Pre-operative Optimisation

Yorkshire RTC
April 2013

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Clinical lead for Pre-Assessment
Leeds Teaching Hospitals

- BCSH guidelines
- Leeds Teaching Hospitals
- Vifor Pharma – Conference attendance 2010, research funding possible
- No objections to transfusion

- Rationale for optimisation
- Evidence available
- Practical experience with implementing a programme
  - Results
  - Barriers / Challenges

There is a mandate for PBM

SIXTY-THIRD WORLD HEALTH ASSEMBLY **WHA63.12**

Agenda item 11.17 **21 May 2010**

Availability, safety and quality of blood products

The Sixty-third World Health Assembly,

Recalling resolution WHA58.13 on blood safety: proposal to establish World Blood Donor Day

…and the mandate includes pre-operative optimisation

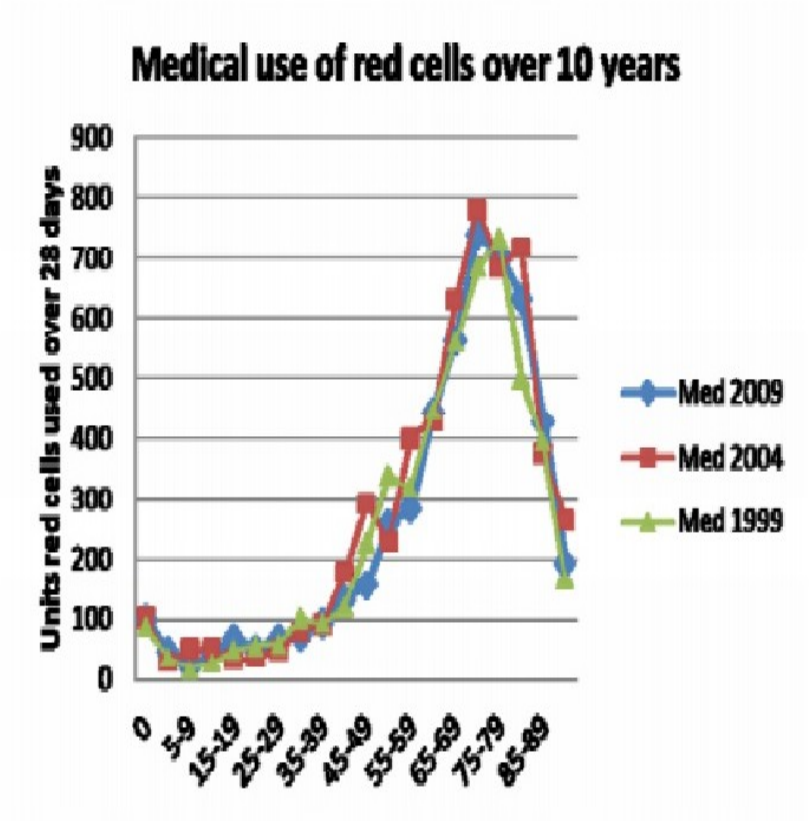
Bearing in mind that voluntary and non-remunerated blood donations can contribute to high safety standards for blood and blood components, and being aware that the safety of blood products depends on testing of all donated blood for transfusion-transmissible infections, and correct labelling, storage and transportation of blood products;

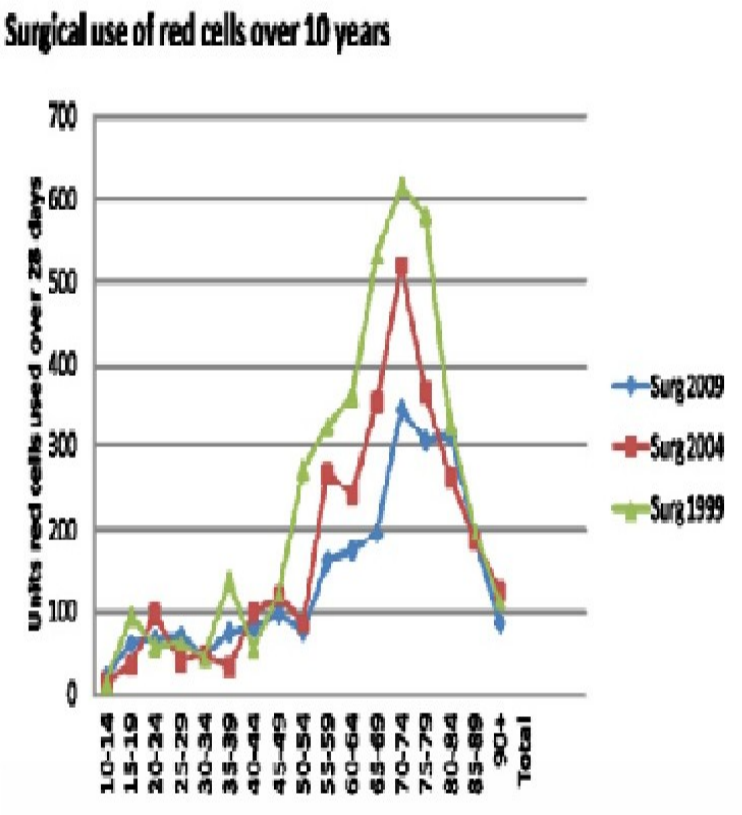
Bearing in mind that patient blood management means that before surgery every reasonable measure should be taken to optimize the patient's own blood volume, to minimize the patient's blood loss and to harness and optimize the patient-specific physiological tolerance of anaemia following WHO's guide for optimal clinical use (three pillars of patient blood management);

Recognizing that excessive and unnecessary use of transfusions and of plasma-derived medicinal products, unsafe transfusion practices, and errors (particularly at the patient's bedside) seriously compromise patient safety;

Concerned that unsafe and/or poor-quality blood products can render patients vulnerable to avoidable risk, if the blood programmes are not subject to the level of control now exercised by

What's the problem?





