

**CASE 10.1**  
**Anemia | Level 1**

Tracy M. Hagemann

**1. What subjective and objective evidence supports the diagnosis of microcytic anemia?**

**SUBJECTIVE FINDINGS:** The patient had an essentially normal presentation but was somewhat irritable and has had changes in sleep lately.

**OBJECTIVE FINDINGS:** Remarkable for decreased hemoglobin of 8.4 g/dL, decreased MCV of 59.4 fL, RDW 20% (increased), and RBC count decreased at 4.75 million/ $\mu$ L

The patient's diet consists solely of cow's milk increasing his risk for the development of this type of anemia.

**2. Develop a nonpharmacologic and pharmacologic regimen for the treatment of iron-deficiency anemia in this patient.**

Iron deficiency is characterized by microcytosis with an increased RDW. Untreated iron-deficiency anemia in infants and toddlers is associated with long-lasting delays in mental, motor, and behavioral functioning. Because this type of anemia is mild and this patient's history and laboratory values are consistent with iron deficiency, it is appropriate to treat empirically with oral iron therapy. The patient should have repeat laboratory testing performed 1 month after starting iron replacement. These labs should include hemoglobin, MCV, RBC count, and RDW. An increase in the hemoglobin level of more than 1 g/dL after 1 month of therapy confirms the diagnosis of iron-deficiency anemia. The patient should then be treated with iron replacement for an additional 3 to 4 months after the hemoglobin returns to normal values, in order to fully replenish the total body stores. If the hemoglobin does not increase after 1 month of therapy, further testing, including a complete blood count, peripheral blood smear, iron studies, and fecal occult blood testing should be performed.

Cow's milk has an iron content of about 0.5 mg/L and cannot meet the iron needs of infants and toddlers. It is estimated that a growing toddler requires about 11 mg/day of iron to maintain normal growth and development. This would mean that this child would need to drink 22 liters of cow's milk per day to meet his requirements. Because the suspected cause of the iron-deficiency anemia in this patient is a diet consisting of mostly cow's milk, the parents should be instructed to stop the patient's milk consumption entirely. He should

be initiated on a diet with normal foods such as fruits, vegetables, meat, and iron-fortified cereals and other liquids, such as water and juice. With this patient's weight, juices should be limited to 1 cup per day. Milk may be added back into his diet once the anemia has started to improve but only with meals.

Ferrous sulfate is the most widely available product and care should be taken to ensure that the correct dose of elemental iron is administered. As this child is only 14-months old, an oral liquid product would be most appropriate. The recommended dose for treatment of anemia in pediatrics is 3 mg elemental iron/kg/day in one to two divided doses; this patient's weight is 12.2 kg, so he should receive 36.6 mg elemental iron per day ( $12.2 \text{ kg} \times 3 \text{ mg/day} = 36.6 \text{ mg/day}$ ). To be most practical, it would be appropriate to round the patient's calculated dose to 36 mg/day.

Ferrous sulfate is available in an elixir, suspension, or oral drops. The elixir is available as 220 mg/5 mL (44 mg elemental iron/5 mL), while the oral drops are available as 75 mg/mL (15 mg elemental iron/mL). The suspension drops MyKidz Iron™ 10, is 75 mg/1.5 mL (15 mg elemental iron/1.5 mL) and is formulated for children with no dyes and is ethanol free. Other appropriate suspensions include Fer-In-Sol 75 mg/mL (15 mg elemental iron/1 mL) and Fer-iron 75 mg/mL (15 mg elemental iron/1 mL), although these both contain 0.2% alcohol. The pharmacist should provide an oral syringe that can measure the correct amount of liquid for this dose.

For this patient, who will require 36 mg of elemental iron/day, an appropriate regimen would be MyKidz Iron™ 10, 3.6 mL (36 mg elemental iron) once daily or 1.8 mL (18 mg elemental iron) orally twice daily. Once-daily dosing results in similar improvement as taking the iron twice daily, with no increase in adverse reactions. Using the other products of Fer-In-Sol or Fer-iron, the regimen would be 2.4 mL (36 mg elemental iron) orally once daily or 1.2 mL (18 mg elemental iron) orally twice daily.

### 3. Identify and propose a solution to the medication-related problem.

This patient has symptoms of seasonal allergies (e.g., sneezing and runny nose), and his mother has been administering diphenhydramine at bedtime for these symptoms. Diphenhydramine is a concern in this patient as he is only 14-months old, and diphenhydramine has a safety warning in children less than 2 years of age. The FDA notes that there are no approved OTC uses for cough and cold products in children less than 2 years of age, due to reported serious adverse reactions including death. Additionally, the parents of this child state that he has not been sleeping well for the past month. Diphenhydramine was started about a month ago and may cause paradoxical excitation in young children. The diphenhydramine should be discontinued immediately. Another product that may help for the treatment of seasonal allergic symptoms in children less than 2 years of age is cetirizine. Cetirizine dosing for children 12 to 23 months of age is 2.5 mg once daily and may be increased to 2.5 mg twice daily if needed for symptoms. Cetirizine is available as an oral syrup at 5 mg/5 mL, so this patient would initially require 2.5 mL (2.5 mg) once daily. Cetirizine is much less likely to cause excitation but may cause some drowsiness and is best to take at bedtime.

### 4. What is the patient's current weight classification? What is the desired weight for this patient?

This patient is at the 97 percentile for weight and height per the Centers for Disease Control and Prevention/National Center for Health Statistics. While body mass index (BMI) is only appropriate for children older than 2 years, weight for length percentile is the appropriate method for assessing risk for under or overweight. Percentiles less than 5 indicate underweight, percentiles between 5 and less than 95 indicate healthy weight, and percentiles over 95 indicate overweight. A desired weight for length percentile for this patient would be between 5 and 95 percentile, or with a length of 78 cm, a weight below 12 kg. At the extremes (percentiles greater than 97 or less than the 3), small