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# Anemia Management at Stormont Vail Health

Carrie Easley MLS (ASCP) SBB



# Objectives



- Discuss the prevalence of anemia due to micronutrient deficiencies
- Explore the risks to patients with pre-operative anemia
- 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

# 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.



World Health  
Organization

**POLICY BRIEF**

# THE URGENT NEED TO IMPLEMENT PATIENT BLOOD MANAGEMENT

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# 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



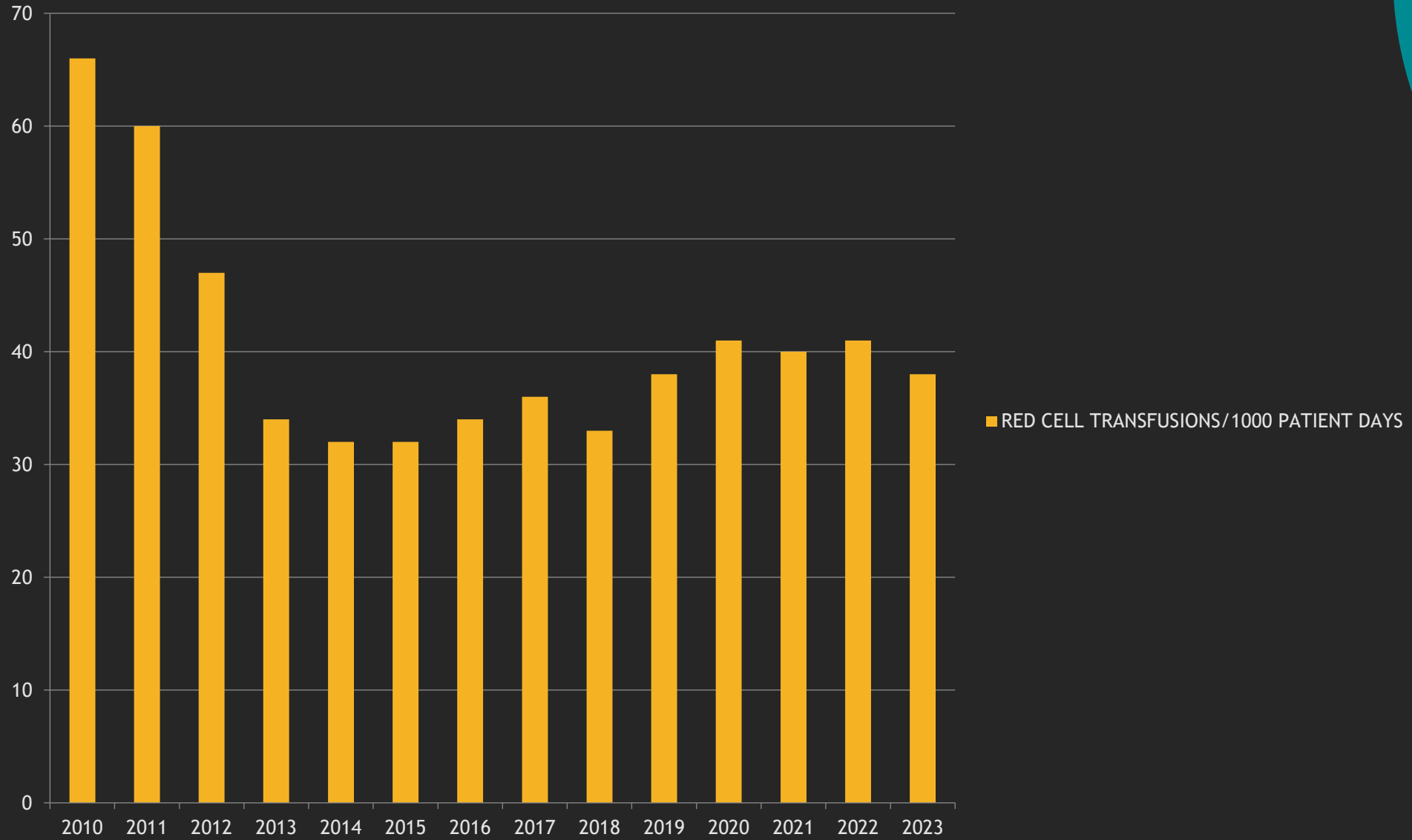
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# PBM Successes