- Pre-operative anaemia predictive of

  - Transfusion rate
  - Length of stay
  - Patient satisfaction

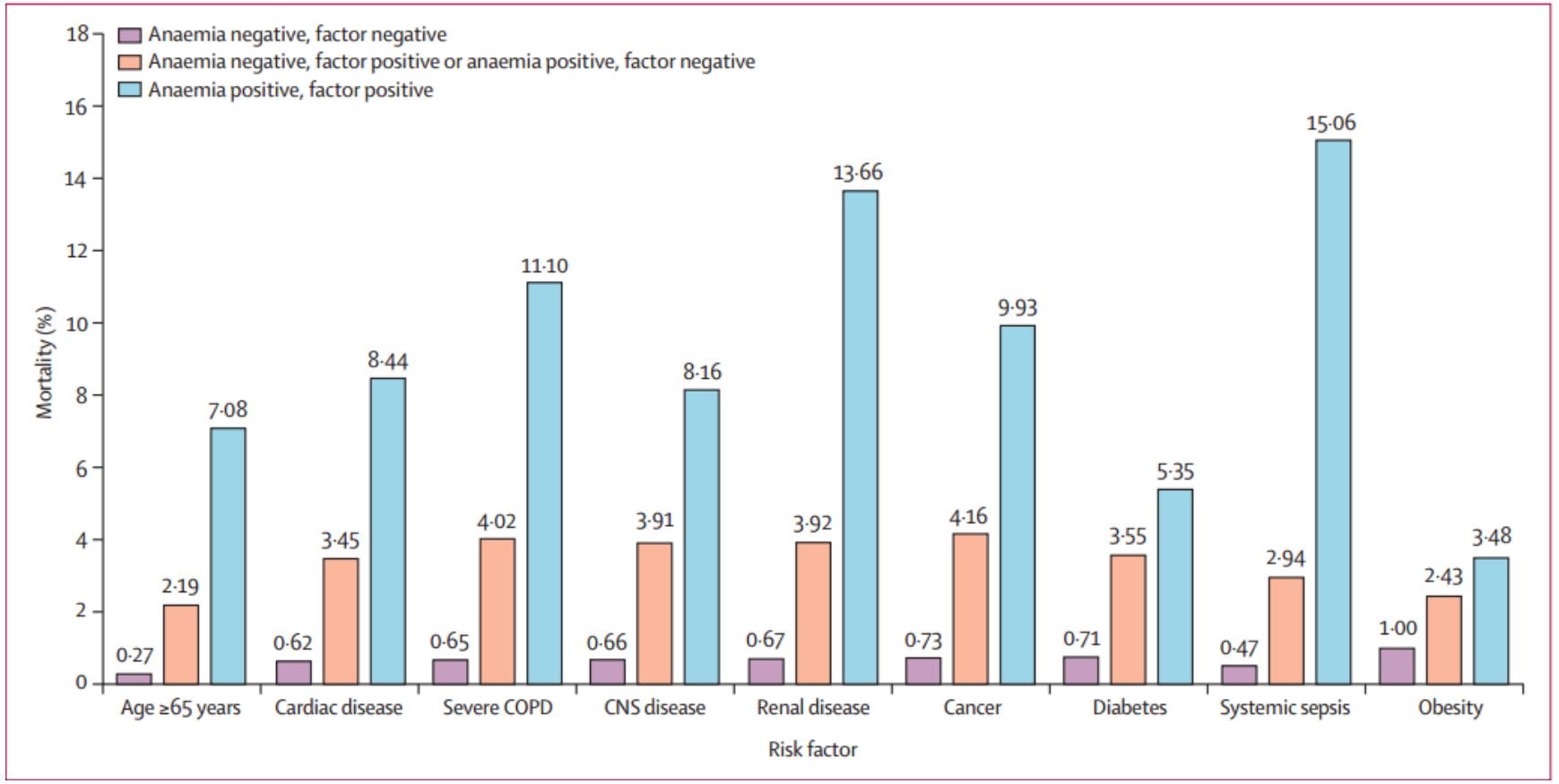
- Peri-operative anaemia predictive of:

  - Mortality, Stroke and ACS
  - Falls & Fractures
  - Reduced quality of life

Husted H et al. Acta Orthopaedica 2008; 79 (2): 168–173
Shander A et al. Am J Med. 2004;116(7A):58S–69S
Conlon NP et al. Anesth Analg 2008;106:1056 –61

