

# **Pre – operative anaemia clinic**

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**Consultant in Anaesthesia**



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# 'Bleeding, Clotting and Haemorrhage – an update' – 11 years....., still bleeding!

08<sup>th</sup> December 2016  
[www.aagbi.org](http://www.aagbi.org)



# Anaemia Clinic

- **Why?**
- **When?**
- **How?**
- **Where?**
- **Who?**
- **What?**



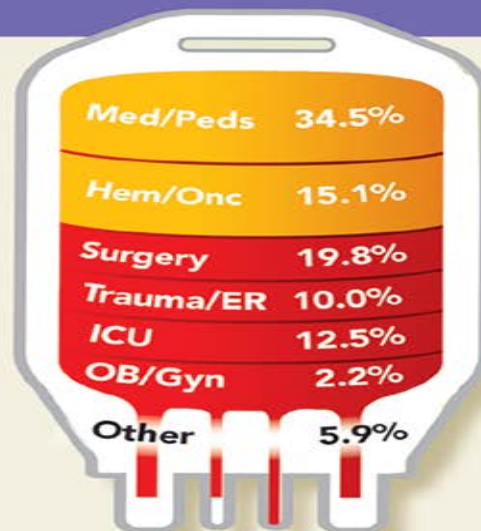
## Perioperative Transfusion: A Complicated Story

*Juan P Cata, January 2015*

Each year approximately **21 million** blood components are transfused in the United States.\*

### TACO

Transfusion-associated circulatory overload has been reported at 1 in 13,843\* but perioperatively may affect **1 in 33**.<sup>1</sup>



Anesthesiologists may be involved in up to **50%** of decisions to transfuse.\*

### TRALI

Similarly, while reported at 1 in 63,940,\* transfusion-associated lung injury in the postop period may affect **1 in 71**.<sup>2</sup>

## Major Complications

Despite the higher incidence recently reported, a **restrictive transfusion** approach had nearly **2x** as many **serious complications** for major cancer surgery.<sup>3</sup>

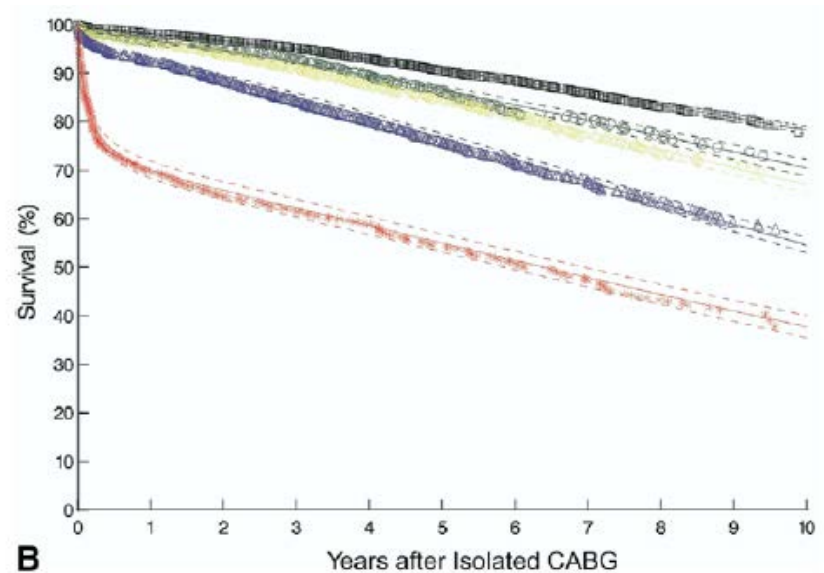
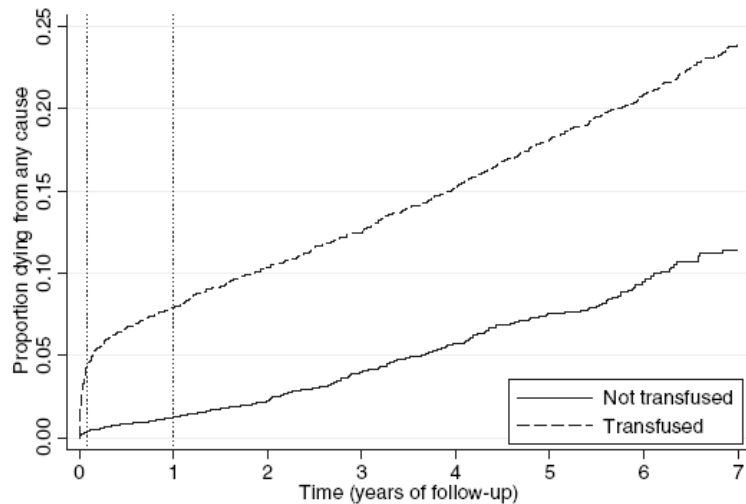


# Anaemia and Surgery

- Morbidity and mortality
- Enhanced recovery – correct pre operative anaemia
- Patient blood management
- IDA is common
- High prevalence

