Implementation of an Intravenous Iron service

Frances Sear
Why Iron?

- Iron is the Most prevalent micronutrient deficiency in the world (WHO 1968)

- Iron deficiency anaemia is a Major reason for blood being transfused

- Iron deficiency without anaemia is 3 times as common as Iron deficiency anaemia (Ionnou.GN, Rockas.D et al 2002)

- Red cell transfusion will not fully replenish diminished iron stores in iron deficient patients, only addressing the acute symptoms of anaemia
Blood management?


- Patient Blood management initiatives

- NCA 2011 Audit of the Use of blood in adult medical patients part 1 identified 13% of patients transfused as potentially iron deficient.

- Alternative treatment for those choosing not to have blood
How does Iron fit into pre-op preparation?

- Studies have identified about 35% (ranging from 20-70%) of pre-op patients as anaemic and a third of those as suffering from iron deficiency. (Goodhough, L et al 2008, (Bisbe, E et al 2008, (Salah, E et al 2007)

- HSC Better Blood Transfusion and NICE guidelines state Hospitals have a duty to assess patients pre-operatively, and patients considered anaemic should have their haemoglobin optimised prior to surgery, which may involve intravenous (IV) iron if appropriate.

- ‘Haematinic deficiency without anaemia may blunt the recovery from post-operative anaemia. The early detection & treatment may reduce the need for transfusion and its negative consequences’ (Bishe, E, Minoz, M 2012)

- Recommendation in the NATA consensus statement that IV Iron is administered pre-operatively for patients undergoing orthopaedic surgery expected to develop severe post-op anaemia

- Future planned pre-operative audits and guidance likely to increase awareness and demand

- Currently the PREVENTT study is taking place to look at the efficacy of IV Iron in major abdominal surgery.
Iron deficiency

<table>
<thead>
<tr>
<th>Evidence of Iron deficiency anaemia</th>
<th>Evidence of functional iron deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Low Hb</td>
<td>• Normal or high ferritin</td>
</tr>
<tr>
<td>• Low ferritin</td>
<td>• Transferrin saturation usually &lt;20%</td>
</tr>
<tr>
<td>• Low serum iron</td>
<td>• Reduced MCV</td>
</tr>
<tr>
<td>• Transferrin saturation usually &lt;10</td>
<td>• Hypochromia</td>
</tr>
<tr>
<td>• Microcytosis</td>
<td>• Increased reticulocytes</td>
</tr>
<tr>
<td>• Hypochromia</td>
<td></td>
</tr>
</tbody>
</table>

Management

- All patients should have iron supplementation both to correct anaemia & replenish body stores

- Parental Iron can be used when oral preparations are not tolerated

(Goddard,a, James,M et al 2005)
## Comparison of Iron Preparations

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>• Cheap</td>
<td>• Slow uptake</td>
</tr>
<tr>
<td></td>
<td>• convenient</td>
<td>• GI Intolerance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• limited absorption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Patient compliance</td>
</tr>
<tr>
<td>IM</td>
<td>• Ease of administration</td>
<td>• High risk of adverse events</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Patient discomfort</td>
</tr>
<tr>
<td>IV</td>
<td>• Rapid effect vs oral iron</td>
<td>• Higher cost</td>
</tr>
<tr>
<td></td>
<td>• Higher doses can be administered</td>
<td>• Administration by health care professional</td>
</tr>
<tr>
<td></td>
<td>• Can be given as total dose</td>
<td>• Risk of adverse events</td>
</tr>
<tr>
<td></td>
<td>• Improved safety of newer preparations</td>
<td></td>
</tr>
</tbody>
</table>
# IV Iron

- 4 preparations
- No longer a requirement for a test dose with IV Iron (MHRA Aug 2013)

<table>
<thead>
<tr>
<th>Product</th>
<th>Maximum total Dose</th>
<th>Total dose infusion</th>
<th>Infusion time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron Dextran (Cosmofer)</td>
<td>1600mg</td>
<td>Yes</td>
<td>6 hours</td>
</tr>
<tr>
<td>Ferric Carboxymaltose (ferinject)</td>
<td>1000mg</td>
<td>Yes</td>
<td>15 mins</td>
</tr>
<tr>
<td>Iron Maltoside (monofer)</td>
<td>1600mg</td>
<td>Yes</td>
<td>1 hour</td>
</tr>
<tr>
<td>Iron Sucrose (Venofer)</td>
<td>200mg</td>
<td>No</td>
<td>15min</td>
</tr>
</tbody>
</table>
IV Iron V’s Red cells

- Appropriate treatment for Iron deficiency
- More economical
- Less associated risk
- Avoids the risk of patient incompatibility
- Readily stored
- Less regulation!
- Longer shelf-life
- Some preparations now offer a much faster treatment time than red cell transfusion
- Option for patients who wish to avoid blood
- Can also be used in combination with red cell transfusion to reduce transfusion requirement in patients requiring regular transfusion support.
So we’ve identified a need... and a treatment of choice...

