Wake Forest® Baptist Health	**DOCUMENT TYPE:** ☒ Policy	**ORIGIN DATE IN TITLE 21** 5/22/2020
CLIA Lab Director: Gregory Pomper, MD	**LAB DEPARTMENT:** Blood Bank	**CONTACT:** Blood Bank Management

APPLICABLE LABORATORY(S)):

☒ North Carolina Baptist Hospital (NCBH)
☐ Lexington Medical Center (LMC)
☐ Davie Medical Center (DMC)
☐ Wilkes Medical Center (WMC)
☐ High Point Medical Center (HPMC)
☐ Westchester
☐ Clemmons

PROCEDURE STATEMENT

The purpose of this policy is outline the crossmatch protocol. The crossmatch must detect ABO incompatibility either serologically or electronically. The crossmatch shall include an antiglobulin test in the presence of a current or historical clinically significant antibody to detect clinically significant antibodies to red cell antigens.

SCOPE

i. Protocol owner/Implementer: Julie H. Simmons/Christina S. Warren
ii. Protocol prepared by: Julie H. Simmons
iii. Who performs protocol: Department staff/management

DEFINITIONS

A. Policy: As defined in the Policy on Creating and Amending Policy, a statement of principle that is developed for the purpose of guiding decisions and activities related to governance, administration, or management of care, treatment, services or other activities of WFBH. A policy may help to ensure compliance with applicable laws and regulations, promote one or more of the missions of WFBH, contain guidelines for governance, and set parameters within which faculty, staff, students, visitors and others are expected to operate.
B. WFBH Lab System: Wake Forest Baptist Lab System is a health system that includes Wake Forest Baptist Medical Center and all affiliated organizations including Wake Forest University Health Sciences (WFUHS), North Carolina Baptist Hospital (NCBH), Lexington Medical Center (LMC), Davie Medical Center (DMC), Wilkes Medical Center (WMC), High Point Medical Center (HPMC), Lab at Westchester and Lab at Clemmons.
C. SCC: Soft Computer Consultants, Blood Bank computer system
D. AHG: Anti human globulin
E. XM IS: Immediate spin Crossmatch
F. IS: Immediate Spin
G. XME: Crossmatch Electronic: Computer checks for ABO compatibility

H. XM: Crossmatch
I. AHG XM: Anti human globulin crossmatch
   - PEG: Crossmatch testing media
   - Gel: Crossmatch testing media
   - LISS: Crossmatch testing media
J. FULL XM: IS crossmatch AND antiglobulin crossmatch
   - For gel testing, immediate spin + IgG phase.
   - For PEG testing, immediate spin + 37C check for hemolysis + IgG phase
   - For LISS testing, immediate spin + 37C + IgG phases
   - For Saline testing, immediate spin + 37C + IgG phases
K. DAT: Direct Antiglobulin Test
L. IgG: Immunoglobulin G: Potentially clinically significant antibodies
M. IgM: Immunoglobulin M
N. MTP: Massive Transfusion Protocol

O. CLINICALLY SIGNIFICANT allo antibodies: Frequently associated with Hemolytic Disease of the Fetus and newborn, with hemolytic transfusion reaction or with notably decreased survival of transfused red cells.
   Antibodies reactive at either 37C or in the antiglobulin (AHG) phase are more likely to be clinically significant. These typically require both an immediate spin crossmatch and an antiglobulin crossmatch even when antibody is no longer detected. The crossmatch units should be antigen negative as indicated above even when antibody is no longer detected. If commercial antisera is not available and antibody is reacting, then full crossmatch is required.

P. CLINICALLY INSIGNIFICANT allo antibodies: NOT associated with Hemolytic Disease of the Fetus and Newborn, with hemolytic transfusion reactions or with notably decreased survival of transfused red cells. These antibodies are typically reactive at Room Temperature or below and may be naturally occurring. These typically require an immediate spin crossmatch only. The crossmatch units are usually NOT screened for antigens.

POLICY GUIDELINES

A. Crossmatch Protocols

1.0 The serologic crossmatch is used in the detection of blood group antibodies to antigen on donor red blood cells by combining patient serum/plasma with donor red cells to allow antigen-antibody interaction.

