Government of Newfoundland and Labrador

Department of Health and Community Services
Provincial Blood Coordinating Program

TRANSFUSION OF BLOOD COMPONENTS AND ADMINISTRATION OF BLOOD PRODUCTS	NLBCP-001

Office of Administrative Responsibility Medical Advisor to the Provincial Blood Coordinating Program Manager, Provincial Blood Coordinating Program	**Issuing Authority** Dr. Lucinda Whitman Daphne Osborne
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Replacing the following Documents	Policy for Blood Component and Blood Product Administration NL06-001 Guidelines for Patient Monitoring During a Transfusion NL2012-034 Guidelines for the Initiation and Termination of Blood Components and Blood Products NL2012-040

Background

The Newfoundland and Labrador Provincial Blood Coordinating Program (PBCP) provides guiding documents for Regional Health Authorities (RHAs) to ensure safety and quality care for the transfusion of blood components and the administration of blood products to promote best practices in transfusion medicine. See PBCP Definitions.

This document will provide policy, procedural and guiding principles, and linkages for the safe transfusion of blood components and administration of blood products. Requirements for patient monitoring are also included in this document.

Note: Special considerations for neonatal and pediatric transfusion are provided as a separate toolkit. See Neonatal and Pediatric Transfusion Toolkit (under construction).

Policy

RHAs shall develop policies and procedures that comply with PBCP policies, to ensure that blood components and blood products are transfused/administered safely to recipients, and for appropriate indications.

1. RHAs shall ensure ongoing training for all staff who participate in transfusion of blood components and administration of blood products.

2. RHAs shall establish a formal process to assess competence in transfusion-related activities including maintenance of competency assessment records by both the employee and the RHA. Transfusionists shall be competent in:
   - 2.1. Transfusion administration;
   - 2.2. Recognition and treatment of transfusion reactions and/or transfusion associated complications; and
   - 2.3. Implementation of appropriate interventions in the event of an adverse transfusion event.

   See Competencies for Transfusionists of Blood Components and/or Blood Products (under construction).

3. Transfusion of blood components and administration of blood products shall be ordered by a physician or other authorized health care provider. See Transfusion Orders For Blood Components And Blood Products.

4. An informed consent for transfusion or administration shall be obtained by the prescriber. See Consent for or Refusal of Administration of Blood Components and/or Blood Products.

5. The recipient shall receive information on the blood product/blood component including indications for transfusion and signs of adverse effects related to transfusion. See Information for Patients/Residents/Clients (pamphlet).

6. Samples for pre-transfusion compatibility testing shall be collected within 96 hours prior to scheduled transfusion if:
   - 6.1. The recipient has been transfused with a blood component containing red blood cells within the previous three months;
   - 6.2. The recipient has been pregnant within the previous three months; or
   - 6.3. The recipient's history is questionable or unavailable.

   Following transfusion of the first unit of blood, the original blood sample may be used to crossmatch additional units within 96 hours.

   For recipients not transfused or pregnant in the last three (3) months the sample may be used for a time specified by the RHA/facility/transfusion medicine program.

7. Requests for blood components and/or blood products sent to the Transfusion Medicine Laboratory shall include the following:
   - 7.1. Recipient first and last names;
   - 7.2. Recipient identification number;
   - 7.3. Recipient's location;
   - 7.4. Blood component(s) or product(s) requested;
   - 7.5. Required volume, dose, or quantity; and
   - 7.6. Special requirements, if any.

   If recipient identification is not available, refer to Emergency Issue of Blood Components.

8. Facilities shall develop a process to identify those blood components released prior to completion of all pre-transfusion testing and/or units for which compatibility cannot be assured (e.g. phenotypically similar). See Emergency Issue of Blood Components.

9. Continuous and unequivocal identification of the recipient and blood component or blood product shall be established from the sample collection through to transfusion. Positive recipient identification is verified at all stages of the transfusion process.
   - 9.1. At least two client identifiers are used before providing any service or performing any procedure.