Anaemia and outcomes in noncardiac surgery

Mussalam et al. *Lancet* 2011



- Blood transfusion predictive of mortality in:
  - Cardiac Surgery
  - Liver Transplantation
  - Intensive Care
  - Acute Coronary Syndrome treatment
  - **Arthroplasty**

- Propensity scoring suggests **need** for transfusion and **transfusion itself** act independently

Kulier A et al. Circulation 2007; 116:471–9
Salim A et al. J Am Coll Surg 2008; 207:398–406
Herbert PC et al. N Engl J Med 1999; 340:409–17
Rajesparan K et al. *J Bone Joint Surg [Br]* 2009;91-B:776-83

- *Ferraris et al. Arch Surg. 2012;147(1):49-55*

Table 3. Outcome Comparisons Between Propensity-Matched Groups

	Unadjusted Rate			Propensity-Adjusted Rate		
Postoperative Complication	No Transfusion (n=893 205)	Transfusion[a] (n=15 186)	*P* Value[b]	No Transfusion (n=11 855)	Transfusion[a] (n=11 855)	*P* Value[c]
Mortality, %	1.1	6.3	<.001	5.2	6.1	.005
Wound problems, %	4.5	11.2	<.001	9.7	11.4	<.001
Pulmonary, %	3.0	15.7	<.001	11.7	15.3	<.001
Renal, %	1.9	6.8	<.001	5.5	6.8	<.001
CNS, %	0.3	1.4	<.001	1.3	1.3	.91
Cardiac, %	0.5	2.6	<.001	2.0	2.4	.06
Sepsis, %	2.4	10.5	<.001	8.2	10.6	<.001
Return to OR, %	4.6	12.3	<.001	11.4	12.1	.09
Composite morbidity, %	11.8	34.6	<.001	30.1	34.2	<.001
Postoperative length of stay, mean (SD), d	3.54 (7.72)	12.0 (14.6)	<.001	10.3 (14.3)	11.8 (14.7)	<.001

Abbreviations: CNS, central nervous system; OR, operating room.
[a] Patients received intraoperative transfusion of 1 unit of packed red blood cells.
[b] Discrete variables used χ^2 test; continuous variables, *t* test.
[c] Discrete variables used McNemar test; continuous variables, Wilcoxon rank sum test.

Donor perspective

Video | TV Ads | Radio Ads

An Ambitious Organisation

Play ▸

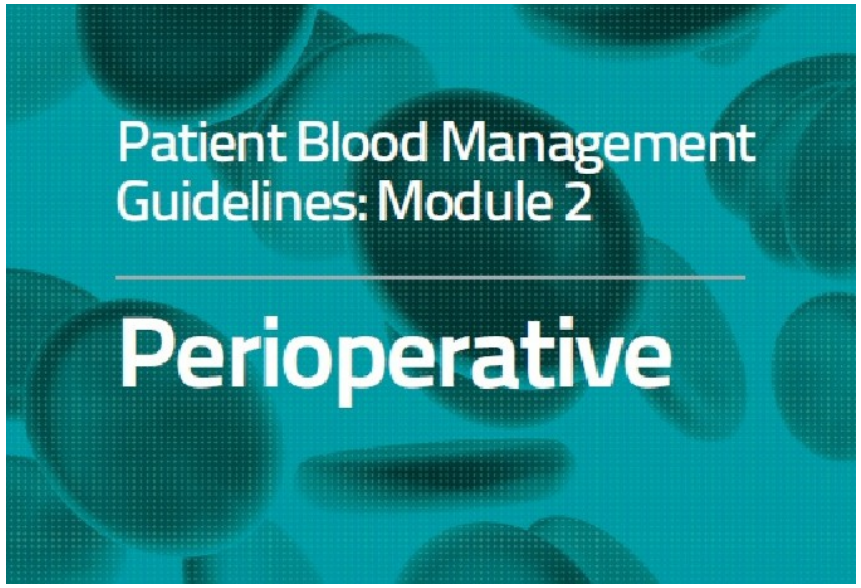
Journey of Blood

Play ▸

NHSBT Thank You

Play ▸

The evidence available



- Australian NBA and NHMRC
- Systematic review process, in itself peer-reviewed
- "Reccommendations" and "practice points"
- Open access
- November 2011

Common features of trials / studies so far

- Co-ordination by individual or group
  - "Clinical champion", parallels with Enhanced Recovery Partnership
- Algorithm usage
- Procedure-specific; target/threshold based

The Ontario Study

WILEY ONLINE LIBRARY Transfusion
Volume 47, Issue 5, Article first published online: 31 MAR 2007
Abstract | Full Article (HTML) | References | Cited By

UNIVERSITY OF LEEDS

BLOOD CONSERVATION AND TRANSFUSION ALTERNATIVES

A cluster-randomized controlled trial of a blood conservation algorithm in patients undergoing total hip joint arthroplasty

- Cluster-randomised trial, 30 hospitals with similar outcomes at baseline
- Intervention was implementation of an algorithm
- ABT rate 9% vs 17% (p=0.02)
- Trend to better patient outcomes, not powered to detect difference

The Ontario Study: issues


WILEY ONLINE LIBRARY Transfusion
Volume 47, Issue 5, Article first published online: 31 MAR 2007
Abstract | Full Article (HTML) | References | Cited By
UNIVERSITY OF LEEDS

