

Effective Date: June 15, 2010

## Iron Deficiency - Investigation and Management (in Patients of all Ages)

For full Guideline please go to website: [www.BCGuidelines.ca](http://www.BCGuidelines.ca)

### Screening

- **Screening of the general population for iron deficiency is not recommended.**
- Identify patients at risk via history, symptom review, and physical exam Table 1.

**Table 1: Causes of Iron Deficiency**

Increased Requirements	Decreased Intake
Growing infants and children Menstruating women Pregnancy, lactation, parturition Multiparity	Low socioeconomic status Vegetarian diet, lack of balanced diet or poor intake Alcoholism Elderly High risk ethnic groups ( <i>First Nations, Indo-Canadians</i> )
Increased Loss	Decreased Absorption
Menorrhagia, GI bleeding, or hematuria Regular blood donation Post-operative with significant blood loss Intestinal parasites (travel/immigration) Intravascular hemolysis: hemoglobinuria Extreme physical exercise Pathological (hemolytic anemias)	Dietary factors ( <i>tannins, phytates in fibre, calcium in milk, tea, coffee, carbonated drinks</i> ) Upper GI pathology: chronic gastritis, gastric lymphoma, celiac disease, Crohn's disease Medications: <i>antacids, PPIs, H<sub>2</sub> receptor antagonists, supplements containing aluminum, magnesium, calcium, or zinc</i> Gastrectomy or intestinal bypass Duodenal pathology Chronic renal failure patients

### Investigation

- See Table 2 for testing suggestions and results interpretation.
- Adult men and postmenopausal women often have a serious underlying cause of blood loss.
- GI bleeding accounts for approx. two-thirds of all causes in iron deficient patients; consider testing for malabsorption.
- Investigate further if anemia is refractory to oral iron treatment or small bowel disease is suspected.
- Other symptoms include:
  - o Adults: hair loss, fatigue, cold intolerance, restless leg syndrome, irritability.
  - o Children: tired / restless / irritable, ADHD, growth retardation, cognitive / intellectual impairment.

**Table 2: Initial Tests for Iron Deficiency**

Investigation	Application	Notes												
<b>Hematology Profile (CBC)</b> = <u>not</u> the diagnostic test of choice	<ul style="list-style-type: none"> <li>• can suggest iron deficiency</li> <li>• Hb required to assess anemia severity</li> </ul>	Anemia, microcytosis & hypochromia are highly suggestive of iron deficiency												
<b>Serum Ferritin</b> = diagnostic test of choice	<p><b>ADULTS</b></p> <table border="0"> <tr> <td style="padding-right: 20px;">&lt;15</td> <td>diagnostic of iron deficiency</td> </tr> <tr> <td>15-50</td> <td>probable iron deficiency</td> </tr> <tr> <td>50-100</td> <td>possible iron deficiency</td> </tr> <tr> <td>&gt;100</td> <td>unlikely to be iron deficiency</td> </tr> <tr> <td>Persistently &gt;1000</td> <td>consider testing for iron overload</td> </tr> </table> <p><b>CHILDREN</b></p> <table border="0"> <tr> <td style="padding-right: 20px;">&lt;12</td> <td>diagnostic of iron deficiency</td> </tr> </table>	<15	diagnostic of iron deficiency	15-50	probable iron deficiency	50-100	possible iron deficiency	>100	unlikely to be iron deficiency	Persistently >1000	consider testing for iron overload	<12	diagnostic of iron deficiency	<ul style="list-style-type: none"> <li>• may be unreliable in patients with chronic disease or malignancy</li> <li>• non-hematologic symptoms can occur when serum ferritin &lt; 50 ug/L</li> <li>• higher ferritin levels do not exclude iron deficiency</li> <li>• for persistently elevated ferritin (&gt;1000 ug/L) without chronic inflammatory disorder, test for iron overload (refer to <i>Iron Overload - Investigation and Management</i> at <a href="http://BCGuidelines.ca">BCGuidelines.ca</a>)</li> </ul>
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- If clinical features and hematology profile suggest iron deficiency but ferritin is normal, additional tests may be considered (Table 3). Consider consulting with a laboratory physician before ordering.