# Blood transfusion - An independent risk factor for mortality

Koch CG et al, Ann Thorac Surg  
2006;81:1650-7

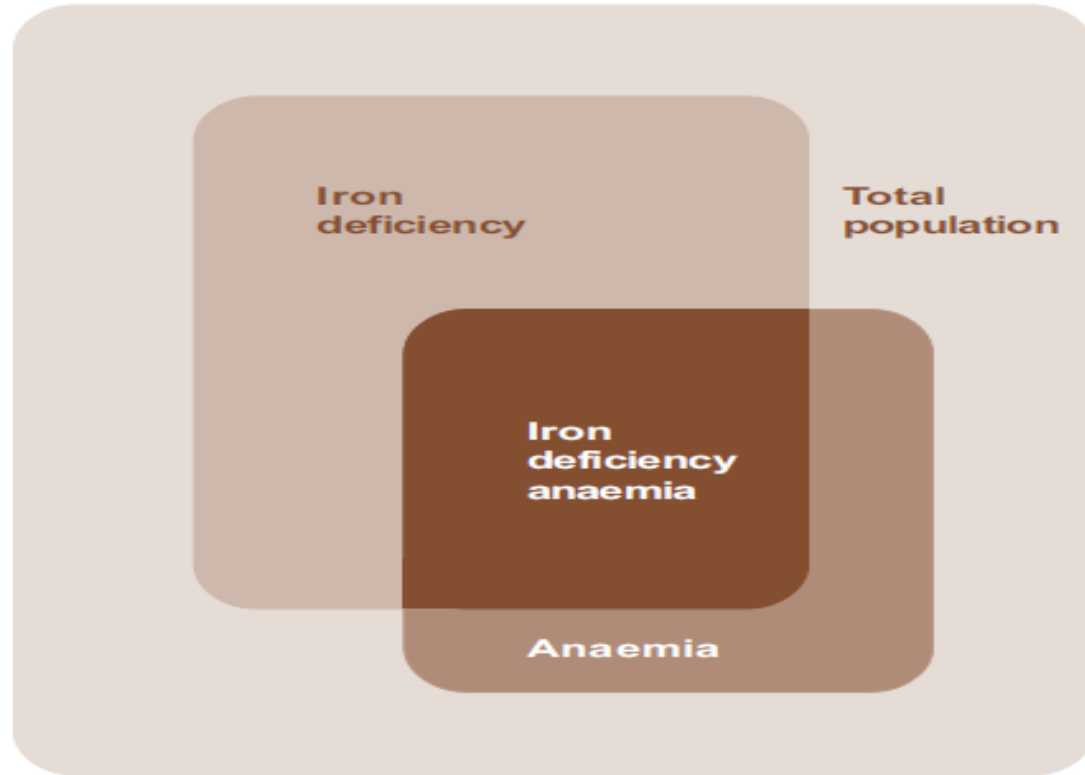


Murphy et al Circulation 2007;116:2544-2552



# Iron deficiency anaemia – WHO statement

*Figure 1. Conceptual diagram of the relationship between iron deficiency and anaemia in a hypothetical population*



*Source: Adapted from Yip R. Iron nutritional status defined. In: Filer IJ, ed. Dietary Iron: birth to two years. New York, Raven Press, 1989:19-36.*

**Worldwide prevalence of anaemia 1993–2005 : WHO global database on anaemia / Edited by Bruno de Benoist, Erin McLean, Ines Egli and Mary Cogswell**

# Background

- Tertiary referral oncological hospital
- Major cancer surgery
  - Upper/lower GI
  - Hepatobiliary
  - Gynaecology/Urology
  - Sarcoma resection

**Prevalence of perioperative anaemia**

- 5 - 75%

**Shander A et al. Prevalence and outcomes of anaemia in surgery:  
a systematic review of the literature. *Am J Med.* 2004; 116: 58S-69S**

# **Total dose iron infusion for iron deficiency anaemia in major cancer surgery – a service evaluation**

**Dr Ed Todman**

**Dr Ravishankar Rao Baikady**

**Mr Satvinder Mudan**



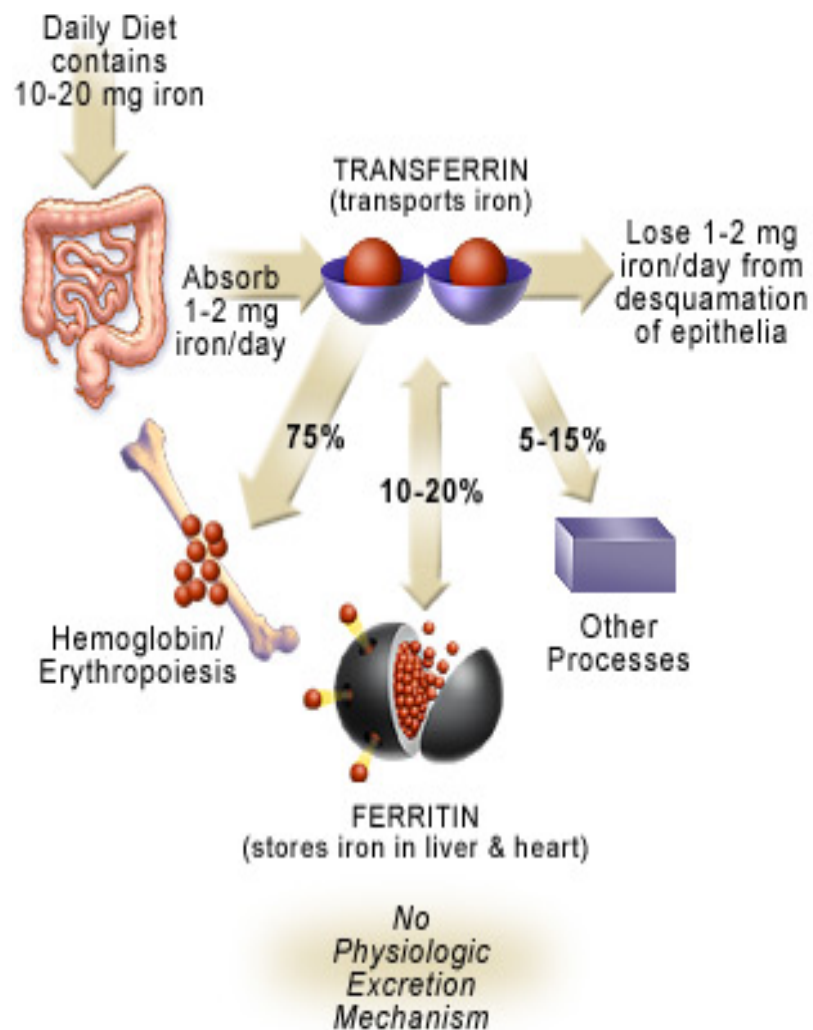
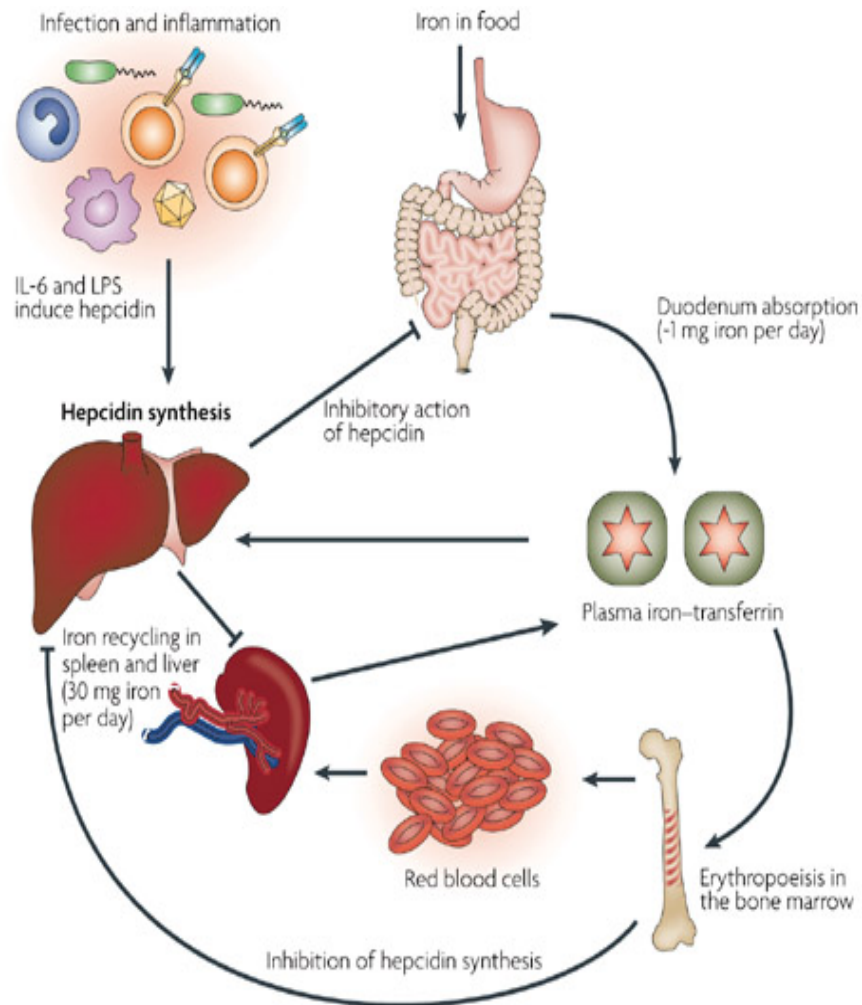
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# Anaemia in cancer surgery