- 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



# RED CELL TRANSFUSIONS/1000 PATIENT DAYS





# 2.9+ BILLION

individuals with anaemia (2-4,195)  
and/or micronutrient deficiencies (4-7)

- Iron deficiency and other micronutrient deficiencies
- Pre-operative anaemia in surgical patients (IDA, AI)
- Anaemia following surgical interventions
- Anaemia in patients with common noncommunicable diseases
  - Anaemia in patients with oncological and haematological malignancies
  - Anaemia in patients with infectious diseases (including viral and parasitic infections)
  - Hospital-acquired anaemia in patients without haemorrhage or surgery

# 600+ MILLION

individuals with chronic or acute  
blood loss and/or bleeding disorders (32-44)

- Major surgery
- Medical and surgical ICU
- Obstetric/peripartum bleeding
  - Heavy menstrual bleeding
- Gastrointestinal bleeding
- Haemoglobinopathies
- Coagulopathies
- Phlebotomy/venipunctures
- Trauma

# Risk Factors for Anemia

- Poor dietary intake of iron, vitamin B-12, and/or folate
- Intestinal disease affecting nutritional uptake (ex. Crohn'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

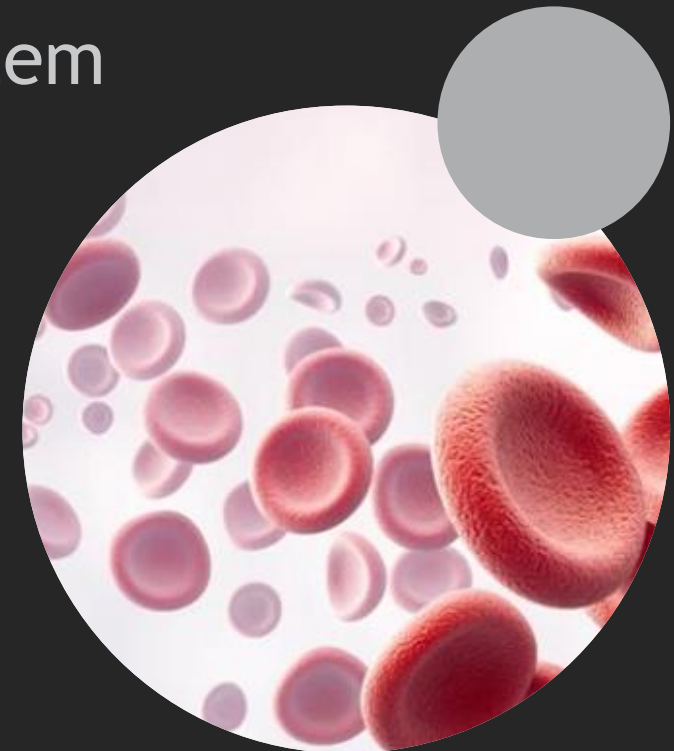
# Anemia



- The most common cause of anemia worldwide is iron deficiency. Incidence is higher in resource-challenged populations.
- 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.

# — Anemia

- Fortunately, iron deficiency anemia is a modifiable risk factor.
- The challenge is to identify the problem while there is still sufficient time to treat.



## 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

# 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<sup>1</sup>; Alexander Chaitoff, MD, MPH<sup>2</sup>; Gary L. Freed, MD, MPH<sup>3</sup>; [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



