30 minutes between units.
Tubing

Note that:

- Platelets must be transfused through blood tubing not previously used for RBC.
  - Platelets will adhere to fibrin captured in the filter.

- **Blood products** (such as IVIG and albumin) do not require blood tubing or a filter. IV tubing that can be vented is required for infusions directly from glass bottles.

- IVIG is not compatible with normal saline.
  - *D5W solution*
Transfusion Process

- Picking up blood
- Checking blood
- Starting blood
- Monitoring
- Completing the transfusion
- Documentation
Picking Up Blood and Blood Products

**BEFORE** picking up blood, ensure that the patient is ready:

- Verify that consent for transfusion has been obtained.

- Connect the primed IV tubing to the patient’s IV site to ensure patency.

- Administer any premedication that may be ordered.

- Arrange for pickup from the TML with appropriate documentation to ensure the correct unit is retrieved for the correct patient.

**ALERT**

Blood must be started within **30 minutes** after it is received and the transfusion completed within **4 hours** of removal from proper storage to decrease the risk of bacterial contamination.
Picking up Blood and Blood Products

The TML requires that the individual picking up blood/product bring documentation for validating the identification of the recipient. This should include:

- Patient’s full name
- UNIQUE Identification number (MCP, HCN, Unit number etc.)
- Location
- Blood product requested

**ALERT**

Blood/blood products cannot be removed from the laboratory if it is not issued to the patient. When the blood/blood product is issued, there is an issue/transfusion card with patient info attached to the blood/blood product.
How to print patient record from PCI

• In "Status" column, the product(s) that have "ISSUED" are the product(s) in Blood Bank available for the patient

• Click "Print" and choose "Print this history report"
Picking up Blood and Blood Products

- Locate the required blood/product on the “ISSUED BLOOD PRODUCTS” Shelf in the designated Blood Bank Fridge.

- If it is a Room Temp blood/product(s), it will be located in the designated Blood Bank RT incubator.

- Make sure the unit number and all patient identifiers match on the Blood product and the patient record.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Product</th>
<th>Unit</th>
<th>Status</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 Jun. 16</td>
<td>19:05</td>
<td>CONCENTRATED RBC</td>
<td>C059016739229 TRANSFUSED</td>
<td>295</td>
<td></td>
</tr>
<tr>
<td>30 Jun. 16</td>
<td>10:36</td>
<td>CONCENTRATED RBC</td>
<td>C055616473460 ISSUED</td>
<td>285</td>
<td></td>
</tr>
</tbody>
</table>
Blood Bank Fridge

Sign-out Binder & Clear Plastic Transport Bags

Blood Bank Stamp
Picking Up Blood - Crossmatch Card

• This “sign-out” card is located in the blood/blood products sign-out binder in the Transfusion Medicine department.

• MUST be checked against the blood product and the transfusion card attached to the blood product.

• MUST be filled out completely and legibly before removing the blood product from the laboratory.

Please print your name/mnemonic. Lab staff need to be able to easily identify the person signing out the blood/blood product.
Visual Inspection

• All blood components and blood products must be visually inspected before being removed from Transfusion Medicine.

• Things to look for:
  • Discolouration – refer to Visual Assessment Guide
  • Contamination
  • Leakage
  • Expiry dates
  • Integrity of unit and tamper proof seals

Returning unused Blood Products

- If the transfusion cannot be started immediately, return blood/product to the laboratory **ASAP**

- If there is no technologist in the laboratory, you must place the blood in the **quarantine basket** in the blood bank fridge

- Never store blood in unapproved fridges such as medication or ward fridges.
Checking Blood

• To avoid errors, have **two qualified individuals** complete the pre-transfusion check.

• Blood must be started soon after being received and immediately after being checked.

• Issue/Transfusion Card must remain attached to the blood unit throughout the entire transfusion.
Checking Blood *(at patient’s bedside)*

- Visually check the blood unit for clots, unusual colour, and any leaks in the bag.

- Check the expiration date on the Canadian Blood Services (CBS) label.

- Check the patient’s ABO and Rh. Ensure the donor’s blood group is compatible with the patient.

- Always check blood at the patient’s bedside.
Checking Blood (continued)

1. Check your patient’s armband to make sure it is correct. When possible, include your patient in the identification process by asking specific questions:
   - ‘How do you spell your name?’
   - ‘What is your date of birth?’

