Iron Deficiency Anemia in Pregnancy

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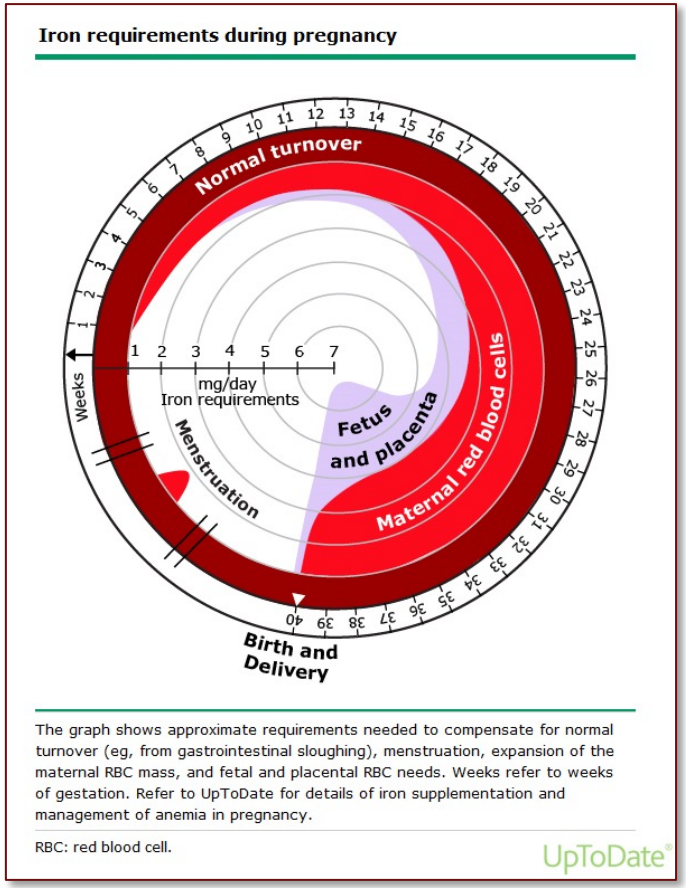
Outline: iron deficiency anemia in pregnancy

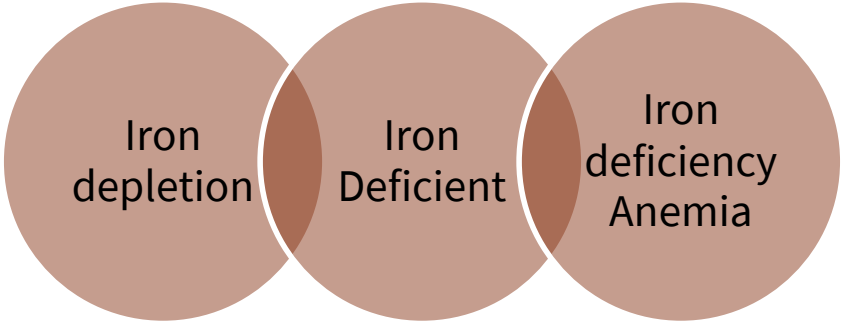
- ✓ Review definitions
- ✓ Identify impact on maternal morbidity and mortality in the US and globally
- ✓ Understand maternal, fetal, neonatal and lifetime consequences
- ✓ Discuss management
- ✓ Explore literature gaps, ongoing research

Iron requirements in pregnancy

- Total iron in body determined by intake, loss, storage
- Menses can cause chronic iron deficiency
- Second trimester: iron requirements increase due to expansion of **maternal blood volume and red cell mass**
- Third trimester: iron accumulates in the **placenta** to support increased **fetal red blood cells**



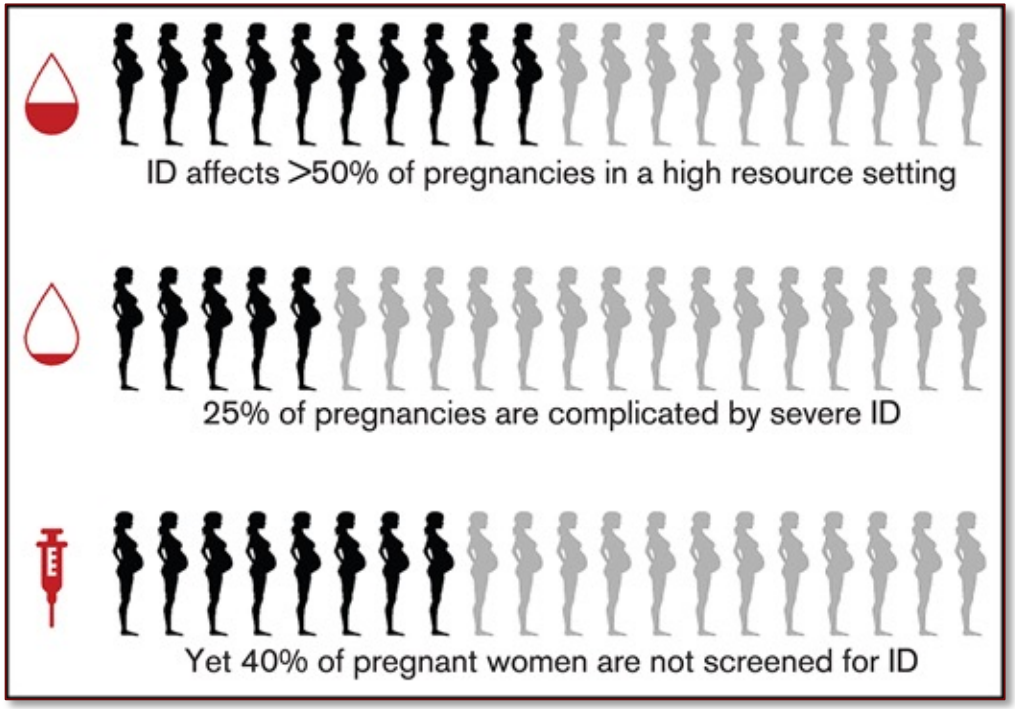
Antepartum iron deficiency anemia: common and progressive



50% of healthy primigravids have minimal iron stores in the first trimester

35% in the U.S. are considered iron deficient in early pregnancy

Iron Deficiency



Mei Z, Cogswell ME, Looker AC, et al. Assessment of iron status in US pregnant women from the National Health and Nutrition Examination Survey (NHANES), 1999e2006. Am J Clin Nutr 2011;93:1312e20;

Teichman, R, Nisenbaum A, Lausman, et al.; Suboptimal iron deficiency screening in pregnancy and the impact of socioeconomic status in a high-resource setting. *Blood Adv* 2021; 5 (22): 4666–4673.

Marcewicz LH, Anderson BL… Schulkin J. Screening and Treatment for Iron Deficiency Anemia in Women: Results of a Survey of Obstetrician-Gynecologists. Matern Child Health J. 2017 Aug;21(8):1627-1633

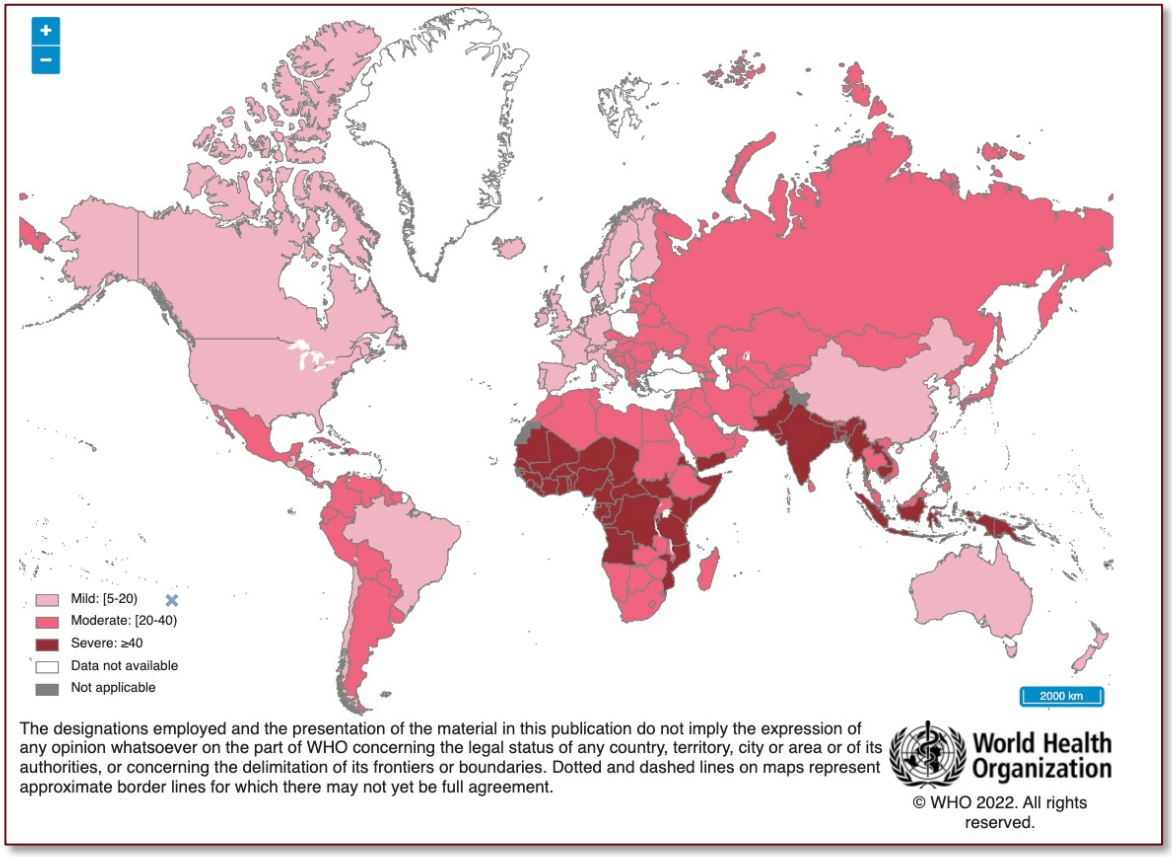
How common is anemia in pregnancy?

Prevalence in U.S.

- ~12%

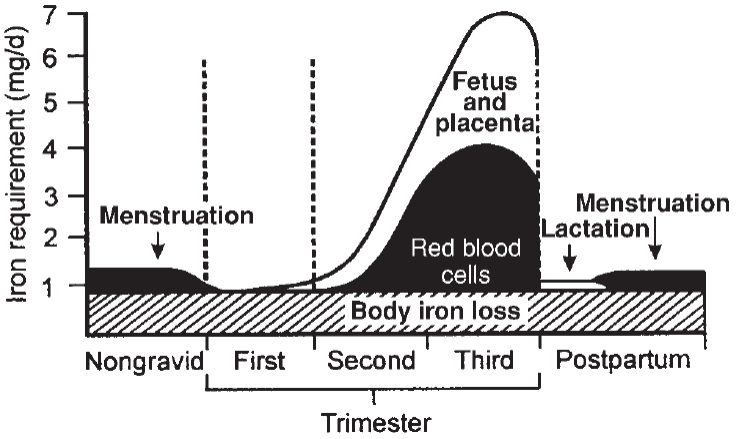
Prevalence among Black pregnant people

- 18-24%



Allen LH. Pregnancy and iron deficiency: unresolved issues. *Nutr Rev.* 1997;55:91–101
Mei Z, Cogswell ME, Looker AC, et al. Assessment of iron status in US pregnant women from the National Health and Nutrition Examination Survey (NHANES), 1999e2006. Am J Clin Nutr 2011;93:1312e20

Iron requirements during pregnancy



Bothwell. Am J Clin Nutr 2000;72:257-64S.

Iron Fate	Mean amount (mg)
Fetal & placental iron	-360
Expansion of maternal RBC mass	-450
Baseline maternal body iron loss	-230
Total iron needs during pregnancy	**-1040**

Bothwell, Am J Clin Nutr 2000; Milman, Ann Hematol 2006; Wintrobe's Clinical Hematology

Iron is supplied from maternal **stores** and from increased intestinal **absorption** of iron

~300 mg iron

1-5 mg iron per day

5 mg/d over 100 days = 500 mg

Slide courtesy of Ella Nemeth, PhD

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Why anemia matters at delivery

- Anemia at delivery: 6-fold increase in major maternal morbidities
  - Abruption, hemorrhage, infectious morbidity, preeclampsia
  - Prematurity
- Uterine blood flow increases 5-fold in pregnancy
- Postpartum hemorrhage can be audible

Leonard SA, Main EK, Scott KA, Profit J, Carmichael SL. Annals of Epidemiology, 2019.

What are drivers of antepartum anemia?

Obstetric comorbidities

Social Determinants of Health: education, insurance, country of birth, prenatal care

- 1 in 10 participants in WIC with anemia
- Food insecurity in the United States

Racial and Ethnic disparities : structural Inequalities, structural racism

Kanu FA, Hamner HC, Scanlon KS, Sharma AJ. Anemia Among Pregnant Women Participating in the Special Supplemental Nutrition Program for Women, Infants, and Children — United States, 2008–2018.
MMWR Morb Mortal Wkly Rep 2022;71:813–819.

