Preoperative Anaemia Management

Implementation of anaemia management pathways in major surgery

Dr Caroline Evans
Consultant Anaesthetist
University Hospital of Wales
Cardiff
• With thanks to Dr Andrew Klein, Consultant Anaesthetist, Papworth for allowing use of the anaemia pathways from Cambridge as a good guideline to follow as well as his slides from NHSBT audit as background to this work
We will cover......

• What is anaemia?
• What are the drivers to implementing an anaemia management pathway in your hospital?
• The causes of Anaemia in the Surgical Population
• Choosing a pathway & delivery of the service
• Results of local IV iron programme
Definition of Anaemia
WHO 1968

• 13 g/dL men, 12g/dL women
• Have we got it right in 2017?
Gender Bias

• Should we be aiming for an Hb > 130 g/L in men and women?
• Women are smaller than men
• Women have smaller body surface area and less blood
• Women bleed just as much as men!
Anaemia - what is it?
Why is it important? The Evidence

- Low Haemoglobin
- Iron deficiency is the commonest cause of anaemia in the surgical population\(^1,3\)
- The most common treatment remains a packed red cell transfusion\(^3\)
- *Patients receiving transfusion during major surgical intervention have poorer outcomes*\(^2\)
  - *Difficult to separate cause and effect*

1. World Health Organisation 2014
Causes of Anaemia

• Nutrient deficiency
  – Iron, absolute
  – Folate
  – B12

• Renal failure

• **Chronic disease**
  - patients have iron restriction due to upregulated Hepcidin hormone
The Drivers for Change in Current Practice

• Perioperative Blood Management
• NICE
• National Blood Transfusion Services
• Implementation of Perioperative Medicine Programmes to support the RCoA curriculum
Perioperative Blood Management

• The First Pillar of PBM & driver globally
  - Timely detection and management of preoperative anaemia
• Poorly addressed across the UK
UK Driver

Royal College of Physicians

National Comparative Audit of Blood Transfusion

NHS

Blood and Transplant

National Comparative Audit of Blood Transfusion

2015 Audit of Patient Blood Management in Adults undergoing elective, scheduled surgery
Audit against PBM standards

• Identification and treatment of pre-op anaemia
• Routine Tranexamic Acid use
• Cell salvage protocol
• Point-of-care protocol
• Restrictive transfusion threshold used
• Single unit blood transfusion only
1. All patients should have their haemoglobin concentration (Hb) measured before listing for major elective surgery.

2. Patients who are anaemic by the World Health Organization definition (Hb men < 130 g.l⁻¹, women < 120 g.l⁻¹) should be investigated before elective surgery and treated appropriately, and elective non-urgent surgery other than caesarean section should be delayed.

<table>
<thead>
<tr>
<th>Colorectal</th>
<th>Urology</th>
<th>Cardiac</th>
<th>Gynae</th>
</tr>
</thead>
<tbody>
<tr>
<td>27% (81/300)</td>
<td>41% (69/167)</td>
<td>40% (217/536)</td>
<td>38% (129/342)</td>
</tr>
</tbody>
</table>

941/3793 (25%) received some sort of intervention for anaemia


NICE quality standards describe high-priority areas for quality improvement in a defined care or service area. Each standard consists of a prioritised set of specific, concise and measurable statements. NICE quality standards draw on existing NICE or NICE-accredited guidance that provides an underpinning, comprehensive set of recommendations, and are designed to support the measurement of improvement.

• Do not offer erythropoietin 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 or
  - the appropriate blood type is not available because of the patient’s red cell antibodies.
• Offer oral iron before and after surgery to patients with iron-deficiency anaemia.
• Consider intravenous iron before or after surgery for patients who:
  - have iron-deficiency anaemia and cannot tolerate or absorb oral iron, or are unable to adhere to oral iron treatment (see the NICE guideline on medicines adherence)
  - are diagnosed with functional iron deficiency
  - are diagnosed with iron-deficiency anaemia, and the interval between the diagnosis of anaemia and surgery is predicted to be too short for oral iron to be effective.

Endorsing bodies

This Quality standard is endorsed by NHS England as required by the Health and Social Care Act (2012).

