Procedure

Effective from: February 2025
Review date: April 2028

Medicines - Intravenous iron therapy (total dose) – Adult patients 004809

NSQHS STANDARDS 4. Medication Safety 1. Clinical Governance 7. Blood Management

Purpose and intent

To provide best practice principles resulting in safe use and best patient outcomes for adult patients who require total dose intravenous (IV) iron therapy.

Intravenous iron replacement is one therapeutic option to manage iron deficiency or iron deficiency anaemia (IDA)[1].

Scope and target audience

This procedure applies to the use of total dose IV iron replacement for adult patients across all Metro North Hospital and Health Service (Metro North Health) facilities including Hospital in the Home (HITH) and Residential Aged Care District Assessment and Referral (RADAR) service patients.

It excludes chronic kidney disease (CKD) patients requiring iron while undergoing haemodialysis and routine maintenance dosing for non-dialysis dependant CKD patients. Refer to the Metro North Kidney Health Services Iron IV administration for renal patients procedure.

It excludes paediatric patients. For guidelines on intravenous iron in paediatrics refer to Children's Health Queensland Paediatric Medication Guideline - Intravenous Iron.

This procedure applies to all Metro North Health employees (permanent, temporary, and casual) and all organisations and individuals acting as its agents (including Visiting Medical Officers, students and other partners, contractors, consultants and volunteers) working within Metro North Health.

Procedure / process

Decision to prescribe

Iron deficiency can be treated with either oral or parenteral iron supplementation[2]. In most cases, oral iron supplementation should be trialled prior to IV iron therapy. The usual recommended dose of oral iron for the treatment of iron deficiency anaemia in adults is 100-200mg of elemental iron daily[3]. Single doses on alternative days may result in optimised iron absorption[4] and tolerability. After therapeutic doses of oral iron,

haemoglobin levels should rise by approximately 20g/L every 3 weeks[3]. A guide for clinicians to optimise oral iron use is available in Appendix 1.

IV iron therapy must be prescribed in accordance with the List of Approved Medicines (LAM) restrictions. IV iron can only be prescribed for non-LAM indications where local approval has been obtained.

IV iron therapy must **only** be considered in patients with confirmed iron deficiency or IDA and one or more of the following:

- Demonstrated intolerance, non-compliance or lack of efficacy (e.g. haemoglobin levels do not rise by approximately 20 g/L every 3 weeks) after 3-month trial with oral iron, despite modification of dose, timing and frequency[3] (refer to Appendix 1);
- Pregnancy (beyond the first trimester) and postpartum, for demonstrated intolerance, non-compliance or lack of efficacy associated with oral iron therapy (no rise in haemoglobin in short trial period of 3-4 weeks if time permits), OR rapid restoration of iron stores is required to avoid imminent decompensation/transfusion (late presentation >34 weeks gestation or severe anaemia).[7] For additional information refer to Appendix 2.
- Intestinal malabsorption (e.g. inflammatory bowel disease[3]);
- Ongoing iron (i.e. blood) losses that exceed absorptive capacity[3];
- A clinical need for a rapid iron supply (i.e. in patients where optimisation of erythroid response is important to prevent physiological decompensation/transfusion[3]);
- Treatment of iron deficiency (with or without anaemia) in heart failure patients[5];
- Chronic renal impairment receiving concomitant erythropoietin-stimulating agent therapy[3] (Note: dosing, administration and monitoring information for this indication are outside the scope of this procedure. Refer to Kidney Health Services Iron IV administration for renal patients procedure).
- Optimisation in patients with anaemia undergoing procedures in which substantial blood loss is anticipated

An iron supplementation indication flow chart has been developed to guide decision making on appropriate iron supplementation (see Appendix 3).

Recording of IV iron infusion order / prescription

IV iron infusions must be documented by an authorised prescriber on the Intravenous and Subcutaneous Fluid Order Form or relevant electronic prescribing system (e.g., ieMR, MetaVision) See DMN Ordering Iron QRG for ieMR sites and Appendix 4 which provides examples of how to prescribe various iron formulations using paper based charts. Specific dosing details for each IV iron formulation are available in Appendix 5 and Appendix 6.

For eligible patients who are receiving an IV iron infusion within an outpatient setting, a Pharmaceutical Benefits Scheme (PBS) compliant prescription is required.

For inpatients, to prevent inadvertent duplication of dose at sites with paper based prescribing records, and to facilitate clinical handover processes, the infusion should be documented as administered on the Medication Action Plan (MAP) by a pharmacist and/or cross referenced on the National Standard Medication Chart. For ieMR sites, doses administered will be visible on the MAR.

Supply of medication

Where possible, access to IV iron preparations within imprest should be restricted to enable pharmacist review of the prescription prior to administration. The clinical pharmacist should be consulted to review the prescription, when possible, prior to administration of intravenous iron.

Provision of medicine information

Patients should be actively involved in their own care. The patient must be informed of the risks (including the risk of permanent skin staining), benefits and alternative treatment options prior to prescribing of IV iron therapy. Utilise the statewide Iron Infusion Consent form and Statewide Iron infusion patient information leaflet. Further information on informed consent is available within the Queensland Health Guide to Informed Decision-making in Healthcare.

Administration

Intravenous iron can be administered via either a central or peripheral line. Administration should occur in accordance with the relevant iron formulation and administration rate as outlined in Appendix 6.

All IV iron infusions should be administered using the relevant infusion safety software profile where they exist (e.g. GuardRails®).

A fully equipped emergency trolley, including adrenaline 1:1000 ampoules and hydrocortisone 100mg ampoules, for the treatment of anaphylactic reactions, must be available within the patient's vicinity for the duration of the infusion.

Use the Metro North Health Iron infusion checklist and monitoring form (or the ieMR equivalent) for all patients receiving intravenous iron therapy.

IV iron infusions should only be administered where a medical officer is readily available for the entire duration of the infusion and post-infusion monitoring period.

Administration of IV iron is rarely an emergency. Administration after business hours must be avoided.

Cannulation

Iron extravasation can result in permanent skin staining (tattooing). When utilised, peripheral intravenous catheters (cannulas) must be managed in accordance with the Metro North Peripheral Intravenous Catheter Insertion and Management (ADULT) procedure.

To minimise the risk of extravasation resulting in staining (when IV iron is administered via a peripheral intravenous cannula (PIVC)), IV iron should be administered via an appropriately placed PIVC**, avoiding sites of flexion (e.g., wrist, cubital fossa), hands and lower limbs**, and the catheter site must be assessed as healthy and catheter assessed as patent.

Where a cannulation attempt fails, subsequent cannula insertion and iron administration should be **proximal to previous sites**.[6] Extravasation risk resulting in staining is unlikely when administered via central vein, however central access should not be obtained solely to minimise this risk.

The **antecubital vein and other sites of flexion should be avoided** for IV iron administration. Where sites of flexion are used, ensure this is discussed with the patient as the risk of skin staining is higher. Splint the arm to minimise the risk of extravasation. The rationale for not utilising an alternative site must be documented by the prescriber within the clinical notes.

Ensure the PIVC is visible, adequately secured and protected from excessive movement. An infusion extension set should be used to minimise movement/manipulation at the short peripheral catheter hub.[6]

Where a patient requires placement of a cannula for the administration of an IV iron infusion, and the clinician fails to cannulate a vein following **two attempts**, escalation according to local procedures should occur. The clinician must assess the risk of:

- further cannulation attempts,

- iron extravasation resulting in staining,
- delaying IV iron administration.

Administration of IV iron is rarely a medical emergency and generally can be postponed, minimising the risk of iron extravasation resulting in staining.

Monitoring

Monitoring should occur in accordance with the requirements outlined for the relevant iron preparation and administration rate within Appendix 6. Cannula site monitoring documentation should occur on the Metro North Iron infusion checklist and monitoring form and in accordance with standard procedures for cannula site documentation within ieMR. Any adverse effects or patient reactions should be reported to the prescriber immediately. They should also be reported in the facility's electronic incident management system and the Therapeutic Goods Administration should be informed by completing an online Adverse Event Report.

