Anaemia Study Day
South West Regional Study Day
25th March 2015
Pre Operative Optimisation

Mr John Faulds

Patient Blood Management Coordinator

Royal Cornwall Hospital

Why Pre Optimisation and what is Patient Blood Management?

Our reason for Pre op Optimisation and PBM

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

What is 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

Key benefits of a surgical patient blood management service

- Reduced risk for patients and improved patient care
- Reduced demand on blood banks and associated costs
- Reduction in last minute cancelled operations
- Reduced risk of peri-operative operative complications leading to reduce length of stay.

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 techniques to conserve 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

Transfusion / Anaemia Headlines

Patient Blood Management – The Future of Blood Transfusion

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

Blood Matters: doing nothing is not an option

Sir Bruce Keogh, *NHS Medical Director*

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

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.

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.***

Enhanced Recovery After Surgery

NHS

Enhanced Recovery Partnership Programme

Delivering enhanced recovery

Helping patients to get better sooner after surgery

First published 31 March 2010

Published to DH website, in electronic PDF format only

www.dh.gov.uk/publications

Optimising patients with anaemia prior to surgery

What should be done and why?		Where and when is best?
General health check including full blood count • If anaemic (haemoglobin in females below 12g/dL and males below 13g/dL) look for a cause. • If iron deficient, treat with oral iron and look for cause.	BEST PRACTICE	**GP surgery** • Optimise prior to referral. • Early detection of anaemia. • Time to treat iron deficiency or refer other anaemias.
Benefits of detecting anaemia prior to surgery • Earlier detection, more opportunity to treat anaemia and raise haemoglobin. • Higher haemoglobin at surgery, lack of symptoms of anaemia. Less likely to need blood transfusion. Own red cells physiologically better than transfused red cells.	EARLY + RESOURCES	**Pre-op clinic** • Optimise prior to surgery. • Treat iron deficiency. • Identify those who might need transfusion; counsel. • Specialist referral for cause of anaemia.
Cost of detecting anaemia prior to surgery • Detection of anaemia may lead to delay or cancellation of surgery to investigate and manage anaemia. • Investigation of anaemia may be costly and require specialist input. • Treatment of iron deficiency takes time (iv iron quicker than oral). • Detecting another illness causing anaemia may change priorities but patient remains symptomatic from joint disease.	TOO LATE	**Admission for surgery** • Anaemic patients likely to be transfused or cancelled. • Can still target blood.