Supporting organisations

A number of organisations recognise the benefit of this Quality standard in improving care. They work with us to promote it to commissioners and service providers:

• NHS Blood and Transplant
• UK Transfusion Laboratory Collaborative
NICE Guidance Summary

• Identify, assess and treat anaemia
• Consider postponing elective non-urgent surgery if anaemic
• Time surgery with optimization of red blood cell mass
Incidence & Importance

UK wide 40% incidence
19,033 patients
regional variations

54% anaemia prevalence
2688 patients
Papworth/ Specialist/ Comorbidity high
Implementation of Anaemia Management Pathways - The Challenges

‘Fit to fly’: overcoming barriers to preoperative haemoglobin optimization in surgical patients†


1Perioperative Transfusion Medicine, School of Medicine, 2Department of Pharmacology, School of Medicine, University of Málaga, Málaga, Spain, 3Internal Medicine, Xanit International Hospital, Benalmádena, Spain,
Implementation of Anaemia Management - The Challenges

• Organisational problems outlined in ‘Fit to Fly’
• We do not recognise anaemia?
• Recognition is too late in the patient care pathway

• ‘Management of preoperative anaemia seems to be as much an organisational as a clinical problem’ Rob Feneck Anaesthesia June 2016 editorial
Perioperative Medicine
Aspirational Goals

• Preoperative assessment and agreed treatment pathways for Anaemia – national/centre adopted strategy
• Aim for pre surgery haemoglobin in the normal range
• Remove gender differences
• Have potential to optimise/superboost Hb for surgeries with a high expected blood loss
• Save blood
• Save hospital bed days
Engaging Stakeholders/MDT in an Agreed Pathway
Questions to Ask

• Who to treat?
• Where?
• Which drug?
• Timing of Surgery?
• Outcome data – what to collect?
Pathways

- Cambridge
- Cardiff
Both Pathways

• Get FBC as soon as possible
  (- should this be Primary Care?)
• Hb<130 g/L = move on to Anaemia Pathway

• Full work up (Papworth)
• Hb & Ferritin (Cardiff)
Figure 2.

Adapted from M. Munoz et al., International consensus statement on the peri-operative management of anaemia and iron deficiency. Anaesthesia 2017 doi:10.111/anae.13773
**PREOPERATIVE ANAEMIA PATHWAY**
CARDIAC SURGERY CARDIFF AND VALE UHB

**BLOOD TESTS ON SURGICAL REFERRAL**
FBC/U&E/CRP/FERRITIN/TFT

**NO ANAEMIA**

*FERRITIN < 100 mcg/L*
WITH expected major blood loss or complex case D/W
AG or JK

**PATIENT ANAEMIC IF**
Hb < 130g/L
ALL PATIENTS

**LOOK at FERRITIN LEVELS**

**KNOWN ANAEMIA PRIOR TO PRE ASSESSMENT**
- Review current therapy
- Liaise with previous renal or haematology team
- Consider iron based on Ferritin

**FERRITIN < 100 mcg/L**
Total dose iv iron replacement with iv iron @ 20mg/kg
- SEE **MONOFER DOSING ALGORITHM**

**RAISED CRP**
GIVE 1g IV IRON AND
- Haematol advice or renal review if CKD
- consider gastro review & GI investigation

**NORMAL CRP**
- Review clinical findings
- Review MCV, MCH & BLOOD FILM
- REVIEW LFT/V&E/TFT
- **AG/JK email referral with above results**
- +/-renal review in presence of CKD

---

**AG andrew.goringe@wales.nhs.uk or JK jonathan.kelll@wales.nhs.uk**

**SEE SEPARATE SHEET – should be given 10-40 days pre surgery max effect at 4-6 weeks**
Some patients......

• Ferritin <30

• Absolute iron deficiency

• Consider GI referral for endoscopy

  – serum ferritin level <30 μg·l\(^{-1}\) is the most sensitive (92%) and specific (98%) cut-off level for the identification of true iron deficiency; no further laboratory work-up is needed
Diagnose cause of anaemia

- Ferritin <100
- CRP >5 mg.l\(^{-1}\)
- and/or TSAT < 20%
- Strongly suggests iron deficiency. It also indicates inadequate iron stores for surgery during which moderate-to-high blood loss is anticipated.
Listed for surgery

Transfusion risk >10% and/or estimated blood loss >500 ml?

NO

Standard pre-operative evaluation

Proceed to surgery

YES

Laboratory work-up request

Pre-operative Hb <130 g·l⁻¹?

NO

Is there haematinic deficiency?

NO

Prescribe supplements

Proceed to surgery

YES

Non-elective Surgery

Elective surgery

YES

Classify anaemia and start treatment

Proceed to surgery

Classify anaemia and start treatment

Postpone surgery until patient no longer anaemic

Figure 3.

