

Standard Operating Procedure for Pre-Transfusion Testing

Purpose:

The purpose of pre-transfusion testing is to select blood components that will not harm the recipient and that will have acceptable survival when transfused. If performed properly, pre-transfusion tests will confirm ABO compatibility between the component and the recipient and detect most clinically significant antibodies.

Materials:

Transfusion Medicine Request form

[Associated SOPs—Include related Blood Bank SOPs that will be used for compatibility testing]

Procedure:

I. INITIATION OF A TRANSFUSION REQUEST

- A. Who Can Order Blood?—Only a physician can initiate an order to administer blood.
- B. How is Blood Ordered?—The physician's order must be written on a *Transfusion Medicine Request* form (that is sent to the Blood Bank), and shall specify:
 1. Patient's first/last names
 2. Patient's date of birth
 3. Patient's gender/age
 4. Patient's diagnosis and past transfusion/pregnancy history (if applicable)
 5. Desired blood component (e.g., RBCs, platelets, etc.)
 6. Indication for transfusion
 7. Number of units to be transfused
 8. Date to be transfused
 9. Name of physician ordering transfusion
- C. Samples—If patient blood sample has not been submitted to the Blood Bank prior to request for blood, it must be submitted at this time.
 1. Patient's blood sample consists of one 5 mL red top (clot) tube

2. Patient's blood sample must be obtained in such a way that identity of the patient is confirmed
3. Person who draws patient's blood sample must do the following:
 - a. Label sample tube with patient's first/last names and date of birth
 - (1) This must be done by blood drawer before leaving patient's bedside
 - (2) NOTE: Names/birth date on the tubes must perfectly match those on the *Transfusion Medicine Request* form
 - b. Initial the tube so as to confirm who obtained it
4. Confirm sample identity in the Blood Bank
 - a. When sample and *Transfusion Medicine Request* form arrive in Blood Bank, a trained member of staff must confirm that information on label and on form is identical (i.e., that it matches)
 - b. If there is any doubt about identity of patient, a new sample must be obtained
 - c. An incorrectly labeled sample must not be corrected in Blood Bank (rather, in all but absolutely emergent situations, a new sample must be drawn)
5. Appearance of sample
 - a. Whenever possible, a hemolyzed sample should be replaced with a new specimen
 - b. The same applies to markedly lipemic plasma
6. Age of sample—When sample is to be used for red blood cell crossmatching, it must be no more than 3 days old (Exception—if patient has not been transfused or pregnant in the past 3 months)
7. Retaining and storing sample
 - a. Recipient's blood specimen and sample of donor's red blood cells must be sealed and stored in refrigerator for > 7 days following transfusion
 - b. Keeping patient's and donor's samples allows repeat or additional testing if patient experiences adverse effects of transfusion

II. Blood Bank Compatibility Testing

A. ABO/Rh Testing

1. Prior to all non-emergent transfusions, the patient's ABO/Rh testing must be performed
2. Testing must be done in forward (i.e., with anti-A and anti-B) and reverse (i.e., with A₁ and B red cells) manner
3. Any discrepant results should be resolved before blood is transfused (however, in such cases, if RBCs are urgently needed, type O RBCs may be given until resolution is achieved)
4. Anti-D testing also must be done, with suitable controls to avoid false-positive reactions
5. If discrepancies in D typing arise, patient should be given D-negative (i.e., Rh-negative) RBCs until resolution occurs

B. Detecting Unexpected Antibodies to Red Cell Antigens

1. Goals—
 - a. To detect as many clinically significant antibodies as possible
 - b. To detect as few clinically insignificant antibodies as possible
 - c. To complete the procedure in a timely manner

