

## **Patient Blood Management of Anaemia Prior to Elective Surgery - Full Clinical Guideline – RDH Sites Only**

Reference No: CG-ANAESTH/2020/015

### **1. Introduction**

Patient Blood Management is a multidisciplinary, evidence-based approach to optimising the care of patients in order to avoid, or minimise the need, for allogeneic blood transfusion.

Anaemic patients are at increased risk of transfusion, mortality and major morbidity, in proportion to the severity of anaemia. Even mild anaemia increases relative mortality risk by a third.

Pre-operative anaemia is common and prevalence varies from 5-75% depending on the population studied and the surgical procedure. Transfusion increases the risk of peri-operative mortality and major morbidity in a dose-dependent fashion.

Pre-operative anaemia substantially increases health care costs with significant additional cost incurred out of hospital. Anaemia further predisposes patients to requiring allogeneic blood transfusion, thereby increasing the burden on blood donors and donor services. It is now a NICE standard that patients undergoing elective surgery with an expected blood loss of 500ml or more (or 10% transfusion risk) are screened for anaemia and treated appropriately.

The World Health Organisation (WHO) has defined anaemia as:

Hb < 130 g/L for men

Hb < 120 g/L for women

This document should be read in conjunction with the following trust policies:

Trust Policy and Procedures for the Transfusion of Blood and Blood Components.

Trust Policy and Procedures for Consent.

Trust Policy and Procedures for Incident Reporting, Analysing, investigating and learning.

All policies are accessible via the hospital intranet (Flo).

### **2. Aim and Purpose**

To identify and optimise all patients with anaemia prior to elective surgery, where the expected blood loss is 500ml or more (or 10% transfusion risk) to minimise the risk of requiring an allogeneic blood transfusion and improve patient outcomes.

To provide health care professionals with clear and simple recommendations for the management of anaemia prior to surgery.

To reduce blood usage in adult elective surgery.

### 3. Scope

This guideline is for all clinical staff involved in the care of patients prior to surgery and to facilitate safe and appropriate treatment of anaemia where necessary.

### 4. Roles, Responsibilities and Accountabilities

The patient should be assessed by the pre-op nursing team and /or a consultant anaesthetist. The pre-op nurse is responsible for checking the blood results (if not done earlier eg at listing) and drawing to the attention of the parent team and/or a consultant anaesthetist the presence of anaemia and instigating appropriate therapy.

Please note, the administration of IV Iron will take place on EPU (ward 202). Senior nurses on EPU who have been trained in IV Iron therapy will admit the patient, administer the iron and discharge the patient. The IV iron prescription form can be accessed on Flo and needs to be completed and sent to EPU in order for them to organise admission.

Risk and Clinical Governance is responsible for authorising this document and receiving assurance of compliance through review of documentation provided by the Hospital Transfusion Committee.

The Hospital Transfusion Committee (HTC) is the sponsor group for this document. The HTC is responsible for promoting the safe care of patients who require treatment for anaemia, through local policy, based on review of national guidelines. The HTC will ensure compliance with this document by review of adverse incident reports and will also provide reports to Clinical Governance.

The Transfusion Practitioners are responsible for review of any individual incidents of non-compliance, report externally to SHOT and MHRA when required and feed in to the HTC. The Transfusion Practitioners provide training on the application of this document.

Ward and departmental managers are responsible for dissemination of this document and ensuring compliance of all staff within their sphere of responsibility.

**All Staff are required to comply with this document and to bring to the attention of their immediate manager any difficulties they encounter in using this document. Report any adverse incidents via the Trust Policy and Procedures for Incident Reporting, Analysing, Investigating and Learning.**

## 5. Definitions, Keywords

|        |                                       |
|--------|---------------------------------------|
| >      | Greater than                          |
| BD     | Twice per day                         |
| CRP    | C-Reactive Protein                    |
| ESA    | Erythropoiesis Stimulating Agents     |
| Fe     | Iron                                  |
| GI     | Gastrointestinal                      |
| eGFR   | estimated Glomerular Filtration Rate  |
| EDTA   | Ethylenediaminetetraacetic acid       |
| EPO    | Erythropoietin                        |
| g      | Grams                                 |
| g/L    | Grams per litre                       |
| Hb     | Haemoglobin                           |
| HTT    | Hospital Transfusion Team             |
| HTC    | Hospital Transfusion Committee        |
| IM     | Intramuscular                         |
| IV     | Intravenous                           |
| min    | Minute                                |
| mg     | Milligrams                            |
| mg/L   | Milligrams per litre                  |
| mg/kg  | Milligrams per kilogram               |
| ml/min | Millilitres per minute                |
| µg     | Micrograms                            |
| µg/L   | Micrograms per litre                  |
| NSAIDS | Non-steroidal anti-inflammatory drugs |
| OD     | Once per day                          |
| TDS    | Three times per day                   |
| TSAT   | Transferrin Saturation                |
| IDA    | Iron deficiency anaemia               |

## 6. Pre-operative Assessment

The investigation and management of pre-operative anaemia should ideally be a collaborative process involving primary and secondary care.