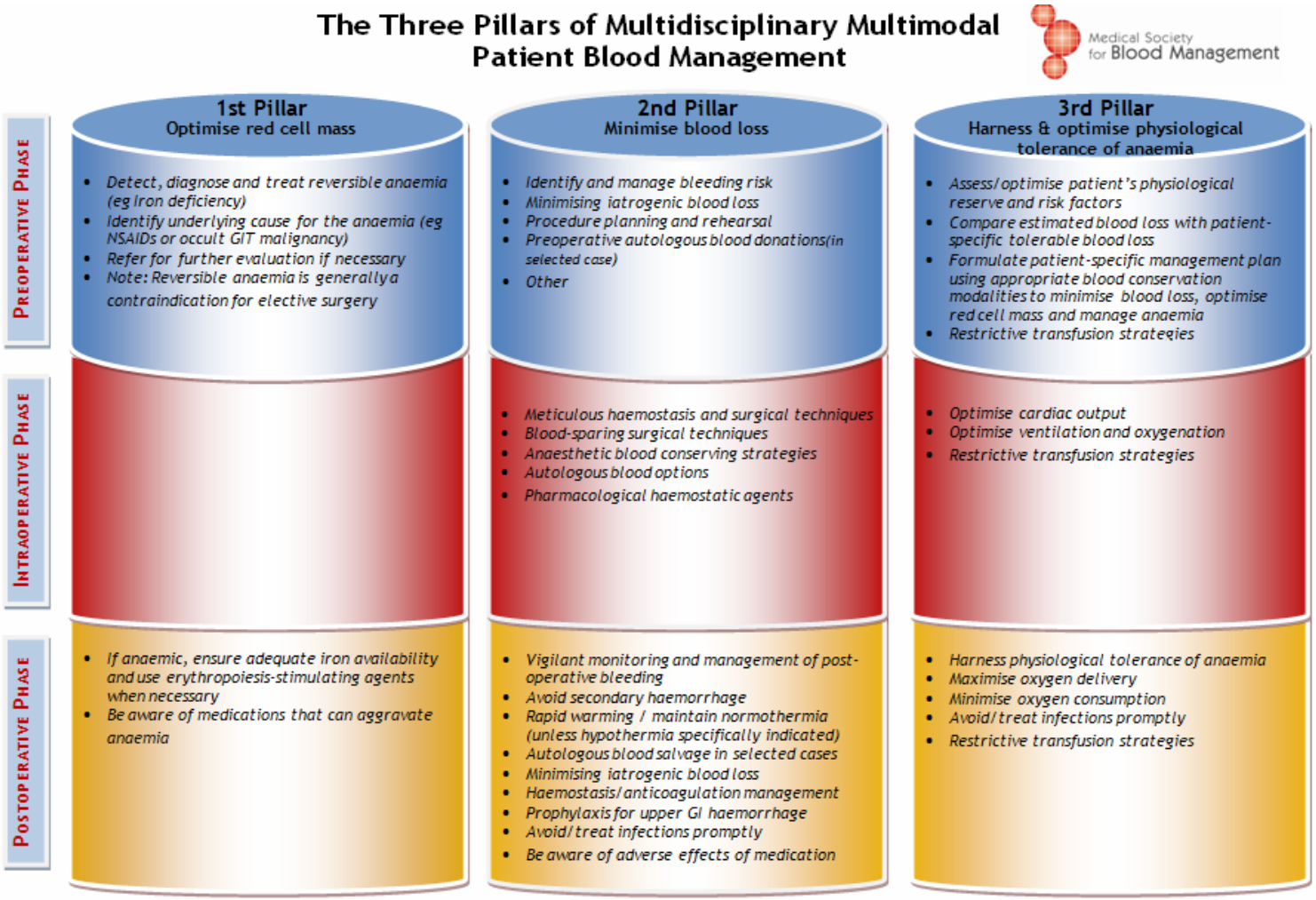


Figure courtesy of the Western Australian Patient Management Program from a presentation given by Dr Simon Towler, Chief Medical Officer, WA Department of Health

Department of Health Efficiency Programme

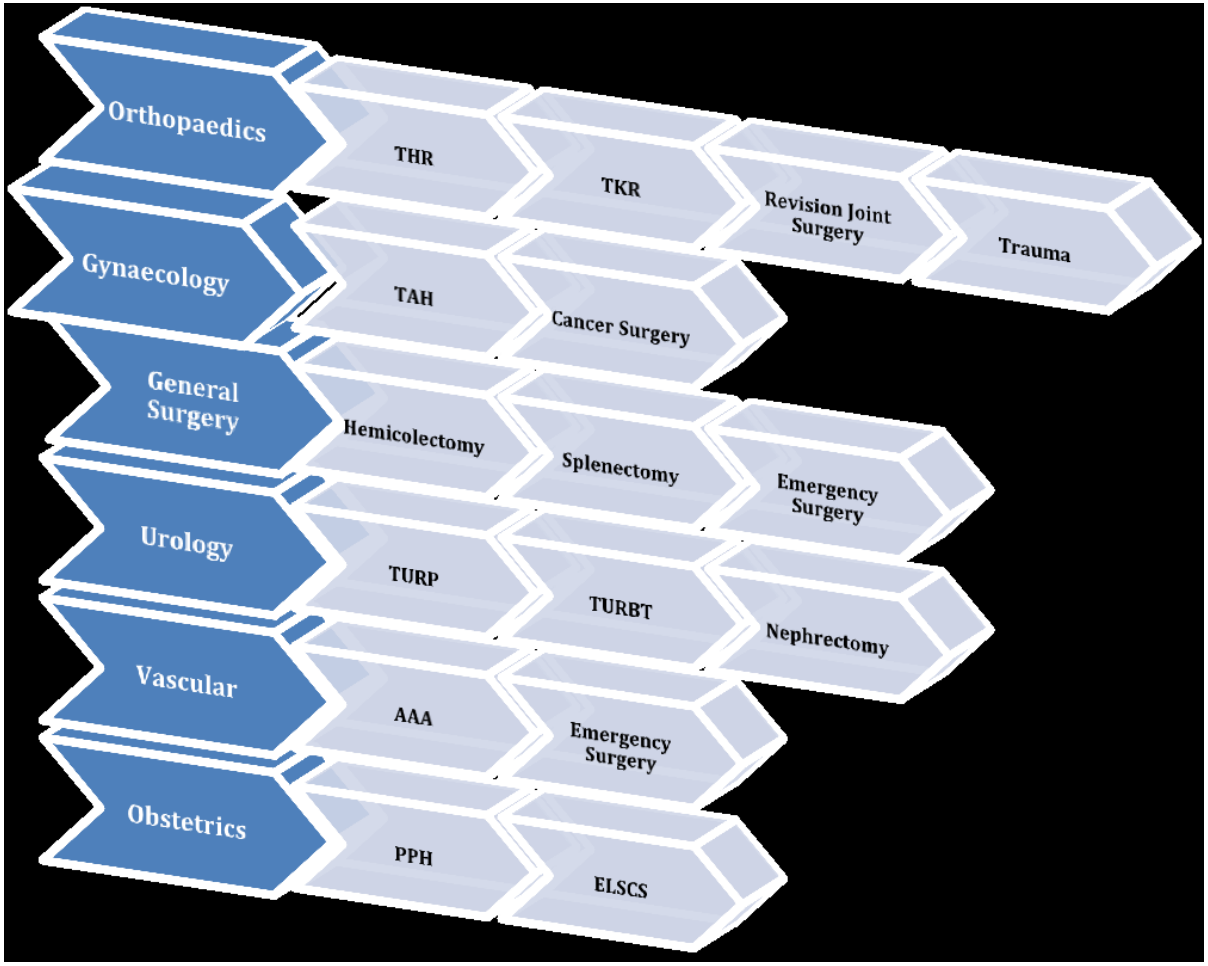
10% cut in A&E attendance
20% reduction in unplanned admissions
Cut length of stay by 25%

RCHT
Pre Optimisation Service

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

Targeted Cases



RCHT PBM Service

- Successfully running for past 3 years
- Team – x1 PBM Coordinator, x2 Registered Nurses, A&C support

