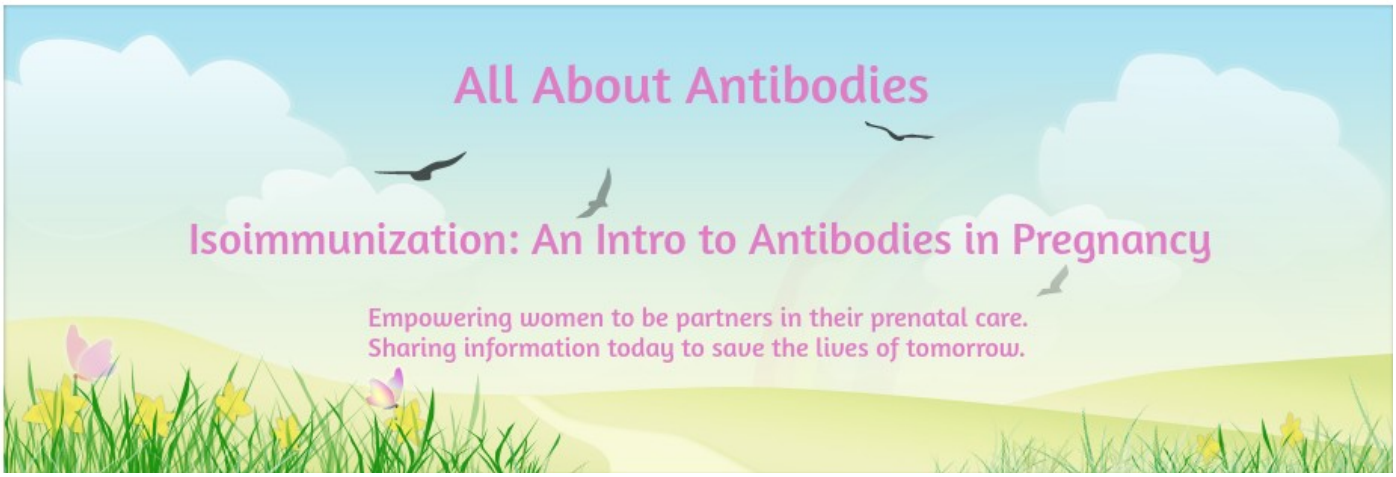

Personal Care Record

This educational handout is provided as a courtesy by www.AllAboutAntibodies.com It is intended to promote broad personal understanding about isoimmunization, and to provide a spot for women to record their relevant health data if they so choose.

The information, including but not limited to, text, graphics, images and other material contained on in this handout is for informational purposes only. The purpose of this handout is to promote broad consumer understanding and knowledge of various health topics. It is not intended to be a substitute for professional medical advice, diagnosis or treatment. The medical information on this site is provided as an information resource only, and is not to be used or relied on for any diagnostic or treatment purposes. Always seek the advice of your physician or other qualified health care provider with any questions you may have regarding a medical condition or treatment and before undertaking a new health care regimen, and never disregard professional medical advice or delay in seeking it because of something you have read in this handout.

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If found, please contact:

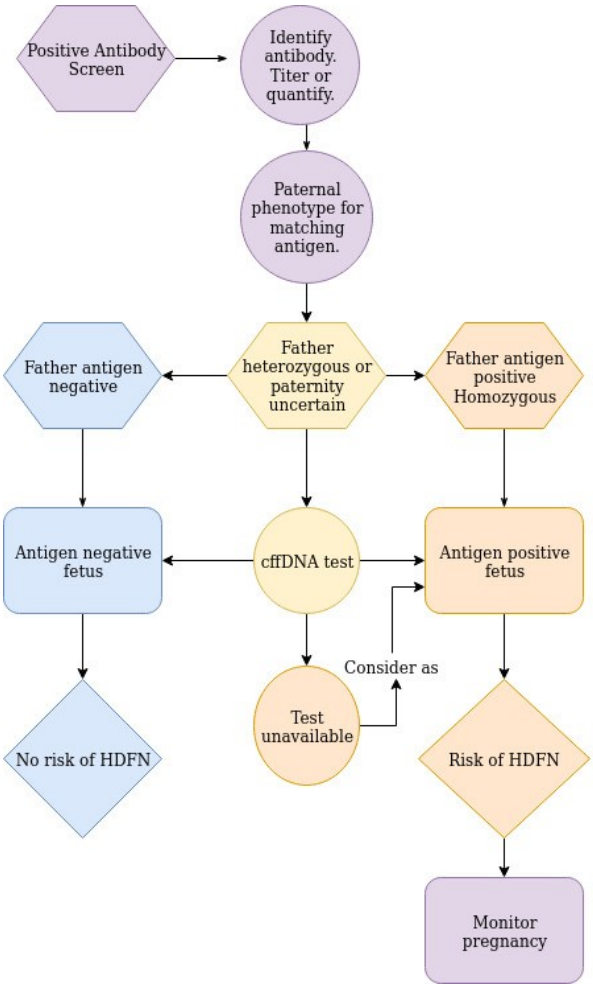
Name: _____ Phone: _____

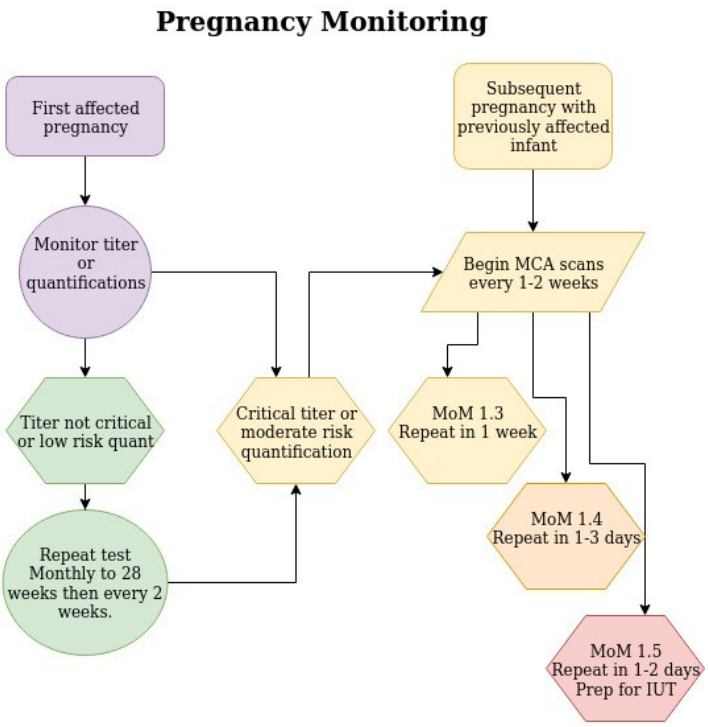
My Healthcare Providers

Office	Hours	Phone	Fax
Midwife			
Obstetrician			
MFM / FMU			
Labor & Delivery			
Laboratory			
NICU			
Hematology			
Pediatrician			

Common Course of Prenatal Care

This chart shows the common tests and monitoring given to women with high risk pregnancies due to isoimmunization.





The critical titer for all antibodies except anti-Kell is 16.
The critical titer for anti-Kell is 4, though severe anemia has occurred with anti-Kell titers of 2.

For those in the UK, the RCOG Green Top Guideline 65 says:

Quant Values	Anti-D	Anti-c
Moderate Risk of HDFN	> 4 iu/ml but < 15 iu/ml	> 7.5 iu/ml but < 20 iu/ml
Severe Risk of HDFN	> 15 iu/ml	> 20 iu/ml

“Referral to fetal medicine should be made as soon as anti-Kell is detected, and at quants of 4 iu/mL for anti-D, and >7.5 iu/mL for anti-c. If anti-E is present with anti-c referral at lower levels is indicated. For antibodies other than D, c, and K, a history of previous significant HDFN or IUT, or a titer of 32 or above should prompt referral.”

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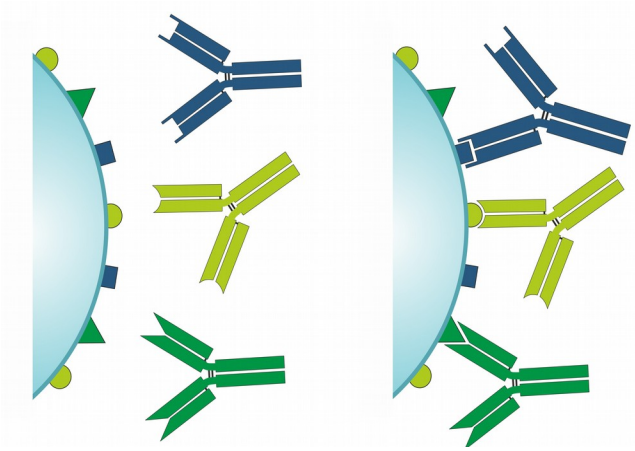
Pregnancy Quick Reference

Antibody - Antibodies are free-floating proteins that bind to foreign antigens and destroy foreign cells.
Antigen - Antigens are protein surface markers located on red blood cells.
Cell-free fetal DNA (cffDNA) - cffDNA can be used to check the fetal antigen status without the risks of amniocentesis and is useful for women with anti-Kell, anti-D, anti-C, anti-c, anti-E, and anti-e antibodies.
Critical Titer – the titer associated with a risk of developing severe anemia and hydrops. Below the critical titer the fetus is at risk for developing mild to moderate (but not severe), anemia. A titer of 16 is critical for all antibodies except anti-Kell. A titer of 4 is critical for anti-Kell but severe anemia has occurred at titers of 2.
Hematocrit (Hct) - this is a blood test that measures the percentage of the volume of whole blood that is made up of red blood cells and is used as an indicator of anemia.
Hemolytic Disease of the Fetus and Newborn (HDFN) – This is the temporary disease that baby has.
Isoimmunization - The life-long disease that mom has where she makes antibodies to foreign blood cells. Also called alloimmunization.
MCA Scan - This is an ultrasound of a specific artery in the fetal brain to measure how fast the blood is flowing. It is used to determine if the baby is anemic.
Multiple of the Median (MoM) - This is the end result of the calculation to see if baby is anemic. A result of 1.3 indicates mild anemia. Numbers of 1.5 or higher indicate moderate anemia and the need for an intrauterine transfusion or delivery. Use https://medicinafetalbarcelona.org/calc/ to calculate baby's MoM.
Peak Systolic Velocity (PSV) - This is the number gained from the MCA scan. It is the maximum velocity (sometimes called Pmax) that blood is moving through the middle cerebral artery. The PSV is used to calculate the Multiple of the Median (MoM) value to check for anemia.
Quants – another way to measure the antibody levels in a patient's blood. Measured with units of iu/mL.
Titer - Titers are a measure of the amount of antibodies in a patient's blood. They record the dilution of blood at which antibodies stop reacting. The AABB recommended changing how titers were reported to simply reflect the reciprocal value of the titer. Titer results formerly reported as 1:4, 1:8, 1:16, etc., may now be reported as 4, 8, 16, etc.

