Iron deficiency anaemia: Management in chronic kidney disease with intravenous iron (Ferinject®)

Anaemia is a common feature of chronic kidney disease (CKD). Iron therapy is used to replenish iron stores and maintain target haemoglobin (Hb).

Oral iron supplements may not be appropriate for CKD patients due to inadequate response or intolerance. Intravenous iron is recommended for peritoneal dialysis and pre-dialysis patients (CKD Stage 3-5) when oral iron is inappropriate.

CKD patients may also be receiving erythropoietin stimulating agents (ESA). Iron deficiency is a common cause of delayed or diminished response to ESA therapy in patients with renal failure.

The intravenous iron preparation of choice at WUTH for is Ferinject® for peritoneal dialysis and pre-dialysis patients. Treatment consists of a total loading dose of Ferinject®, followed by maintenance doses to maintain target parameters.

**IRON DEFICIENCY**

A diagnosis of iron deficiency can be made in patients with CKD when Serum ferritin <100micrograms/L

Functional iron deficiency is defined by serum ferritin >200micrograms/L and transferrin saturation (TSAT) <20%

**AIMS OF TREATMENT**

To maintain haemoglobin (Hb) between 10 -12g/dL for peritoneal dialysis and pre-dialysis patients.

(NOTE: Target Hb is at the discretion of the consultant nephrologist, and occasionally may be outside this range)

To maintain serum ferritin between 200-500micrograms/L for peritoneal dialysis and pre-dialysis patients.

Where necessary, to maintain TSAT >20% for peritoneal dialysis and pre-dialysis patients.

**INVESTIGATIONS**

ALL patients should have the following blood tests assessed prior to commencing therapy:

a) Haemoglobin level (Hb)

b) Serum ferritin - If ferritin >500micrograms/L there is a risk of iron overload.

c) Total iron binding capacity (TIBC)

d) Transferrin saturation (TSAT) – Ferritin is not a specific measure of iron store and can be raised in inflammation. TSAT is an optional parameter which can be requested when inflammation is suspected and ferritin >200micrograms/L. Also consider requesting a CRP.

e) Folate and Vitamin B12 - Not necessary to repeat if previous results are normal.
FERINJECT®

Ferinject® is available as ferric carboxymaltose in 500mg/10mL ampoules and 100mg/2mL ampoules.

**Contraindications**
- Known hypersensitivity to Ferinject® or any of its excipients
- Anaemia not attributable to iron deficiency
- Iron overload or disturbances in utilisation of iron
- Pregnancy first trimester

**Cautions**
- Patients with history of asthma, eczema or other atopic allergy – these patients are more susceptible to allergic reactions
- Hepatic impairment
- Acute or chronic infection

**Side effects**
Common (1-10% of patients) adverse effects include:
- headache
- hypotension, hypertension, and facial flushing
- rash
- injection site reactions
- nausea, abdominal pain, constipation, and diarrhoea

Extravasation of Ferinject® at the injection site can cause pain, inflammation, tissue necrosis and brown discoloration of the skin at the injection site. If this occurs, follow WUTH extravasation policy.

Ferinject® can cause hypersensitivity reactions including anaphylactic reactions. If an allergic reaction of any kind is suspected the infusion should be STOPPED immediately and medical assistance sought. In the event of cardiac arrest, anaphylactic shock or respiratory distress the WUTH Cardiopulmonary resuscitation policy should be followed.

Administration of Ferinject® can cause hypotension or hypertension. Consider monitoring blood pressure if necessary. If monitored BP readings should be recorded on CyberRen.

If patients experience symptoms of dizziness, light headedness or confusion following administration they should be advised to not drive or operate machinery until symptoms have ceased.
**TOTAL LOADING DOSE INTRAVENOUS IRON**

The initial dose of intravenous iron is a loading dose to replenish iron stores, especially when initiated concurrently with erythropoetin. The total loading dose of Ferinject® is calculated according to individual patient weight and Hb. The vast majority of CKD patients will have an Hb <10 – the doses below have been calculated on this basis.

