CT Children's CLASP Guideline

Anemia

INTRODUCTION

Anemia is defined as a clinically significant decrease in hemoglobin/hematocrit (Hgb/Hct) that may create health symptoms for the patient. Mild decreases in Hgb/Hct identified on screening lab tests may not be clinically significant; follow-up with the primary care provider that includes a repeat laboratory evaluation may be all that is needed. Persistent or clinically significant anemia requires further evaluation. There are numerous potential etiologies, including diseases specific to the red cell and/or bone marrow, or more systemic diseases such as inflammatory conditions and nutritional deficiencies. Thalassemia trait is the most common benign condition that may be related to chronic persistent anemia.

Symptoms of anemia may include:

- Pallor
- Tachycardia
- Fatigue
- Poor feeding
- Excessive sleeping
- Dizziness
- Irritability
- Headache
- Exercise intolerance
- Jaundice (hemolytic processes)

INITIAL EVALUATION AND MANAGEMENT

INITIAL EVALUATION: for asymptomatic patients with Hemoglobin >9, or Hemoglobin >6 and likely iron deficiency

- History & physical exam to assess for infectious/inflammatory disease, chronic disease, kidney disease, nutritional deficiencies, blood loss, hemolysis (jaundice)
- Family Hx of thalassemia trait
- Labs should include CBC with reticulocyte count, ferritin, serum iron and total iron binding capacity (TIBC)— ***See Appendix A: Normal Values for Hematologic Parameters***

INITIAL MANAGEMENT:

- If evidence of iron deficiency is present [low MCV, elevated RDW, low ferritin (<15)]: trial iron with follow-up assessment in 1 month – ***See Appendix B: Iron Supplement Dosages Table***

WHEN TO REFER

URGENT REFERRAL TO EMERGENCY DEPARTMENT:

- Lethargy, syncope, severe dizziness
- Respiratory distress/significant shortness of breath
- Significant anemia with active bleeding

URGENT REFERRAL TO HEMATOLOGY: ***See Appendix C: Hgb confirmed low by CBC Algorithm***

- Patient is symptomatic, especially if transfusion might be indicated (Hgb <6)
- White blood cell or platelet count low

ROUTINE REFERRAL TO HEMATOLOGY: ***See Appendix C: Hgb confirmed low by CBC Algorithm***

- Hgb <9 and not microcytic (i.e. not clearly iron deficiency)
- Persistent and/or unexplained anemia (>1-2 months)
- Iron deficiency +/- anemia with poor response to iron
- Iron deficiency anemia due to blood loss (heavy menstrual bleeding, epistaxis)

OPTION TO DELAY REFERRAL OR ROUTINE REFERRAL if:

- Suspected thalassemia trait *(**see Appendix D: Suspected Thalassemia Trait**)*
- Mild iron deficiency anemia with plan to trial iron

HOW TO REFER

Referral to Hematology via CT Children's One Call Access Center
Phone: 833.733.7669 **Fax:** 833.226.2329
For more information on how to place referrals to Connecticut Children's, click **here**.

Information to be included with the referral:

- Laboratory test results that include current & previous CBC or H/H values (even if normal)
- Any other relevant information that the referring provider thinks might be helpful (e.g. growth chart, recent clinic notes)

WHAT TO EXPECT

What to expect from CT Children's visit:

- History, physical exam
- Evaluation of prior labs, if available
- Referral to genetic counselor, if needed
- IV iron infusions as indicated
- Additional labs if needed:
  - ✓ Special RBC and hemoglobin studies
  - ✓ Coagulation studies as needed
  - ✓ Bone marrow aspiration

APPENDIX A: Normal Values for Hematologic Parameters in Children

Age	Hemoglobin (g/dL)		Hematocrit (%)		MCV (fL)		RDW (%)	
	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit
6 months to <2 years*	11.0¶	13.5	31	42	73	85	12.3	15.6
2 to 6 years	11.0¶	13.7	34	44	75	86	12.0	14.6
6 to 12 years	11.2	14.5	35	44	78	90	11.9	13.8
12 to <18 years								
Female	11.4	14.7	36	46	80	96	11.9	14.6
Male	12.4	16.4	40	51	80	96	11.9	13.7

This table summarizes lower and upper limits (defined as the 2.5th and 97.5th percentile, respectively) for hematologic parameters in children according to age and sex, based upon normative data from healthy populations in the United States. Previous reports have described lower values for hemoglobin in Black Americans compared with White Americans (approximately 0.5 to 1 g/dL lower for Black Americans). However, those differences likely reflect health disparities related to social determinants of health. We recommend using the same hemoglobin and hematocrit thresholds for evaluation anemia in all racial and ethnic groups (ie, we do not assume that a slightly lower value in a Black individual is normal). Reference ranges may differ slightly from one laboratory to another. For more specific guidance, clinicians should refer to the reference ranges at the laboratory performing the testing.

