

University of California, Davis Medical Center  
Department of Pathology, Transfusion Services  
2315 Stockton Blvd, Sacramento, CA 95817

**TRANSFUSION REACTIONS**

**Administrative Procedure BB2476.A**

**PURPOSE**

To define a suspected transfusion reaction and the procedures for detection, reporting, investigating, and evaluating suspected transfusion reactions.

**PRINCIPLE**

A transfusion reaction is an adverse consequence of transfusion of blood components. Transfusion reactions may be immediate or delayed:

1. Immediate acute transfusion reactions
  - a. Urticaria
    - Symptoms: Rash, hives, welts
    - Etiology: Antibody to plasma proteins
  - b. Febrile
    - Symptoms: Fever
    - Etiology: Donor's granulocytes
  - c. Dyspnea
    - Symptoms: Shortness of breath
    - Etiology:
  - d. Anaphylaxis
    - Symptoms:
    - Etiology: Antibody to IgA suspected
  - e. Marked fever with shock
    - Symptoms: Drop in blood pressure or shock
    - Etiology: Bacterial contamination
  - f. Hemolysis with symptoms (Acute intravascular hemolytic transfusion reaction)
    - Symptoms:
      - 1) Pain in the back
      - 2) Patient voicing a feeling of impending doom
      - 3) Pink urine without red cells in urine
      - 4) Diffuse bleeding or hemolysis in serum,
      - 5) Oozing from puncture or incision sites, etc.
    - Etiology:
      - 1) Red cell incompatibility
      - 2) Physical destruction of blood, eg, freezing or overheating
      - 3) Mixing nonisotonic solutions with red blood cells
  - g. Congestive heart failure
    - Symptoms:
    - Etiology: Volume overload
2. Delayed transfusion reactions
  - a. Hemolysis
    - Symptoms:
      - 1) Jaundice
      - 2) Unexplained drop in hematocrit
      - 2) Positive direct Coomb's 3-12 days post transfusion.
    - Etiology: Anamnestic antibody to red cell antigens
  - b. Transmitted diseases: hepatitis, AIDS, and CMV.

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The personnel attending the patient must immediately notify the responsible physician and the Transfusion Services of any adverse reaction. The Transfusion Services must evaluate the transfusion reaction promptly and to the extent considered appropriate by the Medical Director or a designee. The transfusion reaction workup should not delay proper clinical management.

**PROCEDURE**

1. Patient's nurse must notify the Transfusion Services and patient's physician that the patient has had a transfusion reaction.
2. The Transfusion Services personnel will use the checklist (See Example 1) to request the nurse to:
  - a. Stop transfusion immediately.
  - b. Perform clerical check for patient identification (check patient's ID on the arm band and on the crossmatch slip) to ensure correct unit is transfused to the correct patient.
  - c. Identify the name of the patient, medical record number, DOB, and the ward/location of the patient.
  - d. Describe the symptoms and record the symptoms.
  - e. Send appropriately labelled samples (7 cc clotted blood and 10 cc urine collected after reaction) ASAP and slips, except for patient with urticaria symptom (See Note 1).
  - f. Send the remainder of the implicated unit(s) or empty blood bags and attached administration set and I.V. fluids to the Transfusion Services for transfusion reaction workup.
  - g. Follow suggested medical therapy in UCDMC Hospital Policies and Procedures Manual, section 3110, Suspected Transfusion Reaction.
  - h. Indicate whether pall filter is used.
  - i. Fill out form completely when it arrives.
3. Send a Transfusion Reaction Investigation Form to the ward to be filled out by patient's physician and request the form to be returned to the Transfusion Services ASAP.
4. Notify the Medical Director or the designee **immediately** of all transfusion reactions, except for cases of mild urticaria alone.
5. Laboratory workup should be performed by a technologist other than the one who performed the original crossmatch to avoid duplication of a previous error.
6. The Transfusion Services personnel must **immediately** check the following for discrepancies:
  - a. Patient's name, medical record number, and DOB on the crossmatch slip, order form, and issue/transfuse card. If a discrepancy is found, **immediately** search the records to find if another patient or donor blood has been misidentified or incorrectly issued.
  - b. ABO & Rh compatibility (Patient's blood type vs. unit's blood type)
  - c. Donor unit ID number
  - d. Patient's previous records
  - e. Correct interpretation of blood type, antibody screen results, and compatibility testing results
  - f. Verification label of unit ABO and Rh (if negative) is present.
  - g. Expiration date and time of the donor unit.
  - h. Check for the overall appearance of the blood bag, administration set, saline, and estimate the amount of blood remaining in the bag. Check for purple or brown color,

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hemolysis, gas bubbles, clots, abnormal masses, opaque or muddy looking plasma or peculiar odor.

7. Retrieve pre-transfusion specimen from the designated refrigerator according to BB \_\_\_\_\_ T.
8. Proceed laboratory workup as follows:
  - a. For urticaria or allergic transfusion reaction: No transfusion reaction workup is needed.
  - b. For all other types of transfusion reactions, perform the following minimum workup:
    - 1) ABO & Rh typing on both pre-transfusion and the first post transfusion specimens.
    - 2) Check hemolysis on both pre-transfusion and the first post transfusion specimens.
    - 3) DAT on both pre-transfusion and the first post transfusion specimens.
    - 4) Urine test on first post transfusion specimen.

