

Clinical Guidance: Best Practices in the Management of Iron Deficiency and Iron Deficiency Anemia

Do	• Screen for iron deficiency (ID) and iron deficiency anemia (IDA) in patients at risk, especially in people who menstruate, are pregnant, or lactating.¹⁻⁴ • Diagnose patients with ferritin <30 mcg/L (adults) or <20 mcg/L (pediatric) with ID/A and offer iron therapy.⁴⁻⁶ • Investigate and manage underlying causes of ID/A (e.g., comorbid conditions, increased loss).^{5,7,8} • Treat with intravenous (IV) iron when oral iron is not tolerated or ineffective after 4-12 weeks.^{1-4,9,10} • Assess all patients for hematologic treatment response following iron therapy.¹⁰ • Monitor patients for IV adverse events per product monograph. • Refer to your institution's clinical decision support guidelines specific to iron deficiency.
Stop	• If not responding to oral iron supplementation, stop oral and assess eligibility for IV iron.¹¹
Consider	• Increasing dietary iron alone is not sufficient to treat ID/A.^{7,10} • Most people with ID/A have normal red blood cell mean corpuscular volume.^{1,3,4,9,10} • Iron deficiency without anemia may require treatment.^{1,3,4,9,10} • IV iron has a favourable risk/benefit profile, with efficacy, benefits, and safety profile often outweighing the risk of severe adverse events, such as anaphylaxis in 1:200,000.^{10,12,13}

Background

Globally, iron deficiency is the most prevalent micronutrient insufficiency that negatively impacts health, quality of life, and functioning.¹⁴ Iron deficiency is characterized by inadequate iron stores or availability, leading to compromised red blood cell production and decreased hemoglobin concentration.^{1,2}

Iron deficiency can occur without anemia (ID), but prolonged, untreated deficiency may progress to iron deficiency anemia (IDA). IDA is the most common cause of anemia, affecting more than 1.2 billion individuals.^{1,2} In Canada, iron deficiency is found in 7% of Canadians overall, ~20% of women aged 14-50 years, 30% of pregnant individuals, and many are unaware that they are iron deficient.^{1-3,15,16}

Symptoms of ID/A^{1,3,4,9,10,17}

Symptoms of ID/A are related to decreased oxygen delivery to the entire body and can seriously impact quality of life, although many patients have no symptoms.¹ A diagnosis may be missed because the common symptoms of ID/A can often be overlooked as pressures of daily life.

ID Symptoms

- Physical fatigue
- Cognitive (e.g., mood changes, impaired memory, headache)
- Decreased exercise tolerance
- Restless leg syndrome, pica

IDA Symptoms

- **ID symptoms +**
- Shortness of breath
- Neurological (e.g., insomnia, lightheaded, fainting)
- Cardiac (e.g., rapid heart rate, palpitations, chest pain/tightness)
- Muscle weakness
- Pale skin, cold hands/feet
- Brittle nails/hair

Who is at risk of ID/A?^{4,5,9,18-21}

Screening should occur in patient populations with risk factors for ID/A, including those with:

- ↑ **Higher iron demands:** menstruating, pregnant, lactating people; children/adolescents undergoing rapid growth
- ⊕ **Comorbid conditions:** gastrointestinal disorders/surgery, chronic kidney disease, chronic intravascular hemolysis
- ↓ **Decreased availability:** conditions that cause chronic inflammation or affect nutrient absorption, active celiac disease, dietary restrictions, large consumption of cow's milk, *H. pylori*, post-bariatric surgery
- 💧 **Increased loss:** heavy menstrual periods, chronic gastrointestinal blood loss
- ⚖️ **Social determinants of health:** lower socioeconomic status, minority race or ethnicity

Impacts of iron deficiency

Iron deficiency is associated with:^{9,14}

- Decreased health-related quality of life
- Impairment in cognitive performance in young children
- Adverse outcomes in pregnancy for both mothers and newborns
- Decreased physical capacity in adults
- Cognitive decline in the elderly

