

WGBD Oral Iron Supplementation

(Refer to Institutional Guidelines)

Suggested Max Adolescent Dose: Approx. 150 mg of elemental iron daily.
 ***Consider once daily or every other day dosing for better iron absorption ^{19, 20}

Iron	Brand Names [®]	Formulation (Common concentrations, others may be available & brands may reformulate)	Side Effects	Cost	Misc.
Ferrous sulfate	Fer-In-Sol; Fer-Iron; FeroSul; Ferro-Bob; FerrouSul; Iron Supplement Children's; Iron Supplement; Slow Fe; Slow Iron	325 mg tablet (contains 65 mg elemental iron per tablet) 200 mg tablet (contains 65 mg elemental iron per tablet) 300 mg/5 mL oral syrup (contains 60 mg elemental iron per 5 mL) 220 mg/5 mL oral elixir (contains 44 mg elemental iron per 5 mL) 75 mg/mL oral solution (contains 15 mg elemental iron per mL)	GI upset, constipation, metallic taste, dark or black stools	\$ - \$\$	Available as liquid or pill "Slow" or enteric coated brands may have reduced absorption Keep out of reach of young children to avoid accidental ingestion.
Iron polysaccharide	NovaFerrum 50; NovaFerrum Pediatric Drops; EZFE 200; Ferrex 150; Ferric x-150; IFerex 150; Myferon 150; NovaFerrum 125; Nu-Iron; PIC 200; Poly-Iron 150	Various over-the-counter tablets (e.g., NovaFerrum 50 contains 50 mg elemental iron per tablet) 15 mg/mL oral solution (contains 15 mg elemental iron per mL)	Fewer GI side effects than other oral iron preparations	\$\$	Better taste than other oral iron preparations Available as liquid or pill Slower resolution of iron deficiency compared to FeSO ₄ in pediatric studies
Ferrous gluconate	Ferate Ferogon Ferotabs	240 mg tablet (contains 27 mg elemental iron per tablet) 256 mg tablet (contains 28 mg elemental iron per tablet) 324 mg tablet (contains 38 mg elemental iron per tablet) 325 mg tablet (contains 36 mg elemental iron per tablet)	GI upset, constipation, metallic taste	\$	Tablet only Lower iron content compared to ferrous sulfate Enteric coated brands will have lower GI side effects but also reduced absorption and efficacy
Ferrous fumarate	Ferrimin 150, Ferretts, Ferrocite, Hemocyte	90 mg tablet (contains 29.5 mg elemental iron per tablet) 324 mg or 325 mg (contains 106 mg elemental iron per tablet) 150 mg tablet (contains 150 mg elemental iron per tablet)	GI upset, constipation, metallic taste	\$\$	Tablet only "Slow" or enteric coated brands will have lower GI side effects but also reduced absorption and efficacy

Possible Indications for Oral Iron (Auerbach, et al 2020; Mantadakis, et al 2016)

- Oral iron intolerance or failure - Persistent gastrointestinal adverse effects, not compliant with oral iron due to poor taste. Check in with family within 2 weeks to assess for oral intolerance.
- Oral iron refractoriness
 1. Defective absorption: Helicobacter pylori infection, gluten enteropathy, IBD, atrophic gastritis, gastrectomy, duodenal bypass, bariatric surgery, IRIDA
 2. Prolonged oral iron therapy with no improvement
- Functional iron deficiency (seen in inflammatory conditions)
 1. Rheumatoid arthritis
 2. CKD (along with erythropoietin stimulating agent or ESA treatment)
- Chronic blood loss difficult to manage with oral iron
 1. Heavy uterine bleeding
 2. Gastrointestinal losses
- Other
 1. Postoperative anemia of major surgery
 2. Chronic heart failure
 3. Parasomnias

WGBD IV Iron Supplementation

(Refer to Institutional Guidelines)

$$\text{Total iron dose} = [\text{actual body weight} \times (\text{target Hb} - \text{actual Hb})] \times 2.4 + \text{iron stores (iron stores } >35 \text{ kg} = 500 \text{ mg, } <35 \text{ kg} = 15 \text{ mg/kg)}$$