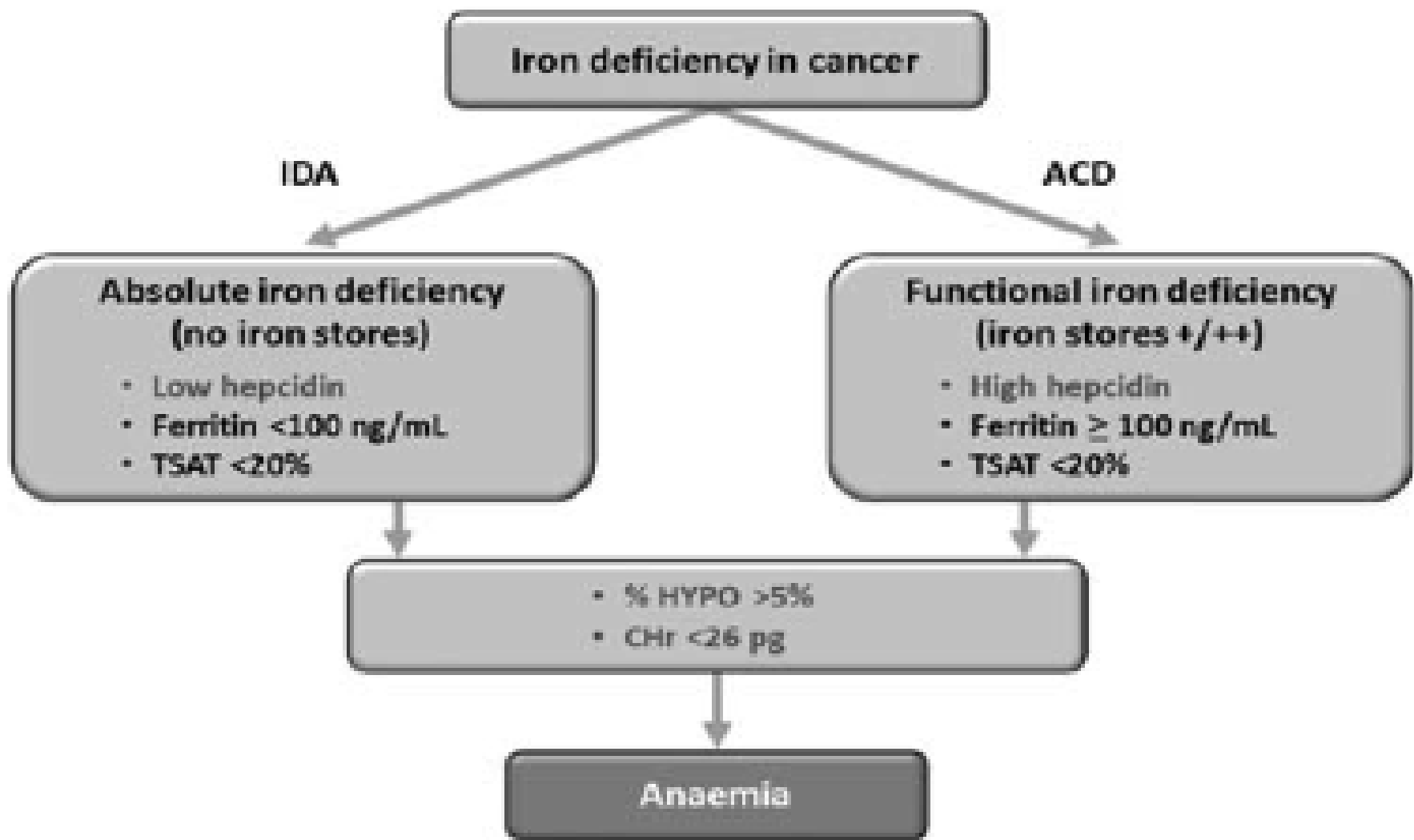
- **Iron deficiency anaemia**
  - True vs. functional
  - Acute or chronic blood loss
- **Other causes - vitamin deficiency / poor nutrition**
- **Anaemia of chronic disease**
- **EPO – limited role**
- **Why a service evaluation?**
  - Anaemia management strategy
  - Transfusion and poor surgical outcome



