

## Guideline on the Pre-operative Management of Adults for Elective and Scheduled Surgery Presenting with Anaemia

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<b>Approved by:</b>	Pre-op Directorate Governance Meeting	
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<b>This is the most current version and should be used until a revised document is in place</b>		

### Key Amendment

Date	Amendment	Approved by
21 <sup>st</sup> January 2019	Inclusion of advice for edoxaban. Additional information for the management of medicines for diabetes	Medicines Safety Committee
25 <sup>th</sup> June 2020	Document extended for 6 months during COVID-19 period.	QGC
4 <sup>th</sup> January 2021	Pre-operative assessment Key Documents approved for 3 years	Pre-op Directorate Governance Meeting
27 <sup>th</sup> December 2023	Extended document for 6 months whilst under review. Updated owner details.	Dr Harsha Mistry
12 <sup>th</sup> November 2024	Document extended for 12 months whilst awaiting National Guidelines to inform if changes are required	Dr Harsha Mistry
15 <sup>th</sup> April 2026	Pre-operative assessment Key Documents approved for 3 years	Pre-op Directorate Governance Meeting

## Introduction

Anaemia is defined as haemoglobin below 13 g/dl and should be viewed as a serious and treatable medical condition. Pre-operative anaemia has been identified in up to 50% of patients awaiting surgery and is associated with a 30% increased risk of perioperative complications (CPOC 2025). Pre-operative anaemia and allogeneic blood transfusion are independently associated with adverse outcomes (Kotze and Lavies, 2011).

It is good practice to treat all surgical patients with pre-operative iron deficiency anaemia but there is particular emphasis on patients having major surgery. Evidence collated by the Perioperative Quality Improvement Programme shows 67% of anaemic patients did not receive treatment for anaemia preoperatively.

Patients are more likely to be anaemic due to their age, presence of chronic diseases and the use of non-steroidal anti-inflammatory medication. Anaemia can be due to nutritional deficiencies such as iron, B12 or folate, anaemia of chronic disease including chronic kidney disease or a combination of these (Kotze and Lavies 2011). Iron deficiency is the commonest cause of anaemia in the surgical population, accounting for 80% of cases (CPOC 2025).

Anaemia should be investigated and treated before planned surgery, using haematinics such as oral/intravenous iron rather than transfusion (The Association of Anaesthetists of Great Britain and Ireland,

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2010). The urgency and nature of surgery, plus patient specific factors, will determine the balance between reversing anaemia and proceeding with surgery. The aim, to avoid perioperative blood transfusion, is best achieved when hospital pre-operative services work with other departments and primary care (The Association of Anaesthetists of Great Britain and Ireland 2010).

The aim of the guideline is to:

- Identify all patients whose Haemoglobin is reduced.
- Advise, arrange or institute treatment in identified patients
- Identify higher risk patients, such as patients with significant co-morbidities, patients with very low Haemoglobin levels and patients whose surgery may result in significant blood loss

### Definition

Severity of anaemia:

- Mild- Hb 10-12g/dl
- Moderate- 8-10g/dl
- Severe below 8g/dl

Red blood cell size

- Normocytic MCV 76-96
- Microcytic MCV <76
- Macrocytic MCV>100

When deciding which category of anaemia applies in an individual patient, red cell count, mean cell haemoglobin, and mean cell haemoglobin concentration should be considered – a simple FBC will show these parameters.

### Screening

Patient blood management should start in primary care at the time of referral for surgery; working closely with the pre-operative assessment clinic at the hospital (Norfolk, 2013). Primary care can help optimise patients' fitness before surgery by optimising treatment of chronic conditions such as anaemia. This may help increase survival, decrease peri-operative morbidity and shorten the duration of hospital admission (The Association of Anaesthetists of Great Britain and Ireland 2010).