Now how do we go about delivering it?
The Need for a Formalised Service

Appropriate framework

• Who will decide if IV iron is necessary?

• Who will prescribe it?

• Who / where to administer it?

• Who will perform follow up?

• Patient information – ensure patient confidence in service
The key to making it work...

An efficient process from start to finish

Simple
Straight forward

- Referrals
- Admissions
- Prescriptions
- Dedicated infusion area
- Information – for staff and patients
- Standard Follow up
How we do it

The Nurse led Service;

- Frees up Consultant time
- Reduces waiting time
- Appropriate use of specialist nurse skills & knowledge
- Consultant Back up if required
- Utilisation of PGD’s for prescriptions
- Use of Protocols
- Information
- Improved access – day case admission, not in-patient care
- Acute admission reductions & financial savings
The details
The Referral

- Flow chart for the use of IV iron – i.e. ensuring appropriate referrals
- Designated referral form (internal)
- Recent blood results
- Referred to me
- GP referrals: Initial referral sent to Consultant, subsequent admissions arranged by me
Treatment flow chart for iron deficiency anaemia once investigations for cause are complete

1. Is patient taking oral iron?
   - Yes
     - Is oral iron tolerated?
       - Yes
         - Is anaemia resolving?
           - Yes
             - Continue & monitor blood every 2-3/52
           - No
             - Is diagnosis secure?
               - Yes
                 - Refer for IV iron
               - No
                 - Non-compliance, ongoing bleeding
       - No
         - Commence oral iron
         - Why?
           - Poor absorption
           - Poor compliance/refusal
             - Change preparation & vitamin C intake to aid absorption
             - Tolerated/effective?
               - Yes
                 - Change preparation & monitor blood
                 - Tolerated/effective?
                   - Yes
                     - Continue & monitor blood every 2-3/52
                   - No
                     - Refer for IV iron
               - No
                 - Continue & monitor blood every 2-3/52
REFERRAL FOR TREATMENT WITH INTRAVENOUS IRON

Patient name
Patient DOB
Patient hospital number
Name of referring physician
Contact number (bleep/secretary)

Recent blood results

<table>
<thead>
<tr>
<th>Date</th>
<th>Hb</th>
<th>Hct</th>
<th>MCV</th>
<th>MCH</th>
<th>Iron</th>
<th>Transferrin</th>
<th>Transferrin saturation</th>
<th>Ferritin</th>
<th>Weight (kg)</th>
</tr>
</thead>
</table>

Has iron deficiency been investigated? ☐ Yes ☐ No

Reason for iron deficiency if known -

Has the patient been given oral iron? ☐ Yes ☐ No

Why is the patient being referred for IV iron?

Has the patient previously had IV iron? ☐ Yes ☐ No

Other relevant information

Send referral to Frances Sear – Transfusion Practitioner frances.sear@nhs.net or C/O Pathology office

THE PATIENT WILL REMAIN UNDER THE CARE OF THE REFERRING PHYSICIAN
Admission

- Upon referral patients are contacted by myself – for medical history including weight & allergies, explanation of procedure and choices of treatment.

- Consent to be treated under the patient group directive. All documented in their medical records.

- Admission is then arranged. Aim is to get all patients treated within 1 - 4 weeks of referral.

- Admitted to dedicated infusion suite as a day case;
  - Dedicated unit with trained staff
  - Full facilities for CPR and anaphylaxis management for dealing with potential adverse reactions.
The Prescription

• At the beginning a lot of running around to find a doctor who didn't know the patient, would never meet the patient, didn’t know the drug so had to be told what to write!

• Now.....
The Patient Group Directive (PGD)

- PGD, approved by physicians and pharmacy, - a set of criteria under which the patient can be treated.
  - for total dose infusion of iron Dextran (CosmoFer).
  - Dosed according to weight and current/ target Hb – we use a target of 130g/L

- for repeated dose iron sucrose (Venofer)

- If a patient does not meet the criteria of the PGD they can still receive IV Iron under the direction of a consultant.
What Influences the Choice of Preparation?

- Patient choice – length of stay, frequency of visits, usually to fit around work commitments

- Medical history – Venofer 1st choice for patients with history of severe / multiple allergy

- Admission slots available

- Time to scheduled surgery
Information, Information, Information...

- Dedicated section on the hospital intranet for the IV Iron service – accessible and accurate information available to all staff at all times.

- Referral form and flow chart

- Full Protocols for both Cosmofer and Venofer detailing indications, dosage table, administration

- Nursing Care Plans

- Patient information with contact number
Protocols

- Individual protocol developed for each product

- Based on manufacturers' guidance and current research

- Enabled all staff access to the information they needed for prescribing and administering IV Iron – enables the same treatment to be given to inpatients/obstetrics by medical staff
The protocols detail:

- General information, IV Iron preparations available and response to products
- Investigations required & flowchart for IV Iron use
- Clinical indications, contraindications and cautions
- Dosage table and guidelines on how to select the correct dose
- Guidelines for administration, including patient monitoring, side effects and treatment and management of adverse events
- Guidelines for obstetric use - ante-natal and post-natal
- Follow -up
Follow up

- Patients given forms for blood tests 3 weeks post infusion (or pre-op if sooner)

- Follow up letter with results sent to patient and GP/hospital consultant

- No further routine follow up but advised to contact GP if symptoms related to anaemia arise in the future

- Patients who have had Iron pre-operatively often find the cause for anaemia is resolved by the surgery they have had - no further treatment required.