To avoid disruption to surgical schedules, anaemia screening should take place as early as possible in the referral pathway, ideally when referral is first made. Wherever possible, this screening should take place with sufficient time to allow investigation and correction if appropriate.

Where surgery is urgent, whatever time is available before the operation should still be used for anaemia investigation and treatment initiation.

Anaemia may be expected as part of the presenting surgical complaint. However, surgery represents a 'sentinel event' for many patients and pre-op work-up may reveal previously unsuspected disease.

### Anaemic patients will fall into two groups:

1. Those who may safely proceed to surgery with treatment of anaemia.  
This treatment will have three possible pathways:
  - a. Oral iron (or other replacement therapy depending on cause of anaemia)
  - b. IV iron
  - c. Blood transfusion
2. Those who require further investigation and can safely have their surgery delayed while these investigations are carried out.

The pre-operative assessment should include:

- Identification, investigation and management of elective patients with anaemia.
- Assessment of the adequacy of iron stores in elective patients who are to undergo major surgery where significant blood loss is expected (>500ml).
- Awareness and assessment of medications and complementary medicines that might increase bleeding risk.
- Identification of patients where substantial blood loss is anticipated.
- Awareness of and ability to discuss with patients, the possible risks associated with blood transfusion and to give information on the possibility of requiring, when appropriate, cell salvage intra or post-operatively (See Appendix 1,2 & 3).

## 7. Screening for Anaemia

Patients undergoing major elective surgery should have an FBC and U&Es performed as part of their preoperative work-up. *All blood results should be reviewed within two working days.* If anaemia is identified, then a serum ferritin, TSAT (transferrin saturation) and CRP should be added to the U&E sample within 48hr. ***If blood results will not be reviewed within 48hr then the initial blood tests requested should also include ferritin and CRP in case anaemia is present.***

Abnormal results should be discussed with a member of the clinical team (at SpR/Consultant level), who can either refer for further investigation or delay surgery as necessary

**See flow chart, appendix 4.**

Questions to consider in a patient for elective surgery

Does the patient have anaemia?

What are the patient's iron stores?

Are there chronic conditions that may impede a haemopoietic response to anaemia (e.g. chronic kidney disease, chronic inflammation or bone marrow pathology)?

Is the patient being informed about the possible risks associated with iron therapy or blood transfusion and other alternatives that may be available? (appendix 1, 2 & 3)

Determine the possible cause of anaemia based on history, examination and laboratory results.

Common causes of anaemia include absolute iron deficiency, functional iron deficiency (anaemia of chronic disease), vitamin B12 and/or folate deficiency and chronic kidney disease.

Consider bleeding or haemolysis if the reticulocyte count is increased.

Inherited haemoglobin disorders (haemoglobinopathies) should be considered in all individuals with a microcytic anaemia without evidence of iron deficiency, or if red cell changes persist after adequate iron replacement. An EDTA blood sample is needed for haemoglobinopathy testing.

***Seek specialist advice as appropriate , for example:***

Haematology advice if platelet and/or white cell counts are low as it suggests a bone marrow issue.

Gastroenterology advice if GI bleeding is suspected.

Nephrology advice in the presence of chronic kidney disease (eGFR<30 ml/min).

## **8. Management of anaemia**

Both oral iron tablets and intravenous iron preparations are inexpensive products compared with the transfusion of red cells.

Oral iron is indicated in iron deficient anaemic patients whose surgery is not scheduled for 6 weeks or more.

Intravenous iron is a very safe and effective treatment for iron deficiency. It is indicated in patients who:

- are intolerant or unresponsive to oral iron
- have a functional iron deficiency
- are due to have surgery in less than 6 weeks

Iron therapy is also indicated for non-anaemic iron deplete patients (ferritin <100µg/L) scheduled to undergo surgery with a predicted total peri-operative blood loss of 500ml, to protect against post-operative IDA.