You can find your country's guidelines here:
USA: ACOG Practice Bulletin 192 published March 2018 https://www.ncbi.nlm.nih.gov/pubmed/29470342
UK: RCOG Green Top Guidelines 65 published May 2014
https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg65



Antibodies are very specific and will only bind to the matching antigen. In the picture, antibodies are the Y shaped proteins, and the antigens are the bumps on the blood cell. Mom has the antibodies, dad and baby have the antigens.

All women with antibodies should have a medical alert card, bracelet, necklace, or tattoo to alert medical professionals to their antibodies. Alloimmunized patients are at high risk for hemolytic transfusion reactions and should carry a medical alert with wording such as "Transfusion Reaction: Anti-E Antibodies", or "Hemolytic Transfusion Reaction Risk: Anti-K". You may request a free medical alert card at www.AllAboutAntibodies.com.

Hemolytic transfusion reactions are serious complications from blood transfusions. Transfused blood cells are destroyed by the patient's immune system negating the usefulness of the transfusion. HTR can result in the creation of anaphylatoxins, a systemic inflammatory response, hypotension, disseminated intravascular coagulation, diffuse bleeding, and disruption of microcirculation leading to renal failure and shock.

Red blood cell antibodies are the second leading cause of fatal HTRs.

Prenatal Blood Work

Mom's Blood Type: _____ Mom's Antibodies: _____

Dad's Blood Type: _____ Dad's Antigen Phenotype: _____

Baby's Due Date: _____ Baby's Antigen Phenotype: _____

Titer or Quant Values

Date								
# of Weeks								
Antibody 1								
Antibody 2								
Antibody 3								

Date								
# of Weeks								
Antibody 1								
Antibody 2								
Antibody 3								

Intrauterine Transfusion Results

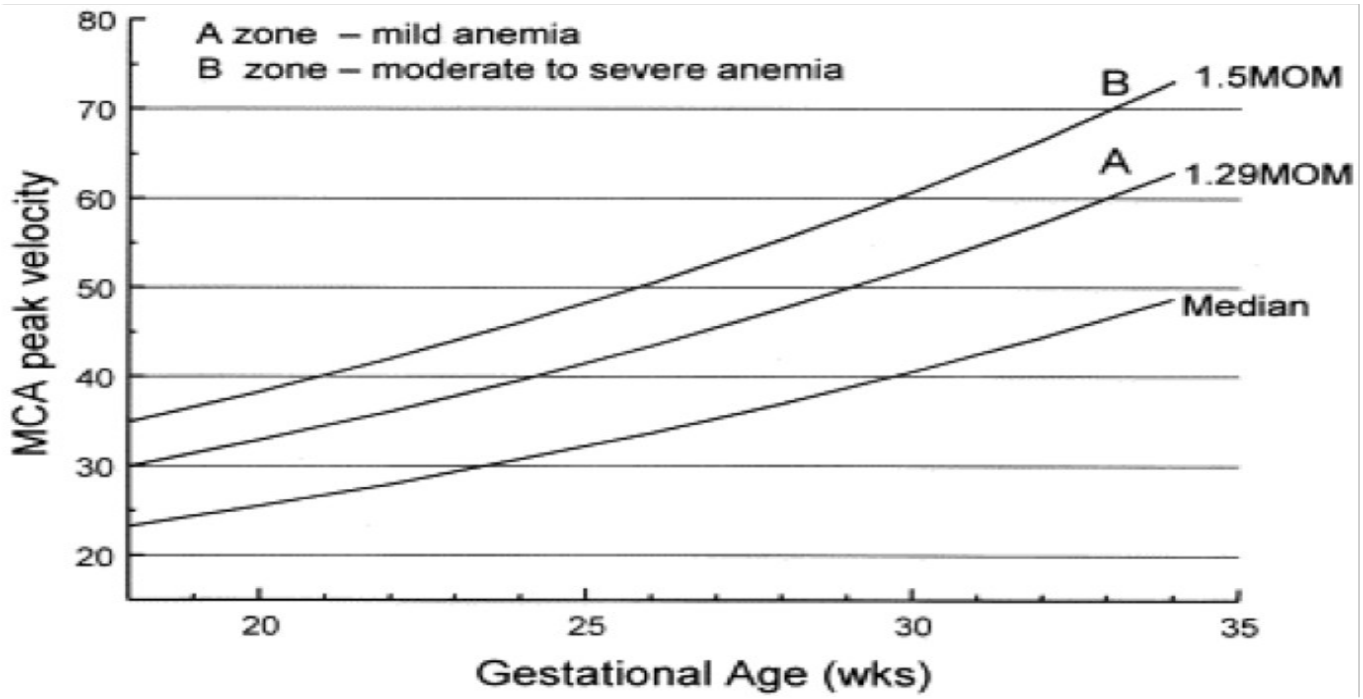
Date								
Starting Hct								
Ending Hct								
Volume Transfused								

