1. **Principle**

To determine ABO compatibility between donor red cells and patient plasma when the antibody screen on the intended patient is negative and there is no previous history of clinically significant antibodies.

In the immediate spin crossmatch, donor red cells and patient plasma are combined and centrifuged at room temperature. After centrifugation, the red cells are observed for direct agglutination or hemolysis.

Agglutination or hemolysis usually indicates the presence of IgM antibodies (e.g., ABO or cold antibody).

1. **Scope and Related Policies**
   1. Compatibility testing shall be performed before red cells are transfused9.1, except in life-threatening situations.
   2. When there is insufficient time to complete the ABO and Rh group of the recipient or a sample cannot be obtained, group O red cells shall be issued. In this situation, group O Rh negative red cells should be issued for women of childbearing age and children.9.1
   3. If red cell units are issued before compatibility testing is complete, the issue voucher shall indicate that testing is incomplete. This information shall be documented in the recipient’s medical record. Should the red cell units subsequently prove incompatible, the attending physician and the TS Medical Director shall be informed.9.1  Infusion of incompatible units must be stopped immediately and the units set aside pending the physicians’ decision.
   4. If no clinically significant antibodies were detected in the antibody screen test and there is no record of previous detection of such antibodies, at a minimum a compatibility testing shall be performed before red cells are transfused.9.1 
      1. For patients who have been transfused with a blood component containing red cells or pregnant within the preceeding three months, or if history of transfusion or pregnancy is uncertain or unknown, the blood sample for compatibility testing shall be collected within 96 hours prior to transfusion.9.1.
      2. For patients who have not been transfused or pregnant in the past three months, plasma for compatibility testing may be stored and used at any time during the current hospital admission or as specified by facility policy.9.1 The current admission period is the time from admission to discharge, but also included up to a one month period from the time of pre-admission testing up to the current admission.
   5. Compatibility testing shall include: 9.1

* Determination of the recipient’s ABO and Rh type
* Antibody screening. The current antibody screen must be negative and there must be no known history of clinically significant red cell antibodies.
* A test to confirm ABO compatibility between donor red cells and recipient serum/plasma.
  1. It is not necessary to repeat the ABO grouping on red cells collected and prepared by the blood supplier if a serological crossmatch is performed. When the patient reverse grouping is reacting weaker than grade 2, ABO confirmation of donor units should be performed.
  2. An issue voucher shall be provided to the transfusion service for all red cells requested. This must identify: 9.1
* Recipient’s family and given name(s)
* Recipient’s identification number(s)
* Type of blood component or blood product and amount if applicable
  1. For transfusion to neonates:
     1. A venous or capillary blood specimen shall be used for all pre-transfusion testing. Cord blood must not be used for pre-transfusion testing.9.1
     2. The initial pre-transfusion blood specimen shall be tested for ABO and Rh antigens and for clinically significant antibodies.9.1
     3. If there is insufficient plasma from the neonate, maternal plasma may be used for crossmatching and antibody screening.9.1
     4. If the initial pre-transfusion antibody screen is negative, further compatibility testing during the current hospital admission in the first four months of life is not required for small volume transfusions.9.1
     5. For exchange transfusion criteria see RT.011 – Antiglobulin Crossmatch – Saline, LISS, PEG.
  2. The recipient’s blood specimen must be stored at 1-6° C for at least 7 days after the unit is transfused.9.1
  3. An identifiable segment of all donor red cell units transfused must be kept and stored at 1-6° C for at least 7 days after the unit is transfused.9.1

