Pre - operative Management of anaemia and iron deficiency.

Barrie Ferguson 2018

Definition and Prevalence of Anaemia

WHO 1968 Males: Haemoglobin less than 130g/l Females: Haemoglobin less than 120g/l



17 49 over 65 over 85

Prevalence of anaemia

10% of people aged over 6525% of people aged over 8530% of pre operative patients

For (major) surgery, have we got this right?

- Should we be aiming for a haemoglobin more than 130g/l for men and women?
- Women have less blood volume but bleed as much as men, so are likely to drop their haemoglobin more post surgery
- There is an argument pre-operatively for using 130g/l as the cut off for both men and women

(International consensus statement on the peri-operative management of anaemia and iron deficiency, Volume: 72, Issue: 2, Pages: 233-247)

Anaemia in patients aged over 65(NHANES111)

- 30% Nutritional deficiency, Iron, B12 and Folate
- 30% Anaemia of Chronic Inflammation including chronic renal failure
- 30% Unexplained, likely multifactorial (but would include myelodysplasia)
- However other studies of pre operative patients have found that iron deficiency accounts for up to 75% of cases of anaemia (munoz, transfusion medicine 2016)

Why treat pre-operative anaemia?

HE LANCET

Musallam KM 2011

- 200 000 pre- operative patients, major non-cardiac surgery , 30% were anaemic by WHO criteria
- Post-operative mortality at 30 days was higher in patients with anaemia than in those without anaemia (odds ratio [OR] 1.42, 95% CI 1.31-1.54)
- 'Preoperative anaemia, even to a mild degree, is independently associated with an increased risk of 30-day morbidity and mortality in patients undergoing major non-cardiac surgery'



Mussalam et al. Lancet 2011

Anaemia and effect on Cardiopulmonary Exercise Testing

 Anaemia leads to a decrease in exercise capacity and lowers the anaerobic threshold on CPET testing; both of these factors are associated with an increased risk of post operative complications and death

Why not blood transfusion?

- Accumulating evidence in both cardiac and non cardiac surgery that peri-operative blood transfusion increases risks of infection, length of stay and morbidity and mortality
- Best practice is to correct anaemia by treating the cause
- Only transfuse patients after careful consideration of their individual risks, using restrictive thresholds



Patient Blood Management



NICE National Institute for Health and Care Excellence

NG24 Blood Transfusion

AAGBI guidelines: the use of blood components and their alternatives 2016



Journal of the Association of Anaesthetists of Great Britain and Ireland



THE ASSOCIATION OF ANAESTHETISTS of Great Britain & Ireland International consensus statement on the perioperative management of anaemia and iron deficiency

British Committee for Standards in Haematology Guidelines on the Identification and Management of Pre-Operative Anaemia



Consistent messages regarding management of pre-operative anaemia

- Focus on major surgery with estimated blood loss of 500mls or more
- Diagnose the anaemia as early as possible, preferably at listing. May be scope for primary care involvement
- Postpone elective non-urgent surgery until the cause of the anaemia has been established and treated if possible
- Look for and treat the low hanging fruit: Anaemia due to haematinic deficiency:
 - Use oral iron if more than 6 weeks from surgery or iv iron if less than 6 weeks, intolerant of oral iron or unlikely to be able to take regularly
 - Treat B12 and Folate deficiency

'Management of preoperative anaemia seems to be as much an organisational as a clinical problem'

Rob Feneck, Anaesthesia June 2016 editorial



Classification of Pre operative anaemia



International consensus statement on the peri-operative management of anaemia and iron deficiency, Volume: 72, Issue: 2, Pages: 233-247, First published: 20 December 2016, DOI: (10.1111/anae.13773)

Transferrin Saturation (TSATS) and Ferritin

- Transferrin binds iron in the plasma and transports it to where it is needed
- TSATS are the % of the iron binding sites of transferrin that contain iron, normal 20-50%
- Ferritin is the protein iron complex in cells that stores iron mainly in the macrophages and liver.
- A small proportion circulates in the plasma, this is what is measured. Normal 30-300ug/l



Absolute Iron Deficiency

- 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
- Need to establish whether further investigation into the cause of the iron deficiency required

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Anaemia of Chronic Inflammation with iron deficiency

- Ferritin levels unreliable in infection/inflammation
- In these patients, iron deficiency is likely to be present with ferritin in the 30-100mg/l range, if coupled with raised CRP above 5 and/or a TSATS level of less than 20%

Oral Iron

- Needs time.....Current recommendation is for 6-8 weeks pre surgery
- Dose 40-60mg day of elemental iron or alternate day dosing 80-100mg
- Assess response at 4 weeks, 3 months to replace iron stores fully
- Cheap of course, no hospital visit but side effects limits compliance, may need IV iron as well

Intravenous Iron

- Not enough time for oral iron to work
- Unable to tolerate
- Oral iron ineffective
- In chronic inflammatory conditions (hepcidin blocks oral absorption)
- Single visit, equivalent cost roughly to 1 unit of blood
- Hb gain average of 12-17g/l
- Increasing evidence of safety

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What about using erythropoeitin for pre operative anaemia?

BSH 2015

Individual risk-benefit decisions are necessary we make no recommendation for the use of ESA therapy, other than where transfusion avoidance of itself is clearly beneficial to the individual eg in patients who refuse blood or with complex alloantibodies

NICE 2016

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.

Is there still a place for peri-operative blood transfusion? BSH 2015

- Optimal transfusion threshold remains to be defined, and will vary for different patient groups and type of surgery
- There is no evidence that transfusing patients up to near normal haemoglobin levels is beneficial; systematic reviews show liberal transfusion to be either inferior or non-beneficial compared to restrictive strategies
- How low should you go? Single studies of perioperative transfusion in major cancer surgery (de Almeida 2015) and cardiac surgery (Murphy *et al*, 2015) suggested a trigger Hb of 90 g/l is more appropriate than 70 g/l or 75 g/l

Other considerations:

- Oral iron for non-anaemic but iron deficient pre operative patients
- Post operative iron for anaemic iron deficient patients should be part of the peri operative anaemic pathway

Conclusions:

- 30% of pre operative patients likely to be anaemic, with high percentage due to iron deficiency, easy and safe to treat
- Good evidence for establishing peri-operative anaemia pathways, reduces transfusion and length of stay, high quality evidence for effect on outcomes still awaited
- Erythropoeitin for selected cases only
- Blood Transfusion after individualised risk assessment and using restrictive thresholds