Blood Administration

A Handbook for Health Professionals

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To view the online program, visit our website at www.transfusionontario.org

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March 2010

**General Disclaimer:**

While the advice and information in this handbook is believed to be true and accurate at the time of publishing, neither the author nor the publishers accept any legal responsibility or liability for any errors or omissions in the information provided, or for any of the recommendations made. Any decision involving patient care must be based on the judgement of the attending physician according to the needs and condition of each individual patient.

**LEARNING OBJECTIVES**

▲ Outline the importance of checking that informed consent has been obtained before administering blood products.

▲ Describe the process for verifying that the transfusion order is appropriate and complete.

▲ List the steps required to prepare the patient for transfusion.

▲ Describe the importance of accurate identification of patient, blood samples and blood products

▲ Outline the steps for safe blood administration including appropriate monitoring and assessments.

▲ Note what documentation is required with the administration of blood products.

▲ Describe the signs and symptoms, the clinical management and the reporting required when an adverse transfusion reaction occurs.

Review the **ALERT** boxes to understand why it is important not to deviate from recommended practices.

The **icon** is used to remind you to consult your hospital policy for information specific to your facility as practice may vary from hospital to hospital.

Throughout this handbook, BTL refers to the Blood Transfusion Laboratory in your hospital, sometimes referred to as the Blood Bank or Transfusion Service.
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**Pre-transfusion**

**Informed consent**

Consent for transfusion should be obtained by a physician. Generally a consent form will be used to document that consent has been obtained.

The transfusion consent usually remains in effect for the entire admission or course of treatment.

Consent for transfusion is required.

Transfusion can be given without consent only if the following conditions exist:

▲ Urgent transfusion needed to preserve life or continuing health AND

▲ Patient unable to consent and substitute decision maker is not available AND

▲ No evidence of prior wishes refusing transfusion for personal or religious reasons

Guidelines for the person obtaining consent:

▲ Describe the blood product to be transfused.

▲ Inform the patient or substitute decision maker of material risks and benefits of the transfusion and any alternatives. Patient information pamphlets can be used but should not replace the need for a discussion.

▲ Give the patient the opportunity to ask questions.

▲ Document that consent was obtained by completing a transfusion consent form or notation in the patient’s chart.

▲ Clearly document the reason for transfusion in the patient’s chart.

▲ Whenever possible, consent for transfusion should be discussed early enough to allow for blood alternatives to be considered.

**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 product

▲ Number of units or amount

▲ Rate of infusion

▲ Special requirements if any (e.g. irradiated, CMV negative)

▲ Premedication or diuretic, if required

It has been shown that non-urgent transfusions should occur during daytime hours for increased patient safety.

**Example of a Transfusion Order:**

John Doe
Hospital Number 2345678

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

Dr. J. Stevens
Requesting blood

When requesting blood from the BTL, the following items are required:
▲ Patient’s first and last name along with one additional unique identifier
▲ Patient’s location
▲ Blood product required
▲ Amount
▲ When required

Additional information may be required:
▲ Any special blood requirements (such as irradiation).
▲ History of recent blood exposure — usually through transfusion or pregnancy
▲ Indication or reason for transfusion
▲ Name of the ordering physician

Know why the patient requires a transfusion
▲ Review the most recent laboratory values
▲ Assess the patient’s symptoms
▲ Know the indications and appropriate dosage for blood products to verify that the transfusion is appropriate

• See Appendix 1 — Blood Products Table and Appendix 2 — Plasma Derivatives Table

Pre-transfusion samples

Determine if a pre-transfusion sample is required.
Pre-transfusion samples are used to:
▲ Determine ABO and Rh blood groups — The Group or Type
▲ Identify antibodies acquired from previous blood exposure or pregnancy — The Screen
▲ Crossmatch suitable units of blood

The expiry or outdate of a sample will vary depending on the patient’s recent blood exposure and pregnancy history. The age of very young pediatric patients may also be a factor.

Patient Identification:
1. Even if you know your patient, check your patient’s arm band or identification to make sure it is correct.
2. 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?’
   • AVOID questions that require only a ‘Yes’ or ‘No’ answer such as ‘Are you John Smith’?

If any discrepancies are discovered they must be satisfactorily resolved prior to collecting a pre-transfusion sample.

Continued on the next page…
Pre-transfusion samples (cont’d)

4 Steps for labeling samples:
1. Take sample labels with you to your patient’s bedside.
2. Verify that the labels match your patient’s armband/identification and any accompanying paperwork.
3. After drawing the sample(s), label the tubes before leaving the patient.
   • Labeling samples away from the patient greatly increases the risk of mislabeling.
4. Document that you drew the blood sample. Never sign for anyone else’s work!

Accurate patient identification is critical.
▲ Misidentified patients can result in incompatible blood being transfused to the patient.

