Reference Number: FOI202324/492
From: Commercial

Date: 26 January 2024

Subject: Iron Infusion and Iron Extravasation

Q1 How many iron extravasations have been reported within your organisation, if possible, could I have a 5- or 10-year breakdown?

A1 One

Q2 Do you know how often IV iron is given, prescribed, and used within the organisation?

A2

	Ferric carboxymaltose solution for injection	Ferric Derisomaltose 100mg in 1mL injection	Ferric Derisomaltose 100mg in 1mL injection (Clinic Use Only)	Iron sucrose (Venofer) 100mg in 5mL injection	Grand Total
2019	116	0	0	4	120
2020	107	0	0	1	108
2021	143	0	0	3	146
2022	269	0	0	4	273
2023	121	54	218	1	394
Grand Total	756	54	218	13	1041

Q3 Are patients given any information leaflets/documents prior to infusion? May I have a copy?

A3 Yes, please see attached document 'FDI Patient Information Leaflet'.

Q4 Do you have an iron infusion policy - May I kindly have a copy?

A4 Yes, please see attached documents 'HF Policy' and 'Parenteral Iron Protocol'.

Treating iron deficiency with ferric derisomaltose Pharmacosmos 100 mg/ml solution for injection/infusion

Patient information

For more information on iron and how to prepare for your infusion, watch our patient video **here**

Why am I being treated with FDI?

FDI (which is short for ferric derisomaltose) is used for treating iron deficiency. Your doctor will have chosen this treatment because you need to correct the iron levels in your body.

Why do I need iron?

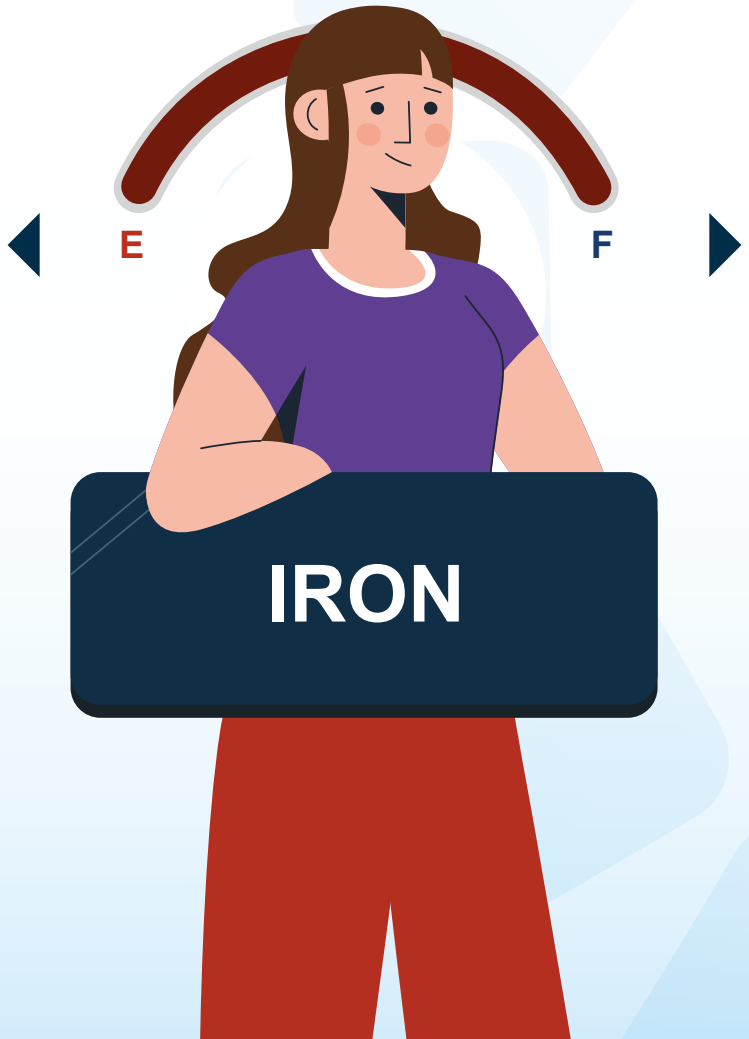
Iron plays a key role in many processes, especially in facilitating the formation of red blood cells and enabling them to carry oxygen around the body. A lack of iron can make us feel tired, dizzy, irritable, unable to sleep and lead to dry skin or hair loss.

Before receiving treatment

Treatment with FDI does not require any preparation from your side. Have your usual meals on the day and make sure you are well-hydrated. Continue taking all your usual medications, but stop any iron tablets at least a day before your appointment. Wear loose, comfortable clothes and a short-sleeved shirt. You can also bring along a book, or something to watch. We advise you to go through your full medical history with your doctor. Please note that this leaflet does not replace the Patient Information Leaflet, which your doctor or nurse can provide you with.

What is FDI?

FDI is a dark brown liquid containing iron. It is used for treating iron deficiency when oral iron preparations are ineffective or cannot be used, or when there is a need to deliver iron rapidly.



Administration

FDI is an intravenous iron treatment that is administered directly into a vein. This means the iron is delivered into your bloodstream via a drip, or you might receive it from a slow injection, all while being monitored by a nurse. The iron doesn't hurt, but you may feel a cold sensation in your arm.

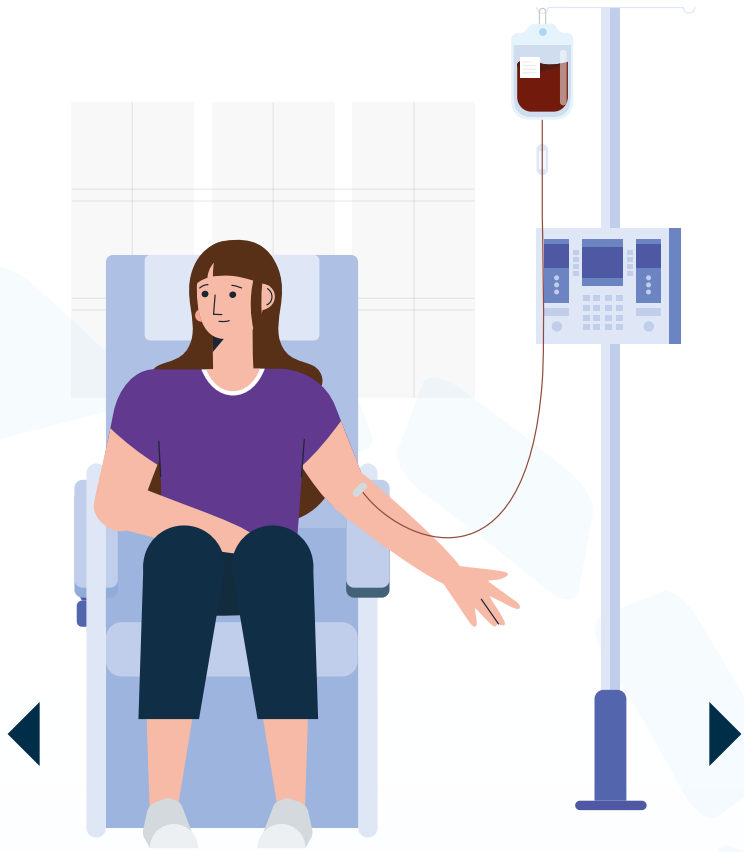
Are there any side effects during treatment?

Like all medicines, FDI can cause side effects, although not everybody gets them. Your doctor will discuss all possible side effects with you before starting treatment. For all intravenous iron treatments administered directly into your arm, there is a low risk that you may experience an acute severe hypersensitivity reaction. Symptoms can include breathing difficulty, dizziness and swelling in the mouth. Your doctor or nurse will be monitoring you closely to make sure your body is responding well to the treatment. There is a risk (uncommon) that iron could leak and cause a stain to your skin which may be permanent. If you experience pain, discomfort, or notice leaking around the treatment site, please let your doctor or nurse know immediately.

A few days after treatment, you might experience headache, mild fever or joint pain – these symptoms usually settle on their own. Tell your doctor or nurse if you experience any symptoms during treatment. The procedure will be stopped immediately – they'll take care of you, and let you know if it's possible to restart. You can find more information on possible side effects in the Patient Information Leaflet provided with your medicine.

How long will the infusion take?

It will take around 30 minutes to receive your iron. Your nurse or doctor will keep you for an additional 30 minutes afterwards to ensure you're well before going home.



What happens after treatment?

A new blood sample will usually be taken some weeks or months after the treatment to determine if your body's iron stores are fully corrected. Depending on your weight and how iron deficient you are, you may only need one treatment to restore your body's iron stores – unless you have ongoing issues that affect your iron levels.

Are you taking iron tablets?

If you are taking iron tablets on a daily basis, it is recommended that you discuss this with your doctor, as you will likely need to stop taking them for a while after your treatment with FDI.

Iron facts

- The human body contains 3–4 grams of iron, approximately two-thirds of this iron is found in the red blood cells
- Iron is needed to produce haemoglobin, the protein that transports oxygen around the body in red blood cells, and myoglobin, a similar protein that is found inside muscle tissue
- Iron is found in many enzymes, such as those that aid energy production. It is also used by the body for assisting the immune system
- Each day, an adult male requires around 11 milligrams (mg) of iron and an adult woman requires around 25 mg. This daily requirement usually comes from dietary sources

Sources: Stein J. et al. *Nat Rev Gastroenterol Hepatol.* 2010;7:599–610. WHO/FAO. Vitamin and mineral requirements in human nutrition. World Health Organization; 2004:1–341.

