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RBC Crossmatch Guidelines - Blood Bank

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

This document is to provide the Blood Bank staff with red blood cell (RBC) crossmatching guidelines and policies.

II. CLINICAL SIGNIFICANCE:

A. Crossmatching is performed by one of two methods: either the electronic crossmatch or a serologic crossmatch method. The majority of crossmatches are performed by the electronic crossmatch method, which uses computer logic to assist in detecting ABO incompatibility. In general, patient samples with two confirmed blood typings on file and no current or historical unexpected antibody(ies) may be eligible for electronic crossmatching.
Patients who are not eligible for electronic crossmatching will be crossmatched by a serologic method. Patients are not eligible for electronic crossmatching during computer downtimes, if they have an unresolved ABO/Rh discrepancy, or if they have a current indication or historical record of unexpected antibodies.

III. SCOPE:

A. This document applies only to patients four (4) months old and greater; it does not apply to neonates. For neonates, refer to Transfusion Medicine Procedure, *Neonatal Compatibility Testing Guidelines.*

B. This document applies to both serological and electronic crossmatching procedures. Therefore it is to be used in conjunction with Transfusion Medicine Policies Serological Crossmatch of Red Blood Cells and Electronic Crossmatch - Blood Bank.

IV. DEFINITIONS/ACRONYMS:

A. CDM: Blood Bank Computer Documentation Manual

B. MRN: Medical Record Number

C. Allogeneic RBCs: refers to all RBCs, including directed donors, that are not from autologous donation.

D. Autologous donor unit: A red blood cell donation that is made from the same person as the intended recipient.

E. Designee: any blood bank technical director, or transfusion medicine fellow.

F. Unexpected antibody: any antibody (other than naturally occurring Anti-A or Anti-B that is regularly found in normal serum or plasma) that is currently or was historically present in a patient's sample.

G. CMV: Cytomegalovirus

H. Clinically significant antibody: an antibody that;

1. is known to cause Hemolytic Disease of the Newborn or shortened survival of antigen positive RBCs.
2. requires transfusion of antigen negative red cells.
3. is usually IgG and best detectable with AHG.

I. Clinically insignificant antibody: an antibody that;

1. does not cause shortened red cell survival of antigen positive RBCs
2. does not require transfusion of antigen negative red cells,
3. is usually IgM and reacts best below 37°C.
   Antibodies that are usually considered clinically insignificant include the following specificities; Anti- IH, Anti-H, auto-Anti-I, Anti-Le^a, Anti-Le^b, Anti- P_1, Anti-M, Anti-N, and Anti-A1.

J. Current sample: a sample that was collected no more than 3 days before the current date. For example, if a sample is drawn on Monday (day 0), then the sample remains "current" all day Mon., Tues., Wed., and Thur.

K. Neonate: infant from birth through the first four (4) months of life.

L. Passively acquired antibody: is an antibody due to passive transfer from another source, e.g., transfused in donor plasma or product or RhIG.

M. RhIG: Rh Immune Globulin

N. Special Needs: a patient's special requirements for the provision of blood and blood products, e.g. irradiated, Kell negative.

O. Complete ABO/Rh typing: ABO/Rh typing that includes both a forward and a reverse typing in adults.

P. Massive transfusion: the administration of 8-10 RBC units within a 24 hour period, or the acute administration of 4-5 RBC units within a one-hour period to an adult patient.

Q. Maximum Surgical Blood Order Schedule: also known as MSBOS, SBOS, or the surgical matrix. For the purpose of this document this is defined as predetermined listing of units to be crossmatched by procedure for select surgical diagnosis.

V. SPECIMEN COLLECTION AND HANDLING:

The preferred specimen is a current 6 ml EDTA sample that is affixed with an identifying label that includes the patient's first and last name, wristband number, medical record number, collection date and phlebotomist identification. Refer to Transfusion Medicine policy, Triaging And Identifying Acceptable Samples For Testing for additional details.

VI. POLICIES:

A. Patient must have a current properly labeled sample

B. ABO/Rh Testing Requirements

1. A patient blood type must be performed on each admission for the transfusion of red blood cells.
2. All patients must have two (2) complete, separate sets of ABO/Rh results in the Blood Bank computer before crossmatching or issuing type specific units to a non-group O patient.
    a. Any ABO discrepancy must be resolved before crossmatching non-group O RBCs.
        i. If an ABO discrepancy remains unresolved and a RBC transfusion is necessary, then
        Group O immediate-spin (I.S.) crossmatch-compatible RBCs should be used.
        ii. The message "Use Group O RBCs" should be added to the patient file.
        iii. If the patient also has unexpected antibodies, then both I.S. and antihuman globulin crossmatches (usually by the gel method) are required.
        Refer to Transfusion Medicine Policy, *Resolution of ABO/Rh Discrepancies*
        for additional information.
    b. A Rh discrepancy must be resolved before Rh positive RBCs may be crossmatched.
    Refer to Transfusion Medicine Policy, Resolving ABO/Rh Discrepancies.