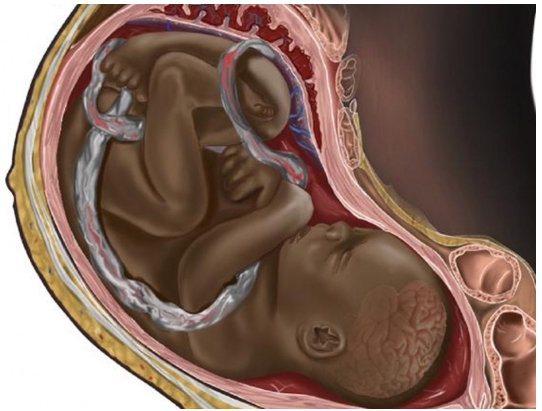
Racial and ethnic disparities in iron deficiency anemia at delivery

Black vs. White: ~2x-4x higher rates of anemia

Hispanic/Latinx vs. White: 1.5-2x higher rates

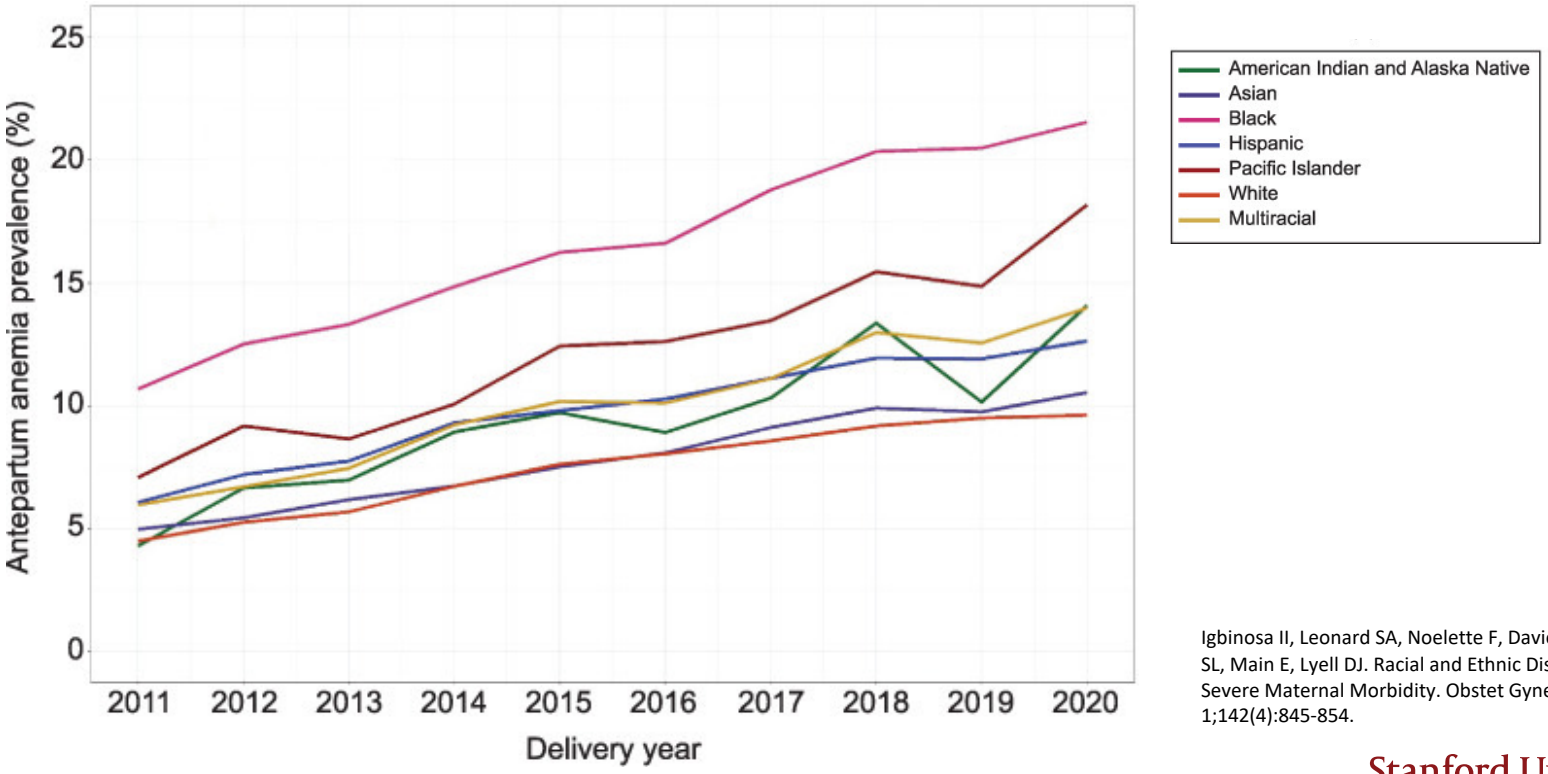
Anemia may exacerbate other disparities. Among Black vs. White:

- Black people experience 2-3x more frequent severe maternal morbidity (SMM), regardless of sociodemographic factors and comorbidities
- Anemia increases number of SMM events
- SMM increases the risk for death
- Black pregnant people are 3-4x more likely to die in childbirth



Leonard SA, Main EK, Scott KA, Profit J, Carmichael SL. Annals of Epidemiology, 2019
Igbinosa I, Leonard SA, Butwick AJ, Lyell DJ. AJOG supplement, 2020
Main EK, Chang S-C, Dhurjati R. Am J Obstet Gynecol 2020;223:123e1-143

Trends of Antepartum Anemia in California



Igbinosa II, Leonard SA, Noelette F, Davies-Balch S, Carmichael SL, Main E, Lyell DJ. Racial and Ethnic Disparities in Anemia and Severe Maternal Morbidity. Obstet Gynecol. 2023 Oct 1;142(4):845-854.

Antepartum Anemia and Severe Maternal Morbidity

Table 4. Associations between anemia and severe maternal morbidity within racial-ethnic subpopulations, California, 2011-2020 (n=3,998, 523)		
Race/Ethnicity	Adjusted RR (95% CI)	Adjusted population attributable risk percentage (95% CI)
American Indian-Alaska Native	3.61 (2.80-4.66)	19.8 (9.2-29.7)
Asian-Pacific Islander	2.70 (2.57-2.85)	12.7 (10.8-14.8)
Black	2.87 (2.69-3.05)	22.8 (20.4-25.7)
Hispanic	3.67 (3.57-3.76)	20.6 (19.7-21.6
Multi-race	2.61 (2.22-3.08)	17.4 (10.1-23.8)
White	2.98 (2.86-3.11)	13.8 (12.0-15.5)

CI, confidence interval; RR, risk ratio
Adjusted for age, education, payment method, obstetric comorbidity score, parity, delivery method

****Antepartum anemia contributes to severe maternal morbidity in 1 in 5 pregnancies among Black and Hispanic/Latine pregnant people.**

Igbinosa II, Leonard SA, Noelette F, Davies-Balch S, Carmichael SL, Main E, Lyell DJ.
Racial and Ethnic Disparities in Anemia and Severe Maternal Morbidity. Obstet Gynecol. 2023 Oct 1;142(4):845-854.

Anemia Severity and Maternal Outcomes

Table 3. Unadjusted and Adjusted Odds Ratios Showing the Association Between Anemia Severity and Maternal Outcomes, British Columbia, 2004–2016 (N=515,270)

Maternal Outcome	3rd-Trimester Hb Level and Preadmission Diagnosis of Anemia			
	Mild Anemia (Hb 9–10.9 g/dL)		Moderate Anemia (Hb 7–8.9 g/dL)	
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Obstetric morbidity				
Preeclampsia	**1.11 (1.03–1.21)**	**1.16 (1.07–1.25)**	**2.08 (1.56–2.78)**	*
Placenta previa with hemorrhage	**1.75 (1.55–1.96)**	**1.65 (1.47–1.86)**	**5.11 (3.66–7.14)**	*
Placental abruption	**1.33 (1.24–1.43)**	**1.30 (1.21–1.40)**	**3.24 (2.56–4.09)**	*
Transfusions and postpartum anemia				
Antepartum transfusion	**2.17 (1.28–3.66)**	*	**94.2 (60.2–147.5)**	*
Intrapartum–postpartum transfusion	**2.53 (1.80–3.56)**	**2.45 (1.74–3.45)**	**22.3 (12.8–38.8)**	**21.3 (12.2–37.3)**
Postpartum anemia†	**2.01 (1.97–2.06)**	**2.07 (2.02–2.11)**	**5.23 (4.81–5.70)**	*
Infectious morbidity				
Antibiotics during delivery admission	**1.13 (1.11–1.15)**	**1.15 (1.13–1.17)**	**1.54 (1.42–1.68)**	**1.68 (1.53–1.83)**
Prophylactic antibiotics for cesarean delivery†	**1.25 (1.20–1.31)**	**1.22 (1.17–1.28)**	**1.62 (1.30–2.02)**	**1.57 (1.25–1.96)**
Chorioamnionitis	**1.34 (1.26–1.42)**	**1.35 (1.27–1.44)**	1.34 (1.00–1.79)	**1.61 (1.19–2.16)**
Postpartum wound infection†	1.16 (0.95–1.41)	1.15 (0.94–1.40)	1.39 (0.58–3.35)	*
Postpartum infection†	**1.20 (1.06–1.36)**	**1.19 (1.05–1.35)**	**2.22 (1.42–3.45)**	*
Postpartum UTI†	**1.43 (1.09–1.88)**	*	2.56 (0.96–6.88)	*

Mild Anemia

Transfusion Risk

Smith C, Teng F, Branch E, Chu S, Joseph KS. Maternal and Perinatal Morbidity and Mortality Associated With Anemia in Pregnancy. Obstet Gynecol. 2019 Dec;134(6):1234-1244.

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Anemia Severity and Postpartum Depression

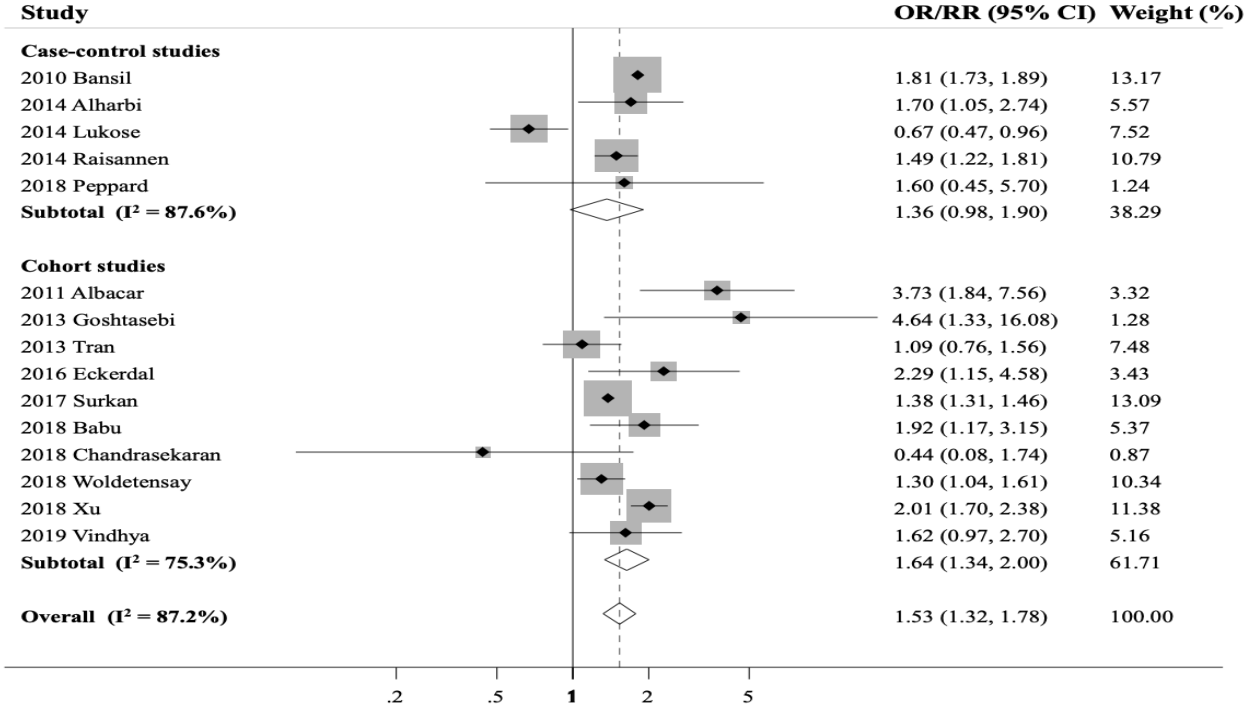


Fig. 2. Association between anemia and maternal depression in a meta-analysis of observational epidemiological studies (n = 15).

American Academy of Pediatrics

Kang SY, Kim HB, Sunwoo S. Association between anemia and maternal depression: \
A systematic review and meta-analysis. J Psychiatr Res. 2020 Mar;122:88-96.