Reporting of side effects

Ferric derisomaltose

If you get any side effects talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in the package leaflet. You can also report side effects directly via the Yellow Card Scheme at https://yellowcard.mhra.gov.uk or search for MHRA Yellow Card in the Google Play or Apple App Store. By reporting side effects you can help provide more information on the safety of this medicine.

FDI, ferric derisomaltose.

If you need information or advice, please contact your nurse or doctor, who can also contact:

Pharmacosmos UK Ltd
The White Building
33 Kings Road
Reading
RG1 3AR
T: +44 1844 269 007
F: +44 1844 269 005
E: info@pharmacosmos.co.uk
www.pharmacosmos.co.uk

UK-FDI-0423-00002
Date of preparation: April 2023

Iron Administration Intravenously (IV) Iron to Patients with Heart Failure in a Day Case or Inpatient Setting

Policy

For completion by Author			
Author(s) Name and Title:	Archana Rao (Consultant Cardiologist), Dr James Redfern, Clare Quarterman (Consultant Anaesthetist), Marc Vincent (Deputy Chief Pharmacist), Amyleigh Nelson, Anaemia Nurse Specialist		
Scope:	Heart Failure patients	Classification:	Clinical Policy
Version Number:	4.0	Review Date:	22/03/2025
Replaces:	3.0		
To be read in conjunction with the following documents:	Medicines Administration Procedure		
Document for public display:	No		
Executive Lead	Dr Perry		

For completion by Approving Committee			
Equality Impact Analysis Completed:		No	
Endorsement Completed:	Yes	Record of Changes	Yes
Authorised by:	Drug and Therapeutics Committee	Authorisation date:	22/03/2023

For completion by Document Control					
Unique ID No:	T19DC008	Issue Status:	Approved	Issue Date:	28/03/2023
After this document is withdrawn from use it must be kept in archive for the lifetime of the Trust, plus 6 years.					
Archive:	Document Control		Date Added to Archive:		
Officer responsible for Archive:	Information Governance & Document Control Facilitator				

Contents

Document Statement

Introduction

Heart failure (HF) affects around 2% of the population and has a significant impact on quality of life, functional capacity and cognitive health. It is linked with significant morbidity and mortality resulting in frequent hospitalisation and significant healthcare cost [1,2,3,4].

Iron deficiency is increasingly recognised as a significant comorbidity in patients with HF and in this group in-particular is associated with a worse prognosis [5].

Two randomised controlled trials looking at intravenous (IV) ferric carboxymaltose (Ferrinject®) for patients with heart failure and iron deficiency have shown that it is safe, improves exercise capacity, quality of life and reduces hospitalisations [6,7].. The European Cardiology Society guidelines for heart failure [5] state ferric carboxymaltose should be considered in symptomatic patients with heart failure with reduced ejection fraction (HFrEF) and iron deficiency (defined as serum ferritin less than 100micrograms /L or between 100-299micrograms/L plus transferrin saturation less than 20%) in order to alleviate heart failure symptoms and improve exercise capacity and quality of life, after screening for other causes of the iron deficiency.

In 2022, the IRONMAN study was published which randomised 1137 patients with heart failure (LVEF ≤45%) and iron deficiency (TSAT <20% or ferritin <100µg/L) to ferric derisomaltose (Monofer®) or usual care. Results of IRONMAN were similar to AFFIRM-HF with both studies failing to meet their primary endpoints but, showed significantly fewer cardiovascular hospitalisations and improved quality of life in the treatment groups [6,8]. The advantage of Monofer is that a total dose can be given in one visit making it more convenient for patients by reducing the frequency of visits and the waiting time for an appointment. The heart failure team will generally favour Monofer for patients requiring more than 1g per dose unless tolerability issues are identified.

Objective

This policy provides a framework for doctors, heart failure nursing staff and members of the IV iron service to prescribe and administer IV iron in a daycase setting in order to reduce hospitalisation and improve quality of life and exercise capacity for patients with heart failure with reduced ejection fraction (HFrEF) and iron deficiency.

This policy will also be followed when IV iron is to be administered to heart failure patients by LHCH nursing staff whilst an inpatient if prescribed by a cardiology consultant/ registrar.

Scope of Policy

This policy will apply to all patients receiving IV iron for iron deficiency with heart failure and a reduced ejection fraction.

1. Roles and Responsibilities

The consultant clinical lead for heart failure has overall responsibility for this policy.

The Anaemia Nurse Specialist has overall responsibility for the day to day management of the service in conjunction with the Heart Failure Specialist Nurses.

Patients will only be accepted for Iron replacement therapy when referred via the EPR system.

It is the responsibility of the Heart Failure Specialist Nurses and Anaemia Nurse Specialist to ensure compliance with the policy and highlight any issues to lead consultant and matron. The cardiology registrar/consultant is responsible for arranging the prescription of the required dose of IV iron for the patients eligible under this protocol where the Anaemia Nurse Specialist is a non-prescriber.

It is the responsibility of the Heart Failure Specialist Nurses to educate day ward nursing staff in regard to this policy.

It is the responsibility of the lead pharmacist to disseminate the policy to cardiology consultants and registrars and make available for pharmacists as reference.

2. Controlled Document Standards

All staff involved in the referral process, and the subsequent administration of intravenous iron for heart failure patients are responsible for adhering to the policy.

3. Procedure

3.0 Indications for use / inclusion criteria:

1. Age over 18 years
2. Symptomatic with their heart failure
3. NYHA class II or above and confirmed diagnosis of left ventricular systolic dysfunction (LVSD) on echocardiogram (EF less than or equal to 45%)
4. Haemoglobin (Hb) less than 150 g/L
5. Iron deficient (Ferritin less than 100ng/mL or 100-400ng/mL when transferrin saturation (TSAT) is less than 20%. If ferritin is >400ng/mL cases should be discussed with the consultant clinical lead for heart failure or consultant clinical lead for IV iron service on a case-by-case basis regarding eligibility)
6. If anaemic then to have had other possible causes that are treatable (e.g. gastrointestinal bleeding, vitamin B12 or folate deficiency, colon cancer) excluded prior to treatment with IV iron. Once treated if still having iron deficiency anaemia, IV iron would then be an option.
7. Systolic BP greater than or equal to 90 but less than 170mmHg
8. Heart rate above 50 bpm but below 120bpm

3.1 Heart Failure Specialist Nurses may receive referral for this treatment option by several routes:

1. Heart failure clinics (EPR referral)
2. Cardiology ward referrals (e.g coronary care unit, Birch ward via EPR referral)
3. Patients referred from community heart failure services

3.2 Intravenous iron

Patients who fit the criteria for IV iron need their dose determined, based on weight and haemoglobin (see appendix 1). This dose should be prescribed on EPR and a request for the medication should be phoned through to pharmacy. A pharmacist will confirm the dose and infusion rate before the prescription is dispensed.

Choice of IV iron preparation

There are two intravenous iron preparations available, Monofer (ferric derisomaltose) and Ferinject (ferric carboxymaltose). Monofer is considered 1st line for patients requiring a total dose of >1g as this can usually be given in one visit. Ferinject may still be used for patients requiring at total dose of ≤1g or if tolerability issues are identified.

Preparations available: Ferinject; 1000mg in 20mL or 500mg in 10mL
Monofer: 1000mg in 10mL or 500mg in 5mL

Supplies should be obtained from pharmacy on a named patient basis prior to administration.

For dosing and administration see appendix One (Monofer) and Two (Ferinject)

Patients to be cannulated & cannulas monitored as per Trust policy.

IV iron must only be administered in a clinical area with full resuscitation facilities available in case of anaphylaxis. Nurses administering IV iron must be trained to evaluate and manage anaphylactic reactions. An anaphylaxis kit must be available.

Patients must be monitored for a minimum of 30 minutes after the end of the infusion.

Patients should be advised to stop any oral iron preparations for 5 days post-infusion.

See Appendix Three for management of adverse reactions. The cardiology registrar on-call and hospital coordinators should be contacted if patient requires hospital admission as a result of IV iron administration.

3.3 Patients having treatment in a day case admission setting

- Recent lab tests including serum ferritin and transferrin saturation, to be recorded prior to referral
- Clinically stable to receive care if receiving treatment in an outpatient setting (the patient will be admitted as a day case procedure for the infusion).
- Able to manage Activities of Daily Living (ADL's) if receiving treatment in an outpatient setting
- Patient has agreed to treatment.

3.4 Contraindications / Exclusion Criteria

- Patient under age 18 years
- Clinical instability likely to require additional treatment eg vasoactive drugs, vasodilators or inotropic agents.
- Patient in fast AF (HR more than 120bpm)
- Systolic BP less than 90 or more than 170mmHg
- HR below 50bpm
- Unclear diagnosis for clinical presentation
- Patients receiving end of life care
- Signs of on-going infection
- Hypersensitivity to intravenous iron preparations
- Anaemia not attributed to iron deficiency eg other microcytic anaemia
- Evidence of iron overload or disturbances in the utilisation of iron

Patients who do not meet the inclusion criteria or are excluded from the policy should be referred back to the referrer / prescriber and not receive IV iron.

