Lab Dept: Transfusion Services

Test Name: TRANSFUSION REACTION EVALUATION

General Information

Lab Order Codes: TRXR

Synonyms: Transfusion Complication Workup; Hemolytic reaction

CPT Codes: Dependent on testing involved. Refer to individual serologic procedures.

Test Includes:

If there is any evidence of significant reaction other than mild urticaria, stop the transfusion but keep normal saline dripping in slowly to keep the I.V. open. Report all reactions to Transfusion Service (612-813-6824/651-220-6558).

Clerical Check: Examination of label on blood container(s) and all clerical work and records for possible error, and review possible mirror image or other-side-of-the-coin error. (If one unit is infused into a wrong patient, has another patient/unit been also mixed up?)

Visible Plasma Hemoglobin: Examination of prereaction and postreaction serum or plasma for hemolysis or jaundice. This should be begun by examination of the postreaction blood sample sent very promptly to the Transfusion Service. **Direct antiglobulin test on postreaction specimen.** (If positive, it must be compared with a pretransfusion specimen.) ABO/Rh on Post reaction specimen.

If the above are negative and there is no suspicion of incompatibility, additional tests are not essential. Minor reactions (e.g., febrile or allergic) need no further work-up. If actual hemolysis is suspected, the following may be done.

Blood container, attached transfusion set and intravenous solutions must be sent to Transfusion Service.

Culture of remaining donor blood, if:

- Patient temperature is ≥39ºC
- Patient's temperature increases ≥2ºC
- Patient's temperature increases ≥1ºC and is associated with chills and rigors.

Repeat ABO and Rh typing on patient and donor blood; compare with previous reports. **Repeat crossmatch and antibody screen** on donor and recipient. **Antibody identification** if indicated.

Under Direction of Pathology:

Hemoglobin and hematocrit: Look for expected increase from amount of blood infused or lack of increase... was there an appropriate rise? (But in the bleeding patient, for instance, the hemoglobin may not rise anyway.)

Urinalysis for free hemoglobin: A red supernatant in the centrifuged urine specimen, positive for hemoglobin. Watch for brown as well as red urine. Urine dipsticks also provide reactions for bilirubin and urobilinogen. Follow urine output and record it.

Test for **haptoglobin** in recipient (haptoglobin may decrease even following uneventful transfusions).

In case of possible DIC (disseminated intravascular coagulation), baseline studies include platelet count, prothrombin time, PTT, fibrin split products, fibrinogen, and thrombin time. Oozing from venipuncture site or from a surgical wound is an indication for as many of these tests as can be done stat; preferably, all of them. Such microvascular bleeding has often been the only clue to a hemolytic reaction occurring during surgery.

Serum bilirubin, BUN and Creatinine

Logistics

Test Indications:

Report all adverse effects of transfusion at once to the Blood Bank for follow-up and investigation. Reactions may be indicated by any of the following:

Chills, temperature elevation, hematuria, dyspnea, urticaria, lower back pain, shock.

The provider in charge of the transfusion must investigate all reported specimen reactions, with interpretation and recommendations recorded in the patient's chart. The FDA requires a full report of all fatal transfusion reactions. Report also any suspected cases of transfusion-associated infectious disease to the Transfusion Service so that implicated donors can be traced and investigated.

Lab Testing Sections: Transfusion Services

Referred to: Complex investigations may be referred to Memorial Blood Center-Mpls, or American Red Cross/North Central blood Services-STP.

Phone Numbers: MIN Lab: 612-813-6824

STP Lab: 651-220-6558

Test Availability: Daily, 24 hours

Turnaround Time: Initial investigation is performed immediately (approximately 30minutes); 1 hour for other routine studies except culture.

Special Instructions:

The patient's vital signs, general appearance, and symptoms should be closely observed pretransfusion, at least 15 - 30 minutes after the beginning of the blood or blood component administration and post-transfusion. If chills, temperature elevation of ≥1.0ºC, hematuria, dyspnea, urticaria, pain in lower back and/or shock develop, the following steps must be taken by the transfusionist:

1. Stop the transfusion to limit the amount of blood infused.

2. Notify the patient's provider.

3. The intravenous line should be kept open with a slow infusion of normal saline.

4. Report to the Transfusion Service immediately.

5. Perform clerical check of all labels, forms and patient identification.

6. Complete Transfusion Reaction Report Form. Please print the Transfusion Reaction Report form from the "Forms" section for completion.

