NHS Wales Postoperative Anaemia Pathway

This is a consensus document developed by NHS Wales Postoperative Anaemia Leads Group & the Blood Health National Oversight Group (BHNOG)

1. Aim

The aim of this pathway is:

- To build upon the NHS Wales Preoperative Anaemia Pathway[1] and further embed patient blood management in surgery.
- Provide a standardised approach to post operative anaemia identification and treatment in adult patients having significant blood loss following major surgery, as defined by a blood loss of greater than 10% of the patient's estimated blood volume.
- Facilitate the proactive identification and management of anaemia and iron deficiency in adult patients undergoing emergency surgery.
- To reduce the use of donated blood in patients postoperatively with treatable causes of anaemia.
- Enhance postoperative recovery and reduce the risk of complications by initiating iron therapy in patients with iron deficiency, with or without anaemia.

2. Pathway

2.1 This pathway applies to all patients aged 18 and over who are scheduled to undergo major elective surgery, as defined by the NHS Wales Preoperative Pathway[1], or at risk of blood loss from any emergency surgery including emergency laparotomy*. This guidance does not apply to obstetric practice.

2.2 Patients identified as having an anticipated blood loss greater than **500 mL** should be screened for anaemia and underlying causes wherever feasible.

2.3 Review of results are not required until the post operative period. This approach enables accurate identification of iron deficiency and supports appropriate postoperative management.

2.4 **Preoperative blood testing** is an opportunity to have clear assessment of a patient's iron status as post operative testing can be influenced by acute phase inflammation.

2.4.1 ***Elective Patients:*** Pre-surgical blood samples should be taken from elective patients up to 24 hours before surgery, using the Preoperative Anaemia Screen (POAS) test set * (*Refer to section 4 for detail of the POAS test set)

2.4.2 **Emergency Laparotomy patients**: The **POAS test set** should be considered preoperatively. If this is not performed, a minimum of a preoperative full blood count (FBC) and either ferritin and/or transferrin saturation (TSAT) should be undertaken to assess iron status in this particular emergency patient group.

2.4.3 **Emergency Patients**: Due to the time-sensitive nature of emergency admissions, there is often limited opportunity to assess iron status before surgery. If possible, a minimum of a preoperative full blood count (FBC) and either ferritin and/or transferrin saturation (TSAT) should be undertaken to assess iron status.

2.5 **Postoperative Blood Testing** will ascertain if anaemia is present following surgery and where diagnosed, management will be determined by the blood results and the patient's entry point onto the pathway, as outlined in **Figure 1**.

2.5.1 **Any patient** that loses **>10% blood volume** should have a postoperative Haemoglobin (Hb) level measured **immediately postoperatively** and on **Postoperative Day 1 (POD1)**.

2.5.2 Blood loss **exceeding 10%** of estimated blood volume is a recommended threshold, as it accounts for body size and physiological differences. This patient-specific approach allows for a more accurate assessment of blood loss and informs tailored perioperative management[2].

$$\text{Blood Loss (\%)} = \frac{\text{Volume of Blood Lost}}{\text{Estimated Blood Volume}} \times 100$$

Use 70 mL/kg for estimated blood volume[3]

2.5.3 If the preoperative testing as described in 2.3 has **not** been performed, a **TSAT** should also be performed on **POD1**. Postoperative TSAT is considered a more reliable marker of iron bioavailability, as it is less affected by the acute-phase inflammatory response[4].

