University Hospitals of North Midlands NHS
NHS Trust

# Anaemia management – putting it into practice.

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Consultant Anaesthetist UHNM

"Being a place our families would choose"

PROUD TO CARE

- The story so far:
  - Anaemia is associated with transfusion.
  - The more anaemic you are pre op the more likely you are to require a transfusion.
  - Anaemia is associated with increased post op morbidity & mortality – independent of transfusion.

THE LANCET

Articles

# Preoperative anaemia and postoperative outcomes in non-cardiac surgery: a retrospective cohort study

*Khaled M Musallam, Hani M Tamim, Toby Richards, Donat R Spahn, Frits R Rosendaal, Aida Habbal, Mohammad Khreiss, Fadi S Dahdaleh, Kaivan Khavandi , Pierre M Sfeir, Assaad Soweid, Jamal J Hoballah, Ali T Taher, Faek R Jamali*

US Veterans Database (NSQIP) (n=227,425)

Anaemia (n=69,229; 30.4%)

30 day mortality

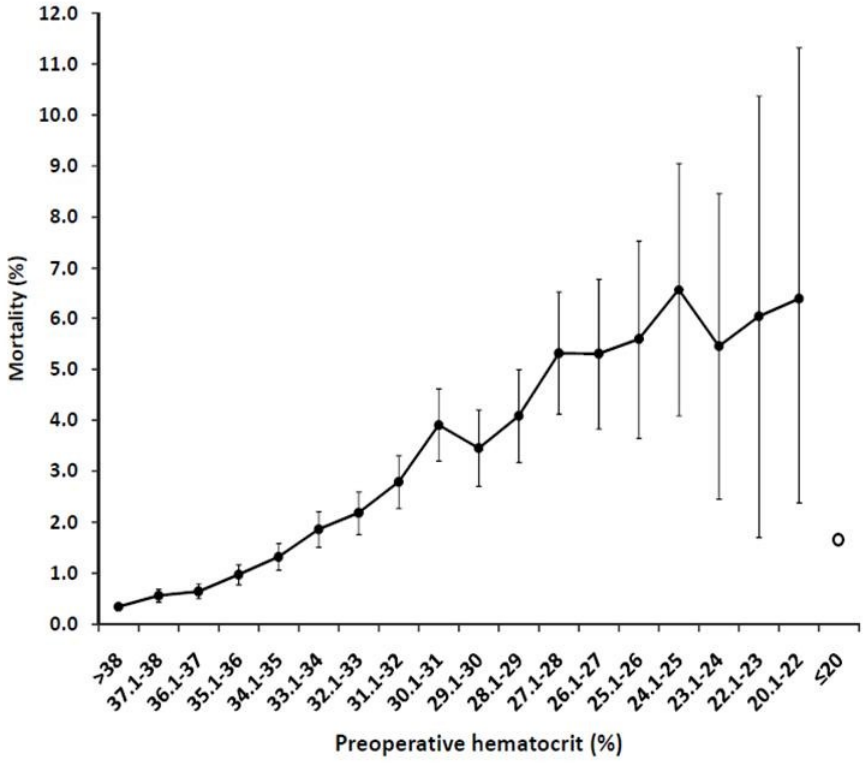
30 day composite morbidities (9 defined areas)

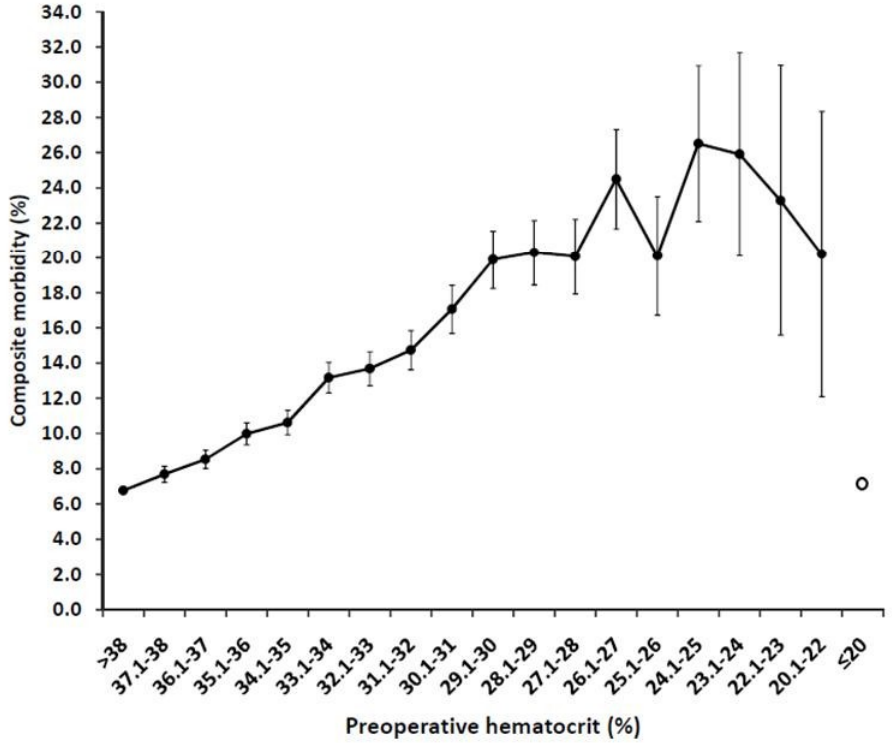
Multivariate regression

(9 defined subgroups)

(56 cofactors)