3.5 Initiating Treatment

Treatment is to be initiated by consultant cardiologists, Specialty Cardiology Registrars or Heart Failure Nurses after referral. The Anaemia Nurse Specialist will initiate treatment after referral in the Day Case Setting only.

For Aspen Suite:

Patient to be reviewed by a nurse who has training in the administration of IV iron prior to commencing treatment.

Before the infusion:

- Consent:
  - Provide patient with information leaflet (available from the Anaemia Nurse Specialist) to read.Explain to the patient /carer the purpose of treatment as well as outlining what is involved and obtain verbal consent to treatment
- Undertake initial patient assessment including:
  - Baseline observations
  - Medication List
  - Review of lab test results
  - Past medical history including allergies
- Complete EPR document in full at patients' bedside, Inpatient document for use when patient is being infused in clinic and Ward document when infusing on the ward.
- Insert appropriate cannula and test patency by flushing with 10ml 0.9% sodium chloride injection.
- Prescribe treatment as per algorithm (See appendices)
- Commence treatment as per algorithm (See appendices).Patients who do not fulfil inclusion / exclusion criteria to be referred back to source

3.6 Monitoring

- Provide close monitoring during IV iron infusion.
- Observations should be taken at baseline, 5 minutes after initiation of infusion, on completion of the infusion and based on clinical need for 30 minutes following completion.
- Monitor for extravasation. Paravenous leakage should be avoided as there is the potential to cause discolouration of the skin and surrounding tissue. Following insertion of the cannula, it should be flushed to confirm patency and the site of infusion should be visible and monitored throughout the period of administration. Should an extravasation occur remove cannula or butterfly apply a cold compress encourage elevation and mobilisation of the limb. Administer appropriate analgesia if the patient complains of pain.

Adverse Drug Reactions:

- Acute severe hypersensitivity reactions may occur with parenteral iron preparations. They usually occur within the first few minutes of administration and are generally characterised by the sudden onset of respiratory difficulty and/or cardiovascular collapse; fatalities have been reported. Other less severe manifestations of immediate hypersensitivity, such as urticaria and itching may also occur. In pregnancy, associated foetal bradycardia may occur with parenteral iron preparations.
- Flushing in the face, acute chest and/or back pain and tightness sometimes with dyspnoea in association with IV iron treatment may occur (frequency uncommon). This may mimic the early symptoms of an anaphylactoid/anaphylactic reaction. The infusion should be stopped and the patient's vital signs should be assessed. These symptoms disappear shortly after the iron administration is stopped. They typically do not reoccur if the administration is restarted at a lower infusion rate.
- Delayed reactions may also occur with IV iron and can be severe. They are characterised by arthralgia, myalgia and sometimes fever. The onset varies from several hours up to four days after administration. Symptoms usually last two to four days and settle spontaneously or following the use of simple analgesics.
- For comprehensive details on side effects, precautions for use and use in pregnancy and lactation prescribers should refer to the relevant Summary of Product Characteristics (SPC).

Action to take if there is a reaction:

- Stop infusion immediately
- Ask for help
- Assess and administer appropriate treatment - see Appendix Three for further information on management of adverse reactions.
- The cardiology registrar on-call and hospital coordinators should be contacted if patient requires hospital admission because of IV iron administration.

Additional Information:

- Observe closely throughout infusion for hypersensitivity reactions. Intravenous Chlorpheniramine, Adrenaline and Hydrocortisone should be available for immediate use in the event of a severe adverse drug reaction.

- Patients with asthma, rheumatoid arthritis, eczema, SLE (lupus) or atopic allergies are more likely to be hypersensitivity to IV Iron, consider infusion over an hour.
- As with all parenteral iron preparations the absorption of oral iron is reduced when administered concomitantly. Oral iron therapy should not be started earlier than 5 days after the last administration of IV Iron.
- Parenteral iron has been reported to give a brown colour to serum from a blood sample drawn four hours after administration.
- Parenteral iron may cause falsely elevated values of serum bilirubin and falsely decreased values of serum calcium.

3.5 Location

For outpatients:

Aspen Suite

For inpatients:

Ward area

3.6 Training and Resources

All staff to be registered general nurses.

Heart Failure Specialist Nurses should have appropriate training and be familiar with this policy before before independently making referrals into the IV iron service. To have undergone standard IV training and be familiar with this policy to administer & be a qualified medical or non-medical prescriber if prescribing.

4. Policy Implementation Plan

This policy is approved by the Drugs and Therapeutics Committee. All staff involved in the care of patients receiving IV iron will be made aware of the policy and are responsible for adhering to it.

5. Monitoring of Compliance

5.0 Monitoring and Audit

Data will be collected on all day case patients receiving IV Iron treatment. This will include response to treatment.

This data is to be collected and uploaded to EPR at the time of the first infusion at clinics subsequently as above.

5.1 Equality and Diversity

The trust is committed to an environment that promotes equality and embraces diversity in its performance as an employer and service provider. It will adhere to legal and performance requirements and will mainstream equality and diversity principles through its policies, procedures and processes. This policy should be implemented with due regard to this commitment.

To ensure that the implementation of this policy does not have an adverse impact in response to the requirements of the Equality Act 2010 this policy has been screened for relevance during the policy development process and a full equality impact analysis conducted where necessary prior to consultation. The Trust will take remedial action when necessary to address any unexpected or unwarranted disparities and monitor practice to ensure that this policy is fairly implemented.

This policy and procedure can be made available in alternative formats on request including large print, Braille, moon, audio, and different languages. To arrange this please refer to the Trust translation and interpretation policy in the first instance.

The Trust will endeavour to make reasonable adjustments to accommodate any employee/patient with particular equality and diversity requirements in implementing this policy and procedure. This may include accessibility of meeting/appointment venues, providing translation, arranging an interpreter to attend appointments/meetings, extending policy timeframes to enable translation to be undertaken, or assistance with formulating any written statements.

5.2 Recording and Monitoring of Equality and Diversity

The Trust understands the business case for equality and diversity and will make sure that this is translated into practice. Accordingly, all policies and procedures will be monitored to ensure their effectiveness.

Monitoring information will be collated, analysed and published on an annual basis as part Equality Delivery System. The monitoring will cover the nine protected characteristics and will meet statutory duties under the Equality Act 2010. Where adverse impact is identified through the monitoring process the Trust will investigate and take corrective action to mitigate and prevent any negative impact.

The information collected for monitoring and reporting purposes will be treated as confidential and it will not be used for any other purpose.

