

# **Managing Anaemia in Knee & Hip Replacements**

## **A Quality Improvement Project**

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Clare Casson MCSP

FAST TRACK

=

ENHANCED RECOVERY

=

RAPID RECOVERY

# Knee replacement

- 81000 cases per year in the England and Wales in 2010
- NHS cost almost £450M on TKR
- Increasing



# Tariff

|       |   |        |
|-------|---|--------|
| HB21B | Major Knee Procedures for non Trauma Category 2<br>with CC    | £6,145 |
| HB21C | Major Knee Procedures for non Trauma Category 2<br>without CC | £5,585 |

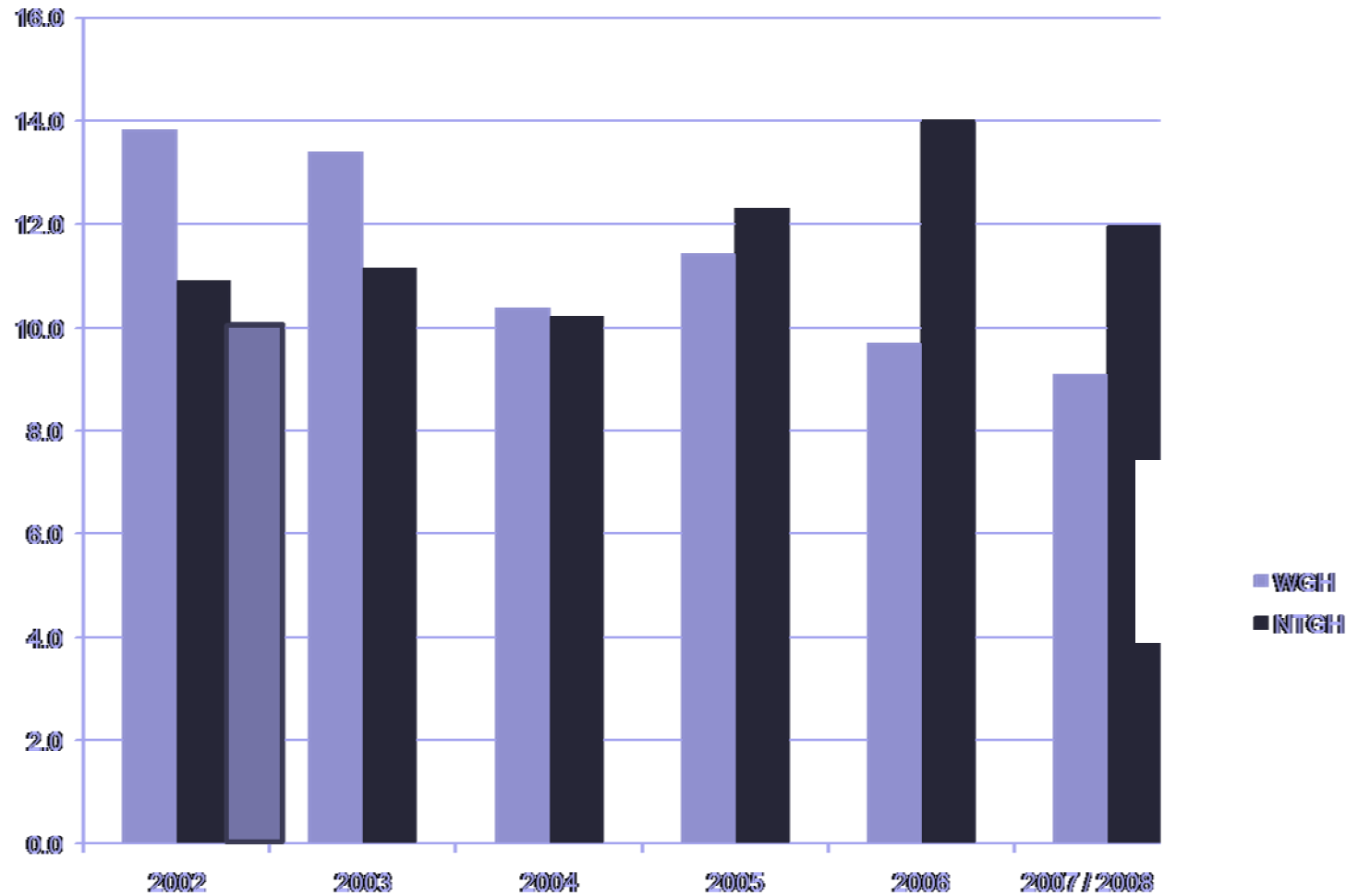
**BPT !!**

**MINUS £232**

- (a) patient aged 19 or over
- (b) elective admission method

- **IMPLANTS**     £900-3000
- **Length of stay (LOS): ?**

# Hip replacements – how long do they stay ?

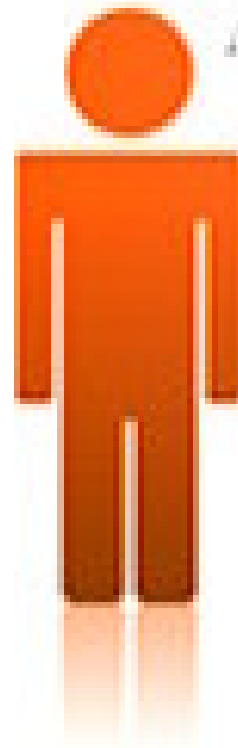
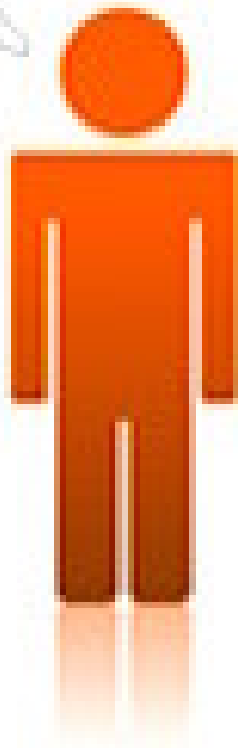


MR

This is bollocks.....

JB

No really, it's  
true....