2.0 Crossmatch procedures are performed on packed red blood cells, granulocyte pheresis and platelet pheresis which contain more than 2mL of red cells.

3.0 ABO incompatibility is tested serologically with the immediate spin crossmatch (XM IS) or electronically (XME) using the computer.

4.0 Immediate spin crossmatch is required for patients with an ABO discrepancy that results in an interpretation of “No Group” except neonates up to 4 months**.**

5.0 The IS procedure (IS XM) or electronic crossmatch (XME) is used in compatibility testing of all transfusion recipients who lack clinically significant blood group antibodies AND have no history of clinically significant antibodies.

5.1 Crossmatch performed by automation is not currently validated or authorized for immediate spin crossmatch.

5.2 The electronic crossmatch (XME) has been validated on site for electronic (computer)crossmatch (XME) to ensure only ABO-compatible whole blood or red cells are selected for transfusion.

5.3 Criteria for electronic crossmatch validation includes the below:

a. Electronic computer crossmatch must be used with a validated electronic crossmatch program. (Cannot use during downtime)
b. Two (2) determinations of the patient's ABO/Rh on file with no discrepancies and they must match.
c. Returning patients can use a previously resulted blood type to qualify IF testing occurred after February 11, 2006 in Sunquest. If testing occurred prior to this date, repeat of ABO/Rh must occur.
d. For new patients (no previous record),
    i. Collected by inpatient phlebotomy:

    the ABO/Rh blood type may come from the same specimen that is repeated by a different tech (ABO2 is test ordered).

    ii. Collected by nursing or outpatient phlebotomy:

    The ABO/Rh blood type MUST come from a separate specimen collected at a different time OR Group O red cells, low titer whole blood or granulocytes must be transfused. Specimen may be obtained from Core Lab if available.

    - ABOEO may be ordered and performed on the same sample to allow electronic crossmatch of Group O units until new sample is received.

e. The antibody screen must be resulted as NEGATIVE.
f. The patient has NO clinically significant antibodies in the ABID field or history of clinically significant antibodies.
g. ABO recheck on sample with add-on is NOT required.
h. ABO recheck must be completed on each unit of blood and ABO compatible with patient.
i. Patient blood specimen must NOT be expired.

6.0 The crossmatch should include the antiglobulin tests IF clinically significant antibodies were detected in current screening tests OR previous detection of such antibodies (historical record).

6.1 The completion of the crossmatch (XM)through the antiglobulin (AHG) phase of testing permits detection of incompatibilities caused by antibodies that sensitize cells at 37˚C.

6.2 Antiglobulin crossmatch (AHG XM) can be completed using the following methods:

a. Solid Phase, Gel, LISS, PEG, or Saline.
b. Gel is the routine antiglobulin crossmatch (AHG XM) method.

6.3 Immediate spin crossmatch (XM IS) testing is required in addition to the antiglobulin crossmatch (AHG XM) to detect ABO incompatibility and is referred to as a FULL crossmatch (Full XM).

6.4 When the patient has had clinically significant antibodies identified currently or in the past, blood lacking the relevant antigens should be selected for transfusion.

Refer to Attachment 1: Screening and Crossmatch Requirements for Patients with Antibodies

7.0 The blood specimen must be drawn and labeled according to the protocols of the Blood Bank.

Refer to Front Desk: Specimen Labeling Requirements

8.0 Patient cell suspension or plasma aliquot tube should be labeled as below.

- Large barcode accession label OR
- Small accession label with complete last name OR
- Patient's full last name from main blood specimen and MRN #
- Date/Time of Collection
- Initials of Tech aliquoting
- BBID on plasma aliquots