BLOOD CONSERVATION AND TRANSFUSION ALTERNATIVES

A cluster-randomized controlled trial of a blood conservation algorithm in patients undergoing total hip joint arthroplasty

- No formal diagnosis of cause
- Limited use of iron
- Extensive use of pre-operative autologous donation

Practical experience in the UK

British Journal of Anaesthesia **108** (6): 943–52 (2012)
doi:10.1093/bja/aes135

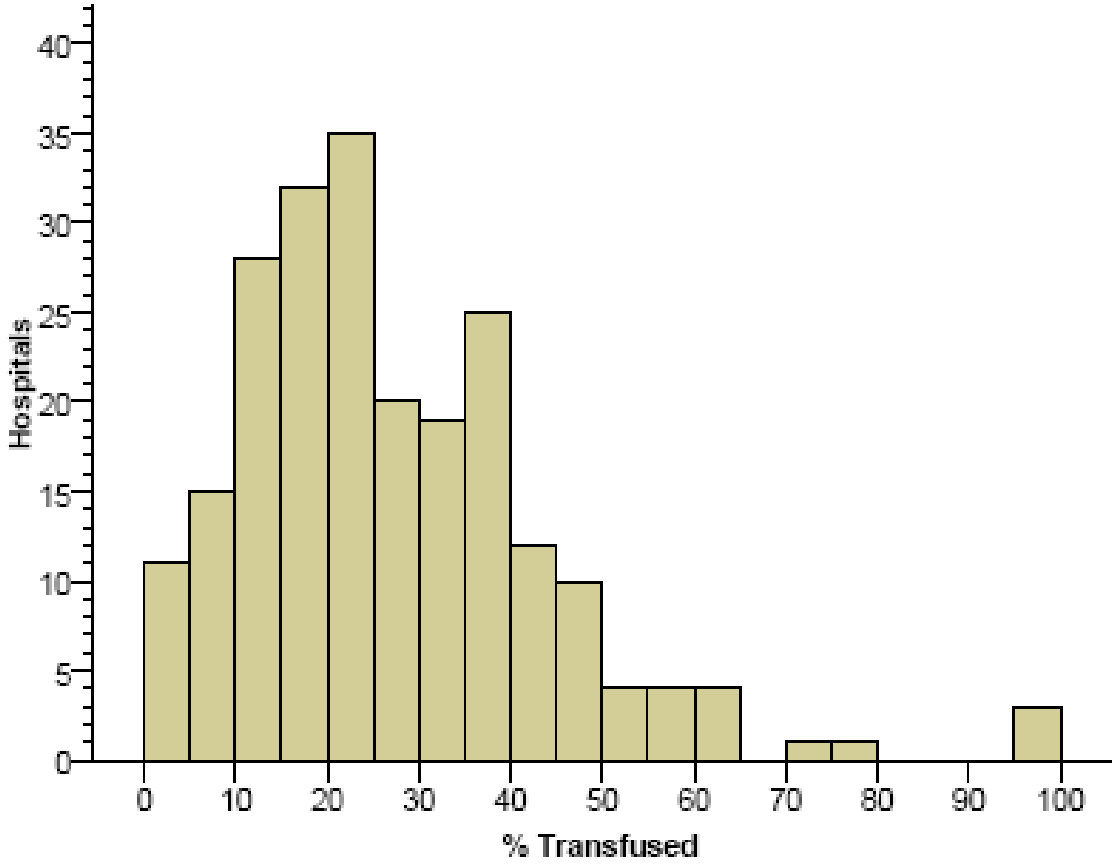
BJA

CLINICAL PRACTICE

Effect of a patient blood management programme on preoperative anaemia, transfusion rate, and outcome after primary hip or knee arthroplasty: a quality improvement cycle†‡

