NHS
Blood and Transplant

Information for clinicians

Iron deficiency and iron deficiency anaemia

Iron is essential for red blood cell production and iron deficiency is the most common nutritional deficiency worldwide both in developed and developing countries. Iron deficiency (ID) is a progressive process of decreasing iron stores from normal, through stages of depletion, to absent with the eventual consequence being iron deficiency anaemia (IDA). In 2016 the prevalence of IDA in the UK was 5% or above in all age groups[1].

Causes of ID and IDA include inadequate dietary intake, impaired absorption, and blood loss. The management of ID requires investigation and correction of the underlying cause in addition to treatment with iron supplementation.

Most patients with IDA do not require transfusion. While acute blood loss is frequently associated with haemodynamic instability and poor oxygen delivery, chronic IDA is not associated with hypovolaemia, and oxygen delivery is facilitated by increases in 2,3-diphosphoglycerate and a shift in oxygen dissociation.

Patients presenting with severe IDA and symptoms of inadequate oxygen delivery, e.g. syncope or chest pain, are likely to benefit from transfusion. If a decision is made to transfuse a patient for IDA with symptoms of inadequate oxygen delivery, a single unit of red cells is usually sufficient and further increases in haemoglobin concentration (Hb) can be achieved with oral and/or parenteral iron. Recently developed intravenous iron formulations have less allergic reactions reported than earlier preparations.

Avoiding unnecessary red cell transfusions is both beneficial for patients and essential to ensure that supplies meet appropriate demands.

NB: Transfusions given for haematinic deficiencies with no symptoms are reportable to the Serious Hazards of Transfusion UK haemovigilance scheme (SHOT).

Parenteral iron therapy is indicated when there is non-compliance with, or intolerance to, oral iron or proven malabsorption. Several papers report a faster increase in Hb and better replenishment of iron stores when compared with oral therapy. When the degree of anaemia is severe, or time to correct anaemia is limited, parenteral iron should be considered.

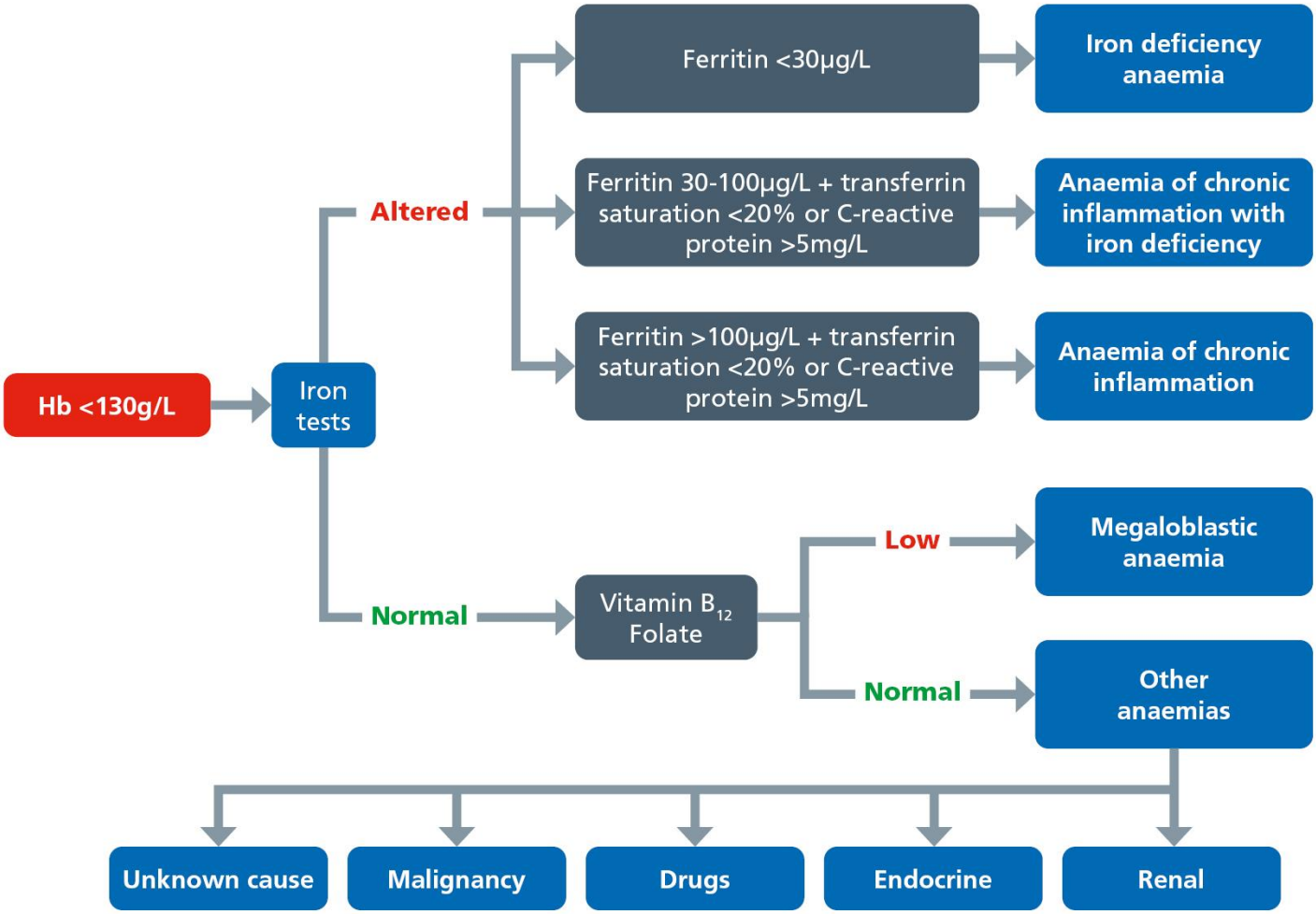
Safety data regarding iron (both oral and modern parenteral preparations) versus transfusion supports the initial use of oral iron. Side effects of oral iron include nausea and gastric discomfort.