9.2. Prior to initiating a blood component/blood product, two health care providers (or one healthcare provider and an electronic identification system) shall, in the presence of the recipient, positively identify the recipient using two unique identifiers.

9.3. The compatibility label/tag shall remain attached to the blood component or blood product until the transfusion is complete.

10. A policy shall be established for patient monitoring pre, during and post transfusion.

10.1. The recipient shall be observed for changes in status pre, during and post blood component/blood product transfusion/administration in order to detect signs and/or symptoms of an adverse reaction.

10.2. If signs and symptoms of a transfusion reaction are exhibited, the infusion must be stopped immediately and established facility policy for management of a transfusion reaction must be followed. Identification and Management of Adverse Transfusion Events.

11. RHAs shall develop policies, processes and procedures for the operation of infusion devices and associated equipment.

11.1. Only equipment and infusion devices that are approved by Health Canada shall be used.

11.2. A physician (or other authorized prescriber) **order is required** for use of blood warmer or rapid infusion device with the exception of specialty areas with an established policy. Blood warmers are recommended to reduce hypothermia risks in high volume rapid transfusions or the neonate population.

These devices are **not** required in routine transfusions.

11.3. Blood warmers shall:

- Be validated;
- Display biomedical certification and date visible on unit;
- Have a temperature alarm system and visual temperature display;
- Be calibrated and maintained as part of a quality control system; and
- Comply with CAN/CSA-C22.2 No.60601-1 and other applicable medical device standards.

12. Blood administration sets shall be connected directly to the venous access site.

12.1. All administration set connections shall be secured and directly luer-locked to the insertion site.

12.2. RHA/site shall establish policies/procedures to ensure the minimal length of intravenous tubing required is used (i.e. use only administration set with no extensions where possible or if extension set is required use the minimal length to prevent accidental disconnection).

12.3. Air shall not be introduced into the blood component bag or administration set.

13. Administration sets shall be changed:
    13.1. In accordance with manufacturer's guidelines;
    13.2. If the administration set becomes occluded;
    13.3. Immediately prior to the transfusion of platelets;
    13.4. If no manufacturer's guidelines, change the transfusion administration set and filter a minimum of every 4 hours. The transfusion set may be used for a maximum of 4 units of red blood cells as long as the 4 hour period is not exceeded and the filter does not become occluded (see RHA policy for further details). It is recommended that filter tubing sets be changed between the administrations of different blood components/products. A new administration set **must** be used for **platelet** transfusion.

14. External pressure devices, if used, shall be applied evenly over the entire component bag; pressure shall not exceed 300 mmHg. Pressure generated by the device shall not cause the pressure in the infusion set to exceed the manufacturer's recommendation.

15. The transfusion of red blood cells shall be completed within four hours of removing the unit from its controlled-temperature location.
    Note: Red blood cells should not be returned to usable inventory unless specific criteria are met including the blood component has not been outside of a controlled environment for more than **60 minutes**. See Returning Blood Components and Blood Products into Inventory.

16. All recipients shall be notified in writing that they have received blood components and/or blood products. See Patient Notification of Transfusion or Administration of Blood Components and/or Blood Products.

Guidelines

1. Elective transfusion should be avoided outside of core daytime hours when possible. Studies have shown that transfusion errors are more likely to occur during 'off' hours when staffing levels are reduced.

2. Blood components/products must only be stored in temperature controlled storage specifically for blood components/products with continuous temperature monitoring. Blood must not be stored in unapproved fridges such as medication or ward fridges.

3. Positive recipient identification at all stages of the transfusion process is essential. Most transfusion incidents are caused by identification errors at the time of pre-transfusion sampling, sample handling in the laboratory, collecting or removing the wrong component from the blood bank, or transfusion to the wrong patient. The identity check between the recipient and the blood component is the crucial final opportunity to avoid potential fatal adverse transfusion events.

4. Venous access must be established prior to requesting the blood components/blood products.

5. Needle gauge should be a diameter large enough to allow for adequate flow rates and avoid cell damage. In the adult population, a 20 or 18 gauge intravenous catheter is recommended. In the pediatric population, a 24 or 22 gauge intravenous catheter may be suitable.