A. Kotzé[1]*, L. A. Carter[1] and A. J. Scally[2]

Hospital variation histogram for the percentage of audit patients transfused

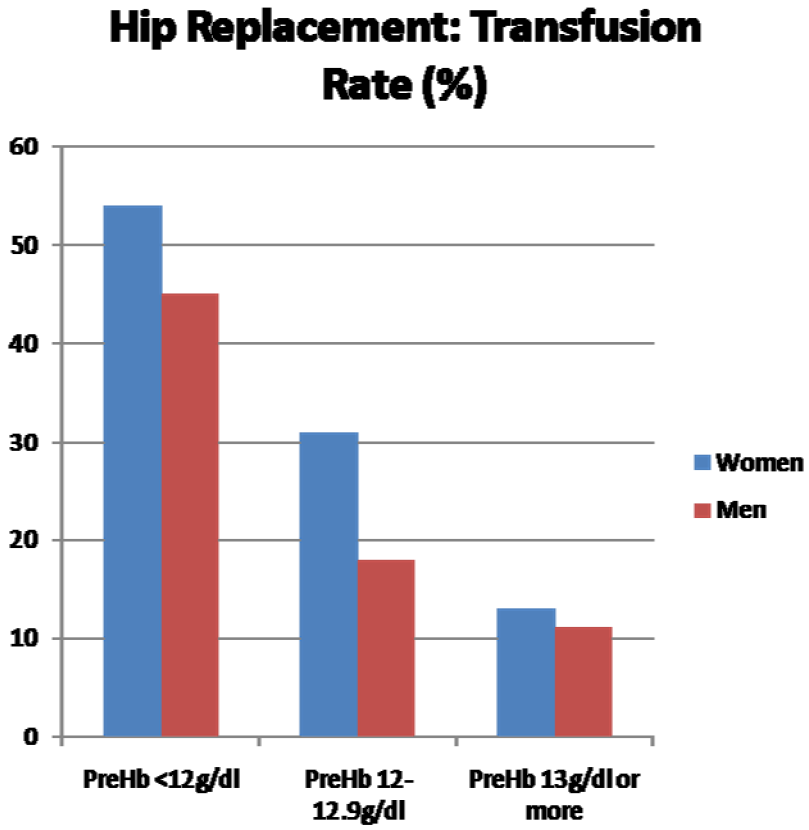


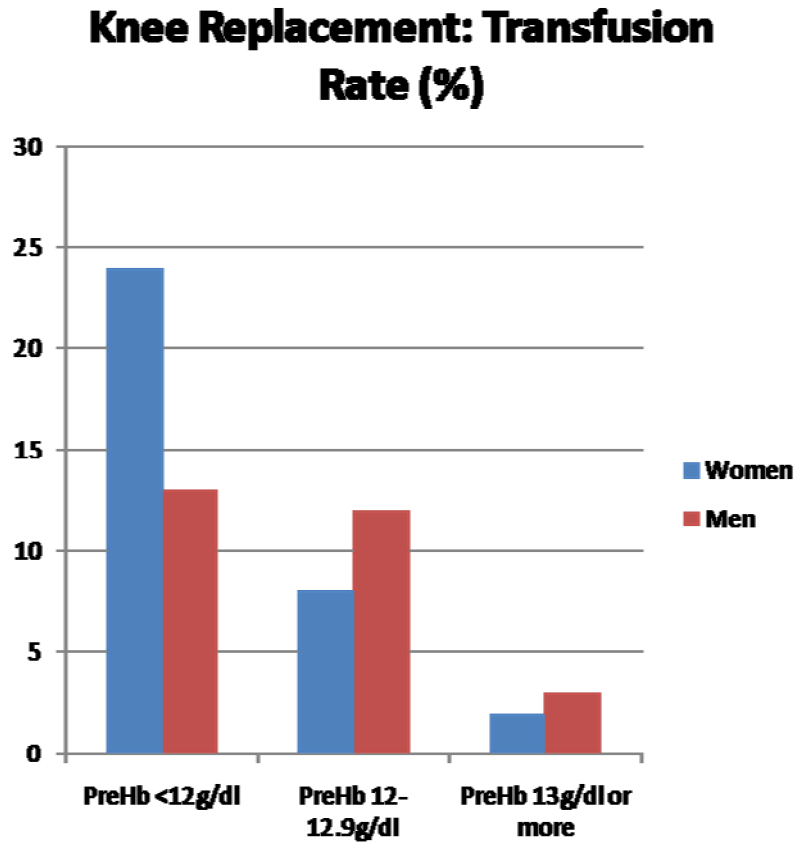
Boralessa H et al. *Annals of the Royal College of Surgeons of England*; 2009: 91(7):599-605.

Programme Stages

- Examine local associations between anaemia, transfusion & outcome
- Agree pathway
- Monitor implementation

