Current Status: *Active* **PolicyStat ID:** *10886823*

Origination: *5/28/2021*
Effective: *1/6/2022*
Last Approved: *1/6/2022*
Last Revised: *1/6/2022*
Next Review: *1/6/2024*
Document Contact: *Teresa Lovins: Supv, Laboratory*
Area: *Laboratory-Blood Bank*
Key Words:
Applicability: *Dearborn, Troy*

Newborn Compatibility Testing Guidelines - Blood Bank

Document Type: Guideline

I. PURPOSE AND OBJECTIVE:

The purpose of this document is to provide the Blood Bank staff with guidelines and policies for neonatal compatibility testing.

II. SCOPE:

A. The guidelines in this document should be applied in the following situations:
   1. Before any blood component may be released for neonatal transfusion, or
   2. When the maternal record indicates unexpected antibodies, even if a neonatal transfusion has not been ordered.

III. INTRODUCTION:

A. Neonates are immunologically immature. Neonates generally do not produce enough levels of ABO antibodies to obtain valid reverse typing results during ABO testing procedures. Compatibility testing begins with maternal testing (Type and Screen) and neonatal testing (ABORh Forward Typing and antibody screen), as indicated in procedure, *Initial Neonatal Compatibility Testing.* Compatibility testing is usually performed only one time per admission until the age of four months to reduce blood loss due to repeated draws, and because alloimmunization is rare during the neonatal period.

B. Due to their immature immune system and small blood volume, neonates have special transfusion requirements. In most instances, a newborn may receive a standard neonatal RBC unit, as described in the procedure, *Providing Blood Products for Neonatal and Infant Transfusion*. However, if there is a history or current indication of unexpected antibody, it may be necessary to perform additional testing. It may be necessary to provide RBCs that are negative for the antigen corresponding to the maternal antibody and that are gel crossmatch compatible, as indicated in the procedure: *Additional Neonatal Compatibility Testing.*

IV. DEFINITIONS:

A. Neonates: infants from birth through 4 months of age.

B. Standard neonatal RBC Unit: an RBC unit intended for neonatal transfusion meeting the following minimal requirements:

1. Group O
2. Rh Compatible with the neonate
3. Leukocyte Reduced
4. CMV seronegative
5. Hemoglobin S (Sickle Cell) negative
6. Irradiated
7. Fresh (preferably less than 10 days old)

C. 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.

D. Passively acquired antibodies: antibodies that are transferred from the donor(s) to a recipient through the transfusion or administration of plasma-containing components (i.e., RhIG administration).

E. Alloimmunization: the process whereby a recipient forms antibodies in an immune response to foreign antigens on donor RBCs.

F. Current sample:

1. Maternal sample: 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.
2. Neonatal sample: the pre-transfusion sample from current admission used to determine neonatal ABO and Rh type. Sample is valid on current admission until 4 months of age or patient discharge.

G. Clinically significant antibody is an antibody that:

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

H. Clinically insignificant antibody is an antibody that:

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

I. NEXM: Not Eligible for Electronic Crossmatch

J. MRN: Medical Record Number

V. POLICIES:

A. Historical Record Check

1. The Blood Bank must perform a historical record check on each sample as described in Transfusion

Medicine Policy, Historical Blood Bank Record Check.

B. Neonatal ABO/Rh

1. An initial pre-transfusion sample from the neonate shall be tested to determine the neonate's ABO and Rh type as described in the procedure, Transfusion Medicine Policy, Forward Typing Determination of Neonatal ABO and Rh by the Tube Method.

C. Antibody Screening using the Neonatal Sample

1. A gel antibody screen should be performed using the neonatal sample:
    a. When the maternal sample is not available.
    b. When the maternal sample is greater than 4 days of the neonatal sample.
    c. If the baby was discharged, then readmitted.

D. Antibody Screening using the Maternal Sample

1. The maternal antibody screen may be considered if the neonatal sample contains insufficient volume or if performing a neonatal screen would cause undue delay:
    a. If the maternal sample is *current* on the day that the neonatal sample was collected, (collected within the 4 days of the neonatal sample) then the maternal antibody screen interpretation will be entered under the neonate's computer record. A comment should be added to the neonatal antibody screen test to indicate that maternal plasma was used and should include the maternal MRN and sample collection date.
    b. If the maternal sample is not *current* on the day that the neonatal sample was collected, then a new sample on the newborn must be collected for antibody screening

E. Repeat ABO, Rh, and Antibody Screening

1. Repeat testing may be omitted for the remainder of the neonate's hospital admission or until the neonate reaches the age of 4 months, whichever is sooner. This policy is valid whether maternal or neonatal plasma is used for antibody screening, and whether the antibody screen is positive or negative. However, the Medical Director should be consulted, and more frequent testing may be indicated in the following situations:
    a. If a neonate of a mother with a clinically significant antibody receives an RBC unit that is positive for the corresponding antigen.
    b. If inquiry or donation is made for a non-group O neonate to receive non-group-O RBCs; i.e. a directed donation. Refer to the procedure, *Providing Blood Products for Neonatal and Infant Transfusion*, specifically the *Policy for Non-Group O Neonates Receiving Non-Group O RBCs*.
    c. If a neonate receives a Rh(D) incompatible RBC or platelet component.

