New Vision Medical Laboratories St. Rita's Medical Center Lima, Ohio Technical Procedure		**Procedure Number:** **nvml.bb.special.010** Procedure Initiated: 4/18/1991 Revision: 3.16.2022

SUBJECT: INVESTIGATION OF POSSIBLE TRANSFUSION REACTION

1. PRINCIPLE:

Each blood bank shall have a system for detection, reporting, and evaluation of suspected complications of transfusion. Any adverse reaction of the patient associated with a transfusion is a suspected transfusion reaction. Circulatory overload or allergic reactions need not be evaluated as a possible hemolytic transfusion reaction. A febrile reaction must be >1.5 ^{o}F.

A pathologist must be notified if the work-up shows a hemolytic reaction, or if the floor wants to transfuse more blood. *If a physician wishes to continue the same unit*, call the on-call pathologist and make them aware that blood is being continued. The pathologist may/may not need to discuss the appropriateness of continuing the transfusion with the ordering physician. The physician makes the clinical decision to continue. Perform the routine workup as quickly as possible. Immediately notify all parties if there are signs of a hemolytic reaction. All reactions called by the floor should be worked up.

2. CLINICAL SIGNIFICANCE:

Any possible reaction must have a work-up done to determine whether it is transfusion related.

3. SPECIMEN:

A. COLLECTION AND PROCESSING:

Using the Possible Transfusion Reaction form complete the patient's bedside check with the nurse over the phone having the nurse check and read back to you the following information: all labels, forms, and patient's identification to check for clerical errors. This includes patient's name, blood bank band number, blood types of patient and donor, and donor numbers. Document this on investigation form with tech initials and nurse's name that you verified this information with over the phone.

1. If an ABORH is required place an order in the LIS. Have nurse draw a post transfusion specimen if patient is a line draw or contact phlebotomy to draw the patient. If nurse is drawing send the label to the floor. Have a Blood Bank pink EDTA tube drawn.
2. A urine specimen must be obtained from the patient
3. Have nurse complete her form regarding the symptoms,vitals etc and send it to the lab with the Urine sample.

B. REJECTION:

NA

C. STORAGE AND PRESERVATION:

The specimen is stored in the specimen refrigerator for 2 weeks at 2-9 degrees Celsius.

4. REAGENTS, STANDARDS, AND CONTROLS:

A. PREPARATION:

Found in the daily reagent rack

5. PROCEDURE:

A. PERFORMANCE:

Routine work-up

1. If there are symptoms or findings suggestive of a hemolytic transfusion reaction, the transfusion must be discontinued immediately, and a responsible physician and Blood Bank are to be notified.
2. The Blood Bank technologist reviews information over the phone with nurse caring for the patient. Using the Possible Transfusion Reaction form complete the patient's bedside check with the nurse over the phone having the nurse check and read back to you the following information: Patient information on armband from hospital including Patient name,MRN and date of birth, transfusion record information including patient name,Medical Record number, Date of birth and donor number as well as blood type of patient and donor, Patient's blood bank armband if required including patient's identification and typenex numbers to check for clerical errors. Document this on investigation form with tech initials and nurse's name that you verified this information with over the phone.
3. Remind nurse that she will need to complete the report of possible blood transfusion reaction(nursing form) and send it with the patient's urine.
4. The urine is examined for the presence of free hemoglobin. Perform a dipstick and a microscopic examination if blood is present. Note if specimen is from a catheter.
   a. Intact red cells in the urine are a sign of hemorrhage into the urinary tract which is not caused by hemolytic transfusion reactions.
   b. Following a hemolytic reaction, hemoglobin released from damaged cells can enter the urine, but the cells do not.
5. Examine pre and post transfusion serum for hemolysis.
6. Perform a direct antiglobulin test on the pre- and post-transfusion tubes using the Anti-IgG, C3D MTS card. Two positives and one negative control must be run on the Anti-IgG, C3D card if one has not been run yet that day. Use the .8% screening cells for your negative control. For your positive controls use Coombs Control check cells and Complement Coombs Control Cells. Place 2 drops of control into a tube with a pipette and then add 5 drops of the MTS 2 diluent to make 0.8%. If your poly card DAT is positive perform a DAT using the IgG gel card as well.
7. Perform an ABORH on the postreaction specimen
8. A full workup is needed if the platelets are not the same ABO type.
9. Any delayed transfusion reaction due to an antibody not detected in the pre sample must be reported to the patient's physician and documented in the patient's chart.
10. All transfusion reactions must be investigated and if it is determined that the product was at fault in causing a transfusion reaction, copies of all such written reports shall be forwarded to the collection facility. This also includes when there is a problem with manufacturing (which includes donor selection by the ARC), possible septic reactions, TRALI, serious allergic reactions and some hemolytic reaction (hemolysis in a group A recipient of a group O platelet with high titer anti-A). There are forms to be filled out for the ARC and these are found in the Transfusion Reaction Forms folder.