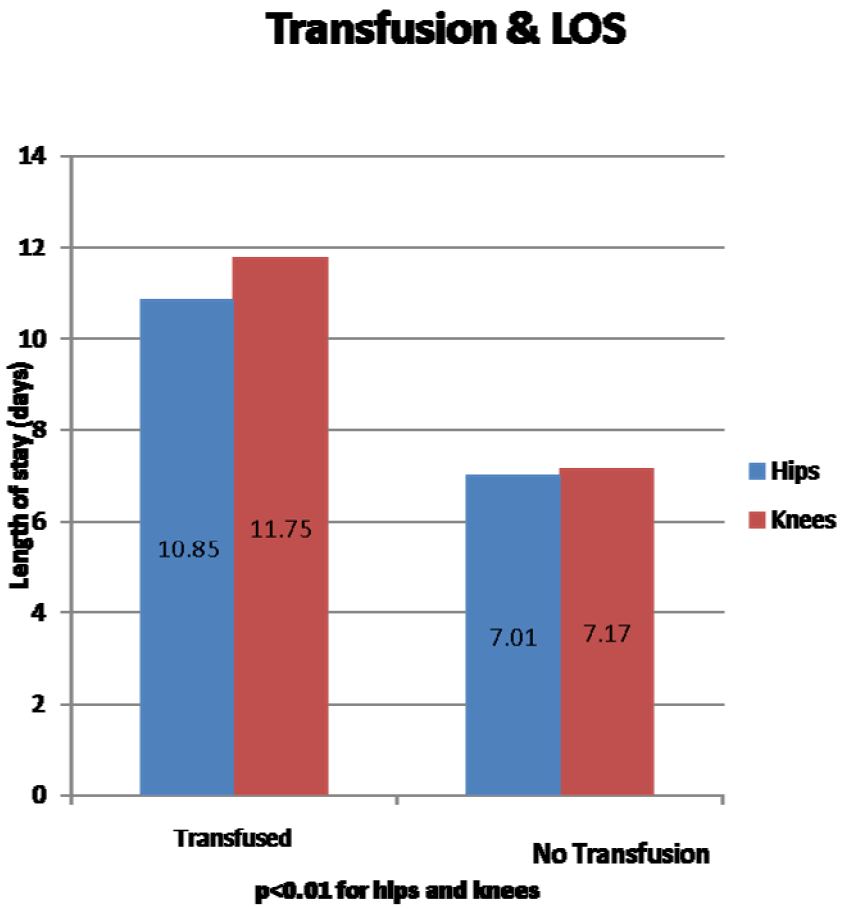
The ANHSFT Project: Local associations

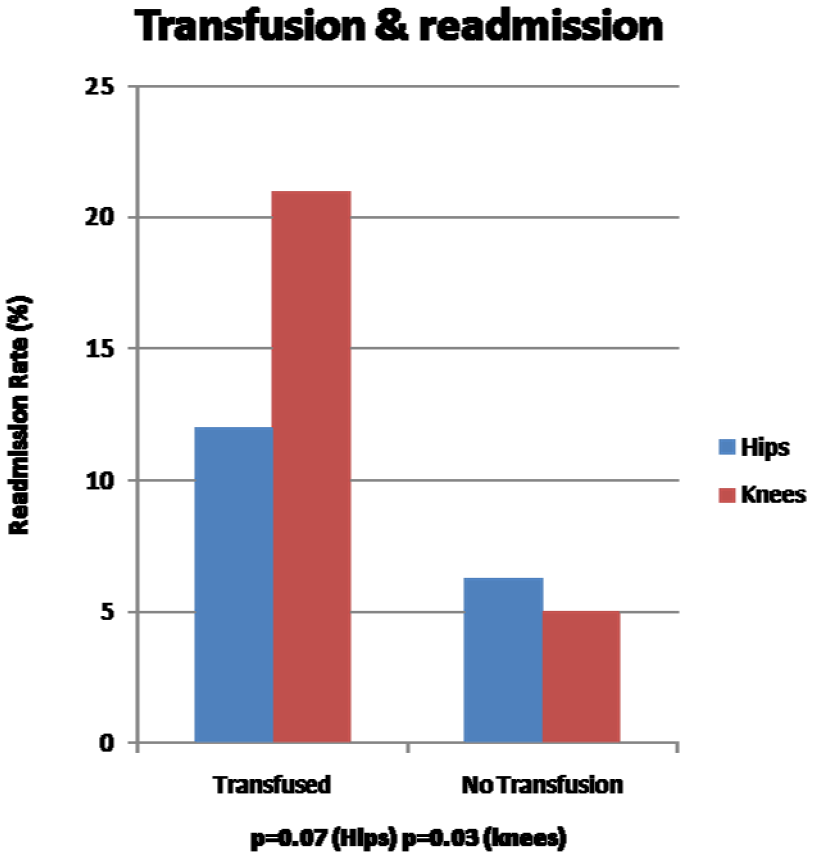




- p<0.001 for THR and TKR (accounting for age, gender, surgeon, ASA score)

