Ferrous sulfate 2015

Indication

1. Prevention of iron-deficiency anaemia in infants at risk of reduced body stores
   - -Preterm infants <1800g
   - -Infants 1800-2500g
   - -Ex-preterm infants not tolerating feeds of 180 mL/kg/day with iron containing fortifier or formula
   - -When ceasing iron containing fortifier or formula prior to discharge
2. Treatment of iron deficiency anaemia

NOTE: Formulas with 5-9 mg/L of iron are considered adequate in iron content

Iron content in common Fortifiers and Formulas at various mL/kg/day:

	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

Action

Iron is needed for the production of haemoglobin and certain iron-containing enzymes.
Ferrous sulphate corrects iron deficiency by re-saturating iron storage organs.

Drug Type

Iron supplement

Trade Name

Ferro-Liquid

Dosage / Interval

Prophylaxis: 2 mg/kg of **elemental iron** daily. To commence at 2-6 weeks of age (2-4 weeks of age in extremely low-birthweight infants)

Treatment: 2 mg/kg of **elemental iron** 12 hourly

Maximum daily dose

15 mg daily INDEPENDENT OF WEIGHT

Prophylaxis: 2-3 mg/kg/day of **elemental iron**. Commence only when on full feeds in hospital or prior to discharge when fortification is stopped or preterm formula changed to term formula. Delay in infants with multiple transfusions and increased Serum Ferritin levels (>350 microgram/L) or have received a transfusion in last 2 weeks. Prophylaxis dose >5 mg/kg/day should be avoided in preterm infants because of possible risk of retinopathy of prematurity

Treatment: Can commence on 3 mg/kg/day of **elemental iron** and may need to go up to 6 mg/kg/day in iron deficiency anaemia or on erythropoietin. It is suggested to undertake iron studies to titrate the dose.

Total cumulative dose

Doses >5 mg/kg/day should be avoided in preterm infants because of possible risk of retinopathy of prematurity

Presentation

Ferrous sulphate liquid: 150 mg **ferrous sulfate**/5 mL equivalent to 30 mg **elemental iron**/5 mL=6 mg/mL of **elemental iron**

Route

Oral

Administration

Oral or intragastric tube

Monitoring

Periodic haemoglobin and reticulocyte count during therapy. Can take 2 weeks for haemoglobin concentrations to rise.
Regular serum ferritin if treating iron deficiency anaemia.

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Contraindications	Haemolytic anaemia, haemochromatosis, haemosiderosis
Precautions	Excessive iron supplementation can lead to increased risk of infection, poor growth and disturbed absorption or metabolism of other minerals. Being a potent pro oxidant, non-protein bound iron can cause free oxygen radicals and increase risk of retinopathy of prematurity, especially when given in high doses as a component of blood transfusions or as adjunct to erythropoietin therapy. Risk of iron induced haemolysis in preterm infants with Vitamin E deficiency is more in first 6 weeks.
Drug interaction	Zinc supplementation does not impede iron absorption. There is no effect of iron supplementation on zinc or selenium absorption. Iron absorption from fortified milk is intact in spite of its high calcium content.
Adverse Reactions	GI irritation: epigastric pain, diarrhoea, constipation, dark stools (green or black), erosion of gastric mucosa Increased RBC haemolysis and haemolytic anaemia in premature infants with low vitamin E levels Rickets - with large doses of iron over a prolonged period of time. Acute toxicity - more severe GI effects including haematemesis and malaena, lethargy, pallor, cyanosis and shock
Compatibility	Can be administered with Penta-vite.
Stability	Solution may be used up to one month after opening (document date of opening on label).
Storage	Store below 25°C. Protect from light
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 summary	1. LBW infant supplementation-RCT (Berglund 2010) suggested all babies born less than 2.5 kg will benefit from early supplementation, main outcome being iron deficiency at 6 months 2.Dose - Low vs high-RCT (Friel 2001)-Preterm infants with an average birth weight of 1.46 kg received an iron intake of 5.9 versus 3.0 mg per kg per day at discharge and about 3 versus 2mg per kg per day at 3 to 9 months. There was no difference between the 2 groups in anaemia prevalence or neurodevelopment at 12 months, but the high-iron group had higher glutathione peroxidase concentrations (a marker of oxidative stress), lower plasma zinc and copper levels, and more respiratory tract infections, suggesting possible adverse effects from the higher intake. 3.Early vs late supplementation-3 RCTs (Franz 2000,Stienmarcher 2007, Arnon 2009) Steinmacher 2007-showed increased proportion of children with abnormal clinical neurological examination in late iron group (35% vs 17%;p=0.02) Franz et al randomised 204 infants with an average birth weight of 0.87 kg into an early iron group receiving 2 to 4 mg/kg/day of iron supplements from about 2 weeks and a late iron group that did not receive iron supplements until 2 months of age. There were no differences in serum ferritin and haematocrit at 2 months of age but infants in the late iron group had received more blood transfusions. Arnon 2009 - large RCT, 2 weeks vs 4 weeks, improved dermatological parameters in early group.
References	1.Hey E, Neonatal Formulary 4th edition. London: BMJ Publishing Group, 2003, pp87-88 2.Neonatal and Paediatric Pharmacists Group, Royal College of Paediatrics and Child Health: Medicines for Children 2nd Edition, London: RCPCH Publications Limited, 2003, pp343-345 3.Young TE, Mangum B: Neofax: A Manual of Drugs Used in Neonatal Care, 13th edition. Raleigh, North Carolina: Acorn Publishing, USA, 2000, pp 198 4.Ferro-Liquid: Product Information (MIMSOnline) 5.Agostoni C, Buonocore G, Carnielli VP et al for the ESPGHAN Committee on Nutrition. Enteral nutrient supply for preterm infants: Commentary from the European Society for Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition. Journal of Pediatric Gastroenterology and Nutrition 2010;50:1-9 6.Neofax 2011. Twenty fourth edition. Thomson Reuters, Montvale, NJ.

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Original version Date: 08/08/2015	**Author: NeoMed Consensus Group**
Current Version number: 1	**Version Date: 08/08/2015**
Risk Rating: Medium	**Due for Review: 08/08/2018**
Approval by: As per Local policy	**Approval: RHW Quality & Patient Safety Committee 19/11/15**

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