IRON DEFICIENCY ANEMIA

Module Overview

Total Time: 30 minutes

Learning Objectives

• Define iron deficiency anemia.
• Describe the consequences of iron deficiency anemia for children.
• List signs and symptoms of iron deficiency anemia in children.
• Identify children who are at high risk for iron deficiency anemia.
• Describe strategies to prevent iron deficiency anemia in children.

Topics

23.1 About Iron Deficiency Anemia
23.2 Signs and Symptoms of Iron Deficiency Anemia
23.3 Children at Risk for Iron Deficiency Anemia
23.4 Strategies to Prevent Iron Deficiency Anemia

Materials

<table>
<thead>
<tr>
<th>SUPPLIES</th>
<th>ACTIVITY SHEETS</th>
<th>HANDOUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>o PowerPoint slides</td>
<td>o Guess the Symptom!</td>
<td>o Anemia</td>
</tr>
<tr>
<td>o Flip chart</td>
<td>o Guess the Symptom!</td>
<td></td>
</tr>
<tr>
<td>o Markers</td>
<td>o Answer Key</td>
<td></td>
</tr>
<tr>
<td>o Pens</td>
<td>o Causes of Iron Deficiency Case Studies</td>
<td></td>
</tr>
<tr>
<td>o Paper</td>
<td>o Causes of Iron Deficiency Cases</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Studies Answer Key</td>
<td></td>
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</tbody>
</table>

Prerequisite

• Module 1 (Nourished and Thriving Children Overview), Topics 1.1 and 1.2.
# ABOUT IRON DEFICIENCY ANEMIA

| Supplies: | • PowerPoint slides  
|           | • Flip chart  
|           | • Markers  
|           | • Pens  
|           | • Paper  
| Activity Sheets: | • None  
| Handouts | • None  

## Learning Objectives
- Define iron deficiency anemia.
- Describe the consequences of iron deficiency anemia for children.

## Introduction
- Tell participants that anemia is one of the most common nutritional deficiencies in children, especially children in foster care. And today you will be discussing the causes and consequences of anemia and strategies to prevent it.

## First Thing that Comes to Mind! Activity
- Ask participants to have their pens and papers ready.
- Ask participants to quickly write down three words that come to mind when they hear you say “anemia.” Provide the group 10 seconds to respond.
- Ask participants to shout out their answers as you write them on the flip chart.
- Use the words provided by participants to facilitate a discussion around the definition and consequences of iron deficiency anemia. See Activity Notes in the Trainer’s Notes section for examples.

## Summary
- Present the About Iron Deficiency Anemia, Other Types of Anemia, and Consequences of Iron Deficiency Anemia in Children content in the Trainer’s Notes.
- Synthesize and summarize the content.

## Activity Notes
- Participants will likely provide some of the following words: blood, iron, tired, malnutrition, deficiency, brain, supplement, testing, pale, meat, hemoglobin, development. Here are some example of how to use these words to facilitate the conversation around the definition of anemia:
  - “Many of you said ‘blood’. Why is that? What is the relationship between blood and anemia?”
  - “Some of you said ‘brain’ (or ‘development’). What did you mean by that? How are anemia and the brain (or development) related?”
  - “You said iron”. Can someone explain how iron and anemia are related? Do you think there are nutritional reasons other than low iron for anemia?”
  - “Some of you listed food sources of iron like meat and beans. We will talk
About Iron Deficiency Anemia

- Anemia essentially means a low number of red blood cells.
- Red blood cells carry a red pigment called hemoglobin. Hemoglobin is a special protein that captures and transports oxygen to all body parts. To make hemoglobin, the body needs iron. Every red blood cell in the body contains iron in its hemoglobin. Iron gives hemoglobin the ability to carry oxygen to where it needs to go.
- Iron deficiency happens when stores in the body cannot meet the iron needs of the child.
- Iron has multiple functions in the body:
  - It is needed to make red blood cells.
  - It is important for brain development in children, especially the first 5 years of life. The brain is the largest user of oxygen! Remember, iron helps make hemoglobin in the body, which transports oxygen throughout the body including the brain.
  - It is necessary for healthy skin, hair, and nails.
- When iron is not available in the body in sufficient amounts, not enough hemoglobin is made. As a result, iron deficiency anemia (commonly referred to as just “anemia”) develops.
- When a child has anemia, less oxygen reaches the cells and tissues and that affects how the body works.