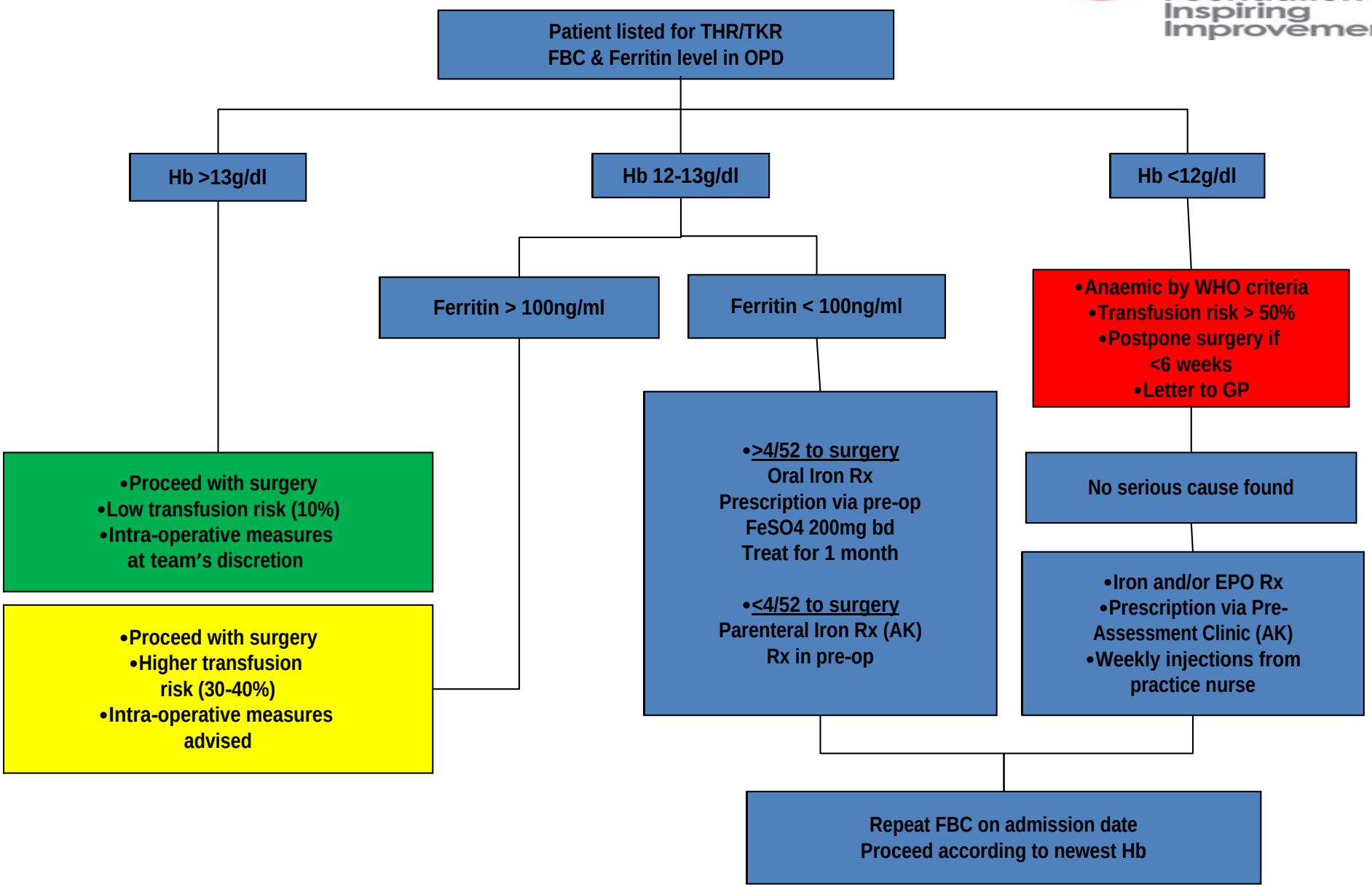
The ANHSFT Project: Local associations





Airedale NHS
NHS Foundation Trust

The Health Foundation
Inspiring Improvement



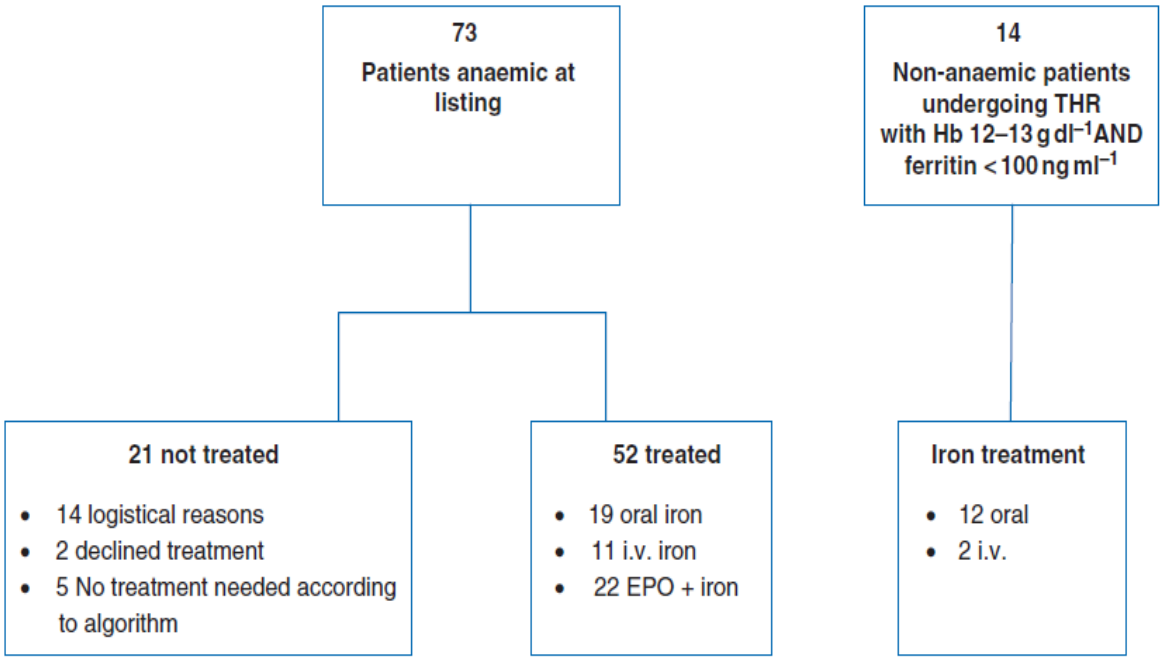


Fig 5 Patients treated during programme implementation.