A single dose of Ferinject® should not exceed 1000mg of ferric carboxymaltose and should not be administered more than once a week.

It is not possible to administer the total loading dose required to replenish iron stores in ONE session for all patients. Therefore the total loading dose is given in two separate doses - referred to in the tables below as the first and second dose. See tables below for dosing information.

Serum ferritin will be checked 4 weeks after the first dose of Ferinject® and depending on the results of these investigations the second dose may not be required. Where serum ferritin is not thought to represent iron stores due to inflammation TSAT will also be checked to guide therapy.

**First dose:**

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<tr>
<th>Patients with body weight</th>
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<tbody>
<tr>
<td>&lt;40kg</td>
<td>40-44kg</td>
<td>45-49kg</td>
<td>50-70kg</td>
<td>&gt;70kg</td>
</tr>
<tr>
<td>500mg</td>
<td>800mg</td>
<td>900mg</td>
<td>1000 mg</td>
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4 weeks after the first dose of Ferinject® repeat the Hb and ferritin.

- If ferritin is 200-500micrograms/L the second dose is not usually required.
- The second dose is required if:
  - ferritin is <200micrograms/L.
  - ferritin >200micrograms/L and TSAT is <20%. Ferritin is raised due to an acute phase response and the second dose of Ferinject® is required.

**Second dose; if required:**

<table>
<thead>
<tr>
<th>Patients with body weight</th>
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</tr>
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<tbody>
<tr>
<td>&lt;40kg</td>
<td>40-44kg</td>
<td>45-49kg</td>
<td>50-70kg</td>
</tr>
<tr>
<td>Not required</td>
<td>700mg</td>
<td>600mg</td>
<td>500mg</td>
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<tr>
<td></td>
<td></td>
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<td>1000mg</td>
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If ferritin or TSAT remain low after the second dose seek the advice of a consultant nephrologist. Consider investigation for bleeding / haemolysis/ and poor functioning bone marrow.
Administration

Ferinject® doses above 500mg are administered by intravenous infusion

- Dilute 500mg - 1000mg Ferinject® in 250mL 0.9% sodium chloride. Administer over at least 30mins.
- 200mg can be administered undiluted as a bolus injection over 2minutes. Alternatively dilute 200mg Ferinject® in a maximum 50mL 0.9% sodium chloride. No minimum duration for administration.

Administration should comply with aseptic non-touch technique (ANTT).

Total loading dose intravenous iron infusions of 500mg – 1000mg will be prepared on a named patient basis and supplied by the pharmacy aseptic unit.

MAINTENANCE INTRAVENOUS IRON

- Following a total loading dose of Ferinject® maintenance doses of intravenous iron will be required to maintain iron stores and haemoglobin.
  
  Dose: 200mg Ferinject® every 3 to 12 months

- Administration of maintenance intravenous iron will be via bolus injection at a rate of 200mg over 2 minutes.
- Frequency of iron injection is individualized to patient response.
- Ferritin will be reassessed every 3 to 6 months to determine if further intravenous iron is required.
- The aim of maintenance therapy is to maintain ferritin between 200-500 micrograms/L and TSAT >20%
- Iron therapy should be stopped when ferritin >500micrograms/L due to risk of iron overload. However if the raised ferritin is thought to be due to inflammation as per TSAT or CRP, iron therapy may be continued at consultant nephrologist discretion.

MONITORING

Monitor the site of infusion for signs and symptoms of extravasation.

Ferinject® can cause hypersensitivity reactions including anaphylactic reactions. If an allergic reaction of any kind is suspected the infusion should be STOPPED immediately and medical assistance sought. In the event of cardiac arrest, anaphylactic shock or respiratory distress the WUTH trust cardiac arrest procedure should be followed. Administration of Ferinject® can cause hypotension or hypertension. Consider monitoring blood pressure if necessary. If monitored record BP readings on CyberRen.
References


Companion Documents

WUTH (2011) Peripheral intravenous Access Guidelines in Adults (WIVAG)

Patient Resources

Ferinject patient leaflet – Treating iron deficiency in kidney disease