


Iron Deficiency in Primary Care

Heart Failure

Pregnancy

Pre Operative

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Iron Deficiency - A Quick Recap

- Very common in primary care
- Easy to diagnose, crucial numbers:
  - Absolute ID, Ferritin 30
  - T sat 20 (functional ID , ferritin 100-300)
  - Hb 130 (male), 120 (female)
- A cause must be ascribed when ID is found
- Most cases can be managed safely and effectively in general practice

Heart Failure and Iron Deficiency

- Heart Failure is common in general practice and will increase:
  - Ageing population
  - Better survival form coronary artery disease
- Prevalence (HF and ID without anaemia)
  - 30-60 % (variable definitions)
  - In chronic heart failure (NYHA class 3 & 4) : 2/3 men and ¾ of women
- Poor prognosis 25-30 % mortality after first hospitalisation, *"a more ominous finding than anaemia"*

Iron deficiency but not anaemia is associated with poor outcome in CHF patients

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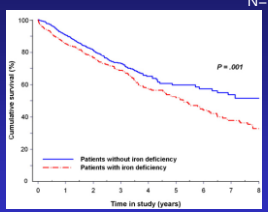

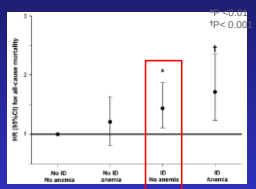

Mortality increases when ID is present

ID is a negative prognostic factor stronger than anemia

Klip et al. Am Heart J 2013

Heart Failure and Iron Deficiency

- Outcomes are independent of any co-existent anaemia
- Higher mortality – 2 fold greater risk
- Poor QoL
- Reduced exercise capacity and endurance

Heart Failure and Iron Deficiency - Who's at risk

- Women
- Non Caucasian
- Older
- Severity of heart failure
- Anaemia

Causes of iron deficiency in heart failure

Malnutrition
- Loss of appetite: <50% intake

Malabsorption:
- GI oedema
- PPI, PO_4 binders

GI blood losses
- Anti-platelets -weak
- Anti-coagulants - weak
- NSAIDs
- Mucosal integrity

→ **Reduced iron storage:** **Absolute iron deficiency**

Inflammation

Cytokines, IL-6, IL-1, TNF-α
- Blunted responses to EPO
- Apoptosis of erythroid progenitors
- Hepcidin-mediated malabsorption and RES pooling

→ **Reduced iron mobilization:** **Functional iron deficiency**

Modified from Jankowska et al. Eur Heart J 2013

Heart Failure and Iron Deficiency - Diagnosis

Check iron studies when HF diagnosed

- Ferritin <100
- Ferritin 100-300 *and* Tsat <20

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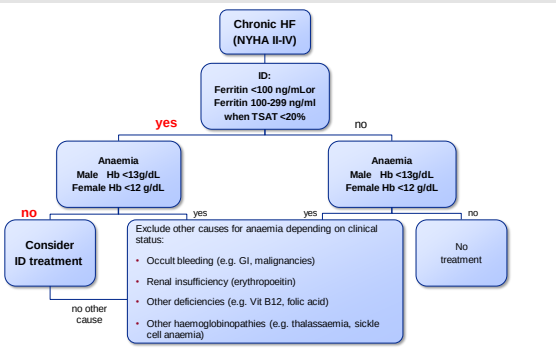
An algorithm for ID in HF



McDonagh T, *Eur J Heart Fail* 2015;17:248–62
McMurray JJ, et al. *Eur Heart J* 2012;33:1787-847.

Heart Failure and Iron Deficiency - Treatment

- IV iron is preferable - oral not as effective
- Check levels at 6w and give further dose if low
- Review – clinical, 6 min walk test
- Once optimised monitor 6 monthly

Outcomes:
- Better QoL
- Improved exercise capacity
- Reduced hospitalisation
- Less symptoms

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Pregnancy and Iron Deficiency

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Key Messages

- Iron deficiency in the absence of anaemia needs treatment
- *The infant does not receive all the iron they need during the gestational period*
- Many over the counter iron supplements are inadequate
- Transfusion will not replenish all the depleted iron stores
- A normal ferritin does not necessarily exclude iron deficiency
- Iron infusions can be safely administered after the 1st trimester

