

Iron Deficiency Anaemia

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Red Flags

- Unexplained persistent iron deficiency anaemia

Background

About iron deficiency anemia

Iron deficiency anaemia is the major cause of anaemia worldwide. It is preceded by iron deficiency. Because iron overload can be toxic, iron absorption is limited in the body to 1 to 2 mg a day. The remainder of the daily requirements (25 mg a day) come through recycling after the break down of red cells.

- Iron deficiency anaemia occurs:
 - in males when haemoglobin (Hb) < 130 g/L
 - in females when Hb < 120 g/L
 - with ferritin level < 30 microgram/L (in adults) in iron deficiency and < 10 microgram/L in iron deficiency anaemia.
- Iron deficiency can be present with ferritin levels of 30 to 100 microgram/L in the presence of inflammatory disease.
- Dietary iron deficiency is the commonest nutritional deficiency in children and usually occurs in toddlers.

1. Take a history. Ask about:

- **symptoms of anaemia.**

Symptoms of anaemia

- Fatigue
- Palpitations
- Shortness of breath on exertion
- Worsening angina
- Lack of concentration
- Headache and dizziness

- **blood loss.**

Blood loss

- Gastrointestinal – change in bowel habit, rectal bleeding, weight loss
 - Menstrual – see [Heavy Menstrual Bleeding](#)
 - ENT – recurrent epistaxis
 - Haematuria
 - Blood donation
 - Following surgery
- diet inadequacy – vegans, eating disorders, toddlers .
 - failure of iron absorption – malabsorption, e.g. coeliac disease, inflammatory bowel disease.
 - excessive requirements – pregnancy, breast-feeding, athletes, infant and toddlers.
 - medications – NSAIDs, aspirin, anticoagulants, calcium supplements, antacids.

2. **Examine the patient.**

Examine the patient

- Check pulse rate, blood pressure, respiratory rate to ensure haemodynamically stable.
- Assess conjunctiva for pallor, jaundice.
- Examine for cardiac failure in severe cases.
- Perform abdominal examination for splenomegaly, hepatomegaly and any masses.
- Perform a rectal examination if patient has rectal bleeding or tenesmus.

3. Arrange investigations based on history and examination:

- Assess renal function: Urinalysis for haematuria and albumin, electrolytes, urea, and creatinine to calculate eGFR and albumin creatinine ratio.
- Arrange coeliac serology, and ESR if suspect malabsorption.
- Arrange and **interpret serum ferritin** in the setting of **microcytic anaemia.**

Microcytic anaemia

- Usually caused by iron deficiency.
- May be caused by a haemoglobinopathy, sideroblastic anaemia, anaemia of chronic disease or lead poisoning.
- Haemoglobin electrophoresis is recommended in patients with microcytic hypochromic anaemia of appropriate ethnic background.
- Note that co-existent B12 or folate deficiency may give mixed picture.

Interpreting serum ferritin

Conflicting results may occur when iron deficiency is associated with an inflammatory response and ferritin may be normal.

- Ferritin reflects tissue iron stores as well as being an acute phase protein.
- Low Hb, ferritin < 20 micrograms/L – iron deficiency anaemia
- Low Hb, ferritin 20 to 100 micrograms/L, ESR raised, CRP raised – potential iron deficiency anaemia
- If preoperative, normal Hb, ferritin < 100 microgram/L – suboptimal iron stores
- Normal Hb, ferritin < 30 micrograms/L, CRP normal – iron deficiency without anaemia
- Anaemia, ferritin > 100 micrograms/L, CRP raised or normal – anaemia of chronic disease or inflammation or other cause of anaemia in adults

See Australian Red Cross Blood Service – [Interpretation of Laboratory Results](#).

- Arrange faecal occult blood test (FOBT).
 - Organise abdominal ultrasound if palpable mass or hepatosplenomegaly.
4. If investigations do not confirm iron deficiency, see Anaemia in Adults.
5. Decide **possible cause** and consider **criteria for gastrointestinal tract investigation in unexplained iron deficiency anaemia**.