It is recommended to recheck iron levels after an IV iron infusion to ensure that the treatment has been effective and to monitor for any potential iron overload. Typically, iron studies should be rechecked between 4 and 8 weeks after the infusion.

Management of adverse reactions

Allergic reactions

Allergic/anaphylactoid reactions, although rare, may occur within the first few minutes of IV iron administration. Clinical features of an allergic/anaphylactoid reaction include sweating, tachycardia, wheezing, stridor, dyspnoea, dizziness, hypotension, and cardiac arrest. If any suspected allergic/anaphylactoid reactions occur:

1. Cease the infusion immediately;
2. Contact the prescribing team;
3. Consider administration of adrenaline (epinephrine) (for anaphylaxis), bronchodilators and/or oral steroids (persistent wheeze) or antihistamine (for itch or rash);
4. Initiate a medical emergency team call (as per local processes) if criteria are reached.

Infusion related reactions

Patients may experience flushing, dizziness or light-headedness at the start of the infusion. Cease the infusion and contact the prescribing team. Depending on the clinical circumstances the infusion may be restarted at a slower rate after the symptoms have resolved[2]. If an allergic/anaphylactoid reaction is suspected, do not restart the infusion and follow the management guidance listed above.

Extravasation

Signs and symptoms of iron extravasation may include pain, tenderness, discomfort, burning, stinging, feeling of pressure or prickling around the cannula site.[8] Additional signs may include swelling, taut skin, fluid leakage, coolness or blanching, numbness or tingling or skin discolouration (reddened, brown, grey, purple, blue, black or bruised appearance) near the IV site.[8] Immediate staining from iron extravasation is not always present. Appendix 7 displays an example image of iron extravasation resulting in staining. The Statewide Intravenous iron patient information sheet also contains an example image. Inform the patient to advise nursing staff immediately if any of these signs/symptoms occur during an IV iron infusion.

Extravasation into the subcutaneous tissue may initially occur prior to a volumetric alarm pump sounding, therefore careful observation of the cannula site and monitoring of patient signs and symptoms is imperative.

In the event of suspected IV iron infusion extravasation:

- **Stop all fluids/injections immediately**. Disconnect the giving set. Contact Prescriber. If infiltration/extravasation is suspected, do not recommence infusion and:
- **L**eave the device in place.
- **A**spirate any residual drug from catheter. Apply a cold compress for symptomatic relief of pain, burning or stinging (if required).
- **P**lan - Estimate the volume of fluid that has infiltrated into the surrounding tissue and mark the affected area with an indelible pen to allow for follow-up assessment of change. Arrange for hospital photographs to be taken (including follow up photographs if required).
- Inform the prescriber so an assessment can be made of sensory deficit which could indicate nerve damage or compartment syndrome. Ensure a plan is in place which includes ongoing assessment and documentation of limb and cannula site observations. Cases of delayed staining have occurred.
- **P**lastics Review – Notify the prescribing team for an urgent review and referral for urgent Plastics review if extravasation is thought to be severe and/or ulceration and/or a sensory deficit occurs.
- Seek advice from required specialties including dermatology (skin staining) and haematology (anaemia management) as per individual patient symptoms/requirements.

Early cessation of suspected extravasation results in smaller stain sizes for patients.[9]

Ensure appropriate clinician disclosure. Document the management in the patient's clinical record and report the incident through the facility's incident reporting system. Refer to Metro North Health Clinical Incident and Disclosure Management Procedure.

Where skin staining occurs as the result of extravasation, **a management plan is to be developed in consultation with the patient prior to discharge.**

Delayed reactions

Delayed reactions (up to 1-2 days after) can occur. These are usually self-limiting. These may include: vomiting, nausea, light headedness, metallic taste, myalgia/arthralgia, fever, diarrhoea, chest pain/tightness, indigestion, fatigue, rash or headache.

Hypophosphatemia

Repeated administration of intravenous iron, particularly ferric carboxymaltose, has been associated with an increased risk of hypophosphatemia which is typically been reported 5 to 20 days after administration. Symptoms can range from mild fatigue to severe complications like muscle weakness, bone pain/fractures and respiratory compromise[10]. In some cases, the duration of hypophosphatemia can also be quite prolonged[10]. To manage this risk, it is advisable to assess baseline serum phosphate levels before initiating repeated infusions in patients with risk factors such as low body weight, vitamin D deficiency, prior hypophosphatemia, preserved renal function, and concomitant use of anti-resorptives. Monitoring phosphate levels 1-2 weeks post-infusion is recommended for those at higher risk and also for individuals who are symptomatic following IV iron infusion. Phosphate replacement may be required.

In addition, several case studies have also reported the association between iron infusion and hypocalcaemia, typically in the presence of additional risk factors such as recent anti-resorptive administration (denosumab or bisphosphonates) or repeated infusions of intravenous iron[11]. Clinicians

should be aware of this possible adverse effect and have a low threshold to check serum corrected calcium levels in the presence of symptoms or if otherwise clinically indicated.

Clinical handover

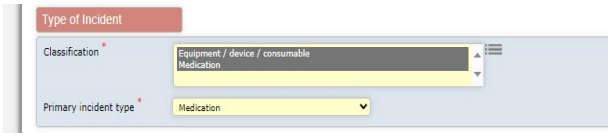
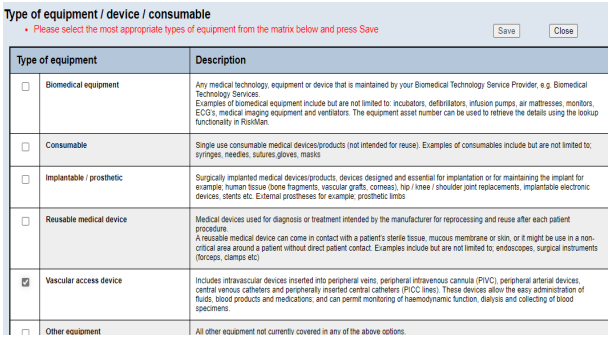
Communication between the hospital and the patient's GP (e.g. via a transfer of care/discharge referral) must outline any iron therapy provided (including any complications) as part of an active management plan. This may prevent unintentional duplication of iron administration by the GP or other health professionals. Administration of intravenous iron during an inpatient admission, including any requirement for subsequent oral therapy, should be documented by the pharmacist on the Discharge Medication Record (DMR). An example is shown below.

Medicine Names	Brand Name	Used for	Directions	Daily Time Table				Changes
				Morning	Noon	Evening	Night	
Ferric Carboxymaltose 500mg/10mL Injection	Ferinject	Treat low iron levels	1 gram was administered intravenously on 1/1/xx	1 gram was administered intravenously on 1/1/xx				New (GP to monitor ongoing iron levels)
Ferrous Sulfate 325mg Sr tabs	Ferro-Gradumet	Prevent/treat anaemia	Swallow whole 1 tablet in the MORNING	1				New - to start on 6/1/xx (5 days after infusion)

Quality Improvement

A clinical review of iron adverse event incidents must occur in accordance with Metro North Clinical Incident Management procedure.

To enable easy identification of IV iron extravasation incidents report them into the clinical incident reporting system using the following classification:

Classification	Medication Equipment / device / consumable	
Primary incident type	Medication	
Type of equipment / device / consumable subform	Vascular access device	

Utilise Metro North Health Iron Adverse Event Clinical Incident Review Checklist and Improvement Template (Appendix 8). A standalone digital template is available – contact your Safety & Quality Unit. When used, upload the completed template and any recommendations into the relevant electronic incident management system clinical incident report.