## Oral iron therapy

Replace with **40-60mg elemental iron per day** eg ferrous sulphate 200mg OD. This better tolerated and more effective than the traditional higher doses.

Patients must be advised how to take oral iron effectively i.e. *on an empty stomach with orange juice*. *Tea, coffee and calcium tablets decrease the absorption of iron and should be avoided for an hour either side.*

Oral iron can cause significant gastrointestinal side effects that result in poor compliance. A patient who fails to tolerate one preparation may tolerate another.

Hb and iron stores should be rechecked after 4 weeks of treatment with oral iron to assess the effectiveness. If there is no increase in Hb by this point, refer for IV iron. Oral iron takes at least 6-8 weeks to have a significant effect and should be continued for at least 3 months after the haemoglobin returns to normal.

## IV (parenteral) Iron

NICE guidelines state that IV iron should be considered before or after surgery in patients who;

- Have iron deficiency anaemia and cannot tolerate or absorb oral iron or who are unable to adhere to oral iron treatment
- Are diagnosed with functional iron deficiency (anaemia with “normal”/high ferritin & either CRP>5 or TSAT < 20%)
- Are diagnosed with iron deficiency anaemia and the interval between the diagnosis of anaemia and surgery is predicated to be too short for oral iron to be effective

IV iron should cause a relatively rapid rise in Hb: 50% increase at 5 days, 75% increase at 10-14 days and maximal response by 3 weeks.

Intravenous Iron will be administered on ward 202 EPU by prior booking with the nursing staff.

Intravenous iron is contraindicated if there is a known hypersensitivity to the IV Iron preparation or any of its excipients and must be used with caution in cases of acute or chronic infection, asthma, eczema or atopic allergies. **NB The IV Iron prescription form can be found on the Trust intranet guidelines under “Iron Day Case - summary guideline.”**

## Vitamin B12 and Folate therapy

For B12 deficiency

- Hydroxycobalamin 1mg IM injection 3 times a week for the first week (Monday-Wednesday-Friday)
- Hydroxycobalamin 1mg IM injection 2 times a week for the second week
- Total of 5 injections initially
- Consider ongoing replacement every 3 months where appropriate

## For folate deficiency

- Folic acid 5mg OD orally for 4 weeks

## Erythrocytosis-stimulating agent (ESA) therapy

*NB. ESA (erythropoietin or EPO) should ONLY be prescribed after consultation with a renal or haematology consultant*

In anaemic patients with CKD (eGFR<30 ml/min or <45 ml/min in diabetics), consider *both* ESA and iron therapy if Ferritin < 100 µg/L.

As per NICE guidelines, **do not** offer ESA to reduce the need for blood transfusion in patients having surgery **unless**:

- The patient has anaemia and meets the criteria for blood transfusion but declines it because of religious beliefs or other reasons
- The appropriate blood type is not available because of the patients red cell antibodies

## Assessment Post Iron Treatment

### Pre-operative

All patients who were anaemic and treated should be re-assessed before surgery by the pre-op team.

In patients with persistent anaemia, a decision to delay surgery may be required based on clinical circumstances.

For those at risk of requiring blood transfusion, ensure that a second group and screen sample is taken from the patient if necessary, as per the Trust Blood Transfusion Policy, to ensure blood will be available if required.

### Intra-operative

Consider intra-operative cell salvage or post-operative cell salvage depending on the procedure and likely blood loss.

Consider peri-operative use of tranexamic acid if blood loss greater than 500ml is likely and there are no contraindications. Continue tranexamic acid for 72 hours post-surgery if appropriate. Do not routinely use cell salvage without tranexamic acid.

Where a blood transfusion is thought necessary, determine what the appropriate transfusion trigger is for the individual patient. Haemocue/ blood gas measurements are readily available in theatre recovery areas and ITU.

### Post-operative

Where blood transfusion is required, consider accepting a lower post-operative haemoglobin level before transfusing blood.

A transfusion trigger could be as low as Hb 70-80 g/l if the patient has no significant co-morbidities (particularly cardiorespiratory) and the patient is haemodynamically stable.

Consider a single unit transfusion when appropriate.

Following surgery, all patients should have their FBC checked and a future management plan determined depending on the clinical circumstances and level of haemoglobin (see Management of Anaemia, page 5). If there has been a significant drop in Hb the patient should be given adequate iron replacement to ensure that iron stores are replenished and the Hb rises as rapidly as possible. ***It is important to note that due to the physiological response to surgery (upregulation of hepcidin) patients are unable to respond to oral iron for 6 weeks postoperatively and IV iron is preferable.***

Iron replacement may be adequate treatment for post-operative anaemia and may obviate the need for post-operative transfusion. The Hb should rise by 10-15 g/l over 4 weeks of treatment with oral iron and 2 weeks with intravenous iron.

