Update on the management of iron deficiency
Outline

• Need to improve management & avoid transfusion
• Diagnosis & investigation
• Oral iron & IV iron
• Tools & resources

No conflicts of interest
SO, WE'VE DONE IRON TO DEATH. WHAT'S NEXT?

THE END OF THE IRON AGE.
“All natural” iron supplement that’s gentle on the stomach...

• BONUS tissue transplant in each bag!
• Prescribed simply with the aid of a pen
2001 NHMRC Blood Component Guidelines

**Clinical Practice Guidelines**

**Appropriate Use of Blood Components**

- Use of blood components for clinical or laboratory indications not listed here is likely to be inappropriate. Consult the NHMRC/ACAT guidelines (www.nhmrc.gov.au) for further details.

- Clinical and laboratory indications for use should be documented.

**Red Blood Cells**

- Hb* Considerations
  - <10g/dL: Lower threshold may be acceptable in patients without symptoms and/or whose specific therapy is available.
  - 70-100g/dL: Likely to be appropriate during surgery associated with major blood loss or surgery for serious or symptomatic anemia.
  - >100g/dL: Not likely to be appropriate unless Hb is not the only decline factor. Classic symptoms of hypoglycemia, ongoing blood loss and/or

**Platelets**

- Use of platelets is likely to be appropriate
  - Bone marrow failure: At a platelet count of <50g/L and <20g/L, in the presence of infections, evidence of hemorrhage.
  - Surgical anemia: To maintain platelet count at >50g/L during surgery associated with major blood loss.
  - Platelet function disorders: May be appropriate in inherited disorders affecting platelet function.

**Fresh Frozen Plasma**

- Use of fresh frozen plasma is likely to be appropriate
  - Single factor deficiencies: Use specific factors if available.
  - Warfarin effect: In the presence of life-threatening bleeding, use in addition to vitamin K-dependent factor concentrates.
  - Acute DIC: Indicated where there is bleeding and abnormal coagulation not indicated for chronic DIC.
  - TTP: Accepted treatment.
  - Congenital fibrinogen deficiency: May be appropriate in patients undergoing high-risk procedures, use specific factor if available.
  - Antithrombin deficiency: May be appropriate in the presence of bleeding and abnormal coagulation.
  - Liver disease: May be appropriate in the presence of bleeding and abnormal coagulation.

**Cryoprecipitate**

- Use of cryoprecipitate is likely to be appropriate
  - Fibrinogen May be appropriate where there is clinical bleeding, deficiency. May be indicated for massive surgery, trauma or DIC.

**Notes:**

- Hb = hemoglobin, DIC = disseminated intravascular coagulation, TTP = thrombotic thrombocytopenic purpura.
Transfusion outside NHMRC Guidelines

But ¼ of red cell transfusions in audit in patients with definite or probable IDA

“This red line indicates the change in this red line over a period of time.”
Red cell Transfusion in IDA

– when an immediate increase in oxygen delivery is required, such as when the patient is experiencing end-organ compromise, or
– where IDA is complicated by serious, acute ongoing bleeding

Doesn’t replenish deficient iron stores!
“Please regard my own blood as a valuable & unique natural resource that should be conserved & managed appropriately”
3 Pillars of Patient Blood Management (PBM)

- Optimise Hb
- Minimise blood loss
- Tolerance of anaemia
Module 1: Critical Bleeding/Massive Transfusion is intended to assist and guide health-care professionals in making clinical decisions when managing patients with critical bleeding who require or are likely to require massive transfusion.

Module 1 is currently being reviewed. The review is being conducted as part of a pilot project to test various approaches to update the PBM Guidelines. The aim of the pilot is to use the lessons learned from the review of Module 1 to update the remaining modules using more efficient and cost-effective methodologies.

Module 2: Perioperative is intended to inform health-care practitioners, health educators, health service managers and policy makers about the pre, intra and postoperative care of patients undergoing surgery or invasive procedures, particularly those in which blood loss is anticipated.

Module 3: Medical is intended to assist and guide clinical decisions and coordination of health-care across the primary, secondary and tertiary care setting for patients with acute or chronic medical conditions requiring haematological intervention.

