Bottom Line Recommendations: Summary of Pediatric Emergency Care Information for Healthcare Providers

Iron Deficiency Anemia

Iron deficiency anemia (IDA) is most commonly found in toddlers and adolescents. A primary diagnosis should be identified to explain insufficient intake or excessive loss of iron. The treatment for IDA is supplemental iron. Blood transfusion is restricted to emergency management of patients with hemodynamic instability.

Diagnosing IDA

- The most common cause of IDA is insufficient iron intake in toddlers, followed by adolescents with heavy menstrual bleeding.[1]
- The most common CBC finding is isolated microcytic anemia, often with thrombocytosis.
- Thalassemia trait can masquerade as IDA. Consider in children with mild anemia and a high red blood cell (RBC) count.
- Ferritin should be used to diagnose IDA. It is an acute phase reactant and can be elevated in the presence of infections or inflammatory disorders. Iron, TIBC and transferrin saturation may be added in such cases.

BLOODWORK:
- CBC, reticulocytes
- Ferritin
- Optional: Iron and TIBC, transferrin saturation (if infection/inflammation)

Age	Hb (g/L)*	MCV (fL)*	Ferritin level in iron deficiency (µg/L) [2]	
			No inflammation	Infection or inflammation
6 months – 4 yrs	< 110	< 70	< 12 ug/L	< 30 ug/L
5 – 11 yrs	< 115	< 75	< 15 ug/L	< 70 ug/L
12 – 14 yrs	< 120			
15 – 18 yrs (female)	< 120			
15 – 18 yrs (male)	< 130			
*Use local age-adjusted reference ranges when available				

Management

THERE IS NO HEMOGLOBIN THRESHOLD BELOW WHICH A BLOOD TRANSFUSION IS REQUIRED IN AN ASYMPTOMATIC PATIENT

Anemia Severity	
Mild	**Hb > 100 g/L**
Moderate	**Hb 70 – 100 g/L**
Severe	**Hb < 70 g/L**

MILD/MODERATE ANEMIA

- **Start oral iron** (refer to TREKK's Iron Deficiency Anemia Treatment Table).
- For symptomatic children, a single dose of IV iron may produce a more rapid Hb response than oral iron alone.[3]

SEVERE ANEMIA

- Evaluate for **hemodynamic instability** (e.g., hypotension, weak central pulses, decreased LOC, decreased urine output, lactic acidosis).[4]
- Evaluate for signs of **heart failure** (e.g., pulmonary edema, hepatomegaly, pitting edema).
- Avoid fluid overload. Use IV fluids cautiously.
- **Start oral iron** in all stable patients.
- Consider IV iron when adherence to oral iron is unlikely, or when a more urgent Hb response is required. IV iron may produce a more rapid Hb response than oral iron alone.[3]
- **Do not base decision to transfuse on Hb values alone.** Incorporate symptoms, signs, comorbid conditions, patient values and preferences.[5]

SEVERE ANEMIA WITH HEMODYNAMIC INSTABILITY

- Contact Pediatric Referral Centre/PICU/Transport Team.
- Investigate for a precipitating cause (e.g., sepsis, hemorrhage, hypovolemia).
- Discuss risk of transfusion and obtain informed consent. Initiate goal-directed transfusion of packed red blood cells (PRBCs) at 5 mL/kg/dose over 2-4 hours.
- During transfusion, monitor for signs of **Transfusion-Associated Circulatory Overload (TACO)**: dyspnea, orthopnea, crackles, hepatomegaly, hypertension.

- Blood transfusion may improve oxygen delivery and relieve physiologic stress of compensated anemia. **It is not a treatment for iron deficiency.** Iron supplementation is still required once the patient is stable.

IRON TREATMENT OPTIONS

- Refer to TREKK's Iron Deficiency Anemia Algorithm and Treatment Table for route and dosing information.
- Oral iron should be taken **for at least 3 months.**[1] Once daily, low dose regimens may promote adherence.
- Consider IV iron for more urgent Hb improvement, or when adherence to oral iron is unlikely.
- IV iron is safe for use in children and is associated with fewer severe adverse events than a transfusion.[6]
- If concern for IV iron infusion reaction, stop the infusion, evaluate the reaction, and manage as per institutional protocol.
    - Flushing, chest discomfort and back pain are common symptoms of a non-severe *Fishbane* infusion reaction.
    - Consider non-sedating oral antihistamine for isolated urticaria.
    - True anaphylaxis is rare. Refer to TREKK's Anaphylaxis Algorithm.

Disposition

CONSIDER ADMISSION TO HOSPITAL IF:

- Signs of heart failure (e.g., pulmonary edema, cardiomegaly, hepatomegaly, pitting edema)
- Uncontrolled bleeding
- Severe malnutrition
- Requires inpatient investigations (e.g., patients with suspected inflammatory bowel disease)
- Concern regarding ability to return for follow-up

CONTACT PEDIATRIC REFERRAL CENTRE/PICU/TRANSPORT TEAM IF:

- Hemodynamically unstable (e.g., hypotension, weak central pulses, decreased LOC, decreased urine output, lactic acidosis)[4]
- Patients with Hb < 20 g/L due to high risk of fluid overload

CRITERIA FOR SAFE DISCHARGE HOME/FOLLOW-UP

- Stable patients who are able to take oral iron can be discharged home.
- **Even patients who received PRBCs or IV iron should be discharged on oral iron**.
- Asymptomatic patients with mild/moderate anemia should be reassessed in 2-4 weeks.
- Symptomatic patients, those with severe anemia AND/OR those who received PRBCs or IV iron should be reassessed in 1-2 weeks. Consider referral to Pediatrics or Pediatric Hematology, if available.
- Bloodwork prior to reassessment: CBC, reticulocytes, ferritin.

PATIENT COUNSELLING TIPS FOR ORAL IRON THERAPY

- To maximize absorption:
    - Take on an empty stomach (1 hour before or two hours after food)
    - Take with a vitamin C supplement or vitamin C-containing foods (orange juice, oranges, tomatoes)
    - Do not take with calcium supplements or calcium-containing foods (milk, cheese, yogurt)
    - Do not take with high oxalate foods (coffee, tea, spinach, kale, broccoli)
- To decrease teeth staining:
    - Drink liquid iron supplements with a straw, mix with water or fruit juice, and brush teeth afterwards
- To decrease GI upset, consider:
    - Starting with lower dose and titrating up
    - Taking with a small snack or meal
    - Taking at bedtime

Scan or click the QR code to learn more and to see a full list of references and development team members