C. Antibody Screen Testing Requirement

1. An antibody screen must be performed on the current sample.
    a. If the antibody screen is negative, then the antibody screen requirement is met.
    b. If the antibody screen is positive, perform antibody identification studies, if

indicated.

2. Compare current results to historical records. Refer to the table *Comparison of Current Antibody Screen to Historical Record* in the Transfusion Medicine Policy, *Antibody Screening*

D. Requirement to Review Patient Record

1. Every time any order/crossmatch is performed, the technologist must review the historical record to determine if the patient had any previously detected antibodies. Refer to Transfusion Medicine Policies, Historical Blood Bank Record Check and Obtaining Patient Histories.
2. Technologists must review any special transfusion requirements for the patient before selecting units. Refer to Transfusion Medicine Policy, *Special Transfusion Requirements for Patients Greater than 4 Months Old*.
3. If it is determined that the patient has autologous, directed, or reserved units then the Transfusion Medicine Policy, Autologous and Directed Donations must also be followed.

E. Criteria for Electronic Crossmatch
A patient is eligible for electronic crossmatch if blood bank computer system is available and

1. Patient ABO/Rh has been performed twice and consecutively matches in the system.
2. Patient has a negative antibody screen performed on a current sample.
3. Patient has current ABO/Rh performed.
4. Patient has no clinically significant antibodies registered.
5. Unit has been retyped in the system.
6. Unit ABO/Rh matches patient ABO/Rh (considering alternate ABO and Rh tables).
7. Specimen is not outdated.

F. Criteria for Serological Crossmatch
A serological crossmatch must be performed anytime the computer indicates that the patient is not electronic crossmatch eligible or

1. Any time that the computer system is down/unavailable,
2. ABO/Rh requirements are not met
3. Patient has an unresolved ABO/Rh discrepancy
4. Patient has a history or current indication of unexpected antibodies.

G. Crossmatch Requirements for patients with Passively Acquired Antibodies.

1. Patients with a currently reactive, passively acquired antibody(ies), such as Passive D or CD38 antibodies, must have a serologic crossmatch performed. Crossmatched donor RBC units must be negative for the antigen that corresponds to the passively acquired antibody if applicable.
2. To ensure that an electronic crossmatch is not performed on a patient with a

currently reactive, passively acquired antibody the patient's antibody field should be updated with the antibody code **NEXM** - "Not Eligible for Electronic Crossmatch."

3. Once the patient's antibody screen reverts to negative, serologic crossmatches are no longer required and the patient becomes electronic crossmatch eligible. In order to make this policy change active in the blood bank computer, the **NEXM** antibody code should be removed.

H. Crossmatch Policies in Bleeding Emergencies

1. Emergency Issue
   If the physician requests uncrossmatched components, then refer to Transfusion Medicine Policy, Emergency Issue of Blood Products.
2. Massive Transfusion
   a. If the patient is eligible for electronic crossmatches, then electronic crossmatches will be performed.
   b. If the patient is not eligible for electronic crossmatches; compatibility testing is not complete then emergency components will be emergency issued. Refer to Transfusion Medicine Policy, Emergency Issue of Blood Products.
3. Post Issue Crossmatches
   A serologic crossmatch must be performed post issue for units dispensed by Emergency Issue, and for the first 12 units issued under the massive transfusion protocol. Refer to site specific Transfusion Medicine Policy, *Providing Components for Massive Transfusion* and Serological Crossmatching of Red Blood Cells.

I. RBC Unit Selection Based on ABO, Rh, and Inventory Concerns
The following table describes the appropriate selection of RBC units based on the recipient's ABO/Rh(D) type and inventory management concerns.

RBC Unit Selection Based On ABO,Rh and Inventory Concerns			
ABO Group of RBCs			
Recipient's ABO	**Donor**		
	Preferred	**Alternate**	
A	A	O	
B	B	O	
AB	AB	A,B,or O	
O	O	O	
Unknown, or unresolved ABO discrepancy	O	O	
Rh(D) of RBCs			
Recipients Rh(D)	**Recipient's Age / Sex/ Description**	**Donor**	
		Preferred	**Alternate**

Rh Negative	Any	Rh Negative	Rh Positive (with Medical Director Approval)
Rh Positive	Any	Rh Positive	Rh Negative
Weak D or Partial D Positive	Neonate (less than 4 months old)	Rh Negative	Refer to Transfusion Medicine Policy, *Neonatal Compatibility Testing Guidelines*.
	Females 50 years old or younger	Rh Negative	Rh Positive (with Medical Director Approval)
	Males 18 years old or younger	Rh Negative	Rh Positive (with Medical Director Approval)
	Females greater than 50 and males greater than 18 years old	Rh Positive	Rh Negative
Unknown, or unresolved ABO discrepancy	Any	Rh Negative	Rh Positive (with Medical Director Approval)

J. Inventory Management
For inventory purposes, general inventory units are selected, with consideration for the following:

1. oldest units first for adult surgical or emergency patients, and patients who are in-house.
2. fresher units (units with more than 2 weeks remaining before their expiration date) if the recipient has sickle cell disease.
3. Surgical Blood Orders and schedules (MSBOS) if applicable.