It’s not just
a maternal issue

Generational impacts:
iron deficiency anemia
in the fetus, newborn
and child

Maternal Anemia and Neonatal Outcomes

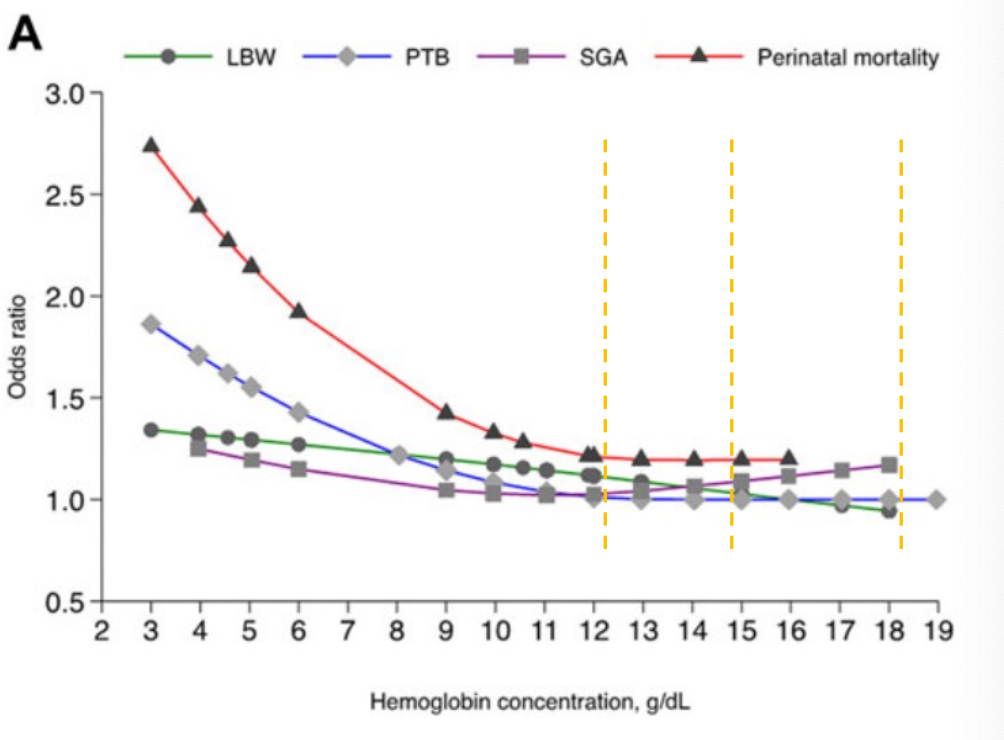
Systematic review and meta-analysis of 117 studies, > 4 million pregnancies

Maternal anemia was linked to

- Preterm Birth OR 2.11, 95% CI: 1.76-2.53
- Low Birth weight OR 1.65, 95% CI: 1.45-1.87
- Perinatal mortality OR 3.01, 95% CI: 1.92-4.73
- Stillbirth OR 1.95, 95% CI: 1.15-3.31

Jung J, Rahman MM, …, Akter S. Effects of hemoglobin levels during pregnancy on adverse maternal and infant outcomes: a systematic review and meta-analysis. Ann N Y Acad Sci. 2019 Aug;1450(1):69-82. doi: 10.1111/nyas.14112. Epub 2019 May 31. PMID: 31148191.

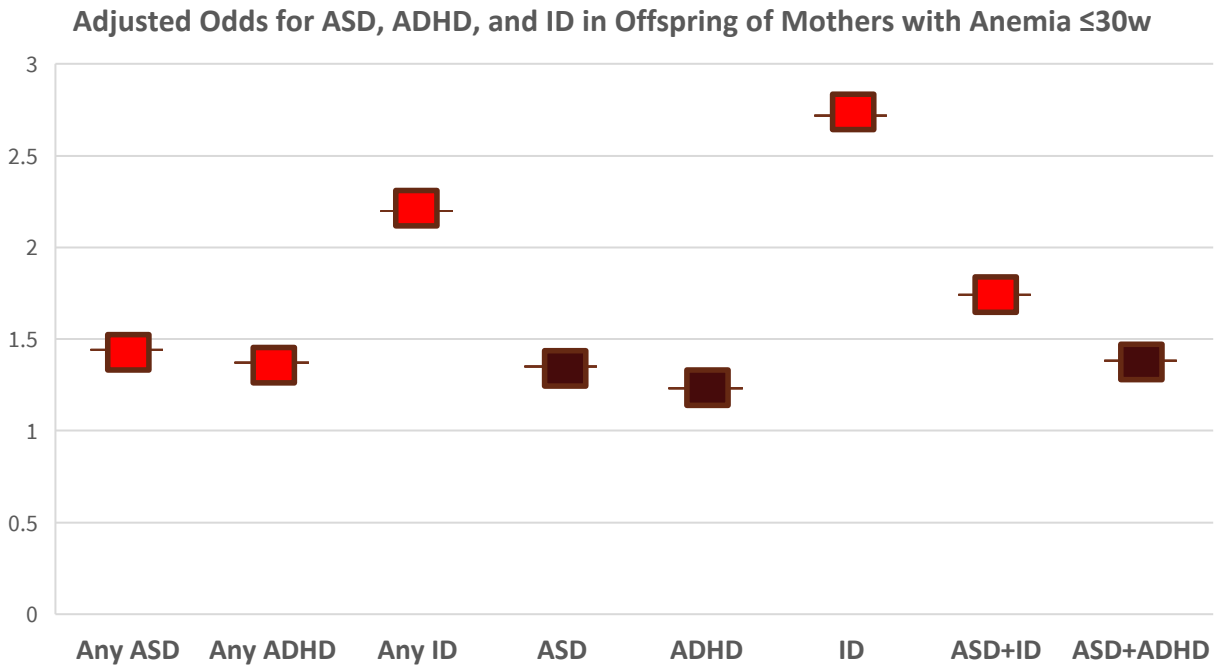
Anemia and Perinatal Mortality



Overall RR **3.01** (1.92-4.73)

Jung et al (2019) Ann N Y Acad Sci

Anemia and Neurodevelopmental Outcomes



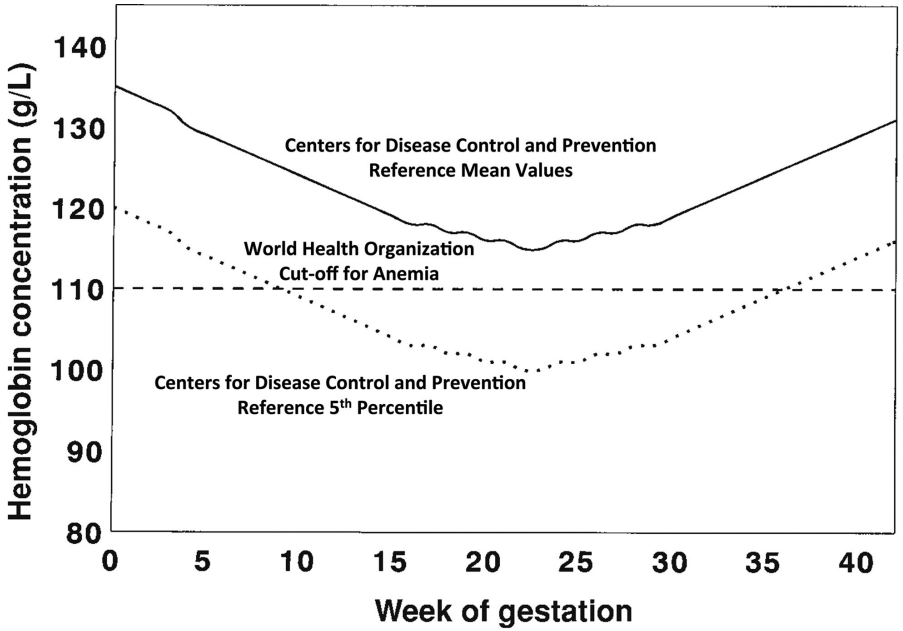
Studies at newborn-2 months, 9 months, 3.5-4 years, and 10 years independent of anemia correction have variably reported poor:

- recognition and memory
- planning and attention
- motor function
- depression and anxiety
- autism spectrum disorders

Wiegersma (2019) JAMA Psychiatry
Siddappa AM et al. Pediatr Res 2004; Amin SB et al. J Pediatr 2010; Kumar A et al. Pediatrics, 2008; Michael Georgieff, AJOG 2020;Riggins T et al., Dev Neuropsychol 2009; Schmidt et al. Am J Epidemiol 2014;
Insel et al. Arch Gen Psychiatry 2008; Jabes et al., J Dev Behav Pediatr 2015

Defining Anemia

Hemoglobin Cut-offs



World Health Organization

- Hemoglobin (Hgb) < 11g/dL or
- Hematocrit (Hct) < 33%, at any time during pregnancy

Centers for Disease Control and Prevention & ACOG

- Hgb < 11 g/dL or Hct < 33% in the first and third trimesters
- Hgb< 10.5 g/dL or Hct < 32% in second trimester

British Society of Hematology

- Hgb <10.5 g/dL beyond 12weeks and <10g/dL postpartum

O'Brien, et al ,Iron status of North American pregnant women: an update on longitudinal data and gaps in knowledge from the United States and Canada†‡,The American Journal of Clinical Nutrition, Volume 106, Supplement 6, 2017, Pages 1647S-1654S

World Health Organization – Anemia in Pregnancy

Pavord, UK guidelines on the management of iron deficiency in pregnancy, British Journal of Hematology, 2020. Vol 188, Issue No.6, 819-830

Who should be screened?

Everyone at the start of prenatal care

Approach:

CBC, serum iron levels, ferritin levels, peripheral smear, **hemoglobin electrophoresis**

ACOG “The initial evaluation of pregnant women with mild to moderate anemia *may include* a medical history, physical examination, and measurements of the complete blood count, red blood cell indices, serum iron levels, and ferritin levels."

ACOG PB 95 Anemia in Pregnancy
ACOG Practice Update on Hemoglobinopathies in Pregnancy

Evaluation of Iron Deficiency and Anemia

Serum Ferritin

- Serum ferritin (<30 ng/mL) can confirm the diagnosis of iron deficiency
- Response to treatment can be seen in 3 weeks after treatment
- Serum ferritin can be elevated in patients with acute illness

Transferrin saturation

- TSAT below 20 percent also evidence of iron deficiency whether the ferritin level is low or normal

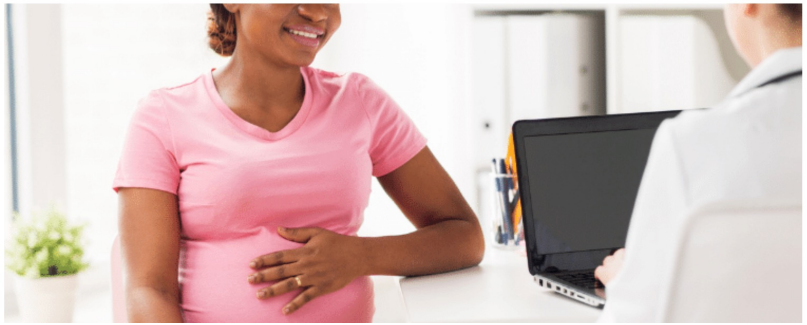
Michael Auerbach. Anemia in Pregnancy
Maureen M. Achebe, Anat Gafter-Gvili; How I treat anemia in pregnancy: iron, cobalamin, and folate. *Blood* 2017; 129 (8): 940–949.

Rethinking Race In Medicine: ACOG Removes A Race-Based Cutoff For Anemia In Pregnancy

Michele Cohen Marill

AUGUST 19, 2021

10.1377/forefront.20210816.198602



Guideline	Trimester 1st	2nd	3rd
Non-Black	<11.0	<10.5	<11.0
Black	<10.2	<9.7	<10.2

- 1993: NHANES II by NAM
  - Hgb is ↓ in healthy Black women by 0.8 g/dL without signs of iron deficiency
- 2008: ACOG PB #95
  - Suggested ↓ Hgb cutoffs for anemia in Black women
- July 2021:
  - N=1369 (79% Black)
  - 1° outcome: Hgb<11 at delivery
  - Black pts with antepartum Hgb 10.2-11 more likely to have delivery Hgb <11 (40% vs 26%)
  - Hgb <11 had 3x higher transfusion

Hamm RF, Wang EY, Levine LD, Srinivas SK. Association Between Race and Hemoglobin at Delivery or Need for Transfusion When Using Race-Based Definitions for Treatment of Antepartum Anemia. Obstet Gynecol. 2021 Jul 1;138(1):108-110
.ACOG PB#95 (2008)

Management Options

Does treatment work? USPSTF statement

Draft Recommendation Statement

Iron Deficiency and Iron Deficiency Anemia During Pregnancy: Screening and Supplementation

February 27, 2024

"We need more evidence."

Recommendation Summary

Population	Recommendation	Grade
Asymptomatic pregnant adolescents and adults	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for iron deficiency and iron deficiency anemia in pregnant persons to prevent adverse maternal and infant health outcomes.	I
Asymptomatic pregnant adolescents and adults	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of routine iron supplementation in pregnant persons to prevent adverse maternal and infant health outcomes.	I

Does Oral Iron Work?

2015 Cochrane review:

- Iron supplementation can reduce:
  - Maternal anemia at term by 70%
  - Iron deficiency at term by 57%

If iron treatment works, why do so many have iron deficiency or iron deficiency anemia?