Accurate labeling of a pre-transfusion sample is critical.
▲ Mislabeled samples can result in another patient receiving incompatible blood.

Preparing the patient

Explain the procedure to the patient. Ensure that any questions they might have are satisfactorily addressed.

Determine if your patient has had any problems or reactions with previous transfusions. If so premedication may be required and the physician will need to be contacted:
▲ IV route — Administer immediately pre-transfusion
▲ po route — Administer 30 minutes pre-transfusion

<table>
<thead>
<tr>
<th>Indication</th>
<th>Premedication</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of repeated allergic reactions</td>
<td>Antihistamine and/or Steroid</td>
</tr>
<tr>
<td>History of repeated febrile reactions</td>
<td>Antipyretic</td>
</tr>
</tbody>
</table>

Meperidine - Demerol® is not indicated as a premedication.

Continued on the next page…
Pre-transfusion

Preparing the patient (cont’d)

Determine the correct IV access required:

<table>
<thead>
<tr>
<th>Blood Product and Category</th>
<th>IV Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red blood cells</td>
<td>Rapid transfusions in adults</td>
</tr>
<tr>
<td></td>
<td>16-18G (Gauge)</td>
</tr>
<tr>
<td>Red blood cells</td>
<td>Routine transfusions in adults</td>
</tr>
<tr>
<td></td>
<td>20-22G</td>
</tr>
<tr>
<td>Other Blood Products</td>
<td>Any size adequate</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>22-25G</td>
</tr>
<tr>
<td>All components and products—adults and pediatrics</td>
<td>Central venous access devices (CVAD)</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.

Blood products must not come in contact with medications or incompatible solutions (e.g. DSW, Pentaspan*).

When transfusing through a CVAD with multiple lumens, medications/solutions can be infused through other lumens without damaging the blood product.

IV pumps, blood warmers, and rapid infusers must be suitable for transfusion and not damage the blood product. Do not use devices that have not been approved for use with blood products.

**Alert**

Blood tubing is required for transfusion of blood products and must be changed at prescribed intervals to decrease risk of bacterial sepsis:

▲ red blood cells, platelets, plasma, cryosupernatant plasma and cryoprecipitate.

Flush blood tubing with Normal Saline (0.9% NaCl) completely wetting filter.

Blood tubing must be changed at least every 2-4 units and within the number of hours specified by your hospital policy.

**Note that:**

Platelets are best transfused through blood tubing not previously used for red cells. Platelets will adhere to fibrin captured in the filter.

Plasma derivatives (such as IVIG and albumin) do not require blood tubing. IV tubing that can be vented is required for IV infusions directly from glass bottles.

Most IVIG brands are not compatible with normal saline. Refer to package insert or specific hospital guidelines.

**Notes**

| ____________ | 
| ____________ |
| ____________ |
| ____________ |
| ____________ |
| ____________ |
| ____________ |
Picking up blood

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

▲ Connect the primed tubing to the patient’s IV site to ensure patency.
▲ Verify that consent for transfusion has been obtained and that there is a written order for the transfusion.
▲ Administer any premedication that may be required – generally only recommended for patients who have previously experienced transfusion reactions.

Arrange for pickup and delivery from the BTL with appropriate paperwork to ensure the correct unit is retrieved for the correct patient.

If the transfusion cannot be started immediately contact the BTL or refer to hospital policy.

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

Confirm that the patient is properly identified.

Patients being transfused MUST be wearing an ID armband.

Checking blood

▲ Visually check the blood unit for clots, unusual colour, and any leaks.
▲ Check the expiration date on the Canadian Blood Services (CBS) label.
  • See Appendix 4 – Canadian Blood Services Label
▲ Check that the donor’s blood group is compatible for the patient.
  • See Appendix 3 – Compatibility Chart
▲ Check the transfusion order and verify that consent was obtained.

Always check blood at the patient’s bedside.

Steps for checking blood:

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
   • BTL label/tag attached to blood
3. Check that the blood unit number and donor blood group matches on:
   • CBS label
   • BTL label/tag attached to blood

If you find any discrepancies do not proceed. Contact the BTL immediately.
Checking blood (cont’d)

To reduce the chance of errors, most hospitals have two qualified individuals complete the pre-transfusion check.

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

The BTL label/tag must remain attached to the blood unit throughout the transfusion.

A chart copy of the BTL label or tag is placed in the patient’s chart.