# EFFECT OF ANAEMIA ON OUTCOME



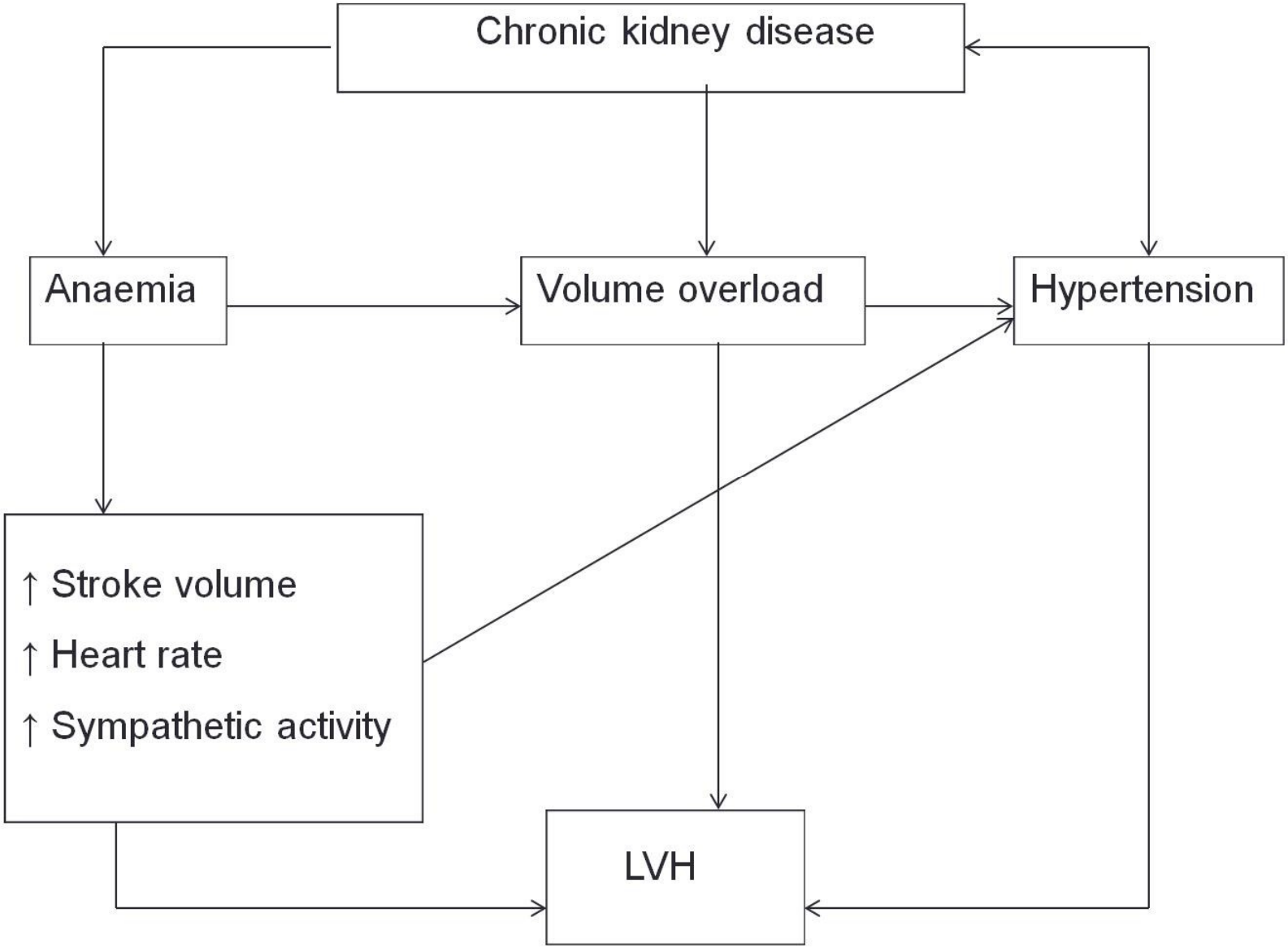
# Oxygen delivery

$$\mathbf{DO_2 = C.O. \times [Hb\ g/l]} \times SaO_2 \times 1.34 \times 10^{-5}$$

But – how much oxygen do we really need to deliver?

At Hb of 150g/l approx 200ml O2 per litre of blood.

Only utilise 200ml O2 at rest




LVH in CKD patients (Mann JF, Nephrol, Dial Transplant 1999;14(Suppl 2):29-36)

- Supposition, correcting pre op anaemia will reduce:
  - Requirement for transfusion
  - Reduce morbidity and mortality
  - Reduce length of stay
  - Reduce cost of health care

  - PREVENTT trial (PREoperative intraVENous iron To Treat anaemia in major surgery)

- PREVENTT
  - Major surgery
  - Hb >90g/litre <120g/litre
  - Single dose of iv iron

- Logistical problems
  - Infusion 14 – 42 days pre op.

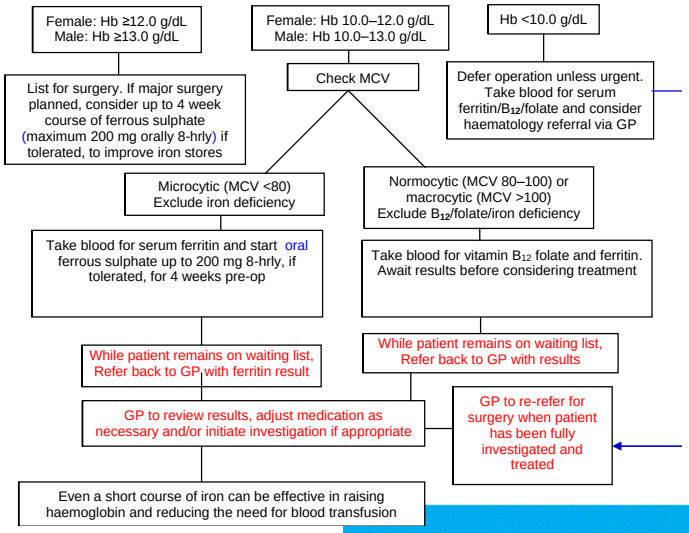
- We already have guidelines:
  - West Mercia clinical guidelines
  - West Midlands RTC guidelines

## PRE-OPERATIVE MANAGEMENT – HAEMATOLOGY

### HAEMOGLOBIN

- Investigate and treat unexpected anaemia. Anaemia is defined by WHO as Hb <13 g/dL in men and Hb <12 g/dL in women. See **Algorithm for management of unexpected pre-operative anaemia**
- in patients with shortness of breath or worsening angina caused by anaemia, consider blood transfusion – see **Chronic anaemia – transfusion flowchart** in **Medical** guidelines and postpone operation until asymptomatic
- Prescribe oral iron for patients with surgical conditions known to predispose to ongoing blood loss from time of diagnosis until condition treated
- if surgery urgent (cancer surgery) or operation required within 2 weeks, consider pre-operative use of intravenous iron, vitamin $B_{12}$ injections and folate as guided by assays; use blood transfusion only when there has been insufficient response to haematinic agents and patient is symptomatic of anaemia
- In patients with anaemia associated with chronic diseases, such as chronic renal failure or rheumatoid arthritis with Hb <12 g/dL, consider intravenous iron to treat functional iron deficiency state
- such patients may subsequently undergo surgery, despite a persistently low Hb, but take into account risk of bleeding during surgery and discuss transfusion requirements with blood bank taking in to account the **Maximum surgical blood ordering schedule (MSBOS)** guideline and patient's usual haemoglobin level
- **if pre-operative** patient has iron deficiency or functional iron deficiency state and is unable to take/tolerate oral iron, treat as soon as possible with IV iron as out-patient after checking with consultant surgeon

**Algorithm for management of unexpected pre-operative anaemia**



# Guidelines for the Management of Anaemia in Pre-operative Assessment Clinics (2007)

West Midlands RTC

## Some key recommendations:

www.transfusionguidelines.org.uk

The GP should **identify and treat anaemia before referral** wherever possible

Pre-operative assessment should take place **at least 4 weeks prior to surgery**, and ideally immediately following the decision to operate

All patients who are identified as at risk of requiring a blood transfusion should **have FBC assessed at PAC**. These patients should also be given information about the possibility of requiring a blood transfusion

All FBC **results should be reviewed within 2 working days**
The **definition of anaemia** should be based on **WHO classifications**
Male Hb <13g/dl / Female Hb <12g/dl

Anaemic **results should be seen by a member of the clinical team who has sufficient authority** to commence treatment, refer for further investigation or delay surgery.

