
Section H: Administration of Blood Products

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I. Intravenous (IV) Access

When determining the correct IV set up for blood administration the following principles must be considered:

- No solutions other than 0.9% sodium chloride are infused in the same line as the blood
- No medications should be infused in the line
- In the event of a transfusion reaction, the setup should allow for immediate cessation of fluids through the blood tubing and the start of 0.9% sodium chloride so that no additional blood product is infused.

To meet these principles, the blood set should be connected to a mainline IV (0.9% sodium chloride must be infusing) either by attaching to the lowest tubing valve nearest the insertion site or through a second port on a central line. The blood tubing can then be easily attached for transfusion, the mainline IV stopped and the blood transfusion started. Following transfusion, or in the event that a transfusion reaction is experienced by the patient, the blood set can be stopped and the mainline IV with saline can be immediately restarted. This set up will help to keep the insertion site intact when the blood tubing is added or removed.

In those clinic situations where transfusions are administered directly without a mainline IV, a 0.9% sodium chloride IV for rescue must be immediately accessible in the event of transfusion reaction.

Peripheral Line:

1. If using a pre-existing IV site, assess the quality of the line by checking for swelling, redness or pain at the infusion site and adequate infusion rates.
2. If establishing a new IV site, confirm adequate infusion rate before starting blood transfusion.
3. Needle size:
 - a. The largest possible catheter should be used
 - b. The smaller the gauge, the slower the flow rate
 - c. If using a smaller gauge catheter, care should be taken to avoid excess pressure

ADULT:

- 18 to 20-gauge catheter is recommended to provide good flow rate without too much discomfort for the patient.

NEONATE, PEDIATRIC or CHRONICALLY TRANSFUSED PATIENT:

- RBCs can be safely administered through 22, 24 or 26-gauge needle

Central Venous Catheter:

1. Is an acceptable venous access option for blood transfusion.
2. Some Peripherally Inserted Central Catheters (PICC) lines with small tubing diameters might pose problems with blood administration due to required slower flow rates and risk of blocking.

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II. Compatible Solutions with Blood Products

Only 0.9% Sodium Chloride should be hung with blood products (see exception of IVIG below). Though usually not necessary, only 0.9% Sodium Chloride should be added to packed cells if dilution is required.

NOTE:

1. 5% Dextrose in water will cause clumping of red cells and hemolysis.
2. 5% dextrose in 0.2% saline causes red cell agglutination at room temperature, and hemolysis at 30°C.
3. Lactated Ringer's may cause clotting due to calcium content.

EXCEPTION: Intravenous Immune Globulin (IVIG): 5% Dextrose in water (D5W) **must** be used when administering IVIG. 0.9% Sodium Chloride is **NOT** compatible with IVIG.

III. Standard Blood Administration Sets

1. Packed cells, whole blood, plasma and platelets require a standard blood administration set (filter size is 170-240 microns). The filter is designed to retain particles such as fibrin and other microaggregates that may cause harm to patient. The Canadian Vascular Access Association recommends that the administration set be changed after 2 units of packed cells.
2. The administration set must be changed at least every 4-6 hours and following completion of transfusion.
3. ALL blood products are leukoreduced by the Canadian Blood Services (CBS). Additional special filters to remove white cells are not required.
4. Platelets should always be run through a **NEW** blood administration set; otherwise the platelets will become trapped in the used filter. Packed cells can be infused through the same administration set following the platelets as long as the set is changed at least every 4-6 hours.
5. With red blood cells, platelets and cryoprecipitate, invert bag several times to ensure resuspension. **This is particularly important for red blood cells.**

Priming the Administration Set and Filter: Although not required, it is recommended that the filter chamber is squeezed and released until the filter is covered with the 0.9% Sodium Chloride which is connected to one of the "Y" connector sites of the Blood Administration Set.

Vented Administration Sets for Blood Products in Glass Bottles: Any blood product that is obtained from the BTL in a glass bottle (albumin, IVIG) requires a specific vented administration set to allow filtered air to enter the bottle. Vented administration sets for use with Infusion Pumps can be obtained from HMMS (#38680). Do NOT use a needle as a vent for these glass bottles.

NOTE: Neither albumin nor IVIG requires a filter.

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IV. Transfusion Flow Rates

1. The Physician's order should indicate the rate of transfusion.
2. If clinically possible, all blood products should be started slowly and the patient should be observed for any adverse effects of transfusion.