Criteria for gastrointestinal tract investigation in unexplained iron deficiency

- Iron deficiency in men and post-menopausal women:
 - Ferritin < 30 µg/L
 - Ferritin 30 to 100 µg/L in the presence of inflammation (e.g. C-reactive protein (CRP) ≥ 5 mg/L)
- Iron deficiency that persists despite correction of potential causative factors.
- Iron deficiency in pre-menopausal women with:
 - positive coeliac serology.
 - positive faecal occult blood test.
 - menorrhagia that has been treated, with good cycle control.

Possible causes

- *Excessive blood loss, e.g.:*
 - *gastrointestinal tract blood loss, e.g. nonsteroidal anti-inflammatory drugs (NSAIDs), cancer, ulcer.*
 - *menorrhagia.*
 - *recurrent epistaxis.*
 - *renal tract malignancy.*
 - *chronic blood donation.*
 - *after major surgery with inadequate replacement.*
 - *intestinal worms*
- *Dietary inadequacy especially in growing children, elderly, vegans, vegetarians, and patients with anorexia nervosa.*
- *Failure of iron absorption, e.g.:*

- *medications, e.g. antacids, calcium supplements*
 - *malabsorption – coeliac disease, pernicious anaemia, inflammatory bowel disease, autoimmune gastritis*
 - *after gastric surgery.*
 - *Excessive requirements, e.g. [pregnancy](#), breastfeeding, rapid growth in children, extreme athletes.*
 - *Familial diseases*
6. If an elderly patient is in an aged care residential facility, consider carefully the implications of further investigations and treatments of iron deficiency anaemia. Consider discussing with family members and whether the patient has an [advance care plan](#) in place.

Management

1. Refer to [Emergency Department](#) if:
 - shortness of breath or chest pain with iron deficiency.
 - haemodynamic compromise.
 - acute gastrointestinal bleeding.
2. If **criteria for gastrointestinal tract investigation**, arrange [urgent or routine gastroenterology referral](#).
3. Manage any **established cause**.

Established cause

- Dyspepsia with iron deficiency – strongly consider treatment with a proton pump inhibitor and request [urgent or routine gastroenterology referral](#).
See [Dyspepsia](#).
 - If the patient is on:
 - nonsteroidal anti-inflammatory (NSAIDs) without dyspepsia or heartburn, consider NSAID cessation or seek [gastroenterology advice](#).
 - aspirin, consider adding proton pump inhibitor.
 - anticoagulants, consult with appropriate specialist for advice.
See [Anticoagulation](#).
 - Colorectal – see [Colorectal Cancer Symptoms](#).
 - Menorrhagia – see [Heavy or Irregular Menses](#).
 - Overt blood loss e.g., haematuria – manage as clinically appropriate.
4. If suspect diet, educate patients on **dietary sources of iron**.

Dietary sources of iron

- Give patient an [Iron information leaflet](#), or consider requesting dietetics if appropriate.
- Advise that:
 - Vitamin C enhances the absorption of non-haem iron (iron not from meat products).
 - Calcium inhibits absorption of both haem iron (iron from animal products) and non-haem iron.

- Tea and, to a lesser degree, coffee reduce the amount of iron available for absorption.

5. Trial oral iron therapy in all patients unless < 6 weeks before non-deferrable surgery.

6. Consider whether a **blood transfusion** is indicated.

Blood transfusion criteria

<i>Level</i>	<i>Transfusion</i>
< 70 g/L	<ul style="list-style-type: none"> • <i>Transfusion of red cells is usually indicated.</i> • <i>A lower threshold may be acceptable in patients:</i> <ul style="list-style-type: none"> • <i>without symptoms.</i> • <i>where specific therapy is available e.g., vitamin B12 administration in patients with pernicious anaemia to correct the anaemia.</i>
70 to 100 g/L	<p><i>Transfusion of red cells is likely to be appropriate:</i></p> <ul style="list-style-type: none"> • <i>if there are signs or symptoms of impaired oxygen transport.</i> • <i>during any surgery associated with major blood loss (determined by the anaesthetist).</i>
80 to 100 g/L	<p><i>For patients with chronic anaemia, transfusion of red cells may be appropriate to control anaemia-related symptoms.</i></p>
> 100 g/L	<p><i>Transfusion of red cells is not likely to be appropriate unless there are specific indications.</i></p>

