

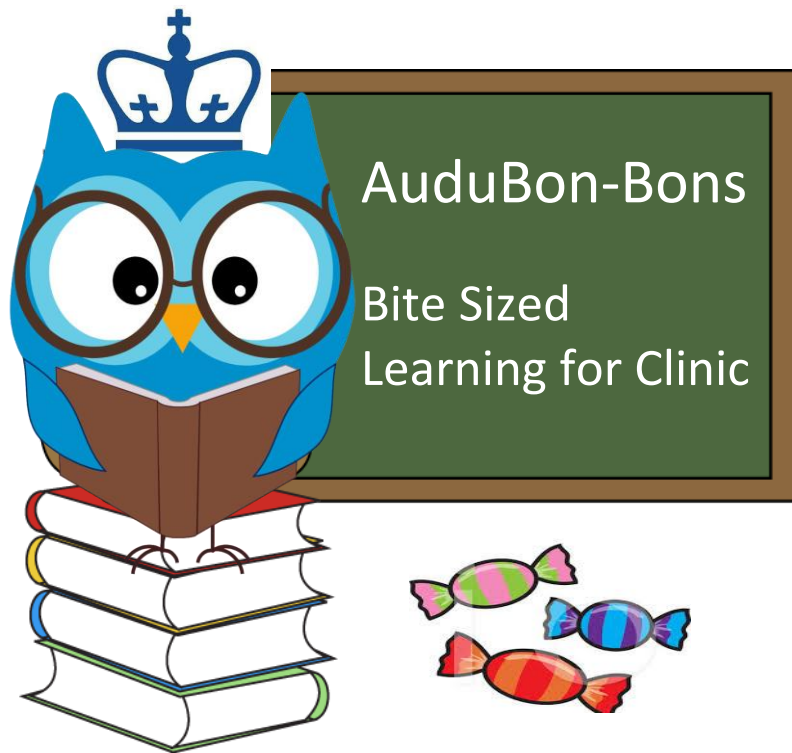
PRENATAL CARE: ANEMIA

Week 51

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Reading Assignment

- *ACOG Practice Bulletin 95*, July 2008: **Anemia in Pregnancy**
- Pavord S, et al. UK guidelines on management of iron deficiency in pregnancy.
<https://onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2141.2011.09012.x>



LEARNING OBJECTIVES

- Understand screening guidelines for anemia in pregnancy
- Be able to diagnosis iron deficiency anemia
- Learn the management of iron deficiency anemia in pregnancy



CASE VIGNETTE

- Ms. Nunca Sangre is a 19 yo G3 P2012 woman presenting at 28w 4d EGA for routine follow up care.
- She states that she feels exhausted all the time.



FOCUSED HISTORY

What aspects of this patient's history are most important?

- **PMH:** Obesity
- **PSH:** Gastric sleeve (2017)
- **PObH:** NSVD x 2, last delivery less than 12 months ago
- **PGynH:** Heavy menses, denies STIs or abnormal Paps
- **Social:** Denies T/E/D
- **Allergies:** NKDA
- **Meds:** Prenatal multivitamins

*Age (Teen pregnancy)



Pertinent Physical Exam Findings

VS: Height 157, Weight: 78 kg, BMI: 33.3, HR: 110, BP: 105/78, RR: 18

- **Gen:** NAD, appears fatigued
- **Skin:** Some pallor
- **Pulm:** CTAB
- **Cardio:** Sinus tachycardia, no murmurs, rubs, or gallops
- **Abd:** Obese, 3 well-healed LSC port site incisions, non-tender
- **Ext:** WWP

Following your visit, CBC returns notable for
Hgb 9.6, Hct 29%, Plts 204



DIFFERENTIAL DIAGNOSIS

- Iron deficiency anemia
- Physiologic dilution anemia of pregnancy
- Hemorrhagic anemia
- Hemoglobinopathies
 - Thalassemia
 - Sickle Cell disease
- Nutritional deficiencies
 - Folate
 - Vitamin B12
- Hypothyroidism/ endocrine dysfunction
- Autoimmune hemolysis
- RBC membrane disorders
- Anemia of chronic disease



ANEMIA: DEFINITION AND SYMPTOMS

- Definition: A hemoglobin or hematocrit value less than the fifth percentile in a healthy reference population based on the stage of pregnancy.
 - **First trimester:** Hgb < **11** g/dL and Hct < **33%**
 - **Second trimester:** Hgb < **10.5** g/dL and Hct < **32%**
 - **Third trimester:** Hgb < **11** g/dL and Hct < **33%**
 - **Non-pregnant women:** Hgb < **12.0** g/dl and Hct < **35%**
- Symptoms:
 - Weakness, fatigue, headaches, dizziness, lightheadedness
 - Changes in cognitive performance and psychological well being
- Pregnancy is a state of **physiological hemodilution:**
 - Intravascular blood volume expands by approximately **50%**
 - Total red blood cell mass expands by approximately **25%**
 - No change in MCV



SCREENING FOR ANEMIA IN PREGNANCY

Who should be screened for anemia?