Starting blood

Before starting blood:
Record baseline vital signs and assessment before starting each unit:
▲ Temperature
▲ Blood pressure
▲ Pulse
▲ Respiration
▲ Oxygen saturation if available
▲ Auscultation for patients at risk for overload (elderly, pediatric, cardiovascular disease)

Steps for spiking blood:
1. Separate the port cover until port is exposed.
2. Port covers that are not removable must be held away from the port to prevent contamination.
3. Hold the blood bag in one hand and exposed blood tubing spike in the other – Do not hang from the IV pole.
4. Insert spike into port while pushing gently and turning clock-wise with ¼ turns – Do not over-spike. Spiking properly will ensure easy removal of the blood bag if required.
5. To remove bag, pull gently while turning counter-clockwise.

After starting blood:
1. For the first 15 minutes:
   • Start initially with a slow rate unless transfusion is extremely urgent.
   • Monitor your patient closely.
2. After the first 15 minutes:
   • Reassess your patient and repeat vital signs.
   • Increase flow to prescribed rate if no reaction observed.
Monitoring

Monitor, Monitor, Monitor!

Monitor the patient closely and document vital signs:

▲ Prior to the transfusion – within previous 30 minutes.
▲ After the first 15 minutes of the blood unit.
▲ At prescribed intervals, according to your hospital policy.
▲ At the end of the unit.
▲ If there is a suspected reaction.

Repeat with each subsequent unit.

Repeat vital signs more often for patients:

▲ At greater risk for circulatory overload (elderly, pediatric, cardiovascular disease).
▲ Who have experienced previous reactions.
▲ Who are unstable.

When possible, instruct your patient to notify you if they experience:

▲ Hives or itching.
▲ Feeling feverish or chills.
▲ Difficulty breathing.
▲ Back pain or pain at the infusion site.
▲ Any feeling different from usual.

Completing the transfusion

Guidelines for completing a transfusion:

1. Complete transfusion within 4 hours of removal from proper storage.
2. If desired flush the blood tubing with normal saline.
3. Disconnect blood tubing when transfusion is completed.
4. Check end vital signs.
5. Repeat vital signs periodically post transfusion according to your hospital policy.

Patients must be appropriately monitored to detect transfusion reactions as soon as possible.

To decrease the risk of bacterial sepsis, each bag must be completed or stopped by 4 hours after removal from appropriate storage.

Used blood tubing can be a breeding ground for bacteria. Do not leave it attached to the patient.

Dispose of used blood tubing and blood bags in a biohazard container unless your hospital policy requires you to return the blood bags to the BTL.

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

Out-patients or their care givers should be provided with an information sheet 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 placing the blood transfusion record (or a copy) in the patient’s chart.

The record should include:
- Date
- Start and finish times
- Type of product transfused
- Blood unit number
- Name of persons starting and checking blood.

Additional information should be documented in the patient’s chart:
- Vital signs and patient assessments
- Volume transfused
- Follow-up testing done:
  - CBC after red blood cells or platelet transfusion, if required
  - INR, PT/PTT after plasma
  - Fibrinogen level after cryoprecipitate
- Patient teaching
- Any reactions and treatment provided

Some hospitals require the return of a transfusion form to the BTL.
Recognizing reactions

Acute reactions usually occur during or 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

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 symptoms must be reported as a possible transfusion reaction to the BTL for investigation.

Chest X-ray of a patient before and during an episode of transfusion-related acute lung injury (TRALI)

Acute transfusion reactions

Acute transfusion reactions may present with similar signs and symptoms.

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>Possible Transfusion Reaction</th>
</tr>
</thead>
</table>
| Fever, Shaking Chills or Rigors | ▲ Bacterial contamination  
▲ Acute hemolytic transfusion reaction  
▲ Transfusion-related acute lung injury (TRALI)  
▲ Febrile non-hemolytic transfusion reaction |
| Urticaria & Other Allergic symptoms | ▲ Anaphylaxis  
▲ Minor allergic reaction  
▲ Severe allergic reaction |
| Dyspnea | ▲ Transfusion-related acute lung injury (TRALI)  
▲ Transfusion-associated circulatory overload  
▲ Anaphylaxis  
▲ Bacterial contamination  
▲ Acute hemolytic transfusion reaction |
| Hypotension | ▲ Bradykinin mediated hypotension  
▲ Bacterial contamination  
▲ Acute hemolytic transfusion reaction  
▲ Transfusion-related acute lung injury (TRALI)  
▲ Anaphylaxis |
| Hypertension | ▲ Transfusion-associated circulatory overload |
| Hemolysis, Red Urine (hemoglobinuria) | ▲ Acute hemolytic transfusion reaction |
| Pain | ▲ Acute hemolytic transfusion reaction  
▲ IV site  
▲ Lumbar  
▲ Transfusion-associated circulatory overload  
▲ Chest |
| Nausea and Vomiting | ▲ Acute hemolytic transfusion reaction  
▲ Anaphylaxis  
▲ Febrile non-hemolytic transfusion reaction |

See Appendix 5 – Acute Transfusion Reaction Table for risk of event and description.
Reaction management

**Suspected reaction management:**

1. **Stop the transfusion immediately!**
2. Maintain IV access for treatment if necessary but do not flush the blood tubing
3. Check vital signs
4. Verify that patient ID matches the BTL tag/label
5. Verify that the blood unit number matches the BTL tag/label
6. Notify the physician but remain with the patient
7. Notify the BTL of the reaction as per hospital policy
8. Treat patient’s symptoms as ordered by the physician

If the patient experiences minor allergic or minor febrile symptoms only, continuing the transfusion may be possible. Refer to your hospital policy for guidelines.