6. References

1. McMurray JJ, Pfeffer MA. Heart failure. Lancet. 2005;365:1877-1889.
2. Zarrinkoub R, Wettermark B, Wandell P, et al. The epidemiology of heart failure, based on data for 2.1 million inhabitants in Sweden. Eur J Heart Failure. 2013;15:995-1002.
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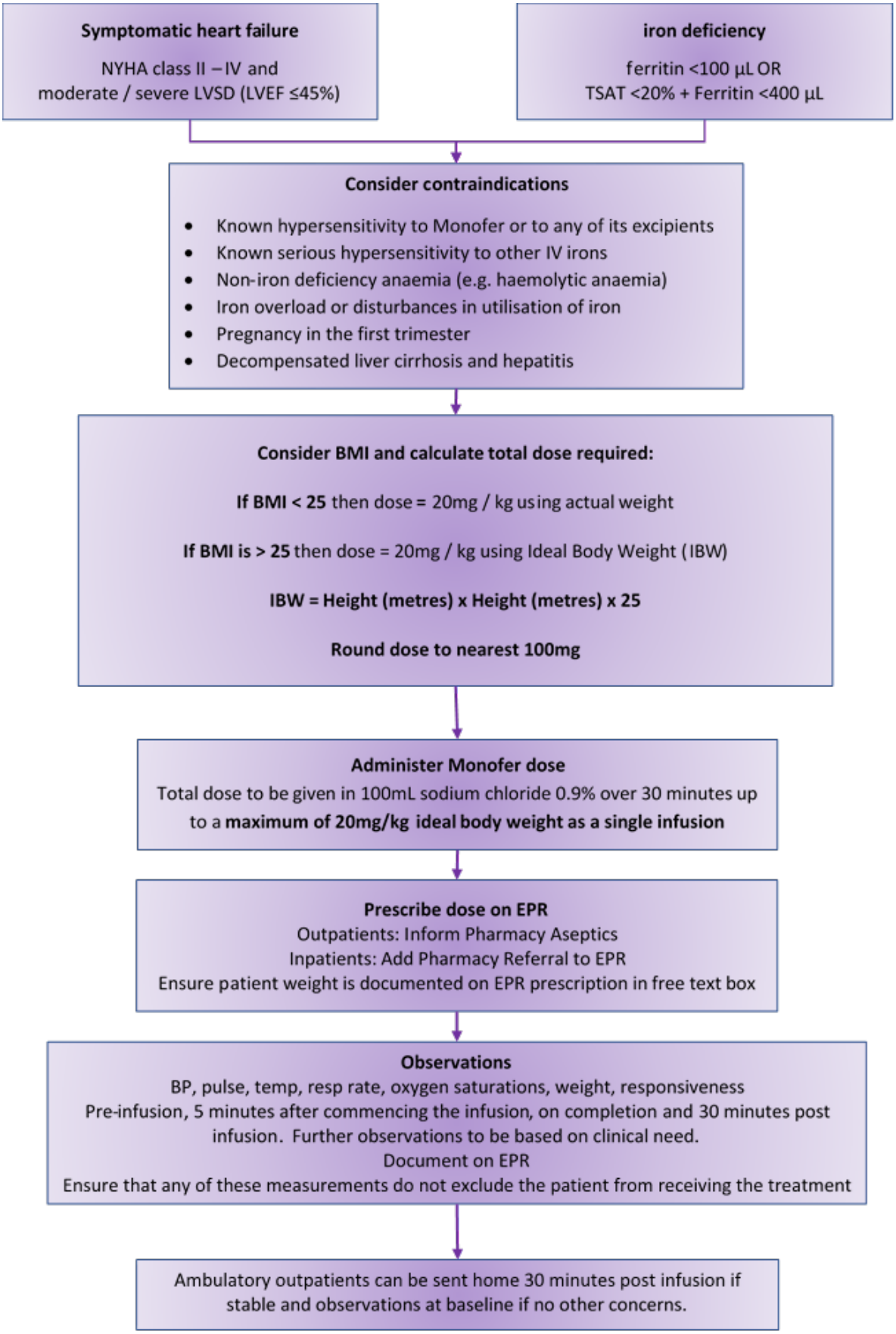
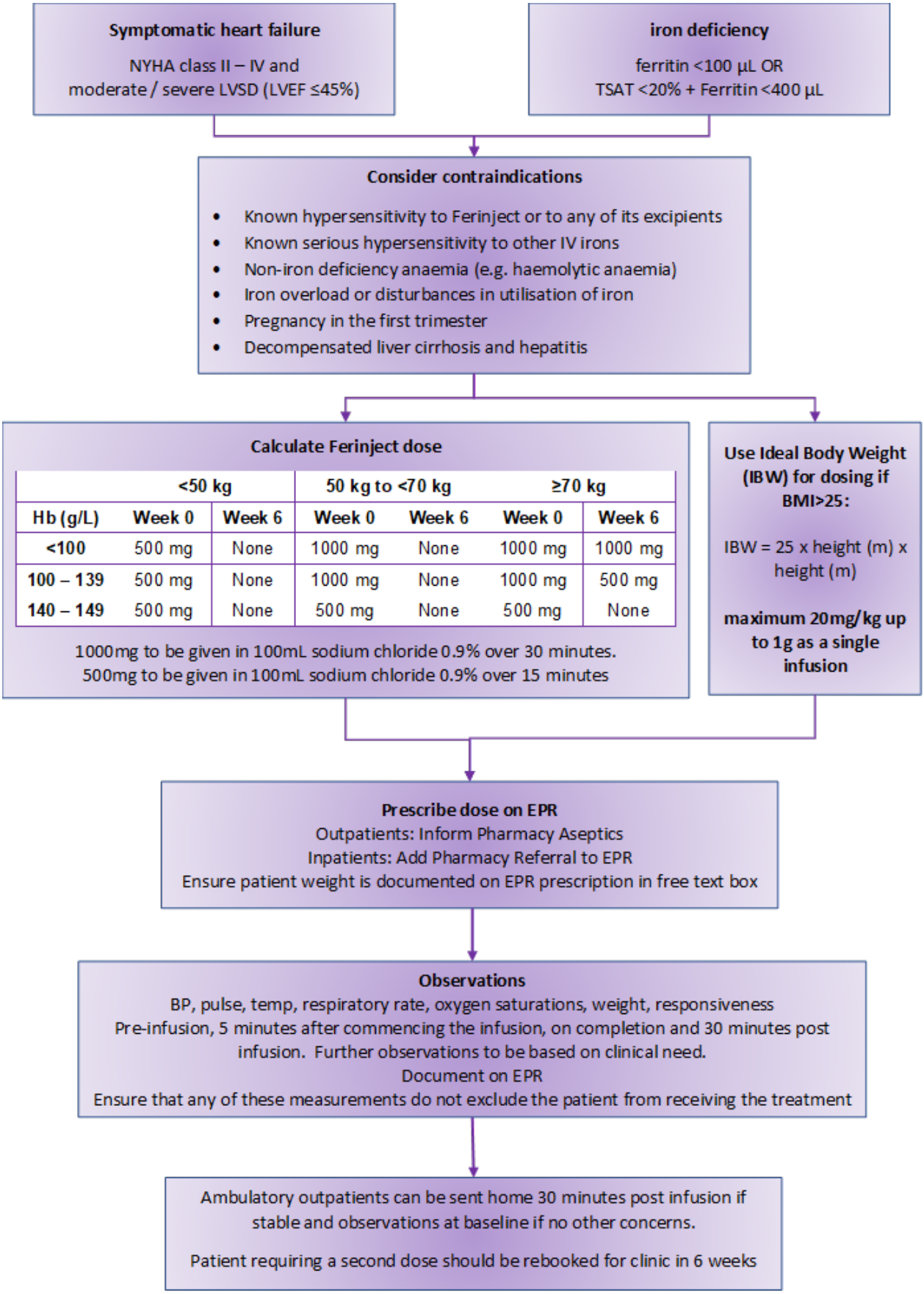
4. Ambrosy AP, Fonarow GC, Butler J, et al. The global health and economic burden of hospitalisations for heart failure registries. J Am Coll Cardiol. 2014;63:1123-1133.
5. European Society for Cardiology guidelines 2016 on chronic heart failure.
6. Ponikowski P, van Veldhuisen DJ et al Beneficial effects of long-term intravenous iron therapy with ferric carboxymaltose in patients with symptomatic heart failure and iron deficiency (CONFIRM HF). *Eur Heart J. 2015 Mar 14;36(11):657-68. doi: 10.1093/eurheartj/ehu385. Epub 2014 Aug 31*
7. Anker, Colet et al Ferric Carboxymaltose in Patients with Heart Failure and Iron Deficiency (FAIR-HF trial) *N Engl J Med 2009; 361:2436-2448December 17, 2009*
8. Kalra PR, Cleland JGF, Petrie MC, Thomson EA, Kalra PA, Squire IB, Ahmed FZ, Al-Mohammad A, Cowburn PJ, Foley PWX, Graham FJ, Japp AG, Lane RE, Lang NN, Ludman AJ, Macdougall IC, Pellicori P, Ray R, Robertson M, Seed A, Ford I; IRONMAN Study Group. Intravenous ferric derisomaltose in patients with heart failure and iron deficiency in the UK (IRONMAN): an investigator-initiated, prospective, randomised, open-label, blinded-endpoint trial. Lancet. 2022 Nov 4:S0140-6736(22)02083-9. doi: 10.1016/S0140-6736(22)02083-9. Epub ahead of print. PMID: 36347265.