# Northumbria – Glasgow – April 08

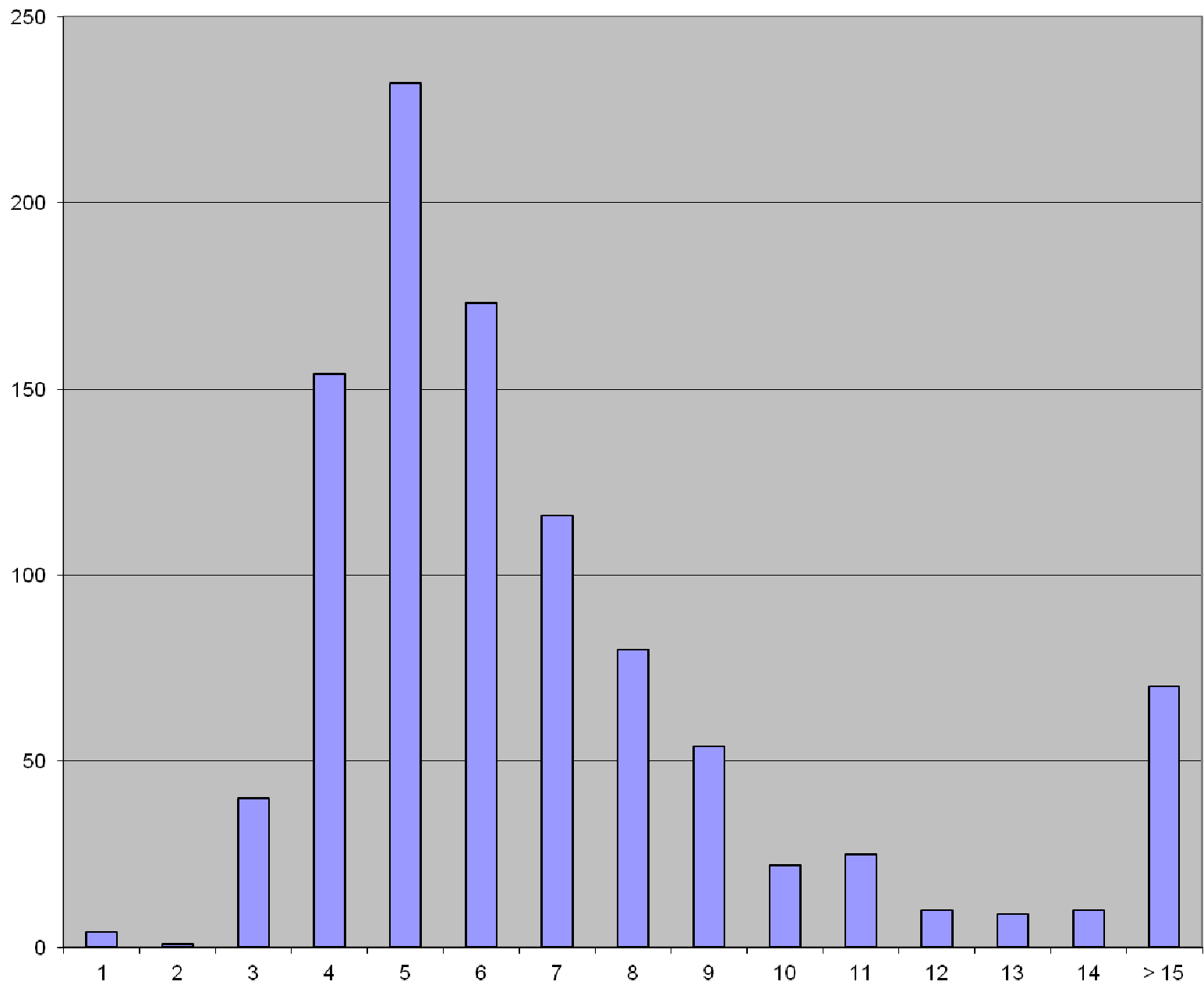
- Manager
- Physio
- Pre-assessment
- Surgeon
- Anaesthetists
- Pain specialist
- Ward nurses
- Matron

# Fast-track protocol for op

- Same day admission
- Pre warming
- Walk to theatre
- No urinary catheter or drains
- Tranexamic acid
- Normal operation
- “Local” given at end of op
- Catheter within joint 24hrs
- Mobilise on day zero