Anaemia needs to be identified as early as possible in the patient's pathway (Kotze and Lavies, 2011) therefore patients that fulfil the National Institute for Healthcare and Clinical Excellence (NICE, NG45) criteria require a full blood count (FBC) as soon as possible after the decision to treat is made.

### Recommendations

The following guidance combine the local recommendations and those from CPOC for the investigation, treatment and management of anaemia.

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### Investigations

At the time of listing for surgery, the Consultant Surgeon, Staff Grade or Registrar will detail the request for pre-operative Full Blood Count in the letter to the GP, advising of the proposed surgery. The referring clinician will notify the patient of the referral to the GP for assessment of anaemia.

Patients will become visible to the pre-operative assessment (POA) department when added to the surgery waiting list. On attending the POA service, the RN will ensure that a FBC was completed and note if any additional blood tests were completed by the GP (Ferritin and CRP). The RN will confirm the results, diagnosis and management plan from primary care.

In the event that a FBC was not completed by the GP at the time of listing, the RN will perform a FBC as per the National Institute for Healthcare and Clinical Excellence (NICE, 2003) criteria. The RN will review the FBC result within 48 hours of the sample being taken. In the event that the result is abnormal the RN will notify the GP and the patient and undertake further tests (as detailed below) to identify a cause. The RN will further notify the Consultant Surgeon to highlight the potential delay to surgery.

The RN will ensure that vital signs are recorded, including manual palpation of the pulse. An electrocardiogram (ECG) will be performed as clinically indicated. In the event that the vital signs are outside of the normal range, the RN will manage the patient as clinically appropriate and make a referral to an additional service as required (GP, Anaesthetist). The RN will ensure appropriate 'safety netting' of the patient.

If the surgery is urgent the RN will inform the Consultant Surgeon and Consultant Anaesthetist (via the worklist) to clarify if surgery can proceed and any requirements to facilitate this.

In the event that the patient is not fit to proceed to surgery, the RN will ensure that the patient, Consultant Surgeon, Anaesthetist, Secretary, ward and theatres have been notified of the cancellation.

The RN will ensure that the GP has been informed of the cancellation, in writing, and will notify the Consultant Surgeon in writing.

All patients presenting to pre-operative assessment for surgery which is likely to involve significant blood loss, will be provided with a copy of the patient information leaflet, 'Iron in the Diet'.

FBC should be taken for:

- All patients having major surgery
- ASA 3 or 4 patients having intermediate surgery

If patients are found to have anaemia, they will require further testing including:

- Haematinics - serum iron, ferritin, transferrin saturation levels, serum folate and Vit B12
- Urea, creatinine, & CRP
- Liver function tests (if relevant medical/social history)
- TSH (if markers of thyroid disease)