6. The transfusionist must verify that the blood has not/will not expire during the anticipated time for transfusion.

7. Blood components shall be transfused through a sterile pyrogen-free administration set with a 170-260 micron filter. For blood products refer to product monograph for any special tubing or filter requirements.

8. Infusion rate should be specified by the prescriber based on recipient's size, circulating blood volume, and hemodynamic, cardiac and respiratory status.

9. Blood components are compatible **only** with 0.9% sodium chloride.
   - 9.1. Lactated ringer's solution will neutralize the anticoagulant in red blood cells and cause clotting/clumping.
   - 9.2. Dextrose solutions will cause hemolysis of red blood cells.
   - 9.3. Red blood cells should not be diluted. No other solution or medication should be infused concurrently via the same intravenous line as the blood component/product. If a multi-lumen intravenous device is present, some facilities will dedicate one lumen for the transfusion/administration of blood components/products. Please refer to RHA/site/unit specific policy for additional guidance.

10. When administering blood products (e.g. IVIG) check the product monograph for compatible intravenous solution.

11. Medication must not be directly added to blood components or products because of risk of hemolysis, difficulty in determining the dose if the transfusion is pre-empted, and the difficulty in evaluating the role of medication in the event of an adverse reaction.

12. Avoid simultaneous transfusion of blood components and administration of blood products. If unavoidable due to massive hemorrhage event, transfuse/administer through two separate venous access sites when possible.

13. Red blood cells **do not** require warming for routine transfusion. Warming ***is recommended*** for trauma, massive hemorrhage events, exchange transfusion of newborn, cardiopulmonary bypass, or when infusion rates greater than 50 mL/minute in adults or greater than 15 mL/kg/hr in children are required.

14. It is recommended that the recipient remain in the transfusion area for monitoring until completion of the transfusion. Transport outside of the transfusion area for purposes that may be deferred until completion of transfusion (e.g. non-urgent diagnostic or other procedures) is not recommended. If transport is unavoidable during transfusion/administration of blood components/products, the RHA/site shall have a policy in place to determine who can be an escort based on recipient status and the level of monitoring required.

15. A transfusion reaction may occur following transfusion of as little as 10 mL of component or product. Most ***serious*** reactions will occur within 10 to 15 minutes of the start of transfusion. See Identification and Management of Adverse Transfusion Events, Algorithm for Suspected Transfusion Reactions, Adverse Transfusion Reactions - Signs and Symptoms, Transfusion Reactions NLPBCP.

Materials

Sterile pyrogen-free administration set
Infusion device
Blood component(s) or blood product(s) and Issue/Transfusion cards
0.9% Normal Saline or specific compatible solution
Vital signs assessment equipment
Personal protective equipment
Pressure bag when indicated
Blood warmer when indicated
Rapid infuser when indicated

Procedure

Prescriber

1. Obtain informed consent. See Consent for or Refusal of Administration of Blood Components and/or Blood Products.

2. Prescribe transfusion of blood component(s) or blood product(s). The order will include:
   - 2.1. Recipient's first name, last name, and identification number;
   - 2.2. Specific blood component(s)/blood product(s);
   - 2.3. Units, dosage, and/or volume;
   - 2.4. Date and time of transfusion;
   - 2.5. Rate of infusion;
   - 2.6. Sequence if multiple products are transfused;
   - 2.7. Special requirement(s) if indicated (e.g. irradiated, washed);
   - 2.8. Clinical indication for transfusion;
   - 2.9. Use of blood warmer or rapid infusion device. (Exception: clinical areas with established policy for use); and
   - 2.10. Medication orders pre and/or post transfusion, if indicated.

3. Perform post-transfusion recipient assessment including an order for post transfusion testing, if indicated (e.g. CBC, INR).

Transfusion Laboratory Technologist

See Issuing and Returning Blood Components and Blood Products Within a Facility.

