Transfusion Reaction Investigation – Testing Laboratory Role
Conflict of Interest

I do not have a relationship with a for-profit or a not-for-profit organization to disclose
Objectives

To give a brief overview of Testing laboratory activities performed during a Transfusion Reaction Investigation

- Receive Transfusion Reaction Investigation
- Classify reaction and determine sample requirements
- Enter in Lab Information System (Trace Line)
- Perform Laboratory Clerical Check
- Test Post and Pre transfusion reaction samples (as required)
- Forward for Supervisor/Transfusion Officer/Consultant review
- Send Preliminary Transfusion Medicine Results Report (as required)
- Send Final Transfusion Medicine Report with Transfusion Medical Officer conclusion/comments
Receive Transfusion Reaction Investigation Request CM105 (CBS/Shared Health)

Time stamp Request and compare Sample to Requisition to ensure it is suitable for testing

• Compare patient’s unique identification number, first name, last name and date of collection on requisition to sample. **Ensure that they are identical.**
• Ensure requisition has: Name of physician or authorized health care provider, phlebotomist identification, and date and time of collection.
• Document comparison on requisition
Receive Transfusion Reaction Investigation Request - Blood Bank

- Reactions to commercial Plasma Protein Products (albumin, factor concentrates, IVIG, etc...) are processed by Shared Health Blood Bank staff.
- Reactions to Red Cells, Platelets, Plasma and Cryoprecipitate are forwarded to Canadian Blood Services.
- Sample is required for all reactions to Red Cells, Platelets, Plasma and Cryo-precipitate that are not deemed Minor.
- Sample may also be sent with separate requisition when a new “Type and Screen or Type and Cross” is requested with Transfusion Reaction.
Classify the Transfusion Reaction and determine Sample requirements

Laboratory will check Signs/Symptoms/Measures Taken

Check that only Minor Signs and Symptoms/Measures Taken are recorded

- Urticarial/hives
- Other Skin Rash
- Pruritus
- Temperature rise greater than 1.0°C
  - AND temperature 38.0°C to 38.9°C
  - AND no associated Major symptoms
  - AND onset greater than 10 minutes into transfusion

If Yes, then no sample is required

Pre-transfusion sample may still be used to issue further products. (sample crossmatch expiry is not changed and remains valid)
Classify the Transfusion Reaction

If Not Minor - Major/Suspected Bacterial Contamination/TRALI

- Pre-transfusion sample is no longer valid (pending investigation)
- Ensure Pre-transfusion sample crossmatch expiry has been changed to current date and time
- Ensure sample is received for preliminary investigation
- If sample is not received, request follow up sample immediately
Suspected TRALI

Transfusion Related Acute Lung Injury (TRALI) may be suspected if patient was **transfused within 6 hours prior to reaction and has one or more** of the following:

- Hypoxia/hypoxemia, pO2 <90 on Room air
- Measures Taken include any of:
  - Chest X-Ray
- Consult with Transfusion Medical Officer/Consultant to determine if Suspected TRALI
- Mechanical Ventilation
Transfusion Reaction

Suspected TRALI

• Contact Medical Officer/Consultant immediately with:
• Name of patient, attending physician, hospital, and when reaction occurred.
• Medical Officer/Consultant will consult with attending physician to determine if the reaction may be TRALI and obtain name of treating physician and fax number.
• Medical Officer/Consultant will notify lab where to fax TRALI Patient Data form
• Forms are faxed awaiting investigation performed by the Platelet Immunology Laboratory
• Samples and Transfusion Reaction Investigation(CM105) forms still need to be submitted.
Enter Reaction into Lab Information System

- Search and enter Patient Information in Trace Line

- Create a Test Request to allow for processing and reporting
  - Require: First and Last Name, PHIN, DOB, MRN, ordering physician, Ward
  - Forward Requisition, Sample and Segments for processing
Perform a Sample/Requisition comparison

Compare sample to requisition to ensure it is suitable for testing

Transfusion Reaction Investigation – Testing Laboratory Role
Prepare Sample for processing – Centrifuge sample

Centrifuge at approximately 2,200 g for 5 to 10 minutes (or appropriate speed and time to achieve visible separation between red cell and plasma layer)
Prepare Sample for processing – perform sample Reception

Perform sample Reception in Trace Line

• Sample is labeled with Trace Line sample number label
• Segments are placed in a tube labeled with Trace Line sample number label
• Where no sample is received – reception is completed with no label being printed
Find Pre-Transfusion Requisition and Sample

Retrieve **Pre-Transfusion Requisition** and **Pre-Transfusion Sample**.
Begin Investigation – Search for Previous Transfusion Reaction File, perform Lab Clerical Check

Label Transfusion Reaction Worksheet and search for previous transfusion reaction file.