Anaemia in Pregnancy

- 20-40 % of all women are anaemic
  - Vast majority are iron deficient (90% at KEMH)
  - Associated with preterm birth, low birth weight increased rate of maternal transfusion

What is normal Hb in pregnancy

- Physiologic haemodilution (increased plasma volume 40%> RBC mass) leads to lowered haemoglobin concentration
  - 105 g/L during second trimester
  - 110 g/L during third trimester

Iron requirements in pregnancy

- Increased from expansion of red cell mass, increased demands of growing fetus and placenta
- Increased from expected blood loss at delivery
  - Vaginal delivery 500ml
  - Caesarean section 750- 1000ml
- Baseline levels are important

Iron Requirements in pregnancy

Total iron cost of pregnancy	
Fetus	270 mg
Placenta	90mg
Expansion of red blood cell mass	450mg
Obligatory basal losses	230mg
Sum	1040mg
Maternal blood loss at delivery	150mg
Total cost	1190

High risk groups

- history of IDA
- multiple gestation/ prior pregnancies in close succession
- Physiological - Teenagers
- Nutritional - e.g. vegans, social disadvantage , eating disorders
- Poor absorption e.g. coeliac disease, IBD, gastric bypass procedures. PPI
- Significant chronic blood loss e.g. menorrhagia, regular blood donation
- Elite athletes.

When and What to Test

- FBP/Iron studies
  - at first antenatal visit
  - 28 weeks
  - 36 weeks
  - 6 weeks post partum
- After initiating oral treatment - check FBP, Iron studies after 6 weeks
- Consider further investigations if indication of other pathology or poor response to treatment

Antenatal Visits

- Check adherence to oral therapy
- Check for side effects to medications
- Check adherence to dietary advice

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During pregnancy: When to treat

Hb ≥ 105 g/L

No anaemia/No iron deficiency :

No treatment required

Expert recommendations for the diagnosis and treatment of iron-deficiency anemia during pregnancy and the postpartum period in the Asia-Pacific region ***J. Perinat. Med.*** **39 (2011)** 113–121 • Copyright by Walter de Gruyter • Berlin • New York. 2011

Hb ≥ 105 g/L

No anaemia but iron deficient

Treat with oral iron

- Reticulocytosis in 72 hours
- Check levels in 6 weeks adjust dose if necessary

Diet advice

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Hb 100-105 g/L

Mild Anaemia:

Hb <105 g/L and ferritin <20 µg/L

- If ferritin >20 µg/L, rule out other causes of anaemia; thalassemia

✓ Treat with oral iron (target Hb ≥ 105 g/L

Dose:

100 mg elemental iron per day

Switch to IV iron if oral treatment is not tolerated, ineffective (↑ Hb <10g/L in 2 weeks) or if there is a lack of compliance (Hb levels drop below 100 g/L)

Expert recommendations for the diagnosis and treatment of iron-deficiency anemia during pregnancy and the postpartum period in the Asia-Pacific region ***J. Perinat. Med.*** **39 (2011)** 113–121 • Copyright by Walter de Gruyter • Berlin • New York. 2011

NOTE: IV Iron is not recommended in first trimester

Hb 90-99 g/L

Moderate Anaemia:

- Treat with IV iron (target Hb ≥ 105 g/L)
- If Hb drops below 90 g/L consider transfusion if symptomatic or compromised

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Hb <90 g/L

Severe Anaemia:

- Treatment at discretion of physician and patient
- Use IV iron if appropriate

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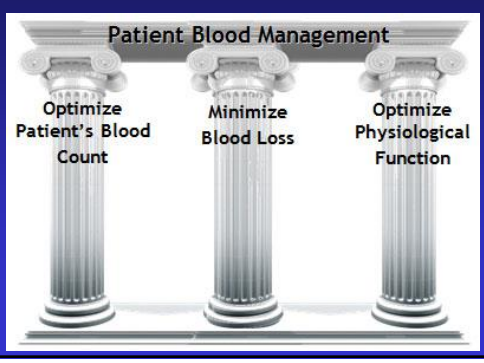
Summary

- Anaemia in pregnancy is extremely common, most often caused by Fe-deficiency
- Treatable with oral or parenteral iron (after 1st trimester) for better outcomes

Iron Deficiency and The Pre-operative Patient

- Rationale : Patient Blood Management
- Check iron and Hb levels (+renal function , CRP) on patients with expected significant blood loss at surgery
- Optimise iron and Hb prior to surgery