F. Neonatal DATs

1. A neonatal DAT is not automatically performed by the Blood Bank. However, a neonatal DAT should be performed:
    a. If specifically ordered by the physician, or

b. If there is a history or current indication of unexpected antibody in the maternal or neonatal record, as described in the procedure, *Cord Blood Evaluation for Hemolytic Disease of the Fetus/Newborn (HDFN)*.

G. Discharge / Readmission

1. If the neonate is discharged and readmitted, then the ABO/Rh and antibody screen shall be performed on a new sample collected from the neonate. The new sample shall remain current for the remainder of the neonate's hospital admission or until the neonate reaches the age of 4 months, whichever is sooner.

H. Neonatal Antibody Investigation

1. Determine whether an antibody investigation is required on a neonatal sample that has a positive antibody screen (or if there is a record of maternal unexpected antibody) by considering the neonate's admission status.
   a. The newborn **was never discharged** and was **born at Beaumont Health** to a mother with unexpected antibodies:
      i. It is not required to perform an antibody investigation on the neonatal sample, so long as an investigation was performed on a maternal sample collected in the 30 days preceding the birth.
   b. The newborn was **transferred** to Beaumont Health (BH) from another hospital, or the newborn was **discharged** from BH and then **readmitted**:
      i. If transferred to BH, an investigation must be performed on the neonatal sample upon the first admission. If discharged then readmitted, an investigation must be performed on the neonatal sample upon the first readmission. After this investigation has been performed, apply standard operating procedures: additional investigations will be required only if 90 days have elapsed or if the neonatal antibody screen increases in strength as described in *Comparison of Current Antibody Screen to the Historical Record* section of the Transfusion Medicine Policy, Antibody Screening.

         Note that in all the above cases; the antibody investigation should be performed using the neonatal sample. However, if the neonatal sample contains insufficient volume then a maternal sample may be used for the investigation if the maternal sample was collected in the 30 days preceding the birth. The maternal sample of a transfer baby may be drawn at the transferring facility and sent to BH or may be collected at BH using downtime collection and testing procedures.

I. Unexpected Antibodies / Crossmatching

1. If unexpected antibodies are detected/present in either the neonatal or maternal record (current and historical), then refer to the table, *Additional Compatibility Testing with the Standard Neonatal Unit.*
   a. **Crossmatching per Policy:**
      i. One RBC unit shall be crossmatched for the neonate regardless of whether the physician orders RBCs.
      ii. If the physician has ordered RBCs, the crossmatch shall be performed and documented in the Blood bank computer.

iii. If the physician has not ordered RBCs, this crossmatch should be documented on the *Log of Red Cell Units Crossmatched for Neonate* (Attachment 1)

iv. In general, the RBCs should be crossmatched in the same manner as they would be for the mother. The standard neonatal RBC unit must also be negative for any clinically significant antibodies.

v. If it is not possible to provide crossmatch-compatible units or antigen negative units, then consult the Medical Director (MD) or designee. Document the MD's instructions in a variance.

vi. Once it is demonstrated that the maternal antibody is no longer present/detectable in the neonatal sample, the following policies apply:

a. The corresponding antibody may be removed from the neonate's Blood Bank computer record.

b. The neonate may be transfused with RBC units that are not tested for the applicable antigens.

c. It is no longer necessary to perform serologic/gel crossmatches.

b. **Crossmatching in Advance of Birth:**

a. One RBC unit shall be crossmatched for the neonate regardless of whether the physician orders RBCs.

b. The crossmatch shall be performed using maternal sample and Group O Rh(D) negative RBCs, as described in Table 2: *Additional Compatibility Testing with the Standard Neonatal RBC Unit*.

c. The RBC unit shall be antigen typed corresponding to the mother's unexpected antibody(ies) for the neonate in advance of the birth.

d. The crossmatch shall be documented on the *Log of Red Cell Units Crossmatched for Neonate* (Attachment 1)

