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Intravenous Iron in General Practice

Iron Deficiency - A Recap
- A common condition – 80-120 patients per FTE
- Variable presentations, across age spectrum and accompanies many other conditions
- Better outcomes with treatment often independent of anaemia
- A cause must be ascribed when ID is found - may need further investigation

Key Messages
- Intravenous iron infusions can be safely and effectively administered in general practice
- Right reason
- Right dose
- Reduce risk by adhering to protocol
- Informed consent is crucial
- Streamlined practice systems
- Follow up is essential and ensure a diagnosis is established

Indications for Intravenous Iron
- Failure of oral iron therapy
  - Intolerance
  - Poor adherence
  - Poor response
- Malabsorption (e.g. inflammatory bowel disease, gastric paresis, some bariatric surgery)
- Chronic renal impairment or cardiac failure
- Ongoing loss of iron (blood) exceeding absorptive capacity (e.g. angiodysplasia)
- Clinical need for a rapid iron supply

Contraindications and Precautions for i.v. iron carboxymaltose
- Contraindications
  - Iron overload
  - Microcytic anaemia not due to ID
  - Known hypersensitivity to particular i.v. agent
  - Pregnancy first trimester
  - Children < 14 yrs
- Precautions
  - Significant hepatic dysfunction
  - Acute or chronic infection
  - Multiple allergic disorders
  - Reaction to other i.v. preparations
Intravenous Iron in general practice – What do you need

- Infusing versus push doses
- Trained and skilled nurses (cannulation training and online training)
  https://bloodsafelearning.org.au/
- Equipment
- Protocol for infusing
- Consent procedure
- Good practice systems (process and documentation)
- Patient information
- Establish fees/costs
- Follow up arrangement

Iron Infusions - Equipment

- Cannulas 20g
- Normal Saline bags 100ml/500ml
- I.V Giving Set/Pump
- Resus equipment

Treatment Room
- Bed/Chair

Types of intravenous iron in Australia

- Iron Polymaltose (FerrumH/Ferrosig)
- Iron Sucrose (Venofer)
- Ferric Carboxymaltose (Ferinject)

The Structure of intravenous iron

- Polynuclear iron–oxyhydroxide core
- Carbohydrate shell
  - Sucrose
  - Carboxymaltose
  - Polymaltose

Iron Polymaltose

- $4.00/100mg
- Suitable for TDI up to 2500 mg over 5-6 hours (or accelerated infusion)
- Similar indications to Fe Carboxymaltose
- Similar Adverse Drug Events (ADEs) to Fe Carboxymaltose

Iron Sucrose

- $13.00 per 100mg
- Multiple 100-200 mg doses or larger 500mg* dose
- Licensed and PBS listed in Australia for:
  - renal indications: IDA in combination with ESA
  - documented hypersensitivity reaction to polymaltose
  - continued IV iron infusions where appropriate
  - undergoing chronic haemodialysis

Fe Carboxymaltose

- $30.00 per 100mg
- Up to 1000 mg (20mg/kg) over 15 minutes
- PBS listed (iron deficiency anaemia where oral therapy is ineffective, not tolerated or inappropriate)
- Comparison with other IV irons:
  - Similar rates of injection site reactions, headache, hypertension, dizziness, vomiting and diarrhea
  - Lower rates of hypotension and taste disturbance
  - Higher rates of hypophosphatemia phosphate, flushing and increased ALT
How much to give? – Calculation of iron deficit

Ganzoni formula:
Total body iron deficit/ cumulative iron dose [mg] = 
body weight * kg / target Hb - actual Hb in g/L x 0.34 + iron depot [mg] **

*Use ideal body weight in overweight patients. If underweight, use actual body weight
**The factor 0.24 = 0.083 x 0.07 x 1000.
For this calculation the iron content of haemoglobin = 0.34%,
blood volume = 7% of the body weight, and
1000 is the conversion from g to mg.
***Iron depot:
<50 kg body weight: iron depot = 15 mg/kg body weight
>50 kg body weight: iron depot = 500 mg

How much to give? – Calculation using the simplified method (doses for Fe Carboxymaltose)

<table>
<thead>
<tr>
<th>Hb (g/L)</th>
<th>Body weight 36 to 55 kg</th>
<th>Body weight 50 to 70 kg</th>
<th>Body weight ≥70 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤100 g/L</td>
<td>1st dose: 500 mg</td>
<td>1st dose: 1000 mg</td>
<td>1st dose: 1500 mg</td>
</tr>
<tr>
<td>≥100 g/L</td>
<td>2nd dose: 500 mg</td>
<td>2nd dose: 1000 mg</td>
<td>2nd dose: 1500 mg</td>
</tr>
</tbody>
</table>

If Hb normal or Hb <70 g/L, calculate total body iron deficit more accurately using Ganzoni formula.

Iron Infusion - Process

- Provide good patient information
- Consent overload
- Insert cannula to forearm (avoid back of hand)
- Assemble equipment, add iron to the infusion fluid (100-200 ml Na saline) and mix the contents.
- Flush the intravenous cannula with at least 10 mL 0.9% Sodium Chloride prior to connecting the iron infusion
- Infusion over 15 min
- Monitor Temp, PR and BP (0, 5, 15 min and 30 min post infusion)
- Check Hb and Ferritin at 6 weeks
- Post infusion instruction

Adverse Events to Fe Carboxymaltose

- Pain at Insertion Site
- Immediate Reactions – Bronchospasm, Hypotension, Flushing, diarrhoea, vomiting
- Late Reactions – headache, fever, joint pain, hypophosphataemia (no significance)
- At Belmont n=2000, minor AEs around 30%

Staining/Tattoos

- From paravenous leakage of iron solutions ‘improper fixation or placement of cannula’
- Length and duration of staining related to volume of drug extravasated
- Often permanent
- Frequency:
  PI: 1-10/1000
  MDU: 1:20
  Belmont Clinic: Nil after 1500
Staining

What to Do

Protocol with clear instructions
- Stop infusion
- Some guidelines recommend aspiration
- Elevate/ice pack
- Medical review/documentation
- Inform patient and arrange follow up and management

Minimise risk
- Informed Consent
- Clear indication i.v. iron
- Appropriately trained personnel
- Avoid sites of multiple venepuncture
- Use large veins and avoid sites prone to movement (back of hand)
- High gauge cannula (Vifor)
- Check position by aspirating blood and then flush with saline before infusion
- Monitor infusion
- Flush with saline after infusion
- Stop infusion immediately if pain, swelling, redness develops

Treatment
- Limited case studies only
- Laser treatment
- Chemical treatments
- Vifor recommends avoidance of sun exposure

Finances
- Set up costs (pump $1-1.5K, chair $4K)
- Currently there is NO MBS item number for infusion
- Cost of consumables ~$20
- Nurse time ~30 min
- Most practices charge consultation item number and fee for administering iron

Summary
- Iron deficiency is common and most cases can be managed in general practice
- Iron can be safely and effectively administered in general practice
- Risks are minimised by:
  - good preparation
  - Clear indication for i.v. therapy
  - Initial and ongoing training of staff
  - Adhering to clear protocols
  - Routine process for informed consent
  - Good documentation
- Follow up and monitoring is essential

Resources
- IV iron tools including patient information, consent and protocol: https://bloodsafelearning.org.au/iv-iron-tools/
- Administering IV iron, a video: https://bloodsafelearning.org.au/resource-centre/videos