Transfusionist

Pre transfusion Preparation:

1. Initiate the Transfusion Checklist (see Appendix).

2. Verify :
   - 2.1. The transfusion order;
   - 2.2. Consent for blood products; and
   - 2.3. Special requirements if indicated (e.g. irradiated, washed).

3. Confirm:
   3.1. Type and screen is valid within time limits specified in guidelines; and
   3.2. Blood components/blood products are available.

At Bedside:

1. Assemble equipment/supplies. Prime tubing(s) with compatible intravenous solution.

2. Verify or establish a venous access site.

3. Provide the recipient/support person with information on the planned transfusion and the signs and symptoms of transfusion reaction. See Information for Patients/Residents/Clients (pamphlet).

4. Assess and document pre-transfusion vital signs.

5. Pre-medicate if ordered.

6. Request the blood component/product from the Transfusion Medicine Laboratory (Note: Only request one unit at a time unless a rapid transfusion is required).

7. Perform visual inspection of the blood component for clots, clumps, and discoloration. If present, notify Transfusion Medicine Laboratory and return the product. See Visual Inspection of Blood Components and Blood Products.

8. Verify and document that **all** identifying information linking the recipient and the blood component matches:
   8.1. In the presence of the recipient, the transfusionist confirms and documents that all identifying information linking the recipient and the blood component/product matches. See Positive Recipient Identification.
   8.2. The recipient (if able) states his/her full name and date of birth.
   8.3. Verify:
   - The **recipient name** and unique **identification number** are an **identical** match (**at a minimum**) on:
     a. Recipient's identification band; and
     b. Issue/transfusion card.

     Note: In the absence of an identification band there must be some other means of positive identification of the recipient (government issued photo ID, resident photo ID, etc.).
   - The **unit number** on the blood component or blood product tag is an **identical** match with the information on issue/transfusion card.

- Cross match details:
  a. ABO group;
  b. Rh type;
  c. Crossmatch interpretation;
  d. Special requirements/modifications, if applicable;
  e. Expiry date; and
  f. Exceptions to compatibility (if any) are documented.

9. Initiate infusion of blood components slowly at a rate of 50 mL/hr (if appropriate) but **no greater than** 2 mL/min (120 mL/hr) for the first 15 minutes (neonate and pediatric rates are weight based mL/kg/hr so may not reach this rate). See product specific monographs for blood product infusion rates.

10. For blood components monitor vital signs (temperature, pulse, respiration and blood pressure:
    10.1. Prior to initiation (within 30 minutes);
    10.2. After the first 15 minutes;
    10.3. At the end of each unit/dose (repeat steps for each subsequent unit);
    10.4. 30-60 minutes following completion of transfusion/administration; and
    10.5. If there is a suspected reaction.

    Note: This is a **minimum requirement** for vital signs; RHA/site policy may require more frequent monitoring.

11. Additional assessments (e.g. chest auscultation, pulse oximetry, cardiac monitoring) may be indicated based on recipient specific needs and acuity level.

12. Increased monitoring is indicated if the recipient :
    12.1. Is at a greater risk of fluid overload;
    12.2. Has experienced previous reactions; or
    12.3. Is unstable prior to start of transfusion.

13. If there are no signs of a reaction after 15 minutes, the flow rate may be increased to the designated infusion rate.

14. Ensure the compatibility label/tag remains attached to the blood component or blood product until completion of the transfusion.

15. Stop the transfusion **immediately** if any signs or symptoms of an adverse transfusion reaction present. See Transfusion Reactions - NLPBCP .

16. Follow RHA/site procedure for flushing infusion set and/or venous access device upon completion of the transfusion.

17. RHA/site specific policy will indicate a specific timeframe for empty component bags to be held post-transfusion in the event that symptoms of an adverse transfusion reaction present, and an investigation is required to rule out suspected bacterial contamination. Empty component bags must be disposed of as per RHA/site specific policy.

18. Complete issue/transfusion card. One section remains with recipients' health record and one to be returned to Transfusion Medicine Laboratory.