Education

Further education on intravenous iron is available at:

- Intravenous iron: Administration and Management

- Intravenous iron: Prescribing
- BloodSafe® elearning Australia iron deficiency anaemia

Partnering with consumers

Patients and family members are to be encouraged and given the opportunity to ask questions, clarify information and identify goals relating to anaemia management including iron deficiency anaemia. Patients and family members should be involved with the decision making regarding appropriate treatment including options and potential risks. Staff are responsible for providing information in a way that is understandable and that meets the consumer's needs and are to check their understanding of discussions. Relevant patient-related resources contained within this procedure should be utilised.

Aboriginal and Torres Strait Islander considerations

In order to improve healthcare delivery and outcomes for patients from diverse cultures, the healthcare system and its staff must be culturally capable. Healthcare staff who work with the patient's belief system, will have greater success in providing culturally responsive care and improved outcomes. This also involves staff being aware of their own cultural filters as we tend to interpret behaviours and decisions according to what makes sense in one's own culture. (Aboriginal and Torres Strait Islander Patient care guideline)

Culturally and Linguistically Diverse (CALD) patients

Staff are to provide care that encompasses physical, social, emotional, spiritual and cultural wellbeing of the individual, in accordance with the Metro North Collaborating in Health Strategy 2022 – 2024.

The Australian Charter of Healthcare Rights states that patients have a right to be informed about services, treatment, options and costs in a clear and open way. Wherever practical, healthcare providers should take steps to meet patient/consumer access, treatment, language and communication needs.

Diversity and Inclusion

The principles of equity and cultural safety provide the guiding principles for implementing and maintaining health equity for our diverse communities, including CALD communities, people from refugee and asylum-seeking backgrounds, LGBTQI+ communities, people living with disabilities, rural and remote communities, people who are homeless or vulnerably housed who access health services. These principles are as follows:

Access

Individuals and groups within the organisation will take responsibility for providing a range of access options to health services that are culturally appropriate for patients identifying with diverse populations.

Safety

Patients and other individuals receive safe and high-quality health services, provided with professional care, skill and competence in an environment that makes them feel safe.

Respect

All individuals and groups are treated according to their unique cultural needs and differences with an understanding to not in any way diminish, demean or disempower individuals on the basis of perceived or actual differences.

Partnership

Individuals make decisions with their healthcare provider and are involved in honest and open communication, which includes choosing the people involved in planning and decision-making.

Information

Information is shared with Individuals and groups within the organisation, demonstrating service models that encompass health promotion, disease prevention, diagnostic, treatment, primary, acute, sub-acute and support services.

Privacy

Individuals' privacy will be respected, and their health information will be secure and confidential

Feedback

Individuals share experiences and participate to improve the quality of care and health services. Feedback or complaints will be provided and actioned without effecting the individual's treatment plan. Concerns will be addressed in a transparent and timely way.

Human Rights

Human Rights are considered as per legislative obligations under s58 of the *Human Rights Act 2019* (Qld) (the Act).

At all times, staff are to act and make decisions in a way that is compatible with human rights by properly considering the human rights of individuals who may be impacted by their actions or decisions in accordance with the Act. Partnering with consumers demonstrates respect, integrity and compassion and Metro North Health's commitment to putting values in action, putting people first and providing high quality healthcare outcomes to patients.

Legislation and other authority

Medicines and Poisons Act 2019 (Qld)

Medicines and Poisons (Medicines) Regulation 2021 (Qld)

Human Rights Act 2019 (Qld)

References

1. Low MSY, Grigoriadis G. Iron deficiency and new insights into therapy. Med J Aust. July 2017 207(2):81-7.
2. eTG. [August 2022]. In: Therapeutic Guidelines [internet]. Melbourne: Therapeutic Guidelines Limited; August 2022.
3. Pasricha AA, Flecknoe-Brown SC, Allen KJ, Gibson PR, McMahon LP, Olynyk JK, et al. Diagnosis and management of iron deficiency anaemia: a clinical update. Med J Aust Nov 2010. 193(9):525-32.
4. Girelle D, Ugolini S, Busti F, Marchi G, Castagna A. Modern iron replacement therapy: clinical and pathophysiological insights. International Journal of Hematology (2018) 107:16–30.
5. Anker SD, Colet JC, Filippatos G, Willenheimer R, Dickstein K, Drexler H et al. Ferric cardoxymaltose in patients with heart failure and iron deficiency. N Engl J Med 2009;361:2436-2448.
6. State of Queensland. Peripheral intravenous catheter (PIVC) Guideline. Version 3.0. January 2015.
7. National Blood Authority (NBA) (2015). Patient Blood Management Guidelines: Module 5 – Obstetrics and Maternity. NBA, Canberra, Australia.
8. Canning M, Grannell L. A stain on iron therapy. Australian Prescriber 2020. 43(5):160-3.

9. Canning ML, Hillen JB, Kashiwagi M, Alizadeh N, Freeman CR. Intravenous iron staining: real-world incidence, preventability, and mitigation tools from a long-term quality improvement project. *Int J Qual Health Care*. 2024;36(4):mzae096. doi:10.1093/intqhc/mzae096
10. Strubbe M, David K, Peene B, et al. No longer to be ignored: Hypophosphatemia following intravenous iron administration. Rev Endocr Metab Disord. 2024.
11. Ye S, Grill V, Luo J, Nguyen HH. Concurrent Denosumab and Parenteral Iron Therapy Precipitating Severe Hypocalcemia and Hypophosphatemia. JCEM Case Rep. 2024;2(2):luae005.

Related Documents

Queensland Health Guideline - Total dose slow intravenous iron polymaltose infusion for the management of iron deficiency anaemia.

Kidney Health Services Iron IV administration for renal patients procedure

Children's Health Queensland Paediatric Medication Guideline - Intravenous Iron

Product information – Ferrosig Injection

Product information – Ferinject Solution for injection

Product information – Venofer Solution for infusion

Product information – Monofer Solution for injection

Australian injectable drugs handbook – Iron polymaltose

Australian injectable drugs handbook – Ferric carboxymaltose

Australian injectable drugs handbook – Ferric derisomaltose

Metro North Health Procedure 004791 Medicines - Administration

Metro North Health Policy 004754 Medicines Management

Metro North Health 004818 Medicines – Prescribing Requirements

Metro North Health Procedure 007041 Peripheral Intravenous Catheter Insertion and Management (ADULT)

Metro North Health Procedure 006517 Aseptic Technique

Australian Commission on Safety and Quality in Health care Management of peripheral intravenous catheters Clinical Care Standard

Digital Metro North Ordering Iron Quick Reference Guide

Digital Metro North Iron Administration Quick Reference Guide

Appendix 1 – Optimising oral iron use – A guide for clinicians

Oral Iron

Oral iron is indicated in most patients with iron deficiency.[1] Unfortunately, some patients may not tolerate or have an adequate response to oral iron supplementation. Intravenous iron supplementation is not without adverse effects[1,2] hence, strategies to optimise the tolerability and response to oral iron should be considered before intravenous iron supplementation. Some patient cohorts (e.g. heart failure, maternity, chronic kidney disease) may benefit from intravenous iron without prior oral iron[3-5].

Dosing

For adults, use elemental iron 100mg to 210mg orally daily.[1]

Strategies to improve tolerability

The following strategies can be used to improve the tolerability of oral iron:

Strategy	Rationale
Intermittent dosing (e.g. dosing on alternate days)	It is hypothesised that low-dose oral iron taken on alternate days maximises the proportion of oral iron absorbed and improves oral iron tolerance.[6] Intermittent dosing may be suitable in patients experiencing GI upset where mild iron deficiency anaemia exists[7].
Administer in divided doses	Consider oral liquid products in divided doses to improve tolerability.[8] Oral iron liquids may cause teeth discolouration.[8]
Take the dose at night	Oral iron administered at night may be better tolerated.[7]
Take the dose with food	Oral iron administered with food may improve tolerability[7], however this may reduce absorption[8].
Consider alternative formulation	While there are limited head-to-head studies comparing the tolerability of different oral iron formulations[7,8], some patients may tolerate an alternative formulation.

