Prenatal Anemia Management at Stormont Vail Health: 2025 Update

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About Stormont Vail Health

- Non-profit integrated health system
- Main campus is located in Topeka, Kansas
- 586-bed acute care hospital
- Level II ACS-verified Trauma Center
- About 1500 births annually
- Laboratory is accredited by the College of American Pathologists (CAP)
- Transfusion Service is accredited by the Association for the Advancement of Blood & Biotherapies (AABB)

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MAYO CLINIC CARE NETWORK Member

In affiliation with Children's Mercy KANSAS CITY

THE COMMITTEE ON TRAUMA VERIFIED TRAUMA CENTER

MAGNET RECOGNIZED AMERICAN NURSES CREDENTIALING CENTER

Objectives

- Describe the risks to prenatal patients who are anemic
- Identify potential implications to neonates born to anemic mothers
- Explain potential interventions to mitigate risks of anemia
- Explore financial benefits to institutions that optimize their patient's blood health

Patient Blood Management

- Patient blood management (PBM) is a comprehensive, patient-centered, multi-disciplinary effort to reduce the need for unnecessary allogeneic blood transfusion (Gammon et al., 2022).
- A key element of PBM is early identification and treatment of anemia, or a decreased red blood cell mass.
- Anemia is prevalent across the globe and associated with a wide variety of clinical manifestations including an increase in morbidity and mortality (Jansen, 2019).
- In a 2021 policy brief, the World Health Organization estimated that over 2.9 billion people worldwide have anemia with or without additional micronutrient deficiencies.

2021 Policy Brief from WHO

Risks of Allogeneic Transfusion

- Potential disease transmission; particularly those not yet identified
- Circulatory overload
- Immune modulation
- Alloantibody formation
- Hemolytic transfusion reactions
- Febrile complications
- Increased incidence of DVT & PE

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PBM Successes

- Empowered Blood Bank laboratory scientists with 100% prospective transfusion auditing
- Transfusions not meeting Medical Staff-approved transfusion indications are reviewed by Blood Bank Manager and/or Clinical Pathologist
- Majority of red blood cell transfusions are ordered as single-units

Image Credit: Jill Wellington

PBM Successes

- Full case review by multi-disciplinary committee of all massive hemorrhage events
- Plasma is no longer transfused based on an INR; requires viscoelastic testing with weight-based administration
- Partnership with Pharmacy colleagues to maximize opportunities to appropriately reverse anticoagulant medications
- Implementation of thromboelastic testing to focus on function rather than simply treating a number