- Some are refractory to treatment, untreated, or incorrectly treated

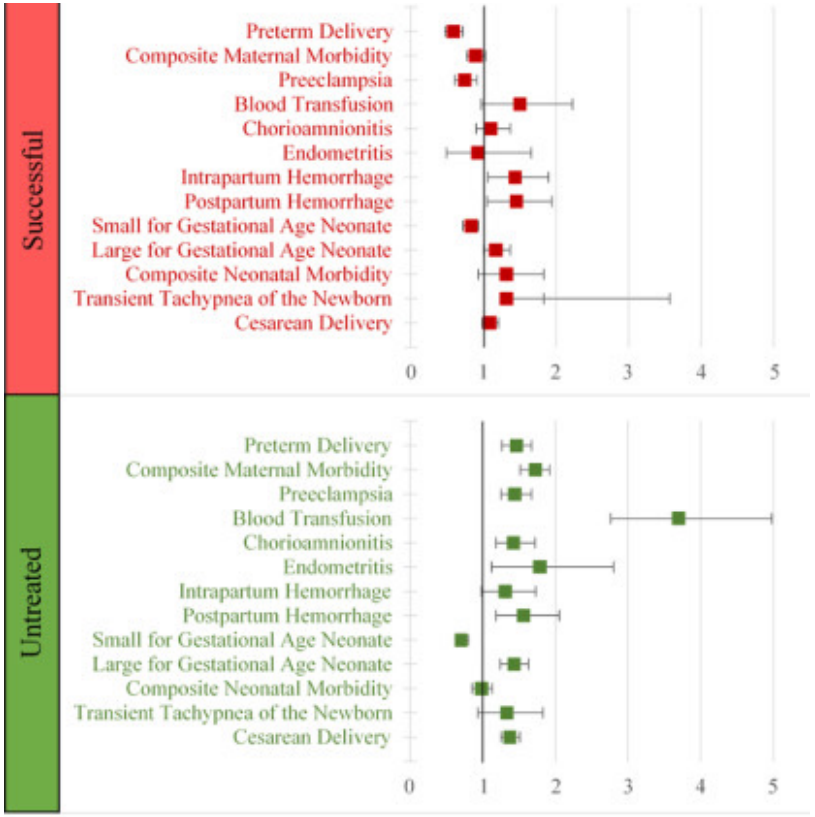
Iron Therapy Improves Outcomes

7416 patients with anemia:

- 36.3% successfully treated
- 7.8% refractory to treatment
- 45.9% untreated

Successful treatment of anemia reduced odds of preterm birth and preeclampsia:

- Preterm birth (aOR 0.59, 95% CI 0.47−0.72)
  - Preterm labor (aOR, 0.49, 95% CI 0.33−0.70)
  - PPROM (aOR 0.60, 95% CI 0.38−0.88)
- Preeclampsia (aOR 0.47, 95% CI 0.28−0.74)

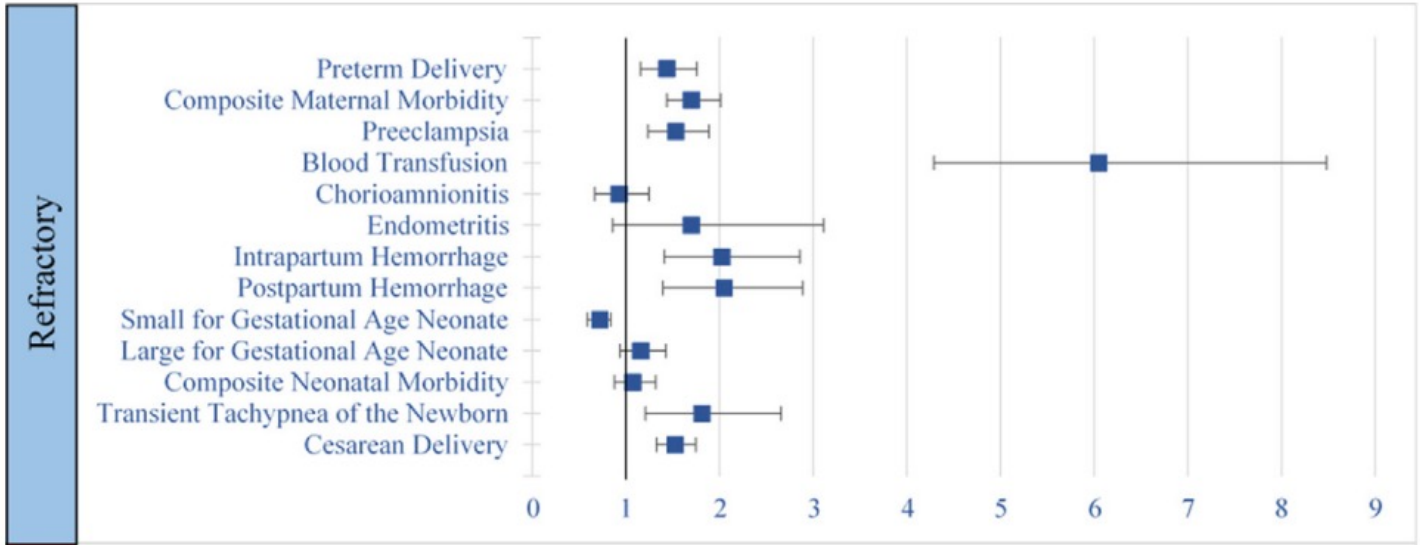


Detlefs et al. The impact of response to iron therapy on maternal and neonatal outcomes among pregnant women with anemia

Refractory treatment outcomes similar to untreated

Refractory or inadequately treated?

- Lack of treatment protocol: potential for incorrect treatment, incorrect advice
- Lack of follow up to assess response to iron therapy
- Undiagnosed secondary micronutrient deficiency?



Detlefs, et al. The Impact of response to iron therapy on maternal and neonatal outcomes among pregnant women with anemia. AJOG MFM. 2022

Challenge:

Oral supplements are readily available but uptake is limited and they are often given incorrectly

Challenge:

Lack of awareness of iron-rich foods, and foods or medications that impair iron absorption

Treatment challenges

ACOG | Clinical
The American College of Obstetricians and Gynecologists

- Pregnant patient requires approximately 30 mg of elemental iron daily
  - Prenatal vitamins
- Absorption of oral iron is poor: 10-15%
  - 325 mg ferrous sulfate has 35-106 mg elemental iron per pill
    - 3.5-16 mg elemental iron
- Side effects are common

ACOG Practice Bulletin #95
Penas-Rosas, Cochrane Review

Is More Better?

No! Absorption decreases with more frequent doses

RCT comparing 1 vs. 2 capsules of ferrous sulfate

- After 18 weeks, no difference in hemoglobin and ferritin levels between groups
- Increased dose/frequency can inhibit iron absorption (increased hepcidin)
- Worsened side-effects; compliance?
- Reasonable to recommend every-other-day or daily regimen
  - Start with one tablet; consider increase to two if no improvement

Treatment options: IV iron

ACOG | Clinical
The American College of Obstetricians and Gynecologists

Intravenous iron

- Patients who cannot tolerate oral iron, malabsorption syndrome, severe iron deficiency anemia
- IV iron preparations are generally safe
  - First generation – high molecular weight iron dextran - **higher risk**
  - Newer generations – tighter iron binding complex – **better safety profile**

Fishbane reaction, ~1%: Chest tightness/ joint pain, without hypotension, wheezing, laryngeal edema

Multiple randomized clinical trials

- 14 low-income countries, 5 high-income country, 1 both
- Wide variance in starting hemoglobin, IV iron dosing
- U.S. based populations (ongoing trials)

Reveiz L, Gyte GML, Cuervo LG, et al. Treatments for iron-deficiency anaemia in pregnancy. Cochrane Database of Systematic Reviews 2011, Issue 10. Art. No.: CD003094.
Robie-Suh K. Center for Drug Evaluation and Research Application. 2013. FDA
ACOG Practice Bulletin #95

National and International Guidelines IV Iron

- USPTF: data insufficient
- ACOG: IV iron if intolerance to oral iron
- RCOG:
  - IV iron if intolerance to oral iron, or
  - If hemoglobin < 10 g/dL after 34 weeks

United States Preventative Task Force
ACOG Practice Bulletin No. 95: Anemia in Pregnancy
Blood Transfusion in Obstetrics. No.47. Royal College of Obstetricians and Gynecologists.
Breymann C, Bian XM, Blanco-Capito LR, et al. J Perinat Med 2011;39(2):113-121

Additional Considerations IV Iron

- Infection risk – In large systematic review and meta-analysis of 154 RCTs, slight increase in infection: RR 1.16; 95% CI, 1.03-1.29
  - wide heterogeneity of studies, population adults of who received IV iron, malaria-endemic countries

- Avoid overshooting - high maternal hemoglobin (> 13 g/dL) was associated with increased odds of SGA, stillbirth, preeclampsia, and gestational diabetes.

Shi H, Chen L, Wang Y, et al. Severity of Anemia During Pregnancy and Adverse Maternal and Fetal Outcomes. *JAMA Netw Open.* 2022;5(2):
Wendt AS. Maternal hemoglobin concentrations across pregnancy and maternal and child health: a systematic review and meta-analysis. Ann N Y Acad Sci.

Nutrition as an intervention

- Effectiveness of nutrition alone is unclear
- Recommend dietary sources of iron
  - Plant-based: enriched cereals, soaked beans and lentils, leafy greens, tofu, whole grains, tortillas, rice
  - Animal protein: beef, chicken, turkey, fish, pork, liver, eggs
- Avoid foods and medications that impair iron absorption:
  - Dairy and soy products, egg yolks?
  - Coffee, tea
  - Calcium (milk, tablets)
- Foods that may help absorption: vitamin C? OJ, tomatoes
- WIC LA, excellent patient-info: https://www.phfewic.org

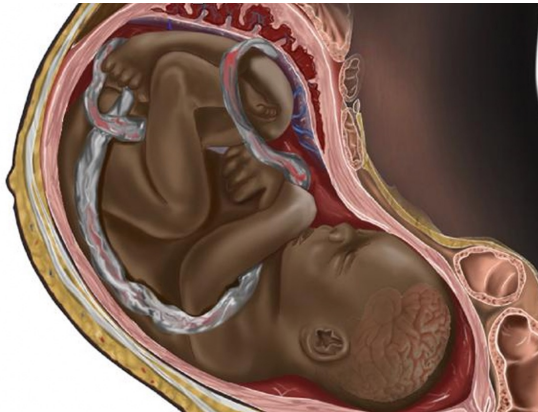
Skolmowska D, Głąbska D, Kołota A, et al. Effectiveness of Dietary Interventions in Prevention and Treatment of Iron-Deficiency Anemia in Pregnant Women: A Systematic Review of Randomized Controlled Trials. Nutrients. 2022 Jul 23;14(15):3023.

Kanu FA, Hamner HC, Scanlon KS, et al.. Anemia Among Pregnant Women Participating in the Special Supplemental Nutrition Program for Women, Infants, and Children — United States, 2008–2018. MMWR Morb Mortal Wkly Rep 2022;71:813–819

Ongoing Research

Anemia contributes to ~25% of cases of severe maternal morbidity

Iron deficiency anemia is preventable



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Igbinosa I, Leonard SA, Butwick AJ, Lyell DJ. AJOG supplement, 2020
Main EK, Chang S-C, Dhurjati R. Am J Obstet Gynecol 2020;223:123e1-143

So why is there still anemia after 7+ months of prenatal care?

- Underrecognized as a problem by providers and patients
- Current screening approaches may inadequately prevent anemia at birth admission
- Sometimes inadequate approaches to evaluation, treatment
- Treatments are not easy to take

Iron Deficiency in the United States: Limitations in Guidelines, Data, and Monitoring of Disparities

Maria Elena D Jefferds [1], Zuguo Mei [1], Yaw Addo [1], Heather C Hamner [1], Cria G Perrine [1], Rafael Flores-Ayala [1], Christine M Pfeiffer [1], Andrea J Sharma [1] **Oct, 2022**

"***Foundational guidelines influencing clinical practice recommendations for assessment and diagnosis of iron deficiency need to be updated***. Given the age of the CDC guideline, the ***available evidence relevant to the assessment and diagnosis of iron deficiency warrants revisiting the guidelines***... "

AJPH
A PUBLICATION OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

Challenge

Current approaches are not working.

