GUIDELINES FOR THE USE OF IV IRON

IN ANAEMIA OF CHRONIC KIDNEY DISEASE

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DISCLAIMER: These guidelines were produced in good faith by the author(s) reviewing available evidence/opinion. They were designed for use by paediatric nephrologists at the University Hospital of Wales, Cardiff for children under their care. They are neither policies nor protocols but are intended to serve only as guidelines. They are not intended to replace clinical judgment or dictate care of individual patients. Responsibility and decision-making (including checking drug doses) for a specific patient lie with the physician and staff caring for that particular patient.

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Anaemia of Chronic Renal Failure is treated with Recombinant human erythropoietin (r-HuEPO), also called erythropoetin stimulating agents (ESAs) and the treatment is ineffective in the absence of adequate iron to allow erythropoesis.

TARGETS :

Anaemia is defined as haemoglobin of <11g/dl.

The target haemoglobin is **>11 and <13.5g/dl.**

In severe chronic renal failure (GFR <30) the target range for serum ferritin is **200-500mg/l.**

When GFR < 30, oral iron is thought to be ineffective and hence intravenous iron is preferred.

Before starting IV iron:

- Stop oral iron.
- Blood transfusion in the previous month?
- If **YES**:
  - check haemoglobin and ferritin.
  - If the ferritin is <200mg/l and haemoglobin <11g/dl **start IV iron**.

- The following baseline data must be available:
  Within the last month
  - Haemoglobin & Reticulocyte count (2.5ml EDTA sample)
  - Ferritin (2ml clotted sample)
  - PTH (2.5ml EDTA and send ASAP to biochemistry)

Preparations used :

- Most effective IV iron preparation is *iron (III) hydroxide sucrose complex (**Venofer**)*.
- The incidence of anaphylaxis is low (0.1%).
- It is more rapidly released into the circulation and produces less hepatic parenchymal iron deposition compared with other IV iron agents.
- It can be given to children who are on peritoneal dialysis or haemodialysis as well as those who are not yet dialysed.

Patients who should be reviewed before considering IV iron therapy

- previous known allergy to iron preparations

- history of atopy, eczema, asthma
- abnormal liver function, liver cirrhosis, hepatitis
- infected
- treatment with β-blockers

If uncertain, discuss with Consultant

Dose of IV iron (III) hydroxide sucrose complex:

The initial dose of IV iron depends on whether the child's haemoglobin is greater, or less than, 11g/dl and hence this section is divided into:

1. Initial dose – Hb < 11g/dl

a) *Initial IV iron for haemodialysis patients*

b) *Initial IV iron for non-dialysed children or those on peritoneal dialysis*

2. Initial dose – Hb > 11g/dl

3. Maintenance IV iron schedule (The maintenance doses are independent of the haemoglobin)

1. Initial dose - if haemoglobin less than 11g/dl:

Use the following formula to calculate the total initial amount of IV iron required;

Fe required (mg) = Body wt (Kg) × (11.5 – actual Hb (g/dl)) × 2.4

NB:
- One 5ml ampoule of IV iron (III) hydroxide sucrose complex =100mg of iron
- Total initial IV iron dose cannot usually be given in a single infusion
- Maximum dose *each day* is **3mg** (= 0.15ml) IV iron/Kg (**absolute maximum 200mg**)
- Maximum frequency is **three** doses in one week.

1 a) *Initial IV iron for **haemodialysis** patients*

(Note – the Venofer preparation is not cleared by dialysis.)

Having calculated the total initial IV iron dose required, work out, using the maximum daily dose, how many doses will be required to give the total initial dose. Usually, the maximum daily dose is given at each

haemodialysis session until the total initial IV iron dose has been administered.

1. b) *Initial IV iron for* ***non-dialysed*** *children or those on* ***peritoneal dialysis***

The above also applies to these groups. They will need to attend the Day Unit for IV iron infusion(s). If a number of doses are required to give the total iron deficit, these can be given on consecutive days up to the maximum frequency of three doses in one week.

After completion of the total initial dose of IV iron:

- Check the ferritin (and CRP) 2 weeks
- Then move on to the maintenance IV iron schedule. (However, if there is no improvement in the haematological parameters at this time, the original diagnosis should be reconsidered.)

2. Initial dose - if haemoglobin greater than 11g/dl:

The initial dose of IV iron is determined by the patient's **ferritin** alone. The following table is used:

If ferritin:	
	Give 3mg(= 0.15ml)/kg IV iron (maximum 200mg per infusion):
<200mg/l	*Twice in 7 day period*
200-500mg/l	*Once*

After completion of the total initial dose of IV iron:

- Check the ferritin (and CRP) 2 weeks after completion of the total initial dose of IV iron
- Then move on to the maintenance IV iron schedule. (However, if there is no improvement in the haematological parameters at this time, the original diagnosis should be reconsidered.)

3. Maintenance IV iron

Give further maintenance IV iron based on the following table:

If ferritin:	*Give 3mg(= 0.15ml)/kg IV iron (maximum 200mg per infusion):*
<100mg/l	*Twice a week*
100-200mg/l	*Weekly*
200-500mg/l	*Monthly*
>500mg/l	*Stop but maintain monthly monitoring*

- Give iron as required above for a period of four weeks
- Then check ferritin (and CRP) levels 2 weeks after the final dose. Alter regimen depending on result.

Administration guidelines for IV iron (III) hydroxide sucrose complex:

- In all cases **(initial and maintenance doses)** doses are given as a **neat** solution over a **minimum of 5 minutes** followed by flush of 2ml 0.9% saline.

- **Test dose:** Before administering the first dose to a new patient a test dose should be given.

  This test dose involves administering 1ml of neat solution over 1 to 2 minutes. If no adverse events occur within 15minutes of completing the test dose, then the remaining portion of the dose can be given.

- **Regular observations** are required when administering IV iron

  Record **Heart rate, blood pressure and respiratory rate** prior to administration, after 15 minutes then after a further 15 minutes. (i.e. **at 0, 15 and 30mins)**

- The patient can go **home** if they remain well half an hour after the dose is given – i.e. after the final set of observations.

  If a test dose has been given, a further set of observations should be recorded after another 15minute interval (i.e. 45mins after initial observations recorded) and the patient can again go home following this if they remain well.

- If **extravasation** occurs during administration of IV iron then: -

  • Stop bolus
  • Aspirate any remaining iron from butterfly and tubing
  • Inject 0.5ml 0.9% saline subcutaneous using same butterfly

- Try to aspirate any fluid back from subcutaneous tissue and discard
- Remove butterfly
- If the needle is still inserted, rinse with a small amount of 0.9% NaCl solution. In order to accelerate the elimination of the iron, instruct the patient to treat the point of injection topically with a mucopolysaccharide gel or ointment (e.g. Movelat). Administer the gel or ointment gently. Do not massage in order to avoid further spreading of the iron.

- **Anaphylactic reactions and/or symptomatic hypotension are very rare but can occur.**

Observe for signs of anaphylactic/ anaphylactoid reaction and if they occur **STOP IRON INFUSION** and proceed as per guidelines of dealing with anaphylaxis.