Strategies to improve bioavailability/absorption

The following strategies can be used to improve the bioavailability (absorption) of oral iron:

Strategy	Rationale
Administration with vitamin C	Vitamin C (ascorbic acid) enhances iron absorption.[9]
Administer on an empty stomach	Phosphates, phytates and tannates in food bind iron and impair absorption.[8]
Avoid tea or coffee before and after iron administration as it can reduce iron absorption	Drinking tannin-containing beverages such as tea can lead to formation of insoluble iron tannate complexes, reducing iron absorption.[10]
Review the need for medicines which reduce oral iron absorption	Oral iron absorption is reduced by proton pump inhibitors, H_2 antagonists, calcium supplements and antacids.[1,8]
Intermittent dosing (e.g. dosing on alternate days)	It is hypothesised that low-dose oral iron taken on alternate days maximises the proportion of oral iron absorbed and improves oral iron tolerance.[6]

A detailed explanation outlining reasons for oral iron failure are outside the scope of this document, however Baird-Gunning et al[8] may be a useful resource.

Appendix 1 References

1. eTG complete [digital]. Melbourne: Therapeutic Guidelines Limited; 2016 Mar. https://www.tg.org.au
2. Canning ML, Gilmore KA. Iron stain following an intravenous iron infusion. Med J Aust 2017;207:58;e1.
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10. Disler PB, Lynch SR, Charlton RW, Torrance JD, Bothwell TH et al. The effect of tea on iron absorption. Gut. 1975 Mar; 16(3): 193–200.

Appendix 2 – Use of intravenous iron formulations in Maternity Patients

Administration

Intravenous iron should only be considered in pregnant patients if there is:

- Demonstrated intolerance, non-compliance or lack of efficacy associated with oral iron therapy (no rise in haemoglobin despite 3–4-week trial of appropriate oral iron therapy), OR
- Rapid restoration of iron stores required to avoid imminent decompensation/transfusion[1].

Antenatal administration indications

Note: Only given beyond first trimester to avoid physiological decompensation or transfusion. Refer to contraindications.

- Gestation <34 weeks: Haemoglobin less than 70 g/L.
- Gestation >34 weeks or within 4 weeks of likely delivery: Haemoglobin less than 100 g/L and iron deficiency anaemia[2].

Postpartum administration indications

- Women with a haemoglobin less than 70 g/L and who are symptomatic, should be offered a blood transfusion first, but if declined can have intravenous iron[1].
- Women with a haemoglobin between 70-90 g/L and who are mildly symptomatic, with no further acute blood loss or decompensation, should be offered intravenous iron transfusion as an alternative to blood products[1].

Special Considerations

- Consider intravenous iron infusion in women with previous history of bariatric surgery or other absolute contraindications to oral iron after the first trimester if their haemoglobin is <100 g/L secondary to iron deficiency.
- Women with co-morbidities that may impact on absorption (i.e. Intestinal mucosal disorders), bone marrow response, or red cell turnover (i.e. chronic renal impairment on erythropoietin therapy).
- In women receiving blood transfusion during their postpartum period, consider the requirement for further iron replacement either oral or intravenous depending on the number of units already transfused, their iron status, clinical symptoms, and ongoing need for rapid replacement of iron on a risk/benefit assessment. Note each unit of packed red blood cells contains 200-250 mg of elemental iron.

Contraindications[3,4]

- First trimester of pregnancy (safety not tested in early pregnancy with animal studies demonstrating foetal skeletal abnormalities and spontaneous miscarriages at maternally toxic doses during organogenesis).
- Known or suspected hypersensitivity to intravenous or intramuscular iron.
- Anaemia not attributable to iron deficiency.
- Haemochromatosis or evidence of iron overload disorders.

- Significant active medical conditions (hepatic disease where iron overload is a precipitating factor, current sepsis, acute polyarthritis, uncontrolled hyperparathyroidism, untreated vitamin D deficiency).
- Haemodynamic instability.

Precautions

- Concomitant disease states (liver impairment, asthma, eczema, atopic allergies, cardiovascular disease, inflammatory conditions)
- Iron should ideally be administered via one route at a time as concomitant intravenous iron supplementation may block iron binding sites so that oral iron is less well absorbed. Additionally, concomitant administration increases the risk of adverse reactions (i.e. anaphylaxis) therefore oral iron should ideally be ceased 48 hours prior to intravenous iron administration.
- Parenterally administered iron preparations can cause hypersensitivity reactions (including anaphylactoid reactions), even after previous uneventful administration. These reactions can be potentially fatal, and as such cardiopulmonary resuscitation equipment must be available within the clinical area for the duration of the infusion. For detailed management refer to Adverse Reactions below.
- Ferric carboxymaltose (Ferinject®) is pregnancy category B3 (taken by only a limited number of pregnant woman, without an increase of malformation or harm on the foetus, but animal studies have shown evidence of increased occurrence of foetal damage, the significance of which is uncertain in humans). A risk/benefit evaluation must be considered before administration in pregnancy and, like all iron intravenous preparations, is contraindicated in the first trimester. If the benefit of Ferinject© treatment is judged to outweigh the potential risk to the foetus, it is recommended that treatment in pregnancy should be confined to women beyond the 16th week of gestation[3].

Dosing[5]

- Dosing of intravenous iron for repletion of the total body deficit is based on the patient's weight, target haemoglobin and actual haemoglobin.
- Target haemoglobin is different in pregnancy with the WHO classification of anaemia defined as:
    - haemoglobin <110 g/L in pregnant women
    - haemoglobin <120g/L in non-pregnant women[5]

As such, when dosing for iron infusions, we advise a target haemoglobin of antenatal patients in the second and third trimester of pregnancy of 120g/L.

- *Ideal bodyweight should be used for overweight or obese patients; alternatively, pre-pregnancy weight could be used and if not known, then the dose should be calculated using the current weight minus 10% (i.e. if currently 80 kg, then body weight in calculation should be 72 kg).

Appendix 2 References

1. National Blood Authority (NBA) 2015. Patient Blood Management Guidelines: Module 5 – Obstetrics and Maternity, NBA, Canberra, Australia
2. Auckland Clinical Practice Guideline 2015. Iron in Pregnancy. National Women's Health. https://nationalwomenshealth.adhb.govt.nz/assets/Womens-health/Documents/Policies-and-guidelines/Iron-in-Pregnancy-.pdf