MCV: mean corpuscular volume; RDW: red cell distribution width.

***Normal values for hemoglobin, hematocrit, and MCV change dramatically during the first 6 months after birth. Refer to UpToDate topic on the approach to the child with anemia for a discussion of normal values in young infants.**

¶The lower limit of normal (ie, 2.5th percentile) for hemoglobin at these ages is slightly less than 11 g/dL. However, for the purposes of screening for iron deficiency anemia in infants and young children, many experts use a cutoff of hemoglobin <11 g/dL to define an abnormal screen.

References:

1. *Brugnara C, Oski FA, Nathan DG. Diagnostic approach to the anemic patient. In: Nathan and Oski's Hematology and Oncology of Infancy and Childhood, 8th ed, Orkin S, Nathan D, Ginsburg D, et al (Eds), Elsevier 2015. P.293.*
2. *Cembrowski GS, Chan J, Cheng C. NHANES 1999-2000 data used to create comprehensive health-associated race-sex- and age-stratified pediatric reference intervals for the Coulter MAXM. Laboratory Hematol 2004; 10:245.*
3. *Baker, RD, Greer FR, Committee on Nutirtion American Academy of Pediatrics. Diagnosis and prevention of iron deficiency and iron-deficiency anemia in infants and young children (0-3 years of age). Pediatrics 2010; 126-1040.*
4. *Staffa SJ, Joerger JD, Henry E, et al. Pediatric hematology normal ranges derived from pediatric primary carse patients. Am J Hematol 2020.*
5. *Higgins V, Tahmasebi H, Bohn MK, et al. CALIPER Hematology Reference Standards (II). Am J Clin Pathol 2020; 154-342.*

Table reference: Powers, J.M., Sandoval, C. (2022). Approach to the Child with Anemia. *UpToDate*. Retrieved September 2, 2022, from https://www.uptodate.com/contents/approach-to-the-child-withanemia?search=normal%20values%20for%20hematologic%20parameters&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1.

