

# 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

- 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

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

- confirm anaemia: FBP, MCV, MCH
- determine type of anaemia+ perform additional tests
  - microcytic: serum ferritin, TIBC
  - normocytic: iron studies, renal function tests, serum folate+B12
  - macrocytic: LFTs, TFTs, B12+folate
- Appropriate correction of anaemia+investigation of cause unless already known
- 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
  - 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

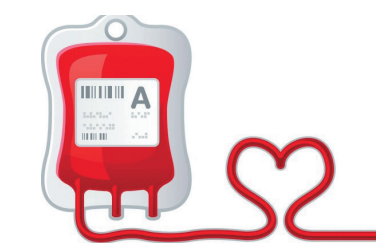
- The aim is optimization of oxygen delivery and haemostasis
  - $DO_2 = CO [(1.34 \times Hb \times SaO_2) + (0.003 \times PaO_2)]$
- All patients should be preassessed at 4-6 weeks as per current guidance
- Anaemia must be appropriately investigated and treated and surgery delayed until this has been done when it is in the patients best interests
- A full review of the patients medications should be carried out to minimize the risk of perioperative bleeding

## Method

- Prospective data collection of 100 cardiac surgical patients
- Audit form completed largely intraoperatively by anaesthetic consultant
  - Remaining data collected in cardiac intensive care by anaesthetic staff
- Parameters measured included :
  - haemoglobin (Hb) at pre-assessment or on admission (if kept as 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.

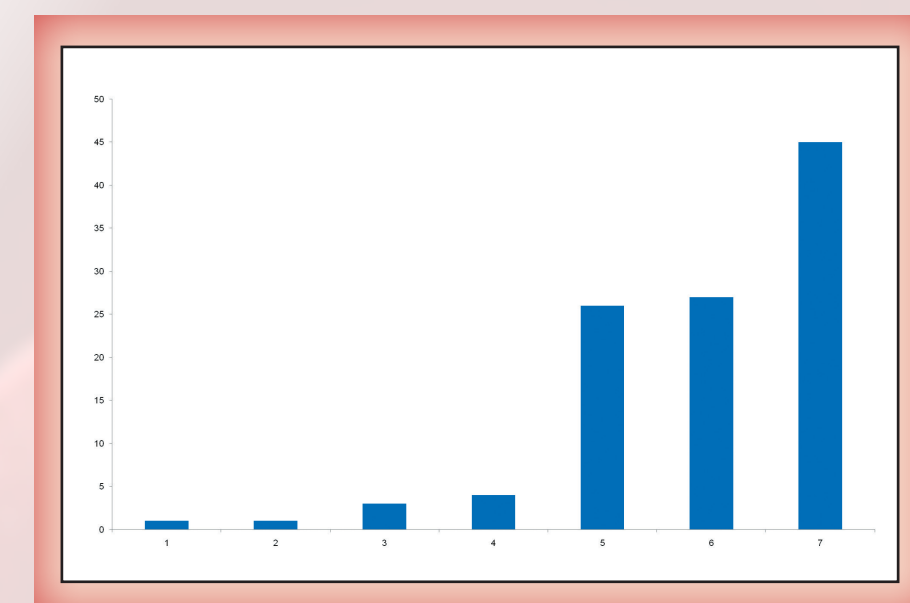
## Standard

- 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.
- This audit tested compliance with the guidance among cardiac surgical patients.