General Guidelines are as follows:

- a. **Packed Cells:** Initial rate of 50mL/hr for the first 15 minutes. If the patient tolerates this "test dose", the rate may be increased so that the remainder of the unit is given within 2 hours.
 - b. **Platelets and plasma products:** Transfuse slowly (50mL/hour) for the first 15 minutes, monitor the patient closely and then platelets or 1 unit of plasma is generally infused over 60 minutes.
 - c. **25% albumin** should NOT be infused faster than 2mL/minute as it draws fluid from extravascular space into venous circulation, and may cause fluid overload.
 - d. **IVIG** should be infused at an initial rate of 0.01-0.02mL/ kg/minute with a gradual increase to 0.06mL/kg/minute if tolerated well. See specific infusion rates for Gamunex/IGIVnex, Gammagard and Privigen.
3. All red blood cells, plasma and platelet products should be infused within 4 hours from time of issue.
 4. Other blood products such as Rhlg, IVIG and albumin must be infused within 4 hours from time the product is spiked.
 5. After 4 hours, transfusion should be discontinued and remaining product should be discarded in appropriate biohazardous waste container.

V. Infusion Pumps

Infusion Pumps are used to control infusion rates. The **Baxter COLLEAGUE Family of Volumetric Infusion Pumps** and the **Alaris Signature Edition[®] Infusion System** have been approved and licensed by Health Canada for the infusion of blood products.

It is imperative that infusion pumps used for transfusion be used exactly as recommended by the manufacturer in order to avoid hemolysis.

Constant rate syringe delivery pumps can be used for transfusion of red cells through small gauge needles. These are used in the pediatric/neonatal patient care areas.

VI. Pressure Pumps / Rapid Infusion Devices

1. External pressure devices assist in rapid infusion of blood products when required.
2. **These devices should be used only with a large gauge catheter.**

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3. Pressure pumps must be equipped with a pressure gauge and pressure should not exceed 300mm Hg.
4. All external pressure devices shall be maintained and validated on a regular basis by the Biomedical Engineering department, and this shall be documented.
5. Blood pressure cuffs are not suitable because they do not exert uniform pressure against all parts of bag, possibly causing the bag to leak.

Pressure Pumps or Rapid Infusion Devices are usually available in the Emergency Rooms, Operating Rooms and Critical Care Areas at most LHSC and St Joseph's sites, and may be obtained from these locations in an emergency. However only staff trained in the use of these devices should operate them.

VII. Blood Warming Devices

1. Warming blood or blood products is not normally necessary. It is often sufficient to keep patient warm during transfusion; however, when numerous units of blood are administered quickly, it may be necessary and/or desirable to warm the blood products.
2. **ALL warming of blood products** should be done using a device that is licensed for use with blood products. The device should not allow the temperature of blood to exceed 42°C. The warming system shall have an alarm system and a visible thermometer. Contact the Operating Room, Critical Care Area or Emergency Room if a warmer is required. Only staff trained in the use of these devices should operate them.
3. All blood warming devices shall be maintained and validated on a regular basis by the Biomedical Engineering department, and this shall be documented.
4. The use of a blood warmer device and the temperature of the device during infusion of blood products should be recorded in the patient's chart.

VIII. Recording of Vital Signs

Vital signs should be recorded in patient's record as per specific patient care order flowcharts/policies.

1. Vital Signs include temperature, pulse, respiration rate and blood pressure.
2. Vital Signs must be taken **before** the transfusion of all blood products.
3. Vital Signs should be repeated at minimum:
 - a. 15 minutes after infusion has started
 - b. Following transfusion
4. The Vital Signs should also be repeated at intervals during transfusion:
 - a. As per specific Clinical Service flowcharts/policies or patient care order
 - b. If the transfusion is longer than 2 hours

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EXCEPTION: When administering albumin or intramuscular immune globulin preparations, it is not necessary to determine vital signs. However, staff should be aware that anaphylactic-like reactions have been reported after the injection of these products.

IX. Patient Monitoring

If appropriate, patient should be informed of possible adverse effects of transfusion, and should be instructed to contact nurse if there are any concerns.

In addition to vital sign monitoring, the patient should be assessed on an ongoing basis for:

1. Signs and symptoms of any adverse effects of transfusion (hives, rash, rigors, chills, difficulty breathing, etc)
2. Correct rate of flow
3. Any pain or swelling at/around the IV site.