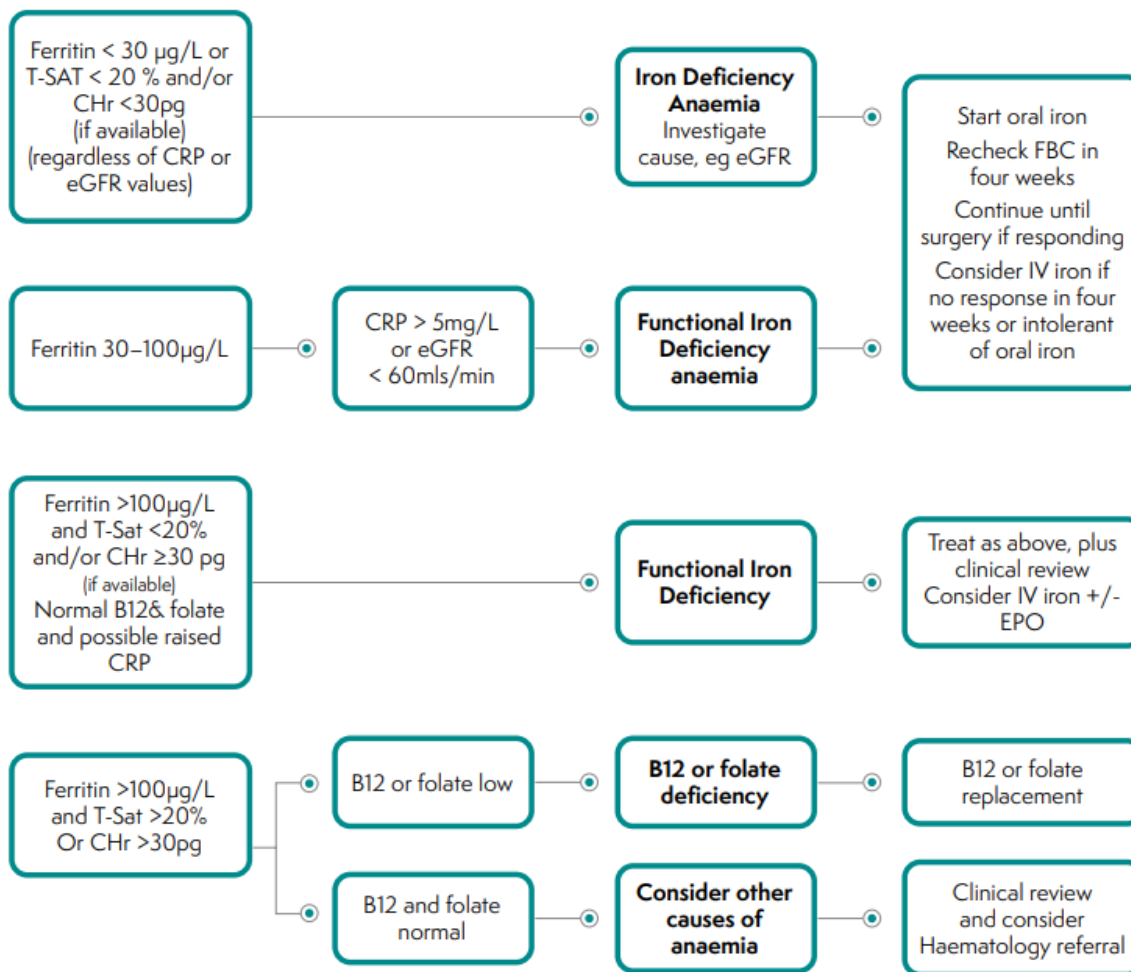
### Determining the cause of iron deficiency

#### Serum Ferritin

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Serum ferritin is the best diagnostic test for iron deficiency, and a serum ferritin of less than 12-15 ug/dl is proof of iron deficiency - low levels indicate low iron stores. However, serum ferritin levels are difficult to interpret if infection or inflammation is present, as levels can be high even in the presence of iron deficiency (National Institute for Health and Care Excellence, 2014)

**Flow diagram 1: Serum iron, total iron binding capacity and transferrin saturation (iron and iron binding capacity) from CPOC 2025.**



Diagnosis	Ferritin	Serum iron	MCH/MCV	TIBC/Tf	sTfR	CRP
<b>IDA</b>	Low	Low	Low	Raised	Raised	Normal
<b>ACD</b>	Normal or raised	Low	Normal/low	Low	Normal	Raised
<b>IDA + Inflammation</b>	Normal or raised	Low	Low	Low	Raised	Raised

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	(<100u g/dl)					
<b>Beta Thalassaemia</b>	Normal	Normal	Low	Normal	Normal	Normal

Total iron binding capacity (TIBC), Transferrin (Tf), Serum transferrin receptor assay (sTfR)

### Iron Deficiency Anaemia (IDA)

Iron deficiency occurs when the body's iron demand is not met by iron absorption from the diet. Iron deficiency anaemia (IDA) occurs in the more severe stages of iron deficiency when the body is iron deficient to the degree that red blood cell production is reduced (National Institute for Health and Care Excellence, 2014).