Module 4: Critical Care is intended to assist and guide health-care professionals in making clinical decisions when managing patients requiring critical care.

Module 5: Obstetrics and Maternity is intended to assist and guide health-care professionals in making clinical decisions when managing pregnant and postpartum women.

Module 6: Neonatal and Paediatrics is intended to assist and guide health-care professionals in making clinical decisions about blood management in neonatal and paediatric patients.

Patient Blood Management Guidelines

% Patients anaemic & with low red cell indices before elective surgery in SA 2008-10
Barrier Analysis: Cause & Effect Diagram

**AWARENESS**
- **Knowledge:** Lack of awareness of whole pathway, importance of pre-op anaemia, adverse outcomes of transfusion.
- **Access:** Ill defined responsibility for follow up and management of abnormal results.

**CARE PROCESSES**
- **Management:** Difficult to interpret the cause of anaemia, and therefore management.
- **Access:** Blood results not available at clinic.
- **Knowledge:** Lack of knowledge about importance of pre-op anaemia.

**RESULT MANAGEMENT**
- **Access:** Ill defined responsibility for who is responsible for follow up and management of abnormal results.
- **Knowledge:** Lack of knowledge of adverse outcomes of transfusion.
- **Knowledge:** Lack of knowledge about importance of pre-op anaemia.

**ACCESSIBILITY**
- **Knowledge:** Lack of access to GPs.

**KNOwLEDGE**
- **Patient:** Lack of awareness of whole pathway, importance of pre-op anaemia, adverse outcomes of transfusion.

**AWARENESS**
- **Hospital and GP:** Unclear about how to manage/treat anaemia once detected.

**Elective patients undergoing arthroplasty with anaemia**
Transfusion rates $1^0$ arthroplasty

![Graph showing transfusion rates for THR, QEH, and TKR from 2006-2015. The graph indicates the percentage of patients transfused each year for each procedure.]
IDA in hospitalised patients

- Retrospective case note review of patients with code of IDA (45% included)
- 119 patients in 2.5 years in 1 hospital in Vic
  - of 66 transfused: 36% no iron, 26% IV iron, 38% oral
  - of 53 not transfused: 23% no iron, 14% IV iron, 60% oral
  - 55% managed according to proposed guidelines (9% in cardiac patients)
Anaemia in persons ≥ 65 years in US

NHANES III 1988 – 1994
- 10% of people in US > 65 y
- 20% of people in US > 85 y
  - 1/3 due to nutrient deficiency (20% IDA)
  - 1/3 due to CKD and/or ACD (12% CKD)
  - 1/3 unknown cause

Guralnik et al Blood 2004
Anaemia by age in Australia: NHMS 2011-12

**Anaemia**
6.4% women v 2.5% men
12.6% diabetics v 4.7% non-diabetics
16.1% with abnormal eGFR v 3.1% without

**Low ferritin** in women
(low + normal Hb)
≤ 15 mcg/L = 8%
≤ 20 mcg/L = 12%
≤ 30 mcg/L = 22%

2011–12 National Health Measures Survey (NHMS)
N = 11,000, part of 2011–13 Australian Health Survey
N = 30,000 (80% participation rate)
Changes with increasing iron deficiency
‘I need something to make me feel better. Can you prescribe a Porsche?’
2009 National IDA Meeting Priorities

• Knowledge gap in interpretation of pathology results
  – red cell indices
  – iron studies
  – influence of inflammation
• Clinician knowledge of Australian oral & IV products
• Hospital / Primary care access to oral & IV preparations
Clinical update

Diagnosis and management of iron deficiency anaemia: a clinical update

Sant-Rayan S Pasricha, Stephen C Flecknoe-Brown, Katrina J Allen, Peter R Gibson, Lawrence P McMahon, John K Olynyk, Simon D Roger, Helen F Savio, Ramdas Tampi, Amanda R Thomson, Erica M Wood and Kathryn L Robinson


Abstract

Iron deficiency anaemia is common and affects a large proportion of the global population. Iron deficiency in the absence of overt anaemia is referred to as iron deficiency anaemia at risk (IDA). IDA is common and affects a large proportion of the global population. IDA can be a source of morbidity and a risk factor for adverse pregnancy outcomes.