7. Send the discontinued unit of blood, administration set and forms to the Transfusion Service per their instructions.

8. Patients may need to have additional specimens collected. Confer with Transfusion Service personnel.

9. The transfusion reaction workup should be completed before the patient receives another transfusion. Please print the Transfusion Reaction Evaluation form from the "Forms" section for completion.

Specimen

Specimen Type: Whole blood

Container: Lavender top tube (EDTA)and Green top tube (Lithium Heparin)

Draw Volume: 2 - 5 mL blood in a Lavender top tube (EDTA) and 2 mL blood in a Green top tube (Li Heparin)

Collection: All specimens submitted to the Transfusion Service must be appropriately labeled at bedside with the time and date of collection, and the signature of the individual collecting the specimen. A completed order, either through the HIS or general requisition must accompany each specimen. It is not always necessary to collect a new sample prior to the provision of blood for patients. Consult with the Transfusion Service prior to collecting additional samples if status unknown.

Special Processing: Lab Staff: Refrigerate specimen

Patient Preparation:	Refer to Collection of Patient Specimens for full details. The patient must be positively identified when the specimen is collected. The label on the blood specimen must correspond with the identification on the patient's Medical Records band (or ED ID) and on the physician's/practitioner's orders. The specimen must be timed, dated and signed by the phlebotomist at bedside.
Sample Rejection:	Gross hemolysis; sample placed in a serum separator tube; specimen tube not properly labeled

---

Interpretive

Reference Range:	Negative
Critical Values:	Acute Hemolytic Reaction
Limitations:	The transfusion reaction work-up will mainly detect those reactions caused by red cell incompatibility and with culture; those caused by bacterial contamination of the infused unit. The conventional investigation may not detect reactions to white cells, platelets, or to plasma proteins such as IgA reactions. Circulatory overload and allergic reactions do not need to be evaluated as possible hemolytic reactions.
Contraindications:	The two most common complications of transfusion are urticaria and fever. Urticaria (hives, rash, itching) occurs in about 1% of transfusions and does not call for a full reaction work-up. An antihistamine by mouth or by vein usually relieves such symptoms. The patient's physician may decide to continue the transfusion after symptomatic medication, bearing in mind the risk of giving more allergen to a demonstrably allergic patient. Fevers and chills (a sharp rise of at least 1.0ºC, sustained, without other causes of fever) indicate **a febrile nonhemolytic transfusion reaction**. Most such reactions are caused by a recipient's antibody to donor leukocytes and respond to symptomatic antipyretic medication. Since true hemolytic reactions may start with fever, the investigation must rule out hemolysis. The time needed to do this usually precludes restarting transfusion of the unit implicated. If a patient has repeated febrile reactions, provide washed red cells and platelets in addition to leukocyte reduction. Culture of the unit is indicated if the temperature increase of 1ºC is associated with chills and rigors. If a patient has sustained high fever (increase ≥2ºC), bloody emesis, diarrhea, or **signs of sepsis, toxemia, or "red shock,"** suspect bacteremia or endotoxic shock from contaminated blood. Immediate, intensive treatment is essential for this very dangerous reaction. A Gram's stained smear and culture from the suspected unit and blood culture from the patient will be diagnostic. **Most fatal transfusion reactions involve clerical (labeling) error and incompatibility in the ABO system, with intravascular hemolysis.** Hemolytic transfusion reactions are characterized by fever, flushing, a feeling of apprehension, chest or back pain, chills, nausea, vomiting, and

in severe cases, shock, oliguria, hemoglobinuria, bleeding, and renal failure.

If a hemolytic transfusion reaction is suspected, the transfusion must be discontinued immediately, the Transfusion Service notified at once and appropriate clinical measures taken to support circulation, renal failure, and coagulation. Bacterial pyrogens, circulatory overload, air embolism, faulty blood warming apparatus, inappropriate storage of blood or components before infusion, and medications added to the blood unit or infusion tubing are other causes of transfusion reactions. These are not always detected by the transfusion reaction work-up. Most are prevented by careful transfusion technique.

Delayed transfusion reactions are often missed. They may be detected by unexplained anemia, by a positive direct antiglobulin test, or by the detection of an unexplained antibody, which was absent when the type and screen were done. Report any case of an unexplained liver dysfunction occurring 2 weeks to 6 months after transfusion to the Transfusion Service because this may be secondary to post-transfusion hepatitis (hepatitis C, cytomegalovirus, or now rarely, hepatitis B.

References:

Technical Manual, Current Edition, Bethesda MD, AABB