

Pre-operative iron optimisation & management of anaemia

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Why?

Reason for surgical blood conservation

Primary aim to reduce the need for red blood cell transfusion, in those patients where transfusion can be avoided, through the use of other treatment/interventions modalities and interventions

Blood Matters: doing nothing is not an option

Sir Bruce Keogh, *NHS Medical Director*

Patient Blood Management – The Future of Blood Transfusion

*A joint initiative with The Department of Health
and The National Blood Transfusion
Committee*

Sustainability of the blood supply

While the demand for red cells is stable, the demand for platelets increased by 8% in the last year. The recent increase in the use of platelets is projected to continue due to a number of factors such as medical advances and an aging population. Only 4% of the eligible population give blood, and new donors are always needed to replace regular donors who can no longer donate.

What is being done?

A panel of experts and influencers in the field are being invited to consider international best practice and what can be done to ensure a Patient Blood Management approach is adopted across England and North Wales

Killed by a needless blood transfusion!!!

www.telegraph.co.uk/health

- Deryck Kenny – First person in the world, recorded as dying of vCJD in 2003
- Sir Bruce Keogh, NHS Medical Director – one in five blood transfusions “unnecessary”
- Prof Mike Murphy – Most blood transfusions are non-urgent, used routinely to ‘top up’ patients about to undergo planned surgery.
- Dr Paula Bolton-Maggs, medical director of SHOT – “inappropriate” transfusions are due to errors made in measuring Hb levels.

Low iron levels, which cause low Hb levels, are a common reason for blood transfusions?

All patients preparing for elective surgery should have their blood tested beforehand, so that any iron deficiency can be identified and treated.

Pre op Anaemia – The Risks?

- Independent risk factor for allogenic blood transfusion
- Increased perioperative morbidity and mortality
- Increased length of stay
- Increased risk of infections

Why do we Optimise?

The planned surgical intervention is often ephemeral, with the intended surgery dealing with the presenting problem. Therefore anything that we can employ to support the patient through this major surgical insult, is beneficial to both the patient and provider.

Employing a patient centred, evidence gathering approach, allows information to be collated following intervention, utilizing the knowledge to further enhance our understanding and treatment plans.