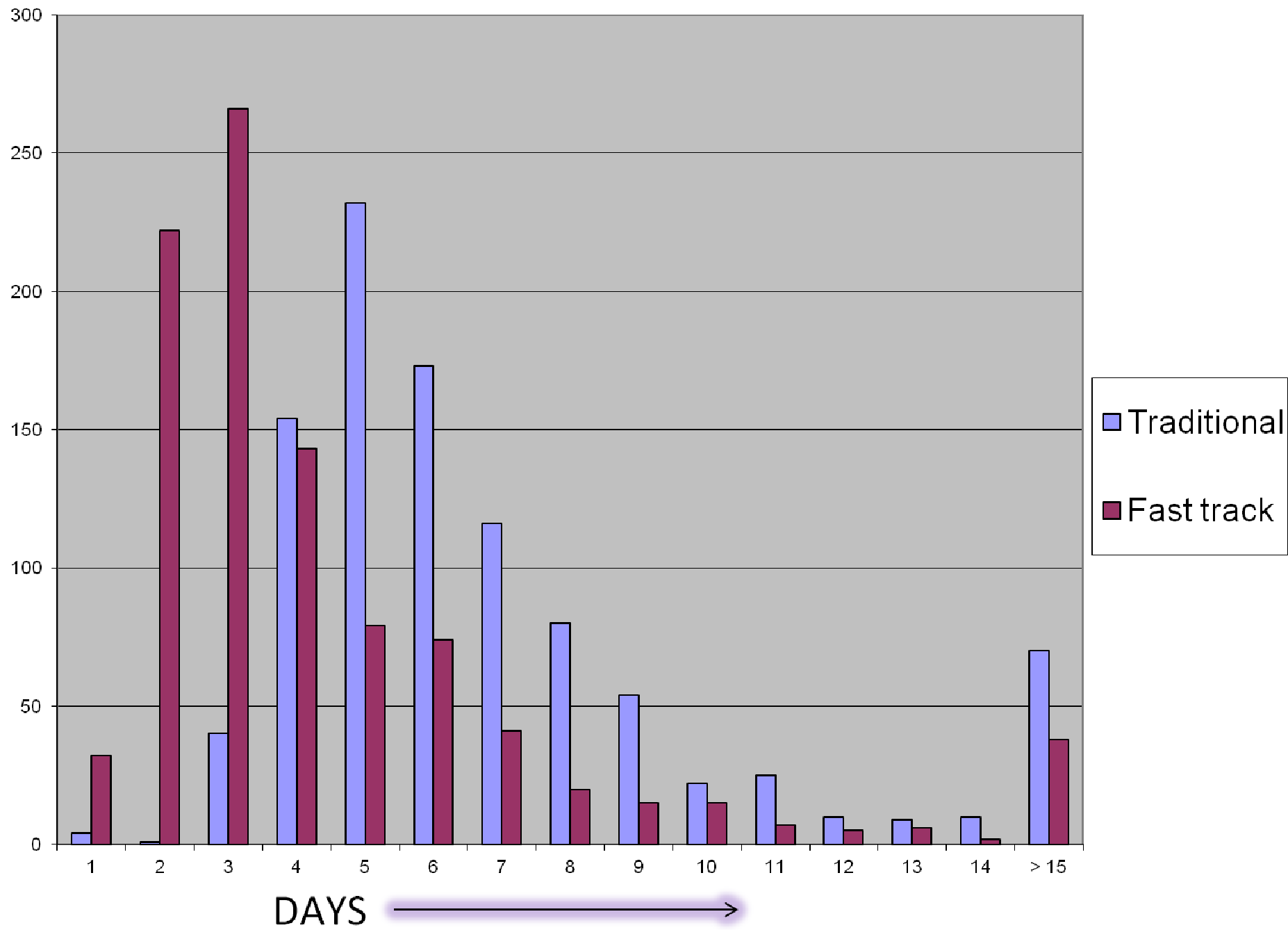






■ Traditional

DAYS →



# Hips and Knees

|             | Traditional | Fast track |
|-------------|-------------|------------|
| Number      | 3000        | 3000       |
| Age (years) | 69          | 68         |
| THR         | 1368        | 1255       |
| TKR         | 1632        | 1745       |
| Mean LOS    | 8.5         | 4.7        |
| Median LOS  | 6           | 3          |

# Costs

- Mean reduction LOS: 3.8 days
  - LOS reduction in this cohort : 11400
  - Cost saving:
    - £4.5M (£400 / day)
    - £3.2M (£285 / day) \*
- £124 million**

\* Jones R. Costing orthopaedic interventions. *British Journal of Healthcare Management* 2008;14-12:539-47.

# Hips and Knees

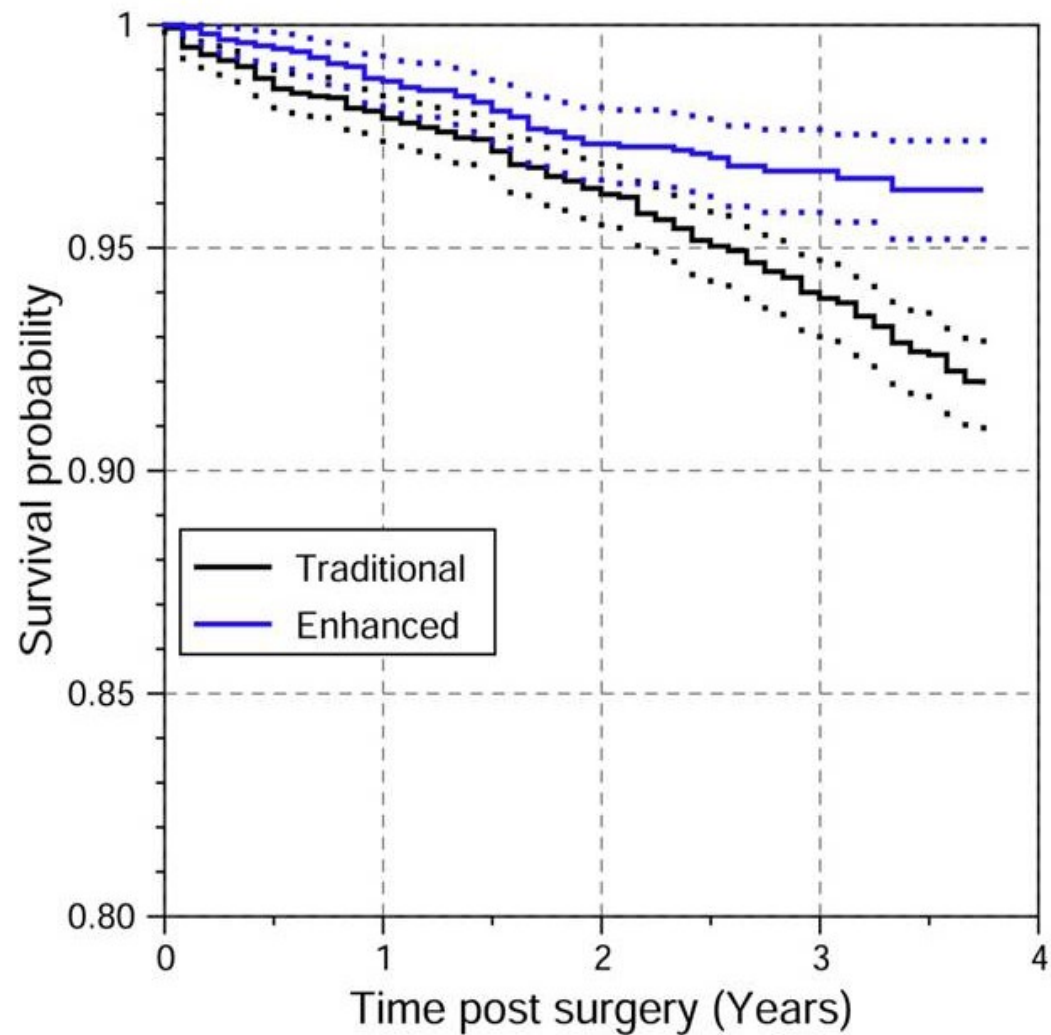
|                   | Traditional | Fast track | P value<br>(Chi squared) |
|-------------------|-------------|------------|--------------------------|
| Total number      | 3000        | 3000       |                          |
| Death (30 day)    | 16 (0.5%)   | 5 (0.2%)   | 0.03                     |
| RTT (30 day)      | 60 (2%)     | 40 (1.3%)  | 0.05                     |
| Stroke (30 day)   | 14 (0.5%)   | 7 (0.2%)   | 0.12                     |
| Pneum (30 day)    | 29 (0.9%)   | 36 (1.2%)  | 0.45                     |
| GI bleed (30 day) | 18 (0.6%)   | 11 (0.4%)  | 0.36                     |
| MI (30 day)       | 26 (0.9%)   | 12 (0.4%)  | 0.03                     |
| DVT (60 day)      | 23 (0.8%)   | 14 (0.5%)  | 0.19                     |
| PE (60 day)       | 36 (1.2%)   | 32 (1.1%)  | 0.71                     |
| Readmission       | 141 (4.7%)  | 139 (4.6%) | 0.95                     |