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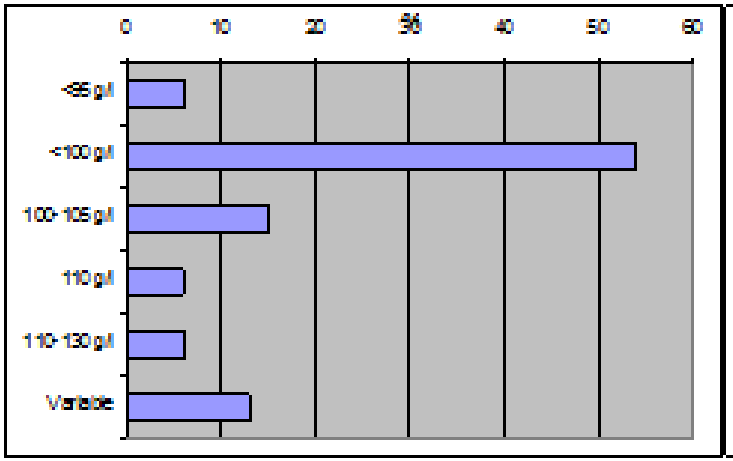
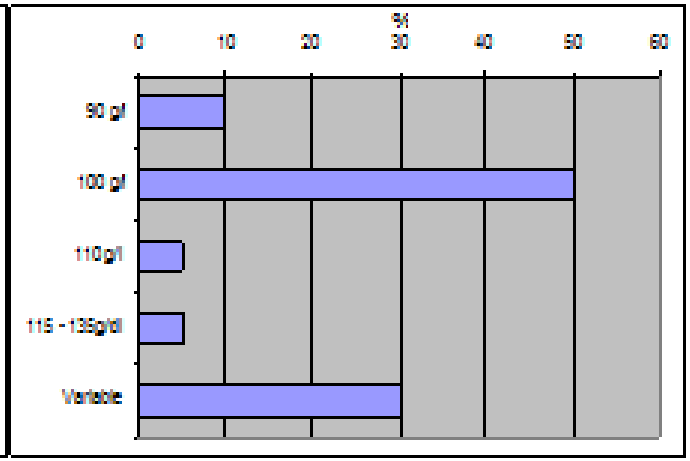
# Hb level at which action is taken in fit patients under the age of 65

2005 survey




2013 survey

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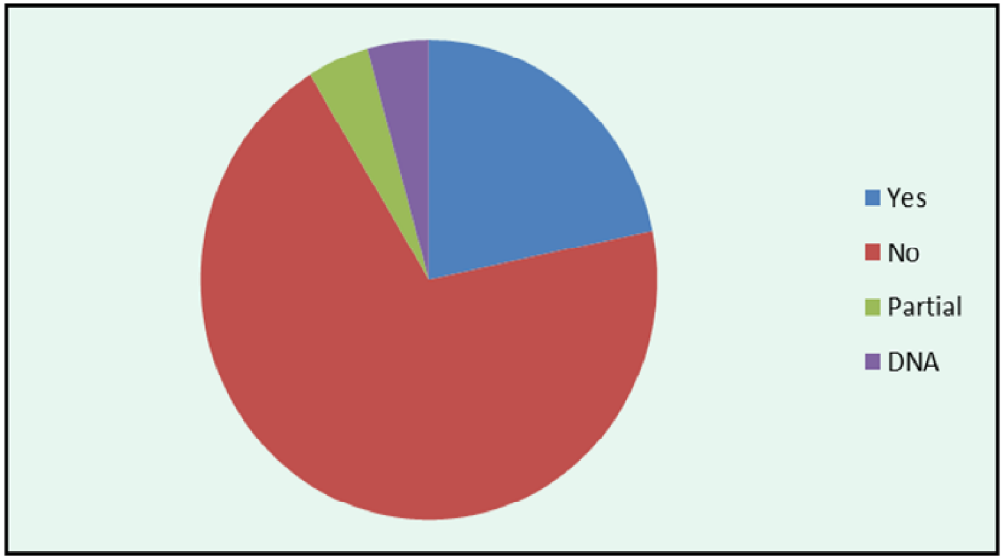
# Is treatment of anaemia initiated by the POAC– 2013 survey results only




## If yes – what treatments are initiated?

| | Routinely | Regularly | Rarely | Never |
|---|---|---|---|---|
| Oral Iron | 2 | 1 | 2 | 0 |
| IV iron | 0 | 1 | 0 | 3 |
| Transfusion | 1 | 2 | 2 | 0 |

- Battles to be fought:
  - Availability of suitable iv iron preparation
  - Selection of appropriate treatment once anaemia identified
  - Recognition of anaemia
  - Somewhere to give iv iron
  - Someone to give iv iron
  - Control of the waiting lists

| Formulation | Iron Dextran | Iron Sucrose | Ferric Carboxymaltose | Iron Isomaltozide |
|---|---|---|---|---|
| **Maximum single dose** | 20mg/kg body weight | 200mg | 20mg/kg body weight, maximum 1000mg per dose | 20mg/kg body weight |
| **Dosage regimen** | Single total dose infusion possible | Repeated doses up to 3 times per week | Single total dose infusion possible | Single total dose infusion possible |
| **Incidence of adverse reactions** | 5% non-serious<br><br>Anaphylactoid reactions 1:100-1:1000<br><br>Anaphylaxis <1:10 000 | 0.5 -1.5% non-serious<br><br>Anaphylactoid Reactions 1:1000 – 1:10 000 | 3% non-serious<br><br>Anaphylactoid reactions 1:100 – 1:1000 | >1% non-serious<br><br>Anaphylactoid reactions 1:100 – 1:1000<br><br>Anaphylaxis <1:10 000 |
| **Test dose required?** | Yes | First treatment only | No | No |
| **Duration of infusion** | 4-6 hours | 2-5 minutes | 15 minutes | 30 minutes (up to 10mg/kg)<br><br>60 minutes (up to 20mg/kg) |
| **Cost per gram of elemental iron** | £79.70 | £93.50 | £191.00 | £169.50 |

# Equivalence of delivering 1000mg of iron to a non compromised patient

| | Oral iron | Intravenous iron | Blood transfusion |
|---|---|---|---|
| Background | Commonly ferrous sulphate or fumarate. | Traditionally bound to dextran, newer compounds bound to Carbohydrates | Blood is donated by volunteers, it is screened for a number of diseases. |
| Risks | Upset tummy, diarrhoea, constipation | Skin staining if extravasates, <1 in 10,000 risk of anaphylaxis | Transfusion reactions, wrong blood, infections, immunomodulation, can no longer donate. |
| Benefits | Will feel better over a few weeks | Will feel better over a few weeks | Will feel better very soon |
| Time taken | 6 months | As little as 30mins | 9-12 hours |
| Costs | £10 | Up to £200 | Over £375 |
| comments | Outpatient treatment | Outpatient treatment | In/outpatient treatment |