X. Adverse Effects of Transfusion

See Adverse Effects of Transfusion / Transfusion Reaction Course (TRAC) Algorithm

1. If any adverse effects of transfusion are observed:
 - a. Immediately clamp off the blood administration set, to prevent additional blood that is in the line from being transfused to the patient.
 - b. Keep vein open with 0.9% Sodium Chloride.
 - i. If the blood administration set is attached to a mainline IV, ensure that 0.9% Sodium Chloride has been primed through that mainline.
 - ii. In those clinic situations where transfusions are administered directly, the blood administration set must be detached and a primed 0.9% Sodium Chloride basic IV tubing set must be immediately attached.
 - c. Verify correct unit has been given to correct patient.
 - d. Contact physician to determine how to proceed. For some reactions such as mild febrile or allergic reactions, physician may order antipyretics or antihistamines, and restart transfusion after 20 minutes if symptoms subside. Do NOT disconnect unit until it is certain that transfusion will NOT be restarted.
 - e. Order Transfusion Reaction (TRX) in PowerChart, as well as any additional tests indicated by the TRAC algorithm. A TRAC report will print to the printer in the patient care area; complete the TRAC report, and fax to the Blood Transfusion Laboratory. Place the original in the patient's chart.
 - f. When so indicated by the TRAC algorithm, the blood product bag/bottle must be returned to the BTL, even if it is empty.

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2. The TRAC algorithm gives general guidelines on how to proceed with the resolution of any adverse events, but a physician must assess each event.

XI. Medication Administration during Blood Transfusion

Medications should never be mixed with the blood component because:

1. The effect of the medication on the blood component is not known.
2. If the transfusion is interrupted or stopped for any reason, the entire dose of medication would not be given.
3. If a reaction occurred, it would be difficult to ascertain whether the reaction was due to the medication or the blood product.

If intravenous medication is ordered:

1. *During the transfusion:* A separate intravenous line should be used.
2. *Between units of blood:* Medication should NEVER be infused through the blood administration set.
 - a. When the blood administration set has been attached into a mainline IV tubing, clamp off the blood administration set as close to the mainline and then infuse medication and flush through mainline IV set.
 - b. In those clinic situations where transfusions are directly connected, medications ordered between units of blood must be given by **detaching** the blood transfusion set, ensuring the end is capped. The medication can be given by connecting a basic IV tubing set and/or giving IV direct if guidelines allow. Post medication and flush, the blood transfusion set can be reattached.

XII. Documentation

Blood transfusions should be documented in two places in the patient's chart.

1. The completed chart label is placed on a blank generic laboratory report or other suitable sheet of paper addressographed with the patient's information. This sheet is then placed in the lab report section of the patient's chart.
2. Enter volume of blood product on Fluid Balance Record. An average volume appears on the PRBC Cerner blood product label, but the exact volume is documented on the Canadian Blood Services label on the front of the PRBC. Most other blood products have the exact volume listed on the Cerner blood product label.

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XIII. After Completion of the Transfusion

1. For red blood cell and all blood product transfusions except IVIG, flush with 0.9% Sodium Chloride until tubing is clear. Use D5W for IVIG transfusions. Check doctor's orders to determine if patient is to receive additional blood products or intravenous solutions. Discard tubing if transfusion course is completed.
2. Discard the empty blood product bags or vials in the Biohazardous Waste Container on the patient care area, unless the recipient has had a reaction to the blood product.
3. If a blood product was not transfused to the patient, it must be returned to the BTL. The final disposition of every product must be recorded in the BTL database, and if the product is not returned, it is assumed transfused.

XIV. Patient Transport With Blood Products Infusing:

1. Prior to transport from one patient care area to another, the patient's assigned nurse at the sending unit is responsible for assessing the care needs of the patient during transport. The assessment includes:
 - a. Patient's current status,
 - b. Potential for the patient's status to change during transport and
 - c. Patient monitoring requirements during transport.
2. The patient assessment will determine whether the patient needs to be accompanied by an escort and the category of care provider needed. The escort (e.g. nurse, physician, porter, PSA) must have the knowledge, skill and expertise to deliver the anticipated care during transport.
3. Unless immediate transport is critical, a patient should NOT be transported if the transfusion of blood products has just been initiated.
4. Pre-transfusion and 15 minute vital signs should be taken and documented on the patient's health record before the patient leaves the sending unit. In order that patient care is not compromised upon transfer, clinical documentation on the patient's health record should clearly indicate:
 - a. Transfusion orders,
 - b. Status of the transfusion and
 - c. Vital signs.