## **Enhanced recovery program for hip and knee replacement reduces death rate**

**A study of 4,500 consecutive primary hip and knee replacements**

**Ajay Malviya, Kate Martin, Ian Harper, Scott D Muller, Kevin P Emmerson, Paul F Partington, and Mike R Reed**





Source:



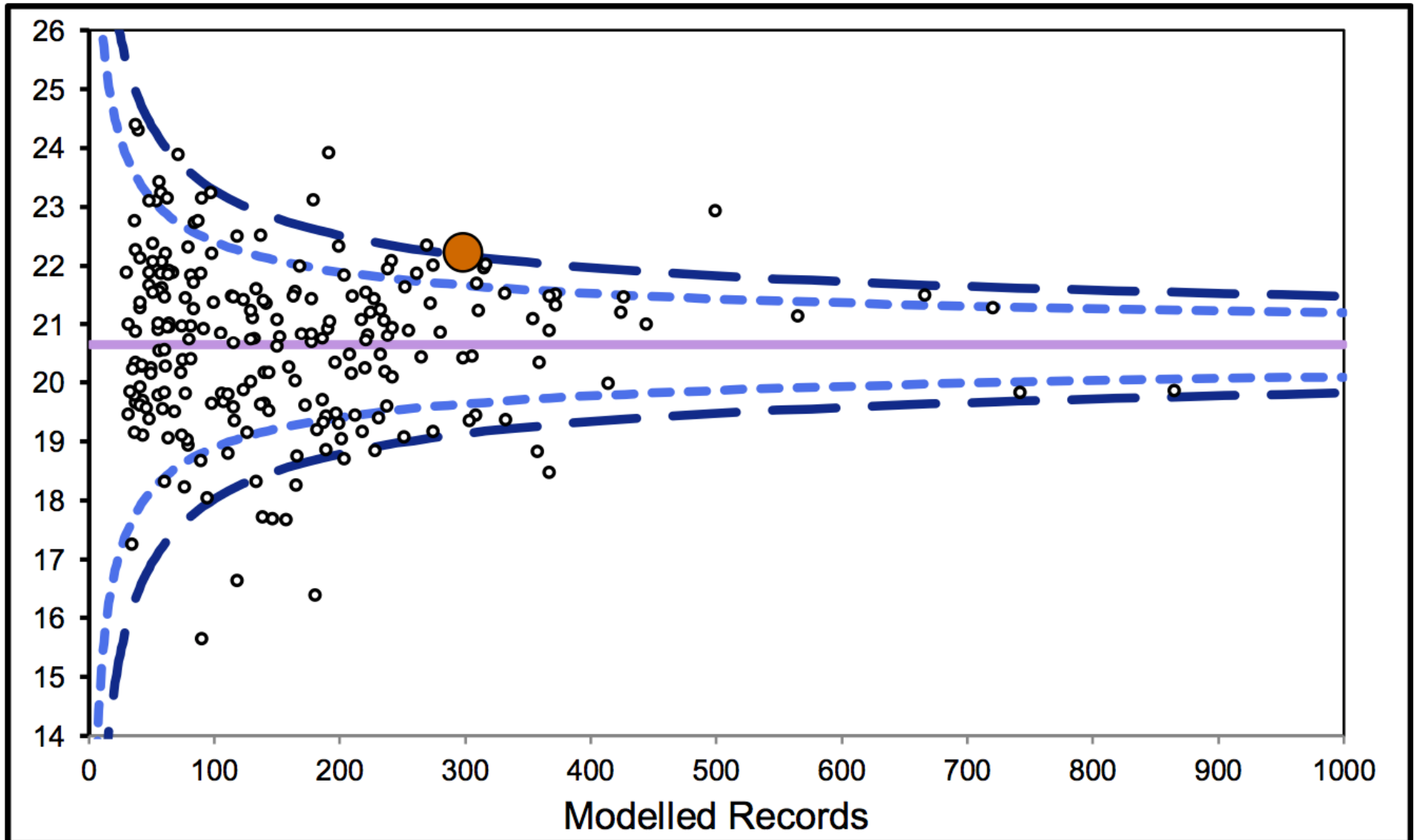
**Survival Probabilities  $\pm 95\%$  C.I.**

|      | Months        |               | Years        |              |              |              |
|------|---------------|---------------|--------------|--------------|--------------|--------------|
|      | 1             | 3             | 1            | 2            | 3            | $\approx 4$  |
| TRAD | 0.995(0.025)  | 0.992(0.003)  | 0.979(0.005) | 0.962(0.007) | 0.939(0.009) | 0.919(0.01)  |
| ER   | 0.999(0.0013) | 0.997(0.0029) | 0.987(0.006) | 0.973(0.008) | 0.967(0.009) | 0.963(0.011) |

#### 4a. PROMs - Improvement in Oxford Hip Score (Primary only)

Timeframe: 2011/12 (May 2013 release)