Modified work-up

A modified work-up consists of only the clerical check along with all the forms being filled out. This is done with the following:

1. Urticarial reaction (hives)
2. Autologous transfusion reaction investigation
3. FFP
4. Platelets (if the blood product is the same blood type as the patient).

Extended transfusion reaction investigation

This may be done if the problem is not resolved by following the above procedures. The medical director or on-call pathologist should be consulted to determine if any of these additional tests should be performed.

1. Pre and post transfusion specimen.
   a. ABO/RH.
   b. Antibody screen (GIAT or with Liss).
   c. Compatibility tests (GXM or Liss).
2. Retained donor segment.
   a. ABO/RH type.
   b. Antibody screen (GIAT).
3. Gram stain and blood culture on donor unit. If this is requested a Gram stain and CBLD must be ordered (use date and time of reaction for collection information). On dayshift take the donor unit, Gram stain labels and CBLD labels and paper work for cultures (found in Tx Rx Forms folder) to Microbiology. On second and third shift the techs must enter the **source** as ***Blood*** and answer the **site** (CTRL A: then free text), ***as Transfusion Reaction***, set up the blood culture , enter the blood culture bottles into the Bac T alert and read the gram stain stat.
4. Bilirubin level on serum 4-6 hours after transfusion.

5. BUN, Creatinine, and coagulation studies if indicated.
6. Order each individual test done and attach comment pre-transfusion or post-transfusion where indicated (on the comment line).

1. All forms are submitted to the pathologist on call for a signature and interpretation, and then the report is sent to the floor to be put on the patient's chart. Keep the empty bag until the pathologist writes his report in case a culture is required.
2. If there are any instances of a transfusion-transmitted disease, follow the ARC protocol for notification of the ARC.
3. If there are any delayed transfusion reactions, the pathologist notifies the patient's doctor that an antibody was discovered post-transfusion and that there may be some hemolysis of the patient's cells. They are told they may want to monitor the patient's condition with hemoglobins, bilirubins, and a urinalysis. This information about a delayed reaction will be written on a Transfusion Reaction form and sent to the patient's chart.
4. All transfusion reaction investigations are reviewed in the Blood Utilization subcommittee which is a part of the Patient Services Committee.

B. CALCULATIONS:

NA

C. INTERPRETATION OF RESULTS:

A reaction showing hemolysis of cells is to be considered a hemolytic transfusion reaction. The initial manifestations of an acute HTR may be hemoglobinuria, hypotension, or diffuse bleeding at the surgical site.

6. QC PERFORMANCE POLICY:
A. CALIBRATION AND CALIBRATION VERIFICATION

Daily QC

7. EXPEXCTED RESULTS:
A. REPORTABLE RANGE:

Negative

B. REFERENCE RANGE:

NA

C. CRITICALVALUES:

Hemolytic transfusion reaction

8. REPORTING RESULTS:
A. NORMAL VALUES:

Computer
1. Order a GTNRX (GEL Transfusion Reaction) for the full work-up
   a. Answer in Patient, Order, Result
   b. The GTNRX is answered:
      i Clerical is "0" for OK and "+" for a problem
      ii Pre DAT and POST DAT are answered "0" or "+". The interpretation is negative or positive.
      iii H-UR is for urine hemolysis; answer "0" for none and "+" for hemolysis.
      iv The clerical interpretation is OK unless there is an error.
      v The interpretation is NEG if both DAT's are negative and the urine is negative. The interpretation is POS if one of the DAT's is positive or the urine is positive.
      vi If the urine is answered "+" then the interpretation must be answered POS even if both DAT's are negative.
      vii At the comment line type in "clerical" if all work is OK; if results are positive try to clarify what was positive (ie. "Blood in urine" can be typed).

viii Do an F4 and type in the pathologist's comments along with the date.
ix Order an ABORH on a separate order to reflect the current date and time. Answer it with your results and type in the comment line on the header, "post-transfusion"

2. Order a MODRX (modified transfusion reaction investigation) for the modified work-up.
   a. Answer "0" or "+" for the clerical check (OK or an error respectively)
   b. Answer the interpretation as OK or ERROR respectively
   c. Type in "clerical" at the comment line if all work is OK.
   d. Do an F4 and type in the pathologist's comments along with the date.
3. When confirming the transfusion (day shift) put in the type of reaction at "observation" (nurse's observation)
   a. Go into Patient, Transfusion, Reaction
      i Select the unit with the Reaction listed
      ii Put in the pathologist's observation
      iii Copy all forms twice for Blood Bank's and QA's record, and send the original copies with the pathologist's signature an interpretation to the nursing unit to be placed on the patient's chart.
      iv IN THE EVENT A HEMOLYTIC REACTION HAS OCCURRED, NOTIFY THE PATHOLOGIST AND THE PATIENT'S PHYSICIAN IMMEDIATELY.
      v Any transfusion reaction which may have been caused by faulty components needs to be reported to the product manager at the ARC.