Image Credit: Jill Wellington

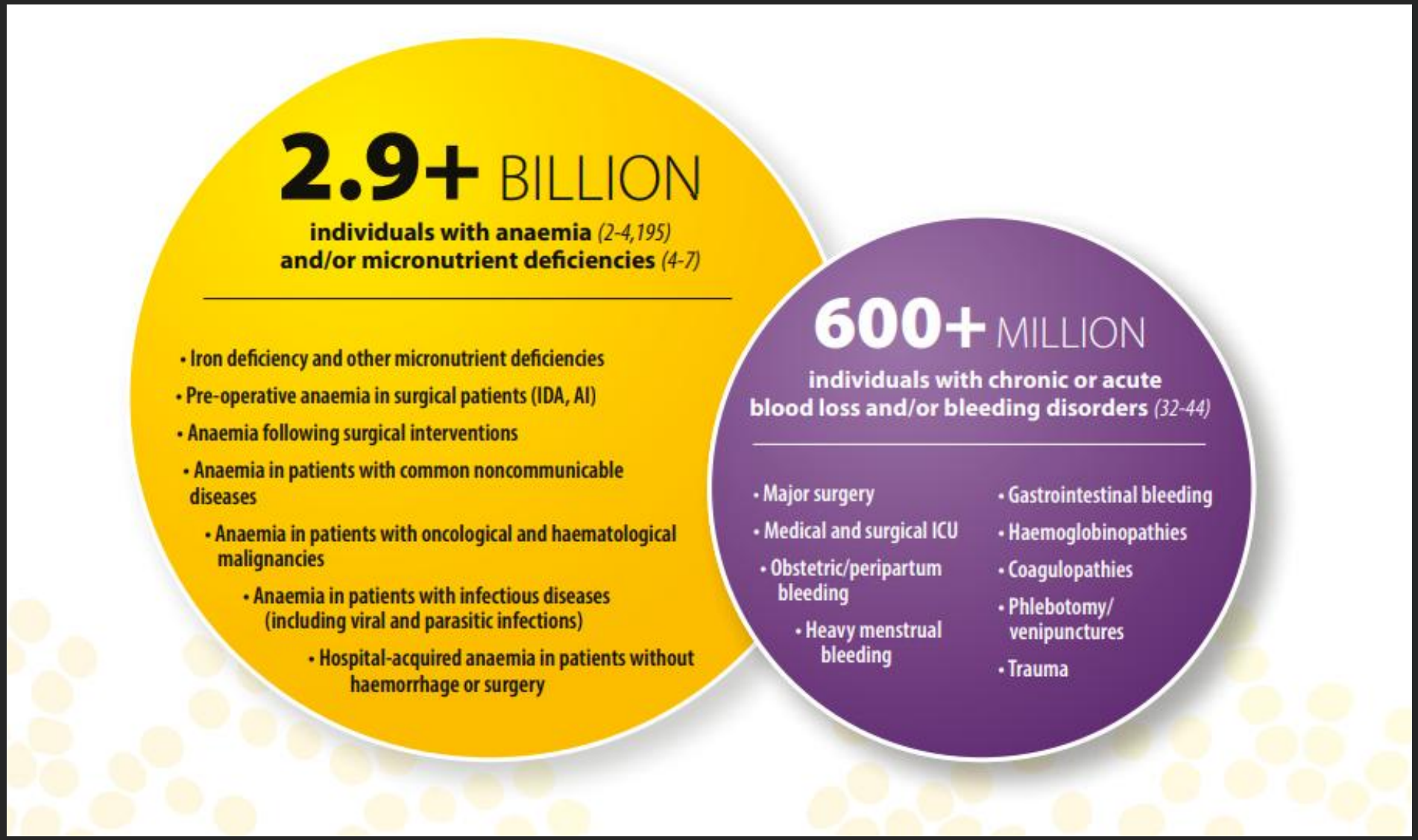

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Image Credit: World Health Organization

Anemia is a Significant Modifiable Risk Factor

Preoperative Anemia is:

1. Prevalent
2. Associated with increased morbidity/ mortality
3. **Treatable**

1.93x higher risk of infection

5.04x higher risk of transfusion

3.75x higher risk of kidney injury

2.9x higher risk of 30 days mortality

22% longer hospital stay

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Image Credit: Accumen Inc.

Risk Factors for Anemia

- Intestinal disease affecting nutritional uptake (ex. Chrohn's and celiac)
- Previous bariatric surgery
- Age over 65
- Menstrual periods
- Pregnancy
- Chronic disease such as cancer, kidney failure, or diabetes
- Family history

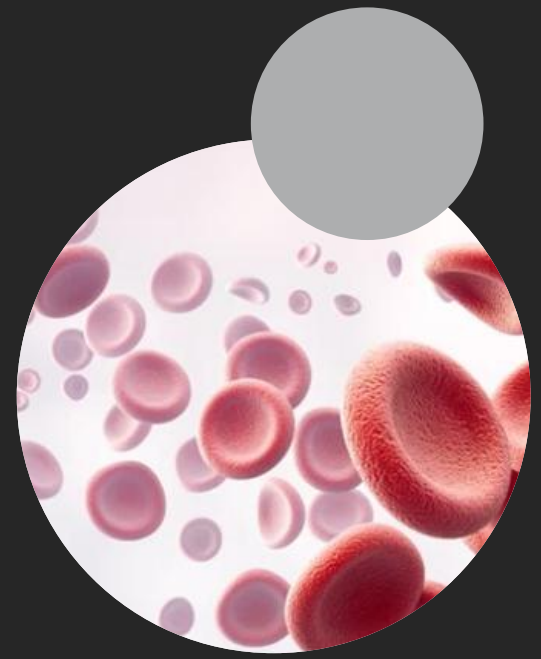
Image Credit: Roger Brown

Symptoms Associated with Anemia

- Weakness
- Shortness of breath
- Excessive tiredness
- Irregular heartbeat
- Dizziness or lightheadedness
- Chest pain
- Cold extremities
- Headaches

Anemia

- Sufficient iron levels are necessary for the optimal performance and production of all human cells, so the range of symptoms observed in iron deficiency anemia (IDA) are broad.
- Iron deficiency without anemia can present with the same range of symptoms AND RISK.
- The challenge is to identify the problem while there is still sufficient time to treat.