There are no studies that consider the perspectives of Black or Hispanic/Latine women on IDA in pregnancy

Maternal anemia is an important driver of transfusions, and other maternal and neonatal complications

Solution

Work with patients and communities to assess their understanding of anemia and iron treatments, and design better messaging and approaches to treatment

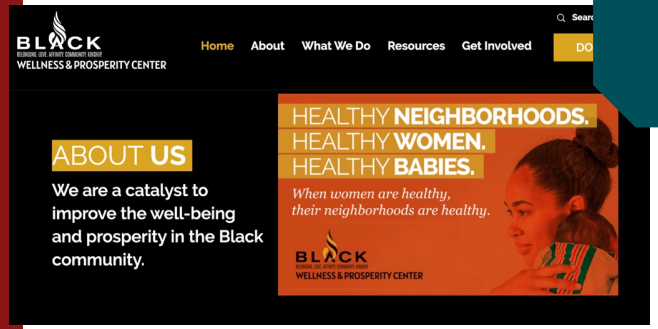
Solution

Work with providers to create and implement better protocols, provider education, and patient-centered solutions

“Community Engagement to Develop a Patient Centered Approach to Anemia in Pregnancy” (SPECTRUM grant 2021-2022)

Lead organization:

BLACK Wellness and Prosperity Center



Anemia Community Leadership Group

Interviews
Focus Groups

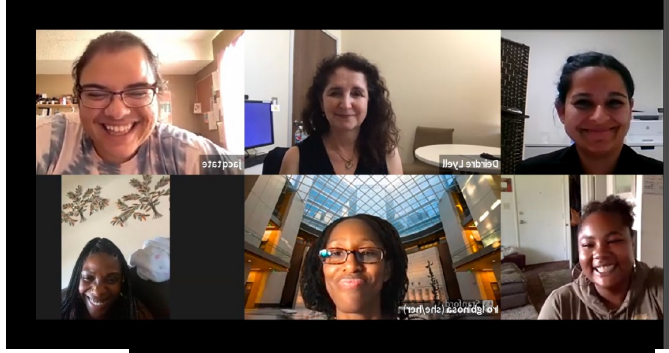
- Assessment of knowledge and experiences
- Identification of patient-valued outcomes
- Review/modify patient education materials
- Develop patient satisfaction/experience survey

Patient-centered tools

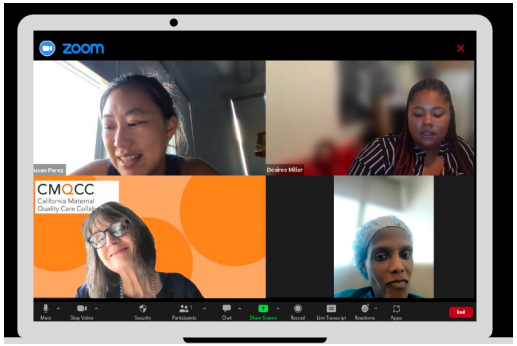
Patient Voices

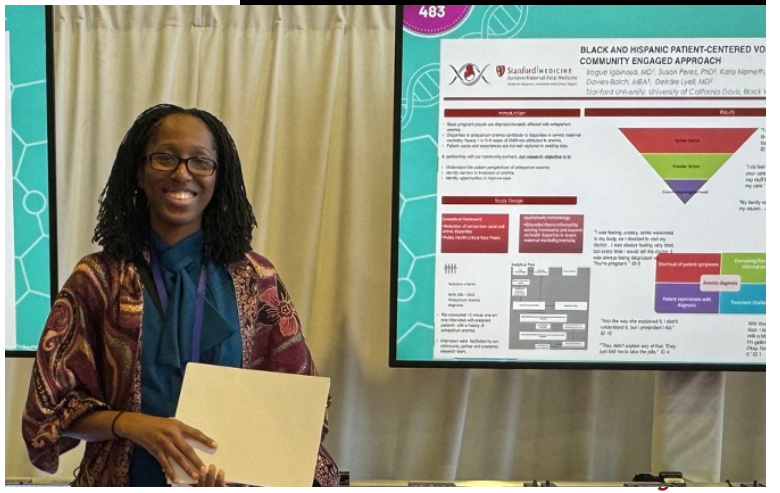
Themes:

- lack of information/education from the provider regarding anemia
- dismissal of patient's reported anemia symptoms
- treatment challenges with nutrition, oral, and intravenous iron
- perception of race and culture as a contributing factor to maternal care
- desire and need for patient centered care and information



BLACK
BELONGING. LOVE. AFFINITY. COMMUNITY. KINSHIP.
WELLNESS & PROSPERITY CENTER





Igbinosa I, Perez S, Nemeth et al., SMFM abstract, 2024

Patient-Centered Community & Clinical Approaches to Reduce Racial Disparities at Birth by Preventing Anemia

Clinician Leadership Group

Deirdre Lyell, MD**, Project 1 Lead**

Anemia Community Leadership Group

Shantay Davies-Balch, MBA, **Community Co-Lead**

Irogue Igbinosa, MD

Stephanie Leonard, PhD

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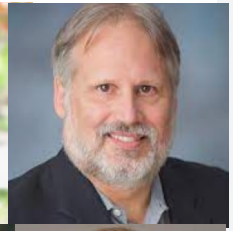
Susan Perez, PhD, MPH

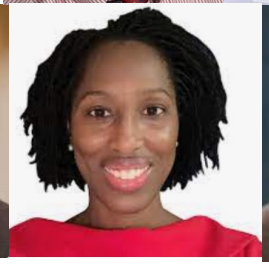
Melissa Rosenstein, MD, MAS

Tayler Hughes

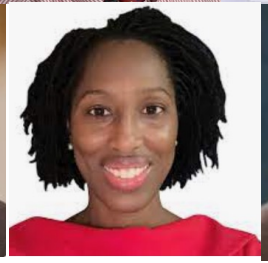
Ijeoma Iwekaogwu

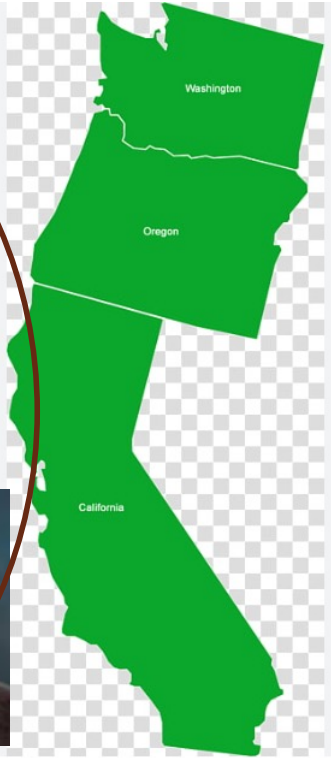
Community and Clinician Leadership Groups



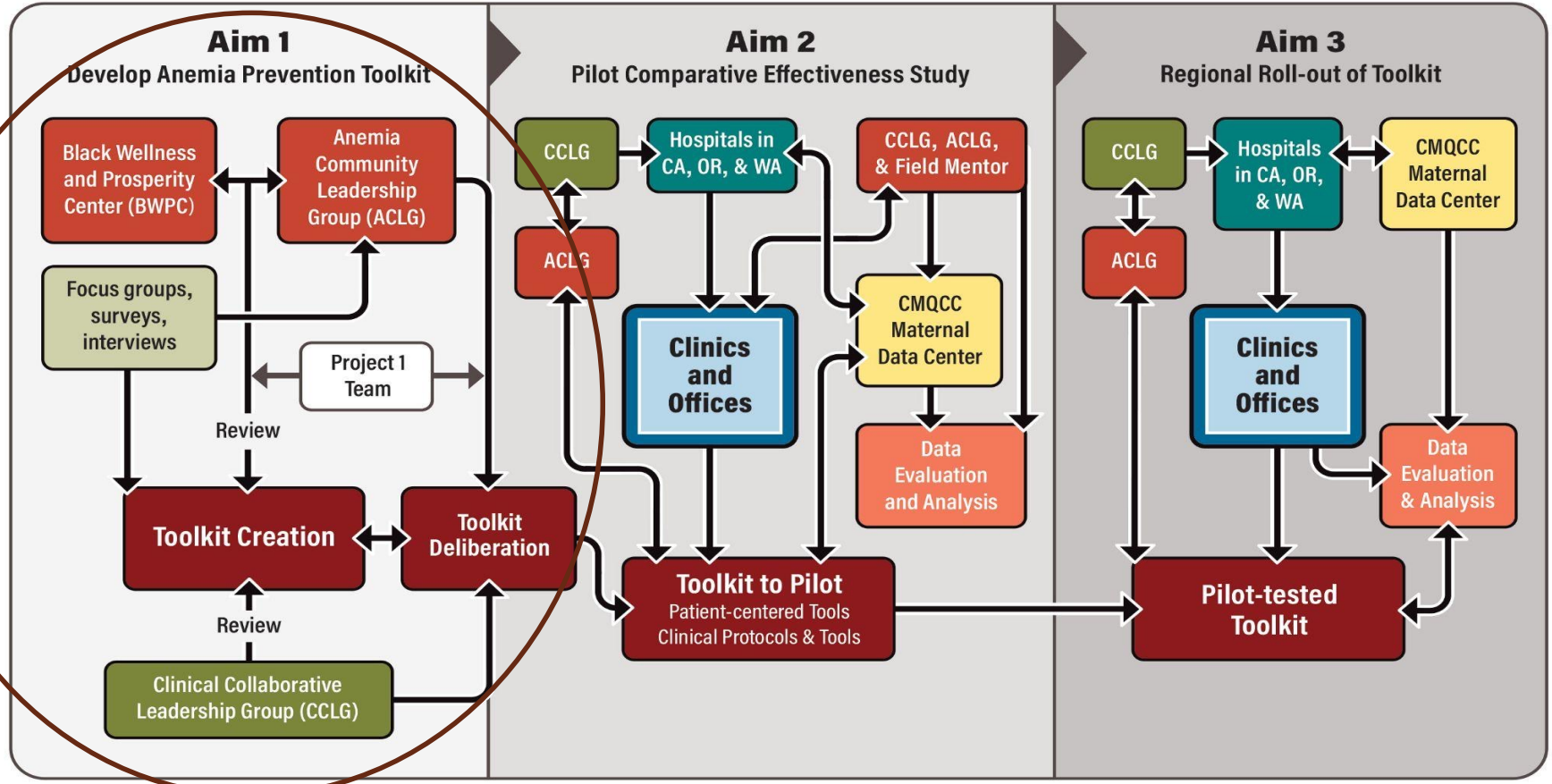


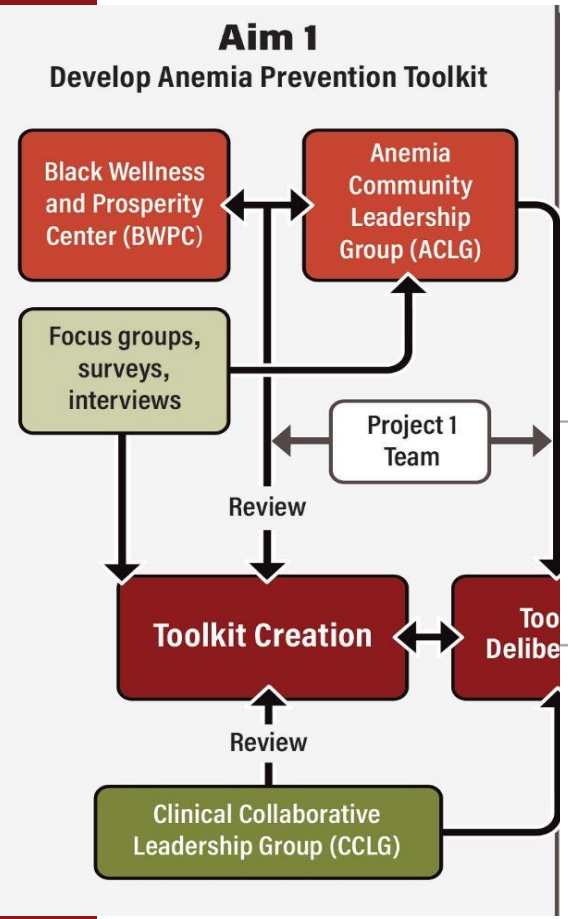
Community and Clinician Leadership Groups