Key interventions

- Hospitals should have guidelines, education, and resources to support the recognition, detection, and treatment of ID and IDA. Guidelines should include appropriate investigations for the cause of iron deficiency
- Laboratory procedures should be in place to support empowerment of staff to identify and challenge inappropriate transfusion requests for iron deficient patients
- Separate pathways should be in place for elective surgical patients, to allow for pre-operative optimisation, and for anaemia in pregnancy

Patients suspected of having anaemia should have FBC and haematinics checked (ferritin, CRP, TSATS, B12 and folate) to determine the type of deficiency. The algorithm below can be used to classify cause of anaemia.

Algorithm for classification of perioperative anaemias[2]



It is important to distinguish iron deficiency from other causes of anaemia.

- If iron deficiency is confirmed, further investigations should determine the cause, e.g. GI or gynaecological bleeding, inflammatory conditions, or dietary insufficiency
- Refer to relevant speciality for further investigation and treatment if indicated
- Discuss dietary advice, e.g. provide Iron in your diet information leaflet, if appropriate

In moderate to severe cases, the therapeutic options are:

- **Oral iron:** daily (40–60 mg) or alternate day (80–100 mg) treatment should be used in patients with ID and no contra-indications. Support with nutritional advice, encourage vitamin C (e.g. orange juice) with meals to help absorption, and avoid tea or coffee within an hour of taking medication
- **Dosing:** taking iron on alternate days or three times per week can reduce gastrointestinal side effects[3]
- **Intravenous iron:** for patients unable to tolerate, or unresponsive to, oral iron or if there is a need to raise iron levels rapidly
- **Transfusion:** may be required if patients have reached agreed transfusion triggers, become increasingly symptomatic, and/or experience cardiovascular compromise. Underlying iron deficiency should still be rectified

Guidance

NICE Blood Transfusion Guidelines NG24[4]

Intravenous and oral iron

- Offer oral iron before and after surgery to patients with iron deficiency anaemia. [Based on very low to low quality evidence from RCTs, cost effectiveness evidence, and the experience and opinion of the Guideline Development Group (GDG)]
- Consider intravenous iron before or after surgery for patients who:
  - ▸ Have IDA and cannot tolerate/absorb oral iron or are unable to adhere to oral iron treatment
  - ▸ Are diagnosed as having functional iron deficiency or
  - ▸ Are diagnosed as having IDA and the interval between the diagnosis of anaemia and surgery is predicted to be too short for oral iron to be effective