Enhanced Recovery After Surgery

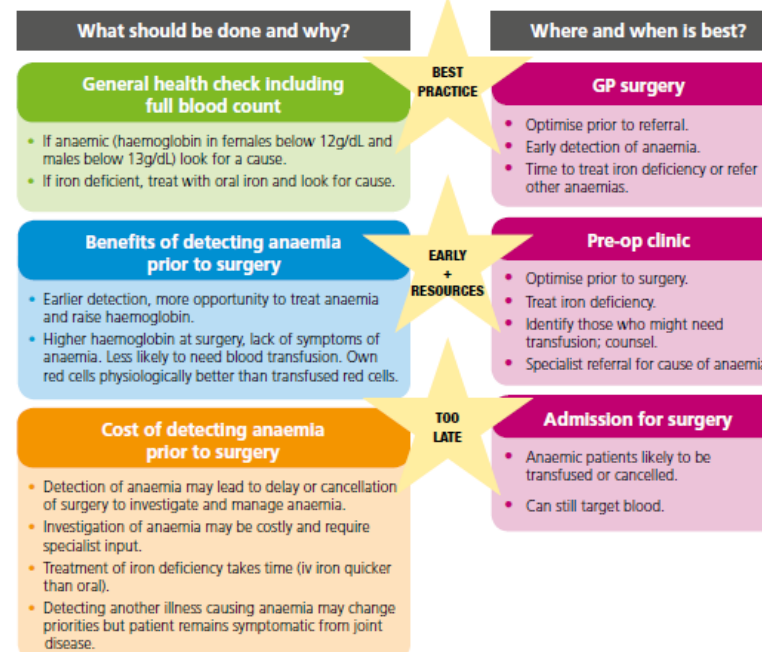


**Enhanced Recovery
Partnership Programme**

Delivering enhanced recovery

Helping patients
to get better sooner
after surgery

Optimising patients with anaemia prior to surgery



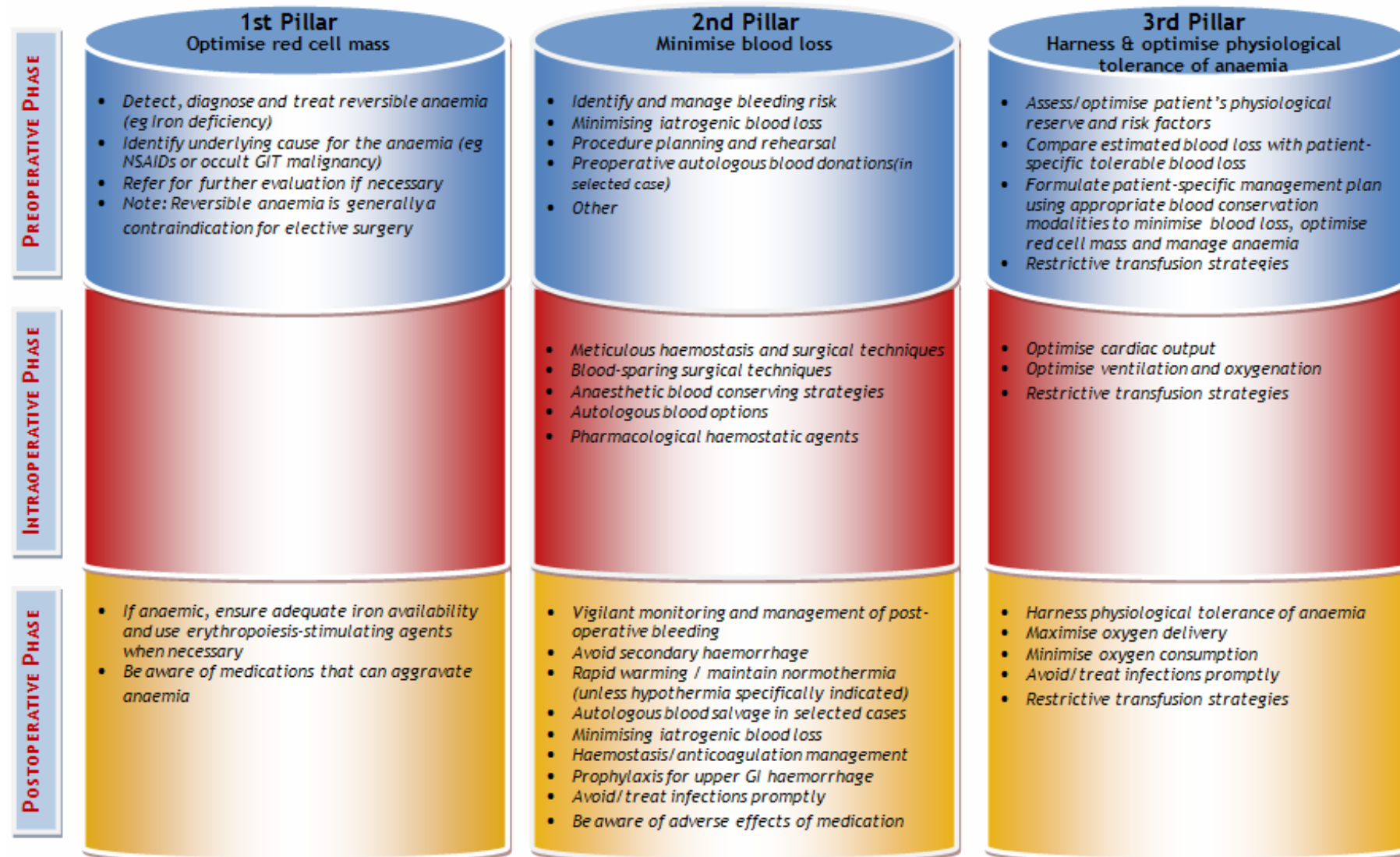
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First published 31 March 2010

Published to DH website, in electronic PDF format only

www.dh.gov.uk/publications

The Three Pillars of Multidisciplinary Multimodal Patient Blood Management



Royal Cornwall Hospital Trust

- Serves a population of approx 450,000

Surgical specialties include

General surgery

Orthopaedics

Vascular

Trauma

Urology

Gynaecology

Cancer Surgery

Blood Conservation Service Pledge Royal Cornwall Hospital

The Royal Cornwall Hospital employs and supports a patient blood management programme.