Anemia in Pregnancy

June 27, 2023

Prevalence of Iron Deficiency and Iron-Deficiency Anemia in US Females Aged 12-21 Years, 2003-2020

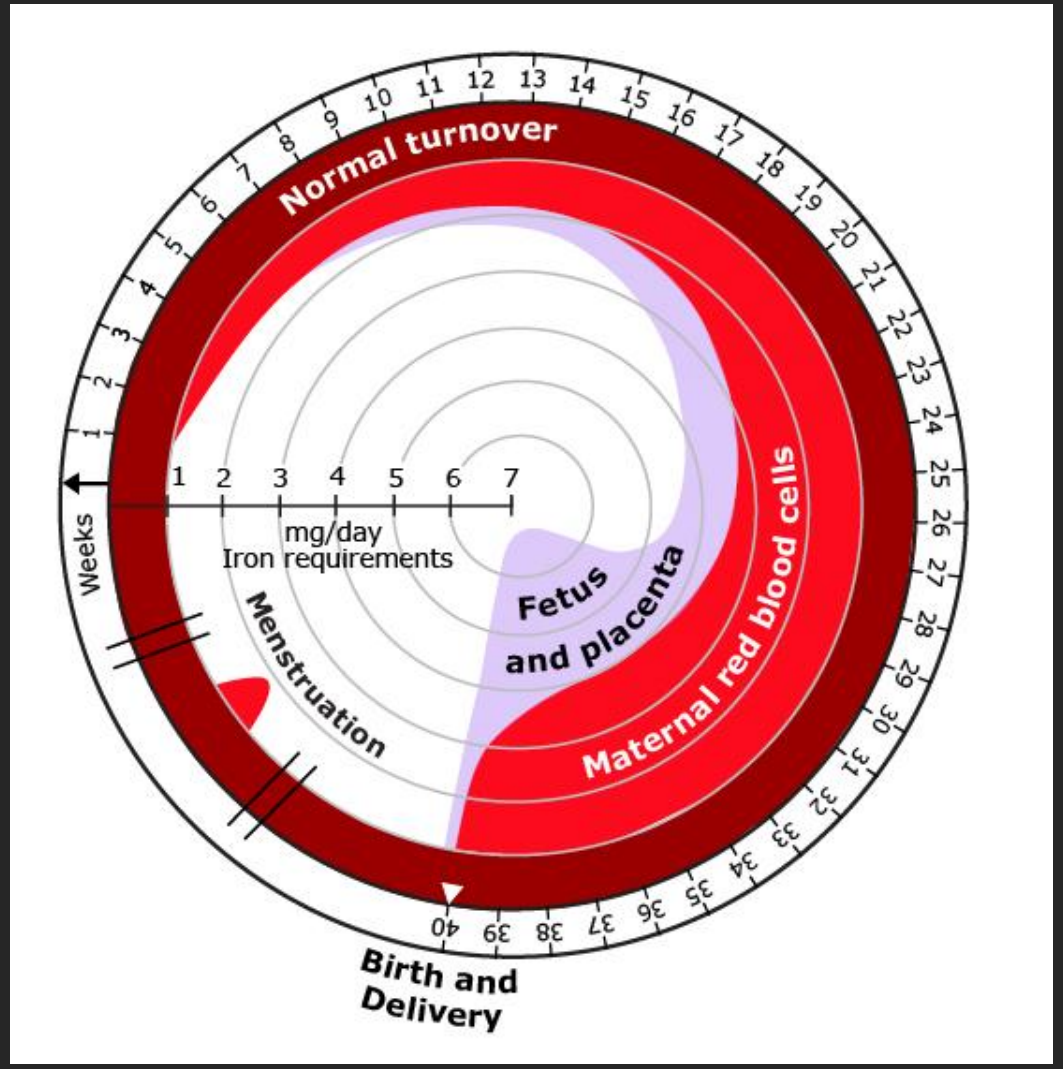
Angela C. Weyand, MD[1]; Alexander Chaitoff, MD, MPH[2]; Gary L. Freed, MD, MPH[3]; et al

- In a 2023 study, Weyand et al analyzed national data spanning 2003-2020 for females aged 12-21 years of age. The overall prevalence of iron deficiency was 38.6%.

Anemia in Pregnancy

- Decreased iron stores and resulting hemoglobin levels decrease the delivery of oxygen to tissues.
  - Decreased cognitive and physical performance
  - Difficulties regulating body temperature
  - Decreased immune function
  - Increased susceptibility to infection, and issues with enzymatic processes
  - Irritability
  - Headaches
  - Extreme fatigue with potential limitations on the ability to work or care for other children
  - Increased risk of postpartum hemorrhage
  - Elevated risk of postpartum depression

Iron Deficiency & Anemia in Pregnancy



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Risks to Infants Born to Anemic Mothers

Iron assessment to protect the developing brain † ‡

Georgieff Michael K

- The implications of anemia to the developing fetus and infant can cause lifelong deficits.
  - Increase in preterm delivery
  - Potential for cerebral developmental delays
  - Decreased iron stores incapable of supporting the rapid growth and development immediately after delivery

Risks to Infants Born to Anemia Mothers

- Significant cost to society in supporting a child dealing with sequelae of iron deficiency early in life
  - Mental health effects
  - Educational challenges
  - Impacts future potential to maintain adequate employment

From Baby Center App

34 weeks pregnant

Animal studies have shown that iron plays an important role in brain development and that the developing fetus doesn't get first dibs on iron if you're deficient. And some human observational studies have linked maternal anemia with cognitive problems and neurodevelopmental disorders – such as autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD) and intellectual disability (ID) – in infants and children.