Iron	Formulation	Dosing	Side Effects	Cost	Misc.
Iron Sucrose (Venofer®)	Venofer®: 20 mg/mL (2.5 mL, 5 mL, 10 mL)	Initial dose: IV: 5 to 7 mg/kg/dose (maximum initial dose: 100 mg/dose children, 200 mg/dose adolescents/adults) over 60 minutes Maintenance dose: IV: 5 to 7 mg/kg/dose every 1 to 7 days until total replacement dose achieved; maximum single dose: 200 mg/dose children; 300 mg/dose adolescents/adults	Hypersensitivity less common, no test dose required Hypotension or hypertension	\$\$	Multiple doses may be required to fully replete iron deficit Total replacement dose (mg of iron) = 0.6 x weight (kg) x [100 - (actual Hgb /desired Hgb x 100)]
LMW Iron Dextran (Infed®)	Infed®: 50 mg/mL (2 mL)	Maximum daily dosage per manufacturer's labeling is 100 mg with total dose to be given in multiple sessions over 1 hour each Total dose infusion or TDI (off label): Data from a retrospective study of patients with iron deficiency anemia suggest a TDI of 1,000 mg over 1 hour is safe and effective (test dose of ~40 mg was administered over 5 minutes, followed by observation for 15 minutes, and then the balance of the dose over 1 hour) Premedication (routine or as needed), infusion rate (1-4 hrs.) and test dose (25-40 mg) per institutional guidelines	Hypersensitivity (test dose strongly recommended) Hypotension, chest pain, flushing	\$\$	Used when larger iron deficit (>500 mg) exists Total dose (mL) = 0.0442 (desired hemoglobin - observed hemoglobin) x LBW + (0.26 x LBW) Limited use in children
Ferric carboxymaltose (Injectafer®)	Injectafer®: 50 mg/mL of elemental iron (15 ml)	<50 kg: 15 mg/kg on day 1; repeat dose after at least 7 days (maximum: 750 mg/single dose; 1,500 mg per course) over 15 minutes ≥50 kg: 750 mg on day 1; repeat dose after at least 7 days (maximum: 750 mg/single dose; 1,500 mg per course) over 15 minutes	Hypersensitivity, Hypophosphatemia (Consider alternative agent for patient w/ baseline low Phos levels)	\$\$\$	FDA approved for use in children as young as 1 year of age in 2021 Data available for use in pediatric restless leg syndrome and periodic limb movement disorder

WGBD IV Iron Supplementation

(Refer to Institutional Guidelines)

Total iron dose = [actual body **weight** × (target Hb-actual Hb)] × 2.4
+ iron stores (iron stores >35 kg= 500 mg, <35 kg =15 mg/kg)

Iron	Formulation	Dosing	Side Effects	Cost	Misc.
Ferric gluconate (<i>Ferrlecit</i> ®)	Ferrlecit®: 12.5 mg/mL or 62.5 mg/5 mL	1.5mg/kg per dose (maximum: 125 mg per dose) over 60 minutes A second dose or higher first dose up to 3 mg/kg per dose can be given in select cases	Hypersensitivity, less common, no test dose required Hypotension or hypertension	\$\$	Multiple doses may be required to fully replete iron deficit Only FDA approved for children with CKD
Ferric derisomaltose or Iron isomaltoside (<i>Monoferic</i> ®) (only for age 18 years and above)	Monoferic®: 100 mg/ml (1 ml, 5 ml, 10 ml)	20 mg/kg single dose (maximum: 1000 mg per dose) over 15 minutes OR Up to 3 doses of 500 mg (each over 15 minutes) can be given over 7 days	Hypersensitivity is rare; no test dose required Rash (1%) and nausea (1%) Hypophosphatemia (4%)	\$\$\$	Safety and efficacy have not been proven in children, but it is FDA approved for use in adults with IDA
Ferumoxytol (only for age 18 years and above)	Feraheme®: 30 mg/ml (17 ml)	510 mg per dose over 15 minutes Repeat dose in 3-8 days (maximum cumulative dose: 1020 mg per course) Single dose regimen with 1020 mg has also been used safely	Hypersensitivity is rare; no test dose required Hypotension and peripheral edema	\$\$\$	There are no pediatric RCTs but a retrospective study using a dose of 10 mg/kg (maximum 510 mg) per dose in 54 children (110 infusions) aged 1 month to 19 years, given over 60 minutes for the first dose and over 15 minutes for subsequent doses, showed clinical improvement with a total of 5 adverse drug reactions, 3 of which were severe