Pre optimisation

Intraoperative Cell Salvage

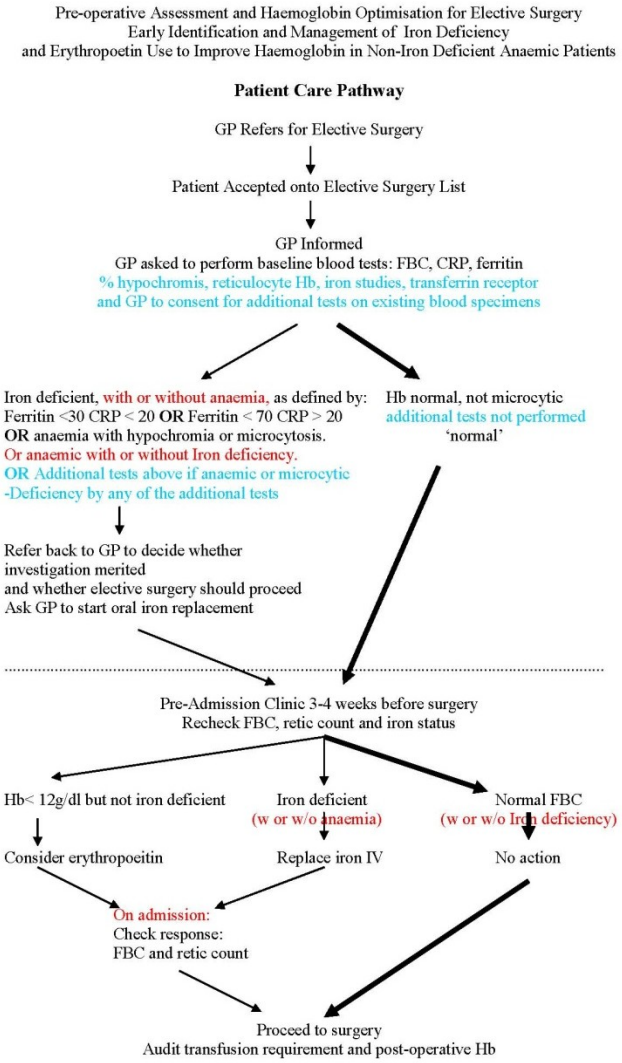
Point of Care Testing

Pre surgery Optimisation Objectives

- Preferred Hb prior to surgery – 120 g/l
- Male and Females
- Patient's referred via PAC for elective surgery
- Blood results required - Hb, Ferritin, CRP, also consider MCH

Also note WCC and neutrophils

Pre – Op Referral Algorithm



IV Iron Clinics

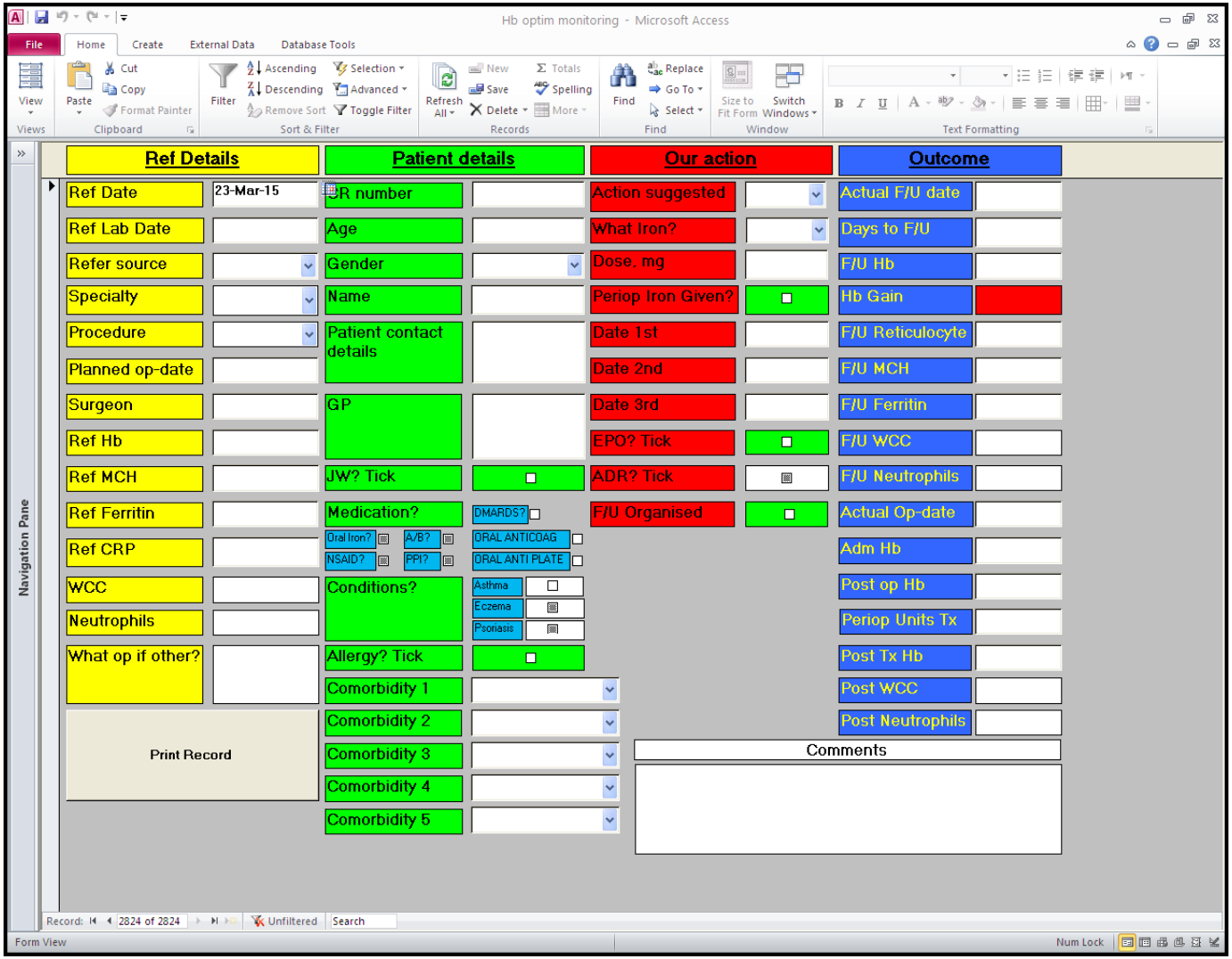
- Integrated into pre assessment clinic
- Dedicated clinic area and staff
- Clinics run over 4 days
- Nurse led