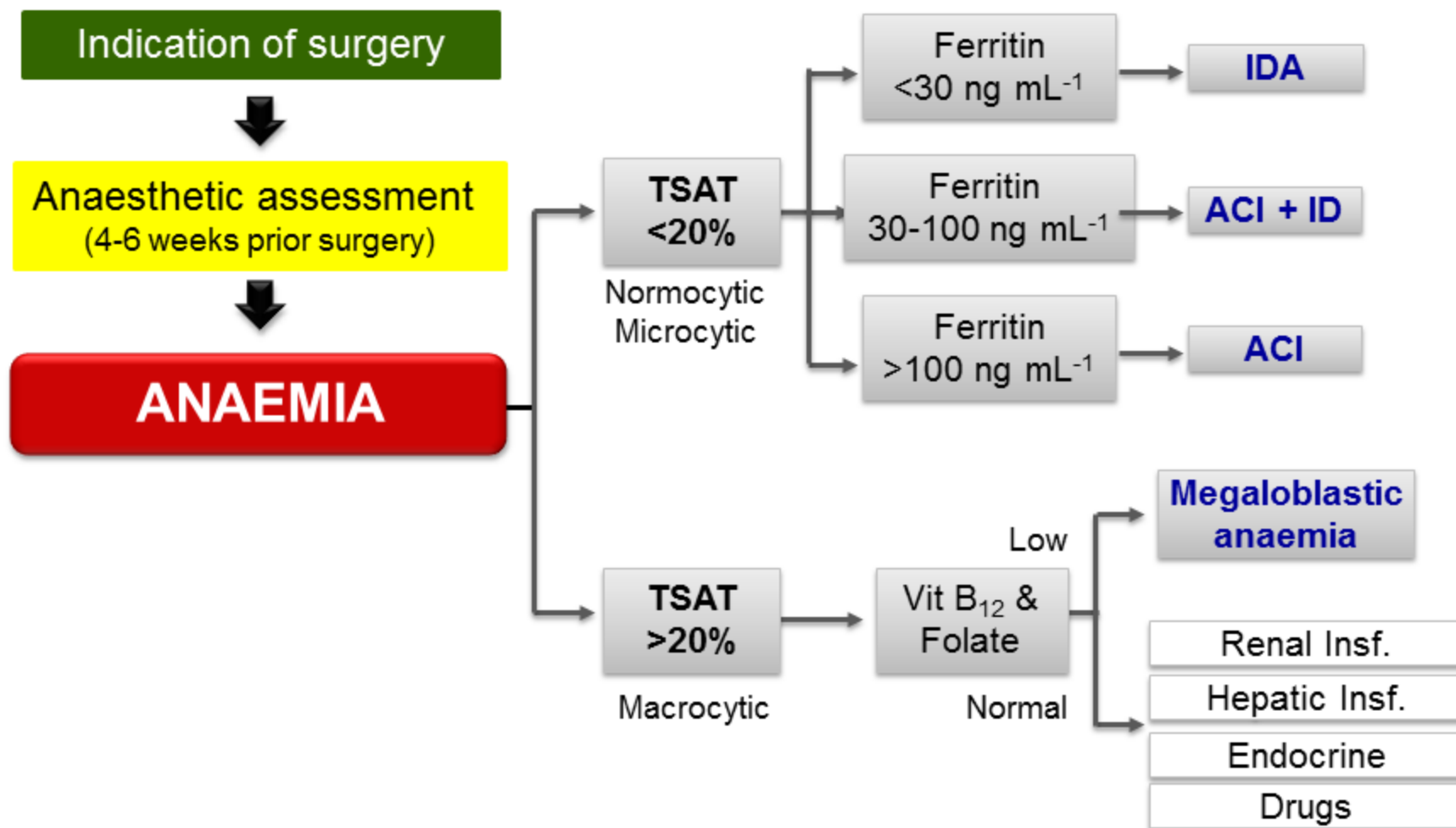
# Iron metabolism



# IDA - definition



Muñoz M, et al. 'FIT TO FLY' overcoming the barriers to preoperative haemoglobin optimization in surgical patients. *BrJ Anaesth.* (2015) 115 (1): 15-24.



# Why intravenous Iron therapy?

- Oral iron – cheap but limitations of treatment effectiveness
- New IV preparations are safe, cost effective
- Single total dose infusion
- Pre operative anaemia – can have an effect in 2-4 weeks



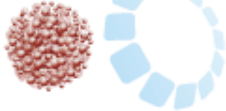
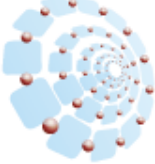
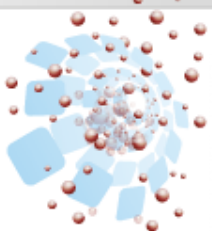
Pharmacosmos and Vifor pharma



**Quick**

**MonoFer<sup>®</sup>**  
iron isomaltoside 1000



ironMatrix		
		
<b>Components</b>	<b>Delivery System</b>	<b>Release</b>
Iron(III) <sup>1</sup> Isomaltoside 1000 with low immunological activity <sup>2,3</sup>	Strongly bound iron <sup>1</sup> Little risk of free iron <sup>1</sup>	<ul style="list-style-type: none"> <li>► High dose infusion<sup>1</sup></li> <li>► No test dose<sup>1</sup></li> <li>► Controlled release<sup>1</sup></li> </ul>

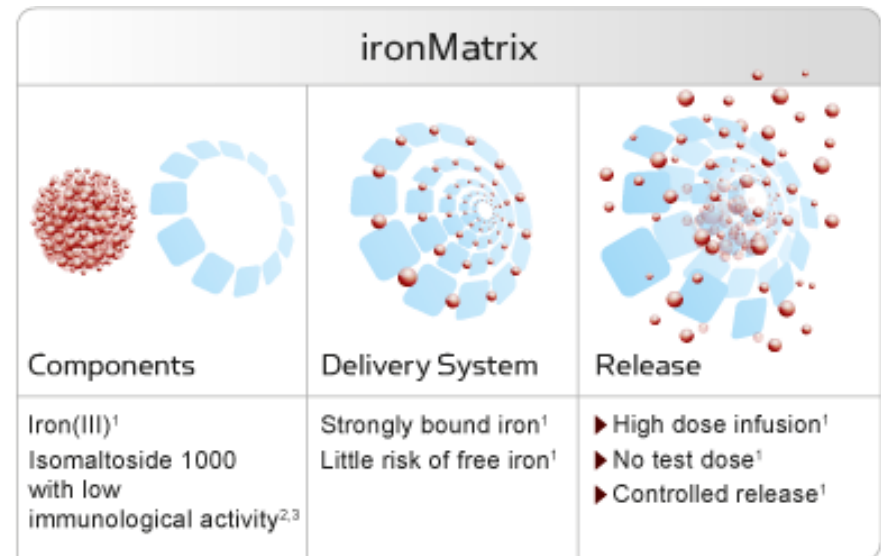


**SAFE**



# Monofer – Iron Isomaltoside

- Iron matrix molecules – controlled release
- Single total dose infusion – 20 mg/kg/body wt
  - Allows for total dose infusion
- Licensed in UK/Europe
- Good safety profile, no test dose required
- Infusion over one hour



