Iron deficiency anemia

Evaluation and diagnosis

Step1. Is it anemia?

Clinical signs and symptoms:

- Fatigue
- Headache
- Irritability
- Exertional dyspnea
- Vertigo
- Angina pectoris
- Pallor
- Dry or rough skin
- Blue sclerae

CBC:
RBC count ↓
Hb and HCT ↓
Absolute reticulocyte count ↓
MCV and MCH ↓

Step2. Is it iron deficiency anemia?

Suspected populations

1. Anemia without reticulocytosis. 2. Pregnant women. 3. CKD ± HD

You may do a trial of iron therapy in:

- Poor resource settings
- Young healthy pts
- Heavy menstruation
- Pregnancy

Responded

No response

Iron studies (Serum iron, ferritin,TIBC, transferrin,TSAT)

+ investigate the reasons for lack of response

Low Ferritin?
Healthy Patient: Serum ferritin <15 ng/ml?
Patient with co morbidities: serum ferritin < 41 ng/ml?

Yes

No

Iron deficiency confirmed

(TSAT) low?
(S.Iron/TIBC)*100

Yes

No

1. Identify source of iron loss and/or blood loss (causes section)
2. Treat with iron (treatment section)

For very strong suspicion of iron deficiency:

- sTfR or sTfR-ferritin index.
- Bone marrow iron stain.
- Hematology consultation may be helpful.

TIBC = total iron binding capacity TSAT = transferrin saturation
S.Iron = serum iron sTfR = soluble transferrin receptor

CAUSES

May be primary

May be due to:

Inadequate dietary intake

Due to malnutrition in poor-resource settings

Blood loss

Is there overt bleeding?

Yes

1. Manage the condition.
2. Treat with iron (treatment section)

No

Stool analysis

Reduced absorption (uncommon)

May be due to:

Dietary factors

Pathological factors

May be secondary to anemia of chronic disease, anemia with co morbidities

May be due

Hepatic problem

Treat according to Child-Pugh score: [1]

Renal problem

Treat with iron (treatment section)

+ve occult bleeding

1. GI endoscopy to investigate the GI disorder 2. Treat with iron (treatment section)

NO occult bleeding

Male patient or postmenopausal woman?

- Yes
  1. GI endoscopy to investigate the GI disorder due to the high likelihood in this population. 2. Treat with iron (treatment section)
- Other population
  Investigate other causes of iron deficiency anemia

↓ Ingestion of heme-iron (in meat, better absorbed)
↑ Ingestion of mineral binding compounds (in whole grains, seeds)
↑ Ingestion of foods high in calcium
↑ Ingestion of acid-lowering foods or medications

1. Celiac disease
2. Atrophic gastritis
3. H. pylori
4. Bariatric surgery.

- **A** → Don't give iron
- **B** → Treat with iron (treatment section)
- **C** → Treat with iron (treatment section)

(1)
- https://www.aasld.org/sites/default/files/2019-06/Garcia-Tsao_et_al-2017-Hepatology.pdf
- https://easl.eu/wp-content/uploads/2018/10/decompensated-cirrhosis-English-report.pdf
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5479992/

Treatment

According to Transferrin saturation (TSAT)

TSAT> 20% and < 30%

Give oral iron

PRODUCTS

- **Ferrous fumarate** 33% elemental iron per 100 mg of mineral salt
- **Ferrous gluconate** 10 to 14% elemental iron per 100 mg of mineral salt
- **Ferrous sulfate** 20 to 30% elemental iron per 100 mg of mineral salt

Dosing and administration

150 to 200 mg elemental iron DAILY **or** ALTERNATE DAY DOSING* for **six to eight weeks** … up to six months to replete iron stores.

*Alternate-day dosing (taking the iron every other day rather than everyday). It may result in better iron absorption than daily dosing.

Side effects

Metallic taste, nausea, flatulence, constipation, diarrhea, epigastric distress, and/or vomiting, Itching , black/green or tarry stools.

TSAT< 20%

Give IV iron

Required IV dose = {(target Hb – actual Hb) * 2.4 * wt} + 500… (2)

- Iron dextran
  1. Sensitivity test: prior to first dose, [25 mg] slow IV over 30 sec.
  2. Dosing: **multiple doses**:
     - 100 mg elemental iron/24 hrs
     - 200 mg elemental iron/ 48 hrs

     or

     Single dose: 1000 mg elemental iron in 250 mL N.S over 1 hr. Once / month
- Iron sucrose
  1. Sensitivity test: ONLY IF a patient has a history of drug allergies,[25 mg] slow IV push.
  2. Dosing:
     - 100 mg elemental iron in 100 ml N.S over 1 hr each 24 hrs
     - 200 mg elemental iron in 200 ml N.S over 2 hrs each 48 hrs
     - 500 mg elemental iron in 500 ml N.S once / week

     or

     or

     3. This product cannot be given IM

Iron sucrose has been shown to be safe and effective in settings of dialysis, non-dialysis CKD, IBD, chemotherapy-induced anemia, the peripartum period, gastric bypass, heavy uterine bleeding and others.

MONITORING

- Oral iron → **EACH TWO WEEKS**
  1. Check hemoglobin and reticulocyte count
  2. Review tolerability of the oral iron.
- IV iron → **EACH FOUR-EIGHT WEEKS**
  Check hemoglobin and reticulocyte count

Response

- Iron stores repleted
- Lack of response

Approaches to lack of response:

- Patient not taking oral iron (e.g. due to side effects) (**compliance**)
- Reduced absorption of oral iron
- Blood loss exceeds iron intake
- Incorrect initial diagnosis
- More than one diagnosis (especially relevant in older adults)
- Inflammatory state with block in intestinal iron regulation (**sepsis**)
- Therapy was effective but bleeding recurred.

Strategies to improve tolerability: ●Increasing the interval (eg, to every other day) if not done already. ●Making dietary modifications (eg, taking iron with food or milk), although this may reduce absorption. ● Switching to a formulation with a lower amount of elemental iron.● Switching from a tablet to a liquid, for which it is easier to titrate the dose.

Target Hb values (3)	
Adult male	13.5 – 17.5 g/dl
Adult female	12 – 15.5 g/dl
CKD	11 – 12 g/dl
CKD + CV	10 g/dl

(2) https://teksmedik.com/uptodate19/d/image.htm?imageKey=HEME%2F54677

(3) https://www.mayoclinic.org/tests-procedures/hemoglobin-test/about/pac-20385075