Patient pathway for referral of 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 Referral Database



Transfusion Data – Elective Cases

Surgical Speciality	Cases	Avg Pre Hb	Total Tx Units	Total Surgical Cases	Tx % of Total Cases
Breast	1	126	1	775	0.1%
Colorectal	27	115	61	716	3.7%
ENT	3	109	7	1,164	0.2%
General Surg	5	108	18	708	0.7%
Gynaecology	4	109	21	1,310	0.3%
Gynae Onc	6	121	16	292	2.0%
Orthopaedic	42	104	105	3,695	1.1%
Upper GI	9	102	19	767	1.1%
Urology	17	106	45	1,382	1.2%
Vascular	32	97	67	496	6.4%
Oral Surg	3	105	4	2,501	0.1%
Totals	**149**		**364**	**13,806**	

Primary Hip Data

Prim THR	Cases	Avg Pre Hb	Tx Cases	Total Units	Avg LOS with Tx	Avg LOS without TX
RCHT	189	126	8	19	10	6
St Michaels	217	138	3	6	8	4
Total	**406**		**11**	**25**		

Primary Total Hip replacements = 406 cases

% of Total cases Tx = 2.7%

SMH – 1.3%

RCHT – 4.2%

Pre Operative Optimisation Clinic Data

Total Clinic Intervention cases 2014/15

Pre Operative Interventions		April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total's
Iron Only - pre op		15	17	18	11	13	14	15	12	13	16			144
Iron and EPO - pre op		6	3	4	10	7	3	4	6	3	6			52
EPO Only - pre op		0	0	0	2	0	0	0	0	0	0			2
GP Ref		4	2	1	0	0	0	1	0	3	5			16
Trial Patient		1	2	1	0	2	0	1	1	0	0			8
Total Numbers		22	22	23	23	22	17	20	19	16	22			206
Speciality	GI	7	8	12	3	4	9	10	9	7	12			81
	Gynae	4	5	3		1	1	1	1	1				17
	Ortho	7	6	6	18	14	6	8	6	5	8			84
	Urology		3	1		1			2		1			8
	Vascular			1		1		1			1			4
	Max Fax									1				
	General	1			1									2
	Breast	1												1
	Cardiac	1												1
	OBS													
	Gynae Oncology				1	1			1					3
	Rhumatology	1												1
	ENT						1							1

> 20

Peri/Post Operative IV Iron

Peri/ Post Op Interventions														
		April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total's
Peri opeartive Interventions		4	5	9	7	7	3	8	3	4	5			55
Venofer usage in 100 mgs		22	10	20	18	18	5	16	10	12	18			149
Ferinject usage in 100 mgs		0	0	10	0	6	6	0	0	0	0			22
Speciality	GI	1	2	1		3	1	4		1	1			14
	Gynae	2		1					1	1	1			6
	Ortho		2	5	1	3	1	4		2	1			19
	Urology	1		1	3		1				1			7
	Vascular		1	1		1								
	Max Fax				1									
	Other													
	Breast										1			
	GP													
	OBS													
	Gynae Oncology				2				2					

IV Iron - In Patient Interventions

In Patient Interventions														
		April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total's
In Patient Interventions		2	5	8	3	2	8	1	1	0	7			37
Venofer usage in 100 mgs		12	14	14	16	2	34	4	6	0	8			110
Ferinject usage in 100 mgs		0	0	40	0	10	6	0	0	0	50			106
Speciality	GI	1		6	2		5		1		3			18
	Gynae					1					1			
	Ortho				1	1					1			
	Urology													
	Vascular			1			3				1			
	Max Fax													
	General	1												1
	Breast													
	GP										1			
	OBS													
	Oncology													
	Oral			1										1
	medical							1						1

Iron Deficiency
and
IV Iron in Practice

Iron Deficiency

- Occurs in 2- 5% of adult men and post menopausal women in the developed world.
- Anaemia defined by WHO 130g/l for men, 120g/l in non pregnant women, 110g/l in pregnant women
- Menstrual blood loss is the most common cause of IDA in premenopausal women, while blood loss from the GI tract is the most common cause in men and post menopausal women.
- The lower the Hb the more urgent the investigation
- Ferritin levels <12mcg/l are indicative of absent iron stores?
- Hepcidin has recently been shown to play a vital role in regulating iron availability to the bone marrow – however assays monitoring its levels are currently being restricted to research investigation.

IV Iron choice at RCHT

Ferric Carboxymaltose® (Black Triangle) – Normally only used pre operatively (dose not exceeding 15mg/Kg body weight/week) max 1000 mg in one dose

Venofer® (Black Triangle) - normally used peri operatively (200 mg daily, max 600 mg per week).

Iron sucrose is well tolerated - though there is a suggestion that 35% of patients have mild side effects.