ANEMIA REFLEX LABORATORY PANEL- CURRENT STATE

Chemistry hold tube drawn at the same time as the complete blood count; with or without differential.

Typically collected with the 28-week labs for OB.

Iron studies automatically reflex if indicated based on a hemoglobin and MCV on prenatal & pre-operative patients

The goal was to make a patient “referral-ready” in the event a Hematology consult was indicated

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FERRITIN VALUES IN OBSTETRIC PATIENTS

- As many as 50% of women start the pregnancy with depleted iron stores (McCarthy et al, 2024).

- Routine prenatal vitamins contain folic acid and may contain iron. The amount of iron in prenatal vitamins is helpful for preventing iron deficiency but is not sufficient for treating iron deficiency.

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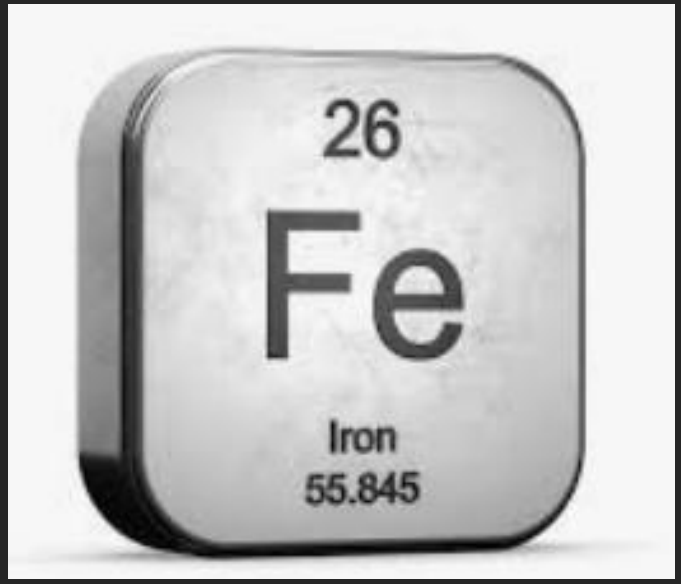
Ferritin Results to Date

Total OB Patients with HGB < 13 g/dL	Total OB Patients that Reflexed a Ferritin	OB Patients with Ferritin < 30 ng/mL	% OB Patients with Ferritin < 30 ng/mL
1009	944	865	91.6%



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Treatment Options

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Initial Challenges & Observations

- Getting support for a hemoglobin trigger of <13 g/dL
- Not all providers know how to evaluate the results
- Change in culture beyond “just anemia”
- Few clinicians focus on benign hematology
- Lack of uniform treatment among providers once anemia or iron deficiency recognized
- About 30% of the reflexed patients had a hemoglobin < 11 g/dL, but over 90% had a ferritin < /= 30 ng/mL
- We realized that our reflex panel is well-designed for the pre-op patients, but there may be a better path for obstetric patients, so…