The cause of IDA may already be known; it may be a feature of underlying disease such as gastrointestinal malignancy, chronic renal disease, heart failure, inflammatory arthritis and inflammatory bowel disease. If the reason is not known IDA must be investigated to identify any other serious underlying causes such as colon cancer (Author, 2015). All men and post-menopausal women who present with no obvious cause for IDA should be investigated; the timing of this will be dependent on several factors as described in this document.

### Treatment

It is important that as well as correcting the anaemia, iron stores are replenished. This is particularly important for patients undergoing surgery where blood loss is expected.

IDA can be treated in two ways:

- Oral iron therapy: this is the preferred treatment and should always be the first choice.
- Parenteral (IV iron)

Parental iron should only be used when oral iron is not tolerated, oral iron cannot be absorbed, the patient has continued blood loss or when rapid correction is needed pre-operatively in the event of scheduled or urgent surgery.

### Oral iron

Therapeutic response the haemoglobin should rise by about 1-2 g/l per day. When the haemoglobin is normal, treatment should continue for a further 3 months to replenish stores (Author, 2015)

Recommended dose: Please consult the British National Formulary for the current recommended dose. NB: If iron is not tolerated at the recommended dose a lower dose could be considered, as clinically appropriate. Also consider oral suspensions which can be better tolerated than tablets

### Parenteral Iron

Please see guideline WHAT-KD-017 Administration of Intravenous Iron for Pre-Operative Patients for further details on precautions, logistical considerations and details on technical process of administration of IV Iron

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**Determination of the iron need**

Hb		Patient body weight		
g/dL	mmol/L	below 35 kg	35 kg to <70 kg	70 kg and over
<10	<6.2	500 mg	1,500 mg	2,000 mg
10 to 14	6.2 to 8.7	500 mg	1,000 mg	1,500 mg
>14	>8.7	500 mg	500 mg	500 mg

Note: do not give more than 20mg/kg at any one time (given as infusion) or give more than 1,000mg of iron in a week. Doses above 1000mg must be split and given in a second dose a week later. I.e. give on day 1 and day 8. Use actual body to dose, even in patients with low or high BMI.

**DRUG INTERACTION**

- Ferinject injection should not be administered concomitantly with oral iron preparations as the absorption of oral iron will be reduced.
- Oral iron therapy should not be started earlier than 5 days after the last injection of Ferinject.

**CONTRAINDICATIONS**

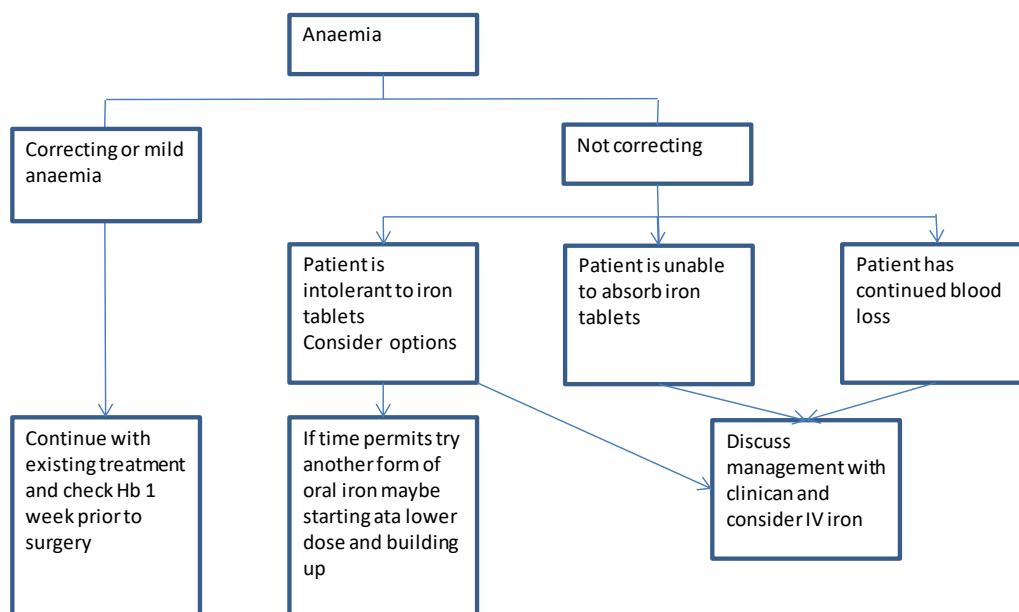
- Non-iron deficiency anaemia (e.g. haemolytic anaemia)
- Drug hypersensitivity to the active substance, to Ferinject or any of its excipients such as Sodium hydroxide and Hydrochloric acid.
- Known serious hypersensitivity to other parenteral iron products.
- Immune or inflammatory conditions such as systemic lupus erythematosus, rheumatoid arthritis where there is an increased risk of hypersensitivity reactions to parenteral iron complexes.
- Iron overload or disturbances in utilisation of iron. (e.g. haemochromatosis, hemosiderosis, decompensated liver cirrhosis, hepatitis and in particular Porphyria Cutanea Tarda)
- Parenteral iron must be used with caution in case of acute or chronic infection, asthma, eczema or atopic allergies