Arrangements should be made with the patients' general practitioner to ensure that the treatment of post-operative iron deficiency is appropriately managed after discharge.

## 9. Associated Trust Policies & Guidelines and References

### Induction and Mandatory Training Policies:

- Trust Policy and Procedures for Incident Reporting, Analysing, Investigating and Learning.
- Trust Policy and Procedures for Consent.
- Trust Policy and Procedures for the Transfusion of Blood and Blood Components.
- Better blood transfusion Network iron. FACTSHEET- Transfusion guidelines version 2 February 2011.
- Anaemia management in people with chronic kidney disease (CG114 NICE 2011).
- McClelland. DBL. (2013) Handbook of Transfusion Medicine 5<sup>th</sup> Edition. The Stationary Office. ISBN 0113226772.
- NHSBT & NBTC Patient Blood Management Document – An Evidence based approach to patient care, 2014.
- Blood Transfusion and the Anaesthetists: Blood Component Therapy (2005). The Association of Anaesthetists of Great Britain and Ireland, London.
- Blood Transfusion and the Anaesthetist: Red Cell Transfusion 2 (2008). Association of Anaesthetist of Great Britain and Ireland, London.
- Department of Health Toolkit - Better Blood Transfusion: Appropriate use of Blood – Preoperative Assessment: [www.transfusionguidelines.org](http://www.transfusionguidelines.org).
- NICE (2008) inadvertent perioperative hypothermia: The management of inadvertent perioperative hypothermia in adults, NICE clinical guideline 65, London, April 2008.
- NICE (2016) Routine preoperative tests for elective surgery, NICE clinical guideline NG45 April 2016.
- NICE (2015) Blood Transfusion, NICE clinical guideline NG24 November 2015.
- NICE Quality Standard (QS138), Blood Transfusion, December 2016.



## 10. Documentation Controls

|                           |  |
|---------------------------|--|
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| Review Date:              | 30th November 2022 – <b>Extended to April 2024</b>   |
| Key Contact:              | Heather CLARKE, Blood Bank Laboratory Manager  |

## 10. Appendices

Appendix 1- Patient Information Leaflet 'Will I need a blood transfusion)

Appendix 2- Patient Information Leaflet 'Iron in your diet'

Appendix 3- Patient Information Leaflet 'Cell Salvage'

Appendix 4- Pathway for Investigation of Pre-op Anaemia

Appendix 5- Template for Patient Letter for Oral Iron

Appendix 6- Template for Patient Information Letter for Anaemia

Appendix 7- Referral Letter for Iron Infusion Therapy to EPU (Ward 202)

## Appendix 1 – Patient Information Leaflet for Receiving a Blood Transfusion

**NHS**  
*Blood and Transplant*

# Will I need a blood transfusion?

Patient information



### **Information leaflet about blood transfusion**

[http://hospital.blood.co.uk/Library/pdf/Will\\_I\\_need\\_blood\\_tx\\_13\\_06\\_26.pdf](http://hospital.blood.co.uk/Library/pdf/Will_I_need_blood_tx_13_06_26.pdf)

Appendix 2 – Patient Information Leaflet for Iron In Your Diet



# Iron in your diet

Patient information



**Information leaflet about Iron in Your Diet**  
[http://hospital.blood.co.uk/Library/pdf/2011\\_Iron\\_English.pdf](http://hospital.blood.co.uk/Library/pdf/2011_Iron_English.pdf)

## Appendix 3 – Patient Information Leaflet- Cell Salvage

### Patient Information

Derby Teaching Hospitals   
NHS Foundation Trust

## Cell salvage

### What is cell salvage?

Cell salvage is a process of collecting blood lost during, or just after an operation, so that it can be given back to you. It is also called autologous blood transfusion (using your own blood).

### How is it done?

There are two different types of cell salvage:

1. **Blood collected during your operation (intraoperative cell salvage)**  
Blood lost during your operation is collected using a cell salvage machine. The red cells (the part which carries oxygen around the body) are separated out and given back to you during or just after your operation. Your red cells will never be given to someone else. This type of cell salvage is only suitable for some operations.
2. **Blood collected after your operation (postoperative cell salvage)**  
Sometimes blood lost immediately after your operation can also be collected and given back to you (usually when you are back on the ward). This is usually used after certain operations eg. knee surgery.