Adjusted mean health gain for primary hip operations only

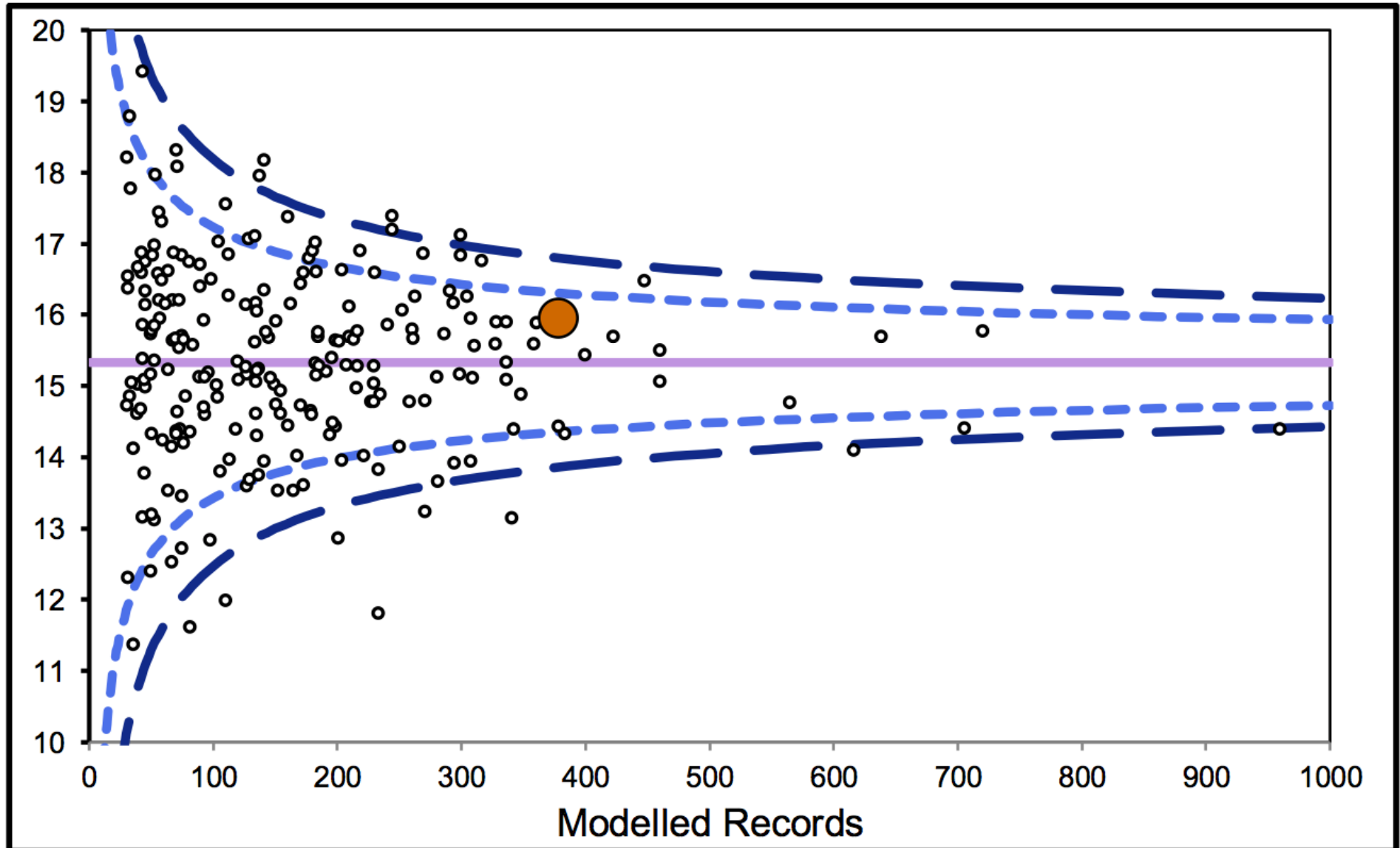




## 4b. PROMs - Improvement in Oxford Knee Score (Primary only)

Timeframe: 2011/12 (May 2013 release)