Background

Since 2003 Blood Conservation strategies have been implemented within the Royal Cornwall Hospital to support the reduction of allogeneic (donor) blood transfusion peri-operatively. Initially focussed on conserving blood during orthopaedic surgery, the service has since expanded to include all surgical specialities, and evolved into a Patient Blood Management Programme.

The current blood management programme aims to reduce the consumption of allogeneic blood in the surgical setting, in the following ways

1. Optimise patients' Hb (blood count) levels before surgery.
2. Use appropriate cell salvage techniques to collect patients' own blood for re-infusion peri-operatively.
3. Implement a comprehensive blood conservation, competency based training program for all staff involved in cell salvage and blood conservation.
4. When indicated, support the use of blood transfusions, ensuring that updated and current practice is employed and patient consent is sought whenever possible.
5. Educate staff to always consider the use of alternatives to blood transfusion when appropriate.
6. Monitor the use of cell salvage, audit interventions, collect and disseminate data relating to blood conservation.
7. Undertake research and publish outcomes in relevant areas of blood conservation

Patient Blood Management

- Patient blood management (PBM) views a patient's own blood as a valuable and unique natural resource that should be conserved and managed appropriately.
- PBM is a multidisciplinary, multimodal, evidence based, patient centred approach to optimising, conserving and managing the patient's own blood.
- PBM puts the patient at the centre of decisions made about transfusion

Challenges when introducing PBM?

MUST SHOW

Reduction in Tx?
Decreased length of stay?
Financially viable?

Pre Operative Assessment

Surgical groups treated pre op?

- So who do we believe are at risk of transfusion and who do we treat?

Patients undergoing

Major joint surgery – THR, TKR etc

GI surgical – Colectomy etc

Gynaecology – Hysterectomy etc

Major urology – Nephrectomy, TURP

Major vascular

Trauma – peri / post op

- * We also treat where appropriate patients with significant low Hb's, as we believe that these patients while not a risk via surgically may be at risk to tx post operatively.*

Are there patients we don't treat?

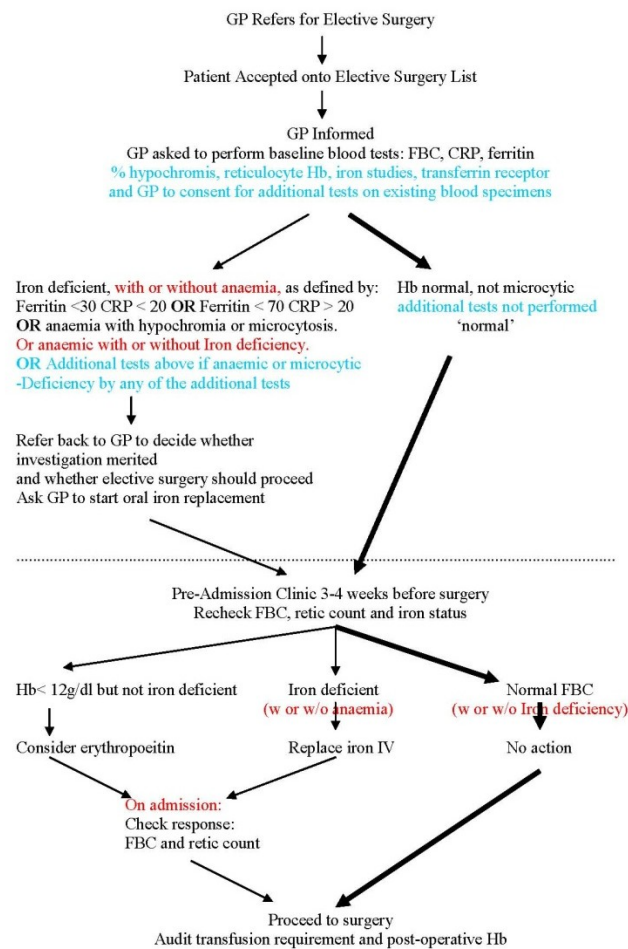
YES

- Patients where it is not appropriate – border line anaemias, where we deem the risk of transfusion low
 - Patients who are allergic to Iron
- Patients who's co morbidities may put them at risk to significant ADR
 - Patients who will not respond to intervention
- Where surgery dates don't allow for a timely response
- Patients who have had significant drops in Hb over a short period of time.