- A number of patients receive regular infusions and are monitored by myself and/or their consultants and brought in when their Iron levels begin to drop.
Case study 1

- Male 43 years old
- Ulcerative Colitis – previous Colectomy
- Unable to tolerate oral Iron, issues around malabsorption.
- Symptomatic affecting work and home life
- Previously transfused
- Brought in for Cosmofer total dose infusion
- Good response to treatment – now has regular infusions every 5-6 months
- Has had 3 operations with Cosmofer infusions pre-operatively to optimise haemoglobin prior to surgery.
<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Cosmofer infusion</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb</td>
<td>95</td>
<td></td>
<td>125</td>
</tr>
<tr>
<td>HCT</td>
<td>0.32</td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>MCV</td>
<td>65</td>
<td></td>
<td>74</td>
</tr>
<tr>
<td>MCH</td>
<td>19.8</td>
<td></td>
<td>22.9</td>
</tr>
<tr>
<td>Iron</td>
<td>1.8</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Transferrin</td>
<td>2.7</td>
<td></td>
<td>2.1</td>
</tr>
<tr>
<td>Transferrin Saturation</td>
<td>3</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Ferritin</td>
<td>6</td>
<td></td>
<td>43</td>
</tr>
</tbody>
</table>
Case study 2

- Male 47 years
- Complex medical history
- MDS—refused all treatment, Hb averaged 20-30g/L for over 1 year.
- V. Poor quality of life
- Finally agreed to have an Iron infusion – still refused blood.
- Now has regular iron infusions every 8-12 weeks and maintains his Hb between 80 and 130g/L
<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Cosmofer infusion</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb</td>
<td>24</td>
<td></td>
<td>83</td>
</tr>
<tr>
<td>HCT</td>
<td>0.26</td>
<td></td>
<td>0.38</td>
</tr>
<tr>
<td>MCV</td>
<td>49</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>MCH</td>
<td>12</td>
<td></td>
<td>19.3</td>
</tr>
<tr>
<td>Iron</td>
<td>&lt;1</td>
<td></td>
<td>2.6</td>
</tr>
<tr>
<td>Transferrin</td>
<td>2.5</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Transferrin Saturation</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Ferritin</td>
<td>&lt;1</td>
<td></td>
<td>52</td>
</tr>
</tbody>
</table>
Results

Rise in Hb

Rise in Ferritin
Activity summary

Nurse led service only (does not include inpatient treatment or obstetrics)

• Over 200 new patient referrals

• Over 20 regular patients receiving infusions anything from every 8 weeks – 9 months

• Activity increasing as awareness of service, and issues of appropriate treatment grow

• The majority of our patients are in gastroenterology (IBD), Haematology, gynaecology, pre-operative patients and Obstetrics (manage their own case load)
The Good, The Bad, The Ugly
The Good

- Appropriate treatment
- Saved..... Red cells
- Alternative treatment option for patients who refuse blood
- Meets the objectives of Better Blood Transfusion & PBM
- Efficient service for iron deficient patients for whom oral iron isn’t an option or quick treatment is required

The Bad & The Ugly

- Beware of being a victim of your own success!
- Be realistic with capacity and patient throughput
- Staffing to cover the service during periods of leave
- Try and use a quick total dose infusion to make patient stay shorter, avoid capacity issues & improve patient experience
The boring important stuff

- Audit
- Re-evaluation of the service – identify problems and put in solutions

Quick simple fixes = big changes

- Admissions times of unit changed from 09.00-08.00 – more flexibility with capacity.
- Stock holding of IV Iron on unit – previous delays of up to 90 minutes waiting for prescriptions from pharmacy.
- The use of short notice cancellation slots

- Income generation from the service-Importance of the correct coding
The future

Currently we are limited by the number of outpatients we can admit due to capacity and staffing of the infusion suite.

Reduced patient stay would allow more patients to be admitted.

Plan;

• Audit of service

• Look at introduction of a quick total dose IV Iron

• Decreased infusion time equals increased capacity for patients and decreased cost to the Trust, increased potential throughput and income
Conclusion

- Appropriate treatment for patients
- Decrease in red cell usage
- Financial savings - Cheaper than red cells
- Avoids inpatient hospital admission and inappropriate transfusion
- An alternative treatment for patients who refuse blood - the service has been adopted and promoted by our Jehovah’s Witness liaison committee and their members
- Increased awareness of Iron deficiency anaemia and the appropriate treatment of it.
Why we really do this...