K. Transfusion of Components that are not Rh Compatible
The Blood Bank will attempt to dispense Rh Negative to Rh Negative male patients less than 18 years of age and females 50 years or younger. However, in some cases it may be necessary to transfuse Rh(D) Positive if the Rh(D) negative supply is depleted during an emergency or massive transfusion. If RBCs that are not Rh compatible must be dispensed, medical director approval must be obtained.

1. Rh(D) positive RBCs shall not be issued if the patient has developed Anti-D.
2. If the patient is a male less than 18 years of age or a female 50 years old or younger, then the Blood Bank Supervisor, Blood Bank Medical Director and/or Blood Bank Fellow must follow up with the patient's physician and suggest the use of RhIG.

L. Patients with Unresolved ABO and Rh Discrepancies must receive Group O immediate spin (I.S.) crossmatch compatible RBCs.
Note: If the patient also has unexpected antibodies then both immediate spin and AHG crossmatches (usually by the gel method) are required.

M. All crossmatched RBCs must be tagged in accordance with Transfusion Medicine

Policy, *Tagging Blood Components.*

N. All crossmatched RBCs must be dispensed leukoreduced with the exception of Autologous donors that have not been leukoreduced by blood supplier or rare RBCs that were collected and frozen prior to current leukocyte reduction practices. All non-leukocyte reduced components that are crossmatched must receive approval from the Blood Bank Medical Director or designee.

VII. QUALITY CONTROL (QC):

A. Quality control of all reagents used in testing is performed as described in Transfusion Medicine policy, *Quality Control of Blood Bank Reagents* and documented in the Blood Bank computer system or on paper per site specific procedures.

B. A visual inspection is performed on RBCs at the time of crossmatch. If a technologist notices that any RBC is of questionable purity or quality, it will be discarded or placed into quarantine. Refer to Transfusion Medicine Procedure, *Blood Product - Quarantine or Discard*.

VIII. PROCEDURE:

A. In the Blood Bank computer, confirm that all Sample Labeling and Testing Requirements are met and that the patient current sample meets the criteria for a pre-transfusion sample. Refer to Transfusion Medicine policies, Transfusion Services Criteria for Specimen Acceptability and Triaging And Identifying Acceptable Samples For Testing

    1. If testing is incomplete and request for Urgent Blood product is received proceed to Transfusion Medicine Policy, *Emergency Issue of Blood Products*.
    2. Complete any pending testing if indicated.

B. Determine if patient meets the eligibility criteria for electronic crossmatch. Refer to policy, Criteria for Electronic Crossmatch and Transfusion Medicine Policy, *Electronic Crossmatch of Red Blood Cells*.

C. Determine whether the patient has any other special transfusion requirements (e.g., irradiated or CMV neg).

    1. These requirements display in the “Messages” field of the patient’s caution window of the Blood Bank computer record.
    2. RBC unit(s) selected for crossmatching must meet the patient’s special transfusion requirements, if applicable. Refer to Transfusion Medicine policy, *Special Transfusion Requirements for Patients Greater than Four Months Old*.

D. Determine whether the patient has autologous or directed units.

    1. “Autologous” displays in the “Messages” field of the patient’s caution window of the Blood Bank computer record.
    2. Directed units display as a held unit in the patient's caution window of the Blood Bank computer record.
    3. If the patient has autologous or directed RBCs, then also comply with the policies of Transfusion Medicine Policy, *Autologous or Directed Donations*.

E. Determine whether the patient has unexpected antibodies.

1. Antibodies display in the "Antibody" field of the patient's caution window of the Blood Bank computer record.
2. If unexpected antibodies are present, then the unit must be crossmatched with serologic methods. Refer to Transfusion Medicine Policies; Serologic Crossmatch of Red Blood Cells, and Policies for Providing RBCs to Patients with Unexpected Antibodies.

F. Select RBC(s) for crossmatch. Refer to the table, *RBC Unit Selection Based On ABO,Rh and Inventory Concerns above.*

G. Perform the Electronic crossmatch or Serological crossmatch based on patient eligibility. Refer to Transfusion Medicine Policy, *Electronic Crossmatch of Red Blood Cells* & *Serological Crossmatching of Red Blood Cells*.

IX. REFERENCES:

1. AABB Standards for Blood Banks and Transfusion Services, current edition.
2. AABB Technical Manual, current edition.
3. College of American Pathologists Transfusion Medicine Checklist, current CAP standards.

Approval Signatures

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Applicability

Dearborn, Farmington Hills, Grosse Pointe, Royal Oak, Taylor, Trenton, Troy, Wayne