- Recognition of anaemia
  - Talk to the pre operative assessment nurses
  - Referrals made to me
  - Treatment initiated – Consultants advised

  - Talk on stat & mandatory training to Consultant staff

# Investigations for anaemia

- FBC
  - Hb >120g/l for women, >130g/l for men
  - MCV 80 – 100fl
  - MCHb 26.5 – 31.5pg
- B12 200-900pg/ml
- Folate 3-12pg/ml
- Ferritin 20-300µg/L
- Serum iron 13 - 32µmol/L
- Transferrin 1.68-3.36g/L
- Transferrin saturation 20-40%
- Reticulocyte count (analyser dependent)
- %hypochromic red cells normal <2.5%. If >10% definitely iron deficient (sample needs to be <4 hours old)

# Why do patients bleed? Causes of anaemia

- Not enough substrate (dietary deficiency)
- Losing it faster than you can make it (Cancer / menorrhagia)
- Functional iron deficiency
- Losing it faster than you can make it (massive haemorrhage)
- Bone marrow failure

# Lady with menorrhagia (1)

| Item Name | 24/07/2013 10:58 | | | | |
|---|---|---|---|---|---|
| Ferritin. | | | | | |
| Haemoglobin | 96 | | | | |
| White Cell Count | 5.7 | | | | |
| Platelet Count | 359 | | | | |
| Red Blood Cell | 4.28 | | | | |
| Haematocrit | 0.32 | | | | |
| Mean Cell Volume | 74.8 | | | | |
| Mean Cell Haemoglobin | 22.5 | | | | |
| Absolute Neutrophil Count | 3.8 | | | | |
| Absolute Lymphocyte Count | 1.4 | | | | |
| Absolute Monocyte Count | 0.2 | | | | |
| Absolute Eosinphil Count | 0.1 | | | | |
| Absolute Basophil Count | 0 | | | | |
| Absolute Large Unstained Cell Count | 0.1 | | | | |
| ESR. | 5 | | | | |
| Prothrombin INR. | | | | | |
| APTT Ratio | | | | | |

# Lady with menorrhagia (2)

| Item Name | 24/07/2013 10:58 | 19/02/2014 13:15 | | | |
|---|---|---|---|---|---|
| Ferritin. | | 4 | | | |
| Haemoglobin | 96 | 97 | | | |
| White Cell Count | 5.7 | 6.7 | | | |
| Platelet Count | 359 | 388 | | | |
| Red Blood Cell | 4.28 | 4.19 | | | |
| Haematocrit | 0.32 | 0.31 | | | |
| Mean Cell Volume | 74.8 | 74.3 | | | |
| Mean Cell Haemoglobin | 22.5 | 23.2 | | | |
| Absolute Neutrophil Count | 3.8 | 4 | | | |
| Absolute Lymphocyte Count | 1.4 | 2 | | | |
| Absolute Monocyte Count | 0.2 | 0.3 | | | |
| Absolute Eosinphil Count | 0.1 | 0.2 | | | |
| Absolute Basophil Count | 0 | 0 | | | |
| Absolute Large Unstained Cell Count | 0.1 | 0.1 | | | |
| ESR. | 5 | 2 | | | |
| Prothrombin INR | | | | | |
| APTT Ratio | | | | | |

# Lady with menorrhagia (3)

| Item Name | 24/07/2013 10:58 | 19/02/2014 13:15 | 25/07/2014 00:00 |
|---|---|---|---|
| Ferritin. | | 4 | 5 |
| Haemoglobin | 96 | 97 | 67 |
| White Cell Count | 5.7 | 6.7 | 5.8 |
| Platelet Count | 359 | 388 | 415 |
| Red Blood Cell | 4.28 | 4.19 | 3.57 |
| Haematocrit | 0.32 | 0.31 | 0.23 |
| Mean Cell Volume | 74.8 | 74.3 | 65.3 |
| Mean Cell Haemoglobin | 22.5 | 23.2 | 18.9 |
| Absolute Neutrophil Count | 3.8 | 4 | 3.9 |
| Absolute Lymphocyte Count | 1.4 | 2 | 1.4 |
| Absolute Monocyte Count | 0.2 | 0.3 | 0.3 |
| Absolute Eosinphil Count | 0.1 | 0.2 | 0.1 |
| Absolute Basophil Count | 0 | 0 | 0 |
| Absolute Large Unstained Cell Count | 0.1 | 0.1 | 0.1 |

# Lady with menorrhagia (4)

| Item Name | 24/07/2013 10:58 | 19/02/2014 13:15 | 25/07/2014 00:00 | 29/07/2014 16:10 | 24/10/2014 15:42 |
|---|---|---|---|---|---|
| Ferritin. | | 4 | 5 | | 6 |
| Haemoglobin | 96 | 97 | 67 | 68 | 110 |
| White Cell Count | 5.7 | 6.7 | 5.8 | 7.3 | 5.4 |
| Platelet Count | 359 | 388 | 415 | 483 | 299 |
| Red Blood Cell | 4.28 | 4.19 | 3.57 | 3.69 | 4.36 |
| Haematocrit | 0.32 | 0.31 | 0.23 | 0.25 | 0.36 |
| Mean Cell Volume | 74.8 | 74.3 | 65.3 | 66.8 | 82.4 |
| Mean Cell Haemoglobin | 22.5 | 23.2 | 18.9 | 18.5 | 25.3 |
| Absolute Neutrophil Count | 3.8 | 4 | 3.9 | 5.2 | 2.8 |
| Absolute Lymphocyte Count | 1.4 | 2 | 1.4 | 1.5 | 2 |
| Absolute Monocyte Count | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 |
| Absolute Eosinphil Count | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 |
| Absolute Basophil Count | 0 | 0 | 0 | 0 | 0 |
| Absolute Large Unstained Cell Count | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| ESR. | 5 | 2 | | | |
| Prothrombin INR. | | | | 1 | 1.1 |
| APTT Ratio | | | | 0.88 | 1.12 |

# Man with SOBOE (1)

| Item Name | 20/06/2014 11:13 | | | | | |
|---|---|---|---|---|---|---|
| Magnesium. | | | | | | |
| Serum B12. | | | | | | |
| Serum Folate. | | | | | | |
| Ferritin. | | | | | | |
| Transferrin. | | | | | | |
| Serum Iron. | | | | | | |
| Transferrin Saturation. | | | | | | |
| Aspartate Transaminase. | | | | | | |
| CRP - Wide Range. | | | | | | |
| Prothrombin INR | | | | | | |
| Haemoglobin | 107 | | | | | |
| White Cell Count | 7 | | | | | |
| Platelet Count | 240 | | | | | |
| Red Blood Cell | 4.61 | | | | | |
| Haematocrit | 0.33 | | | | | |
| Mean Cell Volume | 71.8 | | | | | |
| Mean Cell Haemoglobin | 23.3 | | | | | |
| Absolute Neutrophil Count | 4.9 | | | | | |
| Absolute Lymphocyte Count | 1.1 | | | | | |
| Absolute Monocyte Count | 0.6 | | | | | |
| Absolute Eosinphil Count | 0.2 | | | | | |
| Absolute Basophil Count | 0.1 | | | | | |
| Absolute Large Unstained Cell Count | 0.2 | | | | | |
| Percentage Reticulocyte Count | | | | | | |
| Absolute Reticulocyte Count | | | | | | |
| Direct Antiglobulin Test. | | | | | | |
| APTT Ratio | | | | | | |