9.0 Plasma/red cells must not be poured back into main blood specimen tube.

10.0 Hemolyzed blood specimen

10.1 Refer to FD: Specimen Labeling Requirements and BBID Numbers

11.0 **Interpretation of the Crossmatch**

11.1

INTERPRETATION	DO
INCOMPATIBLE	Hemolysis or agglutination in any phase of testing (IS, 37C, AHG) may indicate the presence of a serologically incompatible crossmatch.
	Further investigation is required: a. Immediately check for ABO incompatibility. b. Refer to antibody identification procedures. c. Incompatible crossmatches with a negative antibody screen may be due to: • The transfusion of out of group platelets, transfusion with group O red cell is required as long as the patient is demonstrating anti-A or anti-B. • A low frequency antibody. • The donor unit has a positive DAT (unit with a positive DAT must be returned to the supplier for credit).
COMPATIBLE	Absence of agglutination and hemolysis in all phases of testing (IS, 37C, AHG) is a negative test result and indicates a serologically compatible crossmatch.
INVALID	If the IgG-sensitized control cells added to confirm the activity of the polyspecific or anti-IgG reagents show only weak agglutination (<2+) or none, the tube test is invalid and must be repeated.
VALID	After the addition of IgG-sensitized control cells to an AHG negative tube test, the presence of agglutination indicates that the AHG reagent added was capable of reacting and that the negative antiglobulin test is valid.

11.2 In the presence of **WARM AND COLD AUTOANTIBODIES,** the crossmatch reaction is reported based on NEAT (unmodified) plasma and donor red cell reactions.

a. Adsorptions (with plasma and/or eluate) are routinely performed to determine if any underlying alloantibodies are demonstrating in either plasma or eluate.
   - Units will be tested with both adsorbed plasma and/or eluate and are expected to be compatible if no alloantibodies are detected. These reactions are recorded on the antibody workup forms or blood bank order requisition but not reported to Epic.
   - Emergency release is required.

b. Prewarming technique may be used in the presence of strong cold autoantibodies to determine if any underlying alloantibodies are demonstrating in the plasma.
   - Units will be tested by prewarm technique with plasma and are expected to be compatible if no alloantibodies are detected. These reactions are recorded on the antibody workup forms or blood bank order requisition but not reported in Epic.
   - Emergency release is required.
   - Cold adsorption may be needed if reactions occur at immediate spin.

12.0 SELECTION OF UNITS FOR CROSSMATCHING

12.1 Whenever possible, patients should receive ABO-identical blood components; however, two determinations of ABORh from specimens collected at different times (unless Group O or collected by inpatient phlebotomy using electronic verification system) must be performed or patient should receive Group O red cells, low titer whole blood or granulocytes.

12.2 Rh positive blood components should routinely be selected for D-positive recipients.

12.3 D-negative patients should receive red cell-containing components that are D-negative to avoid immunization to the D antigen.

Refer to Protocol: Selection of Blood and Blood Components.
Refer to Attachment 1: Screening and Crossmatch Requirements for Patients with Antibodies.

13.0 CLINICALLY INSIGNIFICANT ANTIBODIES THAT ARE NO LONGER DETECTABLE

13.1 Clinically insignificant antibodies that are no longer demonstrating in the patient's plasma may be removed from the antibody section of SCC.

a. *Refer to Attachment 1: Screening and Crossmatch Requirements for Patients with Antibodies Sections II & III* for a list of antibodies that may be removed.
b. For cold or warm autos that are no longer showing, add the Special Message 'PWC' (Previous WARM or COLD auto antibody) to the patient's patient caution window.

13.2 Clinically insignificant antibodies that are no longer detectable do NOT disqualify a patient for a delayed crossmatch sample.

a. The clinically insignificant antibody will be removed from SCC.

14.0 CROSSMATCHING FOR MASSIVE TRANSFUSION OR TRAUMAS

14.1 Massive Transfusion is defined as infusion, within a defined period, of a volume of blood approximating the recipient's total blood volume.

14.2 Following massive transfusion, the pretransfusion sample no longer represents the blood currently in the patient's circulation and has limited benefits.

14.3 Crossmatch testing (electronic or immediate spin crossmatch or AHG crossmatch) is not necessary when blood is being issued emergently with an emergency release form prior to the completion of the antibody screen and crossmatch.