2. Check that your patient’s name and unique identifier matches on:
   - ID armband
   - Transfusion card

3. Check that the blood unit number and donor blood group matches on:
   - CBS label
   - Transfusion card

If you find any discrepancies do not proceed!

Contact the TML IMMEDIATELY
Starting Blood

Before starting blood:

Record baseline vital signs and assessment:
  • Temperature
  • Blood pressure
  • Pulse
  • Respiration
  • Oxygen saturation
  • Auscultation for patients at risk for overload (elderly, pediatric, cardiovascular disease)

When possible instruct your patient to notify you if they experience any new/unusual symptoms:
  • Hives/itching, feeling feverish or chills, difficulty breathing, back pain/pain at the infusion site, any feeling different from usual
**Starting Blood**

After starting blood:

For the first 15 minutes:
- Start with a slow rate unless transfusion is extremely urgent
- Monitor your patient closely
- Most severe acute reactions will occur within the first 15 minutes of a transfusion

After the first 15 minutes:
- Reassess your patient and repeat vital signs
- Increase flow to prescribed rate if no reaction observed

**ALERT**

Start blood with caution as serious reactions can present early in the transfusion. Some patients are at greater risk for circulatory overload – transfuse more slowly.
Monitoring

Monitor, Monitor, Monitor!

Monitor the patient closely and document vital signs:

- Prior to the transfusion
- After the first 15 minutes
- At 60 minute intervals
- Post transfusion

- If there is a suspected reaction
- Repeat with each subsequent unit

Repeat assessment of vital signs more often for patients:
- At greater risk for circulatory overload
- Who have experienced previous reactions
- Who are already unstable

**ALERT**

Patients must be appropriately monitored to detect transfusion reactions as soon as possible.
Massive Transfusions - Monitoring

- A massive transfusion is defined as transfusing more than 10 units of blood components or transfusing more than one blood volume in a 24-hour period.

- Recommendations for the management of patients during massive transfusion/bleeding include:
  - Monitor core temperature
  - Prompt use of measures to prevent hypothermia, including use of a blood warmer for all IV fluids, RBC, and plasma
  - Monitor for secondary conditions (hypocalcemia, acidosis, hyperkalemia, dilutional coagulopathy)

- While patient is actively bleeding, transfuse to keep:
  - Hemoglobin greater than 70 g/L
  - Platelet count greater than 50 x 10⁹/L
    - (if head injury - greater than 100 x 10⁹/L)
  - INR less than 1.5
  - Fibrinogen greater than 2.0 g/L

- Refer to our Massive Transfusion Protocol for further information (Intranet)
Completing a Transfusion

1. Complete transfusion within 4 hours of removal from controlled storage
   • In order to decrease the risk of bacterial proliferation
2. If desired flush the blood tubing with normal saline
3. Check end of transfusion vital signs
4. Disconnect blood tubing when transfusion is completed
   - Insert empty blood bag into a biohazard bag
   - Insert completed transfusion card in the front pouch of the biohazard bag
   - Return to TML. Place in the “TRANSFUSED BLOOD PRODUCTS” basket)
Completing a Transfusion

- Continue to assess the patient for symptoms of transfusion reactions that might occur up to 6 hours post transfusion.

- Out-patients or their care givers should be provided with information detailing:
  - Signs and symptoms of transfusion reactions
  - Information on what to do if they experience a reaction
  - Contact information for reporting reactions
Documentation

Document each blood transfusion by:
1. Placing the Issue Card (top) in the patient’s chart.
2. Returning the Transfusion Card (bottom) to the TML with empty blood bag.