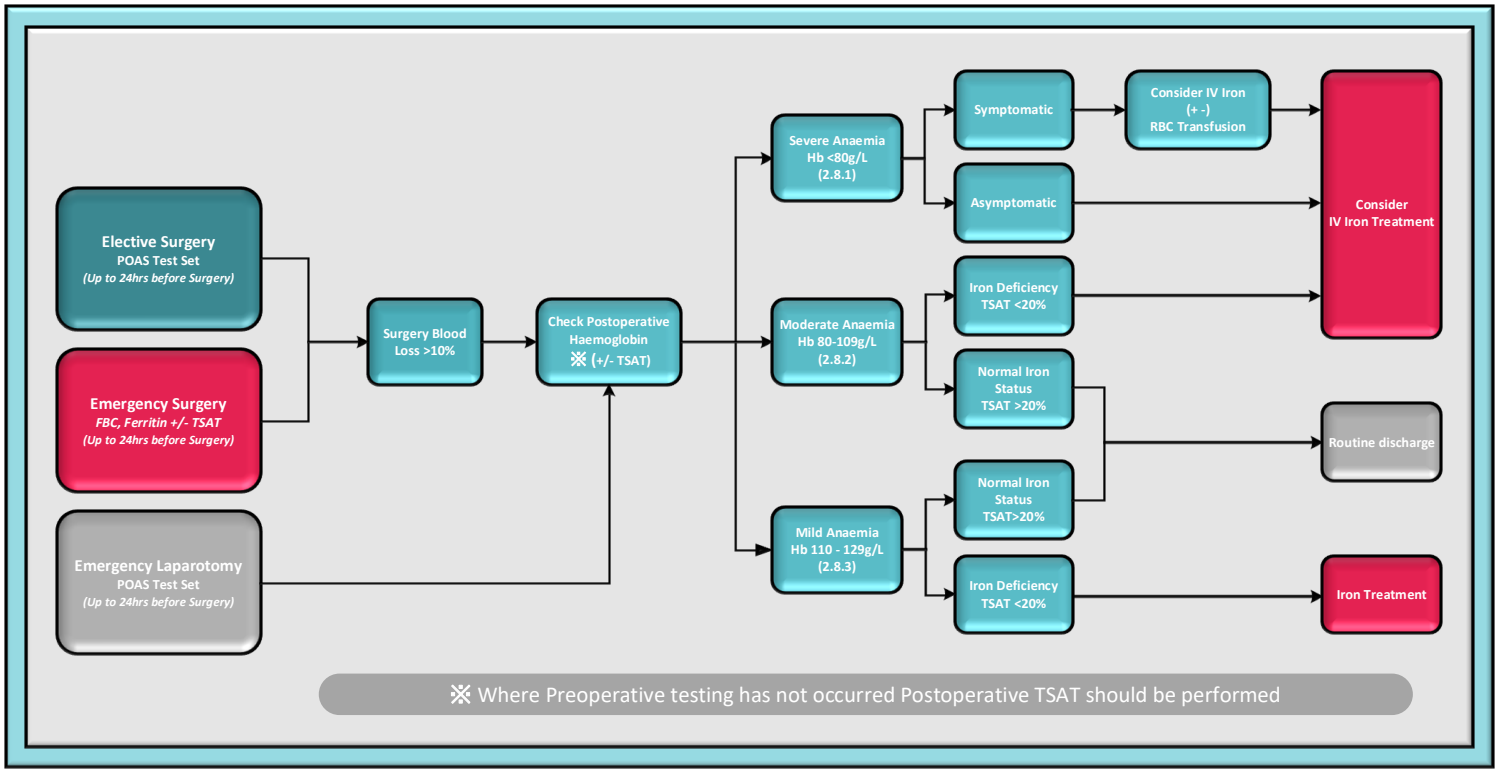

Figure 1. Algorithm for the Classification and Clinical Management of Postoperative Anaemia

2.6 In postoperative settings, the International Consensus Statement on the Management of Postoperative Anaemia[5] provides definitions that classify the severity of anaemia:

- Severe anaemia – Haemoglobin <80g/L
- Moderate Anaemia – Haemoglobin 80-109g/L
- Mild Anaemia – Haemoglobin 110 – 129g/L

2.7 For elective patients, postoperative anaemia management must take into consideration any preoperative IV iron administration, such as timing and clinical response ***(Table 1)***.

2.8 With exception of emergency laparotomy patients, postoperative management within this pathway is initiated when blood loss exceeds **10%** of total blood volume. Patients who experience this level of blood loss rely on their iron stores to support red cell regeneration and should be considered functionally iron-deplete. This should be considered when planning postoperative care.

2.8.1 ***Severe Anaemia: (Hb <80g/L)***

- **Symptomatic patients:** Red blood cell transfusion may be indicated based on clinical assessment. Where appropriate, transfusion should be accompanied by intravenous (IV) iron therapy ***(Table 1)*** to address iron deficit, aid post-surgical recovery and reduce the need for further transfusions.
- **Asymptomatic patients**: a restrictive transfusion strategy is recommended, with a focus on iron repletion alone ***(Table 1)***.