Search for Previous Transfusion Reaction;
Perform Laboratory Clerical Check

Compare Pre-transfusion sample to Pre-Transfusion Requisition;

- Make sure sample number/name on tube matches Requisition to ensure there was no lab error made labelling the sample prior to testing.
Check for Pre-existing Incompatibility

- Check for compatibility of blood group of product to blood group of patient. Ensure only ABO compatible products were transfused
- Platelets issued to patient may be ABO incompatible, but all platelets are screened for High iso-hemagglutinins prior to issue
- Check to ensure ABO incompatible platelets were not high iso-hemagglutinin positive
- Red Cells: Check if patient has clinically significant antibodies. Ensure red cell product is antigen negative to the patient’s known clinically significant antibody
# If Suspected Bacterial Contamination

<table>
<thead>
<tr>
<th>If patient’s temperature has...</th>
<th>then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rise greater than 1.0°C and maximum temperature greater than or equal to 39.0°C, Rise greater than 1.0°C and between 38.0°C and 39.0°C with any of the following: chills/rigors, hypotension, tachycardia, dyspnea, shock. Temperature rise not responding to anti-pyretics and/or suspicion of sepsis in absence of fever</td>
<td>• call ward and confirm date and time blood cultures were ordered on patient</td>
</tr>
<tr>
<td>• not changed or increased by less than 1.0°C</td>
<td>• call blood bank and confirm date and time component bag was sent for culture</td>
</tr>
<tr>
<td></td>
<td>• document on requisition: Blood culture of product: Yes, and date and time blood component bag was sent.</td>
</tr>
<tr>
<td></td>
<td>document on requisition: Blood culture of product: No</td>
</tr>
</tbody>
</table>
Transfusion Reaction

If only a Minor Reaction

- Pre-transfusion sample is still valid – crossmatch expiry is not changed
- No testing is required
- Investigation is forwarded for Supervisor and Transfusion Medicine Physician review
Pre-transfusion sample is not valid until testing is completed on Transfusion Reaction sample

Check that Trace Line Pre-Transfusion sample crossmatch expiry has been changed to outdate sample (if not then change to current date and time)

If Transfusion Reaction sample is not received, request follow up sample immediately
Sample Color Comparison

- Record sample numbers and collection dates and times for both Pre and Post transfusion samples on worksheet.
- Record plasma color comparison. Looking for visual evidence of hemolysis (darker yellow, pink, red or brown appearance) in the Post transfusion sample.
Test Transfusion Reaction Sample for ABO/Rh

- A forward and reverse ABO/Rh grouping is performed
- Tubes are labeled with test numbers from sample label
- ABO/Rh antisera is added
- Forward grouping - Red blood cells from sample are suspended in buffered saline and then added to the anti-A, anti-B and anti-D anti-sera
- Reverse grouping - Plasma from sample is added to the A and B test cells
Test Transfusion Reaction Sample for ABO/Rh

- Tubes are centrifuged, reactions are graded and documented
- ABO/Rh interpretation is documented
- The forward and reverse grouping must agree to interpret a patient’s ABO
Test Transfusion Reaction Sample for DAT

- DAT testing is performed on **washed** red cells
- This minimizes false negative results due to free IgG/C3d binding with anti-sera thus neutralizing the anti-sera
- Cells are washed 3 to 4 times with buffered saline
- Most often this is done using an automated cell washer.
  - Saline is added to cells in tube, filling the tube to near the top
  - Tube is centrifuged to settle the red cells on the bottom of the tube
  - Remaining saline is decanted to waste leaving a “dry” cell button in the tube
  - Tube is agitated to re-suspend the red cells in the remaining liquid
  - Repeats above steps 4 times to wash cells
Test Transfusion Reaction Sample for DAT

- Red cells are initially tested with antisera that contains both anti-IgG and anti-C3d (poly-specific anti-human globulin)

- A few drops of Anti-IgG/anti-C3d are added to the tube, then tube is centrifuged and the reactions are graded. Reactions are read microscopically

- If the reaction is **Positive** a saline control is tested to ensure that red cells are not auto-agglutinating

- If DAT is positive with the poly-specific anti-human globulin reagent then a differential DAT is performed. (to determine if IgG or C3 or both are coating the red cells)

- Further testing is performed using washed cells with only anti-IgG in one tube and only anti-C3d in the other

- All positive DAT results are deemed a critical result, they are phoned to advise responsible nurse or physician
When the testing Results are Positive

• Reactions with a Positive DAT post-transfusion will have the Pre-transfusion DAT sample tested to determine if it was an underlying condition

• Notify Transfusion Medicine Physician immediately if:
  • Serious clerical discrepancy was noted
  • Discoloration or color change is noted in post transfusion sample
  • DAT is positive on post transfusion sample and negative with pre transfusion sample
  • Hemolytic transfusion reaction is suspected
  • Severe condition is reported, Severe hypotension, Mechanical Ventilation or Death
Extended Investigation

If there was serious clerical discrepancy noted or:
- There was a color change in post transfusion sample
- DAT is positive on post-transfusion sample and negative with Pre-transfusion sample

Then:
- Perform Elution on post transfusion sample to elute off and identify offending antibody
- Perform ABO/Rh on pre-transfusion sample
- Perform antibody screen on pre and post transfusion samples
- If new antibody is detected and identified in pre or post transfusion sample then perform antigen typing on component segment(s).
- Perform ABO forward group/Rh and antigen typing, if applicable, on red cell component segment(s)
- Perform crossmatch against component segment(s) on pre and post transfusion samples using IAT technique
Print reports/Medical Officer/Consultant review
Thank you