19. Ensure follow up testing as ordered, is performed (e.g. CBC one (1) hour post platelet transfusion).

20. Document transfusion on the recipient's health record. Include the following:
    - 20.1. Information provided to recipient and/or support person regarding transfusion/administration including signs and symptoms of an adverse reaction to report to transfusionist or other health care provider;
    - 20.2. Pre-medication(s) administration (if ordered);
    - 20.3. Component or product description;
    - 20.4. Unit identification number;
    - 20.5. Date and time transfusion initiated and completed;
    - 20.6. Vital signs and recipient assessments;
    - 20.7. Volume administered;
    - 20.8. Name of person(s) initiating and checking each blood component/product;
    - 20.9. Description of adverse transfusion event, if any, and treatment provided; and
    - 20.10. Any lab investigations.

21. Continue to assess recipients for symptoms of a transfusion reaction that might occur up to six (6) hours post transfusion. See Adverse Transfusion Reactions - Signs and Symptoms. Advise outpatients to seek medical attention if signs and symptoms of a transfusion reaction develop.

Key words

Administration, blood, blood components, blood products, red cells, transfusion

Quality Control

1. Each RHA shall have a quality system in place to ensure the sites' policies, processes and procedures are in compliance with the CSA standards. Additionally, the RHA will have a system in place to ensure that any occurrences, such as errors and accidents or deviations from normal operating procedures are identified, investigated, and evaluated and that corrective action is taken when required.

2. Internal audits shall be performed at least annually to verify the continuing effectiveness of the quality review system.
   - 2.1. The audits are an established program that are carried out by trained personnel who do not have direct responsibility for the procedure(s) being audited.
   - 2.2. The findings of reviews, audits, and corrective actions are documented.

3. All equipment used for transfusion of blood components and blood products shall be designed to facilitate thorough cleaning and sanitation both inside and out.

4. Blood component and blood product containers shall be disposed of in compliance with standard precautions according to hospital policy and procedures.

Supplemental Materials

Transfusion Recommendations

Component	*Infusion Time (Recommended)	*Adult* Infusion rate
Red Blood Cells	2-3 hours	2-6 mL/min**
Platelets	30-60 minutes	4-10 mL/min
Plasma	30-120 minutes	4-10 mL/min
Cryoprecipitate	10-30 minutes per dose	4-10 mL/min

* Transfuse within recommended times only if the recipient's condition permits. Blood components must be transfused **within four hours** of **removal** from temperature controlled storage.
** Unless rapid infuser or external pressure device utilized.

ABO Compatible Donor Red Cells

Recipient	1st Choice	2nd Choice	3rd Choice	4th Choice
O	Group O	none	none	none
A	Group A	Group O	none	none
B	Group B	Group O	none	none
AB	Group AB	Group A	Group B	Group O

Rh Type Compatibility Red Blood Cells

Recipient	Donor
Rh Positive	Rh Positive or negative
Rh Negative	Rh negative
*Exceptions may apply in emergency situations	

ABO Compatibility Plasma

Recipient ABO	Component ABO Group			
	1st Choice	2nd Choice	3rd Choice	4th Choice
O	O	A	B	AB
A	A	AB	(B)	(O)
B	B	AB	(A)	(O)
AB	AB	(A)	(B)	(O)

Blood groups in parenthesis represent incompatible choices listed in "least incompatible" order.

Platelet Compatibility

ABO identical platelets are preferred, although all ABO groups are acceptable. The donor plasma in platelets should be ABO compatible with the red cells of the recipient.

In the instance a recipient receives platelets that are not ABO identical and the platelet contains a high titre Anti-A or Anti-B the recipient may become sensitized; hemolysis may occur with large volume transfusion (more than one adult dose per 24 hour period).

However, in the absence of ABO identical platelets, transfusion **should not** be withheld just because the titre is unknown. Each transfusion should be based on a risk versus benefit evaluation.

ABO Group Selection for Cryoprecipitate

Group specific if available.