# Aim

- To assess the effectiveness of single dose iron infusion (iron isomaltoside – Monofer<sup>R</sup>) for iron deficiency anaemia in major cancer surgery
- To obtain pharmacy approval to get intravenous iron onto the hospital formulary

# Methods

- Local audit committee approval
- A prospective audit of 45 major cancer surgery for perioperative anaemia;
  - defined as Haemoglobin (Hb) <10.0 g/L.
  - diagnosis of IDA was made with serum transferrin saturation (<20%), ferritin & serum iron.
- A single total dose iron infusion - either 2-6 weeks before surgery, or postoperatively.
- Monitoring of Hb levels for up to 8 weeks after infusion
  - or up to next blood transfusion, whichever was earlier.

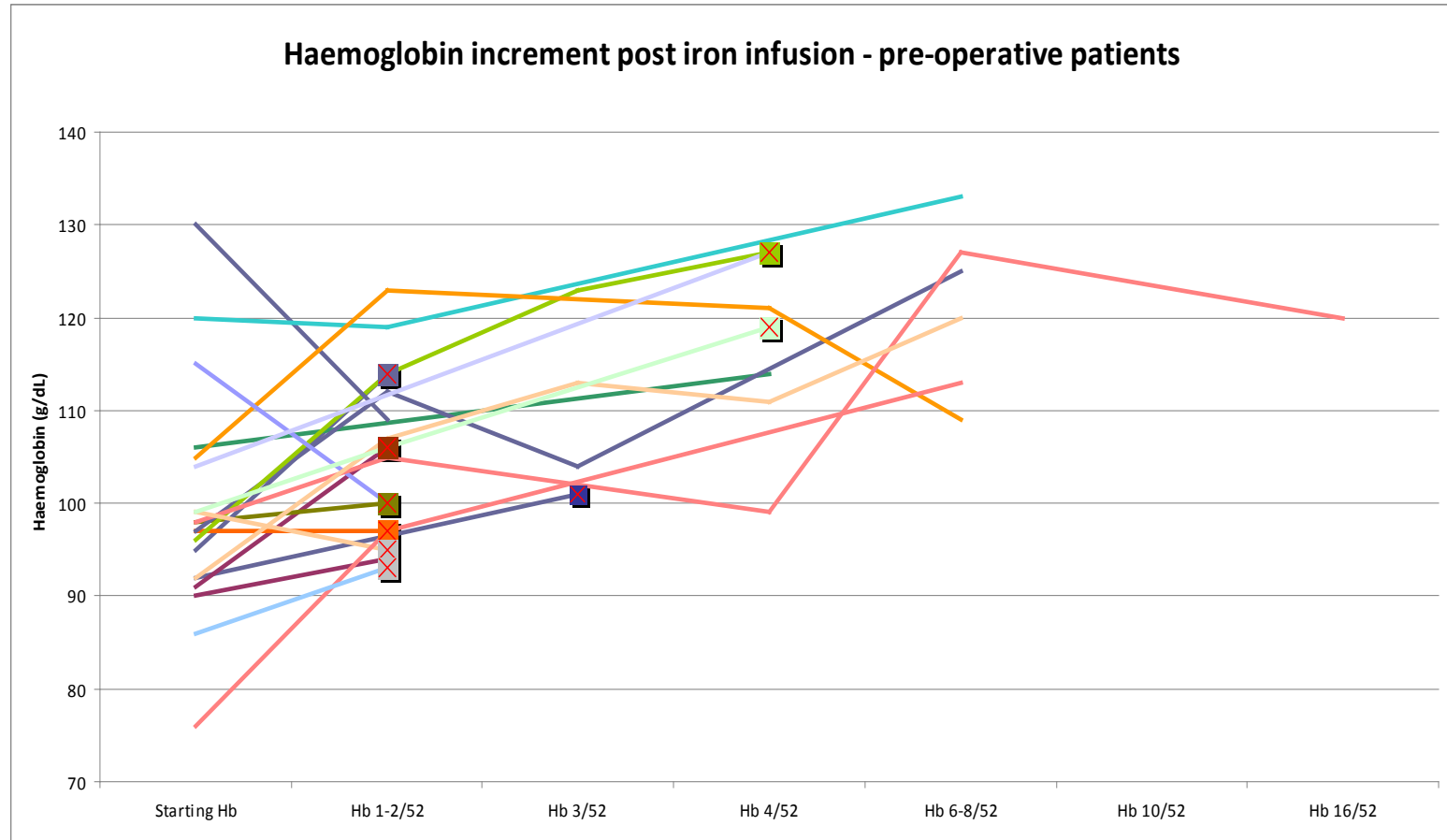


# Results

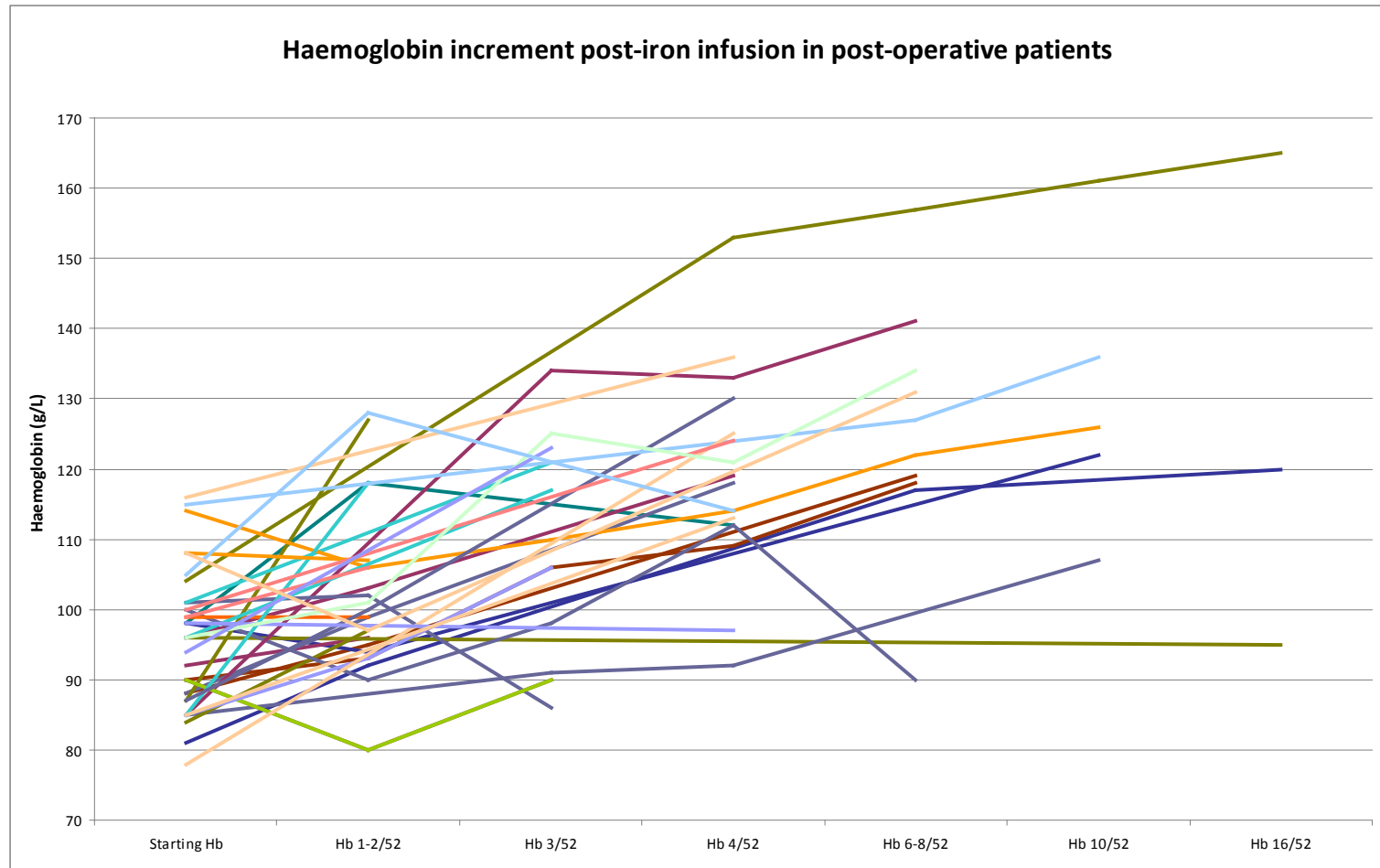
Table to show changes in haemoglobin after iron infusion

	Initial Hb	Hb 1-2 weeks	Hb 3 weeks	Hb 4 weeks	Hb 6-8 weeks
Number of patients	31	24	12	10	12
Mean Hb	9.3	10.1	10.6	11.5	11.9
Mean rise in Hb		0.84	<u>1.2</u>	1.94	2.53
Median Hb	<u>9.5</u>	9.8	10.5	11.3	11.8
Interquartile range	8.8-9.8	9.4-10.7	9.8-11.2	11-11.9	11-12.4

# IDA management in RMH



# IDA management in RMH



# Iron infusion - safety

- Three acute reactions in 50 infusions
- All three experienced body ache
- Two with acute shortness of breath
- All reactions self limiting
- All infusions stopped and responded to treatment
- One infusion continued after 5 minutes without any further symptoms



# Conclusions

- Total dose iron infusion is safe and effective in the management of IDA in cancer surgery.
- Peak Hb rise is 4-6 weeks after iron infusion.
- Simple treatment intervention may significantly reduce transfusion requirement in cancer surgery and improve outcome after surgery.
- Anaemia management guidelines have been incorporated in to the enhanced recovery programme and perioperative anaemia pathway at our institution.

## Management of iron deficiency anaemia in cancer surgery

Anaemia means 'lack of blood' and is common in cancer surgery patients due to disease and treatment related causes. It is associated with an increased blood transfusion requirement, delayed wound healing and prolonged recovery. Preoperative diagnosis and treatment of anaemia can significantly influence surgical outcomes.

### Diagnosis of anaemia

Anaemia is diagnosed after checking full blood count (FBC). This blood test must be done prior to all major surgery.

World Health Organisation thresholds for definition of anaemia:

Male	< 13.0 g/dL
Female	< 12.0 g/dL

Anaemia may result from a variety of factors. Interpretation of simple blood tests can define the cause of anaemia. Iron deficiency is one of the most common causes.

