

Iron Deficiency Leading to Severe Morbidity;

Presented by
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Conflicts of Interest

I have no financial conflicts

Objectives

- Understand the link between iron deficiency, anemia, and severe maternal morbidity
- Highlight disparities
- Discuss potential approaches to anemia prevention

Anemia in Pregnancy is Clinically Important

- **Very common and significance often under emphasized**
- More common in women than men
- More common in pregnant than nonpregnant women
- Iron deficiency anemia is most common and easy to treat
- Disparities exist
- Importance evidenced by:
 - Routine screening twice in pregnancy
 - Prenatal vitamins routinely contain iron
 - Supplemental additional iron is often recommended



ANEMIA



NORMAL

Neonatal Outcomes Associated with Maternal Iron Deficiency

- Anemia
 - Preterm delivery
 - SGA
 - Perinatal mortality
- Iron deficiency
 - Lower cord blood ferritin
 - Neurodevelopmental & behavioral abnormalities in childhood

Anemia in Pregnancy

	Definition Hgb(Hct)	Prevalence (%)	Prevalence of Hgb<10 g/dl (%)
1 st trimester	<11.0 (33.0)	1.8	
2 nd trimester	<10.5 (32.5)	8.2	
3 rd trimester	<11.0 (33.0)	27.4	
Non-Hispanic white	Historically definition varied by race*		1.8%
Non-Hispanic Black			3.5%

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*ACOG Practice Bulletin #95, 2008

Anemia between 2-16 weeks and SMM

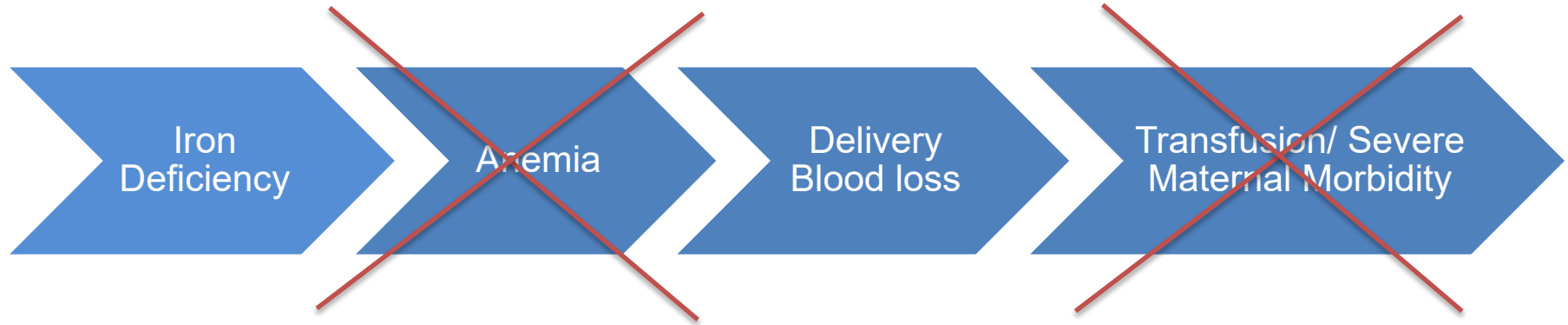
Hgb Level (g/dl) (n=737,393)	SMM (%)	SMM (RR)	Transfusion (%)	Transfusion (RR)
12.5-12.9	1.7	1.00	0.7	1.00
12.0-12.4	1.8	1.07	0.8	1.1
10.5-10.9	2.4	1.31	1.4	1.9
<9.0	8.2	4.53	8.3	11.8
13.0 - >15.0	1.7-21	NS	0.6-0.7	0.8-0.9

Ray, BJOG 2020

Disparities in Anemia and SMM

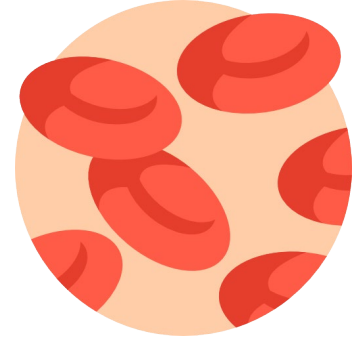
Race	Prevalence (%)	aRR of SMM with Anemia	Adjusted SMM Pop Attributable Risk (%)
White	9.6	1.00	14.7
Black	21.5	1.27	20.9
Hispanic	12.6	1.17	20.9
Asian	10.6	1.33	11.3
AI AN	14.1	1.53	16.7
Pacific Islander	18.2	1.68	16.4
Multiple Races	14.0	1.10	21.4

Path from Anemia to Severe Maternal Morbidity



Ferritin

- Bone marrow biopsy is only direct way to measure iron stores
- Ferritin most sensitive, specific and widely used noninvasive measure of iron deficiency
- Increased in
 - Infection/inflammation
 - Elevated in hemoglobinopathies or hemolytic anemia
 - Can help determine need for supplementation
 - Liver disease



Iron Deficiency in Pregnancy

	Definition (mg/dl) Ferritin Level	Prevalence* (%)
1 st trimester		6.9
2 nd trimester	<10 (ACOG 2008) <30 (ACOG 2021)	14.3
3 rd trimester		29.5

*Prevalence based on limited data

USPSTF - “I” recommendation (2015) – evidence insufficient to assess balance of benefits and harms (Update pending)

Risk factors

- Parity >2
- Non-Hispanic black and Mexican American

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1st Trimester Screening for Anemia at Delivery

Predelivery anemia			
Parameter	Sensitivity	Specificity	ROC-AUC
Ferritin <30	0.71	0.72	0.78
Hgb < 11.0	0.27	0.98	0.60

Crispin, Transfusion and Apheresis Science 2019

What to do?

- Evidence to support screening for iron deficiency is very limited
- Mild anemia (hgb > 10 & <11 g/dl) or normal Hgb at lower limits of normal with a normal or low MCV
 - Either check ferritin or provide a trial of supplemental iron
- Those with macrocytic anemia, very low MCV, moderate (7.0-9.9 g/dl) or severe anemia should be further evaluated
- Oral iron is treatment of choice
 - Every other day therapy is as effective as daily iron over the long term with fewer side effects
- IV iron is indicated for those that fail oral therapy (compliance challenges, poor absorption, inability to tolerate) or late in pregnancy when there isn't time for oral therapy to be effective

Summary

- Anemia disparities, identification, and management are garnering increased attention
- Screening for iron deficiency (not just anemia) has the potential to improve outcomes



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