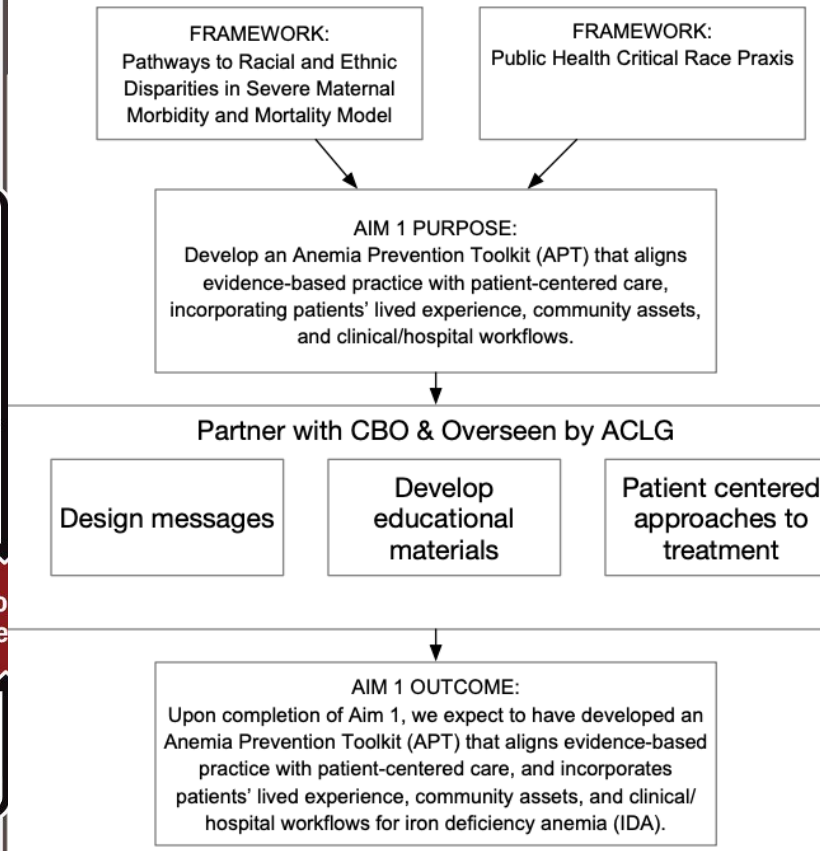


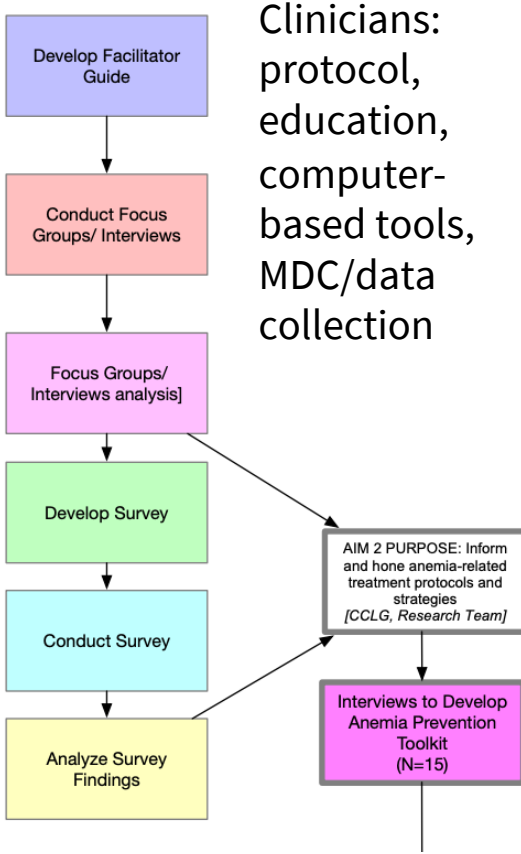


Project Overview: 7 years





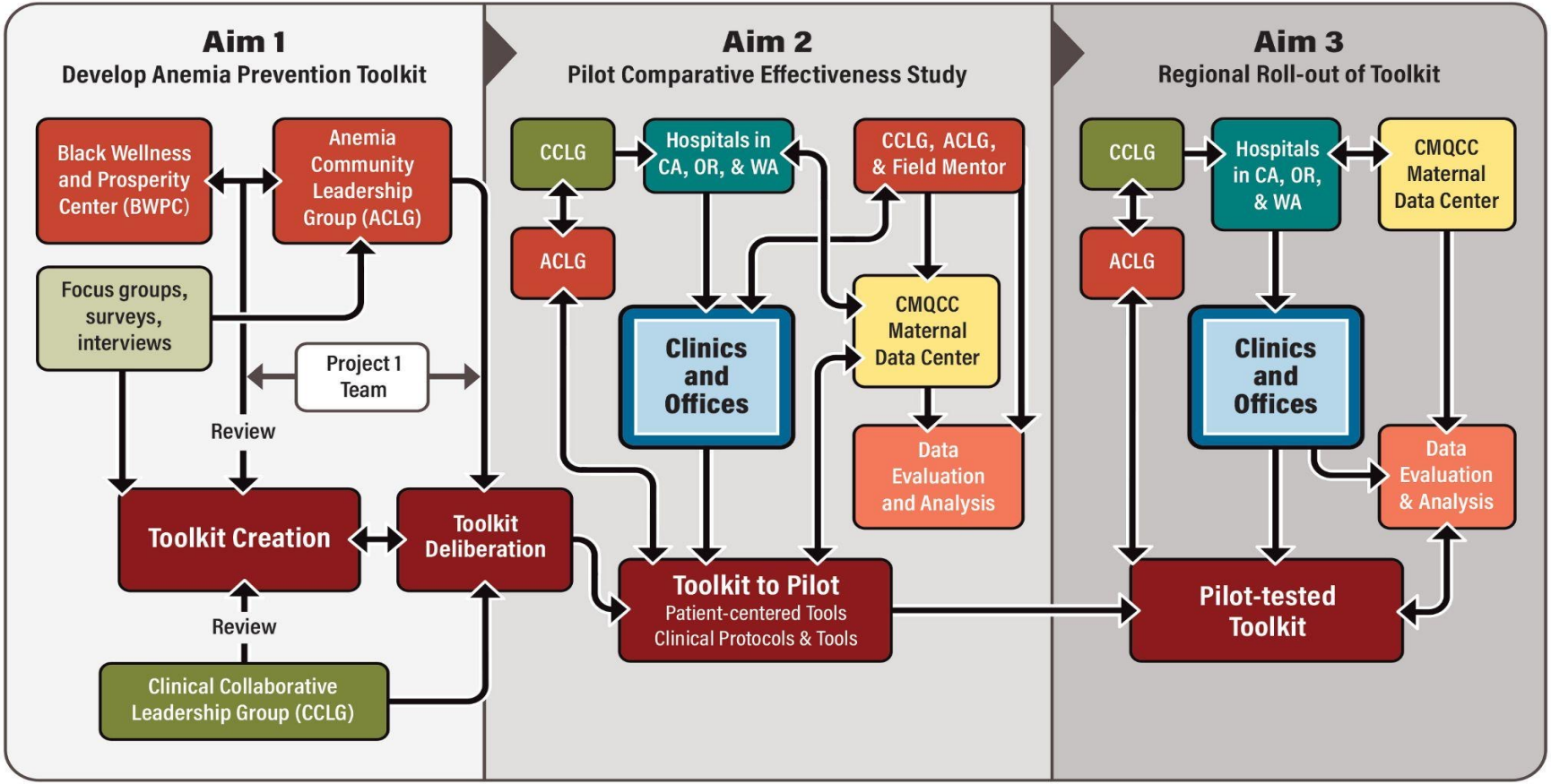




Clinicians: protocol, education, computer-based tools, MDC/data collection

Equity focus in aim 1

Project Overview: 7 years



Summary of key gaps for anemia in pregnancy

- Inadequate messaging about importance
- Existing disparities
- Missing patient perspectives: racially and ethnically diverse groups
- Inadequate guidelines for screening, treatment and ongoing follow up
- Incorrect advice/knowledge
- Best treatment methods may be unclear
- Lack of access to IV iron

Measures for Prenatal Anemia Initiative

Goal: Prevent Hgb <11 on Admission for Labor

Primary Measure

- Hgb On Admission
  - Rate <11g/dL
  - Mild 10.0-10.9 g/dl
  - Moderate 8.0-9.9 g/dl
  - Severe <8.0 g/dl

Data Point

- 1st Hemoglobin collected during Delivery Admission

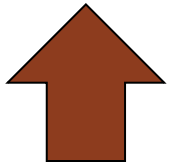
Consequences of Low Hgb on Admission (1): Increased Risk for Blood Loss

Hemorrhage Metrics

- QBL ≥500ml
- QBL ≥1,000ml
- QBL ≥1,500ml
- Mean QBL

Data Point

- QBL at Delivery
- QBL during Birth Admission



Data indicate that patients with low Hgb have higher blood losses at delivery

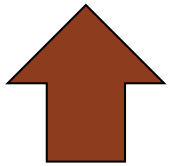
Consequences of Low Hgb on Admission (2): Increased Need for Transfusion

RBC Transfusion Metrics

- Any RBC Transfused
- 2-3 units RBC Transfused
- ≥4 units RBC Transfused
- Mean #RBC Transfused

Data Point

- #RBC units transfused



Strong evidence that anemia on admission is associated with increased risk for RBC transfusion

Where is the Improvement Location? Move from the Delivery to the Outpatient Provider

Metrics by Prenatal Group

- All of the previous metrics will be stratified by prenatal care group

Data Point

- Prenatal Location (Office group or Clinic) for each patient

This is rapidly becoming a key piece of information as we increasingly focus on outpatient interventions to improve maternal health

Examples of Other Maternal Outcomes Already Collected in MDC:

Severe Maternal Morbidity

- with and without Transfusion
- with and without Adjustment for comorbidities

Hospital Length of Stay

- Prenatal Location (Office group or Clinic) for each patient

Stratifications can be made for Parity, Race, Prior CS, among others

Stay tuned for the ability to capture readmissions after delivery in the MDC
(expected late 2024)

CMQCC MDC Maternal Data Center

CMQCC California Maternal Quality Care Collaborative

Addressing Anemia in Pregnancy: Key Data Elements and **CMQCC Maternal Data Center Tools**

May 7, 2024

Contact MDC Staff

Via MDC Support Link or at datacenter@cmqcc.org

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Regions: Southern CA, OR, National

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Supplemental Data Measures in the MDC

Supplemental Data Measures in the MDC

- Certain measures in the MDC require *supplemental data submission* before they can be calculated
- Today, we will review the importance of *and* how to submit supplemental data files for the following measures:
  1) Anemia on Admission
  2) QBL Cumulative Value measures

Importance of Tracking ***Anemia on Admission***

- Prenatal anemia is a modifiable contributor to severe maternal morbidity (SMM) and other adverse outcomes
  - Prenatal hemoglobin optimization is a highlighted strategy in the CMQCC Obstetric Hemorrhage toolkit
- Tracking hemoglobin levels on admission can help your hospital identify patients who should have been on a prenatal iron regimen and review opportunities for improvement
- Additionally, your team can identify how much prenatal anemia contributes to the facility's transfusion rate

Importance of Tracking ***Quantified Blood Loss (QBL)***

- The MDC has a *Hemorrhage Frequency* measure based on ICD-10 codes (e.g., O72.1 *Other immediate postpartum hemorrhage*)
  - May not be perfectly aligned with the clinical threshold of 1000 ml for identifying hemorrhage cases (e.g., O72.1 *Other immediate postpartum hemorrhage* with a QBL of 850 ml)

- Submitting the QBL cumulative value will provide the ability to flag cases that truly met the clinical threshold for hemorrhage
  - Important for case review, QI, and analysis

Submitting Supplemental Data to the MDC

Background

- In addition to the required Patient Discharge Data (PDD) file for the MDC, hospitals also have the *option* to submit additional data via separate Supplemental Data files

- Once the required PDD files are submitted, you can submit supplemental files with any *additional data fields* at any time

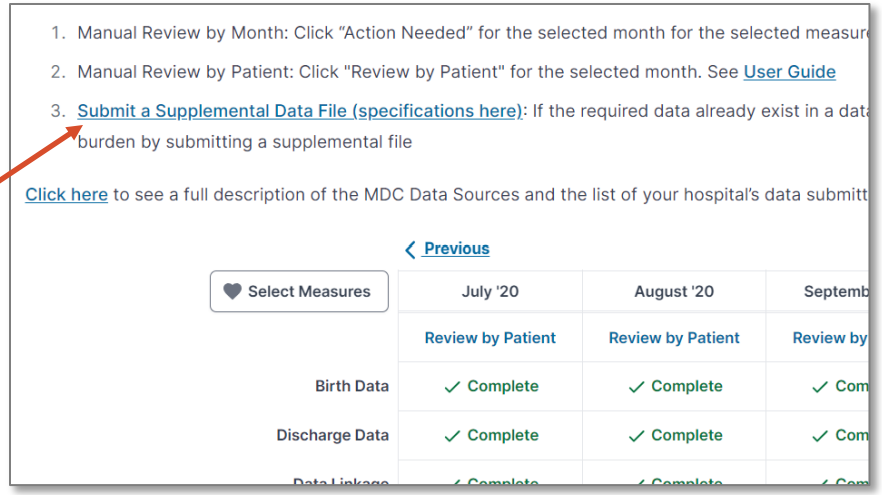
Interactive Supplemental Data Form

- The MDC will generate the following—to help create the supplemental data file:
  - Special notes specific to the measure(s) you selected
  - A “Sample File” (with all the correct column headers to use) that can be downloaded
  - A “Data Dictionary” that includes definitions of the data elements that will be needed

Interactive Supplemental Data Form (cont.)