Serious ADR's – 0.03-0.04%

Dextran irons – Serious ADR's 0.6-0.7% (with fatalities noted)
GI team moving to Sucrose from Dextran - Cosmofer

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)/

ADR's

Common (≥1/100, <1/10)
Headache, dizziness Nausea, abdominal pain, constipation, Diarrhoea, Rash, Injection Site Reactions
Uncommon (≥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 (≥1/10000, <1/1000)
Dyspnoea

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

ADR’s in Practice?

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

Outcomes

Current Value to Trust of PBM looking at Primary THR

- Key Performance Indicators – Length of Stay and Red Cell Transfusion
- Length of stay – National 4.2-15 days (average 9.6 days) www.institute.nhs.uk
  - RCHT average **5.4 days**

- Reduction in Red Cell Transfusion
  - Before PBM **47%**
  - Now **<2.7%**

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Royal Cornwall Hospitals NHS

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

Dr Catherine Ralph, Dr Lars Jakt, Mr John Faulds Dr Julie Sanders, Mr Toby Richards
Blood Conservation Team, Royal Cornwall Hospital Trust, Truro, UK
and University College London (UCL), London, UK

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. A PBM 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.

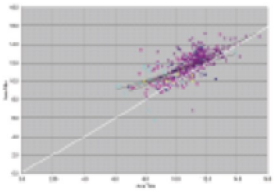


Figure 1: Effect of preoperative PBM on Hb levels

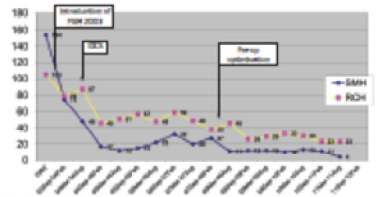


Fig 2 : Transfusion units per 100 cases

Types of Iron Deficiency Anaemia

Iron deficiency can be differentiated into three types –

1. Absolute Iron deficiency - (AID)
2. Functional Iron deficiency – (FID)
3. Iron sequestration due to inflammation – (IS)

Iron Physio-Chemical properties

Ferinject®
Type 1 complex
Polynuclear iron(III)- hydroxide carbohydrate complex
Designed to enable controlled systemic release of iron.
Minimising the risk of releasing large amounts of iron into the serum

Venofer®
Venofer® (iron sucrose injection, USP) is a brown, sterile, aqueous complex of polynuclear iron (III) hydroxide in sucrose, containing 20 mg elemental iron per mL.

The Challenge?

Is to identify how the respective types of Iron deficiency contribute to iron restricted erythropoiesis

Absolute Iron Deficiency

- Most common nutritional deficiency
- Deficit in total body iron stores
- Develops when bodily iron exceed Iron supply or when losses exceed dietary intake

Functional Iron Deficiency

- Manifests when mobilisation of iron is not rapid enough to meet demand e.g. treatment with erythropoietin stimulating agents

Iron Sequestration or Anaemia of Chronic Disease

- Commonly seen in patients with chronic inflammatory disease when the release of iron from the reticuloendothelial macrophages (iron recycling), enterocytes (dietary iron absorption) and hepatocytes (iron storage) is blocked and the available supply of iron in plasma is decreased

Pre op – Intervention required?

Low Hb, Low ferritin, Normal CRP, low MCH = Iron (pre op)

Low Hb, Ferritin less 70, CRP greater than 20 = Iron (pre op)

Low Hb, Ferritin normal, CRP normal = Iron and Darbepoetin (pre op)

Normal Hb, low Ferritin with or without Low MCH = Peri op Iron (recovery or ward)

Low Hb, Ferritin greater than 500 mcg/l, CRP and MCH normal = Darbepoetin only (pre op)

All interventions have follow up bloods at around two weeks, and letters to GP

RCHT strategic objectives 2012-17

- Focus relentlessly on quality of care and patient safety
- Remain the preferred provider of acute and specialist healthcare to the people of Cornwall and the Isles of Scilly
- Work as a constructive partner in the community, promoting the integration of health and social care
- Value and improve the working lives of our staff, promoting education, training and research
- Work towards a sustainable, low carbon future
- Deliver financial surplus annually.

The Hurdles

- Having the service acknowledged at the appropriate level within the trust
- Reduction in transfusion is not a measurable outcome
- Data collection - what do you want/need to know/collect, how do you collect it?
- Who do you present the data to?

Cultural Change

Why IV Iron?