Photo Credit: Yuri Arcurs

Evaluation & Treatment of IDA & Anemia in Pregnancy

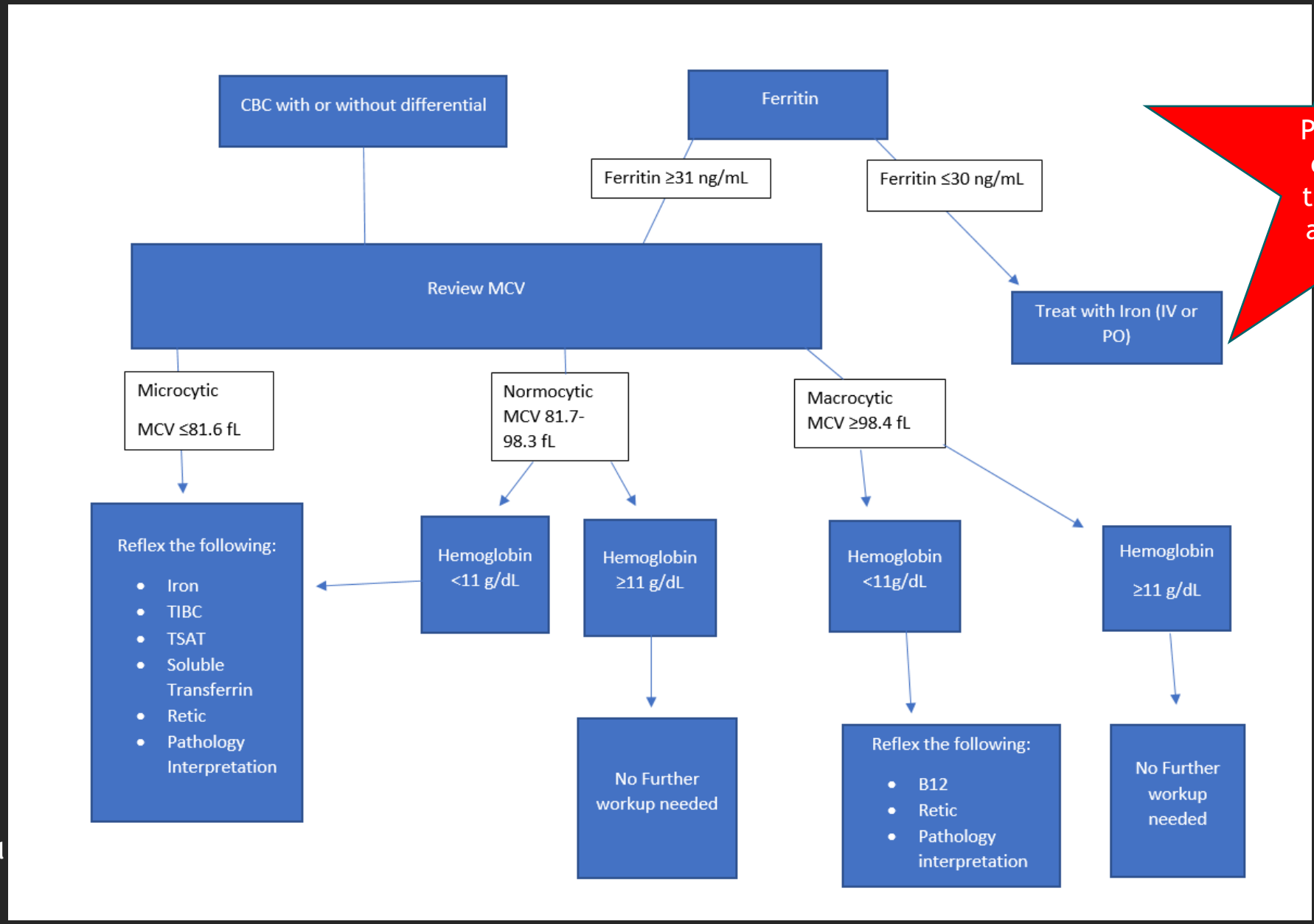
When testing for iron deficiency, most gravidas without comorbidities can be tested with a serum ferritin alone.

If low (eg, <30 ng/mL [<30 mcg/L]), this is sufficient to confirm the diagnosis of iron deficiency.

Levels ≥30 ng/mL are sufficient to eliminate the possibility of iron deficiency in the majority of cases.