General guidelines for continuing a transfusion:

▲ Consult physician first
▲ Medicate patient as ordered
▲ Proceed cautiously with more frequent patient assessments
▲ Remember 4 hour limit
▲ Report to BTL if required but further investigation is not necessary

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Reaction investigation

To investigate a reaction the following may be required by the BTL:

1. Blood bag with attached blood tubing for:
   - Possible culture
   - Hemolysis check
   - Clerical check
2. Previous completed blood bags if available
3. Transfusion reaction reporting document with:
   - Symptoms
   - Pre and post vital signs
   - Time of onset
   - Blood unit number
4. Post transfusion blood sample with required paperwork for:
   - Repeat group/type and screen for comparison with pre transfusion
   - Direct antiglobulin test (DAT) (previously called Coombs test)
   - Hemolysis check
   - Repeat crossmatch of units

Continued on the next page…
TRANSFUSION REACTIONS

Reflection investigation (cont’d)

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 from the patient:
  • Drawn from a different vein
  • Antibiotics should be started immediately if bacterial sepsis suspected
  • Report immediately to the BTL as the blood supplier must be alerted
▲ Other blood samples may be required to investigate:
  • Anaphylactic reactions
  • Transfusion related acute lung injury (TRALI)
  • Acute hemolytic transfusion reaction

The BTL must report all serious reactions to Canadian Blood Services (CBS). Other components from the same donation might need to be recalled. In some cases a donor may need to be deferred from future donations.

The BTL may also be required to report serious reactions to Provincial and Federal Health Agencies that collect data in order to monitor and improve transfusion safety for all patients.

See Appendix 6 – Transfusion Reaction Chart for recommended investigations, treatment and actions.

Reference to sources for more information...

▲ Bloody Easy for Nurses eLearning – www.transfusionontario.org
▲ Bloody Easy for Physicians eLearning – www.transfusionontario.org
▲ Bloody Easy 2 Handbook
▲ Blood Transfusion – A Patient’s Perspective
## Appendix 1: Blood products table

<table>
<thead>
<tr>
<th>Blood Products</th>
<th>Major Uses</th>
<th>Storage &amp; Expiration</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Red Blood Cells (RBC)</strong></td>
<td>Bleeding or anemic non-bleeding patients with signs and symptoms of impaired tissue oxygen delivery. ▲ Tachycardia ▲ Shortness of breath ▲ Dizziness</td>
<td>2-6°C in approved fridge only Up to 42 days</td>
<td>▲ 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</td>
</tr>
<tr>
<td><strong>Plasma</strong></td>
<td>▲ Liver disease coagulopathy ▲ Massive transfusion ▲ Plasma exchange procedures for Thrombotic Thrombocytopenic Purpura/Hemolytic Uremic Syndrome (TTP/HUS) – when cryosupernatant plasma not available</td>
<td>Frozen 1 year Once thawed expires after 5 days stored at 1-6°C</td>
<td>▲ Blood tubing required ▲ Initiate transfusion slowly for first 15 minutes unless massive blood loss ▲ Transfuse over no more than 4 hours ▲ Typically over 30 minutes - 2 hours</td>
</tr>
<tr>
<td><strong>Cryosupernatant Plasma</strong></td>
<td>▲ Plasma exchange procedures for TTP/HUS</td>
<td>Frozen 1 year Once thawed expires after 5 days stored at 1-6°C</td>
<td>▲ Blood tubing required ▲ Initiate transfusion slowly for first 15 minutes ▲ Transfuse over no more than 4 hours</td>
</tr>
<tr>
<td><strong>Platelets</strong></td>
<td>Control or prevent bleeding in patients with: ▲ Low platelet counts (Thrombocytopenia) ▲ Congenital platelet dysfunction ▲ Platelets not functioning due to the effects of medications (ASA, Clopidogrel - Plavix®) ▲ Platelet dysfunction following cardiopulmonary bypass</td>
<td>20-24°C on an agitator to prevent clumping 5 days</td>
<td>▲ Blood tubing required ▲ New blood tubing recommended ▲ Initiate transfusion slowly for first 15 minutes unless massive blood loss ▲ Transfuse over no more than 4 hours ▲ Typically over 60 minutes</td>
</tr>
<tr>
<td><strong>Cryoprecipitate</strong></td>
<td>To replace: ▲ Fibrinogen: In patients actively bleeding who have a low fibrinogen level. ▲ Specific Coagulation Factors: Only when specific factor concentrates are not available.</td>
<td>Frozen 1 year Once thawed expires after 4 hours stored at 20-24°C</td>
<td>▲ Blood tubing required ▲ Transfuse as rapidly as tolerated</td>
</tr>
</tbody>
</table>
Appendix 2: Plasma derivatives tables (list not comprehensive)