B. CRITICAL VALUES:

Hemolytic transfusion reaction.

9. PROCEDURAL NOTES:

A. BACKUP FOR INOPERABLE SYSTEM

Adverse effects of Blood Transfusion
1. Immediate effects
   a. Circulatory overload.
      i Coughing
      ii Cyanosis
      iii Difficulty in breathing.
   b. Febrile nonhemolytic reactions - cytotoxic or agglutinating antibodies in either donor recipient plasma directed against antigens present on lymphocytes, granulocytes, or platelet cell membranes are generally thought to be causative agents.
   c. Allergic reactions.
      i Local erythema.
      ii Hives.
      iii Itching.
   d. Allergic reaction due to lack of IgA.
      i Flushing.
      ii Nausea.
      iii Vomiting.
      iv Changes in blood pressure.
      v Anaphylaxis.
   e. Hemolytic transfusion reactions.
      i Hemoglobinemia.
      ii Hemoglobinuria.
      iii Hypotension.
      iv Disseminated intravascular coagulation.
      v Acute renal failure.
      vi Death.
      vii INITIAL SYMPTOMS.
         - Flushing.
         - Feeling of apprehension.
         - Chest or back pain.
         - Chills.
         - Fever.

- Nausea or vomiting.
- Diffuse bleeding during anesthesia.

f. TRALI (Transfusion Related Acute Lung Injury)
   i Hypoxemia
   ii respiratory failure
   iii fever
   iv bilateral pulmonary edema

g. Reactions due to bacterial contamination (Rapid onset):
   i Chills.
   ii High fever.
   iii Vomiting.
   iv Diarrhea.
   v Marked hypotension.
   vi Acute renal tubular necrosis.

h. Other untoward effects.
   i Hypothermia.
   ii Bleeding diathesis.
   iii Hyperkalemia.
   iv Microemboli.

2. DELAYED EFFECTS
   a. Hemolytic transfusion reactions.
      i Positive direct antiglobulin test
      ii Intravascular hemolysis.
      iii Asymptomatic - mild, gradual anemia.
   b. Viral hepatitis.
   c. Other diseases
      i Infectious mononucleosis-like syndrome characterized by splenomegaly, atypical lymphocytes, and fever.
      ii Malaria.
      iii Syphilis.
      iv Cytomegalovirus infection.
      v Acquired Immune Deficiency Syndrome.
   d. Alloimmunization.
      i To red blood cells.
      ii To platelets.
      iii To leukocytes.
      iv To protein antigens.
   e. Graft versus Host disease.
   f. Transfusion hemosiderosis.
   g. Post-transfusion purpura.

11. METHOD VALIDATION:

The procedures are reviewed biennially and will be compared with any future changes in the Standards or Technical Manual.

11. REFERENCES:

AABB Technical Manual; AABB Standards; CAP Standards

Policy Approval

Medical Director:
Date: 5-4-22

Blood Bank Medical Director: Matthew Kuhn MD
Date: 5/3/22

Assistant Operations Manager: Jamie Lauf MT(ASCP) SBB CM
Date: 3/10/22

INVESTIGATION OF POSSIBLE TRANSFUSION REACTION
St. Rita's Medical Center
Lima, Ohio

Patient's Name_____ Room Number_____

Medical Record Number_____ Date_____ Time_____

Clerical check with nurse at patient bedside verify that the following information matches:

Patient hospital armband		**Typenex or blood bank armband**		**Crossmatch label and donor unit**	
1.First and last name		1.First and last name		1.First and last name on label	
2.medical record number		2.medical record number		2.medical record number	
3. Date of birth		3. Date of birth		3. Date of birth	
		4.blood bank band ID		4.blood bank band ID	
				5.ABO/RH of patient	
				6. ABO/RH of donor xm label against unit label	

RN full name:_____

Tech Initials:_____

Date and time of clerical review:_____

Examination for visible Hemolysis/Icterus: Pre-transfusion Serum_____

Post-transfusion Serum_____

Post-transfusion Urine_____

Direct Coombs Test: Pre-transfusion_____

Post-transfusion_____

ABORH: Post-transfusion_____

Donor Unit Numbers_____ Time Issued_____

_____ _____

_____ _____

Pathologist Notified_____ Time/Date_____

Interpretation: All hemolytic reactions, bacterial contamination, TRALI and/or GVHD must be referred to medical staff functions committee for review.

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_____

Pathologist:_____

Technologist:_____