### What are the benefits of cell salvage?

- Your own blood is given back to you. This reduces the need for a transfusion using blood from a donor and the small risks linked with this.
- **If you are a blood donor** and have received only salvaged blood and no donor blood, it may be possible for you to continue as a blood donor if you wish to, once you have recovered from surgery (patients who have received donor blood since 1 January 1980 cannot be blood donors as a precaution against the spread of vCJD).

### Why isn't it suitable for everyone?

Not all operations result in enough blood loss to enable cell salvage to be used. For some operations cell salvage is not recommended eg. some bowel surgery.

### Where can I get more information?

Your doctor, nurse, or transfusion practitioner will discuss with you if intraoperative cell salvage is suitable for you and the operation you are having.

### Useful contacts

Transfusion Practitioners, Royal Derby Hospital: 01332 788530 or 788540

Pre-operative assessment clinic: 01332 785087 or 01332 787120

Adapted from: The UK Cell Salvage Action Group leaflet

<http://www.transfusionguidelines.org.uk/transfusion-practice/uk-cell-salvage-action-group/patient-factsheet>

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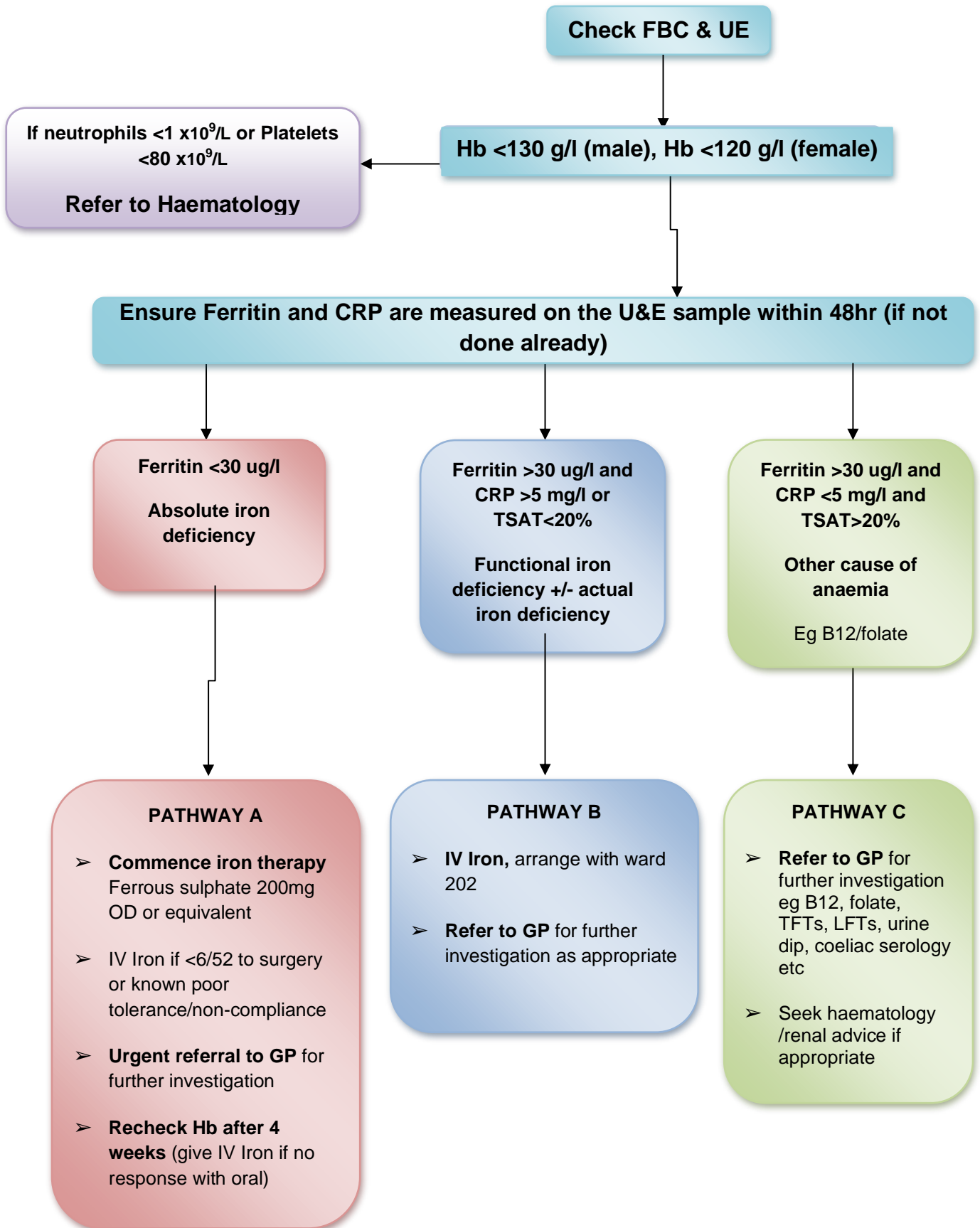
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**Appendix 4 – Pathway for Investigation of Pre-OP Anaemia**