Oral Iron – Compliance low
side effects
timely
absorption rates

IV Iron – Compliance 100%
Timely

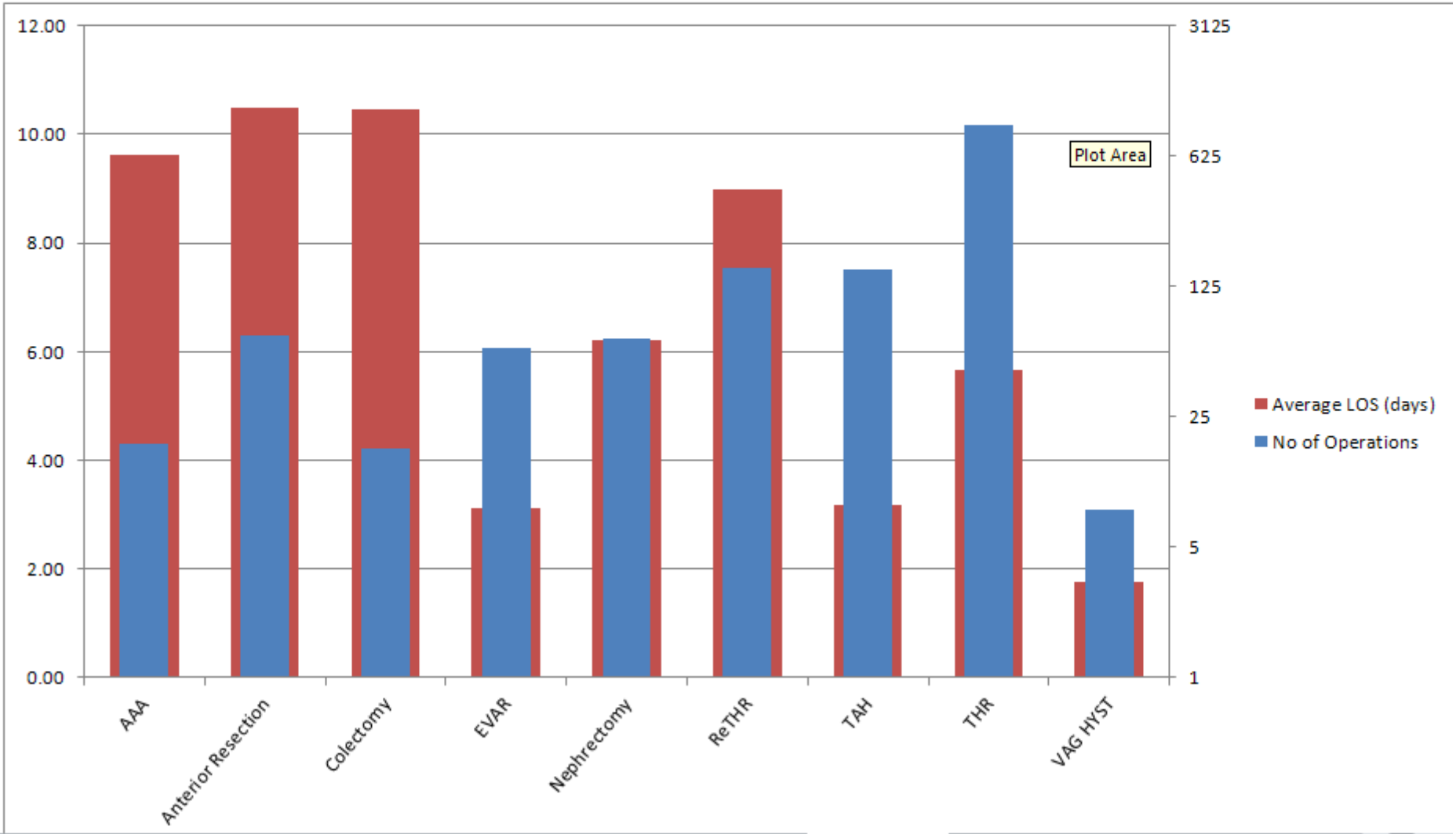
Blood Conservation 2010_12-2012 - Aug [Compatibility Mode] - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

Security Warning Data connections have been disabled Enable Content

H14

Length of Stay (days) by Procedure



Use of BC | Procedures common blood cons | Transfusions | Readmissions | LOS Graph | Trans Graph | Sheet1

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

PBM The Future

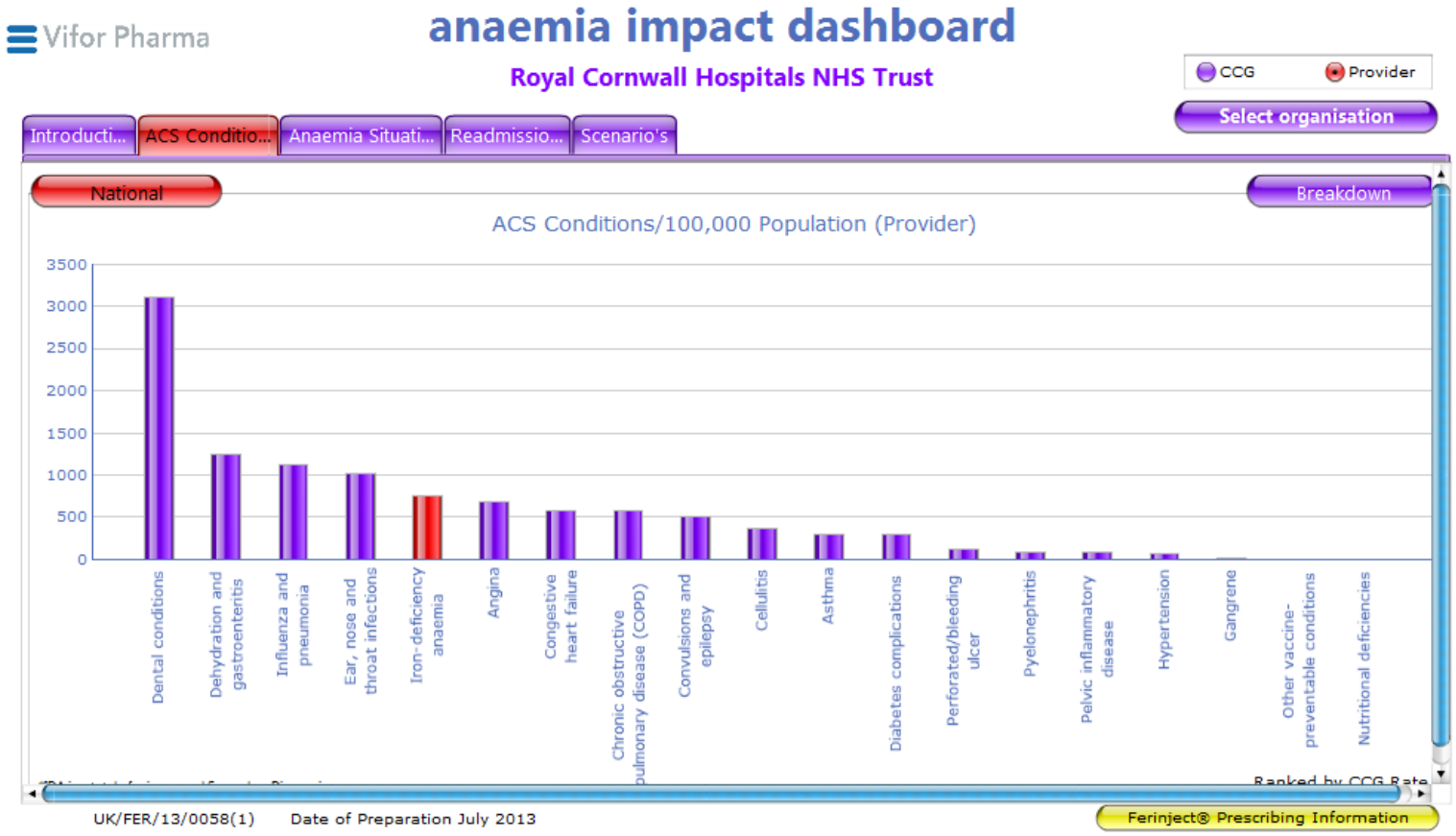
Government Strategies
To integrate Patient Blood Management into the wider trust objectives
Working within the Primary Care
Further research
Data analysis
Make it personal - Hb optimisation is key