### Diagnosis of iron deficiency anaemia (IDA)

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↑ Clinical Assessment Unit

Admissions & Pre-Assessment Unit Reception →

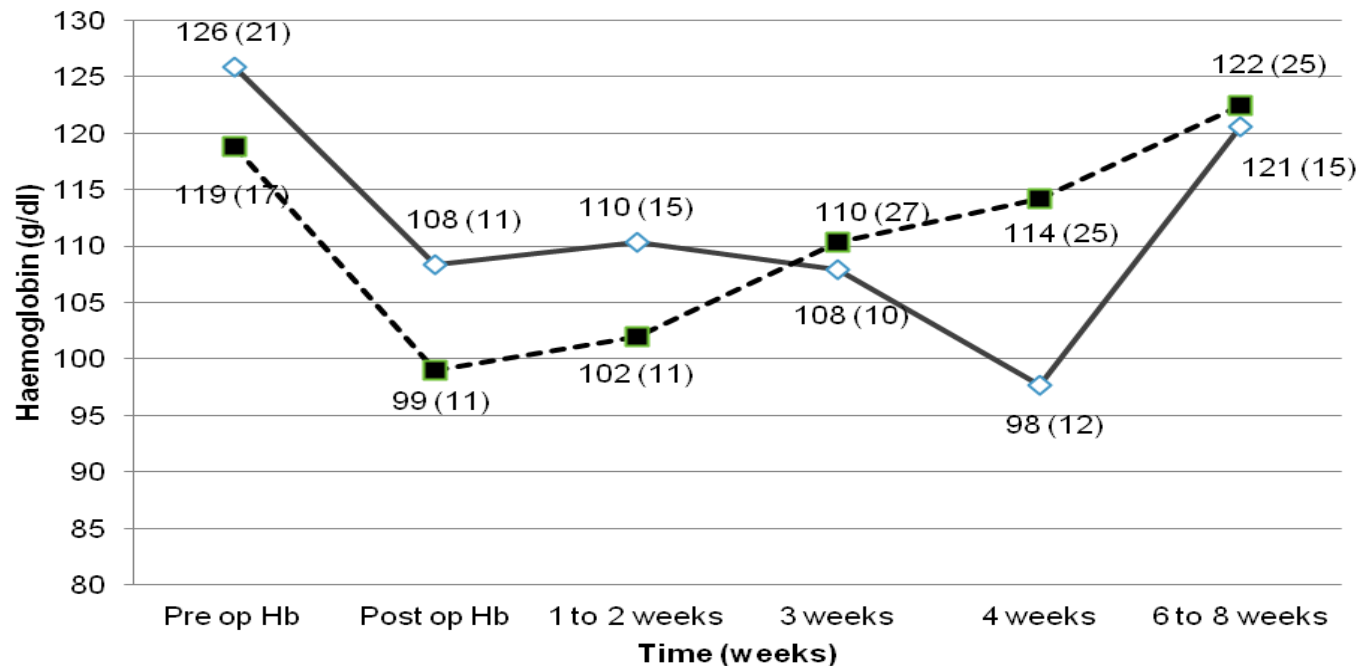




# Iron infusion



CPET

# Post operative IV Iron after major cancer surgery - RMH

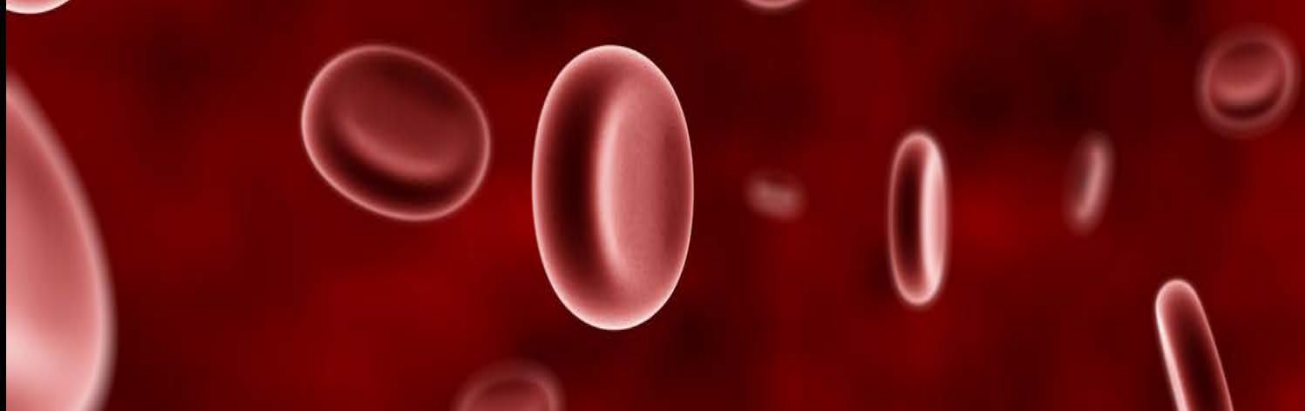


Mean haemoglobin concentration at different time intervals for control group - 45- () and post operative Iron treatment group-50- ()

# **PREoperative intraVENous iron To Treat anaemia in major surgery (PREVENTT)**

- Phase III, multicenter double blind randomised trial
- Ferric carboxymaltose(Ferrinject)1000mg vs placebo – pre op
- Major abdominal surgery, 500 patients over 3 years
- Inclusion- Hb 9.0-12.0g/L
- Primary end point – risk of blood transfusion/death in 30 days post surgery and blood transfusion rate up to 30 days





## Patient Blood Management



- Mr Toby Richards
- Vascular & Endovascular Surgeon
- Senior Lecturer in Surgery
- University College London



# PREVENTT

Preoperative intravenous iron to treat  
anaemia in major surgery

# PREVENTT

**Preoperative intravenous iron to treat  
anaemia in major surgery**

**Congratulations!**

This month, a big congratulations goes to Ravi Raobaikady, Ethel Black, Sham Jhanji and all the team at the Royal Marsden who recruited their 50th patient. This is a great achievement and all your hard work and support for the trial is appreciated. The PREVENTT team hope you enjoyed your celebratory cake!



*Left Dr. Maria Koutra, Dr. Helen Lawrence, Ethel Black and Dr Ravi Raobaikady*



*Above: Dr. Shaman Jhanji, Dr. Nathan Kasivisvanathan, Ethel Black and Dr. Katrina Pirie*

**PREVENTT Patient Payments**

**PREVENTT Raffle Winner**

# Iron infusion - issues

- Dose of Iron infusion
- Infusion setting – MDU, CAU, ward, theatre
- Communication – surgeon, pre assessment, MDU, pharmacy, nurses, junior doctors
- Acute reaction and management
- Education

# Iron infusion - limitations

- All anaemia are not IDA
- Timing of treatment
- True vs functional IDA
- Acute reaction may occur in all preparations?
- Response - poor in infection/inflammation
- Awareness of anaemia management

# Iron infusion in surgery

- Understanding anaemia
- Pre operative or postoperative
- IDA management strategy
- Research/audit
- Cost effectiveness
- Communication

# Iron infusion service at RMH

- Mobile clinic
- Pre and/or post operative
- Total dose iron infusion – single visit
- Treat Iron deficiency
- Clinician or nurse lead clinic
- Audit
- Coding for payment



# Implementing a Pre-Operative Anaemia Service

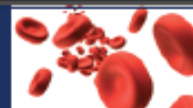
## Preliminary Evaluation and Lessons Learned