7. Appendices

Appendix One: Algorithm for Monofer in HF



Appendix Two: Algorithm for Ferinject in HF

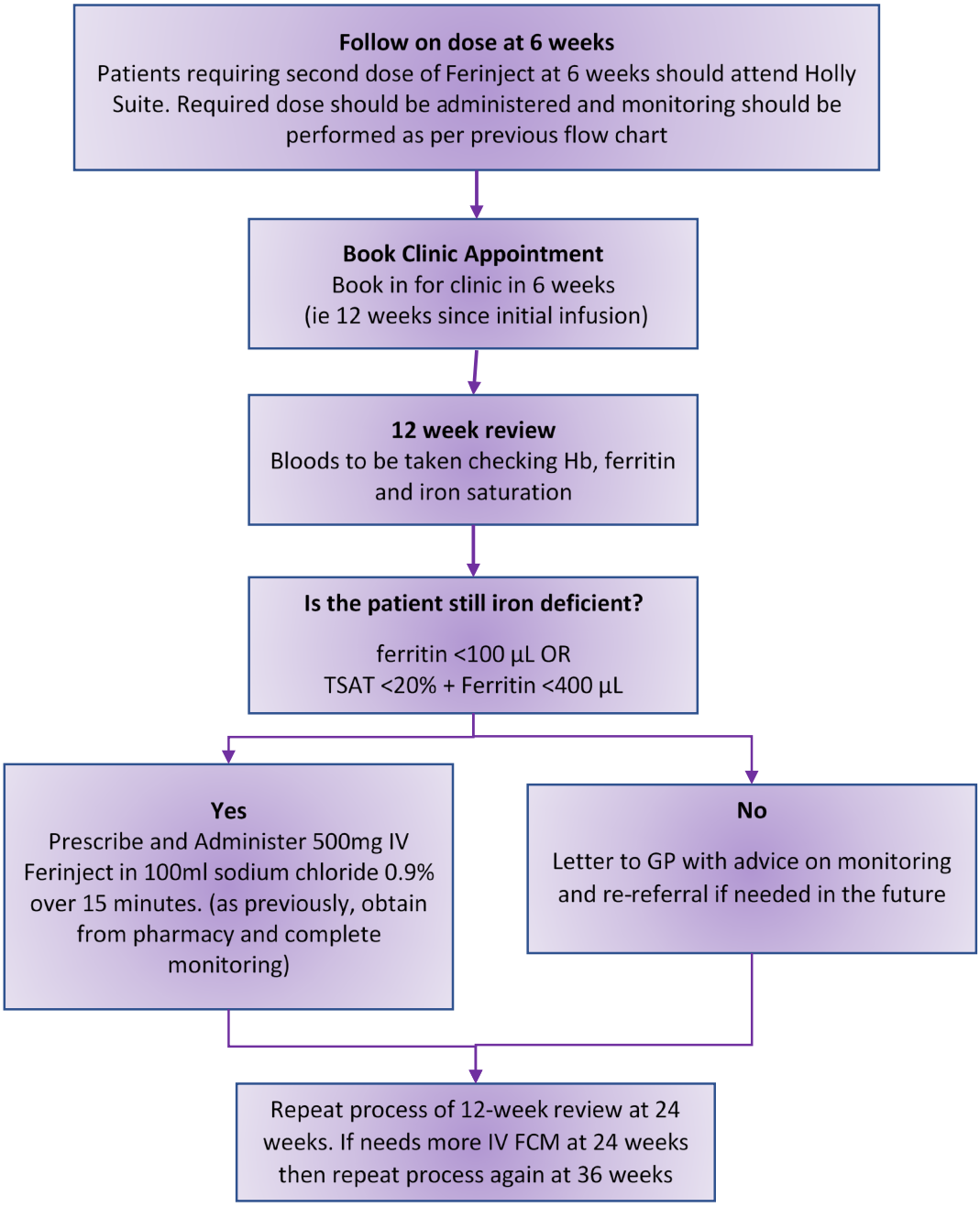


Follow on doses at 6 weeks in ambulatory clinic

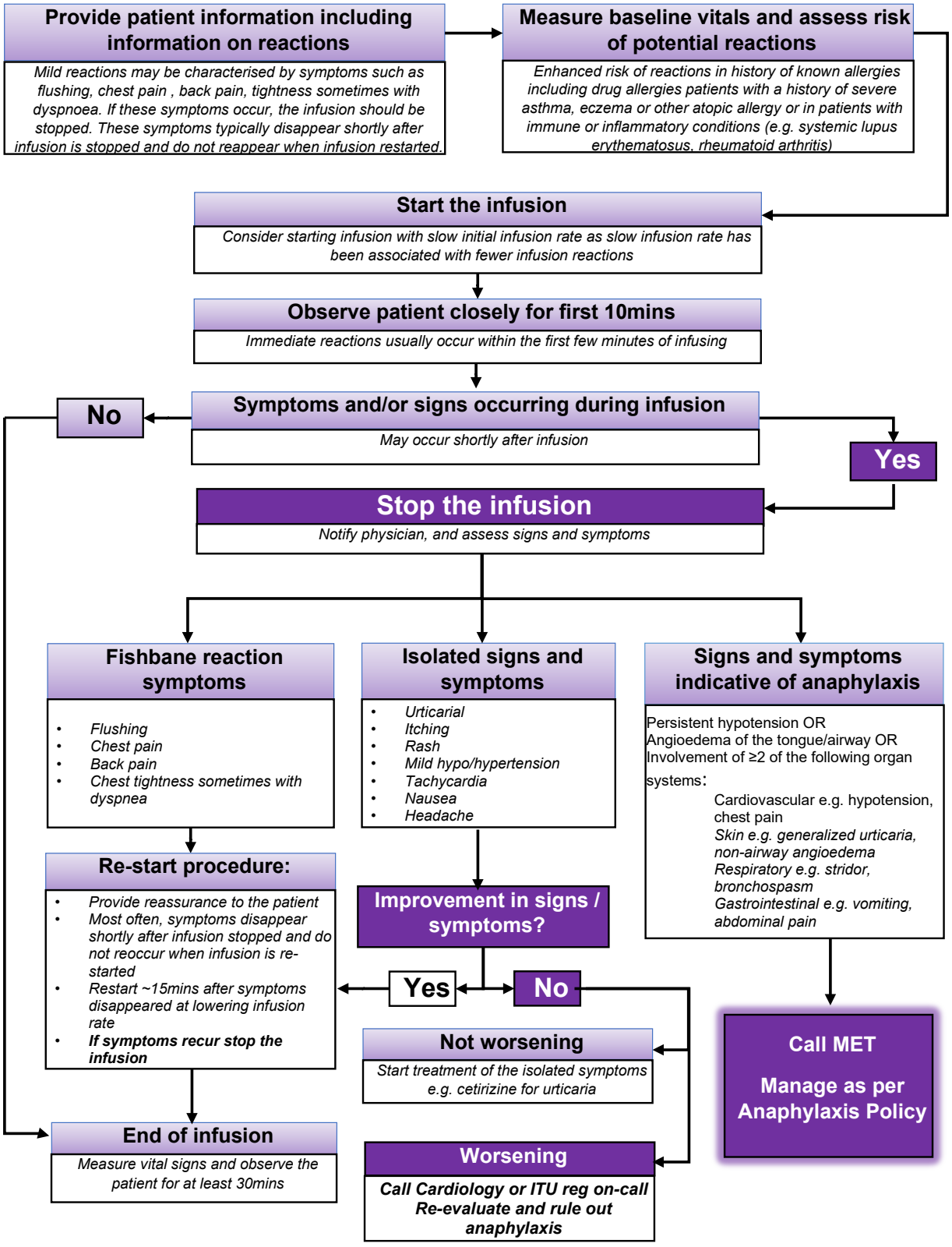
The IV iron nurse will arrange with the patient if a second dose is required and will communicate this with the IV iron group.

For patients who received their initial dose as an inpatient this must be communicated by EPR referral to the heart failure nurses prior to discharge so they can arrange an ambulatory clinic appointment for the patient.

For patients who may not be able to have the second dose as an ambulatory patient, the heart failure nurses should inform their consultant cardiologist.



Appendix Three: Management of Adverse Reactions



Adapted from 1. Achebe M & DeLoughery TG Transfusion 2020;60(6):1154-1159; 2. Rampton D Haematologica 2014;99:1671-1676; 3. Richards T et al. Annals of Medicine. 2020;53(1):274-285

8. Endorsed By:

Name of Lead Clinician / Manager or Committee Chair	Position of Endorser or Name of Endorsing Committee	Date
Dr Watt	Drug & Therapeutics	

9. Record of Changes

Section No	Version No	Date of Change	Description of Amendment	Description of Deletion	Description of Addition	Reason
3	4.0	March 2023			Addition of Monofer information	New evidence available
3	4.0	March 2023	Upper ferritin range amended to 400mcg			In line with practice and IRONMAN inclusion criteria

Parenteral Iron Protocol

Policy

For completion by Author			
Author(s) Name and Title:	Dr Clare Quarterman. Consultant Anaesthetist Amy Nelson. Anaemia Nurse		
Scope:	Trust wide	Classification:	Clinical
Version Number:	3.0	Review Date:	29/09/2025
Replaces:	2.0		
To be read in conjunction with the following documents:	The Transfusion policy Iron Administration in Heart Failure Policy		
Document for public display:	Yes		
Executive Lead	Dr Raph Perry, Medical Director		

For completion by Approving Committee					
Equality Impact Analysis Completed:			Yes		
Endorsement Completed:		Yes	Record of Changes		Yes
Authorised by:	Drug & Therapeutics Committee		Authorisation date:		20/09/2023

For completion by Document Control					
Unique ID No:	TW20DC043	Issue Status:	Approved	Issue Date:	22/09/2023
After this document is withdrawn from use it must be kept in archive for the lifetime of the Trust, plus 6 years.					
Archive:	Document Control		Date Added to Archive:		
Officer responsible for Archive:	IG and Document Control Facilitator				

Contents

Document Statement

The purpose of this policy is to advise medical and nursing staff on the safe prescribing and administration of parenteral iron.

Please refer to the summary of product characteristics (SPC available at www.medicines.org.uk) (Ref 1) for full prescribing information.

1. Roles and Responsibilities

Outpatient staff will be responsible for requesting and obtaining FBC/U&E's/LFT's, via venepuncture and ensuring the CTCP code is present on the EPR sample printout.

The laboratory staff will be responsible for ensuring when the Hb is <130 g/l the reflex order for haematinics will be activated.

The Anaemia Nurse will work under the supervision of the Lead Consultant for the Anaemia Service who assumes responsibility for the anaemia service and will provide training and education regarding the causes of anaemia and the treatment.

The Lead Consultant for Anaemia Service/Anaemia Nurses will be responsible for interpreting blood results, management plan and prescribing treatment on an individual basis (appendix 2).

The Anaemia Nurse will be assessed and deemed competent prior to prescribing. Where the Anaemia Nurse has non-medical prescribing status, they will prescribe treatment. They will be expected to follow the algorithm (appendix 1) and seek advice when necessary. Otherwise, they will communicate with the Lead for the Anaemia Service to arrange timely prescription.

Administration staff will be responsible for the booking the anaemia clinic appointments and contacting the patient. They will also inform the consultant for the patient, the aseptic preparation unit, Holly suite and the patient's GP via letter.