~Up To Date

New OB-Specific Algorithm with Focus on Ferritin- 1st Prenatal Visit



Pharmacy-designed treatment algorithm

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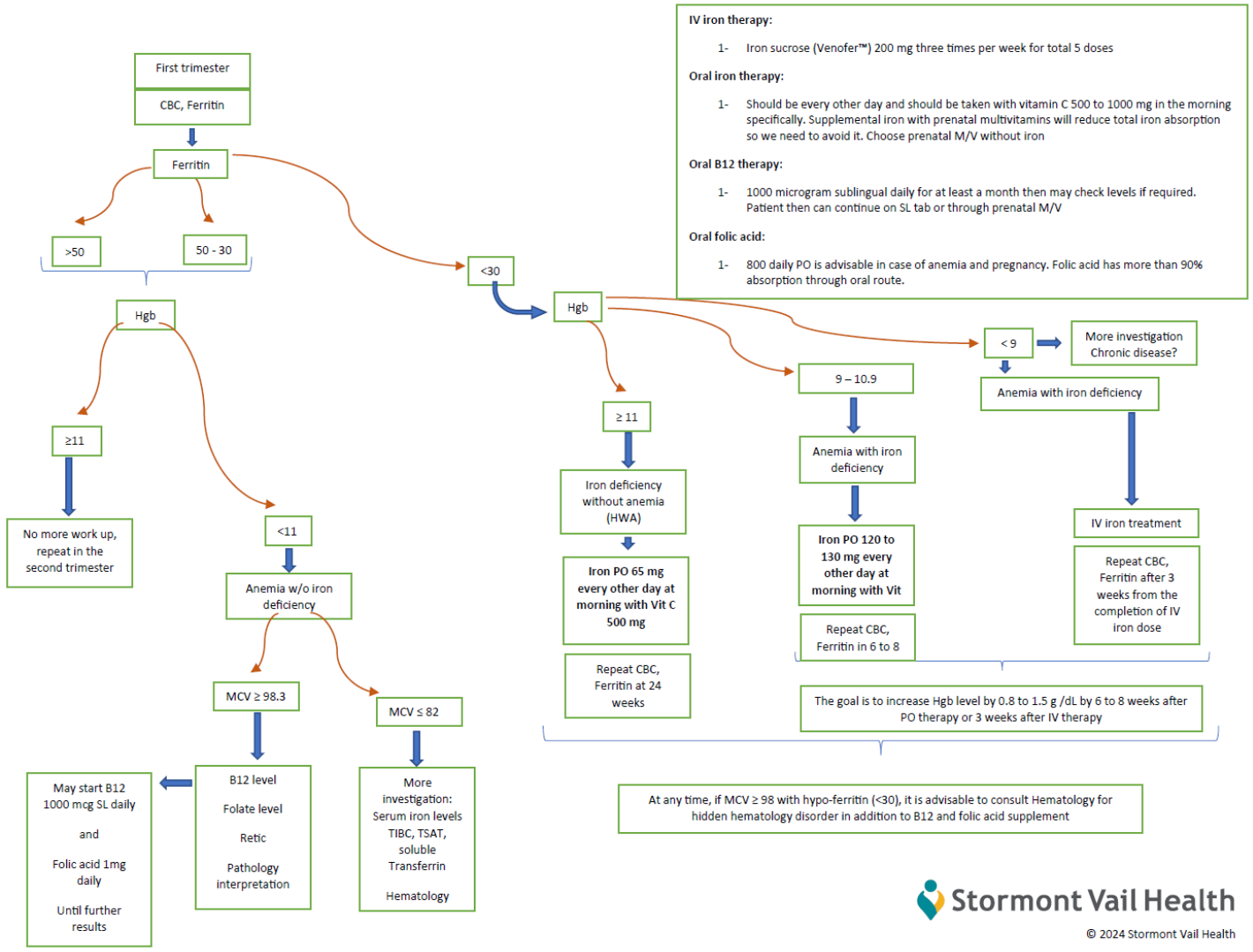
1st Trimester