Transfusion Cards **MUST** include:
- Date
- Start and finish times
- Volume transfused
- Visual inspection performed and any special instructions (use and temp of the blood warmer)
- Name of persons starting and checking blood
Example of a completed Issue/Transfusion Card

Please print your name/mnemonic. No signatures or initials. Lab staff need to be able to easily identify the person performing the transfusion.
Documentation

Additional information should be documented in the patient’s chart:

- Vital signs and patient assessments
- Follow-up testing done
  - CBC after RBCs or platelet transfusion if required
  - INR, PT/PTT after plasma
  - Fibrinogen level after cryoprecipitate
- Patient teaching
- Any reactions and treatment provided
8 Rights of Transfusion

Ensure that the **Right Patient**
is getting the **Right Blood Component/Product**
for the **Right Reason**
in the **Right Dose**
at the **Right Time**
in the **Right Site**
with the **Right Documentation**
and experiencing the **Right Response**
BLOOD ADMINISTRATION

MODULE 2 – INDICATIONS AND COMPATIBILITY

Content derived from
Bloody Easy Blood Administration Handbook Version 2, 2015 and the
NL Provincial Blood Coordinating Program Transfusion Medicine Policies

Prepared by Jenna Williams, LGH Transfusion Safety Officer
Learning Objectives

• Describe blood components and blood products
• Define the major uses, appropriate storage and expiration of blood components and products
• Recognize IV tubing requirements and appropriate infusion times
• Review blood group compatibility and the significance of the ABO and Rh blood group system
Blood Components and Products

• **Blood Components** are separated from the whole blood donation:
  - Red blood cells (RBCs)
  - Plasma
  - Platelets
  - Cryoprecipitate

• **Blood Products** are therapeutic products derived from human blood or plasma and produced by a manufacturing process.
  (e.g. albumin, immunoglobulins, coagulation products).

• Most blood products are distributed by CBS.
Blood Components and Product Storage

**Blood Bank Refrigerators:**
- 24 hour temperature monitoring (2º - 6º C)
- Audible alarms
- Designated crossmatch and assigned areas

**Blood Bank Freezers:**
- 24 hour temperature monitoring (-45º - -25º C)
- Audible alarms

**Room Temperature storage:**
- 24 hour temperature monitoring (18º - 25º C)
- Designated assigned areas

**Platelet Incubator/Agitator:**
- 24 hour temperature monitoring (18º - 25º C)
- Audible alarms
- Continuous agitation

**Alert:**
Blood/blood products must not be stored anywhere besides the designated temperature-controlled storage.
Blood Components
# Red Blood Cells

<table>
<thead>
<tr>
<th>Major Uses</th>
<th>Storage and Expiration</th>
<th>Administration</th>
</tr>
</thead>
</table>
| Bleeding or anemic non-bleeding patients with signs and symptoms of impaired tissue oxygen delivery | 2-6°C in approved fridge only Up to 42 days                                  | • Blood tubing required  
• Initiate transfusion slowly for first 15 minutes unless massive blood loss  
• Transfuse over no more than 4 hours  
• Typically over 1 ½ - 2 hours with slower rates for patients at risk for circulatory overload |
## Plasma

<table>
<thead>
<tr>
<th>Major Uses</th>
<th>Storage and Expiration</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Factor replacement</td>
<td>Frozen: 1 year</td>
<td>• Blood tubing required</td>
</tr>
<tr>
<td>• Massive transfusion</td>
<td>Once thawed expires after 24 hours stored at 2-6°C</td>
<td>• Initiate transfusion slowly for first 15 minutes unless massive blood loss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Transfuse over no more than 4 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Typically over 30 minutes – 2 hours</td>
</tr>
</tbody>
</table>
### Platelets

#### Major Uses
Control or prevent bleeding in patients with:
- Low platelet counts
- Platelet dysfunction

#### Storage and Expiration
- 20-24°C on an agitator to prevent clumping
- 5 days

#### Administration
- New blood tubing required
- Initiate transfusion slowly for first 15 minutes unless massive blood loss
- Transfuse over no more than 4 hours
- Typically over 60 minutes
### Major Uses

To replace:

- **Fibrinogen**: In patients actively bleeding who have a low fibrinogen level

### Storage and Expiration

- Frozen
- 1 year
- Once thawed expires after 4 hours stored at 20-24°C

### Administration

- Blood tubing required
- Transfuse as rapidly as tolerated
ABO & Compatibility

Rh & Compatibility
Urgent Transfusions
Prior to Blood Group Confirmation

Historically…
Patients who required an urgent transfusion, would be provided with Group O Rh Negative RBCs until the patient’s blood group was determined.