3. Aspen Pharmacare Australia. Ferinject® Product Information. [Internet]. Updated 2021; cited September 2021. Available from https://www.mimsonline.com.au
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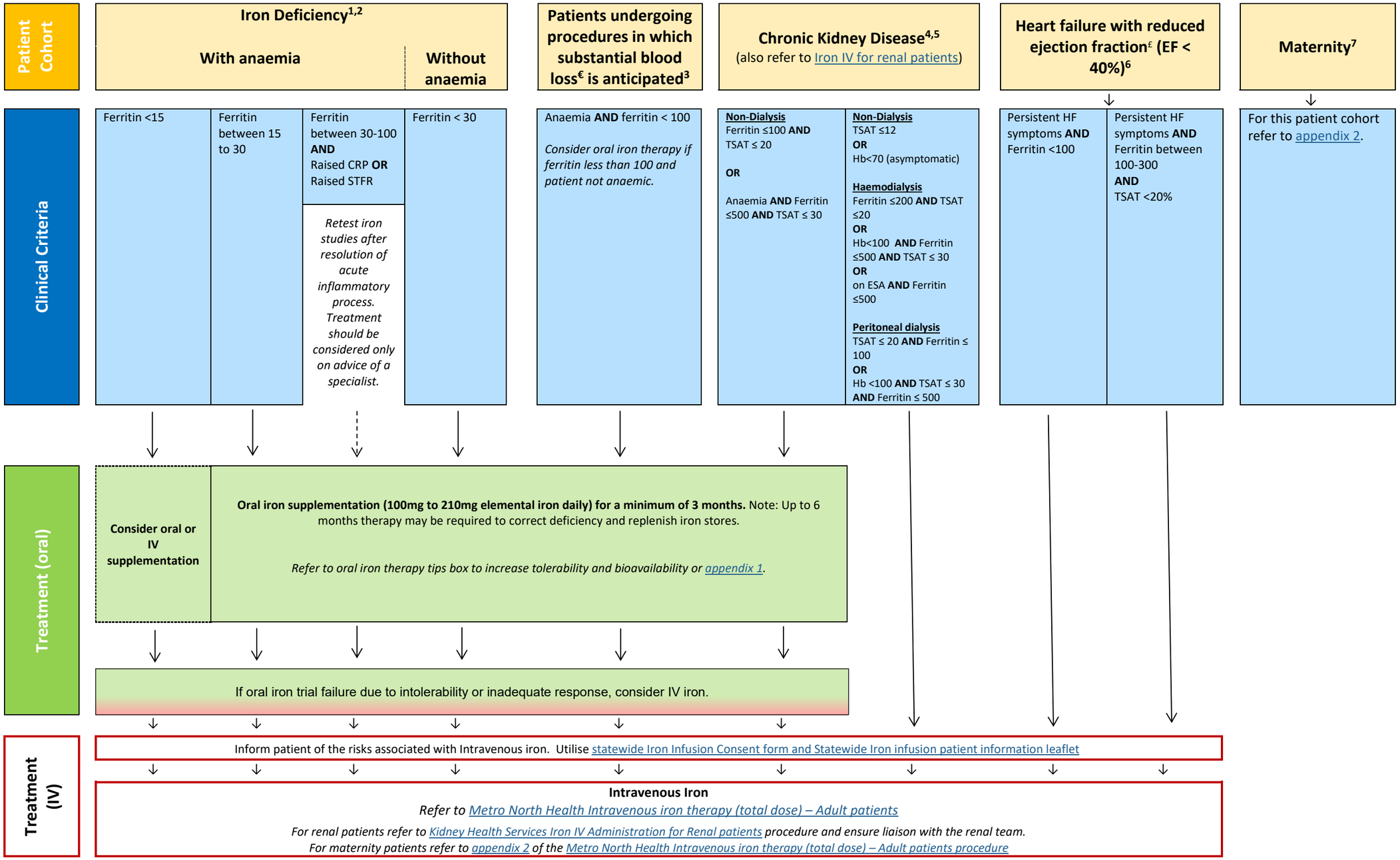
5. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organisation, 2011(WHO/NMH/NHD/MNM/11.1) [Internet](cited September 2021) Available from https://www.who.int/publications/i/item/WHO-NMH-NHD-MNM-11.1

Appendix 3 – Iron supplementation Indication Flow Chart

This iron supplementation flow chart has been prepared utilising available evidence to guide appropriate decision making on prescribing of oral and intravenous (IV) iron.
In some circumstances, patients may benefit from use of oral or IV iron outside of the clinical criteria contained within this flow chart and appropriate clinical judgement should be utilised in these cases.



Oral iron therapy tips[1,2]

To increase tolerability of oral iron trial:

- Intermittent dosing (e.g. dosing on alternate days)
- Administer in divided doses
- Take the dose at night
- Take the dose with food (this may reduce oral absorption though)
- Consider alternative formulation

To increase bioavailability of oral iron trial:

- Administration with vitamin C
- Avoid tea or coffee before and after iron administration as it can reduce iron absorption
- Review the need for medicines which reduce oral iron absorption (proton pump inhibitors, H2 antagonists, calcium supplements, antacids)
- Intermittent dosing (e.g. dosing on alternate days)

Footnote: Anaemia – defined as Haemoglobin less than 120g/L (females), Haemoglobin less than 130g/L (males); €Anticipated Hb decrease is ≥ 30g/L. £Where patients EF > 40% treat according to iron deficiency pathway

Abbreviations – Hb: Haemoglobin; TSAT: Transferrin saturation; CRP: C-reactive protein; STFR: soluble transferrin receptor; HF: heart failure; EF: ejection fraction; ESA: erythropoietin stimulating agent;

References: 1. eTG Complete. Overview of iron deficiency. Melbourne (VIC): Therapeutic Guidelines Ltd. 2016. 2. Pasricha SS et al. Diagnosis and management of iron deficiency anaemia: a clinical update. Med J Aust 2010. 193(9):525-32. 3. National Blood Authority. Patient Blood management Guidelines: Module 2 Perioperative. 2012. 4. Kidney Health Services, Royal Brisbane and Women's Hospital. Iron IV administration for renal patients Procedure. August 2016. 5. Berns JS et al. Treatment of iron deficiency anemia in adults. In: UpToDate. Mentzer WC (Ed), UpToDate, Waltham, MA (Accessed August 2019). 6. Atherton JJ et al. National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand: Guidelines for the Prevention, Detection and Management of Heart Failure in Australia 2018. Heart, Lung and Circulation (2018) 27, 1123–1208. 7. Australian Red Cross Blood Service. Haemoglobin assessment and optimisation action plan. V1.0 Available from: https://www.health.qld.gov.au/__data/assets/pdf_file/0035/931697/f-lifeblood-haemoglobin.pdf [Online]. Accessed: 24/06/2020. 8. Auckland District Health Board. Iron in Pregnancy Guideline. August 2015.
Prepared by Metro North Iron Taskforce – July 2020. Endorsed by Metro North Medicines Management Board August 2020. Review date: August 2023.t Blood management Guidelines: Module 2 Perioperative. 2012. 4. Kidney Health Services, Royal Brisbane and Women's Hospital. Iron IV administration for renal patients Procedure. August 2016. 5. Berns JS et al. Treatment of iron deficiency anemia in adults. In: UpToDate. Mentzer WC (Ed), UpToDate, Waltham, MA (Accessed August 2019). 6. Atherton JJ et al. National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand: Guidelines for the Prevention, Detection and Management of Heart Failure in Australia 2018. Heart, Lung and Circulation (2018) 27, 1123–1208. 7. National Blood Authority (NBA) (2015). Patient Blood Management Guidelines: Module 5 – Obstetrics and Maternity. NBA, Canberra, Australia.

Appendix 4 – IV iron prescription examples

The figures below outline gold standard examples for paper-based prescribing various IV iron formulations.

Refer to DMN Ordering Iron QRG, Iron polymaltose infusion Adult PowerPlan QRG and Iron carboxymaltose infusion Adult PowerPlan QRG when prescribing within the ieMR.

Figure 1 – Gold standard iron polymaltose (slow / traditional) medication prescription

Date ordered	Line / Route	Volume	Fluid Type and Additive (amount per bag or syringe) If blood/FFP attach sticker	Rate mL/hr	Prescriber Signature / Print Your Name
1/1/19	IV	500 mL	elemental iron 1500mg (as polymaltose) in sodium chloride 0.9%	40mL/h for 15mins	A-Doctor / A. DOCTOR
			If tolerated after 15 minutes increase to	then 120 mL/h	A-Doctor / A-DOCTOR

Figure 2 – Gold standard iron polymaltose (rapid) medication prescription

Date ordered	Line / Route	Volume	Fluid Type and Additive (amount per bag or syringe) If blood/FFP attach sticker	Rate mL/hr	Prescriber Signature / Print Your Name
1/1/19	IV	250 mL	elemental iron 1500mg (as polymaltose) in sodium chloride 0.9%	40mL/h for 15mins	A-Doctor / A-DOCTOR
			If tolerated after 15 minutes increase to	then 250 mL/h	A-Doctor / A-DOCTOR

Figure 3 – Gold standard ferric carboxymaltose medication prescription

Date ordered	Line / Route	Volume	Fluid Type and Additive (amount per bag or syringe) If blood/FFP attach sticker	Rate mL/hr	Prescriber Signature / Print Your Name
1/1/19	IV	100 mL	elemental iron 1000mg (as ferric carboxymaltose) in sodium chloride 0.9%.	400 mL/h (over 15 mins)	A-Doctor / A-DOCTOR.