14.4 Patient testing (antibody screen and/or crossmatch) is completed for units once the patient is stable providing a sample is available in the Blood Bank.

a. If NO clinically significant antibody currently detected (negative antibody screen) OR historical clinically insignificant antibody, then the crossmatch can be completed as either electronic (XME) or immediate spin (XM IS).
b. If antibody screen IS POSITIVE OR historical clinically significant antibody, then a Full Crossmatch is required (Full XM).

Refer to Protocol: Emergency Blood Protocols, Section IV. Massive Transfusion Guidelines

14.5 When no sample is received (patient expires or is transported to another facility by AirCare), then the test 'Prepare non-irradiated red cell" is ordered in WakeOne.

a. Units are 'Emergency Issued' in the computer in SCC.
b. Crossmatch testing is cancelled.

Refer to FD: Specimen Receipt

15.0 CROSSMATCHING FOR NEONATES

15.1 Go to Protocol: Selection of blood and Blood Components. Sections: VII. Neonatal Blood/Blood Component Selection and VIII. Neonatal Exchange

16.0 CROSSMATCHING FOR BONE MARROW TRANSPLANT

16.1 Go to Protocol: Transplant Testing Protocols. Section II. Bone Marrow Transplant Testing.
16.2 Go to Special: BMT

17.0 ELUATE CROSSMATCHES

17.1 The eluate may be used for crossmatching in the presence of an unidentified or unidentifiable antibody.
17.2 Modification of the eluate through absorption may result in a compatible crossmatch.
17.3 Eluate results are recorded on Antibody Summary workup forms or on the blood bank order requisition but not reported in Epic.
17.4 Incompatible eluate crossmatch requires Emergency Release.
17.5 Eluate testing may identify an antibody that is not detectable in plasma testing. This antibody must be considered a true antibody and must be honored and antigen negative blood provided.

18.0 GROUP AB PATIENTS that have received multiple out of group red cell transfusions and meet the criteria for No Group:

18.1 Keep transfusing Group A red cells.
18.2 Management should be informed and at management's discretion the ABORh may be interpreted as AB, with "Massive Trans Group A, [initials]" in comment field. Once the AB interpretation has been entered another ABOCK can be performed to avoid supervisor override at issue of group A red cells.

19.0 Delayed Crossmatch Blood Specimens

19.1 Blood specimens collected within 30 days of surgery with a negative antibody screen & no ABO discrepancies qualify and are considered in dated on date of surgery. The new expiration date of specimen is 3 days from date of surgery.

19.2 Blood specimens that qualify but are lost or damaged in blood bank can be still have electronic crossmatch on day of surgery providing that the T&S was completed within 24 hours of collection, antibody screen is negative, no ABO discrepancies, and no historic antibodies. A second sample may be needed to perform ABO2 testing if no history.

19.3 Blood specimens that are drawn within 30 days of surgery and have a positive antibody screen (disqualified) need another blood specimen collected on day of surgery.

3. Review/Revised/implemented:

All protocols must be reviewed according to the Document Change Protocol.
All new protocols that have major revisions must be signed by the CLIA Director.
All reviewed protocols with minor revisions can be signed by the designated section Medical Director.

REFERENCES

Technical Manual, revised periodically
Standards for Blood Bank and Transfusion Service. AABB, revised periodically.

RELATED POLICIES/PROCEDURES (NAVEX)

Crossmatch Procedures
Daily Reagent Quality Control Procedure
Blood and Blood Products: Storage, Transport, Return and Reissue
ABID Protocols; Section III. Providing Low Prevalence Antigen Negative Units
Adsorption and Prewarmed Technique
Transplant Testing Protocols; Section II. Bone Marrow Transplant Testing.
BM/HPC Procedures and Protocols
Selection of blood and Blood Components; Sections: VII. Neonatal Blood/Blood Component Selection and VIII. Neonatal Exchange
Emergency Blood Protocols

ATTACHMENTS/LINKED DOCUMENTS (TITLE 21)

Attachment 1: Screening and Crossmatch Requirements for Patients with Antibodies
Attachment 2: Causes of Positive Pretransfusion Tests

REVISION DATES: REVIEW CHANGE SUMMARY AS REPRESENTED IN TITLE 21.