Pharmacy staff will be responsible for clinically screening the prescription and dispensing the drug according to the individual patient's requirements. For patients in the pre-op clinic/working alone the drug will be aseptically dispensed. For patients on the ward the drug will be dispensed as vials.

Nursing staff in the clinical area will be responsible for appropriate administration.

2. Controlled Document Standards

Iron deficiency anaemia (IDA) is caused by insufficient absorption of dietary iron as a result of chronic illness and inflammation, and/or iron loss from chronic bleeding. Iron deficiency causes morphological changes in red blood cells which can be measured by red blood cell indices (as part of the full blood count). Red blood cells become small (microcytic, MCV greater than 76) and pale (hypochromic, MCH less than 27). Iron deficiency anaemia is generally microcytic anaemia i.e., MCV will be below normal limit, although it can also be normocytic. Patients with combined IDA and folate or vitamin B12 deficiency may have a normal MCV.

Iron supplementation plays a major role in the correction of iron deficiency anaemia, including perioperative anaemia. An international consensus statement on the peri-operative management of anaemia and iron deficiency has been published [2], advocating the identification and prompt treatment of iron deficiency anaemia prior to surgery. The presence of anaemia should be investigated in all surgical patients with expected moderate-to-high blood loss (greater than 500 ml) or a transfusion risk of greater than/equal to 10%. In this trust, all patients undergoing cardiac or aortic surgery are therefore screened for the presence of anaemia.

A haemoglobin level of less than 130 g/l in anaemic patients of both sexes due to undergo major surgery should prompt laboratory investigation to classify the peri-operative anaemia. Where iron deficiency anaemia is identified, treatment should then be arranged in order to improve the patient's pre-operative status which may then reduce their requirement for a blood transfusion in the peri-operative period.

Additionally, patients undergoing surgery may experience blood loss leading to anaemia. Where there is an underlying iron deficiency replenishment of their own stores may be delayed/limited and this may be corrected by the administration of iron. Some patients are given oral iron post operatively; however, in a number of patients the intestinal adsorption of oral iron is impaired due to poor oral intake or inflammation (hepcidin response). In these circumstances parenteral iron in the peri-operative period may be more appropriate in these patients. Where parenteral iron therapy is employed, iron stores can be replenished rapidly, particularly when there is intolerance or lack of response to oral iron.

3. Procedure

Guidance for treatment:

Iron deficiency

- Hb greater than/equal to 130 g/l
- Ferritin less than 30 µg/l
- If the interval before surgery is less than 6 weeks, consider treatment with parenteral iron.

Iron deficiency anaemia

- Hb less than 130 g/l
- Ferritin less than 30 µg/l
- If the interval before surgery is less than 6 weeks, consider treatment with parenteral iron.

Anaemia of chronic inflammation with iron deficiency

- Hb less than 130 g/l
- Transferrin saturation (TSAT) less than 20% **and**
- CRP greater than 5mg/l
- If the interval before surgery is less than 6 weeks, consider treatment with parenteral iron.
- Inflammation may lead to artificial elevation of ferritin as it is an acute phase reactant. Ferritin may be less than 100 µg/l but could also be elevated above 100 µg/l and so this should not preclude treatment if TSAT **and** CRP are within the described ranges

Timing of treatment:

Where the time from identification of anaemia to surgery is >6-8 weeks, treatment with oral iron should be commenced. Whilst higher doses are described in the BNF, they are frequently associated with a higher incidence of side effects and poor compliance, and evidence suggests that absorption of doses is limited.

Daily treatment with 40-60mg elemental iron or alternative day treatment with 80-100mg elemental iron is associated with the best clinical effect and side effect profile. We therefore recommend 200mg ferrous sulphate OD (65mg elemental iron).

Where the time from identification of anaemia to surgery is <6 weeks, treatment with parenteral iron should be scheduled as soon as possible. In surgical patients, the parenteral iron agent of choice will usually be Ferric Derisomaltose, as this allows the full replacement of iron stores with a single visit/dose in most cases. Ferric Derisomaltose injections are available in the following presentations:

- 5ml vial/ampoule contains 500mg iron as iron (III) _Ferric Derisomaltose 1000
- 10ml vial/ampoule contains 1000mg iron as iron (III) _ Ferric Derisomaltose 1000

In some cases, clinicians may choose to use an alternative parenteral iron agent. Ferinject is also utilised for iron replacement in patients with heart failure, and therefore practitioners are directed to the Iron Administration in Heart Failure policy for further information.

Indications for treatment:

Ferric Derisomaltose is indicated for the treatment of iron deficiency in adults of 18 years old and above in the following conditions:

- When oral iron preparations are ineffective or cannot be used
- Where there is a clinical need to deliver iron rapidly to iron stores

Patient selection/exclusion for Ferric Derisomaltose should follow the pre op anaemia optimisation pathway (appendix1).

Outpatient sample request:

Outpatient staff will request and obtain the Common Pre-Op Anaemia bloods below.

The laboratory staff will then identify patients with a Hb of <130g/l and complete a reflex order based on CTCP.

A reflex order is a request on the U&E sample previously sent, for Ferritin, Iron Studies, Thyroid, CRP and Vit B12 and Folate testing to be completed.

If the reflex order is not completed you can contact the Laboratory on ext. 6714 and request Ferritin, Iron Studies, Thyroid, CRP (1 week after U&E sample taken) and Vit B12 and Folate (within 24 hours of U&E sample taken) testing to be completed.

<u>Do not untick any of the request boxes or the order will be void.</u>

Inpatient sample request:

Staff in the clinical area will request by:

- Contacting the Laboratory on ext. 6714 and request Ferritin, Iron Studies, Thyroid, CRP (1 week after U&E sample taken) and Vit B12 and Folate (within 24 hours of U&E sample taken) testing to be completed.
- Completing the Common IV Iron Service bloods order.

Prescribing Ferric Derisomaltose**:**

All parenteral iron preparations can cause hypersensitivity reactions. Ferric Derisomaltose should only be administered in an area where staff are trained to evaluate and manage anaphylactic reactions and where there is access to full resuscitation facilities. No test dose of Ferric Derisomaltose is required.

The cumulative iron dose required may be administered in a single Ferric Derisomaltose infusion up to 20 mg iron/kg Ideal Body Weight (IBW).

If BMI <25 then the calculation is as follows:
Weight (kg) x 20 = Dose of iron to be transfused (mg)

If BMI is > 25 then dose should be calculated using IBW as follows:
Height (metres) x Height (metres) x 25 = IBW.

IBW x 20 = Dose of iron to be transfused (mg).

Ferric Derisomaltose should be added to 100ml sterile 0.9% sodium chloride and transfused over 30-60 minutes depending on patients' sensitivities.

Refer to SPC for further information.

Monitoring:

Before the Infusion.

- Provide patient with information leaflet (available from the Anaemia Nurse) to read.
- Ensure patient consents to infusion.
- Take baseline observations of temperature, blood pressure and pulse.
- Complete EPR document in full at patients' bedside, Inpatient document for use when patient is being infused in clinic and Ward document when infusing on the ward.

IV Iron Day Case (OPD)
IV Iron Ward Inpatient (Wards only)

- Check Prescription.
- Patent venflon and Baxter pump with appropriate giving set.

Monitoring during the Infusion.

- 15 minutes into the infusion take observations of temperature, blood pressure and pulse.
- Observe cannula for paravenous leakage.
- Repeat observations at the end of the infusion.

Monitoring after the Infusion.

- Observe for any reactions for at least 30 minutes following the completion of the infusion.

- Repeat observations at the end of this period.

Iron deficiency anaemia in cyanotic congenital heart disease:

There is a subset of congenital heart disease patients with cyanosis who can be iron deficient as measured using ferritin levels or iron studies, but who may have a normal or supranormal haemoglobin level. These patients may still be referred for treatment with parenteral iron, as correction of iron deficiency has been shown to be clinically important for these patients despite an apparent normal haemoglobin level. Referral for this will be made on an individual basis by an ACHD Consultant.

Safety/Management of potential Adverse effects:

Contraindications as specified in SPC available at www.medicines.org.uk (Ref 1) for full prescribing information. For the management of hypersensitivity reactions see appendix 3.

"▼" This medicinal product is subject to additional monitoring. Healthcare professionals are asked to report all (minor/major) Adverse Drug Reactions via MHRA/yellow card scheme.

Parenterally administered iron preparations can cause hypersensitivity reactions including serious and potentially fatal anaphylactic/anaphylactoid reactions. Hypersensitivity reactions have also been reported after previously uneventful doses of parenteral iron complexes.

Each patient should be observed for adverse effects for at least 30 minutes following each Ferric Derisomaltose injection. If hypersensitivity reactions or signs of intolerance occur during administration, the treatment must be stopped immediately

Facilities for cardio respiratory resuscitation and equipment for handling acute anaphylactic or anaphylactoid reactions should be available. See Appendix 3 for the management of hypersensitivity reactions

Paravenous leakage should be avoided as there is the potential to cause discolouration of the skin and surrounding tissue. Following insertion of the cannula, it should be flushed to confirm patency and the site of infusion should be visible and monitored throughout the period of administration. Should an extravasation occur remove cannula or butterfly apply a cold compress encourage elevation and mobilisation of the limb. Administer appropriate analgesia if the patient complains of pain.