**CHECKING THERAPEUTIC RESPONSE**

- The patient's Hb and ferritin should be measured 4 weeks after the last Ferinject infusion, to confirm the predicted response.

**Management****Patient with existing iron deficiency anaemia:**

- Confirm whether a diagnosis of anaemia has been made and review results.
- Confirm all baseline investigations have been arranged, if not; arrange as detailed above
- Confirm current treatment and duration, if any.
- Evaluate the response to treatment
- Confirm date of surgery and severity of the proposed procedure
- Plan further management considering above information.

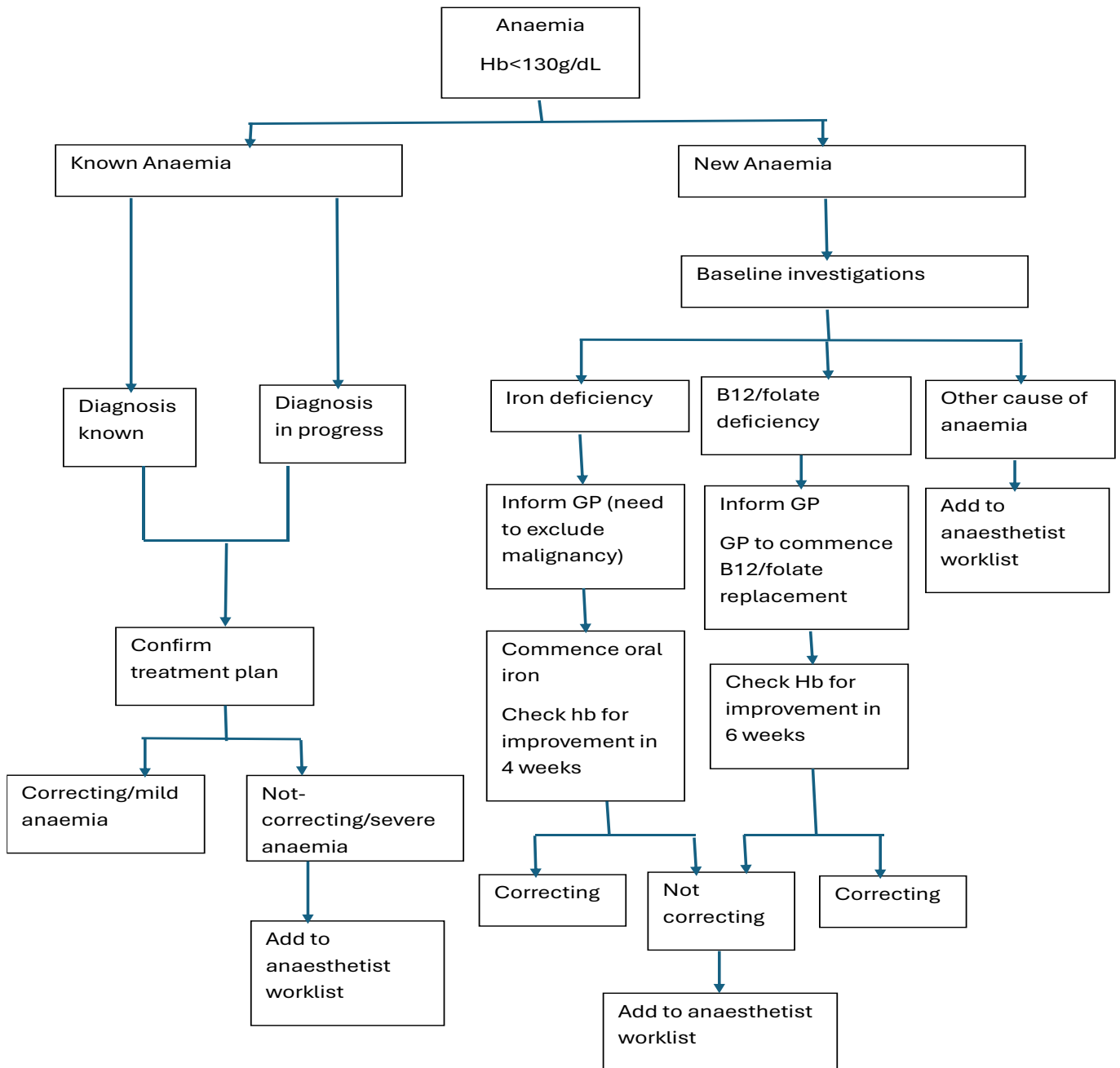


### Patient newly found to be anaemic

- Review available blood test results
- Classify anaemia i.e. normocytic
- Ensure appropriate baseline investigations have been ordered and completed, if not arrange
- Confirm date and urgency of surgery
- If urgent surgery: to be escalated to anaesthetist. Decision on proceeding will be made in conjunction with surgeon considering degree of anaemia, any cause identified, proposed surgery and urgency of case.
- If elective surgery: once the cause has been identified, treatment should be instigated. If feasible, depending on cause, anaemia should be corrected prior to surgery.
- Anaemia that is not due to Iron/B12 or folate deficiency is unlikely to be correctable except with transfusion.

