Iron Deficiency Anemia in Pregnancy

Irogue Igbinosa, MD,
Deirdre Lyell, MD,
Elliott Main, MD

Maternal Fetal Medicine
Department of Obstetrics & Gynecology
Stanford University School of Medicine
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

The graph shows approximate requirements needed to compensate for normal turnover (eg, from gastrointestinal sloughing), menstruation, expansion of the maternal RBC mass, and fetal and placental RBC needs. Weeks refer to weeks of gestation. Refer to UpToDate for details of iron supplementation and management of anemia in pregnancy.

RBC: red blood cell.
Antepartum iron deficiency anemia: common and progressive

- Iron depletion
- Iron Deficient
- Iron deficiency Anemia

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

How common is anemia in pregnancy?

Prevalence in U.S.
- ~12%

Prevalence among Black pregnant people
- 18-24%
Iron requirements during pregnancy

<table>
<thead>
<tr>
<th>Iron Fate</th>
<th>Mean amount (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal &amp; placental iron</td>
<td>-360</td>
</tr>
<tr>
<td>Expansion of maternal RBC mass</td>
<td>-450</td>
</tr>
<tr>
<td>Baseline maternal body iron loss</td>
<td>-230</td>
</tr>
<tr>
<td><strong>Total iron needs during pregnancy</strong></td>
<td><strong>-1040</strong></td>
</tr>
</tbody>
</table>

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

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

Stanford University
Why anemia matters at delivery

• Anemia at delivery: 6-fold increase in major maternal morbidities
  • Abruptio, hemorrhage, infectious morbidity, preeclampsia
  • Prematurity

• Uterine blood flow increases 5-fold in pregnancy

• Postpartum hemorrhage can be audible

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

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
Trends of Antepartum Anemia in California

![Graph showing trends of antepartum anemia in California from 2011 to 2020, with different lines representing different racial and ethnic groups.]

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

Table 4. Associations between anemia and severe maternal morbidity within racial-ethnic subpopulations, California, 2011-2020 (n=3,998,523)

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Adjusted RR (95% CI)</th>
<th>Adjusted population attributable risk percentage (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian-Alaska Native</td>
<td>3.61 (2.80-4.66)</td>
<td>19.8 (9.2-29.7)</td>
</tr>
<tr>
<td>Asian-Pacific Islander</td>
<td>2.70 (2.57-2.85)</td>
<td>12.7 (10.8-14.8)</td>
</tr>
<tr>
<td>Black</td>
<td>2.87 (2.69-3.05)</td>
<td>22.8 (20.4-25.7)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3.67 (3.57-3.76)</td>
<td>20.6 (19.7-21.6)</td>
</tr>
<tr>
<td>Multi-race</td>
<td>2.61 (2.22-3.08)</td>
<td>17.4 (10.1-23.8)</td>
</tr>
<tr>
<td>White</td>
<td>2.98 (2.86-3.11)</td>
<td>13.8 (12.0-15.5)</td>
</tr>
</tbody>
</table>

CI, confidence interval; RR, risk ratio
Adjusted for age, education, payment method, obstetric comorbidity score, parity, delivery method
### Table 3. Unadjusted and Adjusted Odds Ratios Showing the Association Between Anemia Severity and Maternal Outcomes, British Columbia, 2004–2016 (N=515,270)

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

Maternal Depression

Overall: OR 1.53 (1.32 - 1.78)
Antepartum: OR 1.36 (1.07 - 1.72)
Postpartum: OR 1.53 (1.32 - 1.78)


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

Overall RR 3.01 (1.92-4.73)
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

Adjusted Odds for ASD, ADHD, and ID in Offspring of Mothers with Anemia ≤30w

Any ASD  Any ADHD  Any ID  ASD  ADHD  ID  ASD+ID  ASD+ADHD

Wiegensa (2019) JAMA Psychiatry
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 12 weeks and < 10 g/dL postpartum


World Health Organization – Anemia in Pregnancy


Stanford University
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.”
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
Rethinking Race In Medicine: ACOG Removes A Race-Based Cutoff For Anemia In Pregnancy