**Table 3: Additional Tests for Iron Deficiency**

Investigation	Application	Notes
<ul style="list-style-type: none"> <li>Serum Iron</li> <li>Iron Binding Capacity</li> <li>Transferrin Saturation/Fraction Saturation</li> </ul>	<ul style="list-style-type: none"> <li>low serum iron <b>and</b></li> <li>high iron binding capacity <b>and</b></li> <li>transferrin saturation of &lt; 0.15</li> </ul>	<ul style="list-style-type: none"> <li>these tests are recommended when <b>serum ferritin is reported as normal or high and:</b></li> <li>Iron deficiency is suspected clinically, <b>or</b></li> <li>Patient with kidney failure, chronic infection, inflammation or malignancy</li> </ul>
Monitored Therapeutic Trial of Iron (may be both diagnostic and therapeutic)	<ul style="list-style-type: none"> <li>patients with probable iron-deficiency anemia</li> </ul>	<ul style="list-style-type: none"> <li>unreliable in iron malabsorption or ongoing blood loss</li> <li>Hb increase of 10-20 g/L in 2-4 weeks is diagnostic of iron deficiency</li> </ul>

Note: Quantitative, specific determination of serum transferrin level is not indicated.

**Table 4: Lab Differentiation of IDA versus ACD**

Investigation	Results In		
	IDA	ACD	ACD + IDA
Serum Ferritin	↓	↑	↓ or normal
Serum Iron	↓	↓	↓
Iron Binding Capacity	↑	↓	↓ or low normal
Transferrin Saturation/Fraction Saturation	↓	↓ or normal	↓

#### Treatment

- Oral iron preparations include ferrous gluconate, fumarate, or sulfate.
- Usual adult dose is 180 mg of elemental iron/day in divided doses.
- Begin when iron deficiency is detected but make sure to correct the underlying causes.
- Iron intolerance is very common:
  - Oral meds may cause nausea, vomiting, dyspepsia, constipation, diarrhea or dark stools.
  - Try starting at a lower dose and increasing gradually over 4-5 days, giving divided doses or the lowest effective dose, or taking supplements with meals.
  - Sustained release may not be as effective as standard film-coated products.

#### Monitoring

- Hb will increase by 10-20 g/L in 2-4 weeks; monitor response via Hb at 2-4 weeks.
- Will correct in 2-4 months with appropriate iron doses if underlying cause is corrected.
- After Hb normalizes, treat for an additional 4-6 months (adults) to replenish iron stores.**
- If clinical status is compromised by moderate to severe anemia, consider admission to an acute care facility and blood transfusion.** Once the patient is stable, iron replacement can be commenced.
- Oral iron replacement is preferred to IV therapy** (consider IV for inadequate iron absorption, continued blood loss, non-compliance, or intolerance to oral iron therapy).
- Once IDA has corrected and iron stores have normalized, a low maintenance dose may be prescribed if there is an ongoing need for additional iron (e.g. menorrhagia, growth spurt). Consider dietary modification as well as including foods with heme and non-heme iron.

#### Special Circumstances

- Paediatrics** (iron can be toxic to children and should always be safely stored):
  - Increased IDA risk in asymptomatic children aged 6-12 months: Iron rich foods/formula or routine iron (ferrous sulphate); recommended dose 1 to 2 mg/kg/day of elemental iron (max 15 mg elemental iron/day).
  - Suspected IDA in infants and toddlers: 3 to 6 mg of elemental iron/kg/day in divided doses.
- Pregnancy & lactation** (increased need due to fetal/placental development and loss through milk):
  - Non-anemic women: Increase of 15 to 30 mg elemental iron/day (found in most prenatal vitamins).
  - IDA: Defined as Hb <110 g/L in 1st & 3rd trimester, ≤ 104 g/L; treat as per adult guidelines above.
  - If necessary, IV iron is considered to be safe for the second and third trimester.
- Elderly** (common & often multifactorial, significant impact on functional decline and mortality):
  - Investigate if the life expectancy is more than a year.
  - Follow advice for adults (above); if standard dosing is not tolerated, use low dose (15 mg elemental iron/day) but expect iron stores to take longer to rebuild.