Anemia: Laboratory Diagnosis (1)

Algorithms for diagnosing anemia generally fail in the presence of more than one cause.

Definitions:
* First and third trimesters - hematocrit < 33% OR hemoglobin <11.0 g/dl
* Second trimester - hematocrit < 32% OR Hgb <10.5 g/dl
* For African-Americans, recommend lowering cut-off levels for Hgb and Hct by 0.8 g/dl and 2%, respectively
* Choose algorithm based on the MCV (located in the CBC result)

1. Normal MCV (80-100 fl) *go to page 2
2. Low MCV (<80 fl)
3. High MCV (>100 fl) *go to page 3

- Low ferritin (<15 ng/mL)
- Low normal ferritin (15-40 ng/mL)
- Normal or high ferritin (>40 ng/mL)

**Iron Deficiency**

- See Anemia Treatment Protocol for treatment
- Ring sideroblasts on smear?
  - Yes
  - Hematology consult
  - Consider Epogen treatment
    * Risk factors: renal disease, Hct <25% or risks for perinatal hemorrhage
    * Dose =150 IU/kg SQ 3x/wk (Round to 1000 U)
  - No thalassemia
    - No thalassemia
    - Hemoglobin electrophoresis

**Sideroblastic Anemia**

**Chronic Disease**

**Hemoglobinopathy**

- Normal but African or Asian ethnicity
  - Refer for genetic counseling (possible alpha thalassemia)
  - SS = sickle cell
  - SA = sickle trait
  - A_2 = >3.5% = beta thalassemia

- Hemoglobin electrophoresis

- Begin folate (1mg/day) w/ PNV

- Draw paternal CBC and Hemoglobin electrophoresis

- MCV <80 fl or abnormal Hemoglobin electrophoresis
Anemia: Laboratory Diagnosis (2)

Definitions:
- First and third trimesters: hematocrit < 33% OR hemoglobin < 11.0 g/dl
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- Choose algorithm based on the MCV (located in the CBC result)

Normal MCV (60-100 fl)

Reticulocyte count, Ferritin, B12, RBC folate

Reticulocyte count <3%

RDW Normal (12-15%)

*Infections
*Medications
*Renal disease
*Aplastic anemia

Consider hematology consult

RDW Normal (>15%)

Low levels of ferritin, B12, RBC folate

Mixed disorder

Treat per deficiency protocols

Consider Epogen treatment
- Risk factors: renal disease, hct < 25% or risks for perinatal hemorrhage
- Dose = 150 IU/kg SQ 3x/wk (Round to 1000 U)

Normal levels of ferritin, B12, RBC folate

Chronic Disease

Consider hematology consult

Reticulocyte count >3%

Direct Coombs (-)

*G6PD deficiency
*Hemoglobinopathies
*Microangiopathic anemias (HUS, TTP)
*Spherocytosis
*Elliptocytosis

Consider rheumatology consult

Direct Coombs (+)

Autoimmune hemolytic anemia
Anemia: Laboratory Diagnosis (3)

Definitions
* First and third trimesters - hematocrit < 33% OR hemoglobin < 11.0 g/dl
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* For African-Americans, recommend lowering cut-off levels for Hgb and Hct by 0.8 g/dL and 2%, respectively
* Choose algorithm based on the MCV (located in the CBC result)

High MCV
(>100 fl)

B12, RBC folate levels

* B12 deficiency: < 100 pg/ml
* Folate deficiency: RBC folate < 150 ng/ml

Vitamin Deficiency

Folate

Folic Acid 1 mg/d in addition to PNV

B12

1 mg Vit B12 IM Q wk x 8 wks then Q mo

Recheck CBC in 1 month

Refer to medicine service postpartum for etiologic testing
Anemia References:


2) Sifakis S, Angelakis E, Vardaki E, Koumantaki Y, Matalliotakis I, Koumantakis E. Erythropoetin in the treatment of iron deficiency anemia during pregnancy" *Gynecol Obstet Invest* 2001; 51; 150-6. rHuEPO combined with parental iron is an effective treatment for moderate and severe anemia during pregnancy, with minimal adverse side effects.


4) Campbell BA. Megaloblastic anemia in pregnancy. *Clin Obstet Gynecol* 1995; 38: 460. If folate deficiency is determined to be the cause of the megaloblastic anemia, then oral replacement is generally sufficient with 1 mg per day.

5) Campbell BA. Megaloblastic anemia in pregnancy. *Clin Obstet Gynecol* 1995; 38: 460. If vitamin B12 deficiency is confirmed, parenteral therapy should begin with 1000 ug cyanocobalamin given once a week for 8 weeks followed by monthly injections.


Notification to Users

These algorithms are designed to assist the primary care provider in the clinical management of a variety of problems that occur during pregnancy. They should not be interpreted as a standard of care, but instead represent guidelines for management. Variation in practices should take into account such factors as characteristics of the individual patient, health resources, and regional experience with diagnostic and therapeutic modalities. The algorithms remain the intellectual property of the University of North Carolina at Chapel Hill School of Medicine. They cannot be reproduced in whole or in part without the expressed written permission of the school.

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