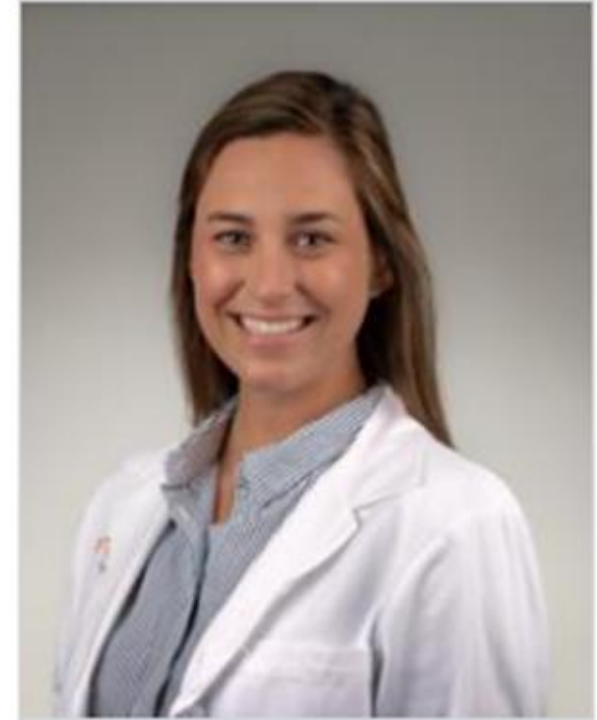


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Ironing Out the Risks: Combating Anemia during Pregnancy

ELIZABETH NODELMAN, MD FACOG

Presentation Objectives:

Define anemia in pregnancy

Discuss prevalence and implications of anemia in pregnancy

Learn about risks contributing to high anemia rates

Discuss ways to prevent and improve anemia in pregnancy

Define Anemia in Pregnancy

	First Trimester	Second Trimester	Third Trimester
Hgb	11 g/dL	10.5 g/dL	11 g/dL
Hct	33%	32%	33%

Anemia in Pregnancy

- 50% of pregnant women in the world are anemic
- 23% of pregnant women in industrialized countries are anemic
- CDC and ACOG recommend screening for anemia in all pregnant women
- Physiological changes occur increasing the likelihood of anemia
- Iron deficiency is the most common cause of anemia in pregnancy

Causes of Anemia

- Physiological Changes:
 - Plasma volume expansion → dilution
 - Increased RBC mass and hemoglobin synthesis
 - Nutritional needs of fetus and placenta
 - Loss of blood and iron at delivery
 - Lactation
- Nutritional deficiencies
- Inherited conditions
- Reduced bone marrow production
- Chronic disease
- Blood loss
- Hemolytic anemias

Symptoms of Anemia

- Fatigue
- Weakness
- Palpitations
- Pallor
- Headaches
- Dizziness
- Hemolysis:
 - Jaundice
 - Scleral icterus
 - Splenomegaly

Testing for Anemia

- CBC
- Ferritin
- B12
- Folate
- Reticulocyte
 - Reticulocyte index = $\text{reticulocyte count} \times \text{Hct}/45$
 - Normal = 1-2%
 - $>3\%$ → hemolysis or blood loss
 - $<3\%$ → consider causes of low production
- Haptoglobin
- LDH
- Coombs'/DAT
 - Warm or cold antibodies

Recommendations- Testing for Anemia in Pregnancy

- **All** pregnant women should be screened for anemia
- If anemia is found, ferritin should be performed
- If IDA is not diagnosed other causes of anemia should be investigated
 - Hemoglobin electrophoresis
 - Folate
 - B12
 - Reticulocyte
 - Peripheral smear

Macrocytic Anemias

- **Laboratory findings:** MCV >100 fL, megaloblastic anemia
- Folate deficiency
 - Deficient = <2 ng/mL
 - Borderline = 2 to 4 ng/mL
 - Normal = >4 ng/mL
- Vitamin B12 deficiency
 - Deficient = <200 pg/mL
 - Borderline = 200 to 300 pg/mL
 - Normal = >300 pg/mL
- Other macrocytic anemias:
 - Hypothyroidism
 - Alcoholism
 - Liver disease
 - MDS

Microcytic Anemias

- **Laboratory findings:** MCV <80 fL
- Thalassemia
 - α -thalassemia
 - B-thalassemia
- Anemia of Chronic Disease
- Iron Deficiency Anemia
 - Consider without microcytosis as well

Iron Deficiency Anemia

- Prevalence of anemia increases with each trimester
 - 1st trimester: 7.7%
 - 2nd trimester: 12.2%
 - 3rd trimester: 33.9%
- Only 20% of pregnant women have sufficient iron stores for pregnancy without supplementation
- **Ferritin <30 ng/L** is the gold standard for testing
 - 98% sensitivity and 92% specificity
- Other measures:
 - Transferrin saturation of <15%
 - MCV can aid in diagnosis, but may be falsely elevated during pregnancy