Appendix 5 – IV iron dosing

Parenteral iron formulations contain an iron core bound to a carbohydrate molecule. **Doses should be expressed as elemental iron**. (Note: iron polymaltose 318mg = 100mg elemental iron).

Total dose replacement

The dose of IV iron for repletion of the total body iron deficit is based on patient weight and haemoglobin. The cumulative iron deficit can be calculated using the Ganzoni formula:

Cumulative iron deficit in mg

= iron depot in mg + [(target Hb in g/L - actual Hb in g/L) x bodyweight in kg x 0.24]

where:

Bodyweight	Target Hb (g/L)	Iron depot
Below 35kg	130	15mg/kg bodyweight
Above 35kg	150	500mg

Ideal body weight should be used for overweight (e.g., BMI >25) or obese (e.g., BMI > 30) patients and pre-pregnancy weight in pregnant women (or ideal weight if obese pre-pregnancy) (see appendix 2).

Target haemoglobin is different in pregnancy with WHO classification of anaemia dependent on gestation. Suggested target haemoglobin for antenatal patients in second and third trimester is 120g/L, and for postnatal patients is 100g/L in those who can continue with oral iron therapy.

Each unit of PRBCs transfused contains 200-250mg of elemental iron. This should be considered when determining the dose of iron required, and subtracted from the total body iron deficit to be infused.

The following table outlines the maximum dose based upon iron formulation and administration rates:

Formulation and administration rate	Maximum dose
Iron polymaltose (slow / traditional)	2500mg
Iron polymaltose (rapid) – 250mL/h	1500mg
Iron polymaltose (rapid) – 166mL/h	2000mg
Ferric carboxymaltose	1000mg per week
Ferric derisomaltose	1500mg per week

Simplified method

A simplified dose table for each product formulation is below.

Iron polymaltose

Body weight (kg)	Measured (actual) haemoglobin level			
	Hb 60g/L	Hb 75g/L	Hb 90g/L	Hb 105g/L
(kg)	mg of iron	mg of iron	mg of iron	mg of iron
40	1350	1200	1100	950
45	1500	1300	1150	1000
50	1600	1400	1200	1050
55	1700	1500	1300	1100
60	1800	1600	1350	1150
65	1900	1650	1450	1200
70	2000	1750	1500	1250
75	2100	1850	1600	1300
80	2250	1950	1650	1350
85	2350	2050	1700	1400
90 and above	2450	2150	1800	1450

Ferric carboxymaltose (Ferinject)

Haemoglobin (g/L)	Weight 35kg to < 70kg	Weight 70kg and above
<100	1500mg (Note: Maximum dose per week is 1000mg)	2000mg (Note: Maximum dose per week is 1000mg)
100 to <140	1000mg	1500mg (Note: Maximum dose per week is 1000mg)
≥ 140	500mg	500mg

Ferric derisomaltose (Monofer)

Haemoglobin (g/L)	Weight 50kg to < 70kg	Weight 70kg and above
≥ 100	1000mg	1500mg
< 100	1500mg	2000mg (Note: Maximum dose per week is 1500mg)

Appendix 6 – IV iron summary tables

The following tables outline information relevant to each of the different IV iron preparations and relevant administration rates. Refer to Kidney Health Services Iron IV administration for renal patients and Appendix 2 for Maternity Patients

6.1 Iron polymaltose (traditional / slow administration)

Dosing	**Maximum dose:** 2500mg Refer to appendix 5 for dose calculation details.
Administration	**Dilution** The total dose of iron is to be made up to 500mL sodium chloride 0.9%. *For fluid restricted patients:* A smaller volume of fluid may be prescribed provided the maximum concentration is 5mg/mL. **Infusion** (Approximate total infusion time: 3 to 5 hours) Infuse at an initial rate of 40mL/hour for 15 minutes, then rate may be increased to 120mL/h for remainder of the infusion if tolerated by the patient.
Monitoring	**Baseline** Record oxygen saturations, temperature, blood pressure, pulse and respiratory rate. Visualise and assess the cannula/infusion site. Record that it has been inspected. **During and post infusion** Record oxygen saturations, temperature, blood pressure, pulse and respiratory rate at the following intervals: • Every 5 minutes for the initial 15 minutes, then • Every 30 minutes until 1-hour post completion of infusion. The cannula/infusion site must be visualised and assessed at these time intervals. This must be documented on the Metro North Iron Infusion Checklist and Monitoring form or the equivalent within ieMR. *If pregnant, refer to monitoring below:* • *A fetal heart rate is to be taken before commencement of the infusion and 15 minutes post cessation of the infusion.* • *A cardiotocograph (CTG) for fetal wellbeing may be considered at the discretion of the obstetrician if any adverse reactions are suspected. If any concerns arise, seek MO review.*
Notes	Contraindications and precautions are available within the product information. Iron polymaltose 318mg = 100mg elemental iron

6.2 Iron polymaltose (rapid administration)

<table>
<tr><td>Dosing</td><td>Maximum dose: 1500mg or 2000mg
Refer to appendix 5 for dose calculation details.</td></tr>
<tr><td>Administration</td><td>Dilution
The total dose of iron is to be made up to 250mL sodium chloride 0.9% (maximum concentration 8mg/mL).
Infusion (Approximate total infusion time: 75 to 105 minutes)
Infuse according to the table below:

<table>
<tr><th>Dose</th><th>Initial rate for first 15 minutes</th><th>Subsequent infusion rate</th></tr>
<tr><td>Up to 1500mg</td><td>40mL/h</td><td>250mL/h</td></tr>
<tr><td>1501mg – 2000mg</td><td>40mL/h</td><td>166mL/h</td></tr>
</table>

If an infusion-related reaction occurs temporarily stop the infusion and restart at the same rate or a reduced rate of 60 mL/hour.</td></tr>
<tr><td>Monitoring</td><td>Baseline
Record oxygen saturations, temperature, blood pressure, pulse and respiratory rate. Visualise and assess the cannula/infusion site. Record that it has been inspected.
During and post infusion
Record oxygen saturations, temperature, blood pressure, pulse and respiratory rate at the following intervals:
• Every 5 minutes for the initial 15 minutes, then
• Every 15 minutes until 1-hour post completion of infusion.
The cannulation/infusion site must be visualised and assessed at these time intervals. This must be documented on the Metro North Iron Infusion Checklist and Monitoring form or the equivalent within ieMR.

If pregnant, refer to monitoring below:
• A fetal heart rate is to be taken before commencement of the infusion and 15 minutes post cessation of the infusion.
• A cardiotocograph (CTG) for fetal wellbeing may be considered at the discretion of the obstetrician if any adverse reactions are suspected. If any concerns, seek MO review.</td></tr>
<tr><td>Notes</td><td>The following patients should not have IV iron polymaltose administered using the rapid protocol:
• New York Heart Association Class III or IV heart failure
• Known left ventricular ejection fraction less than 30%
• Known CKD (estimated glomerular filtration rate less than 15mL per min)
• Otherwise deemed to be at risk of fluid overload
Additional contraindications and precautions are available within the product information.
Iron polymaltose 318mg = 100mg elemental iron</td></tr>
</table>

6.3 Ferric carboxymaltose

<table>
<tr><td>Dosing</td><td>Maximum dose: 20mg/kg to a maximum of 1000mg per week. If the total iron deficit exceeds this dose for a single infusion, the cumulative dose can be given over sequential weeks until the target dose is reached.