Adverse Drug Reactions:

- Acute severe hypersensitivity reactions may occur with parenteral iron preparations. They usually occur within the first few minutes of administration and are generally characterised by the sudden onset of respiratory difficulty and/or cardiovascular collapse; fatalities have been reported. Other less severe manifestations of immediate hypersensitivity, such as urticaria and itching may also occur. In pregnancy, associated foetal bradycardia may occur with parenteral iron preparations.
- Flushing in the face, acute chest and/or back pain and tightness sometimes with dyspnoea in association with IV iron treatment may occur (frequency uncommon). This may mimic the early symptoms of an anaphylactoid/anaphylactic reaction. The infusion should be stopped and the patient's vital signs should be assessed. These symptoms disappear shortly after the iron administration is stopped. They typically do not reoccur if the administration is restarted at a lower infusion rate.

- Delayed reactions may also occur with parenteral iron preparations and can be severe. They are characterised by arthralgia, myalgia and sometimes fever. The onset varies from several hours up to four days after administration. Symptoms usually last two to four days and settle spontaneously or following the use of simple analgesics.

For comprehensive details on side effects, precautions for use and use in pregnancy and lactation prescribers should refer to the Summary of Product Characteristics (SPC) for Ferric Derisomaltose.

Action to take if there is a reaction:

- Stopped immediately
- Ask for help
- Assess and administer appropriate treatment according to the hypersensitivity management algorithm for further information on the management of allergic reactions (Appendix 3)

Additional Information:

- Observe closely throughout infusion for hypersensitivity reactions. Intravenous Chlorpheniramine, Adrenaline and Hydrocortisone should be available for immediate use in the event of a severe adverse drug reaction.
- Insert appropriate cannula and test patency by flushing with 10ml 0.9% sodium chloride injection
- Patients with asthma, rheumatoid arthritis, eczema, SLE (lupus) or atopic allergies are more likely to be hypersensitivity to IV Iron, consider infusion over an hour.
- As with all parenteral iron preparations the absorption of oral iron is reduced when administered concomitantly. Oral iron therapy should not be started earlier than 5 days after the last administration of Ferric Derisomaltose.
- Large doses of parenteral iron (5 ml or more) have been reported to give a brown colour to serum from a blood sample drawn four hours after administration.
- Parenteral iron may cause falsely elevated values of serum bilirubin and falsely decreased values of serum calcium.

Patient Follow-up:

- If patient is discharged following infusion they should be given a contact number to ring if they have any concerns. Alternatively, they are advised if unable to speak to a member of staff to contact their GP or go to their nearest walk-in centre/A&E dept.
- Patients who attend for surgery post infusion should have a repeat Hb level check to determine effectiveness. There is a pop-up prompt on EPR in the nursing admission document to remind staff to complete this.
- Once iron repletion has occurred it is the responsibility of the patients clinical team to ensure regular assessments are completed to ensure that iron levels are corrected and maintained.

4. Policy Implementation Plan

The Hospital Transfusion Team and the Hospital Transfusion Committee will approve the policy. It will be ratified by the QPFEC committee.

This policy will be posted on the Intranet.

It is the responsibility of all managers to ensure their staff have read and understood this policy.

All staff attending Induction Training will be informed of its availability on the hospital intranet

5. Monitoring of Compliance

The content of this policy will be reviewed every three years or sooner if national/local legislation dictates, to ensure the Trust remains compliant.

The Hospital Transfusion Committee (HTC) will be responsible for monitoring compliance with this Policy. This will be completed by ensuring compliance with the CQUIN target and data gathered by the audit department. Any deficiencies will result in a corrective action being agreed and taken.

Patients will also be provided with a patient satisfaction survey and the results of this reviewed at the HTC.

6. References

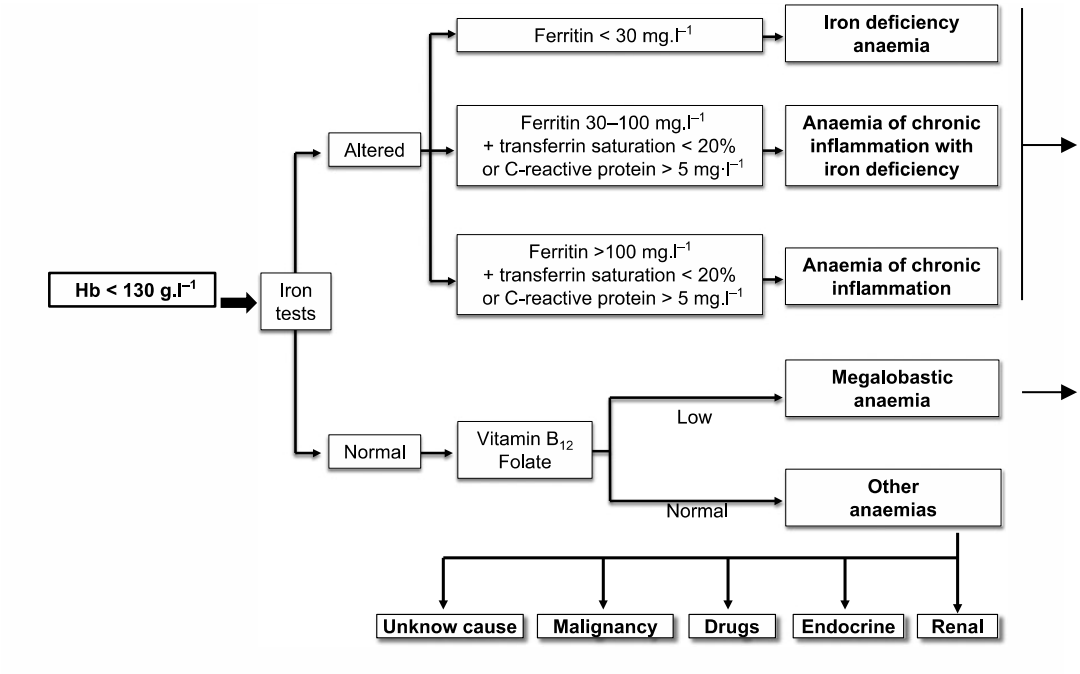
1. Ferric Derisomaltose SPC. Available at https://www.medicines.org.uk/emc/medicine/23669

2. Munoz M et al., International Consensus statement on the peri-operative management of anaemia and iron deficiency, Anaesthesia 2017, 72(2): 233-247

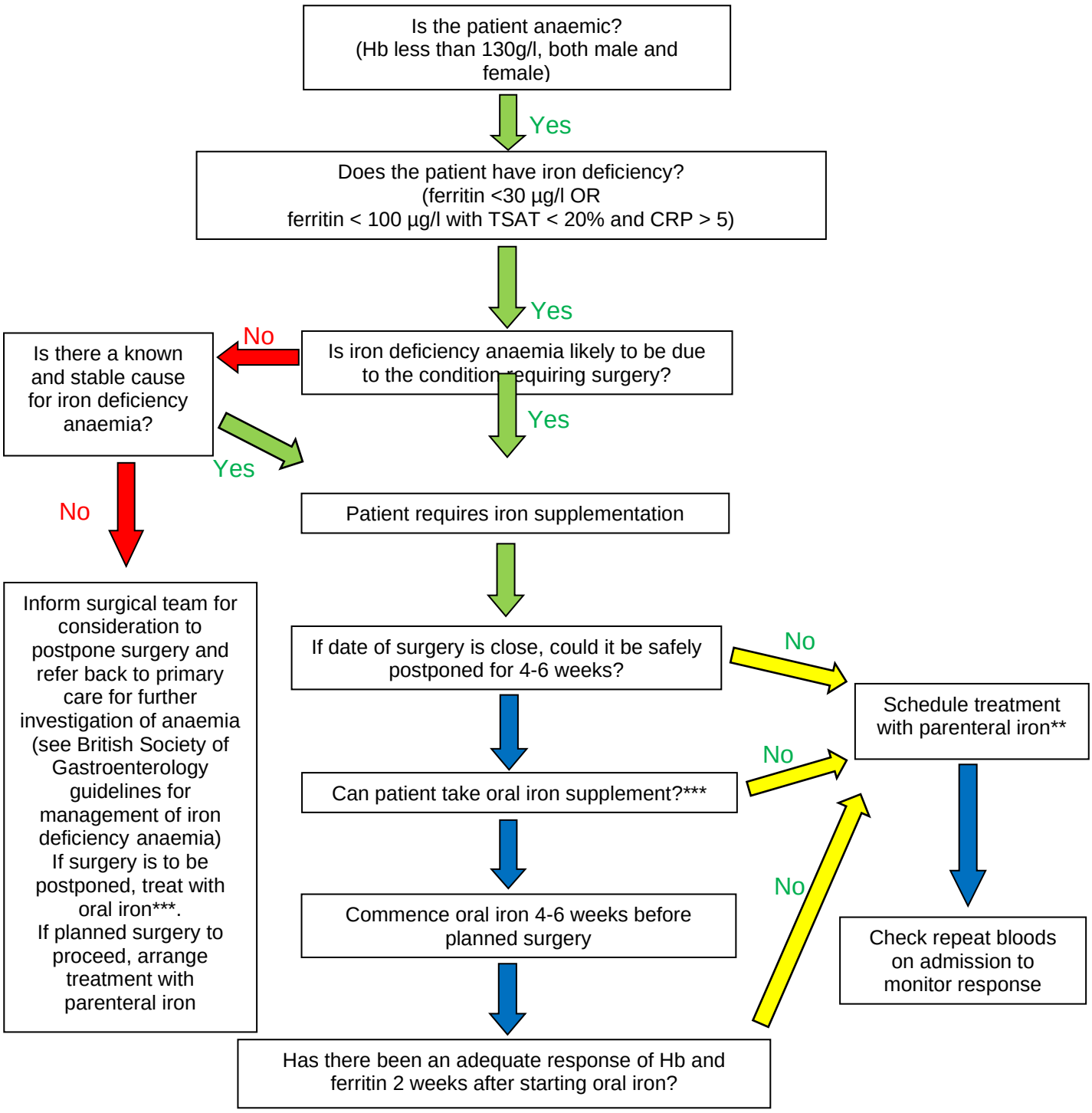
3. Rampton D et al., Hypersensitivity reactions to intravenous iron: guidance for risk minimization and management Haematologica 2014;99:1671-6