Education, education, education

What are ACS Conditions?

Ambulatory care sensitive (ACS) conditions are chronic conditions for which it is possible to prevent acute exacerbations and reduce the need for hospital admission through active management

Anaemia at RCHT



Vifor Pharma

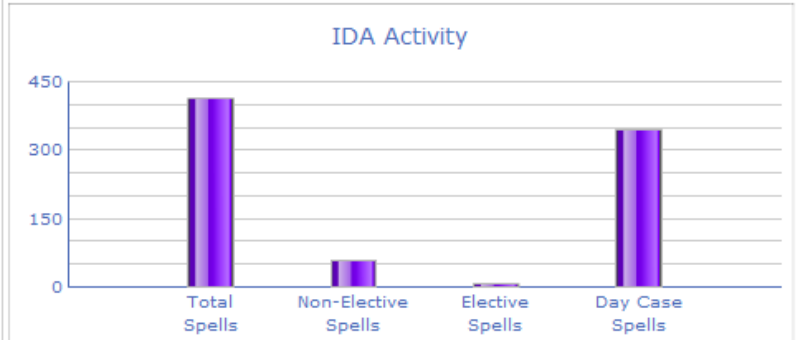
anaemia impact dashboard

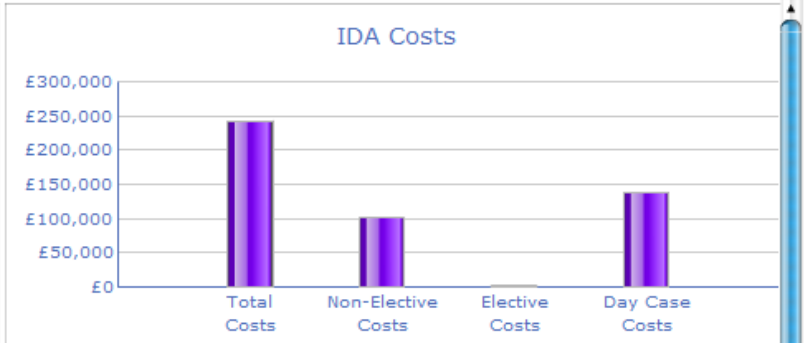
Royal Cornwall Hospitals NHS Trust

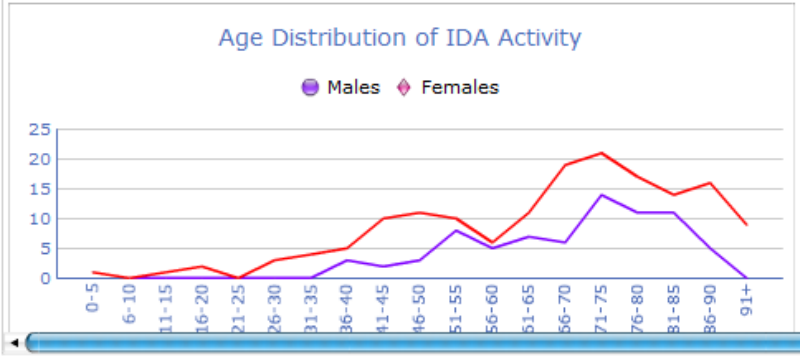
CCG Provider

Select organisation

Introducti... | ACS Conditio... | Anaemia Situati... | Readmissio... | Scenario's