Appendix 1

**Management of patients found to be anaemic pre-operatively (elective surgery)**



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**Appendix 2 GP communication Template**

**Patient Casenote Number: <Patient: Hospital Number>**

**Patient NHS Number: <Patient: NHS Number>**

**CONFIDENTIAL**

To: <GP: Name>

<GP: Address>

**Re: <Patient: Name>, DOB : <Patient: Date of Birth>**

**<Patient: Address Line>**

<Todays Date>

This above patient has been identified as anaemic prior to surgery.

**Operation planned:**

**Surgical Consultant:**

**DELETE AS APPROPRIATE**

\*\*\*\*\* Clinically it has been decided to delay the planned operation until the anaemia is treated. Our tests indicate this patient requires B12/folate replacement. \*\*\*\*\*

\*\*\*\*\*Clinically it has been decided to delay the planned operation until the iron deficiency anaemia is investigated and treated. This is because there is a chance that the anaemia is related to an underlying pathology such as colorectal cancer.\*\*\*\*\*

Please investigate as you usually do and contact:

when you are satisfied that anaemia has been investigated and managed. We aim for a Hb above 130g/L before elective surgery

Many thanks for your help in this matter.

Yours sincerely

The Pre-operative Anaesthetist Group  
Worcester Acute NHS Hospitals Trust