Iron deficiency is defined as a decrease in serum ferritin levels and/or a decrease in red blood cell (RBC) indices (megaloblastic anaemia). IDA is a common condition that affects a large proportion of the global population. IDA can be a source of morbidity and a risk factor for adverse pregnancy outcomes.

Iron Deficiency

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2 Iron deficiency anaemia (IDA): assessment and management

**Anemia**
Hb below laboratory reference range for age, sex, gestation (full history and physical examination is essential in all cases)

- Serum ferritin <15–30 µg/L in adults
  - Serum ferritin <10–12 µg/L in children
    - **Confirmed IDA**
      - MCV may be normal in early IDA or with coexisting vitamin B12 or folate deficiency

- Serum ferritin > 15–30 µg/L but < 100 µg/L (see Box 3):
  - **Possible IDA**
    - Iron deficiency is not excluded in the presence of inflammation, chronic disease or high CRP

- Serum ferritin > 100 µg/L IDA unlikely
  - Identify alternative cause(s) of anaemia
  - FID may still be present in ACD or CKD if TfSat < 20%
  - Diagnosis of FID may be important for directing therapy with IV iron and ESAs

**Not consistent with IDA**
Identify alternative cause(s) of anaemia

**Consistent with IDA**
Review clinical findings for possible underlying pathology and sources of overt and occult blood loss (eg, GI, genitourinary, nose, mouth, blood donation)

**Preschool children**
- Consider:
  - Inadequate dietary iron
  - Inadequate complementary foods (eg, excess milk ingestion)
  - Cow’s milk allergy
  - Rapid/rebound growth, former low birth weight
  - Coeliac disease
  - Parasitic infection
  - GI blood loss

**Older children**
- Consider:
  - Inadequate dietary iron (especially if vegetarian)
  - Rapid/rebound growth
  - Coeliac disease
  - Parasitic infection
  - GI blood loss

**Adolescent and premenopausal women**
- Consider:
  - Inadequate iron intake
  - Blood loss (eg, menorrhagia, GI, haemostatic defect)
  - Coeliac disease
  - Parasitic infection

**Risk factors for GI pathology**
- GI symptoms
- Family history of colorectal cancer
- Age ≥ 50 years
- Refractory, recurrent or unexplained IDA

**Exclude:**
- GI blood loss (eg, neoplasm)
- Coeliac disease

**Investigations:**
- Gastroscopy/colonoscopy
- Coeliac screening
- Others as directed by clinical findings and context

**Treatment (see Box 4):**
- Oral iron liquid (3–6 mg/kg elemental iron per day) for at least 2–3 months after normalisation of Hb
- Optimise dietary iron content

**Adult men and postmenopausal women**
- **Exclude:**
  - GI blood loss (eg, neoplasm)
  - Coeliac disease

**Investigations:**
- Gastroscopy/colonoscopy
- Coeliac screening
- Others as directed by clinical findings and context

**Treatment (see Box 4):**
- Oral iron (usually 100–200 mg elemental iron per day**) for at least 3 months after normalisation of Hb
- IV iron for selected patients (see Box 4)
- Optimise dietary iron (secondary prevention) and address underlying cause

**Notes:**
- **B12**
- **CRP**
- **TfSat**
- **IV iron**
Our Iron Deficiency Anaemia (IDA) Course

 Aimed to increase knowledge to diagnose, investigate and manage IDA.


 For a multi-disciplinary audience e.g. medical clinicians, nurses, midwives, pharmacists and dietitians.

 Interactive tools e.g. an algorithm to assist with diagnosis and treatment.

 Downloadable commercial reference preparation chart for clinicians and patient information.

 Breaking your blood with iron and iron deficiency anaemia.

 Includes clinical case studies and online assessment.

 Certificate for Continuing Professional Development (CPD).

 Our App

 An IDA Algorithm Designed to increase your understanding of the diagnosis, investigation and management of Iron Deficiency Anaemia.

 www.bloodsafelearning.org.au
Iron stores depleted

With continued negative iron balance, iron stores are depleted and will no longer be able to supply iron to the plasma.