RCN iron deficiency and anaemia in adults
https://www.rcn.org.uk/professional-development/publications/pub-007460

Patient Blood Management: an evidence-based approach to care
https://www.transfusionguidelines.org/uk-transfusion-committees/national-blood-transfusioncommittee/patient-blood-management

WHO guideline on use of ferritin concentrations to assess iron status in individuals and populations
https://apps.who.int/iris/handle/10665/331505

Pavord, S., Daru, J., Prasannan, N., Robinson, S., Stanworth, S., Girling, J. and (2020), UK guidelines on the management of iron deficiency in pregnancy. British Journal of Haematology, 188: 819-830
https://b-s-h.org.uk/guidelines/guidelines/uk-guidelines-on-the-management-of-iron-deficiency-in-pregnancy/
A summary of oral and intravenous iron preparations available in the UK is provided in this guideline.

Resources

NHS Blood and Transplant PBM website
https://hospital.blood.co.uk/patient-services/patient-blood-management/

NHS Blood and Transplant Patient Information Leaflets
https://hospital.blood.co.uk/patient-services/patient-blood-management/patient-information-leaflets/

National Institute of Health and Care Excellence Clinical Knowledge Scenarios. Anaemia iron deficiency (2018)
https://cks.nice.org.uk/anaemia-iron-deficiency

Definitions of current SHOT reporting categories and what to report
https://www.shotuk.org/wp-content/uploads/myimages/SHOT-Definitions-update-10.01.20-FINAL.pdf

Choosing Wisely UK
https://www.choosingwisely.co.uk/i-am-a-clinician/recommendations/#1476655947791-98e68713-aae4

Serious Hazards of Transfusion UK haemovigilance scheme
https://www.shotuk.org/wp-content/uploads/myimages/Not-choosing-wisely-BBTS-2019-poster-final.pdf

The urgent need to implement Patient Blood Management: policy brief
World Health Organisation https:// apps.who.int/iris/bitstream/handle/10665/346655/9789240035744-eng.pdf?sequence=1&isAllowed=y

References

1. National Diet and Nutrition Survey (NDNS) 2016 (accessed 25/11/2021) https://www.gov.uk/government/collections/national-diet-and-nutrition-survey

2. Munoz, M., Acheson, A.G., Auerbach, M., Besser, M., Habler, O., Kehlet, H., Liumbruno, G.M., Lasocki, S., Meybohm, P., Rao Baikady, R., Richards, T., Shander, A., So-Osman, C., Spahn, D.R. and Klein, A.A. (2017), International consensus statement on the peri-operative management of anaemia and iron deficiency. Anaesthesia, 72: 233-247. doi:10.1111/anae.13773

3. Stoffel NU, Zeder C, Brittenham GM, Moretti D, Zimmermann MB. (2020) Iron absorption from supplements is greater with alternate day than with consecutive day dosing in iron-deficient anemic women. Haematologica. 2020;105(5):1232-1239. doi:10.3324/haematol.2019.220830

4. National Institute for Health and Care Excellence (2015) Blood Transfusion {NG24} https://www.nice.org.uk/guidance/ng24

Contact us

We would welcome your feedback and comments on this leaflet. You can contact us:

By post to:

Customer Services, NHS Blood and Transplant

Part Academic Block – Level 2
John Radcliffe Hospital
Headley Way, Headington
Oxford OX3 9BQ

By email to: **PBM.team@nhsbt.nhs.uk**

Or by phone: **01865 381010**

This leaflet was prepared by NHS Blood and Transplant in collaboration with the National Blood Transfusion Committee.

Individual copies of this leaflet can be obtained by calling **01865 381010**

NHS Blood and Transplant (NHSBT) saves and improves lives by providing a safe, reliable and efficient supply of blood and associated services to the NHS in England. We are the organ donor organisation for the UK and are responsible for matching and allocating donated organs. We rely on thousands of members of the public who voluntarily donate their blood, organs, tissues, and stem cells.

For more information
Visit **nhsbt.nhs.uk**
Email **enquiries@nhsbt.nhs.uk**
Call **0300 123 23 23**