J. Neonatal Protocol / Special Messages / Antibodies

1. The "neonatal protocol" is automatically added to the computer record of all neonates when an aliquot is ordered. This protocol (a special message) will help ensure that any components transfused will meet the requirements for neonatal transfusion, as described in the procedure, *Providing Blood Products for Neonate and Infant Transfusion*.
2. If unexpected antibody(ies) is(are) present in the maternal sample, then the neonate's *antibody* field and *messages* fields in the Blood Bank computer must be updated as follows:
   a. The *antibody* field should be updated with the specificity of the maternal antibody; e.g., "Anti-Kell."
   b. The *antibody* field should be updated with NEXM.
   c. The *messages* field should be updated by adding the maternal antibody comment (MAB).
3. **Patient Histories / Neonates transferred to Beaumont Health from Another Institution**
   A patient history should be obtained if unexpected antibodies are present for any neonate transferred to BH from another institution. The history should also be obtained on the mother, from the Blood Bank at the hospital where the delivery occurred. Refer to Transfusion Medicine Policy, Obtaining Patient Histories
   a. **Policies Relating to Component Selection**
      All RBCs for neonatal transfusion must be group O (see the following exception) and must meet the

requirements of a *standard neonatal RBC unit*; see *Definitions*. For additional information, refer to Transfusion Medicine Policy, *Providing Blood Products for Neonatal and Infant Transfusion.*

b. **Non-Group O Neonates Receiving Non-Group O RBCs**
On rare occasions, a non-group-O neonate may receive a non-group O RBC. For example, this may occur if a directed donation or rare unit is requested for a neonate. The applicable policy *Non-Group O Neonates Receiving Non-Group O RBCs* may be found in Transfusion Medicine Policy, *Providing Blood Products for Neonatal and Infant Transfusion.*

4. **Post-Issue Crossmatches for Neonates**
Post-issue crossmatches are performed (or cancelled) as described below.
   a. If there are no maternal / neonatal antibodies, then a serologic crossmatch is not required post-issue. The crossmatch that reflexes in Soft may be canceled.
   b. If the neonate's ABO must be interpreted as GND (group not determined), then a serologic crossmatch is not required post-issue if group O RBCs were emergency issued. The crossmatch that reflexes in Soft may be canceled.
   c. If there are maternal or neonatal antibodies, then serologic crossmatches are performed as described in Table 2: *Additional Compatibility Testing with the Standard Neonatal RBC Unit.* The crossmatch should automatically reflex in Soft.

VI. SPECIMEN COLLECTION AND HANDLING:

Both a neonatal and maternal sample (if available) will be tested. All samples must meet the requirements found in the Transfusion Medicine Policies *Triaging and Identifying Acceptable Samples for Testing* and Forward Typing Determination of Neonatal ABO and Rh by the Tube Method.

A. **Neonatal Sample Requirements:**
   1. Samples may be a capillary sample or may be drawn into an EDTA tube, with affixed identifying label.
   2. Cord blood samples are unacceptable for transfusion purposes.

B. **Maternal Sample Requirements:**
   1. The specimen of choice is 6 ml EDTA sample with affixed identifying label.
   2. Samples drawn in serum separator tubes are generally not acceptable.

VII. PROCEDURE:

A. Initial Neonatal Compatibility Testing

1. Perform a Type & Screen on the maternal sample, if available.
2. Perform an antibody screen on the neonatal sample if the maternal sample is not current or if the baby has been discharged and readmitted.
   a. If the screen is negative, proceed to step C.
   b. If the screen is positive, refer to the policy *Neonatal Antibody Investigation* before proceeding to next step.
      i. If the neonatal sample contains insufficient volume or if performing a neonatal screen would

cause undue delay, then refer to the policy *Antibody Screening using the Maternal Sample*.

ii. If applicable, refer to the policy *Crossmatching in Advance of Birth*.

3. Determine the neonatal ABO and Rh by forward typing as described in the procedure, Forward Typing Determination of Neonatal ABO and Rh by the Tube Method.
4. Perform the neonatal DAT, *if* specifically ordered by the physician, as described in the procedure, Performing Neonatal Direct Antiglobulin Test (DAT) by the Gel Method.
5. Review the maternal and neonatal records (current and historical) for unexpected antibodies.
   a. If there is no record of unexpected antibodies, then add any appropriate messages to the neonatal computer record. Compatibility testing is complete.
   b. If there is a record of unexpected antibodies, update the *antibody* and *messages* fields of the neonatal computer record. For example, add the antibodies "Anti-K", "NEXM" and add the message "MAB" Maternal Ab." Proceed to VII.B, *Additional Neonatal Compatibility Testing*.
6. If transfusion is required, refer to the Transfusion Medicine Policy, *Providing Blood Products for Neonatal and Infant Transfusion*.

