

Identifying iron deficiency anemia

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Iron deficiency anemia (IDA) is the most common blood disorder in children affecting 2 to 3 percent of the U.S. population. Infants and toddlers and teenage girls with heavy menstrual periods are most at risk for IDA. The impact of IDA in young children is neurocognitive delays that do not appear to resolve with the treatment of IDA. In adolescents and older women, IDA has been linked to fatigue and decreased health-related quality of life resulting in decreased school and/or work performance.



IDA risk factors in young children and toddlers:

1. **Prematurity** – Most of an infant's iron stores are accumulated in the third trimester.
2. **Excess cow milk intake** – This is the most common culprit. Excess cow milk intake leads to IDA. Infants over 12 months of age should be instructed to consume no more than 16-20 ounces of cow milk daily.
3. **Prolonged bottle feeding** – Infants should transition from the bottle to sippy cups beginning at 12 months of age.
4. **Early transition to cow milk** – Infants should stay on breast milk or formula until 12 months of age.

When to evaluate for IDA:

1. In infants and toddlers, the state often mandates a check of the hemoglobin at the age of 9-12 months. However, because excess cow milk intake is the most common cause of IDA in young children, consider delaying the screen or re-screening for IDA at the age of 18-24 months.
2. Adolescent females who report heavy menstrual bleeding should be screened for IDA at least annually.

Tips on the diagnosis of IDA:

1. IDA is nearly always microcytic. A rule of thumb for the MCV test is that the lower limit of normal can be estimated by using $70 + \text{the age in years}$. So for a 5-year-old, 75 is a reasonable estimate of the lower limit of normal for the MCV test.
2. In most cases, it is appropriate to avoid specific tests (ferritin, etc.) for IDA when a microcytic anemia is encountered in a patient with risk factors for IDA.
3. Ferritin is an acute phase reactant and will be falsely normal in some cases of IDA with concurrent infection. Therefore, the American Academy of Pediatrics (AAP) recommends obtaining a C-reactive protein (CRP) concomitant to the measurement of ferritin for evaluation of IDA.
4. Serum iron fluctuates greatly and depends on recent iron intake. For that reason, serum iron cannot be relied upon to diagnose IDA unless the patient is NPO for the laboratory studies. Other tests like the TIBC and ferritin are recommended for diagnosing IDA.

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Tips on the diagnosis of IDA *(continued)*

5. The AAP also recommends the reticulocyte hemoglobin content (also known as CHR or retic-he, depending on the analyzer) as an alternative to ferritin as a screening test for IDA. It is important to remember that a low reticulocyte hemoglobin content is not specific for IDA. Common conditions like alpha thalassemia trait and beta thalassemia trait can also lower this lab test.

Advice on the treatment of IDA:

1. Recent evidence suggests that once daily dosing is more effective than divided dosing (twice or three times a day) because hepcidin is expressed in an increased amount (thereby limiting iron absorption) for at least 24 hours after a dose of oral iron.¹
2. In most cases of IDA, treatment with 3mg/kg of elemental iron once per day is adequate for treatment. Dosing recommendations can go as high as 6mg/kg per day, but there is little evidence to support that high of a dose.
3. Encourage patients and their families to administer the iron with a vitamin C source. Ascorbic acid aids the conversion of ferric to ferrous iron, thereby aiding iron absorption.

Reasons for lack of response to treatment with oral iron:

1. Poor adherence – bad taste.
2. Poor adherence – difficult medication administration in some toddlers.
3. Poor adherence – not viewed as an important problem by some physicians and families.

4. Poor adherence – inability to obtain medication.
5. Inadequate dosing of elemental iron – the iron dose should be at least 3mg/kg/d and multivitamins with iron along with increasing dietary iron is not enough.
6. Poor absorption – this occurs most commonly if the iron is mixed or co-administered with a substance like milk, which raises the pH of the stomach and results in decreased conversion of ferric (3+) iron to the absorbable ferrous (2+) iron. Milk also contains other divalent cations, which compete with ferrous iron for absorption. Rarely, poor absorption can occur related to conditions such as H. pylori or celiac disease.
7. Ongoing blood loss – blood loss in the GI tract (or rarely in the urinary tract or lungs) can cause IDA, which requires further evaluation and treatment of the underlying cause.

When to consider referral to a hematologist for further evaluation and treatment:

1. In particularly severe cases of IDA (hemoglobin < 8).
2. In cases with an inadequate response to oral iron.
3. In cases of mixed anemia in which IDA is occurring in addition to other hematologic problems.
4. In cases associated with edema/anasarca (can occur in the setting of milk protein allergy, which can result in blood loss in the intestine and protein-losing enteropathy with resultant hypoalbuminemia).
5. In adolescents with poor medication adherence who may be interested in parenteral iron as a treatment option.



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¹Moretti D, et al, Blood, 126: 1981-9, 2015.