Adjusted mean health gain for primary knee operations only



# Tranexamic acid

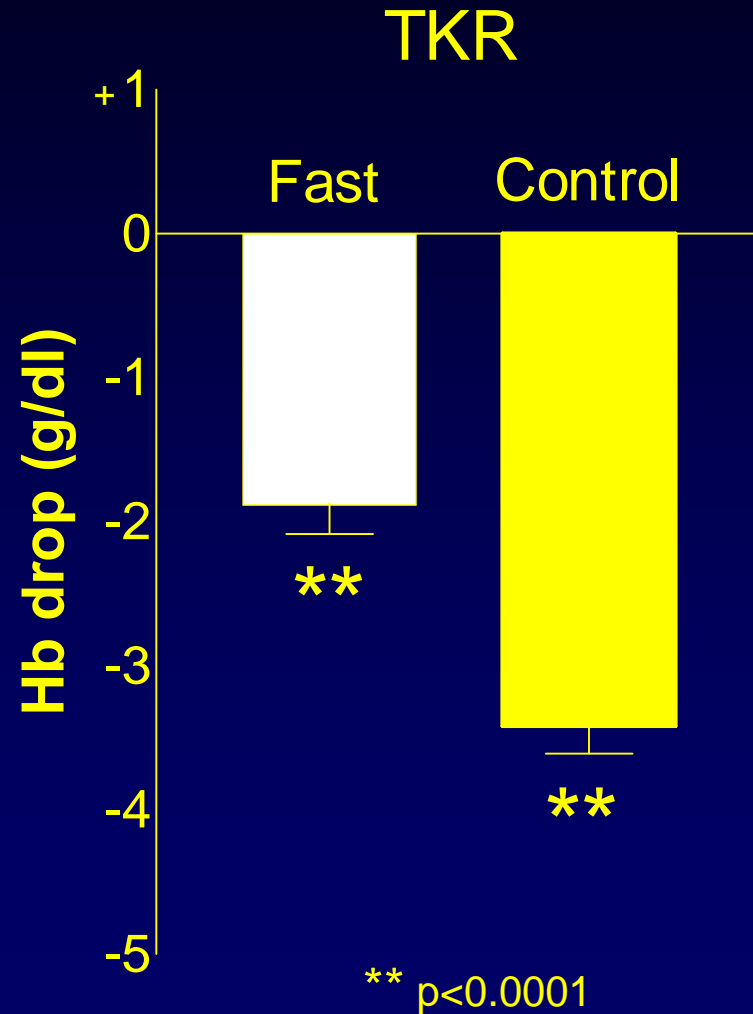
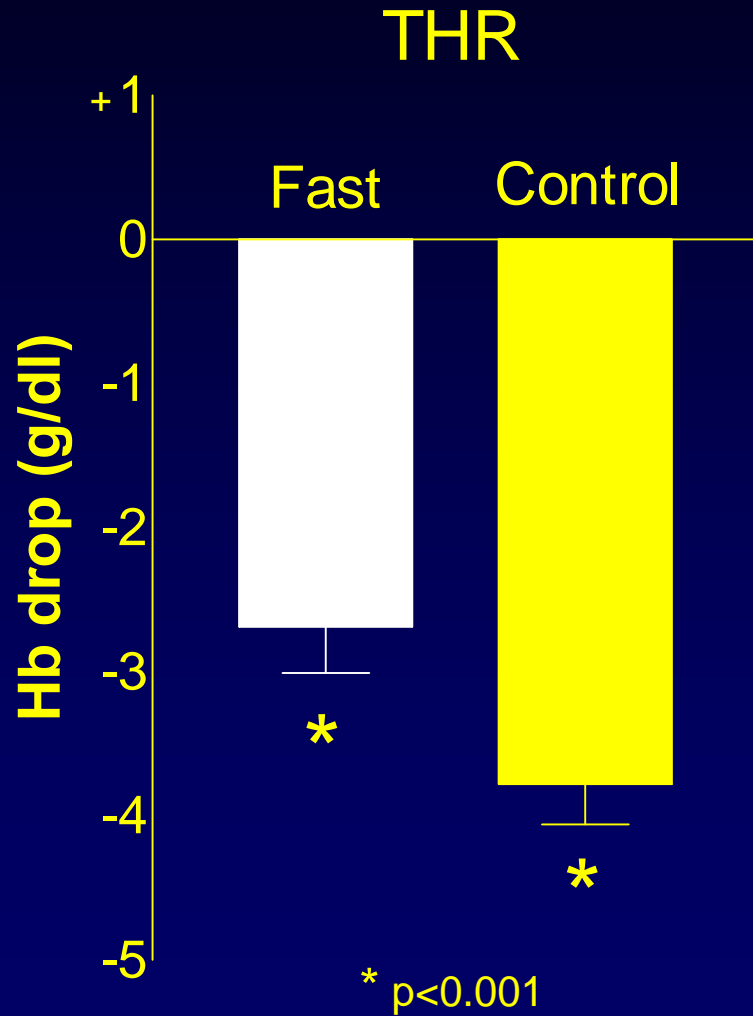
- 15mg/kg iv at induction

# Blood transfusion practice

| Hospital |                       | May-June 2007 | May-June 2008 | +/-  |
|----------|-----------------------|---------------|---------------|------|
| WGH      | Procedures            | 109           | 116           | 6%   |
|          | Transfusion episodes  | 20            | 5             |      |
|          | % patients transfused | 18%           | 4%            |      |
|          | No. RBC transfused    | 44            | 14            | -68% |
|          | Mean RBC/patient      | 2.2           | 2.8 (*2.0)    |      |
| HGH      | Procedures            | 86            | 71            | -17% |
|          | Transfusion episodes  | 19            | 9             |      |
|          | % patients transfused | 22%           | 13%           |      |
|          | No. RBC transfused    | 41            | 21            | -49% |
|          | Mean RBC/patient      | 2.2           | 2.3           |      |
| NTGH     | Procedures            | 80            | 71            | -10% |
|          | Transfusion episodes  | 12            | 21            |      |
|          | % patients transfused | 15%           | 30%           |      |
|          | No. RBC transfused    | 25            | 50            | 100% |
|          | Mean RBC/patient      | 2.1           | 2.4           |      |