In recent years…
• Demand for group O Rh Negative RBCs exceeds the supply
• There is a chronic shortage of O Rh Negative RBC

In situations where there is a possible inventory shortage:
• The TML will issue O Rh Negative RBCs for children and females of child bearing potential (less than 50 years of age) until the patient’s blood group is confirmed.
• All males and women past child bearing potential can receive O Rh Positive RBCs. The lab will issue O Rh Positive RBCs to these patients if there is an insufficient amount of O Rh Negative RBCs on hand.
Red Blood Cell Compatibility

<table>
<thead>
<tr>
<th>Recipient</th>
<th>O-</th>
<th>O+</th>
<th>A-</th>
<th>A+</th>
<th>B-</th>
<th>B+</th>
<th>AB-</th>
<th>AB+</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>O+</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A-</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A+</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B-</td>
<td>✓</td>
<td>×</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B+</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AB-</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AB+</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Universal RBC for urgent transfusion:

- O Negative for children and females less than 50 years
- O Positive can be used for all others

An ABO incompatible blood transfusion will result in a potentially fatal Hemolytic Transfusion Reaction.
Plasma Compatibility

Plasma does not contain any donor RBCs

The Rh group of the donor is not relevant and does not appear on CBS label

**AB plasma** is safe for all patients in an urgent situation

---

An ABO incompatible blood transfusion will result in a potentially fatal Hemolytic Transfusion Reaction
Blood Products

The most common blood products are reviewed in the next slides
# Rh Immune Globulin (WinRho)

<table>
<thead>
<tr>
<th>Major Uses</th>
<th>Storage and Expiration</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used for Rh negative patients:</td>
<td>2-8°C</td>
<td>• Administered usually IM</td>
</tr>
<tr>
<td>• Following exposure or possible exposure to Rh positive blood</td>
<td>Expires as indicated on packaging</td>
<td>• There must be an antibody screen performed <strong>within the last 30 days</strong> prior to administering RhIg (WinRho)</td>
</tr>
<tr>
<td>• To prevent sensitization to Rh(D) antigen during pregnancy and delivery</td>
<td></td>
<td>• Post-partum patients have up to <strong>72 hours</strong> after delivery to receive WinRho. It is required that the newborn have a <strong>cord group typing</strong> performed before WinRho is issued.</td>
</tr>
</tbody>
</table>
# Intravenous Immune Globulin (IVIG)

<table>
<thead>
<tr>
<th>Major Uses</th>
<th>Storage and Expiration</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Replacement of immunoglobulins</td>
<td>Storage variable by brand</td>
<td>• Standard IV set with vent</td>
</tr>
<tr>
<td>• Control of some infections and autoimmune diseases</td>
<td>Expires as indicated on packaging</td>
<td>• No blood tubing or filtering required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Infusion pump required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Begin infusion slowly and increase as tolerated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Frequent vital sign monitoring required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Requires a special request form filled out by the physician</td>
</tr>
</tbody>
</table>
# Albumin 5% and 25%

<table>
<thead>
<tr>
<th>Major Uses</th>
<th>Storage and Expiration</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ascites patients undergoing large volume paracentesis (25% albumin)</td>
<td>Room temperature $&lt; 30,^\circ C$</td>
<td>• Standard IV set with vent</td>
</tr>
<tr>
<td>• Plasma exchange procedures (5% albumin)</td>
<td>Expires as indicated on packaging</td>
<td>• No blood tubing or filtering required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Begin infusion slowly then as tolerated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• See package insert for maximum infusion rates</td>
</tr>
</tbody>
</table>
## Major Uses
- Urgent reversal of warfarin in bleeding patients and those requiring emergency surgery

## Storage and Expiration
- 2-25° C
- Expires as indicated on packaging
- Use immediately once reconstituted

## Administration
- Standard IV set with vent
- See pamphlet insert for infusion rates
- Dosage based on patient weight and INR value
  - usually 2 - 4 vials
- Effect is immediate and lasts 6 - 12 hours
- For complete reversal, Vitamin K 10 mg IV must also be given
- Requires a special form filled out by the physician

