# **Detection and management of anaemia in** preoperative cardiac surgical patients

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#### **Definition of anaemia**

- Hb <130g/L Men over 15 years
- Hb<120g/L non pregnant women over 15 years
- Microcytic: MCV <76fl or MCH <27pg
- Normocytic: MCV 76-100fl or MCH 27-32pg
- Macrocytic: MCV >100fl or MCH >32pg

#### **Current Problems**

### **Method**

- 1) Prospective data collection of 100 cardiac surgical patients
- 2) Audit form completed largely intraoperatively by 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 inpatient awaiting surgery),

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

Aspirin	66	5 days in 32 DOC in 34
Clopidogrel	9	7 days for most 3 days before for 2 patients
Enoxaparin	5	
Warfarin	9	5 Days for most 4 days for 3 patients
Ticagrelor	1	DOS
None	13	

- 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

#### Aims

- To establish the proportion of cardiac surgical patients that are anaemic prior to surgery
- To find out if anaemia is being identified at preassessment or on the • ward, in the case of inpatients
- To establish if the current, updated BHSCT guideline is being followed including investigation, treatment of anaemia and follow up
- To establish if there is a relationship between anaemia and transfusion perioperatively

#### **Current Guidance**

- BHSCT 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

 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.
  - 3) 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



#### undergoing cardiac surgery



#### Preassessment

- Of the patients reviewed, 47% were pre-assessed.
- The average time from pre-assessment to surgery was 12.5 weeks. Of these, 26% were found to be anaemic.



#### **Transfusion Rates**

- Average Hb on DOS 132
- Average post op Hb 81.4
- Average drop in 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 anaemia patients (63% vs 37%)

#### **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 anemia triggers and transfusion

**Procedure Type** 

#### **Steps in Investigation and Management of the** adult patient with anaemia

- 1) confirm anaemia: FBP, MCV, MCH
- 2) determine type of anaemia+ perform additional tests
- microcytic: serum ferritin, TIBC
- Belfast Health and normocytic: iron studies, renal function tests, serum Social Care Trust folate+B12
- macrocytic: LFTs, TFTs, B12+folate
- 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
- Hemoglobin should rise by 10-20g/L every 3 weeks of treatment with iron therapy



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
  - $DO_2 = CO [(1.34 \text{ x Hb x SaO}_2) + (0.003 \text{ x PaO}_2)]$
- 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 interests

- 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!



#### Inpatients

- A further 42% of patients were kept as inpatients awaiting surgery (on average 5 weeks)
- 18% were anaemic at admission
- increasing to 32% by the day of surgery!





- 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 Anaemia in Adult Patients. December 2012.
- Guidelines and Audit Implementation Network (GAIN). Better Use of Blood in Northern Ireland. Guidelines for transfusion practice. March 2009. Available from: www.gain-ni. org [accessed 20/04/2014]
- World Health Organisation (WHO). Haemoglobin Concentrations for the diagnosis of anaemia and assessment of severity 2011. Available from: http://www.who.int/vmnis/ indicators/haemoglobin.pdf [accessed 20/04/2014]
- Risk Associated With Preoperative Anaemia in Cardiac Surgery. K Karkouti, N Duminda et al. Circulation 2008;117:478-484





A full review of the patients medications should be carried out to minimize the risk of perioperative bleeding

PATIENT DETAILS LABE IANAGEMENT OF THE ANAEMIC ADULT PATIENT PRIOR TO ANAEMIA AUDIT te of Surgery SCHEDULED MAJOR SURGERY (Also applicable to other invasive procedures with potential for blood loss definition of anaemia<sup>2</sup>: adult male < 130g1 adult female < 120g 1) Category: Inpatient preoperatively YES 🗌 NO 🗋 Date of admission (include even if another al and drug history d Picture – if anaemic see below hospital) 2) Pre-op assessment YES NO (if yes how long before surgery?\_\_\_\_ Emergenc REDO? YES D NO D Investigate cause of anaemia 3) Surgical procedure Medication and other iditional blood tests to termine type of anaem bstances taken by patient Refer to clinical specialist (e stances (e.g. herbal Hb level at pre-assessment \_\_\_\_\_ or on admission if inpatient \_\_\_\_\_ rea & electrolyt The cause has already bee edies) could increase operative blood loss 5) Hb pre-operativel - It is not in the patient's best dvise patient to discontin 6) Lowest Hb intraoperatively interests (e.g. palliative care erbal remedies 2 weeks befor 7) Creatinine level preoperatively If anaemic (Hb <12 female, <13 male) Blood tests preoperatively to investigate anaemia?</li> B12/ folate Iron Studies Follow 4 Steps algorithm for subsequent management of the anaemic patient 9) Replacement preoperatively? iron 
B12 
folate Treat the cause of anaemia Reduce perioperative blood los rrect anaemia without dela 10) If yes, at what interval was the Hb rechecked after comm ontinue NSAIDs 24 hr propriate Prasugrel Warfarin Clopidogre Ticagrelor Dabigitran onsider risks vs benefits of For newly detected anaemi ay be beneficial to fully valuate the cause and atelet drugs (e.g. clopidogre ust therapy as appropriate ated clinical statu sider preoperative switcl lore surgery<sup>3</sup>, elay date of surgery, unless not in the patient's best Low dose prophylactic LMWH Enoxaparin NSAIDs e.g ibuprofer Bridging therapy with therapeut WH (seek local guidance xpert advice) 12) Lowest Hb in perioperative period (in the first 24hours) TIBC = total iron binding capacity TSAT = transferrin saturation in % NSAIDs = non steroidal anti-inflammatory drugs, e.g. diclofenac, ibuprofen LMWH = low molecular with heparin, e.g. enoxaparin, fondaparinux 13) Number products transfused in perioperative period Pit \_\_\_\_\_ FFP \_\_\_\_\_ sallam et al. Preoperative anaemia and postoperative outcomes in non-cardiac surgery: a retrospecti ohort study. <u>www.thelancet.com</u> October 2011. /orld Health Organisation. Worldwide Prevalence of Anaemia 1993-2005. WHO, 2008 Cryo \_\_\_\_\_ Goodnough et al. Detection, evaluation, and management of preoperative anaemia in the elective orthopaedic surgical patient: NATA guidelines BJA 2011; 106: 13-22 Skinner CM and Rangasami. Preoperative use of herbal medicines: a patient survey J BJA 2002; 89: 792-5

#### Investigation

- Only 30% of all patients found to be anaemic were investigated for this
- Investigation rates equally divided between inpatients and pre-

• Preoperative Anaemia. GA Hans. CEACCP 2013