<table>
<thead>
<tr>
<th>Plasma Derivatives</th>
<th>Major Uses</th>
<th>Storage &amp; Expiration</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin (5% and 25%)</td>
<td>▲ Ascites patients undergoing large volume paracentesis greater than 5 litres</td>
<td>Room temperature &lt; 30° C</td>
<td>▲ Standard vented IV set – no blood tubing or filtering required.</td>
</tr>
<tr>
<td></td>
<td>▲ Spontaneous Bacterial Peritonitis (SBP)</td>
<td>Expiry as indicated on packaging</td>
<td>▲ Bottles must be vented – most standard IV sets have a vent that can be</td>
</tr>
<tr>
<td></td>
<td>▲ Hepatorenal syndrome</td>
<td></td>
<td>opened otherwise a vented set is required</td>
</tr>
<tr>
<td></td>
<td>▲ Plasma exchange procedures</td>
<td></td>
<td>▲ Begin infusion slowly then as tolerated</td>
</tr>
<tr>
<td>Intravenous Immune Globulin (IVIG)</td>
<td>▲ Replacement of Immunoglobulins</td>
<td>Storage variable by brand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▲ Control of some infections and autoimmune diseases</td>
<td>Expiry as indicated on packaging</td>
<td></td>
</tr>
<tr>
<td>Prothrombin Complex Concentrate (Octaplex®)</td>
<td>▲ Reversal of warfarin (Coumadin®) or Vitamin K deficiency in bleeding patients and those requiring emergency surgery</td>
<td>2-25° C</td>
<td>▲ Standard IV set – no blood tubing or filtering required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▲ Usually infused over 15 - 30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▲ May be given slow push usually by physician</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▲ Dosage based on patient weight and INR value – usually 2 - 4 vials</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▲ Effect is immediate and lasts 6 - 12 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▲ For complete reversal, Vitamin K 10 mg. IV must also be given</td>
</tr>
</tbody>
</table>
### Appendix 3: Compatibility chart

<table>
<thead>
<tr>
<th>Patient Blood Group</th>
<th>Compatible Donor Blood Group</th>
<th>Red Blood Cells</th>
<th>Platelets</th>
<th>Plasma/Cryosupernatant Plasma**</th>
<th>Cryoprecipitate**</th>
</tr>
</thead>
<tbody>
<tr>
<td>O Positive</td>
<td></td>
<td>O Positive</td>
<td></td>
<td>Rh Positive or Negative</td>
<td>Any Group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O Negative</td>
<td></td>
<td>O preferred</td>
<td>Any Group</td>
</tr>
<tr>
<td>O Negative*</td>
<td></td>
<td>O Negative</td>
<td></td>
<td>Rh Negative</td>
<td>Any Group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O preferred</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Positive</td>
<td></td>
<td>A Positive, A Negative</td>
<td>Rh Positive or Negative</td>
<td>A, AB</td>
<td>Any Group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O Positive, O Negative</td>
<td>A preferred</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Negative*</td>
<td></td>
<td>A Negative</td>
<td></td>
<td>Rh Negative</td>
<td>A, AB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O Negative</td>
<td></td>
<td>A preferred</td>
<td>Any Group</td>
</tr>
<tr>
<td>B Positive</td>
<td></td>
<td>B Positive, B Negative</td>
<td>Rh Positive or Negative</td>
<td>B, AB</td>
<td>Any Group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O Positive, O Negative</td>
<td>B preferred</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B Negative*</td>
<td></td>
<td>B Negative</td>
<td></td>
<td>Rh Negative</td>
<td>B, AB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O Negative</td>
<td></td>
<td>B preferred</td>
<td>Any Group</td>
</tr>
<tr>
<td>AB Positive</td>
<td></td>
<td>Any Group</td>
<td></td>
<td>Rh Positive or Negative</td>
<td>AB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive/Negative</td>
<td>AB preferred</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB Negative*</td>
<td></td>
<td>Any Group</td>
<td></td>
<td>Rh Negative</td>
<td>AB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AB preferred</td>
<td></td>
<td></td>
<td>Any Group</td>
</tr>
</tbody>
</table>

* In urgent situations (or during times of shortages) Rh Negative patients may need to receive Rh Positive Red Blood Cells and Platelets.