---

**Prothrombin Complex Concentrate (PCC)**
# Blood Wastage

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platelets</td>
<td>502.00</td>
</tr>
<tr>
<td>Fresh Frozen Plasma</td>
<td>354.00</td>
</tr>
<tr>
<td>Red Blood Cells</td>
<td>423.00</td>
</tr>
<tr>
<td>Albumin 25%</td>
<td>56.70</td>
</tr>
<tr>
<td>Albumin 25% 100 ml</td>
<td></td>
</tr>
<tr>
<td>IVIG per gram</td>
<td>62.38</td>
</tr>
<tr>
<td>Anti-D (WinRho) 300 mcg vial</td>
<td>85.86</td>
</tr>
<tr>
<td>Prothrombin Complex (PCC) per IU</td>
<td>0.72</td>
</tr>
</tbody>
</table>

To reduce waste, please make sure:

- Consent has been signed and IV access is ok **before** retrieving blood product
- Do **NOT** delay in taking vital signs
- Transfusion is **started within 30 minutes** of removal from designated storage
BLOOD does not grow on trees!
BLOOD ADMINISTRATION

MODULE 3 – TRANSFUSION REACTIONS

Content derived from


Prepared by Jenna Williams, LGH Transfusion Safety Officer
Learning Objectives

• Identify the signs and symptoms of an acute transfusion reaction
• List the different types of acute transfusion reactions
• Describe the clinical management, reaction investigation and reporting required
• Utilize the transfusion reaction algorithm and chart provided by the NL Provincial Blood Coordinating Program
Recognizing Reactions

Acute reactions usually occur during and up to 6 hours following the end of a transfusion and may present with:

- Fever
- Shaking chills or rigors with or without fever
- Hives or rash, itchiness, swelling
- Dyspnea, shortness of breath, or wheezing
- Hypotension or hypertension
- Red urine, diffuse bleeding or oozing
- Lumbar pain, anxiety, pain at the IV site
- Nausea and vomiting
- Headache
- Irritability (pediatric patients)
Recognizing Reactions

• Initially it can be challenging to distinguish a minor reaction from a serious reaction based solely on the presenting signs and symptoms.

• Any unexpected or suspicious symptom MUST be reported to the TML for investigation of a possible transfusion reaction.

• Delayed transfusion reactions do not present with symptoms until days or weeks following a transfusion.
<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>Possible Transfusion Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever, shaking chills, or rigors</td>
<td>• Bacterial contamination&lt;br&gt;• Acute hemolytic transfusion reaction&lt;br&gt;• Transfusion related acute lung injury (TRALI)&lt;br&gt;• Febrile non-hemolytic transfusion reaction</td>
</tr>
<tr>
<td>Urticaria and other allergic symptoms</td>
<td>• Anaphylaxis&lt;br&gt;• Minor allergic reaction</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>• TRALI&lt;br&gt;• Transfusion associated circulatory overload (TACO)&lt;br&gt;• Anaphylaxis&lt;br&gt;• Bacterial contamination&lt;br&gt;• Acute hemolytic transfusion reaction</td>
</tr>
<tr>
<td>Hypertension</td>
<td>• TACO</td>
</tr>
<tr>
<td>Hypotension</td>
<td>• Bradykinin mediated hypotension&lt;br&gt;• Bacterial contamination&lt;br&gt;• Acute hemolytic transfusion reaction&lt;br&gt;• TRALI&lt;br&gt;• Anaphylaxis</td>
</tr>
<tr>
<td>Hemolysis, hemoglobinuria</td>
<td>• Acute hemolytic transfusion reaction</td>
</tr>
<tr>
<td>Pain</td>
<td>• Acute hemolytic transfusion reaction&lt;br&gt;• IV site&lt;br&gt;• lumbar&lt;br&gt;• TACO&lt;br&gt;• Chest</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>• Acute hemolytic transfusion reaction&lt;br&gt;• Anaphylaxis&lt;br&gt;• Febrile non hemolytic transfusion reaction</td>
</tr>
</tbody>
</table>
# Acute Reactions - Risk and Description

<table>
<thead>
<tr>
<th>Acute Transfusion Reaction</th>
<th>Risk of Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Allergic Reaction</td>
<td>1 in 100</td>
<td>Mild allergic reaction to an allergen in the blood component/product.</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>1 in 40,000</td>
<td>Potentially fatal reaction caused by an allergen that the patient has been sensitized to.</td>
</tr>
<tr>
<td>Febrile Non-Hemolytic</td>
<td>1 in 300</td>
<td>Mild usually self-limiting reaction associated with donor white blood cells or cytokines in the blood component/product. Usually presents with fever and/or rigors (shaking).</td>
</tr>
</tbody>
</table>
## Acute Reactions - Risk and Description