Refer to appendix 5 for dose calculation details.</td></tr>
<tr><td>Administration</td><td>Dilution and infusion (Approximate total infusion time: 15 minutes)

The table below outlines the dilution volume and administration time based upon the required iron dose.
<table>
<tr><th>Iron dose</th><th>Maximum volume of sodium chloride 0.9%</th><th>Minimum administration time</th></tr>
<tr><td>100 to 200mg</td><td>50mL</td><td>3 minutes</td></tr>
<tr><td>201 to 500mg</td><td>100mL</td><td>6 minutes</td></tr>
<tr><td>501mg to 1000mg</td><td>250mL</td><td>15 minutes</td></tr>
</table>
Hospitals may choose to standardise administration of doses between 200mg and 1000mg, diluted in 100mL of sodium chloride 0.9% and administered over 15 minutes.</td></tr>
<tr><td>Monitoring</td><td>Baseline

Record oxygen saturations, temperature, blood pressure, pulse and respiratory rate. Visualise and assess the cannula/infusion site. Record that it has been inspected.

During and post infusion

Record oxygen saturations, temperature, blood pressure, pulse and respiratory rate at the following intervals:

• Every 5 minutes during the infusion, then 15 minutes and 30 minutes after completion of the infusion
The cannulation/infusion site must be visualised and assessed at these time intervals. This must be documented on the Metro North Iron Infusion Checklist and Monitoring form or the equivalent within ieMR.

If pregnant, refer to monitoring below:
• A fetal heart rate is to be taken before commencement of the infusion and 15 minutes post cessation of the infusion.
• A cardiotocograph (CTG) for fetal wellbeing may be considered at the discretion of the obstetrician if any adverse reactions are suspected. If any concerns, seek MO review.</td></tr>
<tr><td>Notes</td><td>Contraindications and precautions are available within the product information.</td></tr>
</table>

6.4 Ferric derisomaltose

<table>
<tr><td>Dosing</td><td>Maximum dose: 20mg/kg to a maximum of 1500mg per week. If the total iron deficit exceeds this dose for a single infusion, the cumulative dose can be given over sequential weeks until the target dose is reached.

Refer to appendix 5 for dose calculation details.</td></tr>
<tr><td>Administration</td><td>Dilution and infusion (Approximate total infusion time: 15 minutes)

The table below outlines the dilution volume and administration time based upon the required iron dose.
<table>
<tr><th>Iron dose</th><th>Maximum volume of sodium chloride 0.9%</th><th>Minimum administration time</th></tr>
<tr><td>0 to 500mg</td><td>500mL</td><td>Infuse over 20 minutes</td></tr>
<tr><td>501 to 1000mg</td><td>500mL</td><td>Infuse over 20 minutes</td></tr>
<tr><td>1001 to 1500mg</td><td>500mL</td><td>Infuse over 30 minutes</td></tr>
</table>
Note: The maximum fluid volume which can be used is 500mL.

Doses less than 500mg can be administered via slow IV injection undiluted or diluted to a maximum of 20mL, administered at a maximum rate of 250mg per minute.</td></tr>
<tr><td>Monitoring</td><td>Baseline

Record oxygen saturations, temperature, blood pressure, pulse and respiratory rate. Visualise and assess the cannula/infusion site. Record that it has been inspected.

During and post infusion

Record oxygen saturations, temperature, blood pressure, pulse and respiratory rate at the following intervals:

• Every 5 minutes during the infusion, then 15 minutes and 30 minutes after completion of the infusion
The cannulation/infusion site must be visualised and assessed at these time intervals. This must be documented on the Metro North Iron Infusion Checklist and Monitoring form or within ieMR.

If pregnant, refer to monitoring below:
• A fetal heart rate is to be taken before commencement of the infusion and 15 minutes post cessation of the infusion.
• A cardiotocograph (CTG) for fetal wellbeing may be considered at the discretion of the obstetrician if any adverse reactions are suspected. If any concerns, seek MO review.</td></tr>
<tr><td>Notes</td><td>Contraindications and precautions are available within the product information.</td></tr>
</table>

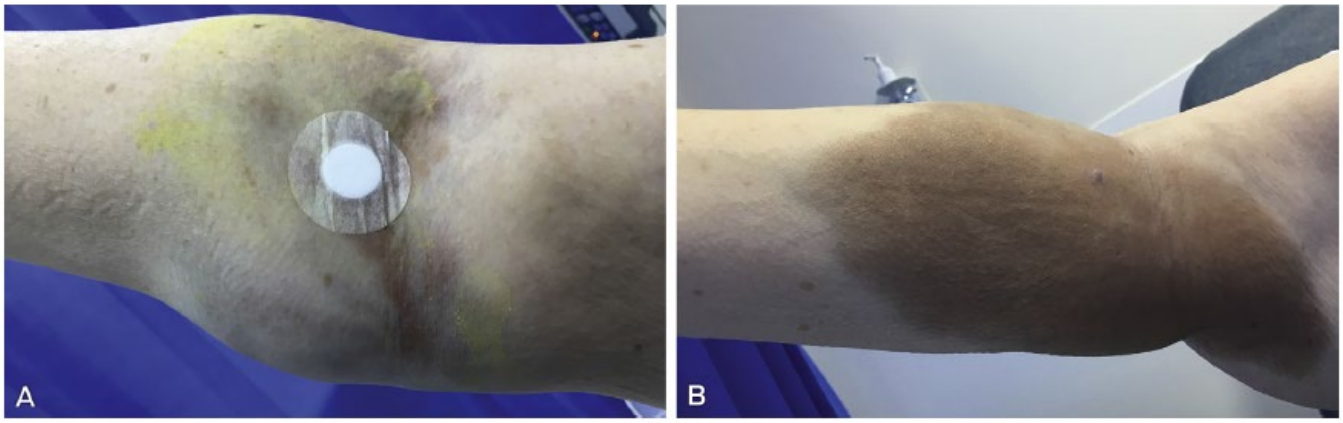
5.5 Iron sucrose

Notes	Maximum doses, frequency, administration and monitoring are not well documented for non-CKD patients. Use of this preparation in the adult patient population is not covered by this document. Refer to the product information. For dosing and administration in CKD patients, refer to Kidney Health Services Iron IV administration for renal patients procedure.

Appendix 7 – Example iron staining image

The following figure shows an IV iron stain at two stages:

- Image A – 30 minutes after cessation
- Image B – 21 days after cessation



Reference: Canning ML, Gilmore KA. Iron stain following an intravenous iron infusion. Med J Aust 2017; 207 (2): 58. doi: 10.5694/mja17.00040

Appendix 8 – Iron Adverse Event Clinical Incident Review Checklist and Improvement Template

This form outlines best practice as defined by the Metro North IV Iron procedure and must be utilised by clinical areas to assess compliance with best practice as part of a clinical incident review into iron infusion related adverse events. To be utilised in addition to current clinical incident management procedures.

RiskMan ID: _____ Patient URN: _____ Facility: _____ Ward: _____

Medication Management Cycle Stage	Best Practice principle – MNHHS IV Iron Procedure	Assessment / Clinical Review notes
Decision to prescribe	Patient meets clinical criteria for use of IV iron therapy. An iron supplementation indication flow chart has been developed to guide decision making on appropriate iron supplementation (See appendix 3).	Did patient meet clinical criteria for use of IV iron therapy (including trial of oral iron if applicable)? Yes No **If no, any practice gaps for improvement?**
Recording of IV iron infusion order / prescription	IV iron infusions must be documented by a Medical Officer on the Intravenous and Subcutaneous Fluid Order Form or relevant electronic prescribing system. Specific dosing details for each IV iron formulation are available in appendix 5 and appendix 6.	Was dose appropriate? Yes No Was infusion volume appropriate? Yes No Was infusion rate appropriate? Yes No **If no, any practice gaps for improvement?**
Supply of medication	Where possible, access to IV iron preparations within imprest should be restricted to enable pharmacist review of the medication order prior to administration. The clinical pharmacist should be consulted to review the medication order, when possible, prior to administration of IV iron.	Was the medication order reviewed by a pharmacist? Yes No **If no, any practice gaps for improvement?**