Michele Cohen Marili
AUGUST 19, 2021

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

---

<table>
<thead>
<tr>
<th>Guideline</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Black</td>
<td>&lt;11.0</td>
<td>&lt;10.5</td>
<td>&lt;11.0</td>
</tr>
<tr>
<td>Black</td>
<td>&lt;10.2</td>
<td>&lt;9.7</td>
<td>&lt;10.2</td>
</tr>
</tbody>
</table>

ACOG PB#95 (2008)
Management Options
### Draft Recommendation Statement

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

February 27, 2024

**Recommendation Summary**

<table>
<thead>
<tr>
<th>Population</th>
<th>Recommendation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic pregnant adolescents and adults</td>
<td>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.</td>
<td>I</td>
</tr>
<tr>
<td>Asymptomatic pregnant adolescents and adults</td>
<td>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.</td>
<td>I</td>
</tr>
</tbody>
</table>

"We need more evidence."
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)
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?
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

- 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
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

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 )

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
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.


Stanford University
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


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

Iron deficiency anemia is preventable
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, Zuguo Mei, Yaw Addo, Heather C Hamner, Cria G Perrine, Rafael Flores-Ayala, Christine M Pfeiffer, Andrea J Sharma  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…”

Stanford University
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

Interviews
Focus Groups

Anemia Community Leadership Group

- 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

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
Elliott Main, MD
Susan Perez, PhD, MPH
Melissa Rosenstein, MD, MAS
Tayler Hughes
Ijeoma Iwekaogwu
Community and Clinician Leadership Groups
Project Overview: 7 years
**Clinicians:** protocol, education, computer-based tools, MDC/data collection

**Framework:**
- Pathways to Racial and Ethnic Disparities in Severe Maternal Morbidity and Mortality Model
- Public Health Critical Race Praxis

**Aim 1 Purpose:**
Develop an Anemia Prevention Toolkit (APT) that aligns evidence-based practice with patient-centered care, incorporating patients’ lived experience, community assets, and clinical/hospital workflows.

**AIM 1 Outcome:**
Upon completion of Aim 1, we expect to have developed an Anemia Prevention Toolkit (APT) that aligns evidence-based practice with patient-centered care, incorporating patients’ lived experience, community assets, and clinical/hospital workflows for iron deficiency anemia (IDA).

**Process Steps:**
- Develop Facilitator Guide
- Conduct Focus Groups/Interviews
- Focus Groups/Interviews analysis
- Develop Survey
- Conduct Survey
- Analyze Survey Findings
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)
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

Melinda Kent
Associate Director

Tamar Boyadjian
Program Manager
Regions: Southern CA, OR, National

Britney Pheng
Data Specialist

Lydia Savelli
Program Manager
Regions: Northern CA, Central Valley CA, WA

Tech Support Team

Andrew Carpenter
Critical Juncture

Brandon Carag
Critical Juncture
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

```
Maternal Supplemental File

Sample File

<table>
<thead>
<tr>
<th>medical_record_number</th>
<th>discharge_date</th>
<th>hemorrhage_risk_assessment_performed</th>
<th>hgb_value</th>
<th>massive_transfusion</th>
<th>qbl_value</th>
</tr>
</thead>
<tbody>
<tr>
<td>123456789</td>
<td>10312018</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Download Sample File
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

```
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>medical_record_number</td>
<td>discharge_date</td>
<td>qbl_value</td>
</tr>
<tr>
<td>123456789</td>
<td>10312022</td>
<td>300</td>
</tr>
</tbody>
</table>
```
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

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>medical_record_number</td>
<td>discharge_date</td>
</tr>
<tr>
<td>2</td>
<td>123456789</td>
<td>10312018</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Encrypted Medical Record Number</th>
<th>Delivery Date</th>
<th>Hgb Value at Admission</th>
<th>QBL (mL)</th>
<th>Transfused</th>
<th>RBC Units</th>
<th>FFP Units</th>
<th>Diagnoses</th>
<th>Procedures</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>a4161bbf21@</td>
<td>07/28/2020</td>
<td>10.5</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>Q76, O41,03X0, D62, O77.0, Z3A.39, Z37.0, O69.81X0</td>
<td>10D0021, 0UHD73Z</td>
<td>Click to comment</td>
</tr>
</tbody>
</table>

QBL (mL)

Hemoglobin Value (Hgb)
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)
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.