# Man with SOBOE (2)

| Item Name | 14/03/2013 08:50 | 20/06/2014 11:13 | | | | |
|---|---|---|---|---|---|---|
| Magnesium. | | | | | | |
| Serum B12. | | | | | | |
| Serum Folate. | | | | | | |
| Ferritin. | | | | | | |
| Transferrin. | | | | | | |
| Serum Iron. | | | | | | |
| Transferrin Saturation. | | | | | | |
| Aspartate Transaminase. | | | | | | |
| CRP - Wide Range. | | | | | | |
| Prothrombin INR. | | | | | | |
| Haemoglobin | 15.3 | 107 | | | | |
| White Cell Count | 8.5 | 7 | | | | |
| Platelet Count | 223 | 240 | | | | |
| Red Blood Cell | 5.35 | 4.61 | | | | |
| Haematocrit | 0.45 | 0.33 | | | | |
| Mean Cell Volume | 84.4 | 71.8 | | | | |
| Mean Cell Haemoglobin | 28.5 | 23.3 | | | | |
| Absolute Neutrophil Count | 5.8 | 4.9 | | | | |
| Absolute Lymphocyte Count | 1.4 | 1.1 | | | | |
| Absolute Monocyte Count | 0.5 | 0.6 | | | | |
| Absolute Eosinphil Count | 0.2 | 0.2 | | | | |
| Absolute Basophil Count | 0.1 | 0.1 | | | | |
| Absolute Large Unstained Cell Count | 0.3 | 0.2 | | | | |
| Percentage Reticulocyte Count | | | | | | |
| Absolute Reticulocyte Count | | | | | | |
| Direct Antiglobulin Test. | | | | | | |
| APTT Ratio | | | | | | |

# Man with SOBOE (3)

| Item Name | 14/03/2013 08:50 | 20/06/2014 11:13 | 14/11/2014 11:30 | | | |
|---|---|---|---|---|---|---|
| Magnesium. | | | | | | |
| Serum B12. | | | 477 | | | |
| Serum Folate. | | | 6.8 | | | |
| Ferritin. | | | Result was 7 ng/mL 17 days ago | | | |
| Transferrin. | | | 3.38 | | | |
| Serum Iron. | | | 5 | | | |
| Transferrin Saturation. | | | 5.7 | | | |
| Aspartate Transaminase. | | | | | | |
| CRP - Wide Range. | | | | | | |
| Prothrombin INR | | | | | | |
| Haemoglobin | 15.3 | 107 | 90 | | | |
| White Cell Count | 8.5 | 7 | 10.7 | | | |
| Platelet Count | 223 | 240 | 276 | | | |
| Red Blood Cell | 5.35 | 4.61 | 4.56 | | | |
| Haematocrit | 0.45 | 0.33 | 0.32 | | | |
| Mean Cell Volume | 84.4 | 71.8 | 71.1 | | | |
| Mean Cell Haemoglobin | 28.5 | 23.3 | 19.8 | | | |
| Absolute Neutrophil Count | 5.8 | 4.9 | 8.2 | | | |
| Absolute Lymphocyte Count | 1.4 | 1.1 | 1.3 | | | |
| Absolute Monocyte Count | 0.5 | 0.6 | 0.7 | | | |
| Absolute Eosinphil Count | 0.2 | 0.2 | 0.2 | | | |
| Absolute Basophil Count | 0.1 | 0.1 | 0.1 | | | |
| Absolute Large Unstained Cell Count | 0.3 | 0.2 | 0.2 | | | |
| Percentage Reticulocyte Count | | | | | | |
| Absolute Reticulocyte Count | | | | | | |
| Direct Antiglobulin Test. | | | | | | |
| APTT Ratio | | | | | | |

# Man with SOBOE (4)

| Item Name | 14/03/2013 08:50 | 20/06/2014 11:13 | 14/11/2014 11:30 | 20/11/2014 14:40 | 21/11/2014 19:24 | 27/11/2014 09:12 |
|---|---|---|---|---|---|---|
| Magnesium. | | | | | | |
| Serum B12. | | | 477 | | | |
| Serum Folate. | | | 6.8 | | | |
| Ferritin. | | | Result was 7 ng/mL 17 days ago | | | |
| Transferrin. | | | 3.38 | | | |
| Serum Iron. | | | 5 | | | 103 |
| Transferrin Saturation. | | | 5.7 | | | |
| Aspartate Transaminase. | | | | 19 | | |
| CRP - Wide Range. | | | | | <4.0 | <4.0 |
| Prothrombin INR | | | | 1.1 | 1.1 | |
| Haemoglobin | 15.3 | 107 | 90 | 69 | 62 | 107 |
| White Cell Count | 8.5 | 7 | 10.7 | 10.6 | 10.8 | 19.6 |
| Platelet Count | 223 | 240 | 276 | 294 | 322 | 263 |
| Red Blood Cell | 5.35 | 4.61 | 4.56 | 3.42 | 3.01 | 4.3 |
| Haematocrit | 0.45 | 0.33 | 0.32 | 0.24 | 0.21 | 0.34 |
| Mean Cell Volume | 84.4 | 71.8 | 71.1 | 71.4 | 71 | 80 |
| Mean Cell Haemoglobin | 28.5 | 23.3 | 19.8 | 20.3 | 20.5 | 24.8 |
| Absolute Neutrophil Count | 5.8 | 4.9 | 8.2 | 8.3 | 8.2 | 17.3 |
| Absolute Lymphocyte Count | 1.4 | 1.1 | 1.3 | 1.2 | 1.4 | 0.9 |
| Absolute Monocyte Count | 0.5 | 0.6 | 0.7 | 0.6 | 0.6 | 0.9 |
| Absolute Eosinphil Count | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0 |
| Absolute Basophil Count | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0 |
| Absolute Large Unstained Cell Count | 0.3 | 0.2 | 0.2 | 0.3 | 0.4 | 0.3 |
| Percentage Reticulocyte Count | | | | 3.2 | | |
| Absolute Reticulocyte Count | | | | 107.9 | | |
| Direct Antiglobulin Test. | | | | Negative | | |
| APTT Ratio | | | | 0.95 | | |

- Failures
  - Time to surgery. CT PET scan but no bloods
  - Last Thursday
  - Control of waiting lists
- Success
  - Upper GI interested in prehabilitation now
  - Last Friday

