



Government of Newfoundland and Labrador

Department of Health and Community Services
Provincial Blood Coordinating Program

INVESTIGATION OF ADVERSE TRANSFUSION REACTIONS	NLBCP-006
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Office of Administrative Responsibility	Issuing Authority
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Overview

All serious adverse reactions shall be **immediately** reported to the Transfusion Medicine Laboratory (TML). The TML shall investigate all reports of serious adverse reactions to determine the probable cause. The investigation shall include appropriate laboratory tests.

Policy

1. All Regional Health Authorities shall develop and implement a policy for the investigation of adverse transfusion reactions that complies with Provincial Blood Coordinating Program policy.
2. An investigation is conducted if a preliminary inquiry indicates that the root cause of the adverse reaction is attributable to an activity carried out by the facility. Any establishment which has received implicated blood component or product must be notified.
3. All adverse reactions shall be documented.
4. The following procedures and tests shall be performed **as soon as possible** to rule out an acute hemolytic transfusion reaction:
 - 4.1. Clerical check of recipient's identification, recipient's pre-transfusion sample, the blood component(s) and all relevant documents;
 - 4.2. Visual inspection of pre- and post-transfusion specimen for hemolysis;
 - 4.3. Direct antiglobulin test (DAT), post-transfusion specimen. If result is positive, perform DAT on pre-transfusion sample;
 - 4.4. Repeat ABO testing on post-transfusion sample.

Further testing may be prompted depending on the results of these checks/tests.

5. The anti-human globulin (AHG) reagent used for a DAT shall contain antibodies to IgG and the C3d component of Complement (polyspecific AHG).
6. If a delayed transfusion reaction is suspected or detected, tests shall be performed to determine the cause.
7. Transfusion reactions due to plasma protein products are documented on an adverse events form and forwarded to the TML.
8. All cases of suspected transfusion-transmitted bacterial sepsis shall be investigated immediately.
 - 8.1. Investigation of blood components and blood products shall include preparation of a gram stain and culture of contents, not segments.
 - 8.2. Blood components and blood products sent for culture must remain sterile from exterior contaminants to prevent false positive cultures.
 - 8.3. Investigation should include recipient blood cultures.

9. Donor units and recipient blood cultures shall be sent to the Microbiology/Bacteriology Laboratory whenever there is investigation of suspected transfusion transmitted bacterial contamination.
 - 9.1. It is not necessary to send empty donor unit bags to Microbiology/Bacteriology Laboratory for culture.
10. Transfusion reactions with **suspected hemolysis** due to IVIG require the following tests to be performed on the post-transfusion sample:
 - 10.1. ABO/Rh testing;
 - 10.2. Indirect antiglobulin test (IAT);
 - 10.3. Direct antiglobulin test (DAT);
 - 10.4. Elution (if required). When testing the eluate ensure reagent A₁ cells and B cells are included. This will identify passively acquired anti-A₁ or anti-B as IVIG may contain blood group antibodies which cause a positive DAT and hemolysis; and
 - 10.5. Additional testing as requested by physician.
11. Any additional testing may be requested by the attending physician to complete investigation of any adverse transfusion reaction.
12. The TML shall report to Health Canada within 15 days of learning of a serious and/or unexpected adverse reaction which is attributable to the quality and/or safety of a blood component and related to a Health Canada-regulated activity carried out by the TML.
13. When a transfusion fatality or other serious, unexpected adverse event occurs that is suspected to be related to an attribute of a donor or a donor unit, the collecting facility shall be notified immediately, within 24 hours, and subsequently in writing.

Guidelines

1. Serious adverse reactions include, but are not limited to:
 - 1.1. Immediate hemolytic reactions;
 - 1.2. Delayed hemolysis;
 - 1.3. Transfusion-related acute lung injury;
 - 1.4. Systemic allergic reactions, including anaphylactic shock;
 - 1.5. Bacterial sepsis;
 - 1.6. Other transfusion-transmissible infections;
 - 1.7. Transfusion-associated graft versus host disease;
 - 1.8. Post-transfusion purpura;
 - 1.9. Other serious reactions;
 - 1.10. Deaths.