Data provided by Rosie Tate, Specialist Transfusion Officer

# Reduction in post-op Hb drop



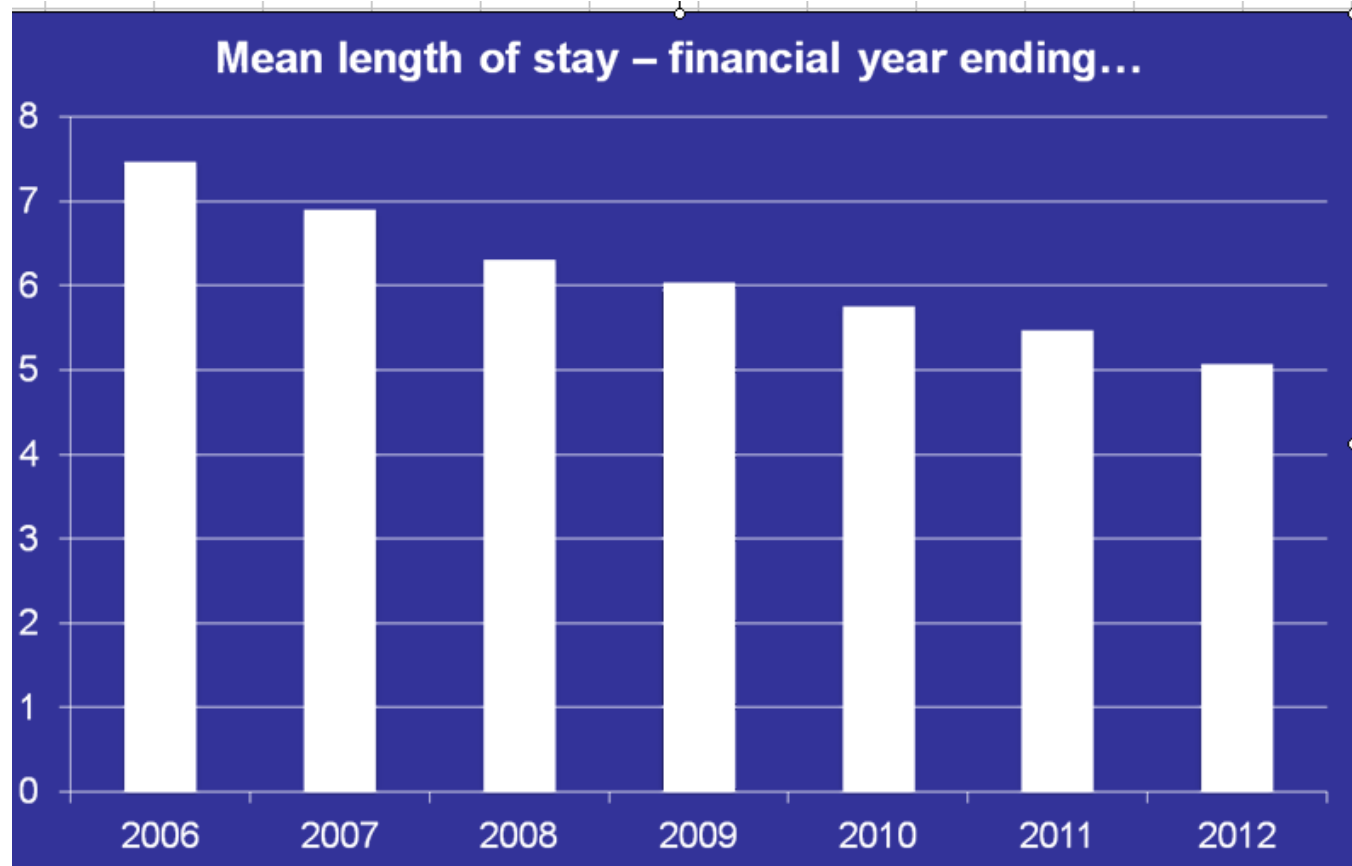
# Blood transfusion rate TJR

- Traditional: (n=1000): 23%
- Fast track: (n=3000): 7.6%
- $p < 0.0001$

# Hips and Knees

|                   | Traditional | Fast track | P value<br>(Chi squared) |
|-------------------|-------------|------------|--------------------------|
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| Death (30 day)    | 16 (0.5%)   | 5 (0.2%)   | 0.03                     |
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# LOS for TKR - England



# MONTHLY REPORT

**NORTHUMBRIA HEALTHCARE NHS FOUNDATION TRUST**  
**Primary hip and knee replacement**  
**Elective orthopaedic spells**

| Hospital on admission |                        | Year & Month of Discharge |        |        |        |        | Y.T.D |
|-----------------------|------------------------|---------------------------|--------|--------|--------|--------|-------|
|                       |                        | 2011/12                   | Apr 12 | May 12 | Jun 12 | Jul 12 |       |
| Hexham                | No. of spells ending   | 589                       | 54     | 56     | 41     | 40     | 191   |
|                       | Mean length of spell   | 3.1                       | 2.8    | 2.5    | 4.5    | 2.7    | 3.0   |
|                       | Median length of spell | 3.0                       | 2.0    | 2.0    | 3.0    | 2.0    | 2.0   |
| North Tyneside        | No. of spells ending   | 532                       | 57     | 57     | 48     | 55     | 217   |
|                       | Mean length of spell   | 4.8                       | 3.4    | 3.4    | 4.1    | 3.9    | 3.7   |
|                       | Median length of spell | 4.0                       | 3.0    | 3.0    | 3.5    | 3.0    | 3.0   |
| Wansbeck              | No. of spells ending   | 700                       | 63     | 64     | 49     | 46     | 222   |
|                       | Mean length of spell   | 4.3                       | 3.7    | 4.0    | 4.8    | 4.1    | 4.1   |
|                       | Median length of spell | 3.0                       | 3.0    | 3.0    | 3.0    | 3.0    | 3.0   |
| Total                 | No. of spells ending   | 1821                      | 174    | 177    | 138    | 141    | 630   |
|                       | Mean length of spell   | 4.1                       | 3.3    | 3.3    | 4.5    | 3.6    | 3.6   |
|                       | Median length of spell | 3.0                       | 3.0    | 3.0    | 3.0    | 3.0    | 3.0   |

Primary hip and knee replacement defined using OPCS4.6 codes W371, W381, W391, W931, W941, W951, W401, W411, W421



- **Improving the protocol...**
  - Optimising outcomes for anaemic patients undergoing total hip & total knee replacement surgery

# Northumbria QIC

IMPROVEMENT IN PRACTICE:

**COULD QUALITY  
BE CHEAPER?**



The  
Health  
Foundation  
Inspiring  
Improvement

November 2011

*'Trust Improvement Way' - Our Strategy for Quality*  
***Best possible outcomes for all patients, at all times***

# Comorbidity – before we operate

|              | Anaemic<br>N=388 (13%) | Non-anaemic<br>N=2552 (87%) | Chi square<br>P= |
|--------------|------------------------|-----------------------------|------------------|
| COPD         | 21                     | 112                         | 0.44             |
| IDDM         | 8                      | 25                          | 0.1              |
| NIDDM        | 53                     | 237                         | <b>0.01</b>      |
| Hypertension | 202                    | 1184                        | <b>0.04</b>      |
| IHD          | 58                     | 189                         | <b>0.0001</b>    |
| AF           | 32                     | 127                         | <b>0.01</b>      |
| RA           | 18                     | 55                          | <b>0.006</b>     |
| Alzheimers   | 6                      | 3                           | <b>0.0001</b>    |

# Complications - after we operate

|                    | <b>Anaemic</b><br><b>N=388 (13%)</b> | <b>Non-anaemic</b><br><b>N=2552 (87%)</b> |      |
|--------------------|--------------------------------------|---|------|
| Stroke (30-day)    | 0.5%                                 | 0.2%                                      | 0.5  |
| MI (30-day)        | 0.77%                                | 0.35%                                     | 0.4  |
| GI Bleed (30-day)  | 0.25%                                | 0.35%                                     | 0.7  |
| DVT (60-day)       | 0.77%                                | 0.35%                                     | 0.4  |
| PE (60-day)        | 1.5%                                 | 1%  | 0.5  |
| Pneumonia (30-day) | 2.3%                                 | 1%  | 0.06 |

# Orthopaedic Anaemia Project (OAP)



**Airedale NHS Foundation Trust: Conserving  
a scarce resource and improving outcomes**

- TRANSFUSION - 10% to 3%
- CRITICAL CARE- reduced by at least 13 nights annually.
- LOS in anaemic patients - 260 bed days.
- READMISSION - Fell in Airedale from 6.8% to 4.3%
- The NHS Blood Transfusion Service recommends that pre-operative anaemia be corrected if possible (Wells et al, 2002)