B. Additional Compatibility Testing with the Standard Neonatal RBC Unit

1. The following steps should be performed in the following situations:
   a. When the maternal or neonatal records (current and historical) indicate unexpected antibodies
   b. When preparing a non-group O RBC for a non-group O neonate.
2. Complete the steps in VII.A *Initial Neonatal Compatibility Testing*.
3. Assess the maternal and neonatal records (current and historical) for unexpected antibodies.
4. Select a standard, neonatal RBC unit for the neonate and perform the appropriate serologic crossmatch. Document the crossmatch as follows:
   a. If RBCs were ordered by the physician, document the results in the computer.
   b. If the physician has not ordered RBCs, this crossmatch should be documented on the attachment, *Log of Red Cell Units Crossmatched for Neonate*.
   c. The standard neonatal RBC unit should be crossmatched in the same manner as RBCs would be crossmatched for the mother (usually by the gel method). Refer to the Transfusion Medicine Policy, *Policies for Providing Red Blood Cells for Patients with Unexpected Antibodies*.
      i. Provide donor RBCs that are negative for the antigens corresponding to any clinically significant antibodies.
      ii. The crossmatch for the neonate shall be performed upon detection/identification of the unexpected antibody (not if/when RBC are ordered). Exception: It is not necessary to crossmatch RBC upon detection/identification of the passive Anti D unless specifically ordered by a the physician.
      iii. If a non-group O RBC is being crossmatched for a non-group O neonate, then the neonatal sample *must* be used for the crossmatch. Refer to the complete policy in the Transfusion Medicine Policy, *Providing Blood Products for Neonatal and Infant Transfusion*.

iv. If the records indicate unexpected antibodies, then a neonatal sample *is preferred* for the crossmatch. However, in some cases it is acceptable to use the maternal sample. For example, if the neonatal sample contains insufficient volume, or if the baby is not yet born. The maternal sample may be used if the maternal sample was collected in the 30 days preceding the birth and an antibody investigation was performed on a maternal sample in the 30 days preceding the birth.

5. When requested by the caregiver, prepare a aliquot of the unit as described in the Transfusion Medicine Policy, *Aliquot Preparation.*

VIII. REFERENCES:

American Association of Blood Banks, *Technical Manual*, current edition.

Attachments

Log Of Red Cell Units Crossmatched to Neonate

Approval Signatures

Step Description	Approver	Date
	Jeremy Powers: Chief, Pathology	1/6/2022
	Vaishali Pansare: Chief, Pathology	1/5/2022
	Ryan Johnson: OUWB Clinical Faculty	1/5/2022
Policy and Forms Steering Committe (if needed)	Gail Juleff: Project Mgr Policy	1/5/2022
Policy and Forms Steering Committe (if needed)	Teresa Lovins: Supv, Laboratory	1/5/2022
	Teresa Lovins: Supv, Laboratory	1/5/2022
	Kelly Sartor: Supv, Laboratory	1/5/2022

Applicability

Dearborn, Troy

Beaumont HEALTH
Beaumont Laboratory

Log of Red Cell Units Crossmatched for Neonates

Tech & Date	Mom's Name & MRN	Baby's Name & MRN & Birthdate	Sample	Sample Order #	Antibodies	Blood Product Code	Donor Number	Unit Exp. Date	Unit Antigen Results
BB 11/29/13	Smith, Mother 1234567	unborn	☐ Maternal ☐ Neonatal	12345678	Anti-Kell	RU3	W201313111222	12/25/2013	Kell Neg
BB 11/28/13	Jones, Mother 7654321	Jones, BabyBoyA 3332210 11/25/2013	☐ Maternal ☐ Neonatal	87654321	WAA (NR 60 minute NL)	RU3	W201313001002	12/24/2013	NA
			☐ Maternal ☐ Neonatal						
			☐ Maternal ☐ Neonatal						
			☐ Maternal ☐ Neonatal						
			☐ Maternal ☐ Neonatal						
			☐ Maternal ☐ Neonatal						
			☐ Maternal ☐ Neonatal						
			☐ Maternal ☐ Neonatal						

Refer to Transfusion Medicine Policy, *Newborn Compatibility Testing Guidelines*.

Use this form only to document crossmatches for babies of mothers with unexpected antibodies, when the physician has not ordered RBCs. Attach completed l
crossmatched unit and place the unit on the Reserved Baby Units shelf in the refrigerator.