Provision of medicine information	Patients should be actively involved in their own care. The patient must be informed of the risks (including the risk of permanent skin staining), benefits and alternative treatment options prior to administration of IV iron therapy. Utilise the statewide Iron Infusion Consent form and Statewide Iron infusion patient information leaflet.	Was the statewide Iron Infusion Consent form completed? Yes No If no, is there documented evidence that the patient was informed of the risks, benefits and alternative treatment options? Yes No Is there documented evidence that the patient was provided with a CMI or IV iron patient information? Yes No **If no, any practice gaps for improvement?:**
Administration	Administration should occur in accordance with the relevant iron formulation and administration rate prescribed by the authorised prescriber.	Was the infusion administered as prescribed? Yes No **If no, any practice gaps for improvement?:**
Administration – Cannulation	To minimise the risk of extravasation resulting in staining (when IV iron is administered via a peripheral intravenous cannula), IV iron should be administered an appropriately placed PIVC, avoiding sites of flexion (e.g., wrist, cubital fossa), hands and lower limbs, and assessed as site healthy and catheter patent. Where a cannulation attempt fails, subsequent cannula insertion and iron administration should be proximal to previous sites. The antecubital vein should be avoided for IV iron administration. Where the antecubital vein is used, splint the arm to minimise the risk of extravasation. The rationale for not utilising an alternative site must be documented by the medical officer within the clinical notes. Ensure the PIVC is adequately secured and protected from excessive movement. An infusion extension set should be used to minimise movement/manipulation at the short peripheral catheter hub.	Was the cannula site appropriate? Yes No Number of cannulation attempts: Was PIVC securement adequate and protected from excessive movement? Yes No Unknown Is there evidence the PIVC was patent (flushing/aspirating) prior to the infusion? Yes No Was an extension set used? Yes No Unknown **If no, any practice gaps for improvement?:**

Monitoring	Monitoring should occur in accordance with the requirements outlined for the relevant iron preparation and administration rate within appendix 6 of the Metro North Intravenous iron infusion Procedure 004809. The cannulation/infusion site must be visualised and assessed at these time intervals. Cannula site monitoring documentation should occur on the Metro North Iron infusion checklist and monitoring form or within the relevant areas within ieMR.	Did monitoring occur in accordance with the requirements outlined for the relevant iron preparation? Yes No Was the Metro North Iron Infusion Checklist and Monitoring form used? Yes No ieMR equivalent used Did cannula site monitoring and documentation occur in accordance with the requirements outlined for the relevant iron preparation? Yes No **If no, any practice gaps for improvement?:**
Management of adverse reactions – Allergic reaction	Allergic/anaphylactoid reactions, although rare, may occur within the first few minutes of IV iron administration. Clinical features of an allergic/anaphylactoid reaction include sweating, tachycardia, wheezing, stridor, dyspnoea, dizziness, hypotension and cardiac arrest. If any suspected allergic/anaphylactoid reactions occur: 1. Cease the infusion immediately 2. Contact the treating team 3. Consider administration of adrenaline (anaphylaxis), bronchodilators and/or oral steroids (persistent wheeze) or antihistamine (for itch or rash) 4. Initiate a medical emergency team call (as per local processes) if criteria are reached	Did the patient experience an allergic adverse reaction? Yes No Were best practice principles adhered to for management of an allergic reaction? Yes No Not applicable **Any practice gaps for improvement?:**

Management of adverse reactions – Extravasation	In the event of suspected IV iron infusion extravasation stop all fluids/injections immediately. Disconnect the giving set. Contact Prescriber. If infiltration/extravasation suspected, do not recommence infusion and: • Leave the device in place. • Aspirate any residual drug from catheter. Apply a cold compress for symptomatic relief of pain, burning or stinging (if required). • Plan - Estimate the volume of fluid that has infiltrated into the surrounding tissue and mark the affected area with an indelible pen to allow for follow-up assessment of change. Arrange for hospital photographs to be taken (including follow up photographs if required). • Inform the prescriber so an assessment can be made of sensory deficit which could indicate nerve damage or compartment syndrome. Ensure a plan is in place which includes ongoing assessment and documentation of limb and cannula site observations. Cases of delayed staining have occurred. • Plastics Review – Notify the prescribing team for an urgent review and referral for urgent Plastics review if extravasation is thought to be severe and/or ulceration and/or a sensory deficit occurs. • Seek advice from required specialties including dermatology (skin staining) and haematology (anaemia management) as per individual patient symptoms/requirements. Document the management in the patient's clinical record and report the incident through the facility's incident reporting system. Refer to Metro North Health Clinical Incident Management Procedure. Where skin staining occurs as the result of extravasation, a management plan is to be developed in collaboration with the patient prior to discharge.	Did the patient experience an extravasation adverse reaction? Yes No Were best practice principles adhered to for management of an IV iron extravasation? Yes No Not applicable Is there documented evidence that clinician disclosure was appropriately completed? Yes No Is there a documented management plan agreed to with the patient? Yes No Not applicable **Any practice gaps for improvement?**
Clinical Handover	Communication between the hospital and the patient's GP (e.g. via a transfer of care/discharge referral) must outline any iron therapy provided (including any complications) as part of an active management plan. This may assist unintentional duplication of iron administration by the GP or other health professionals. Administration of intravenous iron during an inpatient admission, including any requirement for subsequent oral therapy, should be documented by the pharmacist on a Discharge Medication Record (DMR).	Is there documented evidence of clinical handover? Yes No Was IV iron administration documented on a DMR? Yes No Not applicable **If no, any practice gaps for improvement?:**

Completed by:_____ Designation: _____ Date: _____

Document history

Author	Consultant Safety & Quality Pharmacist, Metro North Clinical Governance
Custodian	Executive Director Clinical Governance – Metro North Health
Consequence Level and Risk rating	**Likelihood –** Unlikely **Consequence –** Moderate **Risk Rating –** Medium (12)
Compliance evaluation and audit	Review of clinical incidents related to IV iron reported within the clinical incident monitoring system
Replaces Document/s	Procedure 004809 Intravenous Iron Therapy (total dose) – adult patients V2.0 04/2022
Changes to practice from previous version	Scheduled review Minor practice and/or process change: • Cannulation section updated to refer and align with Metro North Peripheral Intravenous Catheter Insertion and Management (ADULT) procedure • Hypophosphatemia section added • Term ‘medical officer’ updated to ‘prescriber’ within procedure. • Additional simplified dosing tables added.
Education and training to support implementation	Refer to Marketing Strategy
Consultation	**Key Stakeholder Consultation** Metro North Medication Safety Committee membership Metro North Medication Safety Community of Practice Metro North Blood Management Committee Metro North Stream Leads **Broad Consultation facilitated through the following:** Metro North Aboriginal and Torres Strait Islander Leadership Team Metro North Clinical Governance Digital Metro North Metro North Medical Services Metro North Nursing and Midwifery Services Metro North Allied Health Metro North Communication Metro North Finance

	Metro North Norfolk Island Support Program Metro North People and Culture Metro North Workplace Health and Safety Metro North Legal Unit Metro North Ethical Standards Unit Metro North Risk and Compliance Officer Metro North Clinical Streams Metro North Engage Health Excellence Innovation Unit Clinical Directorate Safety and Quality Units Clinical Skills Development Centre
Marketing Strategy	Marketing through regular email to all line managers of new and updated policies and procedures; Also a notification through Safety and Quality Units to key stakeholders.
Key words	Iron, iron polymaltose, intravenous iron, iron infusion, iron replacement, ferric, ferric carboxymaltose, Ferinject, Ferrosig, iron sucrose, venofer, Ferrum H, iron transfusion, monofer, ferric derisomaltose; 004809

Custodian Signature Date

Executive Director Clinical Governance, Metro North Hospital and Health Service

AUTHORISATION

Authorising Officer Signature Date

Executive Director Clinical Governance, Metro North Hospital and Health Service

The original signed version is kept in file at Clinical Governance, Metro North Health.