Iron deficiency definitions¹¹

- **Iron deficiency:** insufficient iron stores to meet the body's needs
- **Iron deficiency with anemia:** ID with reduced erythropoiesis, may be severe despite normal hemoglobin
- **Absolute iron deficiency:** reduced iron intake, defective absorption, chronic blood loss, or increased need
- **Functional iron deficiency:** sufficient iron stores that aren't being used well, often with inflammatory states (e.g., chronic kidney disease, malignancy)
- **Anemia in pregnancy:** hemoglobin levels in 1st and 3rd trimester <110 g/L, 2nd trimester <105 g/L^{12,19-21}

CITE clinical guidance documents are not clinical practice guidelines; they are CITE's best recommendations based on current knowledge, and no warranty or guaranty is expressed or implied. The content provided is for informational purposes for medical professionals only and is not intended to be used or relied upon by them as specific medical advice, diagnosis, or treatment, the determination of which remains the responsibility of the medical professionals for their patients.

Clinical Guidance: Best Practices in the Management of Iron Deficiency and Iron Deficiency Anemia

How to make the diagnosis of ID/A

ID/A diagnosis involves careful history taking and physical examination, which are essential in identifying risk factors and possible etiology, guiding laboratory testing, and identifying the underlying cause of the iron deficiency.⁴