This resource is provided courtesy of All About Antibodies. Www.AllAboutAntibodies.com

MCA Ultrasound Information

Gestational Age	PSV = Median (1.0)	PSV = 1.5 MoM	Gestational Age	PSV = Median (1.0)	PSV = 1.5 MoM
14	19.3	28.9	28	36.9	55.4
15	20.2	30.3	29	38.7	58.0
16	21.1	31.7	30	40.5	60.7
17	22.1	33.2	31	42.4	63.6
18	23.2	34.8	32	44.4	66.6
19	24.3	36.5	33	46.5	69.8
20	25.5	38.2	34	48.7	73.1
21	26.7	40.0	35	51.1	76.6
22	27.9	41.9	36	53.5	80.2
23	29.3	43.9	37	56.0	84.0
24	30.7	46.0	38	58.7	88.0
25	32.1	48.2	39	61.5	92.2
26	33.6	50.4	40	64.4	96.6
27	35.2	52.8	Modified from G Marie et al. N Engl J Med 2000: 342: 9-14		

You can also use this PSV to MoM calculator from Barcelona Maternal Fetal Medicine : https://medicinafetalbarcelona.org/calc/



MCA-PSV (cm/s) versus gestational age. Source: Management of rhesus alloimmunization in pregnancy. Kenneth J. Moise, Jr, Obstet Gynecol. 2002 Sep; 100(3): 600–611.

This resource is provided courtesy of All About Antibodies. Www.AllAboutAntibodies.com

MCA Ultrasound PSV, and MoM Values

Date								
Weeks								
PSV Max								
PSV Min								
MoM								

Date								
Weeks								
PSV Max								
PSV Min								
MoM								

Date								
Weeks								
PSV Max								
PSV Min								
MoM								

Date								
Weeks								
PSV Max								
PSV Min								
MoM								

Additional Pregnancy

Antibodies: _____ Baby's Phenotype: _____

Titer or Quant Values

Date								
# of Weeks								
Antibody 1								
Antibody 2								
Antibody 3								

Date								
# of Weeks								
Antibody 1								
Antibody 2								
Antibody 3								

MCA Ultrasound PSV, and MoM Values

Date								
Weeks								
PSV Max								
PSV Min								
MoM								

Date								
Weeks								
PSV Max								
PSV Min								
MoM								

Intrauterine Transfusion Results

Date								
Starting Hct								
Ending Hct								
Volume Transfused								

This resource is provided courtesy of All About Antibodies. Www.AllAboutAntibodies.com

Infant Quick Reference

Anemia - An inadequate amount of red blood cells. Anemia is commonly tested for with a hemoglobin or hematocrit test. Anemia in an infant may show up as pale skin, lips, or nails, excessive fussiness, and fast breathing. Untreated anemia may result in heart failure or death.
Delayed Onset Anemia - Anemia that is not present at birth, but happens between 2 and 12 weeks of age. All antigen positive infants born to isoimmunized mothers are at risk for delayed onset anemia. Delayed onset anemia can be fatal if untreated.
Direct Agglutination Test (Direct Coomb's Test) - This test looks for antibodies that are bound to red blood cells and is typically done on baby. With specific antibodies, this test can be negative and baby still be affected and needing treatment. These antibodies are anti-C, anti-c, anti-Fya, anti-Good, anti-H, anti-Jra, anti-M, and anti-Mta.
Hematocrit (Hct) - this is a blood test that measures the percentage of the volume of whole blood that is made up of red blood cells and is used as an indicator of anemia. The normal hematocrit range for infants 0-6 months is 37.4 - 55.9% for females, and 43.4 - 56.1% for males.
Hemoglobin (Hgb) - Hemoglobin is a protein in red blood cells that carries oxygen. A blood test can tell how much hemoglobin you have in your blood and is used as an indicator of anemia (common in the USA). The normal pediatric hemoglobin range for infants age 0-6 months is 12.7 - 18.3 g/dL for females and 14.7 - 18.6 g/dL for males.
Hemolytic Anemia - anemia caused by the destruction of red blood cells. This anemia cannot be corrected by iron and attempted treatment with iron supplements without first conducting a ferritin test is dangerous. Treatment options for hemolytic anemia include IVIG, erythropoietin, and folic acid supplementation.
Hemolytic Disease of the Fetus and Newborn (HDFN) - This is the official diagnosis for babies born to mothers with alloimmunization who have a positive direct agglutination test or positive antigen status and at least one of the following: anemia, hyperbilirubinemia, neutropenia, thrombocytopenia.
Hyperbilirubinemia - high levels of bilirubin. Bilirubin is released when blood cells are destroyed. High bilirubin can lead to permanent brain damage, hearing problems, and staining of tooth enamel. Signs of hyperbilirubinemia include a high pitched cry, arched back, inconsolable crying, or excessive sleepiness. Treatment options for hyperbilirubinemia include phototherapy, intravenous immune globulin (IVIG), and exchange transfusion.
Indirect Agglutination Test (Indirect Coomb's Test) - This test looks for antibodies that are free floating in the blood plasma and is commonly done on the mother, though sometimes it is done on the baby to confirm the presence of antibodies (especially if there is a negative direct antiglobulin test). When run on the mother, this test can be negative and baby still be fatally affected in the case of some antibodies: anti-Dia, anti-Jsa, anti-Wra
Neutropenia - This is a reduced level of neutrophils, a specialized kind of white blood cell. Neutropenia is often detected on a CBC. Infants with neutropenia may not be able to fight infections and extra precautions will have to be taken.
Thrombocytopenia - Thrombocytopenia is defined as a platelet count of less than 150 x 109/L. This value is the same regardless of age. Thrombocytopenia is detected with a CBC and is a common side effect of HDFN due to maternal alloimmunization. Infants with thrombocytopenia may bruise or bleed more easily.