- Achievements to date:
  - Education of PREAMS staff
  - Referrals from them
  - Referrals from some surgeons
  - >50 iv iron infusions to date
  - No adverse reactions – even in a patient who had previously reacted to iron dextran
  - iv iron given in PREAMS clinics both in County site and Royal site (by me)

University Hospitals of North Midlands NHS

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# Payments for anaemia management

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SA03D | Haemolytic Anaemia with CC | - | 400 | - | - | 18 | 2,586 | 18 | 236 | No | - | - | 1 | HRG |
| SA03F | Haemolytic Anaemia without CC | - | 400 | - | - | 5 | 1,807 | 12 | 236 | No | - | - | 1 | HRG |
| SA04D | Iron Deficiency Anaemia with CC | - | 417 | - | - | 5 | 1,929 | 22 | 236 | No | - | - | 1 | HRG |
| SA04F | Iron Deficiency Anaemia without CC | - | 294 | - | - | 5 | 813 | 6 | 236 | No | - | - | 1 | HRG |
| SA05D | Megaloblastic Anaemia with CC | - | 565 | - | - | 5 | 1,830 | 22 | 236 | No | - | - | 1 | HRG |
| SA05F | Megaloblastic Anaemia without CC | - | 274 | - | - | 5 | 1,124 | 16 | 236 | No | - | - | 1 | HRG |

- Best practice tariff

| | | | | | | |
|---|---|---|---|---|---|---|
| SA03D | Haemolytic Anaemia with CC | Anaemia | 2,828 | 2,586 | HRG | BP54 |
| SA03F | Haemolytic Anaemia without CC | | 2,050 | 1,807 | | |
| SA04D | Iron Deficiency Anaemia with CC | | 2,171 | 1,929 | | |
| SA04F | Iron Deficiency Anaemia without CC | | 1,055 | 813 | | |
| SA05D | Megaloblastic Anaemia with CC | | 2,072 | 1,830 | | |
| SA05F | Megaloblastic Anaemia without CC | | 1,366 | 1,124 | | |

"Being a place our families would choose"

PROUD TO CARE

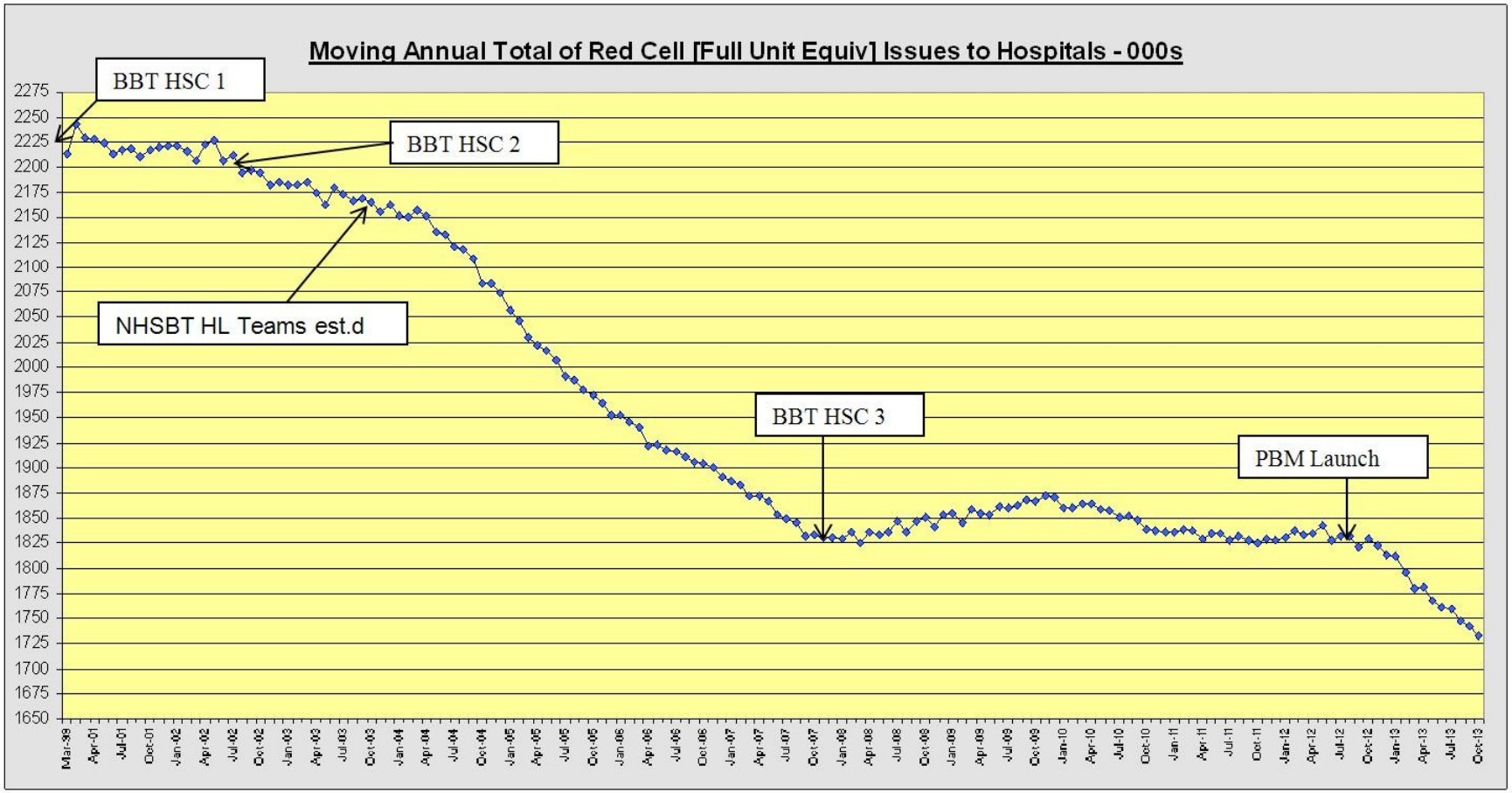
51 yr old lady
1st infusion on 6th March
2nd infusion 20th March,
TAH on 29th April LOS 4 days

| Item Name | 04/02/2013 11:53 | 20/03/2013 00:00 | 16/04/2013 13:39 | 30/04/2013 10:35 |
|---|---|---|---|---|
| Ferritin. | | 235 | 241 | |
| Transferrin. | | 2.47 | | |
| Serum Iron. | | 38 | | |
| Transferrin Saturation. | | 59.1 | | |
| Haemoglobin | 8.9 | 11.6 | 131 | 128 |
| White Cell Count | 6.8 | 6.9 | 6.2 | 10.3 |
| Platelet Count | 338 | 261 | 245 | 243 |
| Red Blood Cell | 4.26 | 5.12 | 4.8 | 4.54 |
| Haematocrit | 0.29 | 0.37 | 0.39 | 0.39 |
| Mean Cell Volume | 68 | 72.8 | 82 | 84.9 |
| Mean Cell Haemoglobin | 20.9 | 22.7 | 27.3 | 28.2 |