Iron is transported in the plasma bound to transferrin. This iron is used for haemoglobin synthesis. Body iron stores, including those in the bone marrow, are now exhausted.

The serum ferritin level falls further (reflecting storage iron depletion) and the transferrin saturation, which reflects transport iron, becomes low. Haemoglobin and red cell production (erythropoiesis) however remain normal.

Iron deficiency anaemia

Red cell production is reduced. Haemoglobin is below the laboratory reference range (for age/sex/gestation). The fall in haemoglobin level is followed by a fall in MCH and then a fall in MCV.

If previous results are available, a fall within the normal range may be evident before they become abnormal.

Changes on blood film examination are not usually marked until the haemoglobin level falls below 100-110 g/L, when characteristic features, including abnormally shaped red cells appear (e.g., elongated red cells called 'elliptocytes' and very narrow cells called 'pencil cells').
The Iron Deficiency Anaemia (IDA) Algorithm is now available for iOS (iPhone, iPad and iPod) and Android.

The iron deficiency anaemia algorithm is an educational tool designed to increase your understanding of the diagnosis, investigation and management of iron deficiency anaemia.

Access for free from your mobile device.
Is anaemia present?  
Is haemoglobin below laboratory reference range for age, sex and gestation?

Yes  No

Full history and examination is essential in all cases.
What is the ferritin level?

- Serum ferritin <15-30 mcg/L in adults or <10-12 mcg/L in children
- Serum ferritin >15-30 mcg/L but <100 mcg/L
- Serum ferritin >100 mcg/L

Ferritin is an acute-phase protein and is elevated in inflammation, infection, liver disease and malignancy. This can result in misleadingly elevated ferritin levels in iron-deficient patients with coexisting systemic illness. In the elderly or among patients with inflammation, iron deficiency may still be present with ferritin values up to 60-100 mcg/L. Serum iron should not be used to diagnose iron deficiency as it is low in both iron deficiency and inflammation and has a marked diurnal variation.
Confirmed IDA

In an anaemic adult, a ferritin level <15 mcg/L is diagnostic of iron deficiency, and levels of 15-30 mcg/L are highly suggestive. In children, lower thresholds (ferritin <10-12 mcg/L) or levels below the age specific cut-offs for the laboratory performing the tests are used. MCV may be normal in early IDA or with co-existing B12 or folate deficiency.

Investigate underlying causes

Use the button to investigate underlying cause/s of IDA
Consistent with IDA

Investigate and determine the underlying cause(s) of IDA. Review clinical findings for possible underlying pathology and sources of overt & occult blood loss (eg GI, genitourinary, nose, mouth, blood donation)

Choose an appropriate category for information on possible underlying causes:

- Pre-school children
- Older children
- Adolescent & premenopausal women
- Adult men & postmenopausal women

The management of IDA involves two CONCURRENT components: determination and treatment of the underlying cause(s) (such as bleeding) and iron therapy to normalise the haemoglobin and replenish iron stores.
Adult men and postmenopausal women

Investigations to exclude GI pathology

Exclude:
- GI blood loss (eg neoplasm)
- Coeliac disease

Investigations:
- Gastroscopy/colonoscopy
- Assessment for coeliac disease
- Others as directed by clinical findings and context

Treatment options

The management of IDA involves two CONCURRENT components: determination and treatment of the underlying cause(s) (such as bleeding) and iron therapy to normalise the haemoglobin and replenish iron stores.
Look for a cause of iron deficiency in parallel to treatment
Adolescent and premenopausal women

Consider the following, then use the button to explore risk factors for gastrointestinal (GI) pathology:

- Inadequate iron intake
- Blood loss (e.g., menorrhagia, GI, haemostatic defect)
- Coeliac disease
- Parasitic infection
- Risk factors for GI pathology

The management of IDA involves two CONCURRENT components: determination and treatment of the underlying cause(s) (such as bleeding) and iron therapy to normalise the haemoglobin and replenish iron stores.