2.8.2 ***Moderate anaemia: (Hb 80-109 g/L)***

- ***Iron deficient patients:*** IV iron should be considered to address the underlying cause of anaemia ***(Table 1).***
- ***Non-iron deficient patients****:* Consider anaemia monitoring as part of post discharge follow up **(Section 3).**

2.8.3 ***Mild anaemia: (Hb 110-129g/L)***

- ***Iron deficient patients:*** Consider Iron therapy – IV or Oral. Oral iron is not indicated in the immediate post operative period, but could be considered as part of a discharge plan (see table 1).
- ***Non-iron deficient patients****:* Consider anaemia monitoring as part of post discharge follow up **(Section 3).**

2.8.4 ***Additional guidance regarding B12 and Folate testing***

- The POAS test set includes reflex testing for serum vitamin B12 and folate when the Mean Corpuscular Volume (MCV) exceeds 100 fL. If a deficiency is identified, it should be managed in accordance with local clinical guidelines.

IV Iron Administration Guide	
Preoperative Iron Review	Evaluate the timing, dose, and clinical response to any preoperative IV iron therapy.
Administration Instructions	Refer to the Summary of Product Characteristics (SmPC)
Patient Information	Refer to the BHNOG Anaemia Toolkit for patient counselling resources. (See link/QR code in - ***Section 5***)
Oral Iron	
Administration Instructions	Initiate oral iron therapy at a low dose or on alternate days to support patient tolerance and adherence, in line with the manufacturer's instructions[2]. Consider delaying the initiation of oral iron therapy for up to 30 days postoperatively, as the surgical inflammatory response may reduce its effectiveness during this period[6].
Patient Information	Provide patient information leaflets, available via the BHNOG Anaemia Toolkit (see link/QR code in - **Section 5**).
Erythropoietin Stimulating Agents (ESA) – Clinical Guidance	
Dosing and Indications	Follow on-label indications as per the marketing authorisation.
Use as Alternative to Transfusion	Consider use alongside IV iron or in iron-replete states where: a. The patient refuses transfusion (e.g. religious beliefs). b. No compatible blood is available due to complex antibodies. c. The patient has functional iron deficiency.

Table 1. Postoperative Anaemia Management – Clinical Guidance Table.

3. Post Discharge Follow Up

All Patients on this pathway identified as being anaemic with or without iron deficiency should have post-surgical review that include an FBC and iron assessment to monitor recovery of red cell mass.
Patients discharged that have deteriorating Haemoglobin and iron status or are slow to recover should be offered oral iron as first line therapy at this point.

Patients who received IV iron post operatively should be reviewed for response to therapy and determine if further doses are required to aid long term recovery.

4. Use of the NHS Wales Preoperative Anaemia Screen

The POAS test set was built within the national Laboratory Information Management System (LIMS) in agreement with pathology leads across Wales. The use was agreed to be specifically for patients aligned with this pathway. If there is consideration locally to expansion of this test set use, this must be done under local agreement with Pathology (Blood Sciences), to allow impact assessments to be performed.

Patients requiring optimisation for other medical reasons related to anaesthesia or surgery should be driven on a clinical basis by the lead clinician.

5. Anaemia Toolkit

To support use of the pathway, an anaemia toolkit has been developed. The toolkit includes several resources including patient information leaflets, documentation for managing patients, and information for health care professionals.

The toolkit can be accessed from the BHNOG website, by using the following link or QR code:

https://bhnog.wales.nhs.uk/perioperative-anaemia-programme/

6. References

1. NHS Wales (2024) Preoperative Anaemia Pathway. Version 4.0. [online] Available at: https://bhnog.wales.nhs.uk/wp-content/uploads/2024/05/English-NHS-Wales-Preoperative-Anaemia-Pathway-V4-3.pdf [Accessed 9 Jul. 2025].
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3. NHS Highland, 2025. *Major haemorrhage protocol: Highland HSCP (Guidelines).* [online] Right Decisions, NHS Scotland. Available at: https://rightdecisions.scot.nhs.uk/tam-treatments-and-medicines-nhs-highland/adult-therapeutic-guidelines/emergency-medicine/major-haemorrhage-protocol-highland-hscp-guidelines/ [Accessed 3 Jul. 2025].
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6. Bisbe, E., Moltó, L., Arroyo, R., Muniesa, J.M. and Tejero, M., 2014. Randomized trial comparing ferric carboxymaltose vs oral ferrous glycine sulphate for postoperative anaemia after total knee arthroplasty. *British Journal of Anaesthesia*, 113(3), pp.402–409. https://doi.org/10.1093/bja/aeu092