** Rh of plasma and cryoprecipitate is not relevant and no longer appears on CBS Label.

### Appendix 4: Canadian Blood Services label

Universal Red Blood Cell for urgent transfusion:
- O Negative for females < 45 years
- O Positive or O Negative for all others

Universal Plasma for urgent transfusion:
- AB
### Appendix 5: Acute transfusion reaction table

<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 product. Categorized as Severe if symptoms involve more than 2/3 body surface.</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 (platelet pool)</td>
<td>1 in 10</td>
<td>Mild usually self-limiting reaction associated with donor white blood cells or cytokines in the blood product. Usually presents with fever and/or rigors (shaking).</td>
</tr>
<tr>
<td>Febrile Non-Hemolytic (red blood cells)</td>
<td>1 in 300</td>
<td></td>
</tr>
<tr>
<td>Bacterial Sepsis (platelet pool)</td>
<td>1 in 10,000 will become symptomatic</td>
<td>Potentially fatal reaction caused by bacteria inadvertently introduced into the blood product or originating from the donor. More common in platelets due to room temperature storage.</td>
</tr>
<tr>
<td>Bacterial Sepsis (red blood cells)</td>
<td>1 in 100,000 will become symptomatic</td>
<td>1 in 500,000 will be fatal</td>
</tr>
<tr>
<td>Acute Hemolytic Transfusion Reaction</td>
<td>1 in 40,000</td>
<td>Potentially fatal reaction caused by blood group incompatibility. Results in hemolysis of the incompatible transfused red blood cells (RBC) or of the patient’s own RBCs if incompatible plasma and rarely platelets are transfused. Can also be caused by chemical hemolysis (i.e. mixing with incompatible medications or solutions) or mechanical hemolysis (i.e. cell savers, transfusing rapidly through a too small needle, improper storage). Can result in renal failure, shock and coagulopathy.</td>
</tr>
<tr>
<td>Transfusion Related Acute Lung Injury (TRALI)</td>
<td>1 in 5,000</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. Etiology not fully understood. Postulated to be caused by donor antibodies (anti-HLA or anti-HNA)* interacting with recipient antigens or vice versa. 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% of cases.</td>
</tr>
<tr>
<td>Transfusion Associated Circulatory Overload</td>
<td>1 in 700</td>
<td>Circulatory overload from excessively rapid transfusion and/or in patients at greater risk for overload (i.e. very young, elderly, chronic anemia, 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 product.</td>
</tr>
</tbody>
</table>

*Anti-HLA and anti-HNA antibodies can develop after exposure to blood or through pregnancies.

HLA – Human Leukocyte Antigen – antigens located on white blood cells and platelets

HNA – Human Neutrophil Antigen – antigens located on neutrophils
### Appendix 6: Transfusion reaction chart