Deborah Sumner,  
Charles Baker,  
Jana Graham

University Hospitals of  
North Midlands, Royal  
Stoke University  
Hospital, UK







# Preoperative anaemia is associated with increased allogeneic pack red cell transfusion in revision hip and knee joint arthroplasty: a retrospective analysis of 5387 patients over a 10-year period at a single high volume centre

R. Kasivisvanathan,<sup>1,2</sup> V. Ramesh,<sup>2</sup> R. Rao Balkady<sup>1</sup> & S. Nadaraja<sup>2</sup>

<sup>1</sup>The Royal Marsden NHS Foundation Trust, London, UK, and <sup>2</sup>The Royal National Orthopaedic Hospital, Stanmore, Middlesex, UK

Received 9 August 2015; accepted for publication 3 May 2016

## SUMMARY

**Objectives:** To estimate the prevalence of preoperative World Health Organisation (WHO) defined anaemia in patients presenting for revision hip and knee arthroplasty and its association with transfusion of allogeneic packed red blood cells (PRBC).

**Background:** Studies have mainly investigated the prevalence of preoperative anaemia in primary and not revision hip and knee joint arthroplasty.

**Method:** An analysis of a prospectively collected patient data for 5387 patients having revision hip or knee arthroplasty over a 10-year period at a single high volume centre was conducted. Logistic regression was used to assess whether the presence of

the commonest major surgeries conducted nationally each year (National Joint Registry, 2013). Orthopaedic surgical patients, especially joint arthroplasty, are reported to account for a significant proportion of the inpatient allogeneic packed red blood cells (PRBC) transfusion (Stanworth *et al.*, 2002; Ponnusamy *et al.*, 2014). Transfusion of blood products have a number of well-described deleterious effects as well as being costly (Engoren *et al.*, 2008; Bernard *et al.*, 2009; Shander *et al.*, 2010; Isbister *et al.*, 2011).

One of the key areas in patient blood management is the reduction in transfusion of allogeneic blood products through the identification and treatment of preoperative anaemia (Spahn *et al.*, 2012). Studies have consistently shown preop-

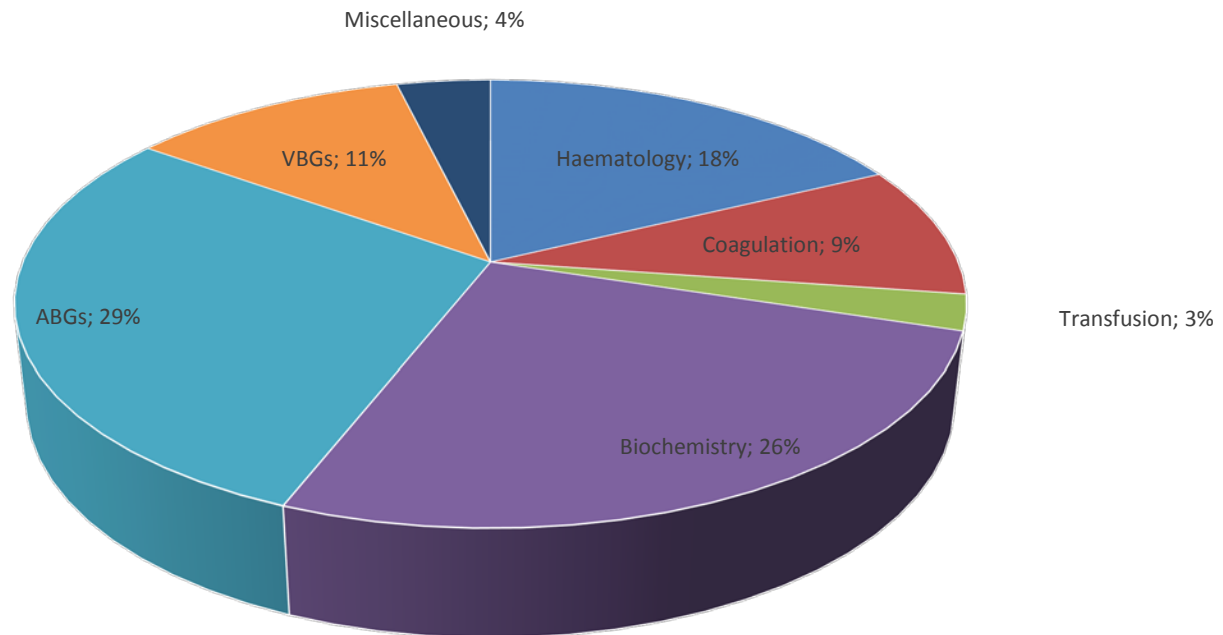
**Conclusion -**Pre operative anaemia is independently associated with peri-operative blood transfusion

# PBM - new concepts



# Impact of diagnostic venesection on perioperative haemoglobin levels in patients undergoing major cancer surgery

Bhatia RK, Ferrin S and Raobaikady R (to be published)



**Mean amount of blood sampled was 341ml/patient**

# Treating Iron Deficiency..

The Iron Clinic specialises in the provision of intravenous iron infusions; there are several options for the treatment of iron deficiency including diet and tablets. Our highly trained staff are experts in giving intravenous iron infusions, providing the necessary medical treatment in private comfortable surroundings.

Worldwide, intravenous iron is common practice with over 30,000 injections <sup>L</sup> every month in Australia, for example. It is very effective in women's health to rapidly correct <sup>L</sup> iron deficiency and anaemia with proven benefits include, vitality, increase quality of life, benefit hair growth, and also improve exercise ability. Intravenous iron is also beneficial in many illnesses associated with iron deficiency and anaemia, such as; heart disease, cancer therapy and patients undergoing operations.

Restless  
Leg

Sho  
of B

## Book an appointment..

Our staff are available and happy to answer your every question.

To book an appointment or an assessment:

020 3875 8171  
[info@theironclinic.co](mailto:info@theironclinic.co).



I felt tired, faint and had suffered hair loss. Prof. Richards recommended an intravenous iron infusion which resulted <sup>L</sup> in an improvement in both my energy levels and symptoms within the same week.

I did the 5km park run in 24:42 minutes this morning –

# Acknowledgement

**PHARMACOSMOS**







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 Peter Mac

The Royal Marsden Conference Team

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