94 yr old man
1st infusion 4th December 2013
2nd infusion 11th December 2013
open Rt hemicolectomy, 10th Feb 14 LOS 4 days

| Name | 28/11/2013 | 11/12/2013 | 10/02/2014 | 11/02/2014 | 13/02/2014 | 31/07/2014 |
|---|---|---|---|---|---|---|
| Transferrin. | | 2.99 | | | | |
| Serum Iron. | | 13 | | | | |
| Transferrin Saturation. | | 16.7 | | | | |
| Ferritin. | | 592 | | | | |
| Haemoglobin | 68 | 85 | 129 | 90 | 107 | 143 |
| Haematocrit | 0.25 | 0.3 | 0.41 | 0.29 | 0.33 | 0.46 |
| Mean Cell Volume | 71.2 | 79.9 | 94.7 | 93.7 | 94.5 | 95.6 |
| Mean Cell Haemoglobin | 19.8 | 23.1 | 29.6 | 29.7 | 30.3 | 30 |

# CHANGE IN RED CELL USAGE 1999-2013



- What will improve anaemia management?
  - Editorials and journal articles (BMJ & BJA)
  - Peer pressure
  - Systems approach

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Editorial

Editorial

## Non-treatment of preoperative anaemia is substandard clinical practice

It is well known that preoperative anaemia is frequent and associated with increased mortality and morbidity, even if only mild anaemia is present.[1,2] In addition, preoperative anaemia is one of the most significant risk factors in subsequent red blood cell transfusion,[3] which in itself has adverse effects on mortality and morbidity.[4] Therefore, unmanaged preoperative anaemia is a contraindication for elective surgery.[5]

In this edition of the *British Journal of Anaesthesia*, Muñoz and colleagues[6] rightly alerted the medical community, reporting that preoperative anaemia is often left untreated. The paradox of known negative consequences of untreated anaemia and current practice is explained by the presentation of 10 widely held misconceptions. Moreover, we identified two additional reasons why physicians are still hesitating to treat preoperative anaemia systematically. First, the World Health Organization's definition of anaemia with a haemoglobin concentration of <120 g litre$^{-1}$ in women and <130 g litre$^{-1}$ in men is not sufficiently known by the majority of physicians. Furthermore, the notion that very mild forms of anaemia (haemoglobin values between 100–120 and 100–130 g litre$^{-1}$, respectively) result in adverse clinical outcomes, such as increased mortality and a long list of complications,[1,2] is also not well known. Second, there may be reluctance by some physicians to treat preoperative anaemia actively, because of the fact that they themselves will be held responsible for any adverse events occurring thereafter. In contrast, a perioperative transfusion in a patient who is anaemic before surgery is considered by most an inevitable event, for which medical staff cannot be held responsible. Therefore, some physicians prefer not to be involved in treating preoperative anaemia. We hope that the refuting by Muñoz and colleagues[6] of 10 widely held misconceptions helps pave the way to widespread treatment of preoperative anaemia.

A consortium of four large German University Hospitals (Frankfurt, Münster, Bonn, and Kiel) is engaged in the concept of patient blood management (PBM). The Frankfurt group has shown how to target and implement treatment of preoperative anaemia (ClinicalTrials.gov Identifiers: NCT01820949 and NCT02147795). Their investigation clearly highlights five key success factors (Table 1) for implementing a comprehensive preoperative anaemia treatment programme. The first factor, which is clearly the most important, was establishing a dedicated interdisciplinary PBM steering committee, with preoperative anaemia treatment being the first pillar of PBM.[4] Second, the inclusion and support of senior hospital management is of utmost importance. Only with this support can the necessary reorganization of the preclinical procedures and structures be implemented. Additionally, the understanding of surgical and medical disciplines is crucial to the management and treatment of preoperative anaemia. Last, but not least, focusing our efforts on the knowledge of how operations are regularly performed in anaemic patients, who frequently require allogeneic red blood cell transfusions, is also essential (www.patientbloodmanagement.eu). Such favourable hospital conditions and improvements can be achieved only by continuous education over years and through the coordination of a dedicated interdisciplinary PBM steering committee. Should your hospital not yet have the aforementioned structure, then becoming a leader in PBM and establishing a steering committee is the way forwards.

Other centres have also succeeded in implementing treatment of preoperative anaemia. Theusinger and colleagues[8] contacted the primary physician of each patient found to be anaemic before surgery. These patients were to undergo major orthopaedic surgery (n=8871), with suggested treatment of anaemia using erythropoietin α, i.v. iron, vitamin $B_{12}$ and folic acid. Despite the fact that not all patients who were anaemic before surgery were treated, the incidence of anaemia on the day of operation decreased from 15 to 10% (P<0.01) and total allogeneic transfusion rate reduced from 20 to 10% (P<0.01). Short-term treatment of preoperative anaemia with erythropoietin and i.v. iron has also been shown to be successful in orthopaedic[7] and cardiac surgery.[9] Likewise, a group of four Spanish hospitals recently published their success in short-term preoperative treatment of anaemia with erythropoietin and i.v. iron in 2547 patients undergoing hip and knee arthroplasty or surgery for hip fracture.[9] They could decrease the allogeneic transfusion rate from 37 to 24% (P<0.01), the postoperative infection rate from 12 to 8% (P<0.01), and the length of hospital stay from 12 to 11 days (P<0.01). In patients undergoing surgery for hip fracture, the 30 day mortality was reduced from 9 to 5% (P<0.01).

Through sound scientific evidence, they disproved 10 misconceptions of perioperative anaemia treatment. Moreover, this medical need can be met with successful treatment options.