<table>
<thead>
<tr>
<th>Acute Transfusion Reaction</th>
<th>Risk of Event</th>
<th>Description</th>
</tr>
</thead>
</table>
| Bacterial Sepsis (platelet pool) | 1 in 10,000 will become symptomatic  
1 in 60,000 will be fatal | Potentially fatal reaction caused by bacteria inadvertently introduced into the blood component/product or originating from the donor. |
| Bacterial Sepsis (red blood cells) | 1 in 250,000 will become symptomatic  
1 in 500,000 will be fatal | More common in platelets due to room temperature storage. |
# Acute Reactions - Risk and Description

<table>
<thead>
<tr>
<th>Acute Transfusion Reaction</th>
<th>Risk of Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Hemolytic Transfusion Reaction</td>
<td>1 in 40,000</td>
<td>Potentially fatal reaction caused by blood group incompatibility. Can also be caused by chemical hemolysis (e.g. incompatible solutions) or mechanical hemolysis (e.g. improper storage). Can result in renal failure, shock and coagulopathy.</td>
</tr>
<tr>
<td>Transfusion Related Acute Lung Injury (TRALI)</td>
<td>1 in 12,000</td>
<td>Acute hypoxemia with evidence of new bilateral lung infiltrates on X-Ray and no evidence of circulatory overload. Patients often require ventilatory support. Usually occurs within 1-2 hours of start of transfusion and rarely after 6 hours. Usually resolves within 24-72 hours with death occurring in 5-10%. Cause not fully understood. Postulated to be related to donor or recipient antibodies acquired through pregnancy or transfusion.</td>
</tr>
</tbody>
</table>
## Acute Reactions - Risk and Description

<table>
<thead>
<tr>
<th>Acute Transfusion Reaction</th>
<th>Risk of Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfusion Associated Circulatory Overload (TACO)</td>
<td>1 in 100</td>
<td>Circulatory overload from excessively rapid transfusion and/or in patients at greater risk for overload (e.g. very young, elderly, impaired cardiac function). Preventative measures include slower transfusion rates and pre-emptive diuretics for patients at risk.</td>
</tr>
<tr>
<td>Hypotensive Reaction</td>
<td>Very Rare</td>
<td>Bradykinin mediated hypotension. Characterized by profound drop in blood pressure usually seen in patients on ACE Inhibitors unable to degrade bradykinin in blood component/product.</td>
</tr>
</tbody>
</table>
Acute Reaction Management

1. If the patient experiences any signs and symptoms of an adverse reaction, **STOP THE TRANSFUSION IMMEDIATELY.**
2. Keep vein open with appropriate solution (i.e. 0.9%NaCl)
3. Do clerical check
4. Notify the physician
5. Monitor patient’s vital signs
6. Refer to "Adverse Transfusion Reaction Algorithm" after conferring with physician.
7. If blood specimens are required as per Algorithm, order **INVTXRXN** through Meditech.
8. Notify the TML.
9. Complete all information on issue/transfusion cards.
10. Fill out the **Transfusion Incident Adverse Reaction** form (Intranet)
12. Bring the suspect blood component/product and administration set, completed Transfusion card, and the **Transfusion Incident Adverse Reaction** form to TML
13. Order additional testing as per physician’s request. (e.g. post urine sample, x-ray)
Restarting a Transfusion

• If the patient experiences only very minor symptoms, restarting the transfusion may be possible.

• General guidelines for continuing a transfusion:
  • Initially **STOP** the transfusion and assess the patient
  • Consult physician
  • Medicate patient as ordered
  • Proceed cautiously with more frequent patient assessments
  • Remember 4 hour limit

• Laboratory Serological Investigation not required, unless requested by the physician.