Other Types of Anemia

- Iron deficiency anemia is a common nutritional deficiency in children. However, anemia may result from causes other than low iron or iron deficiency. These include the following:
  - Nutritional problems (folate deficiency, vitamin B₁₂ deficiency)
  - Infection/inflammation
  - Inherited blood disorder (e.g., sickle cell disease, thalassemia)
  - Some kinds of cancers (e.g., leukemia)
  - Exposure to certain drugs (e.g., anti-seizure drugs, cancer treatment, antibiotics)

Consequences of Iron Deficiency Anemia in Children

- Iron plays many important roles in the body including oxygen transport, brain development, and energy creation. Therefore, a child with an iron deficiency may have noticeable consequences including the following:
  - Learning difficulties
  - Difficulty concentrating
  - Behavioral problems
  - Delayed brain development
  - Delayed physical growth
- There are long-term implications for iron deficiency anemia as well:
  - Impaired school performance
  - Poor reproductive health in women
  - Reduced work capacity and productivity

Evidence of Learning

- Participants will be able to define iron deficiency anemia.
- Participants will be able to describe the consequences of iron deficiency anemia.
## SIGNS AND SYMPTOMS OF IRON DEFICIENCY ANEMIA

**Supplies:**
- PowerPoint slides

**Activity Sheets:**
- Guess the Symptom!
- Guess the Symptom! Answer Key

**Handouts:**
- None

### Learning Objectives
List signs and symptoms of iron deficiency anemia in children.

### Learning Activities

#### Introduction
- Tell participants that many symptoms of iron deficiency in children are often behavioral in nature and could be mistakenly interpreted by adults as the child “acting out”.

#### Guess the Symptom! Activity
- Distribute the Guess the Symptom! activity sheet to participants.
- Ask participants to work in pairs or small groups to write the symptoms or signs of iron deficiency anemia illustrated by each photo.
- After three minutes, ask participants to share their answers. Use the Guess the Symptom! Answer Key to correct answers as needed.

#### Summary
- Present the Signs and Symptoms of Iron Deficiency Anemia content in the Trainer’s Notes. Make sure to mention the Important Note to Caregivers.

### Trainer’s Notes

#### Signs and Symptoms of Iron Deficiency Anemia
- A child with iron deficiency anemia may experience one or more of the following signs and symptoms:
  - Fatigue, tiredness, weakness
  - Shortness of breath, difficulty exercising
  - Difficulty concentrating and learning
  - Dizziness or lightheadedness
  - Rapid heartbeat
  - Irritability
  - Poor appetite
  - Frequent illness
  - Colds hands and feet
  - Brittle or spoon shaped nails or hair loss
  - Sores at the corner of the mouth
  - Pale skin, especially around the hands, nails, and eyelids
  - Cravings for nonfood substances like dirt, clay, or ice (called Pica)
<table>
<thead>
<tr>
<th>Important Note for Caregivers</th>
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<tbody>
<tr>
<td>• If anemia is suspected, caregivers should bring the child to the healthcare provider for examination and a blood test to confirm their anemia status. It is fairly simple to test, diagnose, and treat iron deficiency with a simple blood test.</td>
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<td>• A caregiver should not try to diagnose or prescribe supplements without talking to a healthcare provider first. Children can overdose on iron easily. Giving iron supplements to children who are not iron deficient can cause toxicity.</td>
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<table>
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<tr>
<th>Evidence of Learning</th>
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<tr>
<td>Participants will be able to list three signs and symptoms of iron deficiency anemia.</td>
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### CHILDREN AT RISK FOR IRON DEFICIENCY ANEMIA

**Supplies:**
- PowerPoint slides

**Activity Sheets:**
- Causes of Iron Deficiency Case Studies
- Causes of Iron Deficiency Cases Studies Answer Key

**Handouts:**
- None

### Learning Objectives
Identify children who are at high risk for iron deficiency anemia.

### Introduction
- Tell participants that iron deficiency is the main cause of anemia in children. There are multiple factors that place children at risk of becoming iron deficient that we need to be aware of. These can be categorized into:
  - not enough iron in the diet,
  - poor absorption of iron in the body (i.e. the body has difficulty using the iron), and/or
  - blood loss.

### Causes of Iron Deficiency Case Studies
- Distribute the Causes of Iron Deficiency Case Studies to participants.
- Ask participants to work in pairs or small groups to determine if the children in the case studies are at risk for being iron deficient and to write down the factors that place them at risk. Ask participants to keep in mind the three main causes of iron deficiency (poor intake, poor absorption, and blood loss).
- After 5 minutes, go over each case study and ask participants to share their answers. Make corrections as needed by referring to the Causes of Iron Deficiency Case Studies Answer Key.

### Summary
- Explain additional factors that place children at risk by referring to Children Who Are at Risk and Iron Deficiency Among Foster Children in the Trainer’s Notes.

### Trainer’s Notes
- **Children Who Are at Risk**
  - Children on a vegetarian or vegan diet: Iron from plant sources is harder to absorb than iron from animal sources.
  - Children who drink too much cow’s milk: Drinking more than 24 ounces of cow’s milk per day (most common among toddlers) can contribute to iron deficiency anemia. Cow’s milk contains little iron and can make it harder for the body to absorb iron from other foods.
  - Children with certain gastrointestinal diseases: Children with Crohn disease, Celiac disease, inflammatory bowel disease, or ulcerative colitis may experience iron loss as a result of intestinal bleeding, poor absorption of iron, and diminished
iron intake due to food aversions or avoidance.