2. Minimum Requirements
 - a. Tests for unexpected antibodies should use two or three unpooled reagent red cells
 - b. Method should include an antiglobulin test preceded by 37° C incubation
 - c. Each negative antiglobulin test must be followed by a control system of IgG-sensitized cells (i.e., to prove that negative reaction was not erroneous)
- C. Reading and Interpreting Reactions
 1. Hemolysis or agglutination that constitutes a visible endpoint of a red cell antigen-antibody interaction must be observed consistently and accurately
 2. Strength of agglutination (or degree of hemolysis) observed with each cell sample should be recorded immediately after test is read
 3. All laboratory personnel should use same nomenclature/grading system
- D. Practical Consideration—Antibody identification may be performed in advance of, or together with, crossmatch between patient's serum and donor's RBCs
- E. Comparison with Previous Records
 1. Results from current tests must be compared with previous records (if there has been prior testing), and the comparison must be documented
 2. Corroboration between previous and current ABO/Rh test results gives assurance—but not proof—that no identification or testing errors have occurred
 3. Records also are reviewed for past history of clinically significant red cell antibodies and past histories of transfusion reactions
 4. Even if the current antibody detection test is negative, the antiglobulin phase of the crossmatch is required for patients with histories of clinically significant antibodies
- F. Crossmatching Tests
 1. Overview
 - a. Unless there is an urgent need for blood, a crossmatch must be performed prior to any RBC transfusion
 - b. Method used must demonstrate ABO incompatibility and clinically significant antibodies to red cell antigens (unless no current/prior history of red cell alloantibodies, in which case, only ABO compatibility must be confirmed)
 2. Logistics
 - a. Red cells used for crossmatching must be obtained from a segment of tubing originally attached to blood container
 - b. If no red cell alloantibodies have been identified on the indirect antiglobulin test (and patient has no past history of alloantibodies), then an immediate spin crossmatch may be performed
 3. Testing for Infants \leq 4 Months Old
 - a. Initial pre-transfusion sample must be obtained from infant to determine ABO/Rh type (only forward typing is required)
 - b. Serum or plasma from either infant or mother may be used for antibody screening and crossmatching
 - c. Infant's serum need not be tested for ABO antibodies unless non-group O RBCs are to be transfused
 4. Routine Surgical Blood Orders
 - a. Blood ordering requirements for common procedures can be developed from previous records of blood use

- b. The surgeons, anesthesiologists, and Blood Bank Medical Director should agree on the number of units required for each procedure
 - c. Once a surgical blood ordering schedule has been established, the Blood Bank routinely crossmatches the predetermined number of units for each case (however, modifications may be made, depending upon the patient's pre-existing condition)
5. The Type and Screen
- a. This is a policy in which patient's blood sample is tested for ABO/Rh and unexpected Red cell antibodies, then stored in refrigerator in case crossmatching is required
 - b. This is done for patients who rarely need crossmatched blood (so as to avoid performing the costly crossmatch)

III. LABELING AND RELEASE OF BLOOD COMPONENTS BY BLOOD BANK

- A. The following must take place at the time of issue of the blood component(s) to the floor:
1. Tag or label indicating the following must be attached securely to blood container:
 - a. Recipient's first/last names and birth date
 - b. Donor unit number
 - c. Compatibility test results, if performed (not applicable to RBC components transfused urgently and non-RBC components)
 2. There must be mechanism to identify intended recipient and requested blood component at time of issue
 3. Special transfusion requirements must be identified (e.g., CMV-negative, leukoreduced, etc.)
- B. Records for each component issued must be maintained in Blood Bank. The record for each unit shall include:
1. Recipients' first/last names and birth date
 2. Product name, including any special transfusion requirements
 3. Recipient ABO group and (if needed for the type of component requested) Rh type
 4. Donor unit number(s)
 5. Donor ABO group and (if needed for the type of component requested) Rh type
 6. Interpretation of crossmatch tests, if performed (if not performed, and the request is for a RBC unit, the label must very clearly state, "CROSSMATCH NOT PERFORMED")
 7. Date and time of issue
 8. Identity of person issuing blood
 9. Identity of person who picked up blood, or to whom blood was delivered
- C. Miscellaneous
1. After transfusion, a record of transfusion should become part of patient's medical record
 2. Before issuing blood, Blood Bank personnel must inspect each unit to ensure it does not have an abnormal appearance (this inspection must be documented)