• **ALL TRANSFUSION REACTIONS** must still be documented on the **Transfusion Incident Adverse Reaction Form** and sent to the TML.
The completed form must be sent to the TML following any signs or symptoms of an adverse reaction to blood or blood products.
Reaction Investigation

To investigate a reaction, the TML requires:

1. Blood bag with attached blood tubing for:
   - Possible culture
   - Hemolysis check
   - Clerical check

2. Previously infused blood bags (if not already returned to the lab)

3. Transfusion Incident Adverse Reaction Form with:
   - Symptoms
   - Pre and post vital signs
   - Time of onset
   - Blood unit number or lot number (list all products received in the previous 6 hours)

4. Order for a Transfusion Reaction Investigation
Reaction Investigation

Depending on patient signs and symptoms, additional testing may be required:

- Next voided urine for hemoglobin testing
  - Monitor urine output if hemolysis suspected
- Chest x-ray if patient has new respiratory symptoms
- Blood cultures
Reaction Investigation

• The TML must report serious reactions to blood components/products to the manufacturer.
  • Other components/products may be implicated and need to be recalled.
Algorithm Suspected Transfusion Reaction

Clinical Signs and Symptoms of a Transfusion Reaction

1. STOP TRANSFUSION IMMEDIATELY; maintain IV access with 0.9% sodium chloride
2. Assess recipient and check vitals signs (Q15 min until stable)
3. Perform clerical check
4. Notify health care provider; request assessment if indicated
5. Notify TML

Assessment by Health Care Provider

Minor Symptoms

- Mild rash < 2/3 body surface area, pruritis, urticaria, flushing
  - Diphenhydramine 25-50 mg IV or PO
  - Restart Transfusion
  - Directly observe for 15 minutes after transfusion resumed

- Temperature > 39°C and < 39°C, and > 1°C above baseline; no other symptoms
  - Acetaminophen 325-600 mg PO
  - Restart Transfusion

Serious Symptoms

- Rigors
- Chest/back pain
- Dyspnea, SOB
- Hypotension/shock
- Nausea/vomiting
- Temperature ≥ 39°C
- Tachycardia/arrhythmias
- Generalized flushing or anxiety
- Severe and/or extensive rash/hives over > 2/3 of body surface area
  - DO NOT Restart Transfusion
  - Send to TML:
    - Post transfusion blood samples
    - Transfusion/issue card
    - Un-transfused implicated component or product
  - Consider:
    - Blood cultures/product cultures
    - Chest x-ray

Clerical Discrepancy Incompatibility
**Policies**

- Transfusion Medicine Best Practices: Guidelines for CMV Negative Blood Components
- Guidelines for Emergency Issue of Blood Components
- Guidelines for Initiation and Termination of Blood Components and Blood Products
- Transfusion Medicine Quality Manual: Guidelines for the Transfer of Plasma Protein Products from Facility to Facility
- Guidelines for the Transport of Blood Components and Blood Products from Facility to Facility
- Transfusion Medicine Best Practices Policy: Identification and Management of Adverse Transfusion Events
- Transfusion Medicine Best Practices: Indications for Blood Components
- Quick Reference: Blood Components
- Transfusion Medicine Best Practices: Indications for Blood Products
- Quick Reference: Plasma Protein Products
- Guidelines for Irradiated Blood Components
- Guidelines for Issuing and Returning Blood Components and Blood Products within a Facility
- Guidelines for Patient Monitoring during a Transfusion
- Transfusion Medicine Best Practices: Plasma Guidelines
- Transfusion Medicine Best Practices: Guidelines for Pre-Transfusion Testing (Type and Screen, and Crossmatch)
- Transfusion Medicine Best Practices Policy: Reporting Adverse Transfusion Events
- Transfusion Medicine Best Practices: Single Red Blood Cell Unit Transfusion (Adult)
- Guidelines for Transfusion Orders for Blood Components and Blood Products
- Guidelines for the Transport of Blood Components and Blood Products within a Facility
- Guidelines for Administration of Intravenous Immune Globulin (IVIG)
- IVIG Dosing Table
- Request for IVIG (Adult)
- Policy for Consent for or Refusal of Administration of Blood Components and/or Blood Products.
- Consent form for Administration of Blood Components and Blood Products
- Refusal of Treatment with Blood Components and Blood Products
Thank-You

Questions ????
Any comments or suggestions…

My Contact Information:

Jenna Williams
Regional Transfusion Safety Officer
Labrador Grenfell Health
Phone: (709)897-2219
Email: jenna.williams@lghealth.ca