Investigations

While there is no current consensus on diagnostic cutoff levels for ID/A, serum ferritin is recommended. Several factors, such as inflammation and age, can impact ferritin concentrations. If a false-normal ferritin is suspected, combining different biomarkers may assist in making the diagnosis. CBC alone is an inadequate screen for ID/A, as the sensitivity and specificity of low hemoglobin and microcytosis are limited.^{4,10,20,22}

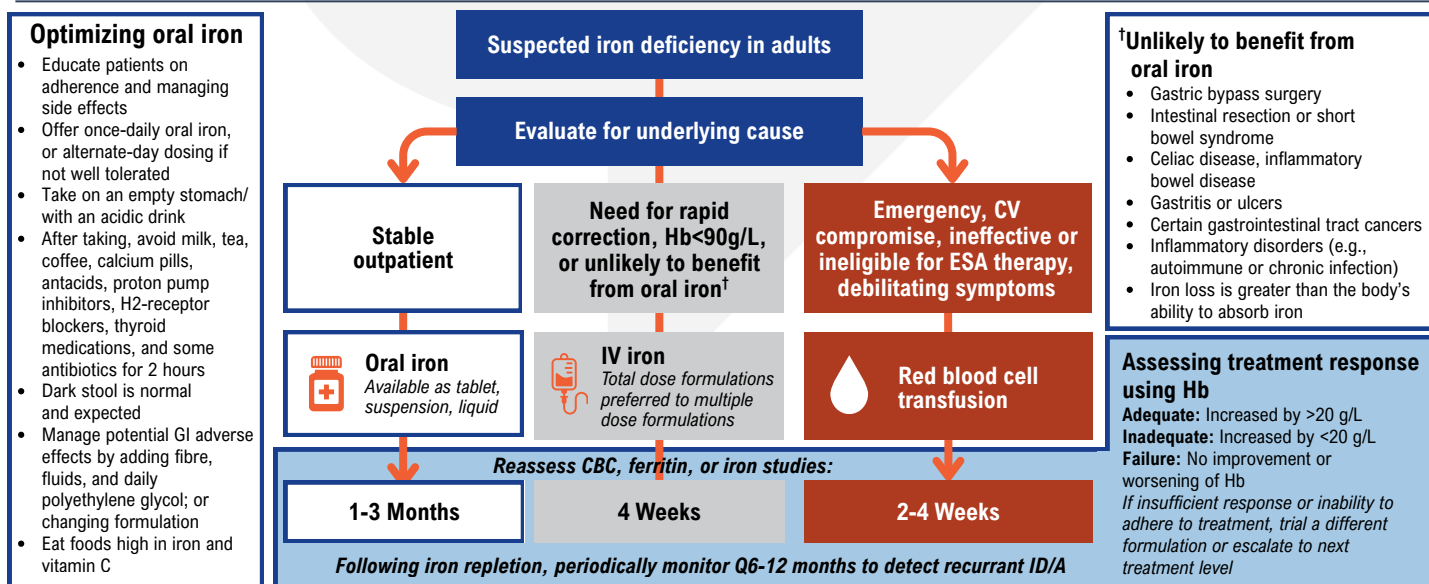
Initial workup should include:	Adult (≥18)	Pediatric (<18)	Interpretation of results ^{5,6}
Serum ferritin	<30 mcg/L	<20 mcg/L	Result consistent with ID
	30–50 mcg/L	20–50 mcg/L	Probable ID*
	51–100 mcg/L		Possible ID if risk factors are present*
	101–300 mcg/L		ID unlikely*
	≥600 mcg/L		Consider test for iron overload
Complete blood count (hemoglobin)	Normal		No anemia, interpret alongside ferritin level to assess if ID
	Low		Anemia, interpret alongside ferritin level to assess if IDA
In patients with concomitant inflammation (e.g. CKD) AND ferritin ≥30 mcg/L (adults) or ≥20 mcg/L (pediatric), add:^{5,6}			
Fasting serum iron	Low		Possible ID
Total iron binding capacity	High		Possible ID
Transferrin saturation	<20%		Result consistent with ID