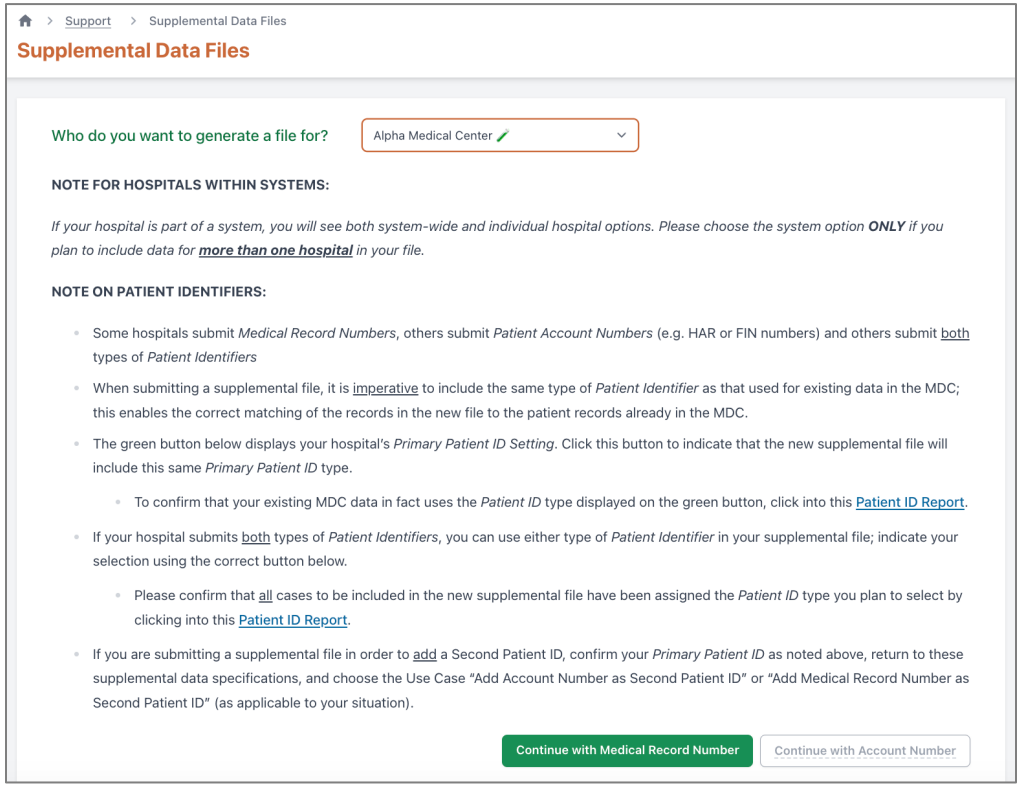
- Log in to *CMQCC Accounts*
  - Click “Launch MDC”
  - In the top right corner, click:

    Data Entry Status
  - In the text above the table, click: Submit a Supplemental Data File



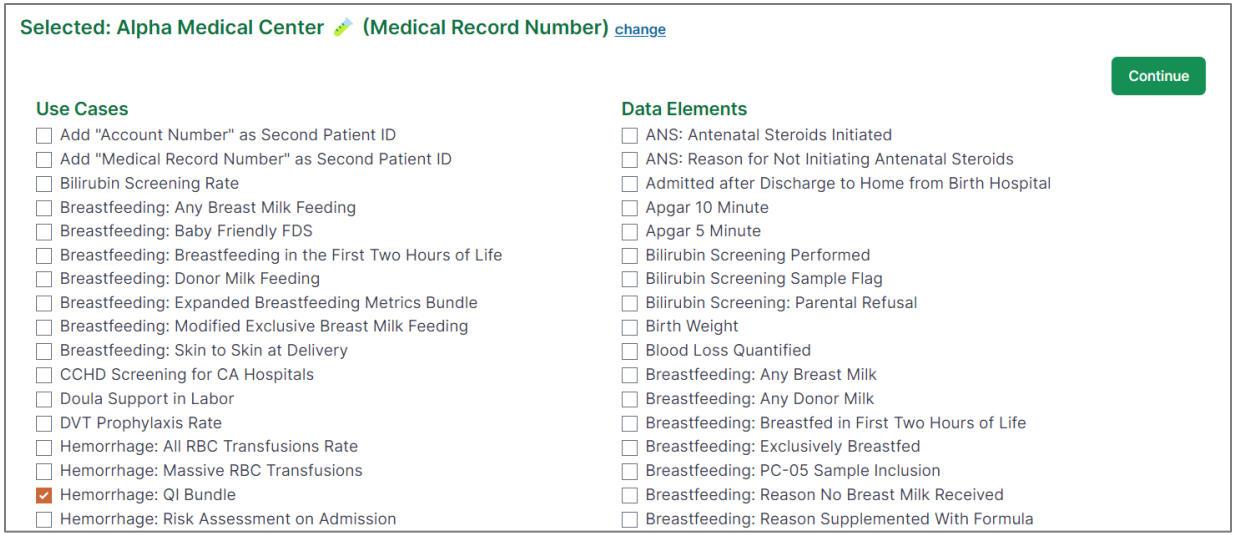
Interactive Supplemental Data Form (cont.)

- Select your hospital and continue with the primary identifier used in the PDD file (i.e., Medical Record Number, Account Number)



Interactive Supplemental Data Form (cont.)

- Select the *Use Cases* groupings or the individual data elements to include
- Click “Continue”

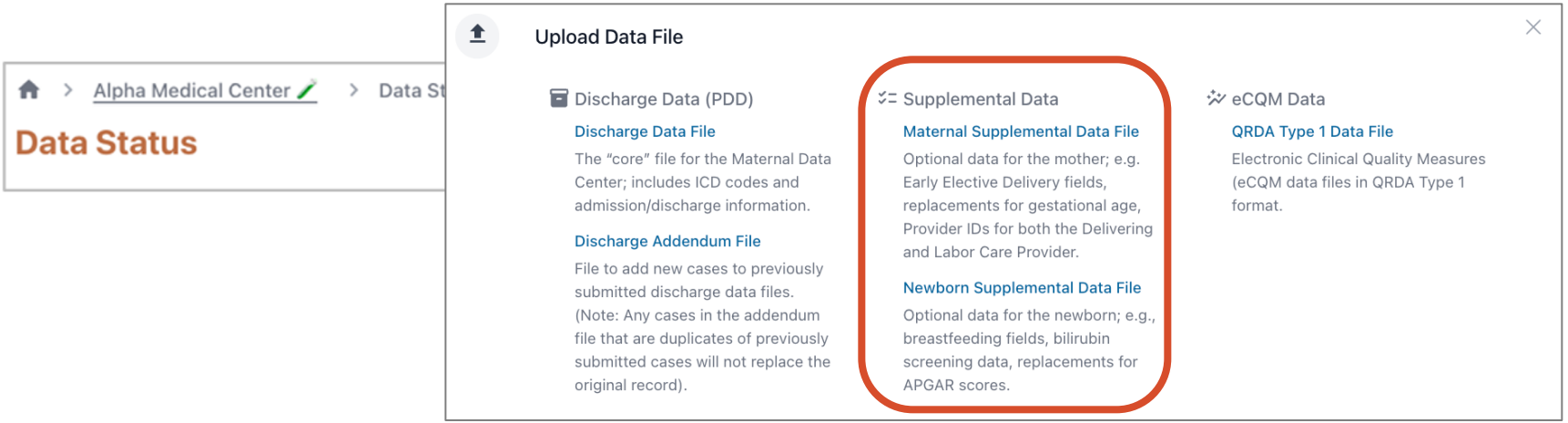


Interactive Supplemental Data Form (cont.)

- Use the CSV File Format with each patient case as a single row
  - File column headers, as denoted in the specifications, MUST be used for all fields you submit to the MDC
  - The Supplemental Data File Generator in the MDC allows you to download a "Sample File" that includes the *exact column headers* for the data elements you selected

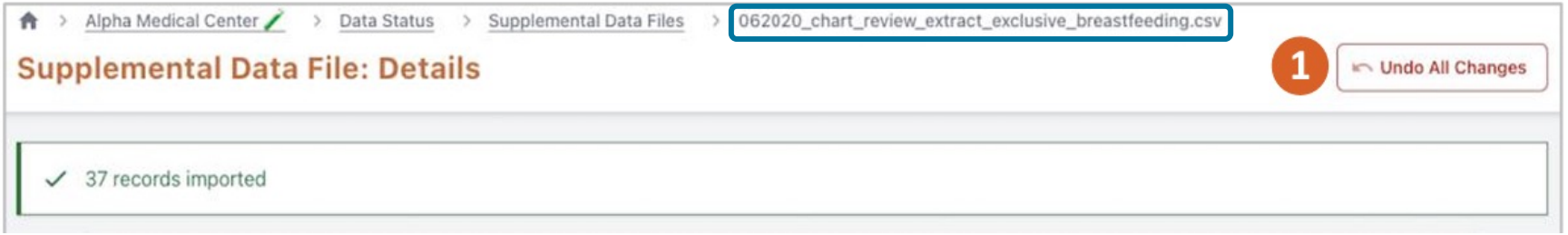
Submitting Supplemental Data: File Upload

- From the *Data Status* (or *System Data Status*) page, click “Upload Data”
- “Maternal/Newborn Supplemental Data File”



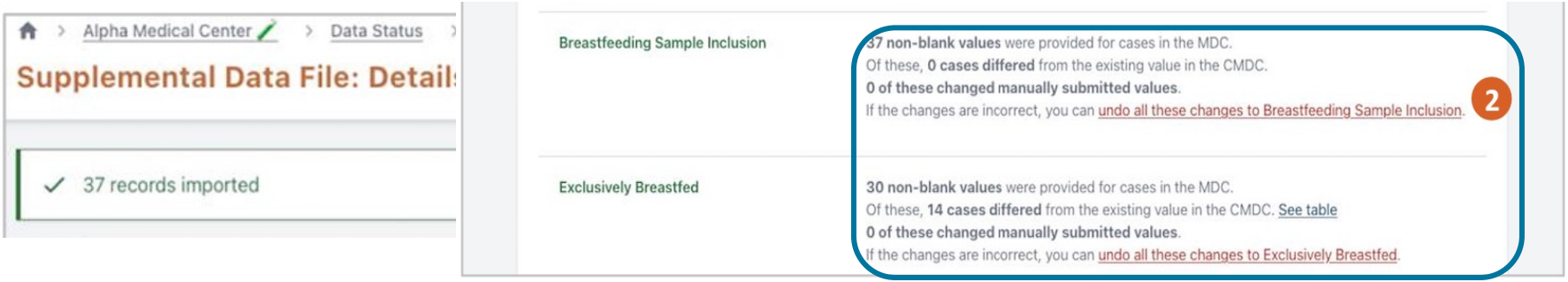
Submitting Supplemental Data: File Upload (cont.)

- After the upload, the file will be found in the *File Upload History;* click on “See details” to view data value changes
- If needed, you have the option to
  1) Undo changes to the entire file



Submitting Supplemental Data: File Upload (cont.)

- After the file upload, the file will be found in the *File Upload History;* click on “See details” to view data value changes
- If needed, you have the option to
  1) Undo changes to the entire file
  2) or Undo changes to specific data fields—in the event the file erroneously overwrites previously submitted values



Submitting Supplemental Data: Updated Metrics

- The MDC metrics will automatically update based on the uploaded values for cases in the supplemental file!

- See user guide for *MDC Optional Supplemental Data File Specifications* (CA, non-CA)

Submitting Supplemental Data for **QBL Cumulative Value**, **QBL at Delivery**, and **Anemia on Admission**

- There are two main ways to submit data on supplemental measures to the MDC:
  - Manual Abstraction/Chart Review
  - Supplemental Data File Uploads

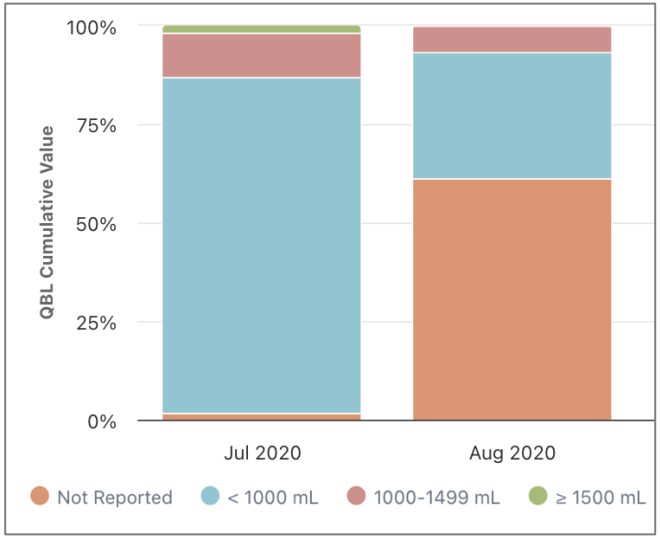
Note! For both *QBL* and *Anemia on Admission*, a data file upload is the only option for data submission!