Use the button to explore risk factors for GI pathology.
Risk factors for GI pathology

Consider the following GI risk factors then use the button for information on further investigations to exclude pathology

- GI symptoms
- Family history of colorectal cancer
- Age ≥50 years
- Refractory, recurrent or unexplained IDA

Further investigations

The management of IDA involves two CONCURRENT components: determination and treatment of the underlying cause(s) (such as bleeding) and iron therapy to normalise the haemoglobin and replenish iron stores.

Click the button to explore exclusions and investigations
Treatment options in adults

Options:
- Oral iron: usually 100-200mg elemental iron per day for at least 3 months post normalisation of Hb
- IV iron for selected patients
- Optimise dietary iron (secondary prevention) and address underlying cause

Refer to the list of commercially-available forms of iron supplementation in Australia suitable for the treatment of IDA in Module Three of the BloodSafe eLearning IDA course. See Module Four for indications for IV iron. Click on the home button below to start again.
BloodSafe eLearning Australia Iron Deficiency Anaemia app - The Iron Deficiency Anaemia algorithm is an educational tool designed to increase understanding of the diagnosis, investigation and management of Iron Deficiency Anaemia (IDA). The IDA Algorithm is now available as an app for iPhone, iPad and Android users.

BloodSafe eLearning Iron Deficiency Anaemia (IDA) module - The IDA course aims to update and enhance your knowledge about the diagnosis, investigation and management of IDA. It is designed for medical practitioners, nurses, midwives, pharmacists and other allied healthcare professionals such as dieticians.

Diagnosis and management of iron deficiency anaemia - An Australian clinical update from the Medical Journal of Australia, 2010.

Guidelines for the Management of Iron Deficiency Anaemia - Comprehensive guidelines from the British Society of Gastroenterology with an excellent flow chart outlining the investigation of iron deficiency in different patient groups.

Oral iron dosing chart for clinicians (PDF 512KB) - Colour illustrations and dosing table of oral preparations available in Australia that are suitable for the treatment of iron deficiency anaemia.

Prescribing checklist for IV iron (PDF 99KB) - This checklist provides guidance on the indications, contradictions and precautions for the use of IV iron.
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$16.00
250ml bottle
PBS listed ($19.35)$

*Intended as a guide to the relative cost NOT price to the consumer (actual cost of OTC medicines may vary). Price guide from MIMS August 2011 except **Ferro-tab (RRP from AFT). $ For PBS listed products, the PBS cost for concession holders is $5.60 (at time of writing). BloodSafe Oral Iron Table Version 1.7 October 2011. For updates & other resources see www.health.sa.gov.au/bloodsafe
Maltofer (oral iron polymaltose) available in Australia since July 2015 – tablets (approx $26 per 30), syrup
Boosting your blood with iron

Why iron tablets have been prescribed for you
This could be because you have too little iron in your blood and have been prescribed iron tablets. It could be that your iron levels are normal and they are there in case you need any in the future.

Why is iron important?
Iron is needed to make normal red blood cells, which carry oxygen around your body. It’s also needed to make myoglobin, a protein inside your muscles that stores oxygen for use when you exercise. Too little iron can cause tiredness and make it harder for your muscles to work properly.

Why is having a “reserves” of iron important?
Some iron is stored in your bones to be used later if needed. It’s also stored in the liver and skin. This is known as your body’s “iron reserves”. They gradually fall over several months if you don’t take iron tablets and may need to be replaced with iron tablets if you don’t eat enough iron rich foods.

Taking iron tablets
Iron tablets contain enough iron to raise your iron levels.

Iron tablets with enough iron
- Make sure you take them with a food that contains vitamin C, such as an orange. This makes it easier for your body to take in the iron.
- Take them with food at the same time every day, so you get the same effect from each dose.
- Take them with meals or with a glass of milk, which can make them easier to swallow.

Ways to avoid side effects
- Don’t drink large amounts of milk, and avoid eating or drinking large amounts of tea, coffee, or brassica vegetables (such as cabbage, broccoli, and cauliflower) as they can affect the amount of iron you absorb.
- If you’re not sure how much iron you need, ask your doctor.
- If you’re taking iron tablets, you may need less vitamin C than usual. Follow your doctor’s recommendations.

