PRENATAL CARE FOR

Maternal Anti-Erythrocyte Antibodies

2017 update

Maternal alloimmunization to erythrocytes occurs when a woman's immune system recognizes foreign erythrocyte surface antigens after a transfusion or during pregnancy, stimulating the production of immunoglobulin G (IgG) antibodies. These antibodies can cross the placenta during pregnancy and may pose a threat to the fetus and newborn. This care process model (CPM) promotes a standardized process for prenatal care in these pregnancies. It was developed by clinical experts from Intermountain Healthcare's Women and Newborns Clinical Program.

Why focus on maternal anti-erythrocyte antibodies?

- **Transplacental passage of anti-erythrocyte antibodies can have grave consequences for the fetus or newborn.** Depending on the degree of antigeneticity and the amount and type of antibodies involved, transplacental passage can lead to hemolysis of fetal erythrocytes, known as **hemolytic disease of the fetus and newborn (HDFN)**. HDFN varies in severity and manifestation; its range includes mild jaundice and anemia to kernicteris, erythroblastosis fetalis, and hydrops fetalis.[ACOG, ARR, DEA]
- **Alloimmunization to erythrocyte antigens is relatively common.** About 0.5 % of women in the general obstetric population will be found to have an anti-erythrocyte antibody capable of causing hemolytic disease in the fetus-neonate.[BAR]
- **Intermountain has an opportunity to improve care and outcomes.** Advancements in fetal surveillance and treatment now allow for successful outcomes for most affected fetuses. The algorithm on the next page summarizes the steps, timing, and clinician roles that Intermountain recommends for this clinical process.

Key responsibilities for clinicians

Routine prenatal testing should include determination of ABO blood group, Rh status, and a screening test for maternal circulating antibodies to red blood cell antigens (the antibody screen or indirect Coombs test). As outlined in the algorithm on the following page, **providers must review testing results for every obstetric patient** and, when anti-erythrocyte antibodies are found, ensure safe and appropriate care through these key activities:

- **Identify the type of antibodies, and determine whether they are a threat** to the fetus-neonate. As needed, consult with specialists to determine risk, and confirm an appropriate management plan.
- **Refer the patient to maternal-fetal medicine (MFM)** when the patient's pregnancy history includes HDFN or when Kell antibodies are found.
- **Order and follow serial antibody titers** on patients with anti-erythrocyte antibodies other than Kell — and if titers rise to ≤ 8 (≤ 1:8), refer the patient to MFM.
- **Communicate/coordinate with all medical providers and staff that may be involved in patient care (both maternal and newborn) before, during, and after delivery** (e.g., L&D and newborn unit staff, delivering hospital's transfusion services, the newborn's pediatrician).

CPM MEASURES

- Facilitate timely detection and appropriate follow-up of pregnancies affected by maternal anti-erythrocyte antibodies.
- Clarify OB providers' specific responsibilities within Intermountain's recommended process.
- Promote resources that support this evidence-based model of care: medical literature, MFM, patient education.

REFERENCES

ACOG American College of Obstetrics and Gynecology. ACOG Practice Bulletin No. 75: Management of alloimmunization during pregnancy. *Obstet Gynecol.* 2006;108(2): 457-464. Reaffirmed 2016.

ARR Arraut A, Tran SH, Caughey AB. Erythrocyte alloimmunization and pregnancy. *eMedicine Journal* [serial online]. emedicine.medscape.com/article/273995-overview. 2011. Accessed June 8, 2017.

BAR Barss VA, Moise KJ Jr. Significance of minor red blood cell antibodies during pregnancy. *UpToDate.* cursoenarm.net/UPTODATE/contents/mobipreview.htm?20/46/21216. Updated May 5, 2010. Accessed June 8, 2017.

DEA Dean L. Hemolytic disease of the newborn. *Blood Groups and Red Cell Antigens.* Bethesda, MD: National Center for Biotechnology Information; 2005. ncbi.nlm.nih.gov/books/NBK2266. Accessed June 8, 2017.

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ALGORITHM NOTES

(a) ANTIBODY ID

The more commonly found antibodies of potential threat to the fetus or newborn are to antigens in the following systems:

- Rh (D, E, C, or c)
- Kell
- Duffy
- MNS
- Kidd

(b) DETERMINING HDFN THREAT

Kell antibodies have been associated with severe fetal hemolysis; patients with Kell antibodies should always be referred to MFM specialist. **In the case of other, non-Kell antibodies, the process for assessing risk generally consists of:**

- Investigating whether antibody in question has been associated with HDFN. See *ACOG Practice Bulletin No. 75.*
- Determining paternal genotype if HDFN is associated with the antibody. If the father is antigen negative and paternity is assured, no further evaluation is indicated; if the father is positive or status unknown, the fetus must be considered at risk. MFM may assist with this determination.

(c) MANAGEMENT

Management will include:

- Maternal antibody titers per the algorithm
- Referral to MFM if titer ≥ 8 (≥ 1:8)
- Assessments of fetal genotype and degree of fetal anemia as needed and in consultation with MFM

Note that good management includes timely communication and coordination with all departments, facilities, and medical providers involved in the patient's care.

ALGORITHM: PRENATAL SCREENING AND CARE (FOR OB PROVIDERS)

Pregnant patient, first prenatal visit

PERFORM routine lab testing
- **DETERMINE ABO blood group and Rh status**
- **INCLUDE antibody screening**
- **REVIEW results by 15 to 20 weeks' gestation**

Positive antibody screening result? — *no* → No action required

yes

RECORD antibody ID (a), and REVIEW patient history

Prior history of HDFN? — *yes* → REFER to MFM

no

Kell antibody identified? — *yes* → REFER to MFM

no

INVESTIGATE further, and DEVELOP plan
- **DETERMINE** HDFN threat. **(b)**
- **INSTITUTE** appropriate management plan if fetus is at risk. **(c)**
- **EDUCATE** patient and family. (See link at left.)
- **CONSIDER** consult with **MFM** to determine plan
- **ORDER** and **REVIEW** titer of maternal antibodies. **All titers should be drawn at the delivering facility to allow the hospital's transfusion service to follow the patient and obtain appropriate blood products prior to delivery.**

Discuss the ***Rho(D) Immune Globulin (RhoGAM) Injection*** fact sheet with your patient. (Available in English and Spanish.) Order this and other Intermountain-approved patient education at iprintstore.org

Antibody titer ≥ 8 (≥1:8)? — *yes* → REFER to MFM

no

SCHEDULE and **REVIEW SERIAL TITERS**
every 3 to 4 weeks until 37 weeks gestation.
Continue to use delivering facility's lab.

Prior to delivery,
COMMUNICATE and COORDINATE
with L & D staff, newborn unit, pediatrician, hospital transfusion services, etc.
To ensure proper care of the neonate, all caregivers must be aware of the presence of maternal anti-erythrocyte antibodies.