Adapted from M. Munoz et al., International consensus statement on the peri-operative management of anaemia and iron deficiency. Anaesthesia 2017 doi:10.111/anae.13773
Consensus Statement

International consensus statement on the peri-operative management of anaemia and iron deficiency

Which Drug?

- Oral vs Intravenous Iron
Oral Iron

• Needs time............
• Current recommendation is for 6-8 Weeks pre surgery
• Dose 40-60mg day of elemental iron
• Takes 3 months to replace iron stores fully

*International Consensus Statement on the perioperative management of Anaemia and Iron deficiency Anaesthesia Dec 2016*
Intravenous Iron

• If you have less time…..
• Failed oral iron therapy – patients with severe iron deficiency or inability to uptake iron through GI tract
• Pressure on team to get patient through the system in a quicker time frame
IV Iron Therapy Evidence
Where has it worked? Current Trials -

• Evidence for using IV iron is developing an increasing evidence base

• Chronic Heart Failure *Bolfer A et al, J Am Coll Cardiol 2006*

• *Iron deficiency anaemia in Major Orthopaedic surgery* *Theusiger et al, Anaesthesiology 2007*

• *IVICA*

• *PREVENT*

• *CAVIAR/ITACS*
Experience in Cardiff
‘virtual’

• Total Dose Iron therapy –
  most patients ≥1.2 up to 1.8 g
• One visit
• Day Case

• Minimal nursing time
• Good safety profile
• No major adverse events to date
Designated prescription – avoids complex calculation and error

### Prescription Chart for Monofer (Iron(III) isomaltoside 1000) in Cardiac Surgery

**Prescriber to complete all boxes shaded in grey**

*Monofer* to be prescribed if haemoglobin < 130 g/L and ferritin < 100 mcg/L.

In patients having complex valve/aortic surgery or a redo procedure, *Monofer* to be prescribed in all patients with a ferritin <100 mcg/L (even if Hb > 130 g/L) – see Preoperative Anaemia Pathway.

#### Step 1: Justify need for parenteral iron therapy

<table>
<thead>
<tr>
<th>Hb (&lt;130 g/L)</th>
<th>Ferritin (&lt;100 mcg/L)</th>
<th>Planned surgery</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Complex valve/aortic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>redo valve/graft</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other (specify indication)</td>
<td></td>
</tr>
</tbody>
</table>

#### Step 2: Dose = 20mg/kg – tick dose as appropriate (calculate if weight <50kg)

<table>
<thead>
<tr>
<th>Weight</th>
<th>Dose</th>
<th>50-50 kg</th>
<th>60-60 kg</th>
<th>70-70 kg</th>
<th>80-89 kg</th>
<th>90-99 kg</th>
<th>≥ 100 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 kg</td>
<td>20mg/kg</td>
<td>1g</td>
<td>1.2g</td>
<td>1.4g</td>
<td>1.6g</td>
<td>1.8g</td>
<td>2g</td>
</tr>
</tbody>
</table>

#### Step 3: Complete the Monofer Prescription Schedule

<table>
<thead>
<tr>
<th>DATE</th>
<th>Drug name and infusion</th>
<th>DOSE</th>
<th>ROUTE</th>
<th>Prescriber signature</th>
<th>TIME GIVEN</th>
<th>GIVEN BY</th>
<th>CHECKED BY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sodium Chloride 0.9% for flushing cannula</td>
<td>5ml</td>
<td>IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Baseline and Pre-operative Haemoglobin in Cardiac Surgical Patients following treatment with Monofer – first 20

Local data from UHW
Change in Haemoglobin

IV Iron Treatment Effect

Local data from UHW
Cardiff Cardiac Surgery Preliminary Data

• Compared Anaemics treated with Anaemics not treated based on WHO criteria
• Compared both to the Non-Anaemic patients
Cardiff Cardiac Surgery
Preliminary Data

• Non-Anaemics
  – Median transfusion of 0 (IQR 0-1)
  – Mortality 0.9%

• Anaemics Untreated
  – Median transfusion 2 units (IQR 1–14)
  – Mortality 6%

• Anaemics treated with IV Iron.
  – Median Transfusion 1 unit (IQR 0-2)
  – Mortality 3.4%

• Fulfils NHSBT standards/PBM standard
Patient Engagement
Summary

• Anaemia is a significant healthcare burden with a large impact on outcomes
• Iron deficiency most common cause (>80%)
• Easy and safe treatment
• Diagnosis and treatment mandated by NHS, NICE, NHSBT, AAGBI
Thanks

- caroline.evan5@wales.nhs.uk