References

1. Auerbach M, et al. Safety and efficacy of rapidly administered (one hour) one gram of low molecular weight iron dextran (INFeD) for the treatment of iron deficient anemia. *Am J Hematol*. 2011; 86(10):860-862.
2. Auerbach M. Treatment of Iron deficiency anemia in adults. In *UptoDate*. 2020. Retrieved from <http://uptodate.com>
3. Hershko C and Camaschella C. How I treat unexplained refractory iron deficiency anemia. *Blood*. 2014; 123(3):326-333. doi: 10.1182/blood-2013-10-512624.
4. Liu K, Kaffes AJ. Iron deficiency anaemia: a review of diagnosis, investigation and management. *Eur J Gastroenterol Hepatol*. 2012; 24(2):109-116
5. Powers JM, et al. Effect of Low-Dose Ferrous Sulfate vs Iron Polysaccharide Complex on Hemoglobin Concentration in Young Children With Nutritional Iron-Deficiency Anemia: A Randomized Clinical Trial. *JAMA*. 2017; 317(22):2297.
6. Powers JM, et al. Intravenous Ferric Carboxymaltose in Children with Iron Deficiency Anemia Who Respond Poorly to Oral Iron. *J Pediatr*. 2017; 180:212.
7. Powers JM, Mahoney DH. Iron deficiency in infants and children <12 years: Treatment. In *UptoDate*. 2020. Retrieved from <http://uptodate.com>
8. Powers JM, Mahoney DH. Iron requirements and iron deficiency in adolescents. In *UptoDate*. 2020. Retrieved from <http://uptodate.com>
9. Russo G, et al. Monitoring oral iron therapy in children with iron deficiency anemia: an observational, prospective, multicenter study of AIEOP patients (Associazione Italiana Emato-Oncologia Pediatrica). *Ann Hematol*. 2020 Mar; 99(3):413-420.
10. Individual Iron preparations. Lexi-drugs. Lexicomp. Wolters Kluwer Health, Inc. Riverwoods, IL. Retrieved from: <http://online.lexi.com>
11. Routine Iron Supplementation and Screening for Iron Deficiency Anemia in Pregnant Women: A Systematic Review to Update the U.S. Preventive Services Task Force Recommendation. <https://www.ncbi.nlm.nih.gov/books/NBK285987/table/ch1.t1/>
12. Auerbach M, Gafter-Gvili A & Macdougall IC. Intravenous iron: a framework for changing the management of iron deficiency. *Lancet Haematol*. 2020; 7:e342-e350.
13. Mantadakis E. Advances in Pediatric Intravenous Iron Therapy. *Pediatr Blood Cancer*. 2016; 63:11-16.
14. Sasankan N, et al. Ferric Carboxymaltose Across All Ages in Paediatric Gastroenterology Shows Efficacy Without Increased Safety Concerns. *J Pediatr Gastroenterol Nutr*. 2021; 72:506-510.
15. Auerbach M, Chertow GM & Rosner M. Ferumoxytol for the treatment of iron deficiency anemia. *Expert Rev Hematol*. 2018; 11:829-834.
16. Hassan N, et al. Intravenous Ferumoxytol in Pediatric Patients With Iron Deficiency Anemia. *Ann Pharmacother*. 2017; 51:548-554
17. Karki NR & Auerbach M. Single total dose infusion of ferumoxytol (1020 mg in 30 minutes) is an improved method of administration of intravenous iron. *Am J Hematol*. 2019; 94: E229-E231.
18. DelRosso LM, Ferri R, Chen ML, Kapoor V, Allen RP, Mogavero MP, Picchiotti DL. Clinical efficacy and safety of intravenous ferric carboxymaltose treatment of pediatric restless legs syndrome and periodic limb movement disorder. *Sleep Med*. 2021 Nov; 87:114-118.
19. Moretti D, Goede JS, Zeder C, et al. Oral iron supplements increase hepcidin and decrease iron absorption from daily or twice-daily doses in iron-depleted young women. *Blood*. 2015; 126(17):1981-1989.
20. Stoffel NU, Cercamondi CI, Brittenham G, et al. Iron absorption from oral iron supplements given on consecutive versus alternate days and as single morning doses versus twice-daily split dosing in iron-depleted women: two open-label, randomized controlled trials. *Lancet Haematol*. 2017; 4(11):e524-e533.