Iron
Newborn use only

2020

Alert

Avoid >5 mg/kg/day as routine supplementation.
Check serum ferritin prior to the commencement of medicinal iron following any haemolysis.
Consider delaying/temporarily ceasing medicinal iron with (1) multiple transfusions, particularly >100 mL/kg (2) serum ferritin concentrations >350 microgram/L or (3) have received a transfusion in the last 7 days.

Indication

1. Prophylaxis in preterm infants <37 weeks and/or birthweight <2.5 kg
2. Supplementation during erythropoietin therapy
3. Treatment of iron deficiency anaemia

Iron content in dietary food

	Iron content		
	140 mL/kg/day	**160 mL/kg/day**	**180 mL/kg/day**
Preterm EBM	0.04 mg/kg/day	0.05 mg/kg/day	0.054 mg/kg/day
EBM+S26 HMF	0.04 mg/kg/day	0.05 mg/kg/day	0.054 mg/kg/day
EBM+FM 85	2.1 mg/kg/day	2.4 mg/kg/day	2.7 mg/kg/day
EBM+Nutricia BMF	0.04 mg/kg/day	0.05 mg/kg/day	0.054 mg/kg/day
Neocate Gold	1.4 mg/kg/day	1.6 mg/kg/day	1.8 mg/kg/day
Pre Nan Gold	2.5 mg/kg/day	2.9 mg/kg/day	3.2 mg/kg/day
Aptamil Gold + Preterm	2.2 mg/kg/day	2.6 mg/kg/day	2.9 mg/kg/day
S26LBW	2.0 mg/kg/day	2.2 mg/kg/day	2.5 mg/kg/day
Elecare/Elecare LCP	1.7 mg/kg/day	1.9 mg/kg/day	2.2 mg/kg/day
Pepti-Junior	1 mg/kg/day	1.2 mg/kg/day	1.4 mg/kg/day
Term Aptamil	0.78 mg/kg/day	0.9 mg/kg/day	1 mg/kg/day
S26 Gold Newborn	1.12 mg/kg/day	1.3 mg/kg/day	1.4 mg/kg/day
Nestle NAN Supreme 1	0.98 mg/kg/day	1.12 mg/kg/day	1.26 mg/kg/day

Action

Iron is needed to produce haemoglobin and certain iron-containing enzymes.
Ferrous sulfate corrects iron deficiency by re-saturating iron storage organs.

Drug type

Mineral

Trade name

ORAL: Ferro-Liquid Oral, Maltofer Syrup
IV – Venofer, Ferrosig iron, Ferrum H, Ferinject

Presentation

ORAL
Ferrous sulfate (Ferro-Liquid Oral) – 30 mg/mL oral liquid (= 6 mg of elemental iron/mL)
Iron polymaltose (Maltofer) – 37 mg/mL (= 10 mg of elemental iron/mL)
IV
Iron sucrose (Venofer) – 100 mg of elemental iron/5 mL infusion
Iron polymaltose (Ferrosig iron, Ferrum H) – 100 mg of elemental iron/2 mL
Ferric carboxymaltose (Ferinject) 50 mg of elemental iron/mL injection

Dose

ORAL
1. Iron prophylaxis in preterm infants <37 weeks and/or birthweight <2.5 Kg.[5-8]
   Iron can be from the diet or medicinal iron
   2 mg/kg/day – can be started from 2 weeks of age and continue up to 6–12 months of age[8-9]
   Consider delaying/temporarily ceasing iron with (1) multiple transfusions, particularly >100 mL/kg/day, (2) serum ferritin >350 microgram/L or (3) transfusion in the previous 7 days
2. Supplementation during erythropoietin therapy
   Oral: 3–6 mg/kg/day[10-11]
   IV: 1 mg/kg/day[12-13]
   IV dose of 20 mg/kg/dose can be given weekly[13]
3. Treatment of iron deficiency anaemia[8]
   3–6 mg/kg/day and to continue for 3 months after correction of anaemia[8]

IV
Supplementation on parenteral nutrition >4 weeks
   Preterm infants: 200–250 microgram/kg/day[14] or 1400 microgram/kg weekly[13]
   Term infants: 50–100 microgram/kg/day[14] or 700 microgram/kg weekly[13]
Supplementation during erythropoietin therapy
   1 mg/kg/day[12]
Treatment of iron deficiency anaemia:

	Total iron dose (mg) = (12.5 – observed Hb (g/dL) x body weight (kg) x 3.4 x 1.4[15] Oral iron must be ceased 24 hours before IV iron and should not be given until at least 7 days after last parenteral administration[16] IV iron must be prescribed as mg of elemental iron (e.g. as iron polymaltose) in mL of sodium chloride 0.9% over 4 hours (see Preparation below) A test dose of 1 mL can be given over 10 minutes prior to the infusion
Dose adjustment	Therapeutic hypothermia: No information. ECMO: No information. Renal impairment: No information. Hepatic impairment: No information.
Maximum dose	Prophylaxis: 5 mg/kg/day. Treatment: 6 mg/kg/day in iron deficiency anaemia or on erythropoietin.
Total cumulative dose	
Route	ORAL IV
Preparation	**ORAL** No preparation. **IV** Draw up required amount of elemental iron from the vial and add to a total volume of sodium chloride 0.9% to a final concentration of no more than 2 mg/mL Example dilution: Total dose of IV iron required is 60 mg. Using e.g. Ferrosig ampoules containing 100 mg elemental iron per 2 mL, draw up 1.2 mL (60 mg) of iron. Add 1.2 mL (60 mg) to 48.8 mL sodium chloride 0.9% to result in a final volume of 50 mL with a concentration of 0.024 mL (1.2 mg) per 1 mL.
Administration	**ORAL:** Administer undiluted. **IV:** Infusion over 4 hours. A test dose of 1 mL can be given over 10 minutes prior to the infusion.
Monitoring	Periodic haemoglobin and reticulocyte count. Can take 2 weeks for haemoglobin concentrations to rise. Regular serum ferritin if treating iron deficiency anaemia. If the baby has had multiple transfusions, then iron studies would be useful to check for iron overload. **IV:** Monitor infusion site and for signs of hypersensitivity during and at least for 30 minutes after administration. Continuous cardiorespiratory monitoring, oxygen saturations and temperature.
Contraindications	Anaemia not due to iron deficiency, e.g. chronic haemolytic anaemia Iron overload conditions: haemochromatosis, haemosiderosis Hypersensitivity to iron Uncontrolled hyperparathyroidism Infectious hepatitis – parenteral iron tends to accumulate in inflamed tissues Acute renal infections – parenteral iron tends to accumulate in inflamed tissues
Precautions	
Drug interactions	**<u>ORAL iron</u>** Ascorbic acid favours absorption. Absorption is better if medicinal iron is supplemented with breast milk or between meals; however, given with or soon after food may reduce gastrointestinal side effects.[17] Not suitable for jejunal administration as enteral absorption occurs in duodenum and upper jejunum. Iron absorption from fortified milk is intact despite its high calcium content. **<u>IV iron</u>** Oral iron is not to be administered concomitantly with IV iron preparations as the absorption of oral iron is reduced. Oral iron therapy should not commence until at least one week after the last iron injection. Concomitant administration of angiotensin converting enzyme (ACE) inhibitors may increase the incidence of adverse effects associated with parental iron preparations e.g. erythema, abdominal cramps, vomiting and hypotension.
Adverse reactions	**<u>ORAL iron</u>**

	GI irritation: Abdominal pain, diarrhoea, constipation, dark stools (green or black), gastric mucosal erosion **IV iron** General: Flushing, sweating, chills and fever; chest and back pain Hypersensitivity, anaphylaxis Gastrointestinal: Nausea and vomiting, abdominal pain Central nervous system: Headache; dizziness Musculoskeletal: Joint and muscle pain; arthralgia; sensation of stiffening of the arms, legs or face Cardiovascular: Tachycardia, hypotension, circulatory collapse Respiratory: Bronchospasm with dyspnoea Haematological: Generalised lymphadenopathy Dermatological: Rash, urticarial, angioneurotic oedema Adverse reactions may be delayed by 1–2 days after treatment with Ferrosig iron or Ferrum H (iron polymaltose) injection **Oral and IV** Increased RBC haemolysis and haemolytic anaemia in preterm infants with low vitamin E concentrations Rickets – with large doses of iron over a prolonged period Acute toxicity – more severe GI effects including haematemesis and melaena, lethargy, pallor, cyanosis and shock
Compatibility	Can be administered with Pentavite
Incompatibility	Do not mix IV solutions with other compounds
Stability	IV preparations: Venofer: Once diluted, use product immediately and discard unused portions Ferrosig: Once diluted, use product immediately and discard unused portions. However, if necessary, can store at 2–8°C for not more than 12 hours
Storage	Store below 25°C. Protect from light
Excipients	Ferro-Liquid Oral: Sucrose, sorbitol, sodium bisulfite; strawberry flavour Maltofer: Ethanol, methyl hydroxybenzoate, propyl hydroxybenzoate, water – purified, sodium hydroxide, sorbitol solution (70%) (non-crystallising), and sucrose Ferrosig and Ferrum H injections (iron polymaltose compound): Hydrochloric acid or sodium hydroxide (for pH adjustment) Venofer (iron sucrose): Sodium hydroxide (for pH adjustment)
Special comments	Infants on erythropoietin or infants with uncompensated blood loss may initially need higher doses and could be receiving iron supplementation in addition to preterm formula or fortified human milk.
Evidence	Refer to full version.
Practice points	Refer to full version.
References	Refer to full version.

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