2. Serological investigation is not required if the only sign/symptom is a mild rash less than 2/3 of the body surface area, pruritus, urticaria, or flushing UNLESS ordered by the attending physician.
3. Pink or red discoloration in the post-transfusion specimen but not in the pre-transfusion specimen is suggestive of intravascular red cell destruction and release of free hemoglobin.
4. If post-transfusion specimen is not collected until 5-7 hours after an acute hemolytic episode, hemoglobin degradation products, especially bilirubin, may cause a yellow or brown discoloration of the plasma. Bilirubin may begin to rise as early as one hour post reaction, peak at 5-7 hours, and disappear within 24 hours if liver function is normal.
5. If transfused incompatible red cells have been coated with antibody and not immediately destroyed, the post-transfusion reaction DAT will likely be positive, frequently with a mixed field agglutination pattern. If there is a delay in collection of the post reaction specimen and the transfused cells have been rapidly destroyed, the DAT may be negative.
6. Examination should be performed on the centrifuged supernatant fluid of a freshly collected urine specimen. In acute hemolytic transfusion reactions, free hemoglobin released from damaged cells can cross the renal glomeruli and enter the urine. If previously intact red cells in a specimen undergo in-vitro hemolysis during transportation or storage, misleading free hemoglobin may be present.
7. If blood in the administration tubing and/or the donor unit is hemolyzed, a faulty infusion device or the addition of an incompatible solution may be suspected. For example, 5% dextrose in water will hemolyze red cells.
8. If the blood in the administration tubing is clotted, the use of an incompatible solution may be suspected. For example calcium containing intravenous fluids such as lactated Ringer's solution can cause clots to form in blood.
9. Platelets, due to their storage temperature, are the most common blood component implicated in suspected bacterial contamination reactions.
10. Initiation of treatment for suspected bacterial contamination should be based on the patient's clinical presentation as a delay in treatment may result in severe morbidity or death.
11. When transfusion-related acute lung injury (TRALI) is suspected, patient and donor testing should be arranged through Canadian Blood Services (CBS). The required form can be retrieved at https://www.blood.ca/sites/default/files/TRALI_Patient_Data.pdf.

Key Words

Adverse, transfusion, reaction

Supplemental Materials

Symptom Reported	Suspected Transfusion Reaction Signs & Symptoms	Possible Etiology	TML Work-up
Fever ≥ 38 °C and > 1 °C and/or Chills/rigors	Temperature >38 °C, < 39 °C and 1 °C above baseline.	Febrile non-hemolytic	No testing required
	Temperature >38.5 °C; chills, rigors, nausea, vomiting, headache, hypotension, pain.	Bacterial contamination	Group & Screen and DAT on post-transfusion sample *Gram stain culture on component/product. *Blood cultures on patient
	Temperature >39; chills, rigors, nausea, vomiting, headache, hypotension, tachycardia, pain, bleeding, hemoglobinuria.	Hemolytic reaction.	Group & Screen and DAT on post-transfusion sample ABO on pre-transfusion sample Further testing as indicated to define possible incompatibility
Urticaria and/or Itching and/or Rash	<2/3 of body; no other symptoms.	Minor Allergic	No testing required
	>2/3 of body, +/- dyspnea, SOB, hypotension, decreased SpO ₂ .	Severe Allergic/ Anaphylactic/ Anaphylactoid	No testing required
	And profound hypotension, loss of consciousness.	Anaphylactic Shock	Group & Screen and DAT *Anti-IgA testing
Dyspnea and/or Decreased oxygen saturation	With hypertension, tachycardia, cyanosis, pulmonary edema.	TACO	Group & Screen and DAT *Chest X-Ray
	With hypotension, fever/chills, +/- nausea/vomiting, DIC, hemoglobinuria, renal failure, +/- pain.	Acute Hemolytic, Bacterial Contamination	Group & Screen and DAT on post-transfusion sample ABO on pre-transfusion sample
	Bilateral infiltrates on chest x-ray, +/-hypotension, +/-fever/chills, cyanosis.	TRALI	Group & Screen and DAT on post-transfusion sample *CBS required testing

*Not performed by TML

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