Other ways of getting iron
- Iron can also be found in animal products, such as red meat, white meat, and fish. If you’re not sure how much you need, ask your doctor.
- Iron can also be obtained from other sources, such as iron supplements and iron-enriched foods. If you’re not sure how much you need, ask your doctor.

For more information
- BloodSafe
- www.bloodsafe.org

Translations available
IV Iron in Australia

- Iron polymaltose (Ferrum H / Ferrosig)
- Iron sucrose (Venofer)
- Iron carboxymaltose (Ferinject)
IV Iron Prescribing Checklist

INDICATION
- Confirmation of iron deficiency anaemia AND:
- Severe clinical signs of iron deficiency

PATIENT LABEL
- UR No ..........................................................
- Name ............................................................
- D.O.B ......................................................... Sex ..................................................
- Doctor ......................................................... Ward ..............................................

- Short time to non-surgical surgery associated with substantial blood loss
- Rapid iron replenishment clinically important to prevent decompensation or transfusion
- Demonstrated intolerance to oral iron (despite modification of dose and frequency)
- Demonstrated non-compliance with oral iron
- Demonstrated lack of efficacy with therapeutic doses of oral iron (100-200 mg of elemental iron a day eg. 1 or 2 tablets per day of either Ferro-lab, Ferro-fuital, Ferrogolden, Ferrograd G, Polfer or FCH)
- Congenital iron (blood) losses exceeding absorption
- Malabsorption of iron
- Absolute or functional iron deficiency in chronic heart failure (as per national guidelines)
- Absolute or functional iron deficiency in chronic kidney disease (as per Renal Unit guidelines)

Details re indication

Contraindications
- NONE
- Anaemia not due to iron deficiency (diagnosis must be based on laboratory tests; seek advice if unsure of anaemia cause)
- Evidence of iron overload or disturbances of iron utilisation including haemochromatosis
- Known hypersensitivity to IV or IM iron (discuss choice of IV iron preparation and indication with an expert such as haematologist, nephrologist, gastroenterologist or other specialist)

Previous IV or IM iron
- NONE

Precautions
- Significant liver dysfunction (discuss risks/benefits with gastroenterologist), avoid in patients with hepatic dysfunction where iron overload is a complicating factor, in particular porphyria cutanea tarda
- Use with caution in acute or chronic infection after assessing risks/benefits and seek expert advice
- Avoid during active systemic infection / bacteraemia
- Use with caution in asthma, eczema or atopic allergies, consider in hospital units - seek expert advice
- In pregnancy seek expert advice re risks/benefits, administer in hospital & avoid in first trimester
- Not recommended in children under 14 years - seek expert advice
- See package leaflet, fertility, sodium content, paramyxovirus leakage (may cause permanent staining)

- IV iron can cause hypersensitivity reactions (including anaphylaxis), which may be fatal & can occur after previous uneventful doses. Cardiopulmonary resuscitation facilities MUST be available. Stop immediately if signs of allergy or intolerance. Observe for at least 30 min post infusion.

- Regular monitoring of Hb & ferritin for recurrent iron deficiency and iron overload is required. Access underlying cause in all patients - refer to Clinical Update on Iron Deficiency Anaemia MJA 2010

- Always consult full product information of IV iron product to be used, seek expert advice when required

- Patient LEAFLET on IV iron given (www.sahealth.sa.gov.au/factsheets)

- STOP and THINK

- "It sort of makes you stop and think, doesn’t it."
### IV Iron Prescribing Checklist

**INDICATION**

*Confirmed Iron Deficiency Anaemia AND:*

*See Clinical Update on Iron Deficiency Anaemia MJA 2010*

<table>
<thead>
<tr>
<th>UR No.</th>
<th>Name:</th>
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<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>D O B</th>
<th>Sex:</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Doctor</th>
<th>Ward:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