*in the absence of concomitant inflammation

Management of ID/A^{2,7,10,23–31}

Studies show improvement in energy levels, cardiovascular health, cognition, energy, and health-related quality of life with iron therapy (oral, IV, or transfusion). While consuming enough iron through food is an important part of preventing iron deficit, people with ID/A need more iron than can be consumed through diet alone. Hemoglobin target level and iron stores may vary in different patient groups and between patients. Iron therapy decisions should consider patient preferences, resource availability, insurance coverage, treatment costs, and healthcare resources. Most cases of ID/A can be managed in primary care, however, referral to a specialist may be necessary in patients who are refractory to iron therapy, complex cases, or have an unexplained etiology following investigations.³²

Algorithm for management decisions for adults with ID/A



Clinical Guidance: Best Practices in the Management of Iron Deficiency and Iron Deficiency Anemia

Management of ID/A with oral or IV iron

Management	 Oral Iron ^{10,22,23,33–37}	 IV Iron ^{1,10,22,38–42}
Agents, common doses, and administration times	- Ferrous fumarate (Palafer®), 300 mg daily³³ - Ferrous gluconate (Fergon®), 300 mg daily - Ferrous sulfate (Fer-In-Sol®, Feosol®), 300 mg daily - Polysaccharide iron complex (FeraMAX®, Triferexx®, Polyride Fe®), 150 mg daily - Liposomal iron (Ferosom®), 30 mg daily - Heme iron polypeptide (Profferin® ES, OptiFer® Alpha), 11 mg, 1–3 times a day; or (Hemaforte® heme iron), 35 mg daily³⁴ - Ferric maltol (ACCRUFer®), 30 mg twice a day³⁶	IV iron dosing and schedule must be individually established for each patient as per each product monograph, based on indication and either fixed dosing (fe-derisomaltose only) or iron deficit: - Determination of “iron deficit” (total dose needed) using hemoglobin deficit equation (Hb and body weight) - Divide iron deficit into appropriate individual doses - Administer until total dose complete Multiple dose formulations (≥3 administrations) - Sodium ferric gluconate complex in sucrose (Ferrlecit®): 125 mg, 60 min., every other day for 8 sessions - Iron sucrose (Venofer®): 100 mg, 2–180 min., weekly for 3–5 weeks Total dose formulations (1–2 administrations) - Ferric derisomaltose (Monoferic®): 20 mg/kg, at least 20–30 min., single infusion, max 1500 mg per single dose - Ferric carboxymaltose (Ferinject®): 15 mg/kg, at least 3–15 min., single infusion or weekly for 2 weeks, max 1000 mg per single dose
Populations	Pediatric, adult, geriatric, pregnancy use	- Adult patients ≥ 18 years - Refer to product monographs for special populations (e.g. pediatric, geriatric, chronic kidney disease, heart failure)
Contraindications	Patients with iron-overloaded states such as hereditary hemochromatosis, hemosiderosis, or have a history of hemolytic anemia	- Evidence of iron overload, known hypersensitivity, anemia not caused by iron deficiency - Fe-gluconate: severe inflammatory diseases of the liver/kidneys - Fe-derisomaltose: decompensated liver cirrhosis or active hepatitis
Potential adverse events	Side effects are common and dose dependent, including nausea, constipation, bloating, diarrhea, metallic taste, or dark stool	- Infusion reactions, including isolated skin, respiratory, or gastrointestinal symptoms - Hypersensitivity reactions can be mild (such as Fishbane), and rarely, severe (such as anaphylaxis)
Monitoring	- Monitor ferritin levels to assess hematologic response after 1–3 months - Following iron repletion, periodically monitor ferritin Q6–12 months to detect any recurrent ID/A	- Monitor ferritin levels, transferrin saturation, and serum iron to assess hematologic response or overload, no sooner than 4 weeks post-infusion - In patients at high risk for hypophosphatemia, monitor serum phosphate levels for chronic low serum phosphate prior to repeated doses, which can lead to osteomalacia, particularly with fe-carboxymaltose - Following iron repletion, periodically monitor ferritin Q6–12 months to detect any recurrent ID/A
Practical considerations	Benefits: Over-the-counter availability and cost effective Drawbacks: Adherence can be poor, in part due to high rates of adverse effects, and variable absorption rates	Benefits: Optimizes hemoglobin levels quickly in stable outpatients, benefits those intolerant or not responding to oral iron, increased efficacy, improved adherence, decreased discontinuation rate, and acceptable safety profile compared to oral iron Drawbacks: Requires visit to infusion centre or hospital for administration, high or repeated doses may lead to prolonged hypophosphatemia/osteomalacia, particularly with fe-carboxymaltose

Clinical Guidance: Best Practices in the Management of Iron Deficiency and Iron Deficiency Anemia

For additional resources on ID/A, please visit:

<https://www.canadiankt.org/nurse-training-iv-iron>
<https://www.hemequity.com/our-resources-for-healthcare-providers>
<https://www.hemequity.com/our-resources-for-patients>
<https://www.hemequity.com/toronto-iv-iron-policy>
<https://gynqi.com/intravenous-iron-infusions/>

References:

1. Al-Naseem A, Sallam A, Choudhury S, Thachil J. Iron deficiency without anaemia: a diagnosis that matters. *Clin Med*. 2021;21(2):107-113. doi:10.7861/clinmed.2020-0582
2. Camaschella C. Iron deficiency. *Blood*. 2019;133(1):30-39. doi:10.1182/blood-2018-05-815944
3. Cooper M, Bertinato J, Ennis JK, Sadeghpour A, Weiler HA, Dorais V. Population Iron Status in Canada: Results from the Canadian Health Measures Survey 2012–2019. *J Nutr*. 2023;153(5):1534-1543. doi:10.1016/j.tnut.2023.03.012
4. Initial Assessment and Diagnosis | Raise the Bar. *Hemequity*. <https://www.hemequity.com/raise-the-bar-assessment-diagnosis>
5. Guidelines for the Use of Laboratory Tests for Iron Deficiency (CLP 002). Published online July 2024. <https://oam.com/wp-content/uploads/2016/05/Guidelines-for-the-Use-of-Laboratory-Tests-for-Iron-Deficiency-2024-FINALfor-July-distribution.pdf>
6. Update to reporting of Ferritin in Ontario – *LifeLabs*. <https://www.lifelabs.com/notification/update-to-reporting-of-ferritin-in-ontario/>
7. Auerbach M. Patient education: Anemia caused by low iron in adults (Beyond the Basics) - UpToDate. *Up To Date*. April 26, 2024. <https://www.uptodate.com/contents/anemia-caused-by-low-iron-in-adults-beyond-the-basics>
8. Nguyen M, Tadi P. Iron Supplementation. In: *StatPearls*. StatPearls Publishing; 2025. <http://www.ncbi.nlm.nih.gov/books/NBK557376/>
9. Camaschella C. Iron deficiency. *Blood*. 2019;133(1):30-39. doi:10.1182/blood-2018-05-815944
10. Benson AE, Lo JO, Achebe MO, et al. Management of iron deficiency in children, adults, and pregnant individuals: evidence-based and expert consensus recommendations. *Lancet Haematol*. 2025;12(5):e376-e388. doi:10.1016/S2352-3026(25)00038-9
11. INESS. Quebec: National Medical Protocol for Intravenous Iron Therapy in Adults. Published online April 2022. https://www.inesss.qc.ca/fileadmin/doc/INESSS/Ordonnances_collectives/Fer_intraveineux/INESSS_IV_Iron_therapy_NMP.pdf
12. Achebe M, DeLoughery TG. Clinical data for intravenous iron – debunking the hype around hypersensitivity. *Transfusion (Paris)*. 2020;60(6):1154-1159. doi:10.1111/trf.15837
13. Arastu AH, Elstrott BK, Martens KL, et al. Analysis of Adverse Events and Intravenous Iron Infusion Formulations in Adults With and Without Prior Infusion Reactions. *JAMA Netw Open*. 2022;5(3):e224488. doi:10.1001/jamanetworkopen.2022.4488
14. Definitions and Relevance | Raise the Bar. *Hemequity*. <https://www.hemequity.com/raise-the-bar-definitions-and-revelance>
15. Malinowski AK, Murji A. Iron deficiency and iron deficiency anemia in pregnancy. *CMAJ*. 2021;193(29):E1137-E1138. doi:10.1503/cmaj.210007
16. Tang G, Lausman A, Abdulrehman J, et al. Prevalence of Iron Deficiency and Iron Deficiency Anemia during Pregnancy: A Single Centre Canadian Study. *Blood*. 2019;134:3389. doi:10.1182/blood-2019-127602
17. Iron Deficiency Anemia. American Society of Hematology. *Iron-Deficiency Anemia*. <https://www.hematology.org/education/patients/anemia/iron-deficiency>
18. Sonoda K. Iron Deficiency Anemia: Guidelines from the American Gastroenterological Association. *Am Fam Physician*. 2021;104(2):211-212. <https://www.aafp.org/pubs/afp/issues/2021/0800/p211.html>
19. Zeller MP, Verhovsek M. Treating iron deficiency. *CMAJ*. 2017;189(10):E409-E409. doi:10.1503/cmaj.160153
20. Iron Deficiency Anemia | HealthLink BC. HealthLinkBC. September 8, 2022. <https://www.healthlinkbc.ca/healthy-eating-physical-activity/conditions/anemia/iron-deficiency-anemia>
21. Toward Optimized Practice [Alberta]. Iron deficiency anemia (IDA) Clinical Practice Guideline. Published online March 2018. <https://actt.albertadoctors.org/media/tc4lq52r/ida-cpg.pdf>
22. British Society of Gastroenterology guidelines for the management of iron deficiency anaemia in adults. *Gut*. Accessed June 29, 2025. <https://gut.bmj.com/content/70/11/2030>