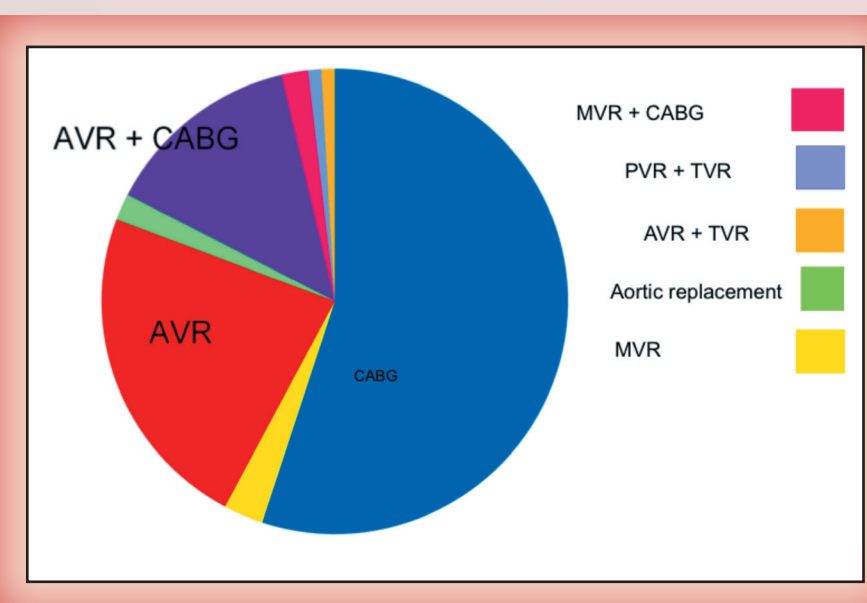


## Results

Age range of patients undergoing cardiac surgery

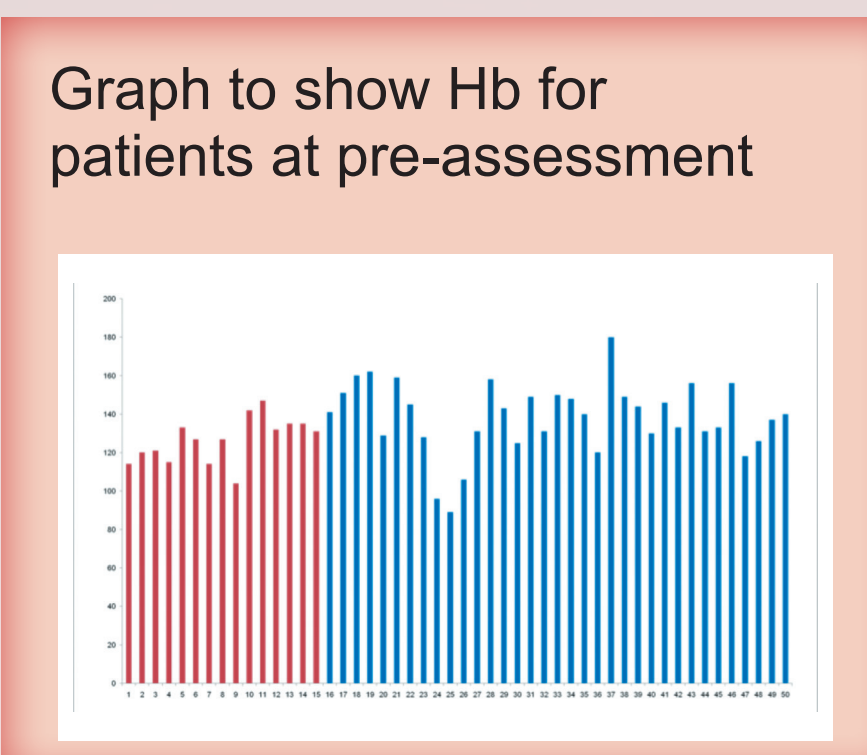
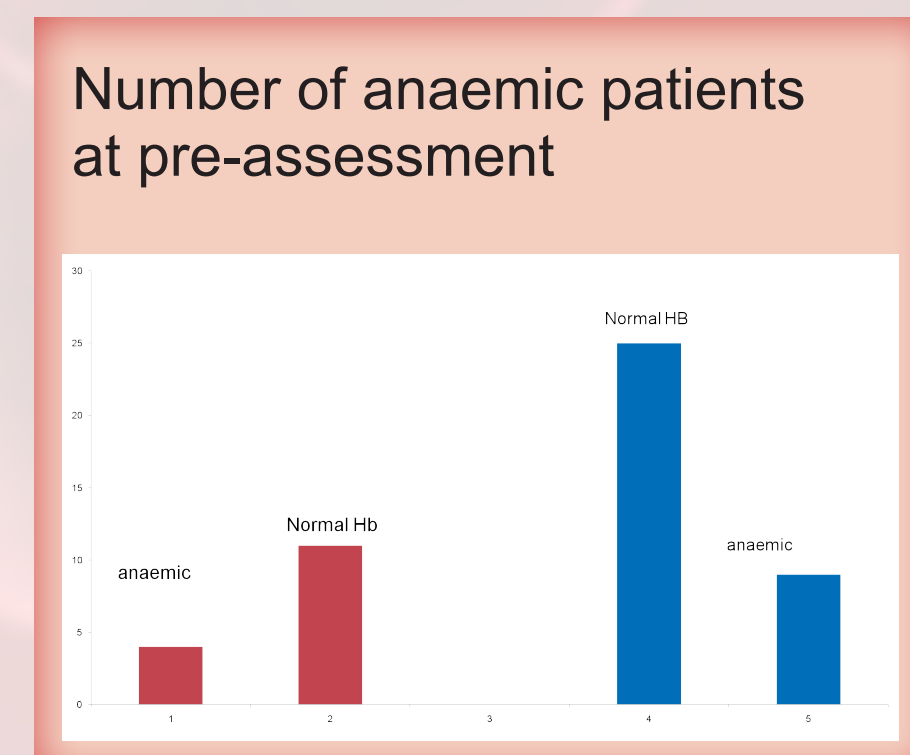