# Risks to Infants Born to Anemia 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

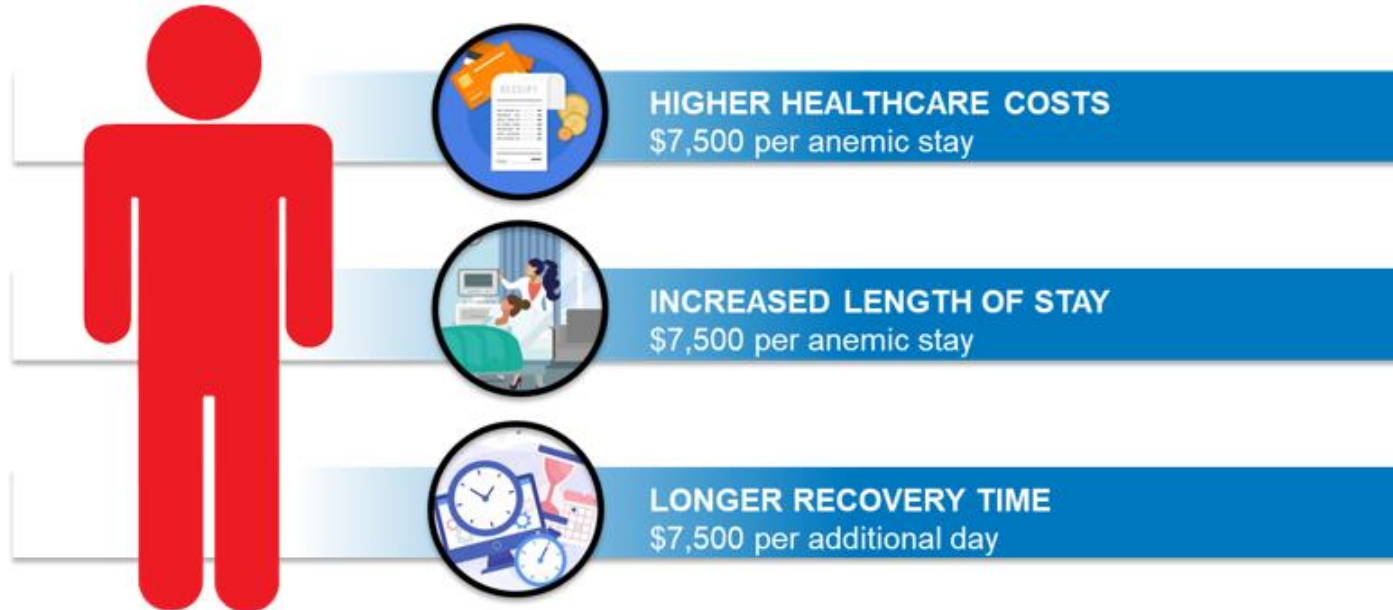
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# Benefits of addressing preoperative anemia

- Avoidance of allogeneic transfusion
- Patients better able to participate in recovery process
- Fewer instances of post-op infections
- Reduced length-of-stays
- Decreased readmissions



## Economic Implications of Anemia



***Failure to address anemia is diverting resources from other patient care initiatives***

# CBC With Anemia Reflex Panel

- Chemistry hold tube drawn at the same time as the complete blood count ; with or without differential
- Iron studies automatically reflex if indicated
- Test panel is available to all providers in system



# CBC With Anemia Reflex Panel

## Microcytic Anemia

If HGB < 13.0 g/dL (< 12 for non-pregnant/preoperative)

& MVC  $\leq$  81.6 fL

Reflex→

Retic, Iron, TIBC, TSAT%, Ferritin, Creatinine with eGFR



# CBC With Anemia Reflex Panel

## Normocytic Anemia

If HGB < 13.0 g/dL (< 12 for non-pregnant/preoperative)

& MCV between 81.7 fL and 98.3 fL

Reflex→

Retic, Iron, TIBC, TSAT%, Ferritin, Creatinine with eGFR



# CBC With Anemia Reflex Panel

## Macrocytic Anemia

If HGB < 13.0 g/dL (< 12 for non-pregnant/preoperative)

& MCV  $\geq$  98.4 fL

Reflex →

Retic, B12 level, Creatinine with eGFR





# Patient Worklist



Dashboard

Worklist

Facilities

Providers

Patients

Documents

Smart Sections

Email Templates

Lab Types

Lab Types Mapping

Case Types

Case Types Mapping

Users

Config

Reports

Sandbox Facility 1

Date	MRN	Patient Name	Case	
2022-09-25	3432895	Maximo Lavalde ⚠	GENERAL SURGERY	
2022-10-20	1102714	Rafaela Minci ⚠	GENERAL SURGERY	
2022-09-11	1082485	Caroline Paige ⚠	CARDIO	
2022-09-16	3746746	Brnaba Ivanshintsev	CARDIO	
2022-09-25	418999	Dona Bonifant	GENERAL SURGERY	
2022-09-30	202669	Silvia Lawford	CARDIO	
2022-10-08	1065631	Renell Ivasechko	GENERAL SURGERY	