Referral Algorithm

Pre-operative Assessment and Haemoglobin Optimisation for Elective Surgery
Early Identification and Management of Iron Deficiency
and Erythropoietin Use to Improve Haemoglobin in Non-Iron Deficient Anaemic Patients

Patient Care Pathway



Patient pathway for treatment of anaemia

- Pre assessment normally 2-4 weeks before surgery
- Blood results normally checked within two days
- Patients flagged up by Pre assessment nurses
- Blood Conservation contacted –
 - Email
 - Telephone
 - In person
 - Netpage

IV Iron Special Warnings and Precautions for use

- Parenterally administered iron preparations can cause hypersensitivity reactions including anaphylactoid reactions, which may be potentially fatal. Therefore, facilities for cardio-pulmonary resuscitation must be available.
- In patients with liver dysfunction, parenteral iron should only be administered after careful risk/benefit assessment.
- Parenteral iron must be used with caution in case of acute or chronic infection, asthma, eczema or atopic allergies. It is recommended that the administration of Ferinject is stopped in patients with ongoing bacteraemia.

[http://www.medicines.org.uk/EMC/medicine/24167/SPC/Ferinject+\(ferric+carboxymaltose\)/](http://www.medicines.org.uk/EMC/medicine/24167/SPC/Ferinject+(ferric+carboxymaltose)/)

ADR's

Common ($\geq 1/100$, $< 1/10$)

Headache, dizziness Nausea, abdominal pain, constipation,
Diarrhoea, Rash, Injection Site Reactions

Uncommon ($\geq 1/1000$, $< 1/100$)

Hypersensitivity including anaphylactoid reactions,
hypotension, hypertension, flushing, dysgeusia, vomiting,
dyspepsia, flatulence, pruritus, urticaria, myalgia, back pain,
arthralgia, pyrexia, fatigue, chest pain, rigors, malaise, oedema
peripheral

Rare ($\geq 1/10000$, $< 1/1000$)

Dyspnoea

[http://www.medicines.org.uk/EMC/medicine/24167/SPC/Ferinject+\(ferric+carboxymaltose\)/](http://www.medicines.org.uk/EMC/medicine/24167/SPC/Ferinject+(ferric+carboxymaltose)/)

ADR's in Practice?

- Flushing / Feeling hot
- Dizziness / Lightheaded + (Nausea + Hypotension)
- Metal taste in mouth
- Rash – hours post iron
- Headaches – Normally 24hrs post iron
- Injection site reactions
- Hypersensitivity

Why IV Iron?

Oral Iron – Compliance low
side effects
timely
absorption rates

IV Iron – Compliance 100%
Timely

IV Pre op iron choice

Ferinject now the iron of
choice pre surgery

Ferinject- Black Triangle▼

400mg 600 mg 1000mg

+/-

Darbepoetin 300mcg

Follow up bloods – normally two
weeks following iron

Patient only has to *attend* once

Patient discharged
(letter to GP)

Intervention outcome – HRG 4

Pre operative Iron

- All Iron interventions are undertaken in the pre op assessment clinic
- Out patient setting
- Dedicated member of staff
- Iron given as slow IV infusion via Baxter pump
- One to one nursing

Peri op Iron

- Iron Sucrose (Venofer) iron of Choice
 - Iron given during surgery or immediately post operatively
 - Undertaken by anaesthetists or recovery nurses
 - Given as a slow IV bolus
 - Offered to patients who have normal Hb low ferritin
 - Follow up bloods in two weeks!
-
- Patients treated peri/post operatively = Approx 80 to date

Post Operative Iron

- Iron Sucrose (Venofer iron of choice)
- Given within 24 hrs post
- Given by Baxter IV pump
- Patients flagged up at Pre assessment
- Follow up results in two weeks
- Letters to GP

Follow up bloods

- Around two weeks
- Normally taken at GP's
- Maybe taken on admission (day of surgery)
- Require – FBC
 - Reticulocyte's
 - Ferritin (sometimes)
 - CRP
- Successful intervention?