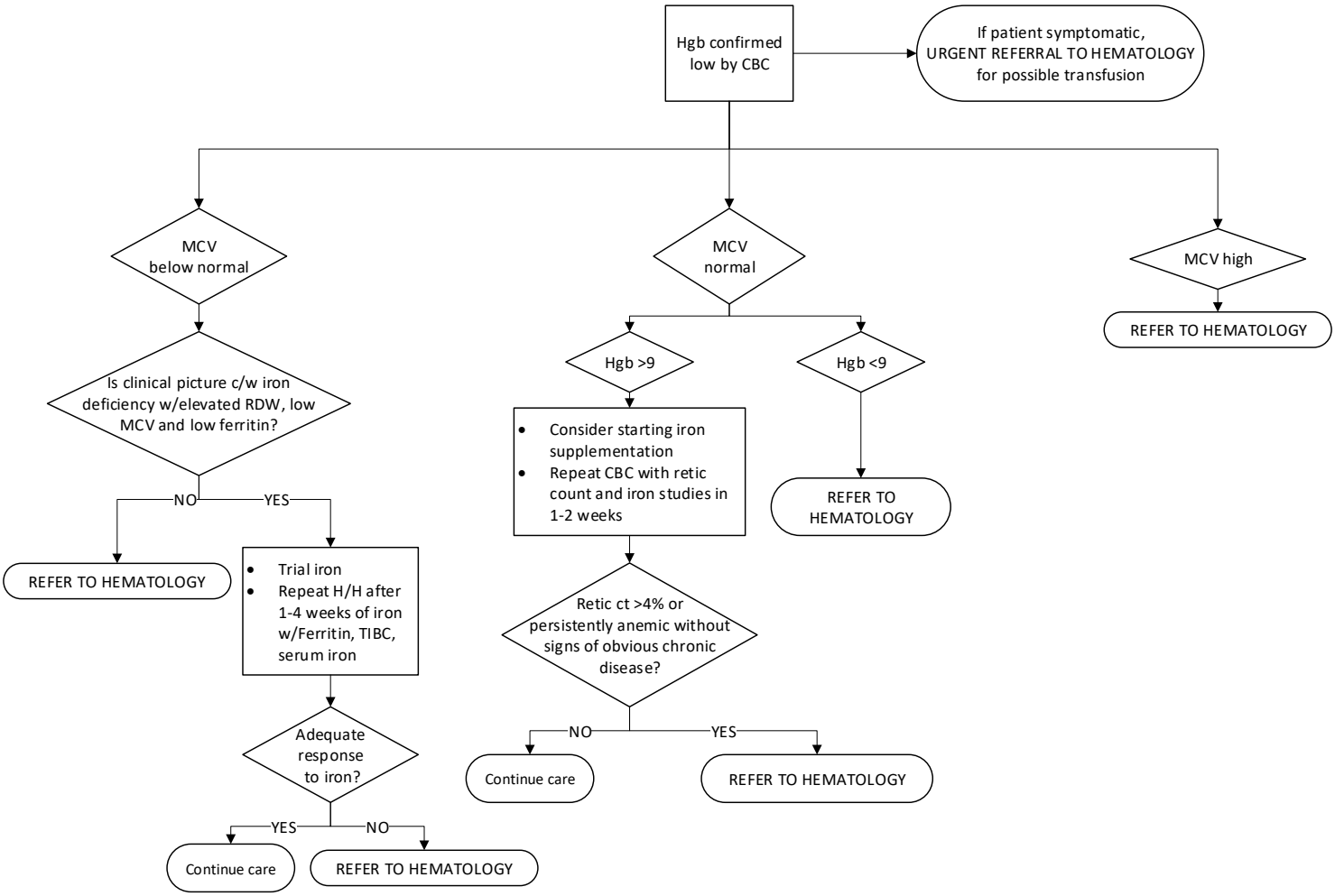
APPENDIX B: Iron Supplement Dosages Table

IRON SUPPLEMENTS
Liquid iron: 3-6 mg elemental iron/kg/day given as single daily dose
Iron tablets/capsules: 65-130 mg elemental iron daily
Max dose: 150 mg elemental iron per day
Ferrous sulfate preparations are widely available and some data suggests that it leads to improved resolution of anemia. However, polysaccharide-iron complex liquid preparations are often better tolerated in young children due to taste.

Compound	Trade Name	Formulation	Compound Quantity	*Elemental Iron (mg)
Ferrous Sulfate	Fer-in-sol	Drops	75 mg/1 mL	15 mg/1 mL
	Ferrous Sulfate (generic)	Drops	15 mg/1 mL	15 mg/1 mL
		Elixir	220 mg/5 mL	44 mg/5 mL
	MyKidz Iron 10	Drop	75 mg/1.5 mL	15 mg/1.5 mL
	Feosol	Tablet	324 mg	65 mg
	Slow-Fe	Slow-release Tablet	142 mg	45 mg
Ferrous Gluconate	Fergon	Tablet	240 mg	27 mg
	Nature's Way Iron	Tablet	160 mg	18 mg
Ferrous Fumarate	Ircon	Tablet	200 mg	66 mg
	Ferretts	Tablet	325 mg	106 mg
	Ferrocite	Tablet	324 mg	106 mg
Iron Polysaccharide Complex	NovaFerrum	Drop	50 mg/mL	15 mg/1 mL
	NovaFerrum 125	Elixir		125 mg/5 mL
	NovaFerrum	Capsule		50 mg
	Nu-Iron 150	Capsule	219 mg	150 mg
	Ferrex Forte	Capsule	219 mg	150 mg
Carbonyl Iron	Feosol	Drop	50 mg/mL	15 mg/1 mL

Table reference: Powers, J.M., O'Brien, S.H. (2019). How I approach iron deficiency with and without anemia. *Pediatr Blood Cancer*. 66(3):e27544. doi: 10.1002/pbc.27544.

APPENDIX C: Hgb Confirmed Low by CBC Algorithm



APPENDIX D: Suspected Thalassemia Trait Algorithm