- [ ] Short time to non-deferrable surgery associated with substantial blood loss
- [ ] Rapid iron repletion clinically important to prevent decompensation or transfusion
- [ ] Demonstrated intolerance to oral iron (despite modification of dose and frequency)
- [ ] Demonstrated non-compliance with oral iron
- [ ] Demonstrated lack of efficacy with therapeutic doses of oral iron (100-200 mg of elemental iron a day: eg. 1 or 2 tablets per day of either Ferro-tab, Ferro-f-tab, Ferrogradumet, Ferrograd C, Fefol or FGF)
- [ ] Ongoing iron (blood) losses exceeding absorption
- [ ] Malabsorption of iron
- [ ] Absolute or functional iron deficiency in chronic heart failure (as per national guidelines)
- [ ] Absolute or functional iron deficiency in chronic kidney disease (as per Renal Unit guidelines)

**Details re indication:**

________________________________________________________________________

________________________________________________________________________
**Contraindications**

- None

- Anaemia not due to iron deficiency (diagnosis must be based on laboratory tests, seek advice if cause of anaemia is unclear)

- Evidence of iron overload or disturbances of iron utilisation including haemochromatosis

- Known hypersensitivity to IV or IM iron (discuss choice of IV iron preparation and indication with an expert such as haematologist, nephrologist, gastroenterologist or other specialist)

**Previous IM or IV iron**

- None

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**Precautions**

- Significant liver dysfunction (discuss risks / benefits with gastroenterologist), avoid in patients with hepatic dysfunction where iron overload is a precipitating factor, in particular porphyria cutanea tarda

- Use with caution in acute or chronic infection after assessing risks / benefits & seek expert advice. Avoid during active systemic infection / bacteraemia.

- Use with caution in asthma, eczema or atopic allergies, consider in hospital use — seek expert advice

- In pregnancy seek expert advice re risks / benefits, administer in hospital & avoid in first trimester

- Not recommended in children under 14 years - seek expert advice

- See PI re lactation, fertility, sodium content, paravenous leakage (may cause permanent staining)

- IV iron can cause hypersensitivity reactions (including anaphylactoid), which may be fatal & can occur after previous uneventful doses. **Cardiopulmonary resuscitation facilities MUST be available.** Stop immediately if signs of allergy or intolerance. Observe for at least 30 min post infusion.

- Regular monitoring of FBC & ferritin for recurrent iron deficiency and iron overload is required. Assess underlying cause in ALL patients — refer to Clinical Update on Iron Deficiency Anaemia MJA 2010.

- Always consult full product information of IV iron product to be used, seek expert advice when required.


---

**Completing MO**

Name: .................................................. Mobile/Pager: ..........................................................

Signature: .................................. Date: .................................. Designation/Unit: ..................................
**Difference between IV iron preparations**

IV iron preparations differ from each other by the size of the core, the type and density of the surrounding carbohydrate shell, and the overall molecular weight. Maximum dosage and infusion rates are specific to each product and are not interchangeable. The molecular weight of iron sucrose is 34–60 kDa, ferric carboxymaltose is 150 kDa and iron polymaltose is approximately 450 kDa.

Three different IV iron preparations

Increasing molecular weight
Table 1. Total Iron Dose With the FCM Dose Regimen

<table>
<thead>
<tr>
<th>Hb (g/dL)</th>
<th>Body weight &lt;70 kg</th>
<th>Body weight ≥70 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥10</td>
<td>1000 mg</td>
<td>1500 mg</td>
</tr>
<tr>
<td>7–10</td>
<td>1500 mg</td>
<td>2000 mg</td>
</tr>
</tbody>
</table>

NOTE. Total dosage was administered in single infusions of 500 mg or 1000 mg iron as FCM. For patients with a body weight <67 kg, single doses of 500 mg were given.
Intravenous (IV) iron infusions

What is an IV iron infusion?

Intravenous (IV) iron infusions are the best form of treatment for iron deficiency. A needle is inserted into a vein in the arm to allow the iron to be given directly into the bloodstream. This is known as an intravenous (IV) injection.

How does IV iron work?

The iron travels through the body and is absorbed into the bloodstream. The iron is then used to make new red blood cells. This helps to increase the number of red blood cells in the blood, which helps to improve the oxygen-carrying capacity of the blood.