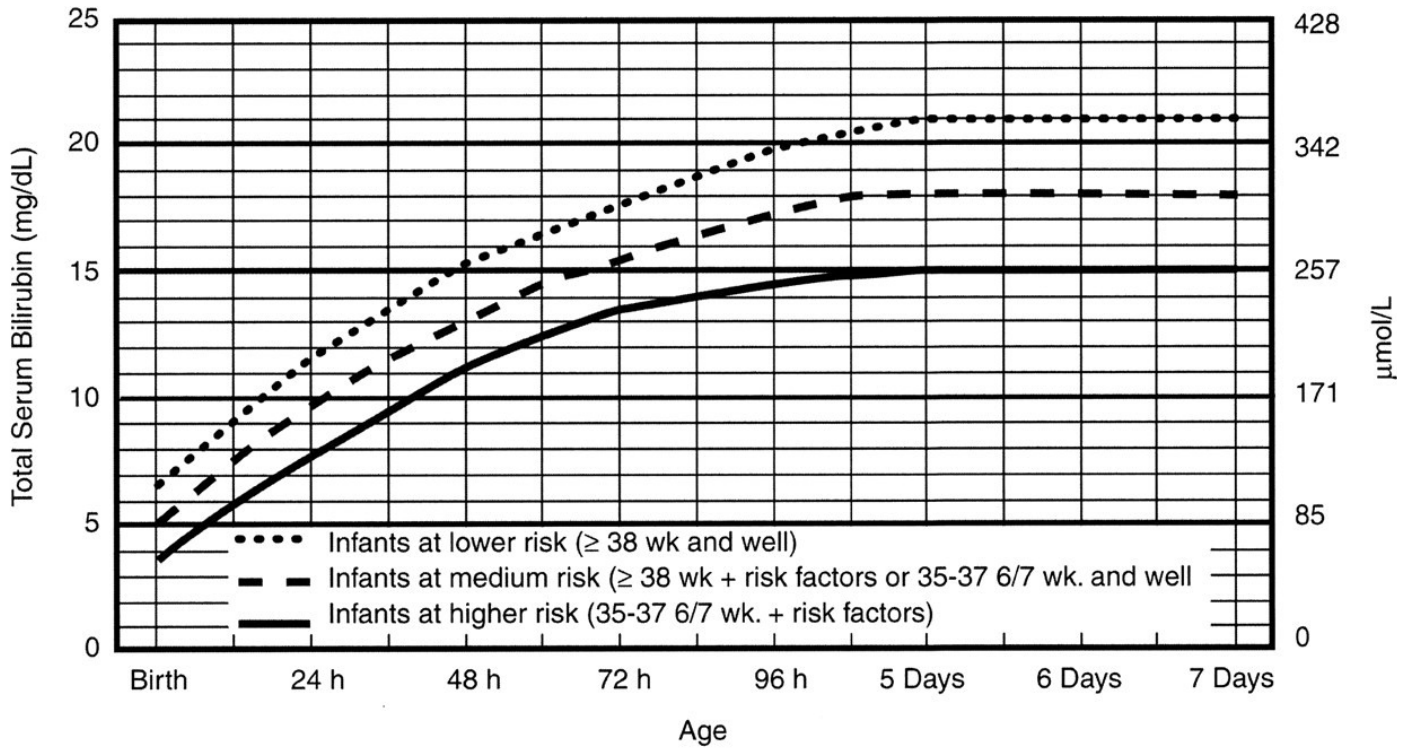
Multiple articles state:
Infants should not be given iron without a ferritin test first.

Of the infants born to alloimunized women, 70% had iron overload at birth and none were iron deficient at birth. At 1 month old 50% had iron overload, and 18% had iron overload at 3 months. **"There are a number of case reports published on the risk of severe iron overload..**. In addition to transfusions for alloimmune HDFN, the haemolysis itself can also contribute to iron overload in alloimmune HDFN...The vast majority of neonates with alloimmune HDFN have iron overload at birth. Incidence of iron overload gradually decreases within the first 3 months without iron supplementation."
https://www.ncbi.nlm.nih.gov/pubmed/23802744

Phototherapy Graph

All infants born to isoimmunized mothers, who have a positive DAT or positive antigen status are medium risk (≥38 weeks) or higher risk (35-37 wk 6 days).
"Risk factor = isoimmune hemolytic disease"

Bilirubin measured in mg/dL use the left side of the graph. Values in µmol/L values use the right.



- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
- Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin < 3.0g/dL (if measured)
- For well infants 35-37 6/7 wk can adjust TSB levels for intervention around the medium risk line. It is an option to intervene at lower TSB levels for infants closer to 35 wks and at higher TSB levels for those closer to 37 6/7 wk.
- It is an option to provide conventional phototherapy in hospital or at home at TSB levels 2-3 mg/dL (35-50mmol/L) below those shown but home phototherapy should not be used in any infant with risk factors.

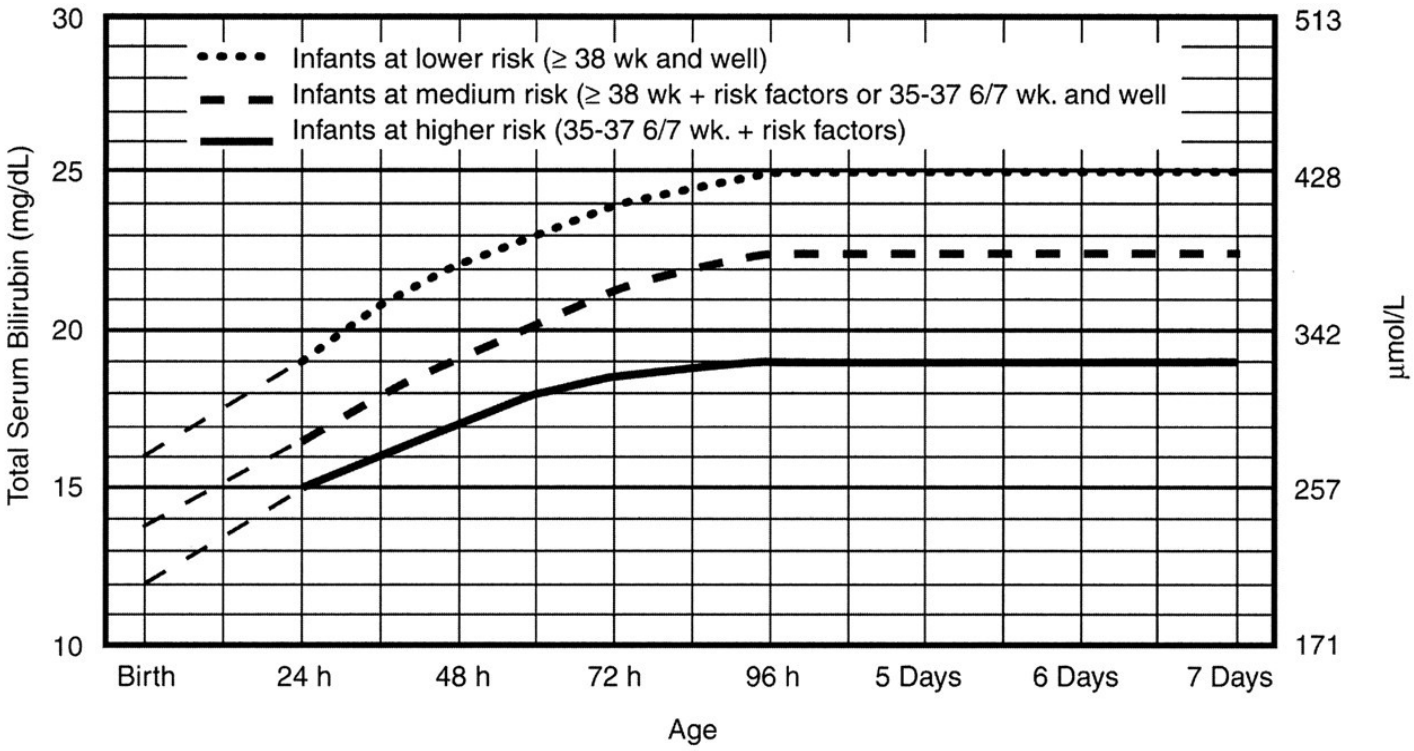
Source: Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation
Pediatrics Jul 2004, 114 (1) 297-316; DOI: 10.1542/peds.114.1.297
Retrieved from http://pediatrics.aappublications.org/content/114/1/297

This resource is provided courtesy of All About Antibodies. Www.AllAboutAntibodies.com

Exchange Transfusion Graph

All infants born to isoimmunized mothers, who have a positive DAT or positive antigen status are medium risk (≥38 weeks) or higher risk (35-37 wk 6 days).
"Risk factor = isoimmune hemolytic disease"

Bilirubin measured in mg/dL use the left side of the graph. Values in µmol/L values use the right.



- The dashed lines for the first 24 hours indicate uncertainty due to a wide range of clinical circumstances and a range of responses to phototherapy.
- Immediate exchange transfusion is recommended if infant shows signs of acute bilirubin encephalopathy (hypertonia, arching, retrocollis, opisthotonos, fever, high pitched cry) or if TSB is ≥5 mg/dL (85 µmol/L) above these lines.
- Risk factors - isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis.
- Measure serum albumin and calculate B/A ratio (See legend)
- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin
- If infant is well and 35-37 6/7 wk (median risk) can individualize TSB levels for exchange based on actual gestational age.