<table>
<thead>
<tr>
<th>Signs &amp; Symptoms</th>
<th>Usual Timing</th>
<th>Possible Etiology</th>
<th>Recommended Investigations</th>
<th>Suggested Treatment and Actions</th>
</tr>
</thead>
</table>
| Fever (at least 38˚C and an increase of at least 1˚C from baseline) and/or Shaking Chills/ Rigors | 38˚C to 38.9˚C but NO other symptoms | Febrile non-hemolytic transfusion reaction | No testing required | ▲ Antipyretic  
▲ With physician approval transfusion may be resumed cautiously if product still viable |
| | Less than 39˚C but with other symptoms (e.g. rigors, hypotension) or 39˚C or more | Febrile non-hemolytic transfusion reaction | | |
| | Usually within first 15 minutes but may be later | Bacterial contamination Acute hemolytic transfusion reaction | | |
| Urticaria (hives) | Less than 2/3 body but NO other symptoms | Minor allergic | No testing required | ▲ Antihistamine  
▲ With physician approval transfusion may be resumed cautiously if product still viable |
| Itching or Rash | | | | |
| | 2/3 body or more but NO other symptoms | Severe allergic | No testing required | Do not restart transfusion  
▲ Antihistamine  
▲ May require steroid |
| | Accompanied by other symptoms (e.g. dyspnea hypotension) | Anaphylaxis | | Do not restart transfusion  
▲ Group & Screen, DAT  
▲ Chest X-Ray (if dyspneic)  
▲ Blood gases (if dyspneic)  
▲ Haptoglobin  
▲ Anti-IgA testing |
| | | | | Do not restart transfusion  
▲ Epinephrine  
▲ Washed/plasma depleted blood products pending investigation  
▲ Return blood product to Transfusion Laboratory  
▲ For additional assistance, contact______________ |
| Dyspnea or Decrease in SpO₂ % | Typically with hypertension | Transfusion associated circulatory overload (TACO) | ▲ Group & Screen, DAT  
▲ Chest X-Ray  
▲ Blood gases  
▲ Urinalysis  
If sepsis suspected:  
▲ Patient blood culture(s)  
If hemolysis suspected:  
▲ CBC, electrolytes, creatinine, bilirubin, LDH, aPTT, INR, fibrinogen, haptoglobin, plasma Hb  
If anaphylaxis suspected:  
▲ haptoglobin, Anti-IgA  
Do not restart transfusion  
▲ Diuretics, oxygen, High Fowler's position  
▲ Return blood product to Transfusion Laboratory  
▲ Slow transfusion rate with diuretics for future transfusions |
| | Typically with hypotension | Transfusion related acute lung injury (TRALI) | ▲ Group & Screen, DAT  
▲ Chest X-Ray  
▲ Blood gases  
▲ Urinalysis  
If sepsis suspected:  
▲ Patient blood culture(s)  
If hemolysis suspected:  
▲ CBC, electrolytes, creatinine, bilirubin, LDH, aPTT, INR, fibrinogen, haptoglobin, plasma Hb  
If anaphylaxis suspected:  
▲ haptoglobin, Anti-IgA  
Do not restart transfusion  
▲ Assess chest X-Ray for bilateral pulmonary infiltrates  
▲ If TRALI may require vasopressors and respiratory support  
▲ If bacterial contamination suspected, antibiotics should be started immediately  
▲ Monitor for hypotension, renal failure and DIC  
▲ If anaphylaxis suspected, epinephrine  
▲ Return blood product to Transfusion Laboratory  
▲ For additional assistance, contact______________ |
1. Where can Red Blood Cells be stored?
   a. Ward fridge
   b. Medication fridge if only for a short time
   c. Blood Transfusion Laboratory (BTL) fridge
   d. All of the above
   e. None of the above

2. When is an order for transfusion NOT required?
   a. When transfusing cryoprecipitate
   b. When transfusing albumin
   c. When the patient is a minor
   d. When the transfusion is very urgent
   e. All of the above
   f. None of the above

3. You are collecting a pre-transfusion blood sample from the patient. Select all that are correct.
   1. The sample tube must be labeled before drawing the blood sample.
   2. The sample label must have at least the patient’s name and another unique identifier.
   3. The sample label must be checked against the patient’s chart not the armband as it might be wrong.
   4. When possible the patient should participate in the identification process.
   5. The sample must be labeled in the presence of the patient.
   a. All are correct
   b. 2, 4 and 5
   c. 1 and 2
   d. 3 and 4
   e. 1, 2 and 5

4. A 17 year old female is admitted to Emergency after being hit by a car. She requires an immediate Red Blood Cell transfusion for active bleeding before her blood group can be determined. Which blood group is appropriate for this patient?
   a. Group AB positive
   b. Group O negative
   c. Group O positive
   d. Group AB negative
   e. Any blood group is appropriate in this urgent situation

5. Bela Lugosi is scheduled for a transfusion of Red Blood Cells today. Before sending for the blood ensure the patient is ready by:
   a. Checking that IV access is ready and patent
   b. Verifying that Bela Lugosi has signed a consent for the blood transfusion
   c. Checking that the physician has written an order for the transfusion
   d. All of the above
   e. None of the above

6. Serious reactions such as Acute Hemolytic Transfusion Reaction usually present more than 6 hours after the completion of the transfusion.
   a. True
   b. False

7. When administering a transfusion, the blood should initially be started slowly to...
   a. Detect transfusion reactions and intervene early before too much blood is transfused
   b. Prevent pain at the IV site
   c. Prevent fluid overload
   d. Allow the patient time to become less anxious

Continued on the next page…
8. You assess Luke White after the first 15 minutes of his transfusion and notice a red rash appearing on his chest and upper arms. What do you do first?
   a. Stop the transfusion and complete a patient assessment
   b. Increase the rate of infusion so the transfusion will finish before the symptoms worsen
   c. Slow the transfusion and reassess Luke in another 15 minutes
   d. Check Luke’s vital signs

9. Which blood product is used to control significant bleeding in a patient who has been taking daily ASA?
   a. Albumin
   b. Cryoprecipitate
   c. Red blood cells
   d. Plasma
   e. Platelets

10. Which of the following can cause hemolysis of transfused blood?
    a. Using an IV access ‘Y’d with an incompatible solution
    b. Using an IV access that is too small when transfusing rapidly
    c. Using an IV access ‘Y’d with a medication
    d. Transfusing incompatible blood
    e. All of the above
    f. a, b and c only

11. You began transfusing Bela Lugosi at 11:30 a.m. When should you next assess the patient and repeat his vital signs?
    a. At the end of the unit
    b. Within the first 15 minutes
    c. Every 30 minutes
    d. At the next routine vital sign check