## Procedure Type



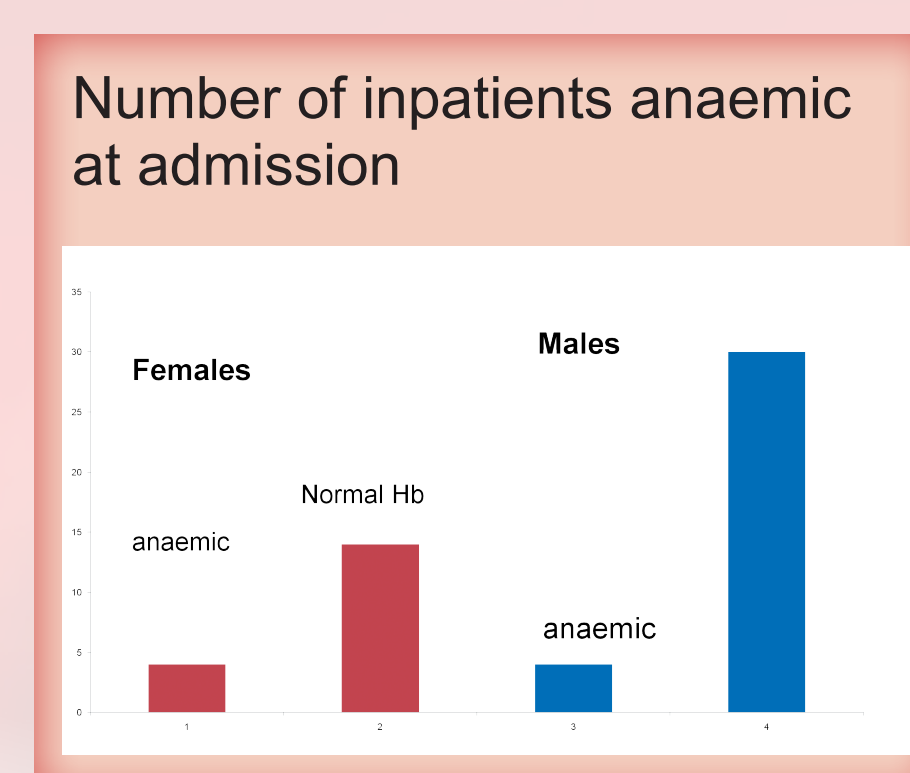
## Preassessment

- 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.
- 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!



## Investigation

- Only 30% of all patients found to be anaemic were investigated for this
- 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

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	



## 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**
- 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.
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- 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
- Preoperative Anaemia. GA Hans. CEACCP 2013

The image shows a flowchart titled 'MANAGEMENT OF THE ANAEMIC ADULT PATIENT PRIOR TO SCHEDULED MAJOR SURGERY' and an 'ANAEMIA AUDIT' form. The flowchart details steps for identifying anaemia, investigating its cause (microcytic, normocytic, macrocytic), and managing it (iron therapy, B12/folate, IV iron). The audit form includes fields for patient details, pre-assessment status, Hb levels at pre-assessment and admission, and transfusion data.