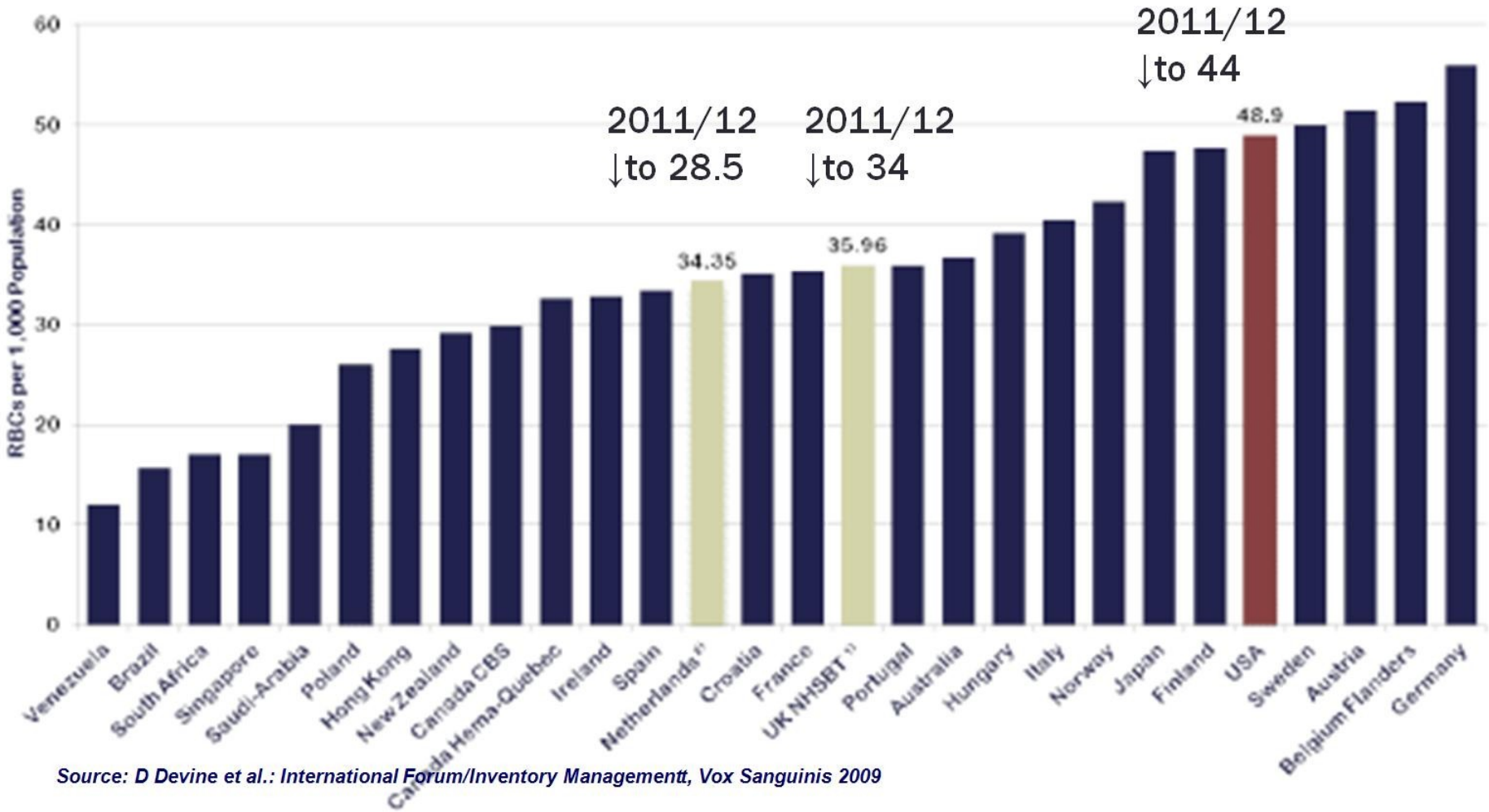




"Being a place our families would choose"

PROUD TO CARE

# GLOBAL RED CELL UTILIZATION RATES: 2008 - 09

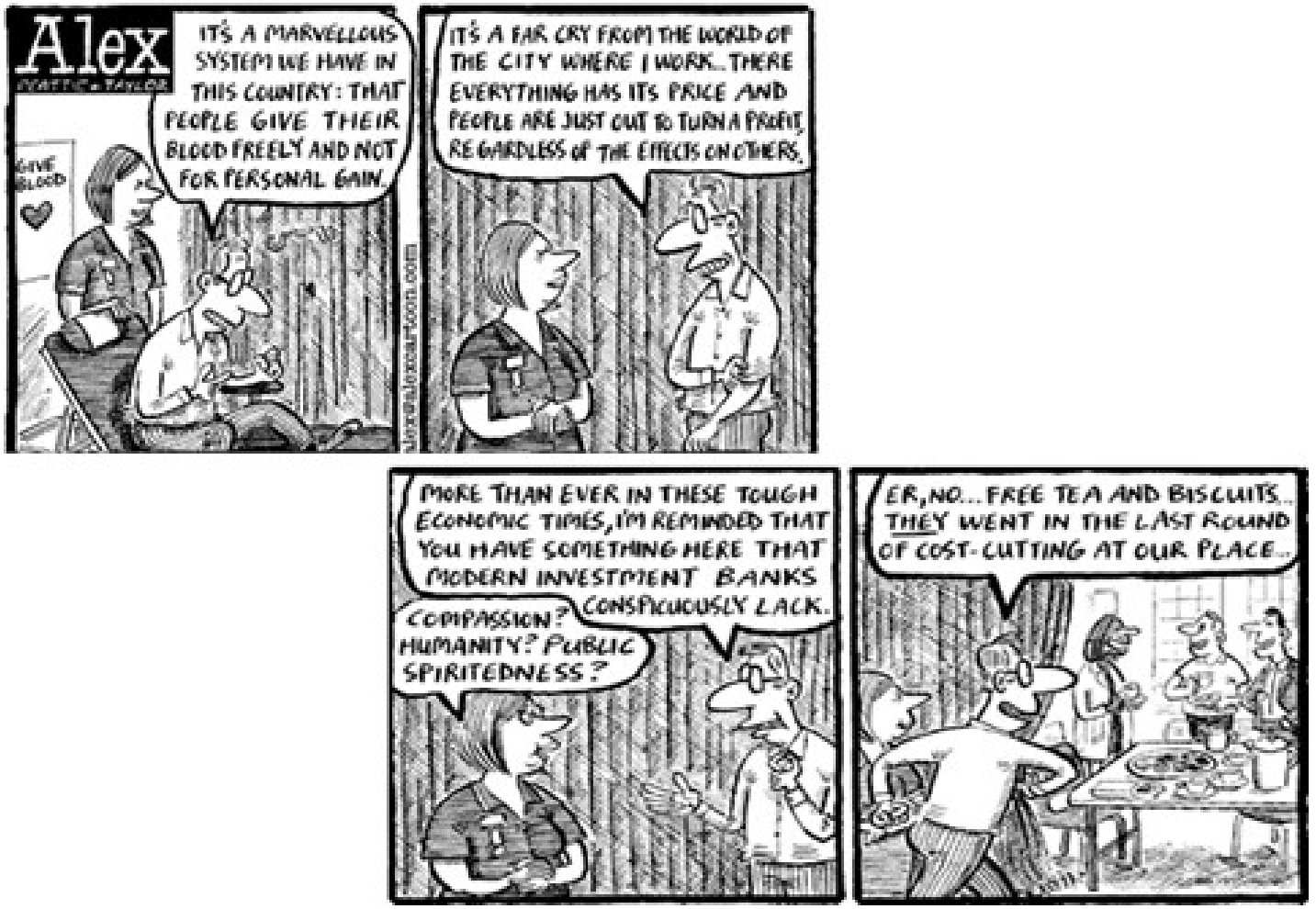



*Source: D Devine et al.: International Forum/Inventory Managementt, Vox Sanguinis 2009*

- Our mission
  - To be un-noticed
  - To ensure all patients turn up in theatre non-anaemic
  - As a consequence – improve outcomes, reduce lengths of stay
  - Let the surgeons take the glory – but be self satisfied that we have made the difference!
  - Ensure that blood is transfused appropriately in all specialties – 25 unit ptp

# University Hospitals of North Midlands

NHS Trust

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