Detection and management of anaemia in preoperative cardiac surgical patients

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Preoperative cardiac surgery

Definition of anaemia
- Hb <130g/L: Men over 15 years
- Hb <120g/L: Non-pregnant women over 15 years
- Microcytic: MCV <78 or MCH <27pg
- Normocytic: MCV 76-100 or MCH 27-32pg
- Macrocytic: MCV >105 or MCH >32pg

Current Problems
- Patients are at risk of significant increased morbidity due to untreated anaemia preoperatively
- A new guideline has been drafted by the Belfast Trust detailing the triggers for investigation, subsequent management and follow up
- Patients for scheduled major surgery have been specifically highlighted in this guideline
- Preoperative assessment should allow time for appropriate management of anaemia prior to surgery, yet many patients are still anaemic on day of surgery
- Inpatients for scheduled surgery appear to be at greater risk of anaemia than their counterparts at home

Current Guidance
- BHSC Policy December 2012: Detection, investigation and Management of anaemia in adult patients
- Anaemia prior to scheduled major surgery is an independent risk factor for morbidity and mortality
- Pre-assessment should be arranged 4 to 6 weeks before intended date of surgery
- If a patient is found to be anaemic, steps should be taken to investigate and manage this in accordance with the guideline

Steps in Investigation and Management of the adult patient with anaemia
1) confirm anaemia: FEP, MCV, MCH
2) determine type of anaemia: perform additional tests
- microcytic: serum ferritin, TIBC
- normocytic: iron studies, renal function tests, serum folate/B12
- macrocytic: UFT, TFA, B12/FAHA
3) appropriate correction of anaemia: investigation of cause unless already known
4) Monitor response to treatment and treat the cause
- Iron deficiency anaemia is the most prevalent cause
- Haemoglobin should rise by 10-20g/L every 3 weeks of treatment with iron therapy
- Iron therapy should be continued for 3 months after Hb has normalised
- Intravenous iron is indicated where surgery must proceed in less than 3 weeks time or other circumstances such as failed oral therapy, malabsorption or haemodialysis patients

Management of anaemic adult patient prior to scheduled major surgery
- The aim is optimization of oxygen delivery and haemostasis
- Hb* (0.054 x SaO2) + (0.003 x PaO2)
- All patients should be preassessed at 4-6 weeks as per current guidance
- Anaemia must be appropriately investigated and treated and surgery delayed until this has been done when it is in the patients best interest
- A full review of the patients medications should be carried out to minimize the risk of perioperative bleeding

Method
- 1) Prospective data collection of 100 cardiac surgical patients
- 2) Audit form completed largely. Intervened by an anaesthetic consultant
- Remaining data collected in cardiac intensive care by anaesthetic staff
- 3) Parameters measured included:
  - haemoglobin (Hb) at pre-assessment or on admission (if kept as an inpatient awaiting surgery),
  - time between pre-assessment/admission and eventual surgery and the steps taken (if any) to investigate the cause of the anaemia or to treat it.

Standard
- All patients should have a normal haemoglobin level on the day of surgery for scheduled major procedures
- Pre-assessment clinics provide the opportunity to correct anaemia
- In 2013 the Belfast Trust drafted new guidance on the detection and management of anaemia
- 4) This audit tested compliance with the guidance among cardiac surgical patients.

Results

Procedure Type

Preassessement
- Of the patients reviewed, 47% were pre-assessed.
- The average time from pre-assessment to surgery was 12.5 weeks.
- Of those, 26% were found to be anaemic.
- A further 15% were found to be in the interim between preassessment and day of surgery.
- In these cases the interval from preassessment would be up to 180 days.

Number of anaemic patients at pre-assessment

Graph to show Hb for patients at pre-assessment

Inpatients
- A further 42% of patients were kept as inpatients awaiting surgery (on average 5 weeks).
- 18% were anaemic at admission
- Increasing to 52% by the day of surgery

Number of inpatients anaemic at admission

Discussion

- Pre-assessment should be arranged six weeks before the intended date of surgery
- If a patient is found to be anaemic, steps should be taken to investigate and manage this
- The audit shows that this is only happening for the minority, resulting in 40% of patients being deemed anaemic on the day of surgery.
- Inpatients are most at risk, with a 14% increase in the number of patients anaemic on day of surgery compared to on admission.
- Those with a low Hb on the day of surgery are more likely to be transfused in the perioperative period.
- It is evident, especially within the inpatient population, that there is a lack of understanding of the differences between anaemia triggers and transfusion.
- Looking at evidence, average Hb drop is 52.9 after cardiac surgery
- The anticipated blood loss must be considered when assessing preoperative Hb level

Conclusion
- Guidance not being followed
- Significant number of patients anaemic on day of surgery
- Transfusion requirements higher in anaemic patients
- Anaemia is under recognised and under treated within the inpatient population
- Inpatients become anaemic during hospital stay

Action
- Presented locally to cardiac surgical and preassessment teams
- Discussed at the regional blood transfusion committee meeting
- Flow diagram from policy available at ward level and preassessment
- Highlight issues to other surgical and medical teams as this can be applicable in all areas
- Education to dispel “traditional view” of transfusion triggers versus anaemia triggers

References
- Belfast Health and Social Care Trust: Detection, Investigation and Management of Anaemias in Adult Patients. December 2012
- Preoperative Anaemia: EA Hare. ICAACCP 2013

Investigation
- Only 30% of all patients found to be anaemic were investigated for B12
- Investigation rates equally divided between inpatients and pre-assessed patients.
- 5 patients had a Hb < 100 on the DOS!
- Only 14.8% patients were on treatment with iron and 4.2% with B12 and folate.
- The remainder of the anaemic patients had normochromic normocytic anaemia and therefore on no treatment
- Iron studies/B12/folate were not investigated in this group to determine whether treatment may have been beneficial

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<thead>
<tr>
<th>Group</th>
<th>Days in DOS</th>
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<tbody>
<tr>
<td>Alpinir</td>
<td>5</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>9</td>
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<tr>
<td>Enoxaparin</td>
<td>5</td>
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<tr>
<td>Warfarin</td>
<td>9</td>
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<td>Ticagrelor</td>
<td>4</td>
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Transfusion Rates
- Average Hb on DOS 132
- Average drop ≥ Hb 81.4
- Average Hb drop ≥ Hb 52.9
- The average number transfused with a Hb of less than 120 is 1.95
- The average number transfused with a Hb above 120 is 1.19
- Packed Red cells: 97 units transfused to patients anaemic on DOS, compared to 57 transfused to non-anemic patients (63% vs 37%)