- **All pregnant women** should be screened for anemia during pregnancy
 - CBC collected at the initial prenatal visit, and beginning of 3TM
- Women who meet the criteria for anemia (e.g. Hct < 33% in the first and third trimesters) warrant further evaluation even if they are asymptomatic:
 - Medical history and physical examination
 - RBC indices (e.g. MCV, MCHC, reticulocyte count, etc)
 - Serum iron, ferritin, transferrin
 - Hemoglobin electrophoresis
 - Peripheral smear, if indicated by history



BACK TO THE PATIENT- EVALUATION

What are next steps?

- Labs:
 - CBC with red cell indices
 - Hemoglobinopathy screen
 - Serum iron level
 - Ferritin level
 - Transferrin level
 - Total iron binding capacity
- Start empiric iron treatment

Ms. Nunca Sangre- Results

- **Hgb: 9.6, Hct: 29%, MCV 80**
- **Hgb AA**
- **Plasma Iron: 25 mcg/dL**
- **Ferritin level: 8 mcg/dL**
- **Transferrin level: 400 mg/dL**
- **TIBC: 450 mcg/dL**



DIAGNOSIS

Table 1. Normal Iron Indices in Pregnancy

Test	Normal Value
Plasma iron level	40–175 micrograms/dL
Plasma total iron-binding capacity	216–400 micrograms/dL
Transferrin saturation	16–60%
Serum ferritin level	More than 10 micrograms/dL
Free erythrocyte protoporphyrin level	Less than 3 micrograms/g

Table 3. Biochemical Tests for Diagnosis of Anemia

Test	Results Indicating Iron Deficiency Anemia	Results Indicating Thalassemia	Results Indicating Anemia of Chronic Disease
Iron level	Decreased level	Normal	Decreased level
Total iron-binding capacity	Increased capacity	Normal	Decreased capacity
Ferritin level	Decreased level	Normal	Increased level
Iron/total iron-binding capacity	Less than 18%	Normal	More than 18%



IRON DEFICIENCY ANEMIA

Hypochromic, microcytic anemia (MCV < 80fL) ***

- However microcytosis may only occur later in iron deficiency anemia
- Measurement of **ferritin** levels has the highest sensitivity and specificity for diagnosing iron deficiency in anemic patients
 - Ferritin level < **10** mcg/dL
- *Risk factors:*
 - Iron poor diet
 - **Malabsorptive conditions i.e. gastric bypass procedures**
 - **Heavy menses pre-pregnancy**
 - **Short inter-pregnancy interval**
 - **Teen pregnancy**
 - **Obesity**
 - Low BMI
- *Prevalence: 21.55 per 1,000 pregnant women in the US*
- Iron deficiency anemia during pregnancy is associated with **adverse outcomes** including low birth weight, preterm delivery, increased need for transfusion, perinatal mortality, and postpartum depression



Scordino, T. American Society of Hematology.
1/13/2016. Accessed online 9/6/2019 at
<https://imagebank.hematology.org/image/60299/microcytosis?type=upload>



MANAGEMENT

What will you prescribe for Ms. Nunca Sangre?

Oral supplementation

- With oral formulations, should see increase in hgb in 2 wks
- Multiple formulations
 - Starting with 60 mg elemental iron, daily to every other day dosing to improve absorption and limit side effects
- Absorption improved taking in the morning with **vitamin C** (ascorbic acid) and avoidance of taking with **coffee, tea, or milk**
- *Adverse effects*: constipation, gastrointestinal irritation, nausea

Preparation	Dose
Ferrous fumarate	106 mg elemental iron per 325 mg tablet
Ferrous sulfate	65 mg elemental iron per 325 mg tablet
Ferrous gluconate	34 mg elemental iron per 300 mg tablet
Iron dextran	50 mg elemental iron per milliliter, intramuscularly or intravenously
Ferric gluconate	12.5 mg iron per milliliter, intravenously only
Iron sucrose	20 mg iron per milliliter, intravenously only

Anemia in pregnancy. ACOG Practice Bulletin No. 95. American College of Obstetricians and Gynecologists. Obstet Gynecol 2008;112: 201-7

MANAGEMENT CONTINUED

What will you prescribe for Ms. Nunca Sangre?