7. Appendices

Appendix 1 – Assessment Algorithm for Pre-op IV Iron (Taken from Ref 2)



Appendix 2 - Preoperative anaemia optimisation pathway



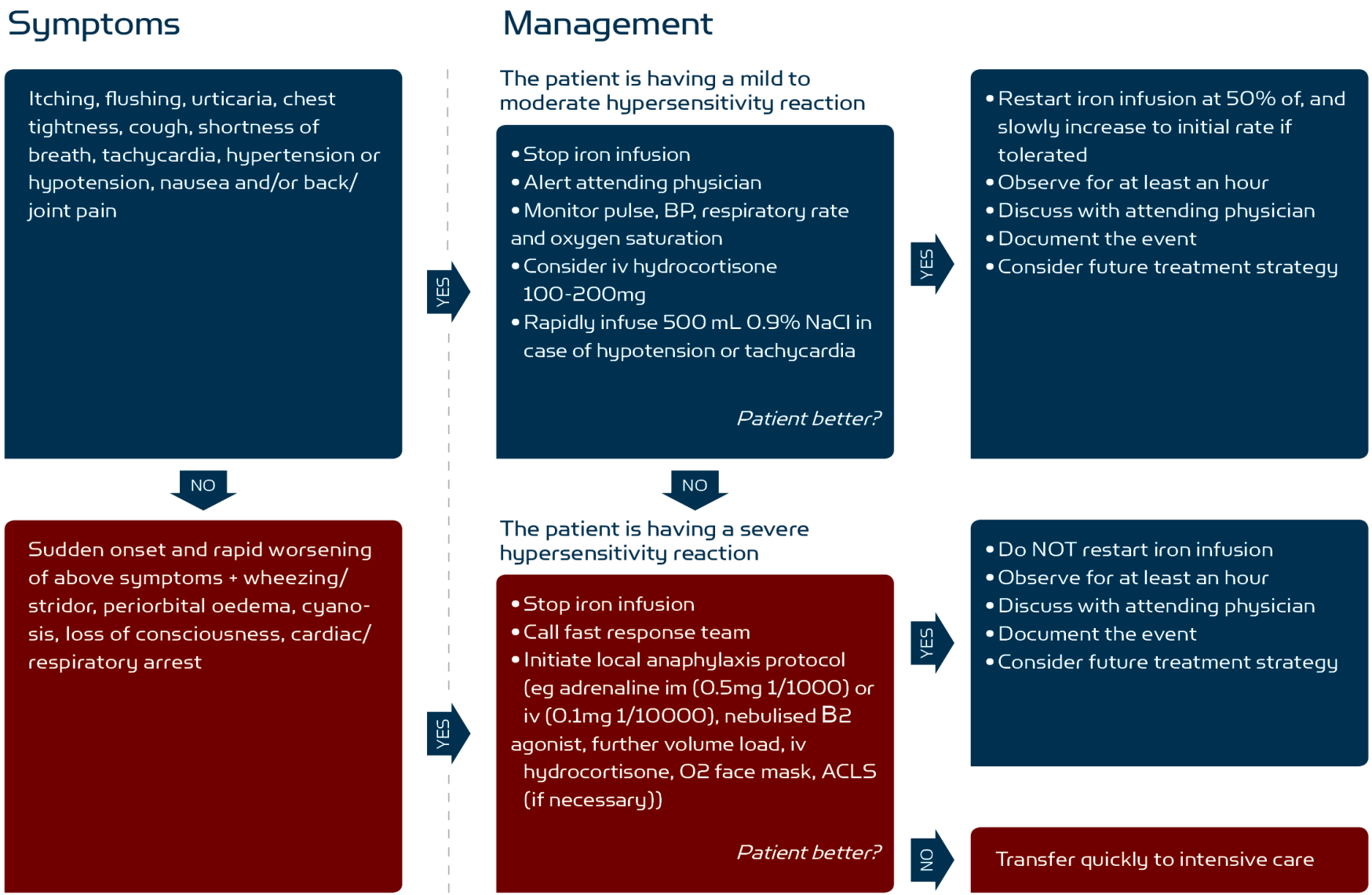
**IV iron is indicated for patients with malabsorption states, inflammatory bowel disease, non-compliance or non-tolerance of side effects of enteral iron

***Oral iron recommendations: Ferrous sulphate 200mg (gives 65mg elemental iron) once daily.
Advise patients to take mid-morning or mid-afternoon, to avoid drinks containing milk for 1 hour either side of dose and to take at least 2 hours after taking a PPI such as lansoprazole.

Contraindications to Ferric Derisomaltose

1. Known hypersensitivity to Ferric Derisomaltose or to any of its excipients.
2. Known serious hypersensitivity to other parenteral iron products
3. Non-iron deficiency anaemia (e.g. haemolytic anaemia)
4. Iron overload or disturbances in utilisation of iron
5. Pregnancy in the first trimester
6. Decompensated liver cirrhosis and hepatitis

Appendix 3 - Management of hypersensitivity reactions



Appendix 4 – GP letters, template & ACHD letter.

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When telephoning please ask for Sue Macklin
Lorraine Boyne
Direct line 0151 600 1396
Direct Fax 0151 600 1405

Date:
Our ref:
NHS number:

Dear

Re:
Your patient has been reviewed by the Anaemia Treatment Service prior to their planned cardiac surgery as they have been found to have iron deficiency anaemia. Their blood results are enclosed. We will be inviting them to attend the hospital as a day patient to receive an intravenous iron infusion.

The aim of the service is to optimize haemoglobin prior to surgery, to try to prevent unnecessary blood transfusion. We do not investigate the causes of anaemia. However in view of the nature of the anaemia, they may require further assessment and potentially investigation to identify a source of chronic blood loss.

For more information please contact the Department of Anaesthesia on 0151 600 1396.

Yours sincerely,

Dictated not signed

Dr Clare Quarterman
Consultant Cardiothoracic Anaesthetist
Consultant Lead Anaemia Treatment Clinic

These letters are changed as necessary to include other information eg. B12 and folate.

****

When telephoning please ask for: Sue Macklin
Lorraine Boyne
Direct line: 0151 600 1396
Fax: 0151 600 1405

Our Ref:
Date:

Our Ref:
NHS No:

Dear Doctor

Re:
Your patient has been reviewed by the ACHD Specialist Nursing Team who have advised she attends for an IV iron infusion.
The blood results are enclosed. We will be inviting ……. to attend the hospital to receive an intravenous iron infusion.
For more information please contact the Department of Anaesthesia on 0151 600 1396.

Yours sincerely

Dictated but not signed
Ms V Wallace
Anaemia Nurse Specialist

CC Sharon Hughes
Pre Op Nurse for ACHD.
LHCH

8. Endorsed By:

Name of Lead Clinician / Manager or Committee Chair	Position of Endorser or Name of Endorsing Committee	Date
Dr Clare Quarterman	The Hospital transfusion Committee	14/10/20
Dr Clare Quarterman	The Hospital Transfusion team	12/10/20
Valerie Wallace	The Transfusion Link nurses	23/11/20
Dr R. Perry	QPFEC	4/12/20
Dr Wat	Drug & Therapeutics Committee	20/9/23

9. Record of Changes

Section No	Version No	Date of Change	Description of Amendment	Description of Deletion	Description of Addition	Reason
All	V 1.0	29/9/20	Removal of numbers and word changes due to update of LHCH policy template	-	-	New policy template
All	V 3.0	15/09/2023	Removal of previous practitioner's name to new lead	Valerie Wallace	Amy Nelson	Change in staff
All	V 3.0	15/09/2023	Change in Iron product name	Monofer	Ferric Derisomaltose	Iron product name changed.
3	V 3.0	15/09/2023	Update of IV iron documents used	IV Iron Inpatient Admission Document. IV Iron Service Ward Document	IV Iron Day Case (OPD) IV Iron Ward Inpatient (Wards only)	Updated EPR document