23. Nguyen M, Tadi P. Iron Supplementation. In: *StatPearls*. StatPearls Publishing; 2023. <http://www.ncbi.nlm.nih.gov/books/NBK557376/>
24. Girelli D, Ugolini S, Busti F, Marchi G, Castagna A. Modern iron replacement therapy: clinical and pathophysiological insights. *Int J Hematol*. 2018;107(1):16-30. doi:10.1007/s12185-017-2373-3
25. Brown A, Caron C, et al. Heavy Menstrual Bleeding - Quality Statement 14: Treatment of Anemia and Iron Deficiency - Health Quality Ontario (HQO). Health Quality Ontario. August 2024. <https://www.hqontario.ca/Evidence-to-Improve-Care/Quality-Standards/View-all-Quality-Standards/Heavy-Menstrual-Bleeding/Quality-Statement-14-Treatment-of-Anemia-and-Iron-Deficiency>
26. Lim W, Afif W, Knowles S, et al. Canadian expert consensus: management of hypersensitivity reactions to intravenous iron in adults. *Vox Sang*. 2019;114(4):363-373. doi:10.1111/vox.12773
27. Ning S, Zeller MP. Management of iron deficiency. *Hematology*. 2019;2019(1):315-322. doi:10.1182/hematology.2019000034
28. Treatment | Raise the Bar. *Hemequity*. <https://www.hemequity.com/raise-the-bar-treatment>
29. Tahir E, Ayyotte P, Little M, et al. Anemia, iron status, and associated protective and risk factors among children and adolescents aged 3 to 19 years old from four First Nations communities in Quebec. *Can J Public Health*. 2020;111(5):682-693. doi:10.17269/s41997-020-00304-7
30. KDIGO 2025 Anemia in CKD Guideline Available for Public Review – DRAFT. Published online November 2024. <https://kdigo.org/kdigo-2025-anemia-in-ckd-guideline-available-for-public-review/>
31. Carson JL, Brittenham GM. How I treat anemia with red blood cell transfusion and iron. *Blood*. 2023;142(9):777-785. doi:10.1182/blood.2022018521
32. Dignass AU, Gasche C, Bettenworth D, et al. European Consensus on the Diagnosis and Management of Iron Deficiency and Anaemia in Inflammatory Bowel Diseases. *J Crohns Colitis*. 2015;9(3):211-222. doi:10.1093/ecco-jcc/jju009
33. Palafer. <https://palafer.ca/>
34. Hemaforce One | Product Information. <https://hemaforce.ca/product-information/>
35. Office of Dietary Supplements - Iron. <https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/>
36. Kye Pharmaceuticals Inc. ACCRUFeR Product Monograph. Published online August 21, 2024. <https://dhpp.hpfb-dgspa.ca/dhpp/resource/103946>
37. British Columbia Ministry of Health. Iron Deficiency – Diagnosis and Management - Province of British Columbia. *BC Guidelines*. November 2, 2023. <https://www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/bc-guidelines/iron-deficiency>
38. PrFERINJECT® (Ferric Carboxymaltose Injection) Product Monograph. Published online June 27, 2024. <https://dhpp.hpfb-dgspa.ca/dhpp/resource/103479>
39. sanofi-aventis Canada Inc. PrFERRLECIT® (Sodium Ferric Gluconate Complex in Sucrose Injection) Product Monograph. Published online February 21, 2023. https://pdf.hres.ca/dpd_pm/00069678.PDF
40. Pfizer Canada ULC. PrMONOFERRIC® (ferric derisomaltose) Product Monograph. Published online April 1, 2025. <https://www.pfizer.ca/en/our-products/monoferric-iron-isomaltoside>
41. American Regent, Inc. PrVENOFER® (Iron Sucrose Injection) Product Monograph. Published online February 14, 2023.
42. Vilaca T, Velmurugan N, Smith C, Abrahamsen B, Eastell R. Osteomalacia as a Complication of Intravenous Iron Infusion: A Systematic Review of Case Reports. *J Bone Miner Res Off J Am Soc Bone Miner Res*. 2022;37(6):1188-1199. doi:10.1002/jbmr.4558.

URLS accessed June 10, 2025.

CITE clinical guidance documents are not clinical practice guidelines; they are CITE's best recommendations based on current knowledge, and no warranty or guaranty is expressed or implied. The content provided is for informational purposes for medical professionals only and is not intended to be used or relied upon by them as specific medical advice, diagnosis, or treatment, the determination of which remains the responsibility of the medical professionals for their patients.