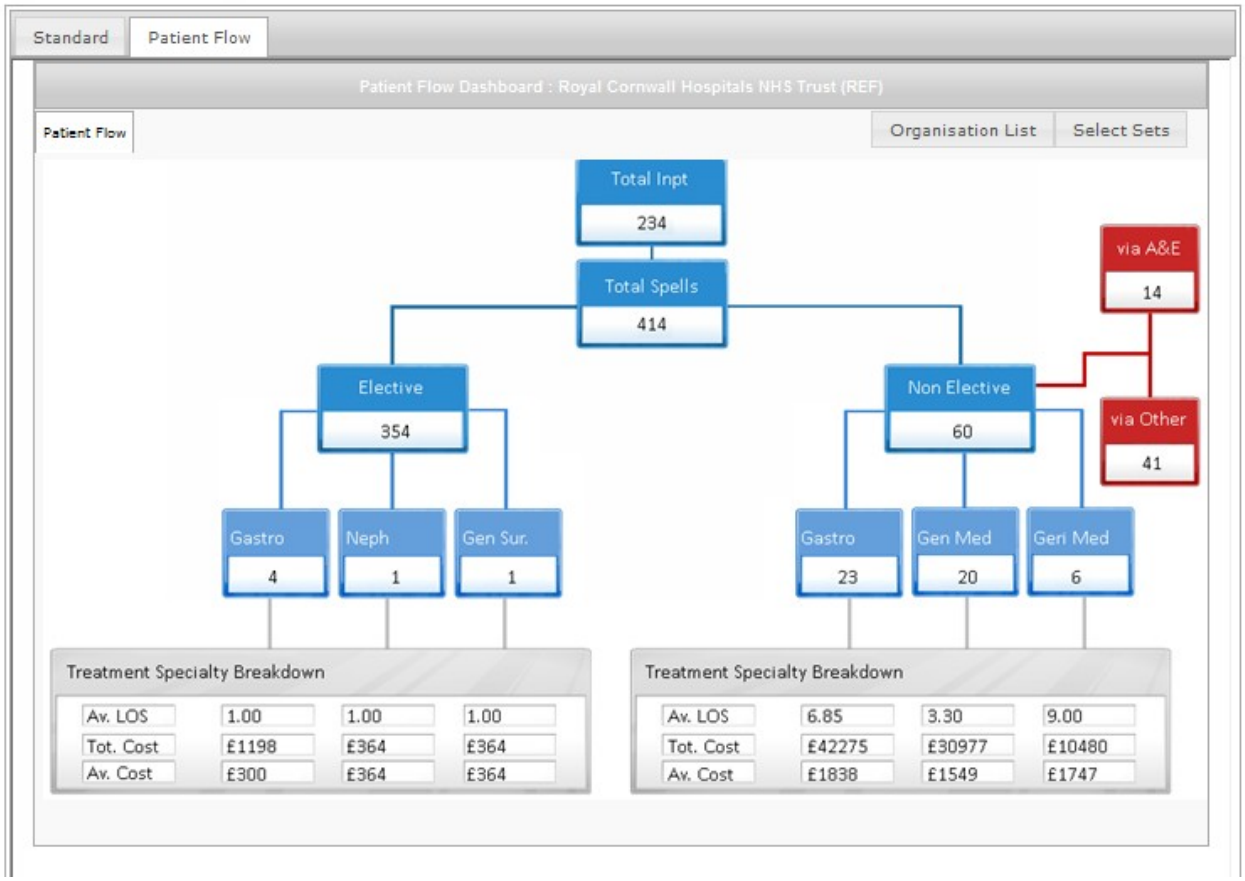
Top 3 Providers (Spells)

NHS Kernow CCG	411
NHS North West Surrey CCG	2
NHS Coastal West Sussex CCG	1
Other Providers	0

UK/FER/13/0058(1) Date of Preparation July 2013

Ferinject® Prescribing Information

Patient Flow chart



RCHT Top 10 30-day re-admissions resulting in no payment – HES Data Qtr3

Top ten 30 day re-admission codes (where Anaemia is the primary Diagnosis)

ICD-10	ICD-10 Description	Total Patients
D509	Iron deficiency anaemia, unspecified	6
D649	Anaemia, unspecified	3
E875	Hyperkalaemia	1
I080	Disorders of both mitral and aortic valves	1
I209	Angina pectoris, unspecified	1
I251	Atherosclerotic heart disease	1
I841	Internal haemorrhoids with other complicati	1
K318	Other specified diseases of stomach and duo	1
K635	Polyp of colon	1
R101	Pain localized to upper abdomen	1

Building the Business Case for Iron

IDA HRG Codes

SAO4F (without CC) - £292 per episode

SAO4D (with CC) - £388 per episode

Cost of current service

- Patient transport costs = 32% of patients requiring transport at an average of £54 per return visit, = £17.28 per return visit
- Nursing costs = 1x band 6 nurse per patient = £107 per hour
- Infusion costs = giving set (£2.22),4 cannula (£2.16),5 dressings (£0.36),6 swabs x2
- (£0.72),7 saline (£1.27)8,9, = £6.73 per infusioni
- · Injection costs = butterfly (£0.85),10 dressings (£0.36),6 swabs x2 (£0.72),7 syringe
- (£0.12)11 = £2.05 per injection

www.pssru.ac.uk
www.stjohnsupplies.co.uk

Current IV Iron costs within secondary care

200 patients (presuming 1 gm)

All with CC (HRG £388 per patient)
Total Income – £77,600
Service cost - 241.76 per patient
Total Iron cost – £48,352
Difference - £29,248

Physical resources required to implement this proposed integrated service?

Requirements
Anemia Service – personnel, database, location, referral facility.

What's currently available?
personnel, database, location, referral facility.

Is this Affordable and Appropriate?

Current HRG codes cover the implementation of this proposed service!

Strategic Objectives

Focus relentlessly on quality of care and patient safety
Work as a constructive partner in the community, promoting the integration of health and social care
Deliver financial surplus annually.