All ABO groups are acceptable for transfusion of Cryoprecipitate. If pooling, ensure only one (1) blood group per pool.

Recipient Name:
Healthcare Number:
D.O.B.:

Transfusion Checklist

Pre-Transfusion Preparation	Yes	No	N/A	Comments
Review transfusion order.				
Review bloodwork and/or confirm indication(s) for transfusion.				
Verify consent for transfusion is signed and on chart.				
Verify if pregnancy within last three (3) months.				
Verify if transfused within last three (3) months.				
Verify completion of cross match.				
Send request for component or product to Blood Bank including any required modifications or special instructions (irradiated, washed, HLA matched, aliquoted unit, etc.).				
Have required equipment readily available at bedside including IV pump/pole, and any additional equipment **if ordered** (blood warmer, rapid infuser, etc.).				
Provide educational material including signs and symptoms of an adverse transfusion reaction.				
Have normal saline or compatible IV solution readily available at bedside in preparation for possible adverse transfusion reaction.				
Immediate Pre-Transfusion to first 15 minutes				
Confirm venous access patency.				
Assess baseline vital signs.				
Administer pre-medication(s) if indicated/ordered.				
Request blood component/product from the Blood Bank (Note: Only request one unit at a time unless a rapid transfusion is required).				
Visually inspect blood component/product for any clots, clumps, and/or discoloration.				
Confirm that the following information are identical on the issue/transfusion card and the component/product label: a) Recipient family and given name; b) Recipient unique identifier number; c) Donor blood group and Rh type. Check to ensure compatibility with recipient blood group and Rh type listed on the transfusion card and double check with type and screen record on recipient chart; d) Unit number of component or lot number of product; and e) Expiry date of component or product. ***Rectify any discrepancies before proceeding with transfusion.**				

Confirm Positive Recipient Identification **in the presence of the recipient** using two unique identifiers present on recipient identification band (resident photo ID, or government issued ID), recipient transfusion record (admission record, transfusion order, chart), and the transfusion card: a) Recipient family name and given name; and b) Recipient unique identifier number.				
Initiate transfusion card documentation (tag to remain attached to component or with product during transfusion).				
Prime set with component and/or product, or compatible solution.				
Begin transfusion at 50 mL/hr **up to a maximum rate** of 2 mL/min or 120 mL/hr for the first 15 minutes for blood components, unless otherwise ordered. Pediatric rates ordered mL/kg/hr. For blood products check specific product monograph if not specified in order.				
Document in health record including unit number, type of component or product, date and time of initiation, and identity of the transfusionist.				
Closely monitor recipient for first 15 minutes of infusion for signs and symptoms of adverse reaction.				
Assess vital signs 15 minutes after transfusion initiated. Note any changes from baseline vital signs.				
During transfusion				
Monitor vital signs as per frequency specified in RHA/site/unit specific policy or as per product monograph if applicable.				
Assess for signs and symptoms of adverse reaction at least every hour.				
Complete blood component transfusion **within four hours** of **removal** from temperature controlled storage. For blood products, check product monograph regarding storage restrictions.				
Change administration sets at a **minimum** every 4 hours and between the administrations of different blood components/products.				
Use a new administration set for **platelet** transfusion.				
Assess vital signs post transfusion as per RHA/site/unit policy.				
Flush infusion set with compatible IV solution.				
Stop transfusion immediately if suspected adverse reaction occurs, and follow the RHA policy for management of adverse transfusion reactions.				
Post Transfusion				
Complete transfusion card. Attach one portion to health record and return one portion to Blood Bank (as per instructions).				
Complete transfusion documentation in health record.				
Empty component/product containers remain in transfusion area for time specified in RHA policy (minimum of 4 hours).				
Review post transfusion testing, if ordered (repeat CBC, INR, etc.).				
Monitor inpatient for signs of transfusion reaction for 6 hours. If outpatient, instruct recipient/support person on signs of transfusion reaction to report.				

Transfusionist name:_____ Date:_____

Transfusionist signature:_____ Time:_____

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