Three Pillars of PBM



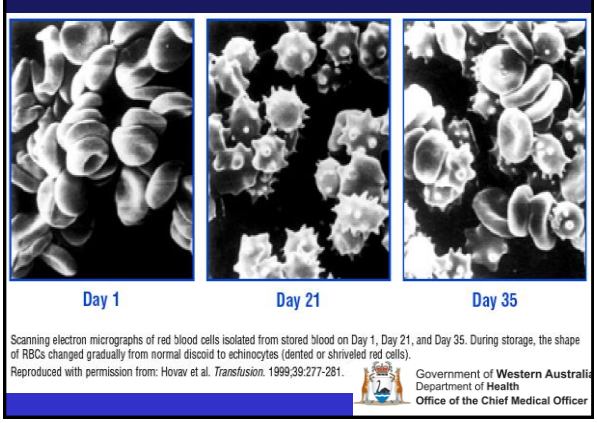
Why not transfuse?

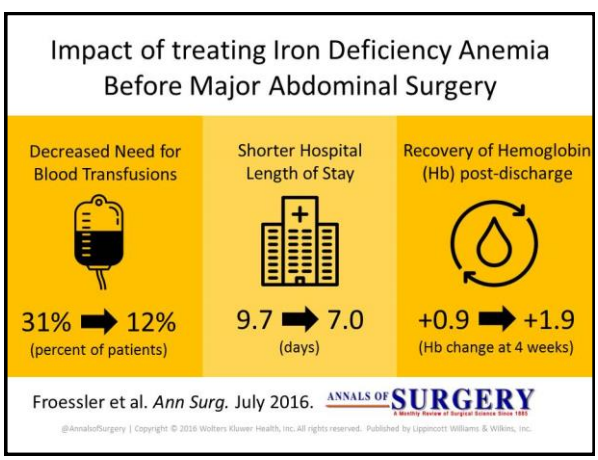
Efficacy: storage lesion

Adverse Outcomes: Transfusion reaction, post op morbidity (X 1.4) , Infection, LOS, Earlier cancer recurrence

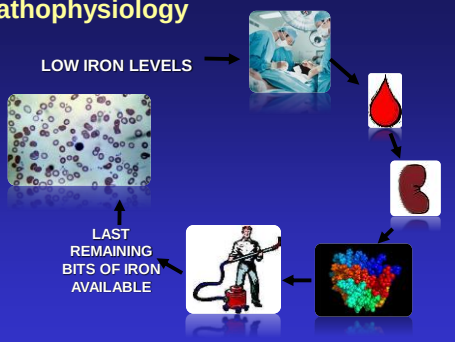
Scarcity: donor population **v DEMAND**

Cost ~ $350 per unit RBC and rising annually

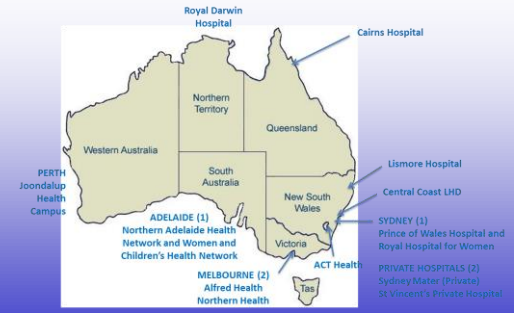




Pathophysiology



National PBM Collaborative Sites



AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

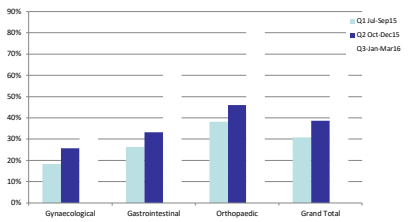
National Patient Blood Management Collaborative

Number of patients who received transfusions, by month – May 2015 to March 2016

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

National Patient Blood Management Collaborative

Percentage of patients with iron deficiency who were assessed by surgical stream by quarter



AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

National Patient Blood Management Collaborative

Treatment algorithm: Fit for Surgery

Resources

- PBM Guidelines (National Blood Authority):
- https://www.blood.gov.au/pbm-guidelines
- Patient information (NPS Medicinewise):
- http://www.nps.org.au/topics/surgery