Source: Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation
Pediatrics Jul 2004, 114 (1) 297-316; DOI: 10.1542/peds.114.1.297
Retrieved from http://pediatrics.aappublications.org/content/114/1/297

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Normal Pediatric Laboratory Values

Hemoglobin

Age	Females (g/dL)	Males (g/dL)
Newborn	12.7 - 18.3	14.7 - 18.6
6 months - 2 years	10.4 - 12.4	10.3 - 12.4

Selected Normal Pediatric Lab Values. Retrieved from http://wps.prenhall.com/wps/media/objects/354/362846/London%20App.%20B.pdf

Hematocrit

Age	Females (%)	Males (%)
Newborn	37.4 - 55.9	43.4 - 56.1
6 months - 2 years	31.2 - 37.2	30.9 - 37.0

Selected Normal Pediatric Lab Values. Retrieved from http://wps.prenhall.com/wps/media/objects/354/362846/London%20App.%20B.pdf

Ferritin

Age	Newborn	1-5 months
Level (ng/mL)	25 - 200	50 - 200

Ferritin. (2015, August 21). Retrieved from http://www.webmd.com/a-to-z-guides/ferritin?page=2

Neutrophil Count

Values	Cord	1 - 12 hours	12 - 24 hours	3-10 days
Neutro x 10^9/L	6 - 26	6 - 28	5 - 21	1.5 - 10

Normal Laboratory Values for Neonates (Term). Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/perinatal-reproductive/neonatal-ehandbook/pathology/normal-laboratory-values

Reticulocyte Count (Retic)

Newborns have a normal reticulocyte count of 2.5% to 6.5%. In normal babies, this value drops within 2 weeks to 0.5% to 2.0%. In ISO babies, it is normal for the retic to remain higher for longer as the baby combats anemia.

Reticulocyte Count. (2015, February 20). Retrieved from http://www.webmd.com/a-to-z-guides/reticulocyte-count

Thrombocyte Count (Platelet Count)

Thrombocytopenia is defined as a platelet count of less than 150 x 109/L. This value is the same regardless of age.

Gersten, T. (2016, February 12). Thrombocytopenia. Retrieved from https://www.nlm.nih.gov/medlineplus/ency/article/000586.htm

Your Baby's Numbers

Birth Date: _____ Time: _____ GA: _____

Blood Type: _____ Antigen Phenotype: _____

DAT: _____ IAT: _____
[For anti-C, anti-c, anti-Fya, anti-Good, anti-H, anti-Jra, anti-M, and anti-Mta]

Bilirubin

Date								
Age (hrs)								
Level								

Date								
Age (hrs)								
Level								

Complete Blood Count

Date								
Hemoglobin								
Hematocrit								
Retic								
Neutrophils								
Platelets								

Date								
Hemoglobin								
Hematocrit								
Retic								
Neutrophils								
Platelets								

It is dangerous to give iron to an infant with HDFN without first doing a ferritin test.

Ferritin Level: _____

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Newborn & Infant Blood Testing

What Needs To Be Drawn When

Please note that these are minimums. Some babies will need labs more frequently, but all affected infants need the weekly check until 12 weeks old or the hemoglobin is going up 2-3 weeks in a row.[1] Do not give iron supplements without first testing the ferritin level. Infants with HDFN do not suffer from iron-deficiency anemia. Iron supplements can be deadly.[2, 6]

Birth

From Cord Blood - this is not testing done at 4/6/12/24 hours old. This is done at birth. If the cord blood clots, it needs redrawn as soon as possible. [3, 5]

- DAT or Direct Coomb's Test [4,7]
  - Antigen phenotype or Indirect Coomb's Test [7]: This is needed as well if the DAT comes back negative and mom has one of the following antibodies: anti-C, anti-c, anti-Fya, anti-Good, anti-H, anti-Jra, anti-M, or anti-Mta.
- Bilirubin [4, 7]
- CBC (Complete Blood Count) [7]: including Hemoglobin/Hematocrit, Neutrophils, Platelets/Thrombocytes, and a Retic/Reticulocyte count.

Days 1-7

- Bilirubin - checked every 4, 6 or 12 hours in the hospital. [3, 4]
- Bilirubin - checked daily when out of the hospital. This is especially important during days 4-6 when bilirubin due to alloimmunization tends to peak.
- Hemoglobin [1] - checked usually at least 1 other time this week besides at birth.
- Retic[1]

Days 8-14

- Hemoglobin/Hematocrit [1] - checked weekly (some docs do 2x a week if <4 weeks old).
- Retic[1]
- Bilirubin - checked every other day.
- Neutrophil count and Thrombocyte/Platelet. [1]

3 Weeks Old

- Hemoglobin/Hematocrit [1] - checked weekly
- Retic[1]
- Bilirubin 1-2x a week to be sure it is still going down.
- Neutrophil count and Thrombocyte/Platelet count may be repeated depending on the values from earlier.