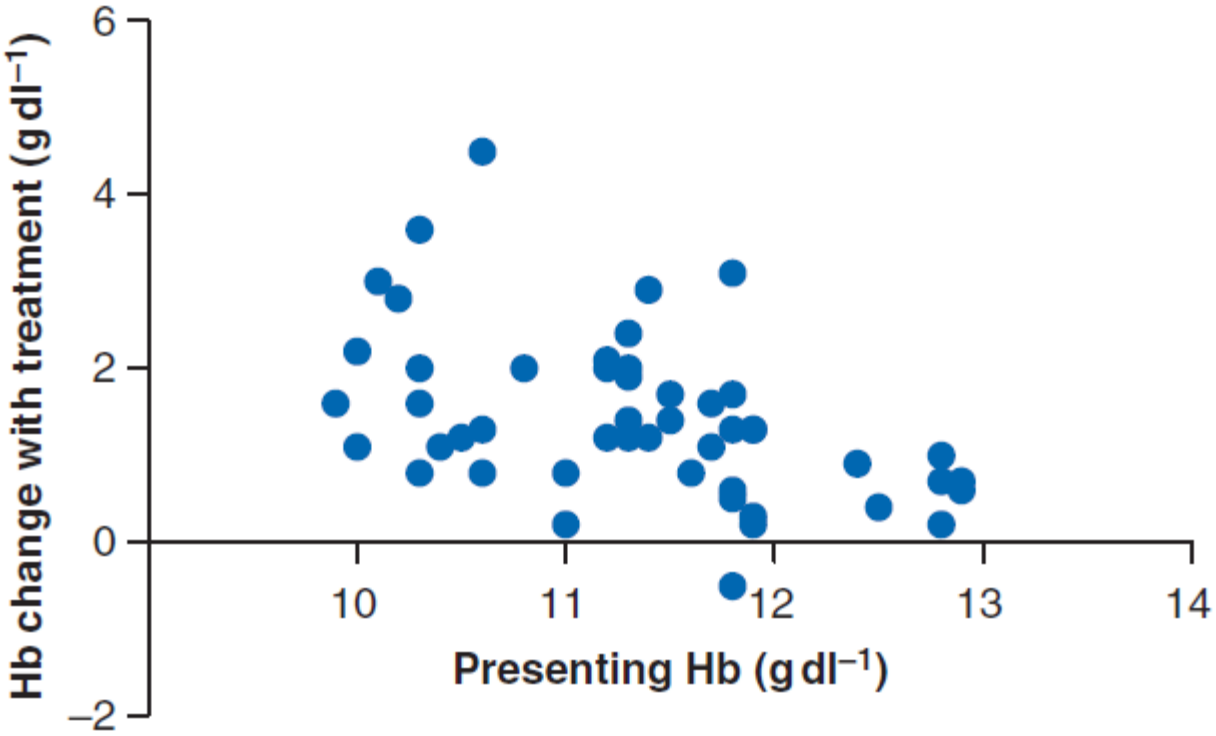


Fig 6 Hb response in patients offered preoperative treatment. Scatter plot showing individuals' Hb concentration at surgical decision to list for arthroplasty, against the Hb change achieved with treatment.

Table 6 Before-and-after comparisons. Continuous data expressed as median (IQR). $^{\dagger}P=0.02$; $^{*}P<0.01$; $^{**}P<0.001$

	Before	After
Female:male ratio	412:305	155:126
TKR:THR ratio	356:361	123:158
ASA score	2 (2–2)	2 (2–3)
Age (yr)	72 (65–78)	74* (66–80)
Anaemia prevalence at decision for surgery	166/684	73/281
Nadir Hb in transfused patients (g dl^{-1})	7.8 (7.2–8.7)	7.6 (7.3–9.2)
Discharge Hb (g dl^{-1})	10.4 (9.5–11.4)	10.4 (9.4–11.0)
Hb loss: THR (g dl^{-1})	3.8 (2.9–4.9)	3.1** (1.9–4.6)
Hb loss: TKR (g dl^{-1})	3.1 (1.9–4.6)	2.6* (2.0–3.3)
Received ABT: THR	83/361	12**/158
Received ABT: TKR	24/356	0**/123
Length of stay (days): THR	6 (5–8)	5** (3–7)
Length of stay (days): TKR	6 (5–8)	4** (3–6)
Readmitted within 30 days	49/717	12/281
Readmitted within 90 days	97/717	23†/281

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The ANHSFT Project: Cash data

- Project itself funded externally
  - The Health Foundation "Shine initiative"
  - "Cash is King!"

- Spend: £15070 (EPO) + £1625 (IV Iron) = £16695
- Save: 101 x £125 = £12625
- Net "cash cost" = £14.48 per patient in programme (n=281)

The ANHSFT Project: Return on Investment

British Journal of Anaesthesia **108** (6): 889–92 (2012)
doi:10.1093/bja/aes166

EDITORIAL

Patient blood management is a win-win: a wake-up call

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[3]Faculty of Health Sciences, Curtin University, Perth, Australia

* Corresponding author. E-mail: donat.spahn@usz.ch

"Drug costs were low (£16 695) and largely offset by the costs of avoided RBC transfusion (£12 625). However, as acknowledged by the authors, they used blood bank acquisition costs for RBC for their calculation and not activity-based costs *which are three to four times higher.*8 "

"It is important to note that they did not account for 404 fewer days of hospitalization and that 16 fewer patients were re-admitted within 90 days after operation. Using an estimated average cost of £400 per hospital stay day in the UK and several thousand pounds for re-admissions, the *PBM team would have achieved a net saving of over £160 000."*

Practical experience of implementing optimisation

- Primarily a process challenge
- Pathway analysis essential
- Anaemia highly prevalent, not frequently serious of itself
- Most patients just need iron!
- Modest cash cost at worst, probably “cash-neutral”.
- Substantial activity cost savings