Hemolytic Anemias

- **Laboratory findings:** Low Hb/Hct, elevated LDH, low haptoglobin, reticulocyte >3%, high bilirubin, normocytic
- Sickle Cell Anemia
- Autoimmune Hemolytic Anemia
- Coomb's Negative Hemolytic Anemia
- Paroxysmal Nocturnal Hemoglobinuria
- HELLP Syndrome
- Pyruvate Kinase Deficiency
- Other considerations:
 - Folic acid
 - Iron overload

Sickle Cell Anemia

- **Laboratory Findings:** hemoglobin electrophoresis
- **Risks:**
 - Preterm birth
 - Miscarriage
 - Pre-eclampsia and eclampsia
 - Thromboembolism
- Discontinuation of teratogens and certain iron chelators
- Prophylactic transfusions – indicated?
- Infection screening

Autoimmune Hemolytic Anemia

- **Laboratory Findings:** Direct Coombs'/DAT
- Warm Antibodies:
 - CLL
 - SLE
 - Drugs (penicillin, cephalosporins)
 - Treatment: corticosteroid, IVIG
- Cold Agglutinin:
 - Mycoplasma pneumoniae
 - Infectious mononucleosis
 - Treatment: clear infection, avoid cold exposure

HELLP Syndrome

- Laboratory Findings: hemolytic anemia, elevated liver enzymes and low platelet count
- Treatment:
 - Over 34 weeks → delivery
 - Less than 34 weeks → Corticosteroid
 - If worsening → delivery
 - Closely monitor
 - Antihypertensive therapy if BP > 160/110
 - Magnesium sulfate

Blood Loss

- **Laboratory findings:** Low Hb/Hct, reticulocyte production index >3%, normal LDH and haptoglobin, normocytic

Evaluate for physical exam findings that indicate potential bleeding

Treatment focused on resolving source of blood loss

- Transfusion may be indicated when Hb <7 g/dL

Prevalence

- A national study of anemia in pregnancy in the US found a prevalence of 21.55 per 1,000 women when anemia was defined as a hemoglobin concentration less than 10 g/dL
- The prevalence of in non-Hispanic Black women was **two times higher** than that of non-Hispanic White women
- Teenage mothers had the highest prevalence of anemia irrespective of race

Effects of Anemia in Pregnancy

Maternal Consequences:

- Postpartum hemorrhage
- Postpartum depression
- Placental hypertrophy
- Preeclampsia
- Fatigue
- Need for transfusion
- Decreased breast milk production
- Exercise intolerance
- Tachycardia
- Suboptimal work performance

Fetal Consequences:

- Preterm birth
- Low birth weight
- Intrauterine growth retardation
- 5 minute Apgar scores less than 7
- Defective myelination
- Impaired cognitive and behavioral development

Nutritional Supplementation and Education

- Education on an iron-rich diet results in higher hemoglobin levels
- Iron-rich foods:
 - Red meat
 - Fortified cereals
 - Clams
 - Oysters
 - Pumpkin seeds
 - Spinach
 - Lentils
 - Chickpeas
- Vitamin C-rich foods:
 - Citrus fruits
 - Bell peppers
 - Strawberries
 - Broccoli

Nutritional Supplementation and Education

- Approximately **15 mg** of elemental iron daily in a typical diet
- ACOG recommends **27 mg** iron supplementation daily starting at the beginning of pregnancy
- CDC recommends **30 mg** iron supplementation daily starting at the beginning of pregnancy
- Daily recommendation during lactation is at least **9 mg** daily
- Oral iron should be taken with vitamin C for best absorption
- Dairy products, coffee, tea, antacids, some antibiotics, and calcium reduce iron absorption

Treatment of IDA

- Oral iron is first-line therapy for most patients
- Ferrous sulfate 325 mg daily is shown to be effective with less GI side effects
 - Counsel on avoiding foods/drinks that reduce iron absorption
- IV iron should be given in patients with:
 - History of gastric bypass
 - Malabsorption disorder
 - Resistance to oral iron
 - Inability to tolerate oral iron
 - Hyperemesis gravidarum
 - Need for rapid response

Schedule

New OB Visit

- Order CBC
- Give patient information on IDA pre-diagnosis
- Evaluate further labs if anemic
- Refer to hematology if hemoglobin is less than 9.0 g/dL
- If diagnosis of IDA is made, then prescribe patient ferrous sulfate

Week 24 Visit

- Order CBC
- Check ferritin if patient had IDA at prior visit
 - If iron has not improved on oral iron consider starting patient on IV iron
- If new diagnosis of IDA, then start patient on ferrous sulfate and give patient information on IDA post-diagnosis
- Refer to hematology if hemoglobin is less than 9.0 g/dL

Week 32 Visit

- Check CBC if patient has history of IDA in pregnancy
- If hemoglobin is less than 9 g/dL, give IV iron

Medications/Orders

- Iron:
 - Oral: ferrous sulfate 325 mg daily
 - IV: Venofer 300 mg day 1 and day 8; 400 mg day 15
- Folate 5 mg
- Vitamin B12 complex

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