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# Treatment Options



# Initial Challenges

- Getting support for a hemoglobin trigger of  $<13$  g/dL
- Not all providers know how to evaluate the results
- Large IT component
- Change in culture beyond “just anemia”
- Getting lab testing completed with time to treat
- Few clinicians focus on benign hematology

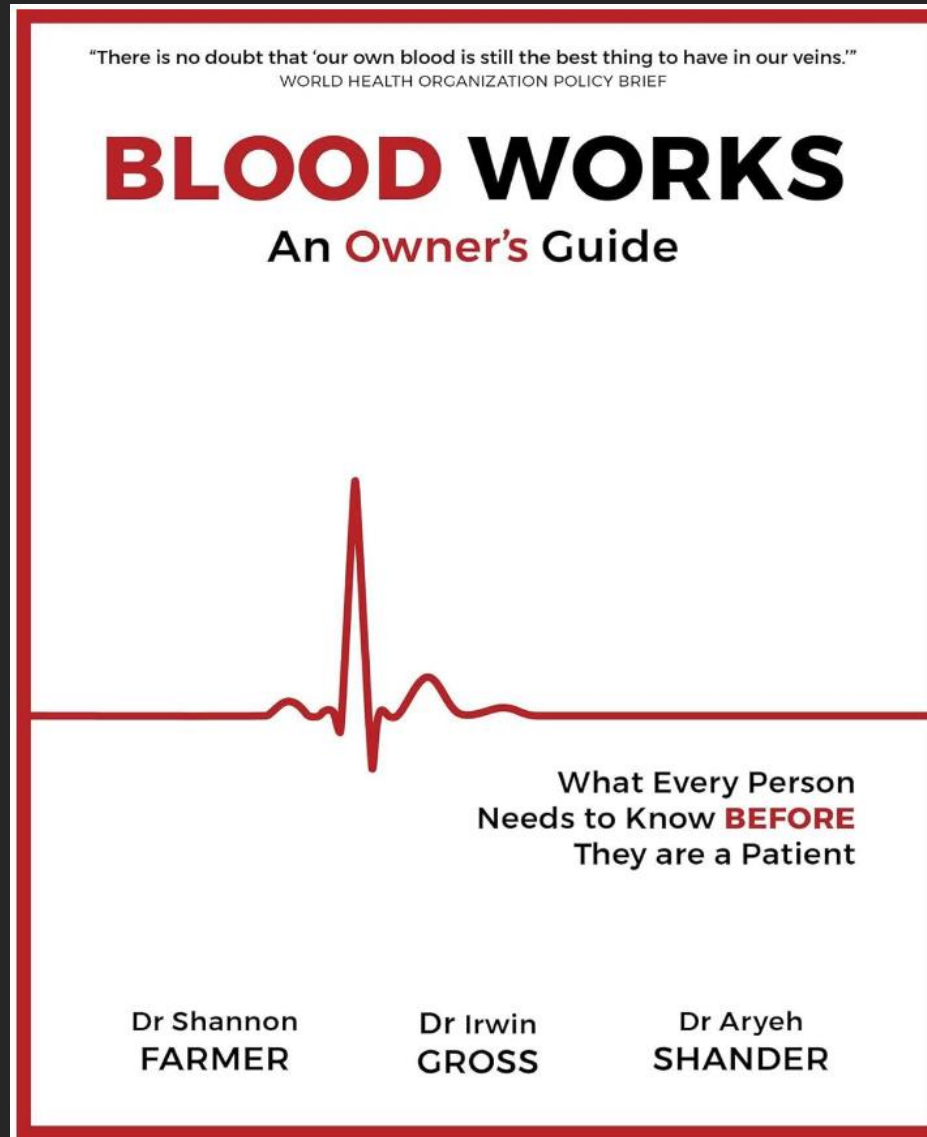




**WIN!**

Few initiatives have the ability to improve patient care and the bottom line. Anemia management can.

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THANK YOU