Patients Referred through pre op optimisation program

2011 – 2012

491 patients referred through the service with 185
patients treated pre operatively

2011 – 2012 (October)

To date has seen 486 patients referred through the
service, with 133 patients treated pre operatively, 77
patients given iron post operatively, 183 patients have
had their bloods reviewed post operatively (over and
above the 77)

Patients treated pre op operatively

May 2011 – April 2012

185 patients treated pre operatively

No Major ADR's (to date)

Mild reactions – Flushing, Headache, Rash

April 2012 – (End) Oct 2012

133 patients treated pre operatively

(Predicated patients 228)

One Major ADR (to date)

Mild reactions – Flushing, Headache, Rash

Blood Conservation Budgets

- Budget for 2010 – 2011
£191,000
- Budget for 2011 – 2012
£216,000
- Budget for 2012 – 2013
£280,000

Optimisation Costs + Income

- HRG 4
- Coded – QZ14B (Tariff of £199)
- Predicted yearly costs - £31,000 approx
- Predicted yearly income - £44,000 approx
- Income generation - £12,500 approx

Predicted on 218 interventions

IRON monitoring OBS - Microsoft Access

File Home Create External Data Database Tools

Navigation Pane

Ref Details	Patient details	Required data	Our action	Outcome
Ref Date: 01-Oct-12	CR number:	Action suggested:	Actual F/U date:	Hb Gain:
Ref Lab Date:	Age:	F/U? Tick: <input type="checkbox"/>	Days to F/U:	
Reference kind:	Name:	Planned F/U date:	F/U Hb:	
Delivery mode:	JW? Tick: <input type="checkbox"/>	What Iron?:	F/U Reticulocyt:	
Bleed kind:	Medication? Tick for Yes: Oral Iron? <input type="checkbox"/> PPI? <input type="checkbox"/> NSAID? <input type="checkbox"/> A/B? <input type="checkbox"/>	Dose, mg:	F/U MCH:	
Planned del-date:	Allergy? Tick: <input type="checkbox"/>	Date 1st:	F/U Ferritin:	
Ref Hb:	GP:	Date 2nd:	Actual Del-date:	
Ref MCH:	Patient contact:	EP0? Tick: <input type="checkbox"/>	Adm Hb:	
Ref Ferritin:		ADR? Tick: <input type="checkbox"/>	Post op Hb:	
		What adverse reaction?:	Periop Units Tx:	
			Post Tx Hb:	
Comments: 				

Record: 2 of 2 No Filter Search

Microsoft Access - [Hb optim monitoring]

File Edit View Insert Format Records Tools Window Help

Type a question for help

MS Sans Serif 8 B I U

Ref Details	Patient details	Our action	Outcome
Ref Date: 06-Jul-12	CR number:	Action suggested:	Actual F/U date:
Ref Lab Date:	Age:	F/U? Tick: <input type="checkbox"/>	Days to F/U:
Refer source:	Gender:	Planned F/U date:	F/U Hb:
Specialty:	Name:	What Iron?:	F/U Reticulocyt:
Procedure:	JW? Tick: <input type="checkbox"/>	Dose, mg:	F/U MCH:
Planned op-date:	Medication? Tick for Yes: Oral Iron? <input type="checkbox"/> PPI? <input type="checkbox"/> NSAID? <input type="checkbox"/> A/B? <input type="checkbox"/>	Date 1st:	F/U Ferritin:
Surgeon:	Allergy? Tick: <input type="checkbox"/>	Date 2nd:	Actual Op-date:
Ref Hb:	GP:	Date 3rd:	Adm Hb:
Ref MCH:	Patient contact:	EPD? Tick: <input type="checkbox"/>	Post op Hb:
Ref Ferritin:		ADR? Tick: <input type="checkbox"/>	Periop Units Tx: 0
Ref CRP:		What op if other?	Post Tx Hb:
Comments:			