As of 27/10/19

## Appendix 5 – Template for Patient Letter for Oral Iron

Date:

Dear Patient

DOB:

Address:

When you attended your appointment at the *(insert clinic name)* and we offered you a *(insert procedure)* we carried out a blood test.

**The blood sample taken at clinic has shown that you are anaemic.**

All patients referred to the University Hospitals of Derby and Burton NHS Foundation Trust for surgery are screened for anaemia. The reason we do this is that people who are anaemic are more likely to have complications after their surgery and may need to stay in hospital longer or need a blood transfusion.

As we discussed on the telephone, you should collect your prescription for the iron tablets from your chosen Boots Pharmacy. You should take the iron tablets as instructed for at least 12 weeks. We will inform your GP and they may organise for you to have further investigations. After about 4 weeks you will need a repeat the blood test to see if your blood count has improved. If not, you will then be offered iron replacement through a drip.

You do not need to make an appointment for this blood test. Please come to any of the drop in clinics on Monday – Friday as follows:

Royal Derby Hospital – 7.30am – 16.15pm

London Road Community Hospital – 7.00am – 16.15pm

Belper Clinic, Babington Hospital – 8.00am – 12.30pm

Ripley Hospital – 7.30am – 12.15pm

Alternatively you can make an appointment at your GP surgery to have this blood test.

**With this letter we also have sent you a form that you will need for this repeat blood test. You must bring this form with you. If you arrive without this form we will be unable to take your blood.**

If you have any problems taking the iron tablets, are already taking iron, are allergic to iron or you think there is some other reason why you should not take these iron tablets then please contact us.

In the meantime you should continue to prepare for your surgery and keep all appointments offered.

Yours sincerely

## Appendix 6 – Template for Patient Information Letter for Anaemia

Dear Patient

When you came for your appointment today we carried out some routine blood tests.

All patients referred to University Hospitals of Derby and Burton NHS Foundation Trust for surgery are screened for anaemia. The reason we do this is that people who are anaemic are more likely to have complications after their surgery and may need to stay in hospital longer or need a blood transfusion.

Anaemia is a condition which occurs when the number of red cells in your blood is lower than normal or the amount of haemoglobin in each red cell is less than normal. Haemoglobin is needed to carry oxygen around the body.

The blood sample taken at clinic today will be used to see if you are anaemic. Please do not be anxious about this, it is a routine screening test.

If you do not hear from us about your blood test result no treatment is needed and you should continue to prepare for your surgery and keep all appointments offered.

**If your blood count is low you may need to take iron tablets or you may be offered iron through a drip. If either treatment is necessary we will send you information including how to access further help and advice.**

Yours sincerely

**Appendix 7 – Referral Letter for EPU (Ward 202) to arrange Iron infusion or EPO treatment**

Dear EPU,

I would be grateful if you can arrange for this patient to have the following treatment:

Sticker

Name of Patient.....

DOB .....

Hospital number.....

Patient was seen in the Pre-operative Assessment Clinic on: .....

Planned surgical procedure: ..... Surgery date: .....

Height..... Weight..... Allergies.....

Full Blood Count Results have indicated that this patient is currently anaemic.

Hb..... Ferritin ..... CRP..... eGFR.....

Treatment required (tick the appropriate box):

**IV Iron**

**EPO**

We have decided to CONTINUE / NOT CONTINUE with the planned surgical procedure as detailed above.

**Signed:** ..... **Name (print):** .....

**Date:** .....

**The dosage of erythropoietin:**

Dose recommended for patients with CKD:

Erythropoietin alpha or beta: 5000-10.000 U s/c week

For high risk patients: e.g. Jehovah's Witnesses:

Erythropoietin alpha or beta: 20.000 U s/c for 2 doses (one week interval)

Intravenous iron: 500 mg