Benefits of IV iron

Compared with oral iron supplements, IV iron infusions offer:

- Immediate availability of iron for the body
- Higher absorption rates due to direct delivery to the bloodstream
- Improved efficacy in people who have difficulty absorbing iron from the stomach
- Lower risk of side effects such as constipation or diarrhea

Risks of IV iron

Side effects are uncommon and include:

- Mild local reactions at the injection site
- Allergic reactions
- Anaphylaxis

What does it feel like?

Some people do not notice any pain or discomfort when an IV injection is given. Others may experience some local discomfort or stinging at the injection site. You will feel a tugging or pulling sensation as the needle is inserted into the vein. You may also feel a slight burning sensation as the IV fluid is administered. Some people feel a mild headache or dizziness.

Intravenous (IV) iron infusions (continued)
Thank-you
Meta-analysis of efficacy & safety of ferric carboxymaltose

• 14 studies with 2,348 randomised patients exposed to ferric carboxymaltose

• Anaemia secondary to CKD, blood loss in obstetric and gynae conditions, GI disease, heart failure

• 3 cohort studies

• Iron given up to the total iron deficit, to max of 1000 mg per week

Moore et al. BMC Blood Disorders 2011, 11:4
http://www.biomedcentral.com/1471-2326/11/4
Response was defined in various ways:
Achieving target Hb increase (typically ≥20 g/L)
Achieving a target Hb level (typically ≥120 g/L)
Figure 2 Time course for serum ferritin changes.
### Table 4. Iron product–related adverse reactions (≥1% of study patients)\(^1\)

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>Ferric carboxymaltose ((n = 1,775))</th>
<th>Oral or IV iron comparator ((n = 1,783))</th>
<th>Oral iron ((n = 253))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea</td>
<td>7.2%</td>
<td>1.8%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>3.8%</td>
<td>1.9%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Flushing/hot flush</td>
<td>3.6%</td>
<td>0.2%</td>
<td>0%</td>
</tr>
<tr>
<td>Blood phosphorus decrease</td>
<td>2.1%</td>
<td>0.1%</td>
<td>0%</td>
</tr>
<tr>
<td>Dizziness</td>
<td>2%</td>
<td>1.2%</td>
<td>0%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>1.7%</td>
<td>0.5%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Injection-site discoloration</td>
<td>1.4%</td>
<td>0.3%</td>
<td>0%</td>
</tr>
<tr>
<td>Headache</td>
<td>1.2%</td>
<td>0.9%</td>
<td>0%</td>
</tr>
<tr>
<td>ALT increase</td>
<td>1.1%</td>
<td>0.2%</td>
<td>0%</td>
</tr>
<tr>
<td>Dysgeusia</td>
<td>1.1%</td>
<td>2.1%</td>
<td>0%</td>
</tr>
<tr>
<td>Hypotension</td>
<td>1%</td>
<td>1.9%</td>
<td>0%</td>
</tr>
<tr>
<td>Constipation</td>
<td>0.5%</td>
<td>0.9%</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

*Note: ALT = alanine aminotransferase; IV = intravenous.*
### Cardiac – chronic heart failure

<table>
<thead>
<tr>
<th>Recommendation</th>
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<tbody>
<tr>
<td><strong>R3</strong></td>
</tr>
</tbody>
</table>

In patients with CHF, identification and treatment of iron deficiency (absolute and functional) is recommended to improve functional or performance status.

This is consistent with the 2011 Update to the National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand *Guidelines for the prevention, detection and management of chronic heart failure in Australia*, 2006.

Note: The studies reviewed only included patients treated with IV iron and of NYHA functional classes II or III.
50 GP Educational Visits

- 82% individual visits, average 37 min
- 86% very interested in topic
- 94% believed pre-op anemia/ID role of GP
- 16% used IM iron, difficulties access to IV
- 42% did CRP but many unaware why, iron studies if microcytic
- 44% consulted haematologist, 36% pathology service for advice
- 84% prescribed a particular oral iron (therapeutic dose) although unaware of interactions
- Frustrating navigating referrals to hospitals