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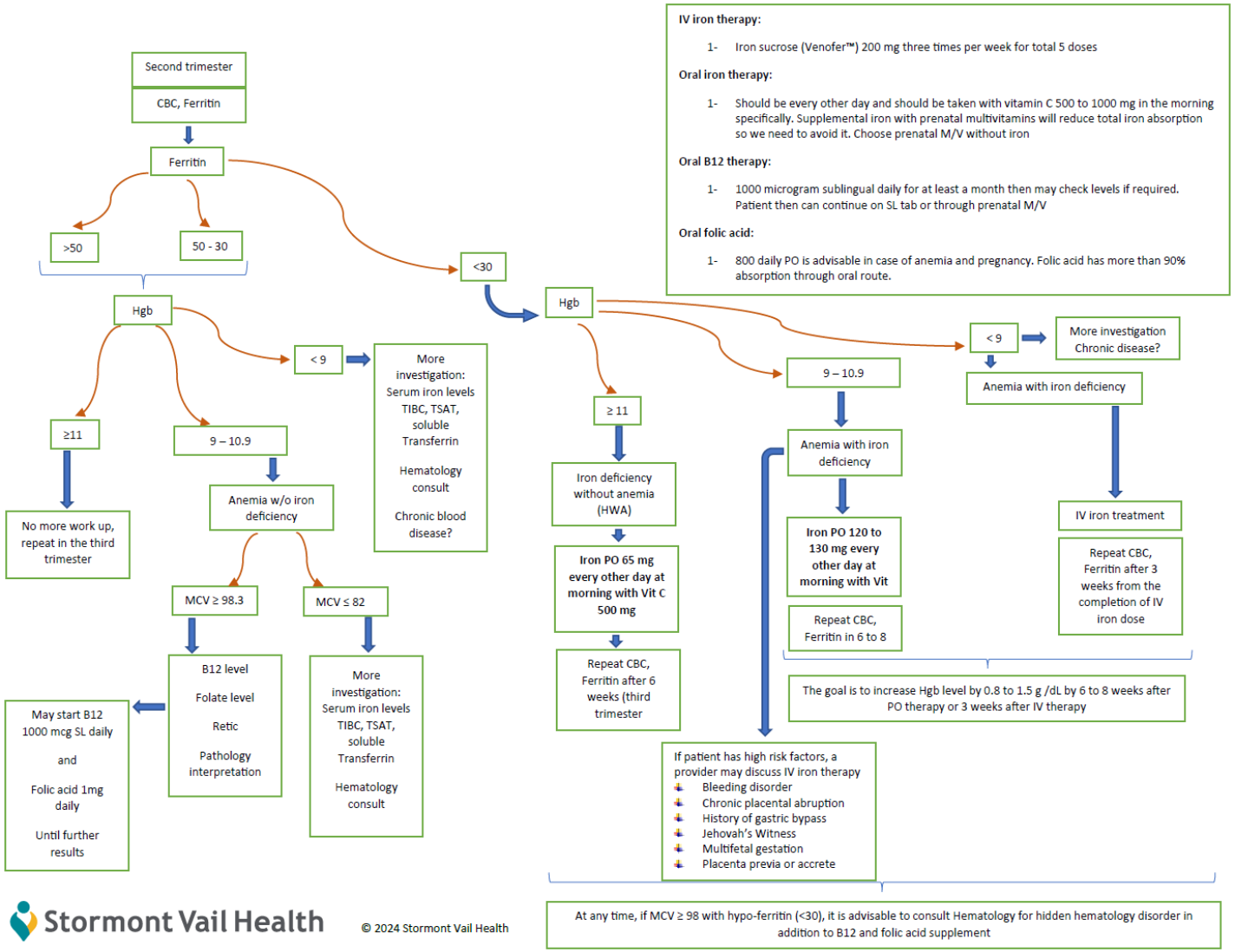
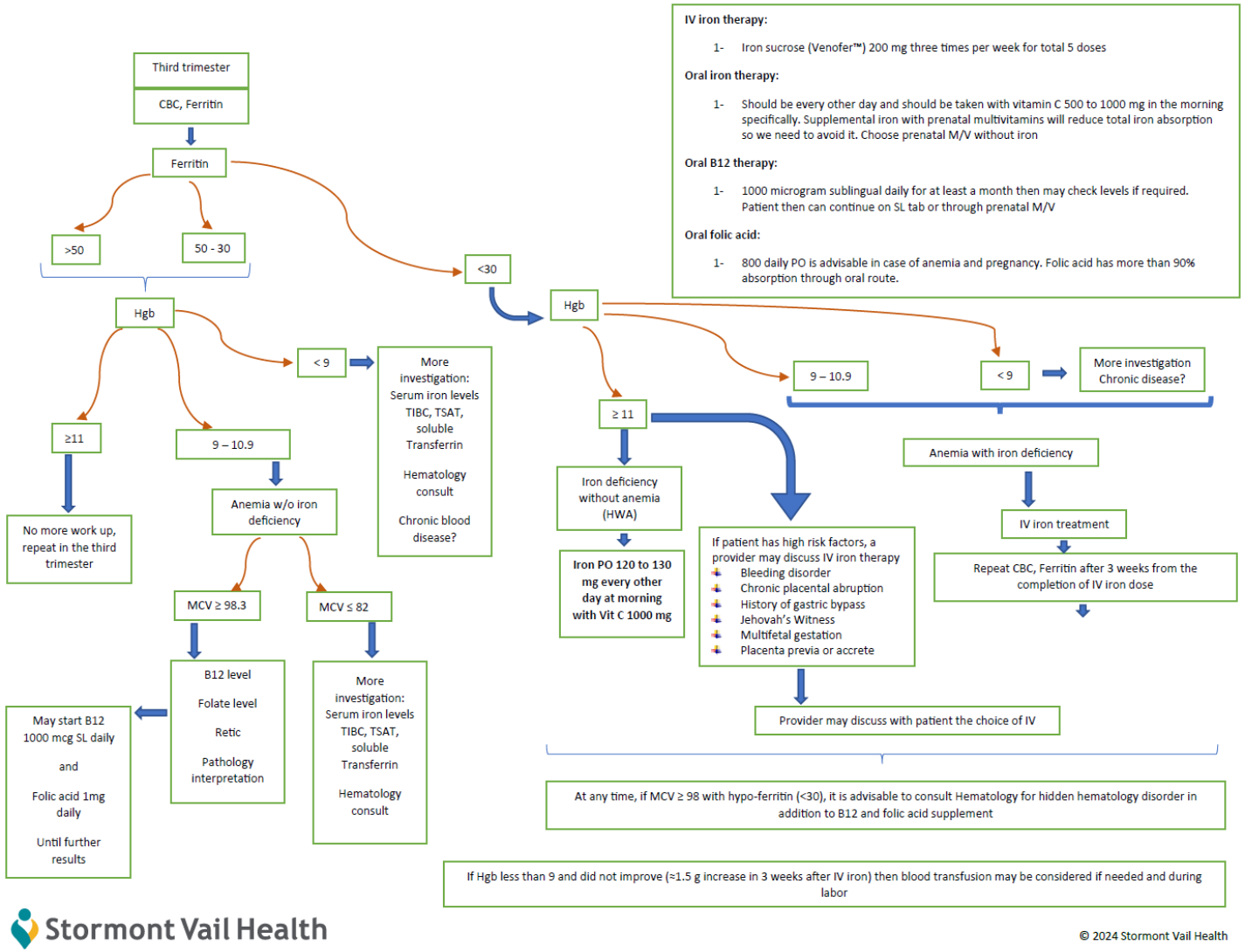
2nd Trimester