4 Weeks Old - 12 Weeks Old

- Hemoglobin/Hematocrit [3] - checked weekly. This is especially important for weeks 4-6 when newborns have a normal drop in hemoglobin. Infants suffering from HDFN can have a larger drop than normal and need their first transfusions during this window. This is not limited to infants whose mothers have had IUTs, but applies to all infants affected by alloimmunization. All infants need the weekly check until 12 weeks old or the hemoglobin is going up 2-3 weeks in a row.
- Retic - checked weekly to see if the infant is making new blood.
- Other Tests - the Thrombocyte/Platelet count, and the Neutrophil count may be repeated every 2 weeks. Thrombocytopenia and Neutropenia are both common side effects of alloimmunization/Hemolytic Disease of the Newborn. [1] See Additional Reading - Neutropenia and Thrombocytopenia.

References

1 - Hemolytic disease of the fetus and newborn: managing the mother, fetus, and newborn. Delaney M, Matthews DC. Hematology Am Soc Hematol Educ Program. 2015;2015:146-51. doi: 10.1182/asheducation-2015.1.146.

2 - Rath ME, Smits-Wintjens VE, Oepkes D, Walther FJ, Lopriore E. Iron status in infants with alloimmune haemolytic disease in the first three months of life. Vox Sang. 2013 Nov;105(4):328-33. doi: 10.1111/vox.12061.

3 - Moise, K Jr. Post-Natal Management of Red Cell Alloimmunization Following IUT. https://lookaside.fbsbx.com/file/Dr.%20Moise%20Post-Natal%20Management%20of%20Red%20Cell%20Alloimmunization%20Following%20IUT08182014.pdf?token=AWzYl8dIfOoH4YGvaclKMiRFFU9ozNcJUpwW-cA3zcKGd2k3OfhMScfhSNGW-FIqWmMsGRFQcqr6JauviAcc2d8t2fz1QD47_51FwvbHJnPtNawaV2Kzfn-gYUz9UvSSk_eaThXb6Ukivxz03Yr6UBK6 Accessed September 20, 2017

4 - Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation Pediatrics Jul 2004, 114 (1) 297-316; DOI: 10.1542/peds.114.1.297

5 - Murray N, Roberts IAG. Haemolytic Disease of the Newborn. Arch Dis Child Fetal Neonatal Ed. 2007 Mar; 92(2): F83–F88. doi: 10.1136/adc.2005.076794

6 - Medscape. Schick, Paul. Hemolytic Anemia Treatment & Management. http://emedicine.medscape.com/article/201066-treatment#showall. Accessed August 8, 2018.

7 - Calhoun, D. Postnatal diagnosis and management of hemolytic disease of the fetus and newborn. https://www.uptodate.com/contents/postnatal-diagnosis-and-management-of-hemolytic-disease-of-the-fetus-and-newborn Accessed July 11, 2018.

Additional Reading By Topic

Direct Coomb's Test (DAT) Exceptions

Anti-C, anti-c, anti-Fya, anti-Good, anti-H, anti-Jra, anti-M, and anti-Mta are the Direct Coomb's Test Exceptions. The test may show negative, but the infant still be severely affected.

Medscape. Wagle S. Hemolytic Disease of the Newborn Workup. https://emedicine.medscape.com/article/974349-workup?. Accessed August 6, 2018

Heddle NM, Wentworth P, Anderson DR, Emmerson D, Kelton JG, Blajchman MA. Three examples of Rh haemolytic disease of the newborn with a negative direct antiglobulin test. Journal of Transfusion Medicine. 1995 Jun;5(2):113-6. Doi: 10.1111/j.1365-3148.1995.tb00197

Babinszki A, Berkowitz R. Haemolytic disease of the newborn caused by anti-c, anti-E and anti-Fya antibodies: report of five cases. Prenatal Diagnosis. 1999; 19(6):533-536. doi: 10.1002/(SICI)1097-0223(199906)19:6%3C533

Frumin A, Porter M, Eichman M. The Good Factor as a Possible Cause of Hemolytic Disease of the Newborn. The Blood Journal. http://www.bloodjournal.org/content/bloodjournal/15/5/681.full.pdf Accessed August 6, 2018.

Shastry S, Lewis L, Bhat S. A rare case of haemolytic disease of the newborn with Bombay phenotype mother. The Asian Journal of Transfusion Science. 2013; 7(2): 153-155. doi: 10.4103/0973-6247.115583

Endo Y, Ito S, Ogiyama Y. Suspected anemia caused by maternal anti-Jra antibodies: a case report. Biomark Research. 2015; 3:23. Doi: 10.1186/s40364-015-0048-x

Thompson DJ, Stults DZ, Daniel SJ. Anti-M Antibody in Pregnancy. Obstet Gynecol Surv. 1989; 44(9):637-641

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Hemolytic Anemia and Iron Status

"The vast majority of neonates with alloimmune HDFN have iron overload at birth. Incidence of iron overload gradually decreases within the first 3 months without iron supplementation...In recent literature, a ferritin level <12 lg/l is used for the definition of iron deficiency during the first year of life. Based on that definition, no cases of iron deficiency were present until 3 months of age in our study group... On the contrary, iron overload occurs in 70% of neonates with alloimmune HDFN at birth, 50% at the age of 1 month and 18% at the age of 3 months. Therefore, we advise to measure iron status, and we discourage the use of iron supplementation in the first 3 months of life in neonates with alloimmune HDFN."
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