**Request the floor to send a 6 hour post specimen if the patient has a acute hemolytic transfusion reaction.**
  - c. Optional tests to be performed (pending on the type of the transfusion reactions) at the request of the Medical Director or the designee.
    - 1) For transfusion reactions with fever or chills:
      - ? a) Antibody screen by albumin and enzyme methods on both pre-transfusion and the first post transfusion specimens.
      - b) Gram stain and culture of blood bag(s)
      - c) Send pretransfusion serum specimen to SMFBC for leukoagglutinins testing
      - ? d) Repeat x-M
    - 2) Dyspnea transfusion reaction
      - a) Send pretransfusion serum specimen to SMFBC for leukoagglutinins testing
    - 3) Anaphylactoid transfusion reaction
      - a) Send pretransfusion serum to Immunology for IgA testing.
    - 4) Marked fever with shock transfusion reaction (Bacterial contaminated unit):
      - a) Gram stain and culture of blood bag(s)
      - b) Send pretransfusion serum to Immunology for IgA testing.
    - 5) Hemolysis with symptoms (Acute intravascular hemolytic transfusion reaction)
      - a) Antibody screen by albumin and enzyme methods on both pre-transfusion and the first post transfusion specimens.
      - b) Gram stain and culture of blood bag(s)
      - c) Send pretransfusion serum specimen to SMFBC for leukoagglutinins testing
      - ? d) Repeat x-M
      - e) Repeat ABO & Rh (if negative) on the donor segment attached to the donor unit or directly from the blood bag.

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- f) Total bilirubin on pre-transfusion and the first and second (6 hr) post transfusion specimens.
  - g) Serum hemoglobin on both pre-transfusion and the first post transfusion specimens.
  - h) Haptoglobin on both pre-transfusion and the first post transfusion specimens.
  - i) BUN and clotting studies on both pre-transfusion and the first post transfusion specimens.
  - j) Minor crossmatch
  - 6) Sepsis with T antigen activation due to administering of fresh frozen plasma or platelets.
    - a) T lectin test
  - 7) Jaundice, unexplained drop in hematocrit or positive direct Coomb's 3-12 days post transfusion (Delayed intravascular hemolytic reaction).  
Follow procedures for acute hemolytic reaction steps a-h.
9. Report all the results to the Medical Director or the designee.
10. The Medical Director or the designee immediately recommend/notify patient's physician of the following:
- a. For urticaria or allergic transfusion reaction:
    - 1) Premedicate the patient
    - 2) Resuspend the platelets
  - b. For all other types of transfusion reactions:
    - 1) If the serum is hemolyzed after specimen is spun down, immediately request the redraw which should be done with extreme care to prevent mechanical trauma causing hemolysis. If the second properly drawn specimen still demonstrated hemolysis, an acute hemolytic transfusion reaction is suspected.
    - 2) If a ABO and Rh typing discrepancy is found on pre and/or post specimens and/or donor units,
    - 3) If the DAT is positive on pre and/or post specimens, an elution should be performed immediately and tested against panel cells.
    - 4) If the antibody screen of pre and/or post specimens becomes positive, or the major or minor crossmatch on the implicated donor unit is incompatible, perform antibody panel to identify unknown antibody(ies). Phenotype the donor units and recrossmatch as needed.
    - 5) If the following findings are observed, delayed hemolytic transfusion reaction is suspected:
      - a) Occurs 3-14 days post transfusion
      - b. Increased retic count
      - c) Brief fall in Hemoglobin or Hematocrit
      - d) Mild transient hyperbilirubinemia
      - e) Mild fever
      - f) Positive DAT
      - g) Development of one or more antibodies - most commonly implicated are Kidd, Duffy, and Rh antibodies.
- 5) When a fatality occurs due to complication of blood transfusion, notify the

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Director, Bureau of Biologics, US FDA Center for Biologics by telephone ASAP. A written report of the investigation shall be submitted to the Director, Bureau of Biologics, within 7 days after the fatality by the Transfusion Services. Also notify the State of California, Sacramento Medical Foundation Blood Center (SMFBC), and the county coroner.

Phone Numbers:

- a) Food and Drug Administration  
Quality Assurance Department: (301)-295-8089
- b) State of California  
Department of Health Services Epidemiology Branch: (916)-324-2833
- c) Sacramento County Coroner: (916)-732-3820
- d) SMFBC: (916)-456-1500

- 11. Specimen storage: After completion of the workup, place the pre and post transfusion specimens, segments, donor blood bags (all together) in a cup, and labelled with patient's name, medical record number and the dates of specimen collections.

**NOTES**

- 2. Hemolysis check should be performed ASAP after specimen is spun. Request the redraw to be done with extreme care to prevent mechanical trauma which may cause hemolysis of red cells. If the second properly drawn specimen still demonstrates hemolysis, hemolytic transfusion reaction is suspected.
- 3. If the Transfusion Reaction Investigation form has not been received in the Transfusion Services 4 (?) hours after the onset of the transfusion reaction, inform the Medical Director or the designee.