- Teenage girls: Menstruation causes blood loss and increases risk for iron deficiency anemia in teenage girls, especially if their diet is low in iron.
- Teenage boys: While teenage girls are at a higher risk, teenage boys whose diets are poor in iron may become iron deficient due to periods of rapid growth.
- Pregnant teenage girls: The iron demands of pregnancy and puberty place teenage girls who are pregnant at a high risk for iron deficiency anemia.
- Young athletes: Athletes who exercise often, especially endurance athletes and long-distance runners, tend to lose more iron and may develop iron deficiency anemia. This is also known as sports anemia.
- Picky eaters: Older children who are picky eaters may not eat foods with enough iron.
- Children who have undergone surgery: Blood loss may occur during surgery leading to iron deficiency anemia.
- Children with lead poisoning: Children who have lived in older homes (built before 1978) may have been exposed to lead in the paint. Many toys or products from outside the U.S. may also contain lead. Lead is a mineral that is dangerous once it gets into a child’s system. It can be inhaled, swallowed, or absorbed through the skin. Once it enters the system, it is distributed to reach various parts of the body just like essential minerals (iron, zinc, calcium) and causes harm wherever it lands. In the bloodstream, it can damage red blood cells and limit their ability to carry oxygen to the organs and tissues that need it, thus causing anemia.

**Iron Deficiency Anemia Among Foster Children**

- In addition to the factors listed above, foster children are especially at risk for iron deficiency anemia, due to the following:
  - Poverty: Foster children may have experienced food insecurity due to poverty, which impacts diet quality and increases the likelihood of iron deficiency anemia.
  - Stress: Foster children experience high levels of stress, which is known to affect nutrient absorption in the gut.
  - Catch-up growth: Foster children may experience catch-up growth post-placement, which may lead to nutrient deficiencies even if they are consuming an adequate diet. Their intake may not keep up with the high demands of catch-up growth.

**Evidence of Learning**

Participants will be able to list three factors that place children at risk for iron deficiency anemia.
# STRATEGIES TO PREVENT IRON DEFICIENCY ANEMIA

## Supplies
- PowerPoint slides

## Activity Sheets
- None

## Handouts
- Anemia

## Learning Objectives
Describe strategies to prevent iron deficiency anemia in children.

## Introduction
- Tell participants that blood iron levels are commonly checked as part of routine screenings at annual well-child visits and WIC appointments. Caregivers should check with their healthcare providers if they are unsure whether their children are being regularly screened.
- Remind participants that caregivers should confirm with a healthcare provider if they suspect anemia and should never give iron supplements to a child without medical supervision. That is why in this section, we will discuss prevention, and not treatment, of iron deficiency anemia.

## Ironing out the Myths & Truths About Iron! Game
- Ask all participants to stand if they are able.
- Read out loud the following Myths & Truths About Iron statements one at a time.
  1. Beans are a good source of iron.
  2. Vitamin C helps the body use iron better.
  3. You should not cook in iron pots.
  4. Milk is a good source of iron.
  5. Make sure you cook peppers to get the most benefit from vitamin C.
  6. Drinking tea with meals helps the body use iron better.
  7. A child does not need to get iron from food because the body is able to make iron.
  8. To get the benefits of cooking in an iron pan, you should use ingredients like lemon juice or tomato sauce.
  9. To get the benefits of cooking in an iron pan, you should use ingredients like lemon juice or tomato sauce.
  10. If a child doesn’t eat meat, they won’t get enough iron and will become anemic.
  11. In the U.S., most people get their iron from plant sources, like enriched grains and cereals.
- After each statement, ask participants to place their hands on their heads if they think the statement is a “truth” or on their hips if they think the statement is a “myth”.
- After each statement, reveal the answer by asking the ones who are incorrect to have a seat and the ones who are correct to remain standing.
• Discuss the correct answers with participants using the Ironing Out the Myths and Truths About Iron Answer Key in the Trainer’s Notes.
• If at any point all participants in the group are sitting down before all of the statements have been read, ask the entire group to stand back up.
• The last person (or group of people) standing is the winner and gets a round of applause.

Summary
• Present any content that has not been covered in the Iron-Rich Foods, Strategies to Prevent Iron Deficiency Anemia, How Much Iron Do Children Need Daily, and When to Seek Professional Help sections from the Trainer’s Notes.
• Distribute the Anemia handout to participants as a reference.