1. **Specimens**

EDTA anticoagulated whole blood

1. **Materials**

**Equipment:**  Serological centrifuge

Block for test tubes

Microscope

Segment device

**Supplies:** Test tubes – 10 x 75 mm

Serologic pipettes

Compatibility labels

Donor units

**Reagents:** Normal saline

**Donor unit(s):** See CSP.001 – Selection of Blood Components for Transfusion

1. **Quality Control – N/A**
2. **Procedure**

|  |  |
| --- | --- |
| **STEP** | **ACTION** |
| 1. Check the patient history and the results of a current antibody screen | 1. See PA.003 – Patient History Check.  |  |  | | --- | --- | | ***If*** | ***Then*** | | The patient has an antibody(ies) or history of clinically significant antibody(ies) | Do not perform an immediate spin, or computer crossmatch. See RT.011 – Antiglobulin Crossmatch – Saline, LISS, PEG. | |
| 1. Check the suitability of the specimen(s) | 1. Ensure that the specimen information matches the request form. See PA.002 – Determining Specimen Suitability steps 6.1 – 6.4. 2. Centrifuge specimen for 5 minutes at 3500 rpm or equivalent, if required. 3. After centrifugation, check the patient’s specimen(s) for abnormal appearance. See PA.002 – Determining Specimen Suitability step 6.5. |
| 1. Select the appropriate donor units | 1. See CSP.001 – Selection of Blood Components for Transfusion. Select units that will be in date on the date of surgery or intended transfusion. 2. Visually inspect each donor unit. See IM.003 – Visual Inspection of Blood, Blood Components and Fractionated Blood Products. 3. Arrange the donor units in order of date, the oldest one in the front 4. Record the donor unit number, including check digit and source code, date of collection, expiration date and ABO/Rh, from the unit onto the request form or scan the information into the computer system using a barcode reader. |
| 1. Label tubes | 1. Remove two stickers from the unit and attach one to each of 2 test tubes. If a sticker is not available copy full donor number onto the first tube and the last 4 digits of the donor number onto the second tube 2. Detach one segment from the unit and place it in one of the labeled tubes 3. Return the donor unit(s) to the blood product storage refrigerator 4. Repeat for each additional unit to be crossmatched |
| 1. Prepare 3% Red cell suspension | 1. Harvest cells from segment using the segment device. See Procedural Notes 8.1and 8.2. and place in tube one of the set of labeled tubes 2. Add 0.5 – 1.0 mL of normal saline to resuspend to 3%. 3. Compare the final suspension with a commercial 3% red cell suspension and adjust the suspension strength if necessary 4. Place the test tubes in the block beside the other identically labeled test tubes and in the  same order as recorded on the request form or on computer screen. |
| 1. Add patient plasma to labeled tubes | 1. Compare the names and identification number(s) on specimen with the corresponding information on the request form or computer screen 2. Add 2 drops of patient’s plasma to all See Procedural Notes 8.3 to the second of the labeled set of tubes |
| 1. Add donor unit 3% red cell suspension | 1. Add 1 drop of the appropriate donor unit 3% red cell suspension into the second of the labeled set of tubes 2. Mix and compare each tube for appearance and volume. 3. Centrifuge tubes at 3400 rpm for 10-15 seconds. |
| 1. Examine Reactions in tube | 1. After centrifugation, Examine for hemolysis. Record if present. See 7.0 – Reporting. 2. Resuspend and read macroscopically for agglutination. 3. Grade and record results immediately. See 7.0 – Reporting and RT.001 – Reading and Recording Hemagglutination Reactions |
| 1. Interpret Results =   ***Donors Incompatible*** | 1. Interpret and report the result of the crossmatch. See 7.0 – Reporting  |  |  | | --- | --- | | ***If*** | ***Then*** | | Donor units were not ABO confirmed upon receipt | Ensure the expected reactions in the patient’s ABO reverse group were grade 2 or stronger | | If expected reactions were weaker than grade 2 confirm the ABO group of all donor units crossmatched. See Procedural Notes 8.4 | | incompatible units are found | |  |  | | --- | --- | | *If* | *Then* | | All donor units are incompatible | Repeat the ABO group on the patient and donor units. | | Some of the donor units are incompatible | Repeat the ABO on the incompatible units. | | The antibody screen was positive | Perform a panel to identify warm reactive antibodies. See NRT.007 – Antibody Identification of Warm Reactive Antibodies. | | The antibody screen was negative and there was no history of clinically significant antibody(ies) and if ABO groups were correct | The incompatibility is probably due to an IgM cold reactive antibody. See Reporting 7.2 | | |  |  1. Perform a panel to identify if cold reactive antibodies are present and to identify. See NRT.006 – Antibody Identification of Cold Reactive Antibodies   Or  Perform an antiglobulin crossmatch. Prewarm technique may be helpful in the presence of cold reactive antibodies. See RT.011 – Antiglobulin Crossmatch – Saline, LISS, PEG and NRT.001 -Prewarm Technique.   1. Indicate on the request form that the donor unit(s) is incompatible. |
| 1. Interpret Results =   ***Donors Compatible*** | 1. Confirm that the antibody screen is negative and there is no history of clinically significant antibody(ies). 2. Indicate on the request form that the donor unit(s) is compatible |
| 1. Label Compatible units | 1. If there is no computer system used to issue blood components, ensure patient and unit information is recorded onto the Issue/Transfusion record form. See IM.004 – Manual Issuing Blood, Blood Components and Other Related Products Using the Issue/Transfusion Record for additional information 2. Prepare a compatibility label for each compatible unit containing the following information9.1  * Recipient’s family and given name(s) * Recipient’s identification number * ABO and Rh group of recipient * Type of blood component (e.g. RBC) * Donor unit ABO and Rh group * Donor unit number (including check digit and source code) * Compatibility status of the unit * Date and time of issue  1. Retrieve units from refrigerator 2. For each donor unit, compare the unit number printed on the blood bag with the unit number recorded on the request form and on the compatibility label. They must be identical. 3. Attach a compatibility label securely to the appropriate compatible donor units.   Check that each donor unit:   * Is suitable for transfusion by performing a visual inspection. See IM.003 – Visual Inspection of Blood, Blood Components and Fractionated Blood Products * Will be in date for the date of transfusion * Is the same ABO and Rh as the patient. If a donor unit with a different ABO and/or Rh has been selected, write an explanatory note at the bottom of the request form or compatibility label, e.g., “This unit is acceptable for transfusion.”  1. Compare the names and identification number(s) on the compatibility label and on the request form (or computer screen) to ensure they are identical |
| 1. Store crossmatched units | 1. Place the donor units in the area where crossmatched blood is stored in the refrigerator. Place the units in chronological order with the oldest unit in the front. |
| 1. Perform a clerical check | 1. For each patient, check that:  * The name and identification number(s) are identical on all specimens and on the request form * The donor unit numbers are identical on the test tubes and on the request form * All test results have been recorded * The test results have been reported and interpreted correctly. |
| 1. Complete paperwork | 1. Initial or sign and record the date on the request form or in the computer 2. Verification of results must be recorded. See 7.0 Reporting |