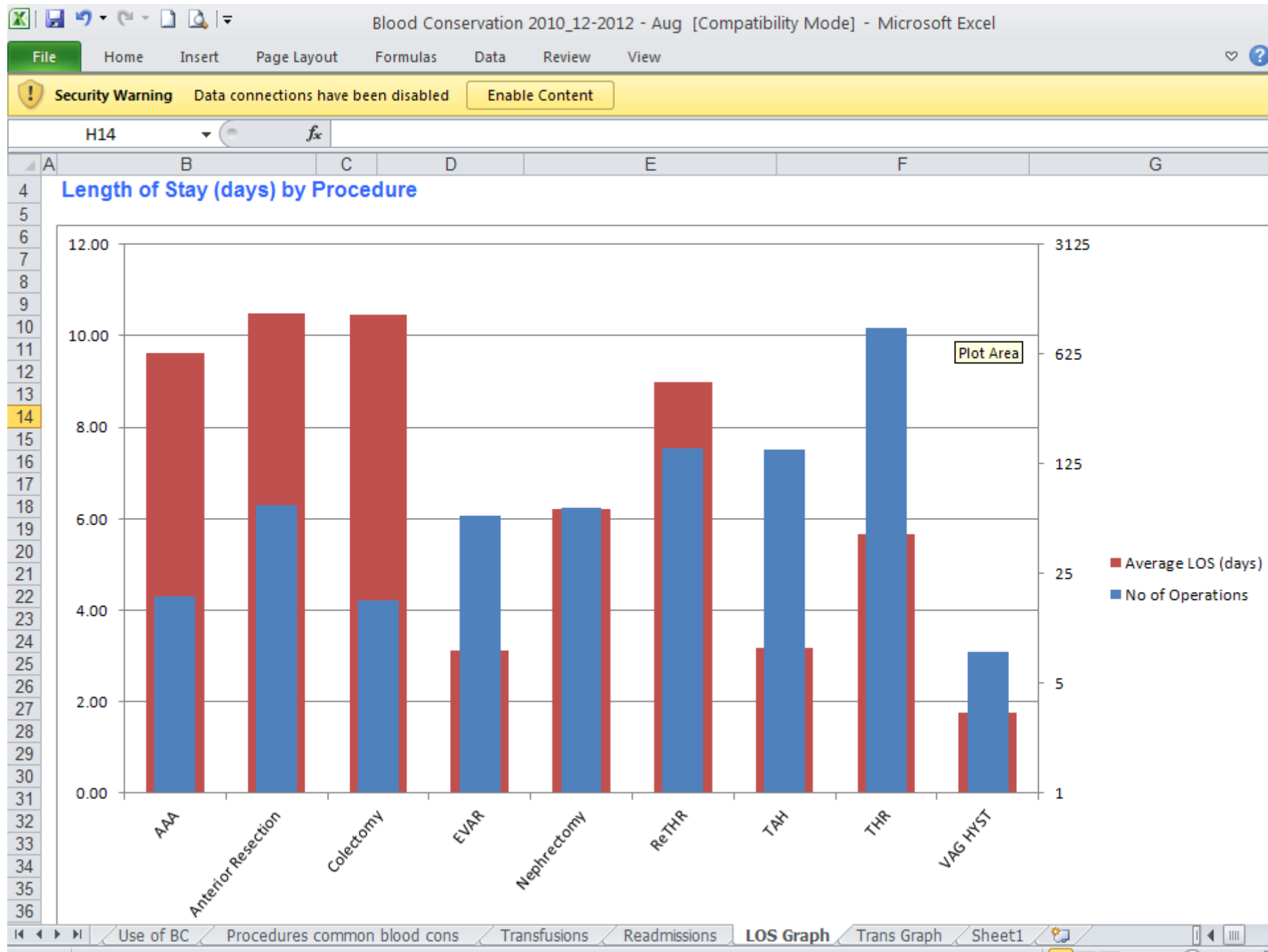
Hb Gain

Record: 691 of 691

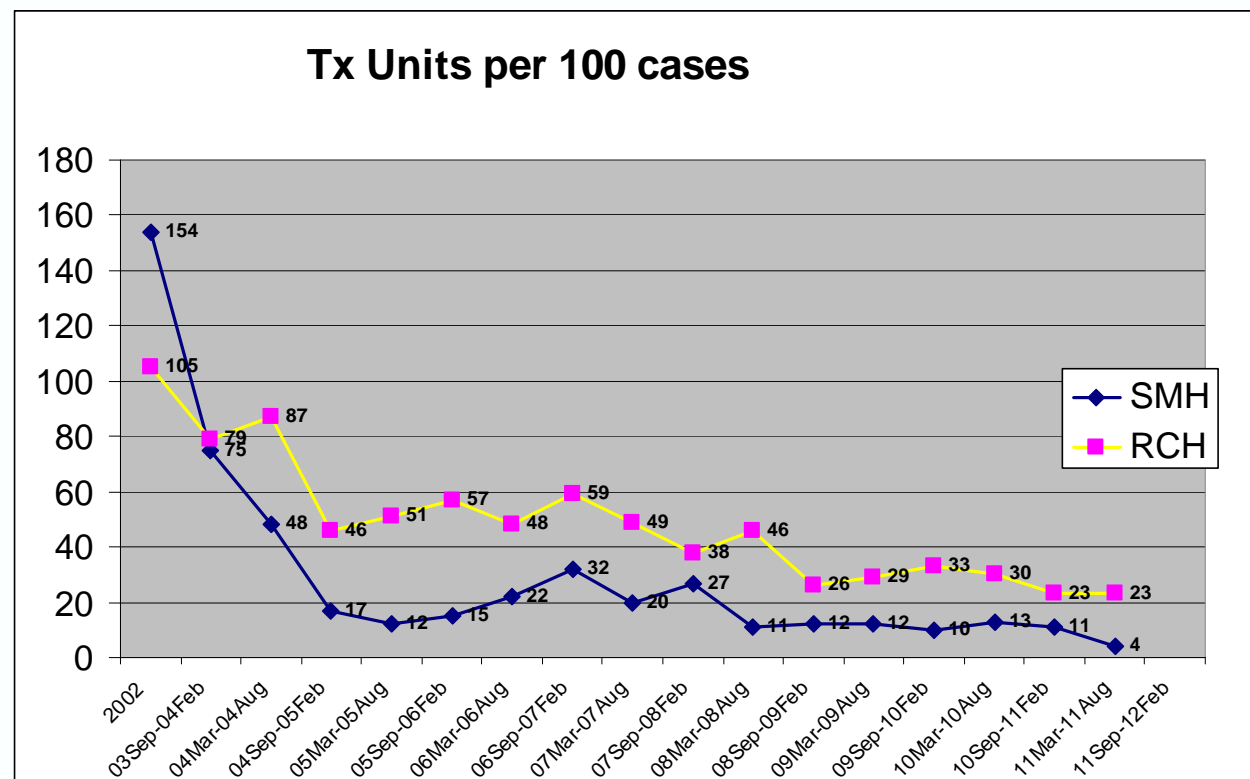
Form View

NUM

Outcomes



THR Transfusion rates



Transfusion Rates (THR)