Ironing Out the Myths and Truths About Iron: Answer Key
1. Beans are a good source of iron. (Truth)
   - Other plant sources rich in iron include:
     - Fortified or enriched breakfast cereals
     - Tofu
     - Baked potatoes
     - Egg noodles or enriched pasta
     - Nuts and seeds
     - Broccoli, spinach, and kale
     - Enriched brown rice
     - Bread

2. Vitamin C helps the body use iron better. (Truth)
   - Foods high in vitamin C like oranges, tomatoes, peppers, kale, and spinach make it easier for the body to absorb the iron from plant foods.

3. You should not cook in iron pots. (Myth)
   - Iron from cast-iron pans and pots can leach out and increase the iron content of food.

4. Milk is a good source of iron. (Myth)
   - Milk is not rich in iron. Foods from animal sources that are rich in iron include meat, seafood, and poultry.

5. Make sure you cook peppers to get the most benefit from vitamin C. (Myth)
   - Heat destroys vitamin C. So, foods high in vitamin C should be offered fresh or lightly cooked alongside plant foods rich in iron.

6. Drinking tea with meals helps the body use iron better. (Myth)
   - Tea has a substance that decreases the absorption of iron. This includes black and green teas. Coffee has the same effect (more relevant among teenagers).

7. A child does not need to get iron from food because the body is able to make iron. (Myth)
   - Iron is considered an essential nutrient because the body is unable to make it itself and therefore, must be provided in adequate quantities in the diet.

8. To get the benefits of cooking in an iron pan, you should use ingredients like lemon juice or tomato sauce. (Truth)
   - Lemon juice and tomato sauce are acidic. They help the iron leach out of the iron pan and into the food, increasing its iron content.

9. If a child doesn’t eat meat, they won’t get enough iron and will become anemic. (Myth)
   - This is not necessarily true, especially when non-meat eaters consume a
diverse and well-balanced diet from plant sources. A vegetarian diet may lead to iron deficiency when it is not well-planned.

10. In the U.S., most people get their iron from plant sources, like enriched grains and cereals. (Truth)
   - The majority of our dietary iron comes from plant-based food due to the high intake of cereals and grains, which are enriched in iron.

Iron-Rich Foods
- Iron is an essential nutrient, meaning the body cannot make it and a child must receive it from food (or a supplement).
- Foods from animal sources contain iron that the body can easily absorb:
  - Meat
  - Seafood
  - Poultry
- Foods from plant sources contain iron that is not as easily absorbed. The majority of our dietary iron comes from plant-based foods. The list of foods below is ordered from greatest source of iron to least:
  - Fortified or enriched breakfast cereals
  - Cooked or canned beans
  - Tofu
  - Baked potatoes
  - Egg noodles or enriched pasta
  - Nuts and seeds
  - Broccoli, spinach, and kale
  - Enriched brown rice
  - Bread

Strategies to Prevent Iron Deficiency Anemia
- Offer foods rich in iron at least once a day.
- Offer foods high in vitamin C with plant foods high in iron.
  - Vitamin C helps the body absorb and use the iron.
  - Foods high in vitamin C include oranges, tomatoes, peppers, kale, and spinach.
  - Make sure these foods are offered fresh or lightly cooked because heat destroys vitamin C.
- Limit milk to 24 ounces per day.
  - Calcium in milk can hinder iron absorption.
  - Do not give milk when the child is eating an iron rich meal. Instead, give milk at snack or breakfast time.
- If a child is receiving iron supplements, follow the guidelines below:
  - Do not give iron supplements with milk
  - Give supplement with food high in vitamin C (orange juice) or a vitamin C supplement
  - Offer plenty of water and foods high in fiber to prevent constipation
- Do not offer children tea (hot or iced) with meals. Tea has a substance that makes it hard for the body to absorb iron.

Note: Iron supplements should be given only when prescribed by a doctor. A caregiver should not diagnose anemia or prescribe iron supplements.
### How Much Iron Do Children Need Daily?
- How much iron children need depends on their age, gender, and overall health.
  - The following groups of children need more iron:
    - Infants and toddlers because their bodies are growing rapidly.
    - Teenage girls since they lose blood through menstruation.
    - Children that exercise a lot because intense exercise can destroy red blood cells.
    - Children with a gastrointestinal disorder (celiac disease, Crohn’s disease, or ulcerative colitis) since their bodies can prevent them from absorbing iron normally.
    - Young children placed in foster care because they may experience catch-up growth.

### When to Seek Professional Help
- The child’s healthcare provider should be consulted about testing for anemia and providing iron supplements in the following cases:
  - If the child shows signs and symptoms of anemia
  - If the child's condition does not improve after iron supplementation
  - If the child eats a diet limited in iron-rich foods
  - If the child has an inflammatory gastrointestinal disease

### Evidence of Learning
- Participants will be able to list three strategies to prevent iron deficiency anemia in children.