3rd Trimester



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Early Success

- Since July 2024:

- 691 completed patient cases
- 621 doses of IV iron administered to OB patients
- 447 patients were advised to take PO iron and increase dietary intake
- $240,000 in revenue


to be continued

Few initiatives can improve patient care and the bottom line. Anemia management is one of those programs.

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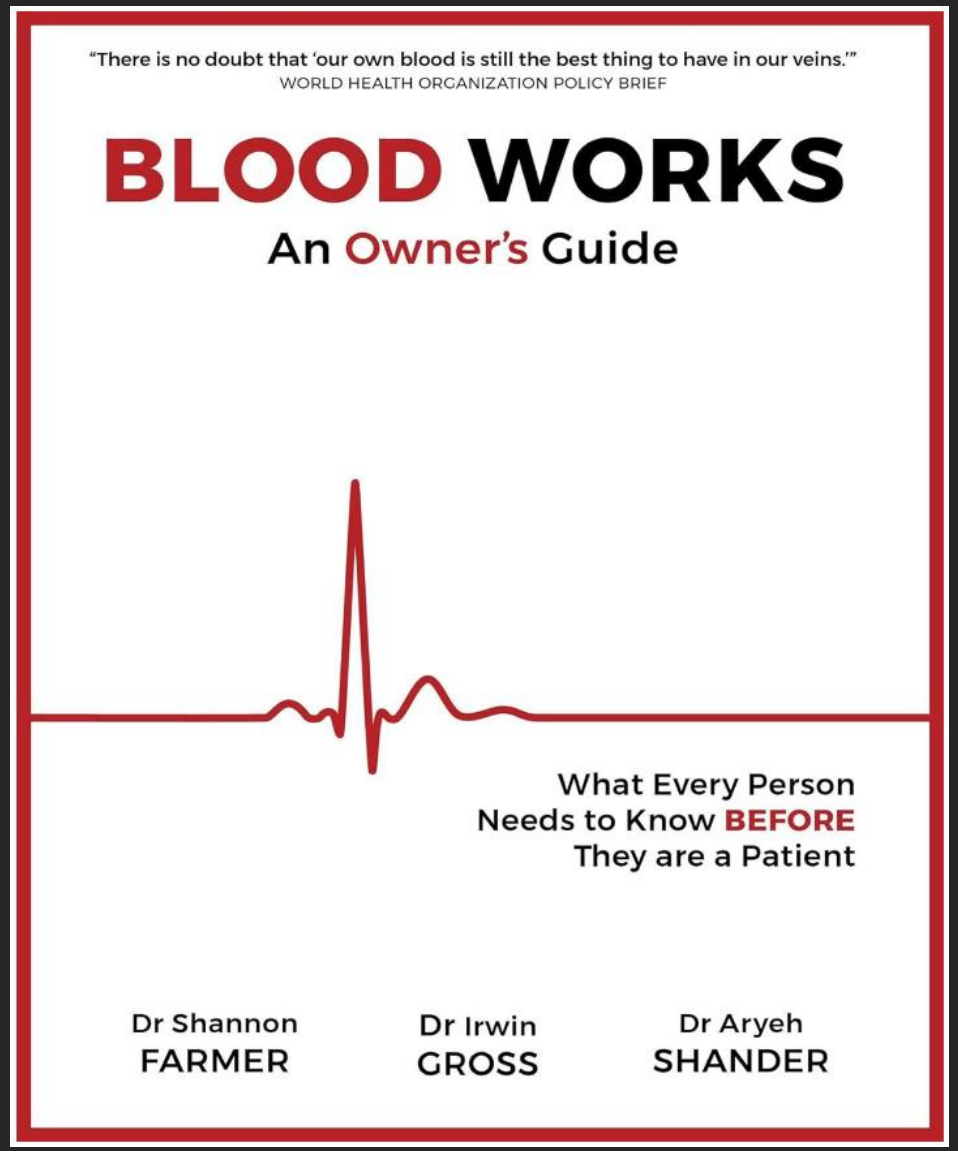

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