7. Consider **parenteral iron**.

Parenteral iron

Parenteral iron may be indicated if:

- *intolerance or poor response to, or malabsorption of oral iron.*
- *ongoing blood loss e.g., gastrointestinal or menorrhagia.*
- *functional iron deficiency e.g., chronic kidney disease, chronic inflammation, or malignancy.*
- *less than 6 weeks to non-deferrable surgery.*
- *symptomatic, to avoid decompensation and reduce need for further transfusion.*
- *a history of chronic iron deficiency anaemia with low iron stores and MCV dropping, even before haemoglobin drops.*

Avoid intramuscular injection of iron because absorption is poor, the skin may become discoloured, and the injection is very painful.

8. Consider iron infusion or blood transfusion for a patient with symptomatic ischaemic heart disease with Hb ≤ 100 g/L. If a patient with stable ischaemic heart disease requires blood

transfusion, discuss with their cardiologist.

9. Manage all **preoperative patients** before elective surgery.

Preoperative patients

- *Treat patients with iron-deficiency anaemia with iron before surgery. Consider intravenous iron.*
- *Investigate incidental iron deficiency.*
- *Consider offering preoperative iron to patients with low iron stores (ferritin < 100 micrograms/L) due for surgery associated with significant blood loss e.g., joint replacement surgery. This is to maximise iron stores and aid recovery from postoperative anaemia.*
- *The anaesthetist will decide if blood transfusion is indicated.*
- *See the National Blood Authority – [Fit for Surgery: Managing Iron Deficiency Anaemia](#).*

10. **Monitor** the patient after iron therapy.

Monitoring

- *Check ferritin and FBE after 1 to 3 months of iron replacement to ensure normal levels.*
- *If persisting iron deficiency refer for [urgent or routine gastroenterology referral](#).*
- *If iron studies are normal, continue oral iron treatment for another 3 to 6 months to build up iron stores. Test ferritin to confirm that iron stores have been replenished.*
- *If cause of the anaemia has been corrected, iron therapy can be stopped.*
- *Frequency of further monitoring should be based on the clinical status of the patient, the severity of the iron deficiency anaemia, the reversibility of the underlying cause, and patient response to treatment.*

11. Provide **long-term monitoring**.

Long-term monitoring

- *FBE and iron studies every 3 months for a year and further checking after 6 to 12 months is recommended.*
- *If iron studies show an inadequate response assess possibility of:*
 - *poor compliance with therapy.*
 - *inaccurate diagnosis.*
 - *poor oral iron absorption.*
 - *ongoing bleeding (consider referring for small bowel visualisation with Pillcam).*
 - *B12/folate deficiency.*
 - *inadequate bone marrow response.*
 - *inadequate dietary intake.*

Referral

- Refer to [Emergency Department](#) if:
 - shortness of breath or chest pain with iron deficiency.
 - haemodynamic compromise.
 - acute gastrointestinal bleeding.
- If **criteria for gastrointestinal tract investigation**, arrange [urgent or routine gastroenterology referral](#).

Information

For health professionals

Education

- Australian Doctor – [How to Treat: Iron Deficiency](#) (login required)
- BMJ Learning – [Anaemia in Old Age: Common Presentations](#) [login required]

Further information

- GESA – [Iron Deficiency](#)
- Health.vic – [Perioperative Patient Blood Management Guidelines](#)
- Medical Journal of Australia:
 - [Diagnosis and Management of Iron Deficiency Anaemia: A Clinical Update](#)
 - [Iron and Vegetarian Diets](#)
- National Blood Authority Australia – [Patient Blood Management Guidelines](#)

For patients

- [Iron](#) – Nutrition Australia
- [Iron-deficiency Anaemia](#) – Patient
- [Iron Deficiency Adults](#) – Better Health Channel

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