3. Final identification of recipient and blood container rests with transfusionist, who must identify patient and donor unit and certify that identifying information on forms, tags, and labels are in agreement

IV. SELECTION OF UNITS

A. ABO Compatibility

1. Whenever possible, patients should receive ABO-compatible blood (however, this will not always be possible)
2. If component to be transfused contains ≥ 2 mL RBCs, donor's RBCs must be ABO-compatible with recipient's plasma
3. ABO antibodies in transfused plasma should be compatible with recipient's red cells when feasible
4. See Table, below, for requirements for components and acceptable alternatives:

Type of Component	ABO Requirements
<i>Whole blood</i>	Must be identical to that of recipient*
<i>Red blood cells</i>	Must be compatible with recipient's plasma
<i>Granulocytes</i>	Must be compatible with recipient's plasma
<i>Fresh frozen plasma</i>	Should be compatible with recipient's red cells**
<i>Platelets</i>	All ABO groups are acceptable; however, units compatible with recipient's red cells are preferred
<i>Cryoprecipitate</i>	All ABO groups acceptable

**Because a large volume of plasma is present in whole blood*

***In rare instances, however, one may have to transfused non-plasma-compatible units*

B. Rh Type

1. Rh-positive blood components should be used for Rh-positive recipients (even though Rh-negative units will work fine in such instances, they should be reserved, whenever possible, for Rh-negative patients)
2. D-negative patients should receive D-negative RBCs; however, that might not always be possible

C. Other Blood Groups

1. Antigens other than ABO and D are not routinely considered in the selection of RBC units; however, if patient has a clinically significant, unexpected antibody, antigen-negative RBCs should be used for crossmatching
2. Those units that screen out as antigen-negative must be confirmed by a licensed reagent, or, when licensed reagents are unavailable, with stored specimens from patients or donors
3. Antigen-negative units are not usually used for patients who have antibodies that are not clinically significant

D. Blood Administered in Urgent Situations

1. In such situations, physician must weigh risk of transfusing uncrossmatched or partially crossmatched blood against risk of patient suffer an adverse event while awaiting the transfusion
2. The Blood Bank Medical Director should provide consultation in such situations

3. Required Procedures—When blood is released before pre-transfusion testing is complete, Blood Bank personnel should:
 - a. Issue uncrossmatched blood, which should be:
 - (1) Group O/Rh-negative RBCs, until ABO/Rh type is known (Rh is far less important than ABO, though)
 - (2) ABO and Rh compatible, if there has been time to test a current specimen for ABO/Rh (DO NOT USE PREVIOUS TEST RECORDS; MILITARY RECORDS, ETC. TO DETERMINE TYPE OF BLOOD TO TRANSFUSE!)
 - d. Indicate, in large letters, that compatibility testing was not complete at time of issue
 - e. Begin compatibility tests, and complete them promptly—If incompatibility is detected at any stage of testing, patient’s physician and Blood Bank Medical Director should be notified immediately
 - f. Have requesting physician sign statement indicating that clinical situation was sufficiently urgent to require release of blood
4. Massive Transfusions
 - a. Definition—Infusion, within a 24-hour period, of a volume of blood approximately equal to that of patient’s own blood volume
 - b. Following massive transfusion, pre-transfusion specimen no longer represents the blood currently within patient’s circulation (therefore, it is not very useful for crossmatching purposes)
 - c. Therefore, only ABO compatibility (i.e., via immediate spin crossmatches using very recent specimen) need be done subsequently until the patient’s transfusion requirement slows significantly

References:

AABB *Technical Manual*, 13th edition