IV Iron:

- For patients:
 - who cannot tolerate PO iron
 - with severe anemia (Hgb 8-10) especially after 30 wks
 - in which PO iron will be ineffective (impaired absorption from gastric surgeries or IBD)
- Safe after first trimester
- Variety of formulations (iron dextran, iron sucrose or venofer, etc)
- No need for premedication in most patients
- AE include low risk (1-3%) of minor infusion reactions

Transfuse only for severe anemia (hgb <6) due to risk of fetal compromise from deoxygenation

PREVENTION

What measures can be taken to prevent anemia in pregnancy?

As per CDC recommendations:



- Start every pregnant patient on *low dose oral iron supplementation* (e.g. 30 mg/day) at the initial prenatal visit.
- Nutritional counseling be provided for pregnant women with regards to an *iron-rich diet*, as well as a diet that supports iron absorption.

As per ACOG recommendations:



- *Iron supplementation* decreases the prevalence of maternal anemia at delivery.
- It is unclear whether iron supplementation in well-nourished pregnant women who are not anemic affects perinatal outcomes.



TAKE HOME POINTS

- Anemia in pregnancy is very common
- Screen all pregnant women for anemia at the initial visit and beginning of 3TM with a CBC
 - 1TM/3TM: Hgb < **11.0** g/dL and Hct < **33%**
 - 2TM: Hgb < **10.5** g/dL and Hct < **32%**
- Pregnant patients with anemia warrant further clinical and serological evaluation
- Therapy with oral iron supplementation of **65 mg/ day to every other day** is effective
- Consider parenteral iron therapy for early diagnosis of anemia, severe anemia, or those not expected to respond to PO iron



SOCIAL DETERMINANTS OF HEALTH

A 2005 study looked at US Natality data from 1995-2000.

- **Data from >20,000,000 births were examined**
- **Anemia of pregnancy (AIP) was defined as hemoglobin-concentration <10g/dl**
- **Prevalence of AIP was two times higher among non-Hispanic blacks (20.44/1,000) than among non-Hispanic whites (10.73/1,000)**

A large systematic review and meta-analysis from 2013 found that lower hemoglobin concentration is associated with higher risk of poor pregnancy outcomes (PTB, and LBW).



Epic .Phrase

.BBonAnemia

Description: Management of Anemia in Pregnancy

Patient was counseled about the diagnosis of anemia in pregnancy. Hemoglobinopathy screen was reviewed and found to be ***. Iron studies, including ferritin, serum iron level, total binding iron capacity, and transferrin were sent. The patient was recommended to begin oral iron daily to every other day with plan for repeat CBC to assess improvement in 4 weeks. Possible side effects of oral iron were discussed including nausea, GI irritation and constipation. Plan for referral to hematology for possible IV iron was discussed in case of intolerance or ineffectiveness of oral iron.



Coding/ Billing

- O99.019, anemia complicating pregnancy, unspecified trimester
- D50.9, iron deficiency anemia, unspecified
- D53.9, nutritional anemia, unspecified
- O90.81, anemia of the puerperium



EVIDENCE

- [Anemia in pregnancy. ACOG Practice Bulletin No. 95. American College of Obstetricians and Gynecologists. Obstet Gynecol 2008;112: 201–7](#)
- [Recommendations to prevent and control iron deficiency in the United States. Centers for Disease Control and Prevention. MMWR Recomm Rep 1998; 47:1.](#)
- [US Preventive Services Task Force. Guide to Clinical Preventive Services: Report of the U.S. Preventive Services Task Force. 2nd edition. Baltimore \(MD\): Williams & Wilkins; 1996. 22, Screening for Iron Deficiency Anemia— Including Iron Prophylaxis.](#)
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- Miller, E. Iron status and reproduction in US women: National Health and Nutrition examination Survey, 1999-2006. *PLoS One.* 2014; 9(11); e112216.
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- Auerbach M, Landy HJ. Anemia in Pregnancy. *UpToDate.* Updated Oct 09, 2019. https://www.uptodate.com/contents/anemia-in-pregnancy?search=anemia%20in%20pregnancy&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1 Accessed October 18, 2019
- Stoffel NU et al. Iron absorption from oral iron supplements given on consecutive versus alternate days and as single morning doses versus twice-daily dosing in iron depleted women: two open-label, randomized controlled trials. *Lancet Haematol.* 2017;4(11):e524.
- Adebisi O, Strayhorn G. Anemia in pregnancy and race in the United States: Blacks at risk. *Family Medicine.* 2005; 37(9):655-62.
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