1. **Reporting**
   1. No agglutination or hemolysis indicates that the donor unit(s) is ABO compatible with the patient plasma.
   2. Agglutination or hemolysis of cells indicates that the donor unit is incompatible. The incompatibility may be due to an ABO or an IgM cold reactive antibody in the patient plasma.
      1. In non-emergency situations, incompatible donor units should not be transfused, the cause of the incompatibility should be further investigated.
      2. If transfusion is unavoidable, authorization by a TS Medical Director or designate must be obtained. This authorization must be documented.
2. **Procedural Notes**
   1. Clotted segments on a donor unit:
      1. If clotted segments are found, inspect the next segment attached to the bag until a segment is found that is not clotted.
      2. If all segments are clotted notify the blood supplier. See IM.005 – Final Disposition of Blood, Blood Components and Other Related Products Not Suitable for Transfusion Manual Procedure.
   2. Hemolyzed segments may only be noticeable while washing the segment (i.e., reddish supernatant).
      1. If hemolysis is found, wash another suspension using the next segment attached to the bag until a segment is found that does not hemolyse.
      2. If all segments are hemolyzed notify the blood supplier. See IM.005 – Final Disposition of Blood, Blood Components and Other Related Products Not Suitable for Transfusion - Manual Procedure.
   3. Hold the pipette or dropper vertically when dispensing plasma or reagents.
   4. High titer anti-A or B present in the patient specimen can cause steric hindrance resulting in a false negative. The use of an EDTA specimen will prevent this.
   5. If an expected positive reaction in the reverse grouping (A1 cell and/or B cell) is weak or grade 1, the specimen may not be reliable to detect an ABO incompatibility. If ABO confirmation is not done on receipt of donor units, confirm the ABO grouping on all donor

units crossmatched. Record “donor units ABO confirmed” on the request form.

1. **References**
   1. Standards for Hospital Transfusion Services Version 3 – February 2011 . Canadian Society for Transfusion Medicine, 5.2.3, 5.3 5.7.1 , 5.7.5, 5.9.2.
   2. Roback JD, ed. AABBTechnical Manual, 17th ed. Bethesda, MD: American Association of Blood Banks, 2008: 452, 897.
   3. Judd WJ. Methods in Immunohematology, 3rd ed. Bethesda, MD: American Association of Blood Banks, 2008; 21-23.
2. **Revision History**

|  |  |
| --- | --- |
| **Revision Dates** | **Summary of Revisions** |
| January 31, 2014 | * Revised name of manual * Changed the citation format in section 2.1 * Made grammatical changes in section 2.2 * Revised the wording of section 2.3 to include the importance of updating the recipient’s medical record and informing the TS Medical Director and the resource was cited * Revised wording to include the collection of a sample for compatibility testing and cited reference in section 2.4 * Minor revision to wording in section 2.7 and 2.8. * Changed PA.006 to RT.001 * Minor revision to wording in section 6.23 to include the “Type of Component” rather than the “Name of Component”, changed ‘Patient’ to ‘Recipient’ for consistency * Added “See Reporting 7.2” to section 6.25.4.1 * Reversed the order of 6.25.4.1 and 6.25.4.2 * Changed the title of the “Medical Chief” to “TS Medical Director” in section 7.2.2 * Updated the reference (9.1 & 9.2) to the latest edition/ version. |