2% AT St Michaels

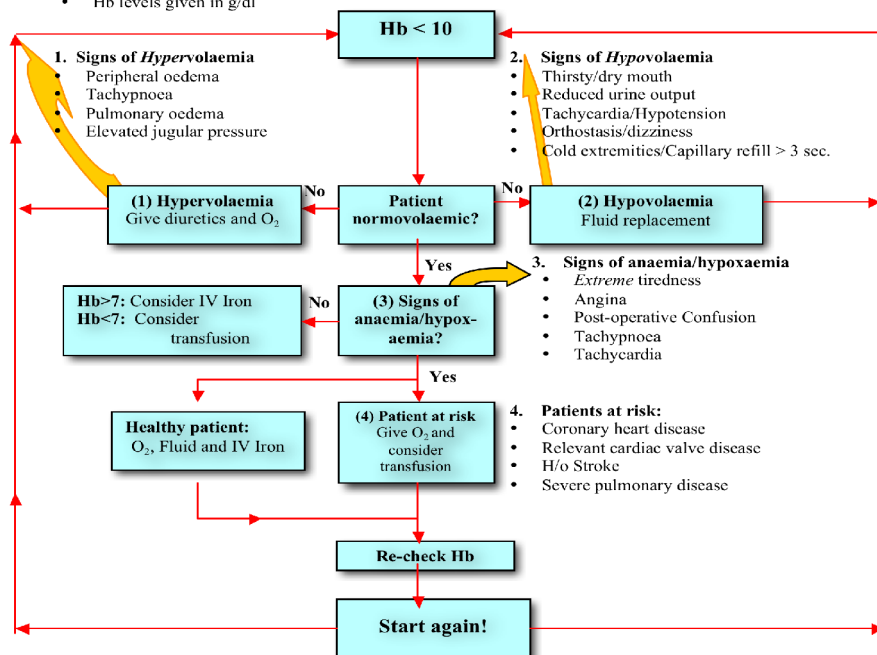
5% overall

Hb of 12 and ICS appears to reduce length of stay

Guidelines for peri-operative blood transfusions in adults.