12. The best way to spike a blood product is to hang it from the IV pole?
    a. True
    b. False

13. You began transfusing Mary Bloodworthy at 9:00. It is now 13:00 and Mary’s unit of blood is ¾ transfused. What do you do?
    a. Dilute the unit with saline to decrease the viscosity so that he blood will flow more easily
    b. Restart Mary’s IV and continue the transfusion
    c. Stop the transfusion and document that Mary only received a partial unit
    d. Continue the transfusion cautiously with more frequent assessments
    e. Elevate the IV pole to increase the flow

14. You are checking platelets prior to starting a transfusion. The patient’s name on the BTL label reads “Joseph White”, but his armband reads “Josef L. White”. What should you do?
    a. Do not start the transfusion and contact the BTL immediately
    b. Discard the platelets and contact the BTL for a replacement
    c. Change the patient’s armband so that it exactly matches the BTL label
    d. The blood group of platelets doesn’t matter so the transfusion can be safely started

15. Which patients should be pre-medicated with an antihistamine prior to transfusion?
    a. Patients who have experienced a fever or rigors with a previous transfusion
    b. Patients who have had prior allergic reactions from transfusion
    c. All patients should be pre-medicated to prevent uncomfortable reactions
    d. Patients receiving platelets always require an antihistamine to prevent common allergic reactions
    e. All of the above
    f. None of the above

Continued on the next page…
16. Which of the following requires transfusion through a blood tubing?
   a. Platelets
   b. Intravenous Immune Globulin
   c. Albumin
   d. Rh Immune Globulin
   e. All of the above
   f. None of the above

17. Luke White’s platelet transfusion has just finished. Suddenly he says he can’t breathe and collapses in his chair. Which type of acute transfusion reaction can present with dyspnea?
   a. Transfusion related acute lung injury (TRALI)
   b. Hypotensive reaction
   c. Minor allergic
   d. Febrile non-hemolytic

18. Select all that are CORRECT:
   1. Before starting blood check patient armband against BTL label/tag.
   2. Check blood with the patient’s chart in the case of an outpatient transfusion.
   3. Allow the blood to reach room temperature so as not to cause chills.
   4. Blood tubing must be primed with D5W only.
   5. Blood must be started soon after it is received.
   a. 1, 2, 3 and 5
   b. 1 only
   c. 2, 3 and 4
   d. 1 and 5
   e. All are correct

19. A 34 year old female requires immediate surgery for a perforated bowel. She has liver disease and her INR is 3.0. The physician has ordered 3 units of plasma. The patient’s blood group is B negative. You are checking the first unit of plasma and the group is B. What is the next step?
   a. Wait for the other 2 units of plasma to be ready and then start the transfusion
   b. After completing the bedside check begin the transfusion
   c. Contact the physician immediately
   d. Contact the BTL immediately to request B negative plasma

20. Signs and symptoms that may be associated with a transfusion reaction include:
   a. Rash
   b. Fever
   c. Lower back pain
   d. Dyspnea
   e. All of the above
   f. a and b only
Bloody Easy Blood Administration Handbook
Feedback Form & Certificate Request

Please indicate your professional designation: ☐ RN ☐ RPN ☐ MD ☐ Perfusion
☐ Other: (please specify) __________________________________________

Name: (print clearly) ______________________________________________
Hospital or facility: ________________________________________________
Date: ____________________________________________________________

Your feedback is important to us for future planning.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The subject matter covered in this handbook was at an appropriate level for me</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>2. I will change my practice as a result of the information within this handbook</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>3. Education/information about blood administration is important to my professional development</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>4. Reviewing this handbook helped me identify learning needs</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>5. I reviewed this handbook as a result of my own initiative</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>6. The format/design of this handbook is user friendly</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>7. The assessment following the course was at an appropriate level</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

Additional Comments: ______________________________________________

Thank you!

If you would like to receive a certificate of successful completion mailed to you, please complete below.
I acknowledge that I have read this handbook and successfully completed the assessment quiz (score of at least 80% — 16 out of 20).

Signature: __________________________________________________________

Return Address: ____________________________________________________

Mail to:
The Ontario Regional Blood Coordinating Network
Blood Administration — Certificate Requests
Sunnybrook Health Sciences Centre
2075 Bayview Avenue, Room B213
Toronto ON M4N 3M5
Ordering Information:

Please contact the Regional Coordinator of the Ontario Regional Blood Coordinating Network in your area.

South West: Kate Gagliardi
gaglikat@HHSC.CA

Central: Deborah Lauzon
deborah.lauzon@sunnybrook.ca

North East: Wendy Owens
wowens@Ottawahospital.on.ca