QBL Cumulative Value

See user guide here

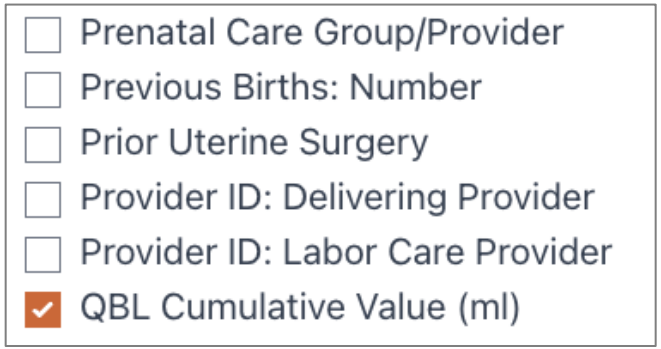
QBL Cumulative Value

- **Measure Definition:** The cumulative amount of blood loss, calculated through quantitative means, throughout the birthing process
- **Denominator:** All deliveries—*sampling not allowed*
- **Numerator:** All deliveries parsed by category
  - QBL Missing/Not Reported | < 1000 ml | 1000–1499 ml | ≥ 1500 ml



QBL Cumulative Value

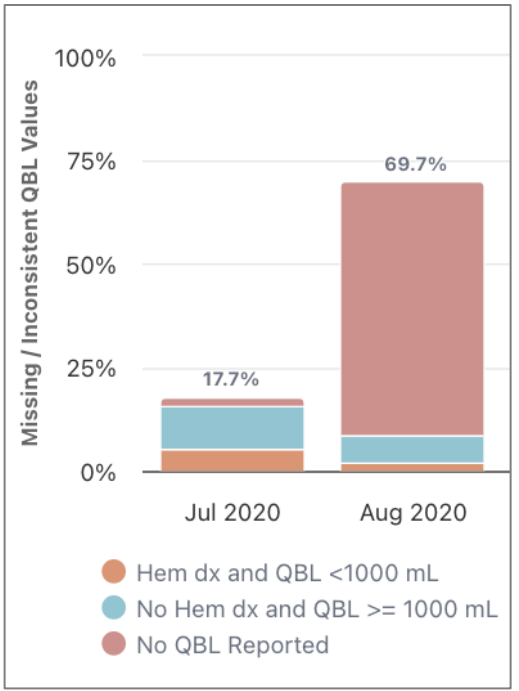
- **Step 1:** Select “QBL Cumulative Value (ml)” from the *Data Elements* (right-hand) column
- **Step 2:** Create a supplemental .csv file with the required data elements
  - Patient Identifier
  - Discharge Date
  - QBL cumulative value



	A	B	C
1	medical_record_number	discharge_date	qbl_value
2	123456789	10312022	300

Data Quality Measure: *Missing/Inconsistent QBL Values*

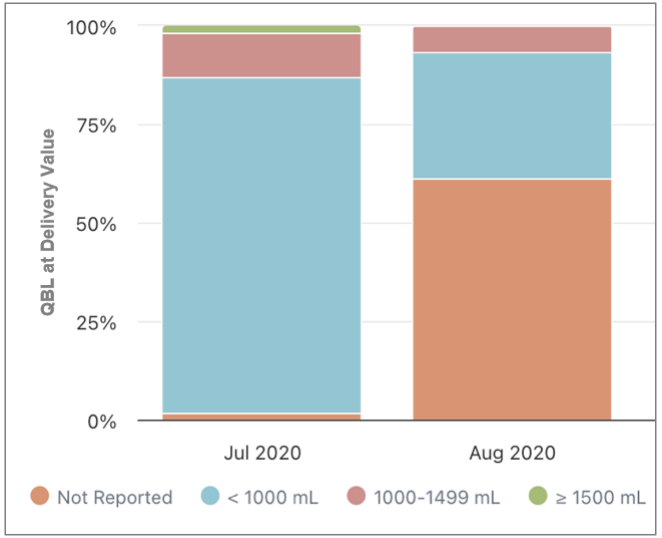
- The MDC will flag cases with *missing* or *inconsistent* values for cumulative QBL when compared to hemorrhage ICD-10 coding
  - Stacked bar chart format
  - Hemorrhage dx and QBL < 1000 ml | No Hemorrhage dx and QBL ≥ 1000 ml | No QBL Reported



QBL at Delivery

QBL at Delivery *(coming soon)*

- **Measure Definition:** The cumulative amount of blood loss, calculated through quantitative means, **at delivery**
- **Denominator:** All deliveries—*sampling not allowed*
- **Numerator:** All deliveries parsed by category
  - QBL Missing/Not Reported | < 1000 ml | 1000–1499 ml | ≥ 1500 ml

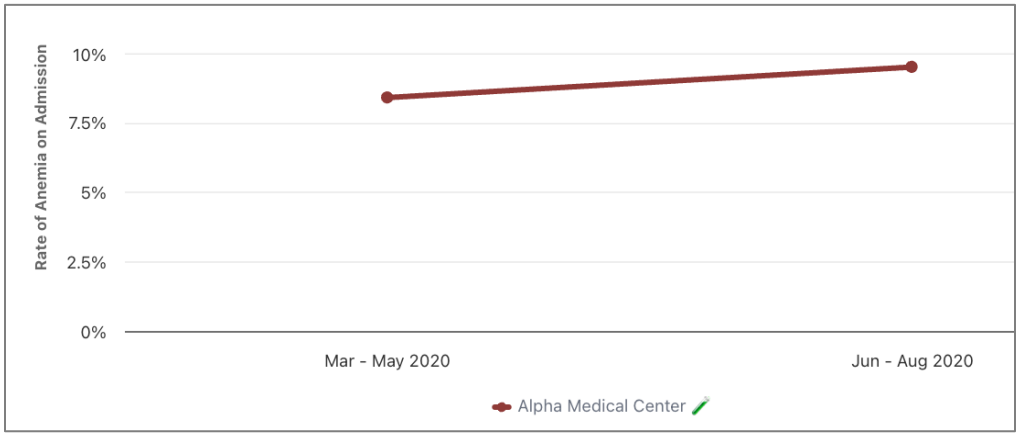


Anemia on Admission

See user guide here

Anemia on Admission

- **Measure Definition**: Delivery cases with anemia on admission to hospitalization
- **Denominator:** All deliveries for whom a hemoglobin value is provided
  - Excluding those with non-iron deficiency anemia
- **Numerator:** Denominator cases with a Hgb value < 11.0 g/dL



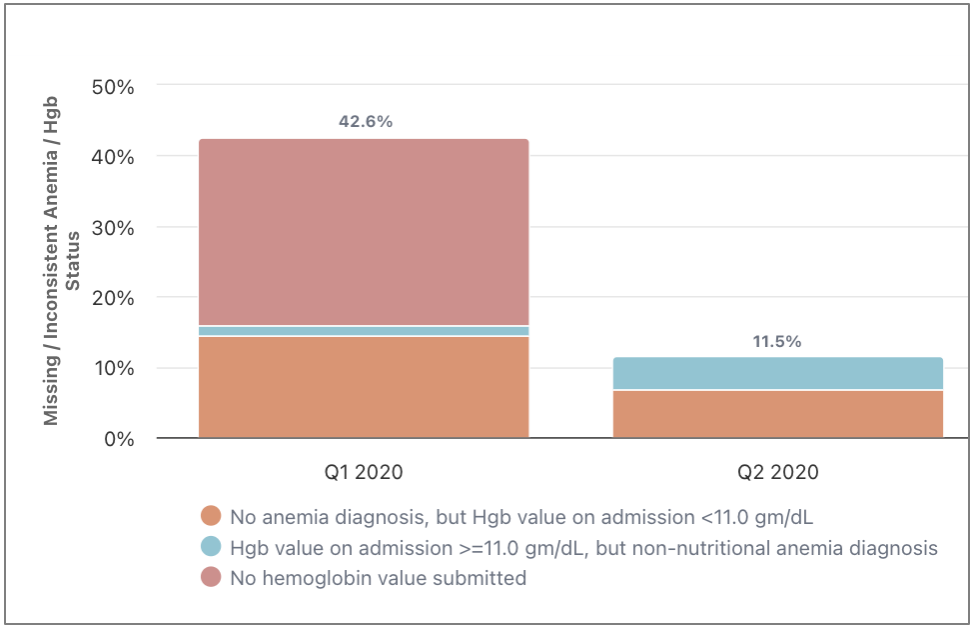
Anemia on Admission

- **Step 1:** Select “Hemoglobin Value (Hgb)” from the *Data Elements* (right-hand) column
- **Step 2:** Create a supplemental .csv file with the required data elements
  - Patient Identifier
  - Discharge Date
  - Hgb value

	A	B	C
1	medical_record_number	discharge_date	hgb_value
2	123456789	10312018	11

Data Quality Measure: *Missing/Inconsistent Anemia/Hgb Status*

- The MDC will flag cases with missing or inconsistent values for hemoglobin value on admission when compared to anemia ICD-10 coding
- Stacked bar chart format
  - No anemia dx, but Hgb value on admission < 11 g/dL
  - Hgb value on admission ≥ 11 g/dL, but non-nutritional anemia dx
  - No Hgb value submitted

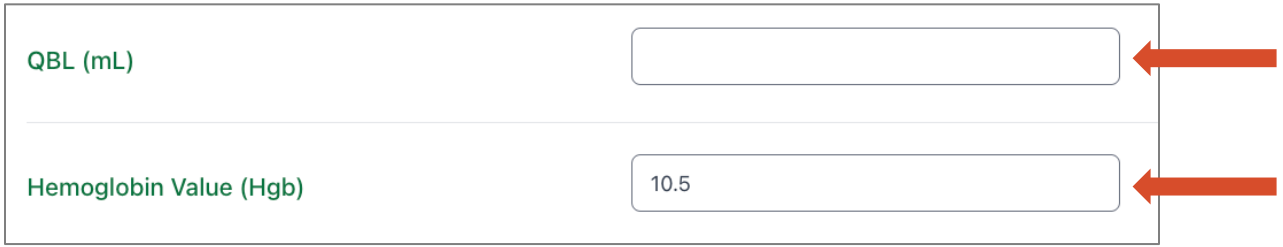


MDC Tips

Tip: Making “one-off” Edits

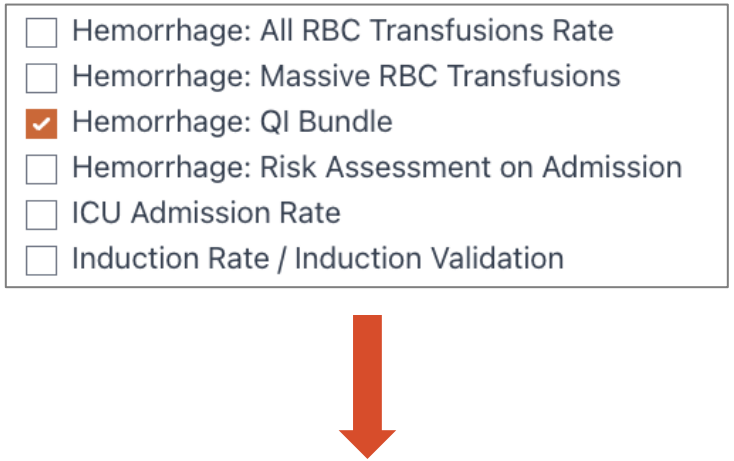
- While a supplemental data file **is** the only way to get either QBL or Hgb values into the MDC for multiple patients at once, you can modify these values on each patient record via the case editing tool:

Encrypted Medical Record Number	Delivery Date	Hgb Value at Admission	QBL (mL)	Transfused	RBC Units	FFP Units	Diagnoses	Procedures	Comments
a4161bbf21	07/28/2020	10.5		No			O76, O41.03X0, D62, O77.0, Z3A.39, Z37.0, O69.81X0	10D00Z1, 0UHD73Z	Click to comment



Tip: Hemorrhage QI Bundle

- Select the ***Hemorrhage: QI Bundle*** use case from the left-hand column of the *Supplemental Data File Template Generator* to pull all data elements recommended for measures in the MDC that support OB Hemorrhage QI

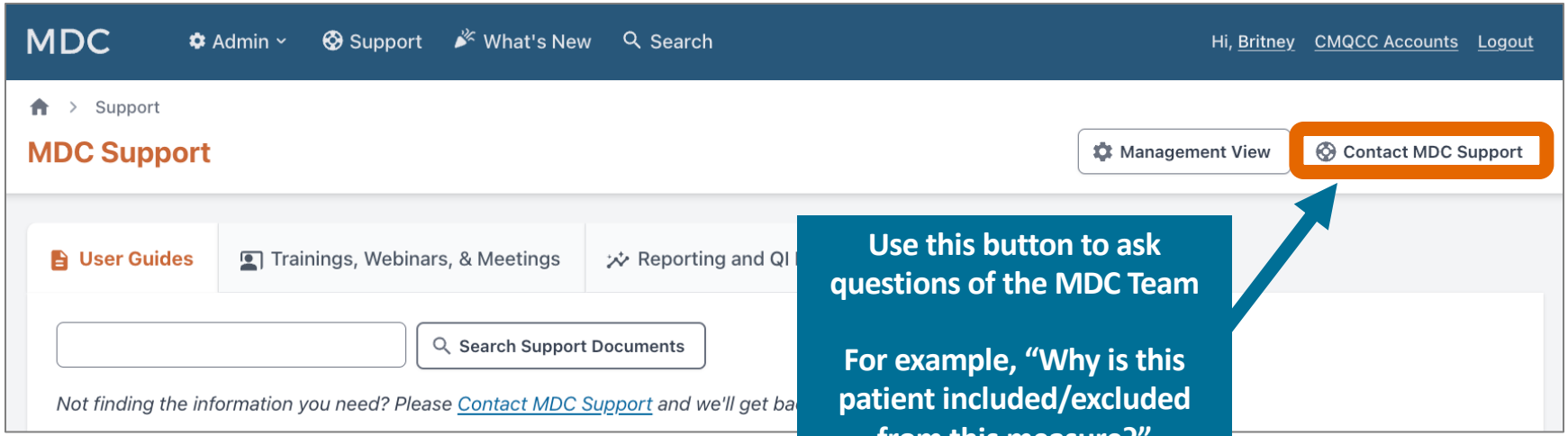


- *Anemia on Admission*
- *Hemorrhage Risk Assessment*
- *QBL Cumulative Value*
- *Transfusion Measures*

Tip: Download Spreadsheet of Patient Cases

- Drill down to a measure's patient-level screen and download an Excel spreadsheet of patients who make up the "Fallout Cases"—cases who experienced an outcome that is not ideal
- Perform additional analyses outside of the MDC (e.g., mean Hgb values)

MDC Support Section



Use this button to ask questions of the MDC Team

For example, "Why is this patient included/excluded from this measure?"

Note: Please do not send true patient identifiers. Use the encrypted version or row number.

Stanford University

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