(not suitable for acute massive haemorrhage)

- RCHT Blood transfusion policy states: "Transfusion should only be given when there is no alternative"
- Peri-operative management of fluid and blood status includes careful consideration of the need for red cells and fluid replacement
- The patient's volume status needs careful assessment.
- **Asymptomatic normal risk patients** with normo-volaemic anaemia **do not need blood transfusion** if the haemoglobin level is above 7 g/dl.
- **Don't give more blood than necessary to achieve the Hb-level you are aiming for.**
 - Calculate one g/dl Hb per unit of blood. **Single unit transfusion is perfectly acceptable.**
- **IV Iron** Sucrose, Venofer, 200 mg can increase Hb 1 g/dl within a few days of an acute bleed. Max 200 mg/day, max 600 mg/week.
- Hb levels given in g/dl



Note: High risk patients need special thresholds for red cell transfusion

Not an indication for transfusion:

- Anaemia with patient feeling well.
- Prophylactic substitution
- Top up of Hb in asymptomatic anaemia
- Hypovolaemia, i.e. use as plasma expander.

REMEMBER

A blood transfusion will ban the recipient from donating blood!

Management of Hypovolaemia:

- Oxygen 2-4 l/min
- Fluid replacement/challenge with crystalloid (Hartmann's®), starch (Voluven®) or gelatine (Gelofucine®),

Lars Jakt/HTT August 2004.
Version 4
Revised Lars Jakt May 2010
To be revised May 2013

PATIENT BLOOD MANAGEMENT IN ELECTIVE ORTHOPAEDIC SURGERY; OUR 10 YEAR EXPERIENCE IN 4500 PATIENTS

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Introduction

Orthopaedic operations are the largest user of blood transfusion in surgery. In 2007 the UK national comparative audit identified that 25% of all patients undergoing THR received a blood transfusion. As a strategy to reduce transfusion, Patient Blood Management (PBM) involves identification and treatment of anaemia in patients prior to operation and blood conservation strategies. We sought to determine the efficacy of a PBM programme at the Royal Cornwall Hospital Trust (RCHT). Further to assess if intervention for anaemia increased preoperative haemoglobin.

Methods

Patients from the RCHT, UK were assessed. APBM programme was introduced in 2003 with peri-operative cell salvage (PCS) in orthopaedic surgery. PBM included preoperative review in orthopaedics from 2006 and expanded to all surgeries from 2008. The PBM identified patients with preoperative anaemia (Hb<12g/dl) or iron deficiency (Ferritin<30 or <70 if CrP>20). Intervention was intravenous iron (Iron sucrose or iron carboxymaltose) with or without Epo. Outcomes included frequency of blood transfusion and change in preoperative haemoglobin.

Results

In Orthopaedic Surgery blood transfusion rates fell sequentially from 58% in 2002; 21-30% in 2004, 6-15% from 2004-2008, to 5-6% from 2008-2012. The use of PCS steadily increased from 25% to over 90% over the same period.

Results cont...

The Preoperative PBM clinic saw a total of 1400 patients of whom half (798) had a Hb<12g/dl and 200 Hb<10g/dl; median Hb was 11.6 (IQR 10.6 - 12.6). Intervention with intravenous iron was performed in 672 patients and 212 also received Epo. Overall preoperative intervention increased median Hb from 11.1g/dl (IQR 10.1-11.6) to 12.0g/dl (IQR 10.9-12.9); non-parametric Wilcoxon $P<0.0001$. In Orthopaedics median Hb increased from 11.35 to 12.30 ($P<0.0001$); similar results were seen in colorectal, gynaecological and other areas of surgery with over 80% of patients seeing a rise in preoperative Hb (figure 1).

Conclusion

Introduction PBM reduced blood transfusion in orthopaedic surgery and intervention for preoperative anaemia increased Hb levels. This model was successfully developed to include other surgical areas.

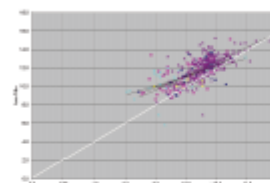


Figure 1: Effect of preoperative PBM on Hb levels

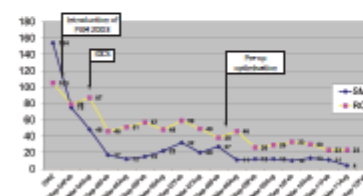


Fig 2: Transfusion units per 100 cases

PBM The Future

- Government Strategies

RCHT

- To integrate Patient Blood Management into the wider trust objectives
- Working within the Primary Care
- Further research

Thank You and Questions

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