# Northumbria OAP

- To identify & treat anaemia pre-operatively
- Project live 01/02/13 – Now in treatment & data collection phase
- Aim: To optimise outcomes post hip & knee replacement
  - ↓ transfusions
  - ↓ Complications
  - ↓ CCU stays
  - ↓ LOS
  - ↓ Readmissions
  - ↓ Mortality

# Stakeholders

- Anaesthetics
- Trauma & Orthopaedics
- Haematology
- Pathology
- Pre-Assessment
- Pharmacy
- Patients
- Management
- 'Gatekeeper'
- Clinic staff
- SAU
- Informatics
- GPs
- Project lead

# External Drivers

## Diminishing UK blood stocks

- 8 - 10% of donated RBC in the UK - Hip & knee replacement
- Only 4% of those eligible give blood (Boralessa et al, 2009)
- 20% of blood components are misused, blood stocks are decreasing (NBTC, 2011)

## **Better Blood Transfusion: *Safe and Appropriate Use of Blood*** (DH, 2007)

- Objective - Avoid the unnecessary use of blood & blood components in medical & surgical practice
  - Pre-op assessment to identify, investigate & treat anaemia
  - Establish agreed indications for transfusion
  - Blood conservation strategy - testing for Hb, transfusion alternatives



# External Drivers

## Readmission rates

- Consistently rising trend - unplanned readmissions cost the NHS £1.6 billion per annum (CHKS, 2010)
- **CQC quality indicators:**  
'Unplanned readmission within 28 days of discharge'

*'High levels may be indicative of poor surgical practice or poor degree of integrated care'*

# Internal Drivers

## Patient outcomes: anaemic v non anaemic (Khan et al, 2012)

|                    | Anaemic<br>N = 388 (13%) | Non-anaemic<br>N = 2552 (87%) | p-value |
|--------------------|--------------------------|-------------------------------|---------|
| Length of stay     | 6.2                      | 4.3                           | <0.05   |
| Blood transfusions | 23.8%                    | 4.6%                          | <0.0001 |
| Stroke (30 day)    | 0.5%                     | 0.2%                          | 0.5     |
| Death (1 year)     | 3.1%                     | 0.8%                          | 0.0004  |
| Critical care stay | 5.6%                     | 2.1%                          | 0.0001  |

- Mortality - Consultant league tables June 2013

# Internal Drivers

## Directorate cost efficiencies

'Nicholson Challenge' – QIPP:

Efficiency savings of £15-20 billion 2011 - 2014

*'The NHS needs to recognise that improving quality & value for money go hand in hand'* (DH, 2009)

## OAP Business Case:

Cost savings: Transfusions

Critical care

Reduced LOS

Ambulatory care payments v Cost of iron

**Potential cost benefit per annum: £162,525.35**

# Practicalities

- Blood needs taking on listing via one-click system on ICE 'Anaemia Clinic Orthopaedics'
- - Orthopaedic surgeon or outpatient team
  
- Process in place for
  - Information
  - Helpline access
  - Treatment pathway
  - Repeat bloods
  - (7% rescheduled)

**Mike Reed** | Patient Name: , PATIENT, , DUMMY | Hospital Number: T8888888 | Sex: Male  
 Date of Birth: 25 December 1988 | NHS Number: 111 222 3339  
 Address: A House, A Street, The Town, NE46 1QJ | Telephone No:  
 WGH Theatre | User: sumrd

Common | **Services** | Blood Sciences | Microbiology | Emergency Care | Conditions Diseases | OPD  
 Powered by ICE

- Demographic Search
- Inpatient Search
- Outpatient Search
- Recent Patients
- Worklists
- New Patient Search
- Worklists
- Pharmacist Worklists

Page 1 **FBC, ESR, U&Es, eGFR and Ferritin. Remember to change the requesting location to 'Anaemia clinic - ortho'** KEY

Search

Diabetes Type 1, annual review

Diabetes Type 2, annual review

CKD 3A, annual review

CKD 3B, 4, or 5, review

Vascular disease, initial screen

Vascular disease, annual review

Vascular disease, pre statin screen

Vascular disease, on statin, annual review

Hypertension, diagnosis or review

MI/ACS, 3 month review

Lower limb joint replacement

NHS Health Checks

Screen for secondary hyperlipidaemia

Suspected Heart Failure Screen

DMARD monitoring

Investigation of Suspected Dementia

Breast Cancer Osteoporosis investigations

Lung Cancer - new referrals (2 week target)

Bronchiectasis

Pulmonary Fibrosis

Critical Care Admit

Critical Care Daily (full)

Critical Care Daily (reduced)

Set as Default Panel

↓ **Most recent requests made for this patient:** To view all requests for this patient, [click here](#).  
To view records of the tests on this panel only made for this patient, [click here](#).

| Requested            | Investigations   | Priority | Loc  | Ordered | Status |
|----------------------|--|----------|------|---------|--------|
| 17 Jan 2013 11:57:49 | ESR, FBC, Ferritin, eGFR, U & E  | Routine  | OAC  | sumrd   | REQ    |
| 09 Jan 2013 11:36:55 | Calcium, Creatinine, U&E, Liver Function Tests (LFT), Urine Calcium Excretion Index (CEI)                      | Routine  | WBIO | padtu   | RR     |
| 08 Jan 2013 09:26:27 | Calcium, Creatinine, Random Urine Calcium, Random Urine Creatinine, Urine Calcium Excretion Index (CEI), U & E | Routine  | NBIO | padtu   | RR     |

- Demographic Search
- Inpatient Search
- Outpatient Search
- Recent Patients
- Worklists
- New Patient Search
- Worklists
- Pharmacist Worklists

Page 1

Search

Set as Default Panel


**Lower limb joint replacement**

- FBC
- ESR
- U & E
- e-GFR
- Ferritin
- results for anaemia clinic - ortho

Rules -- Web Page Dialog

results for anaemia clinic - ortho

Don't tick the box, but do change the location (on the next screen)



Most recent requests made for this patient: To view all requests for this patient, [click here](#).  
 To view records of the tests on this panel only made for this patient, [click here](#).

| Requested            | Investigations   | Priority | Loc  | Ordered | Status             |
|----------------------|--|----------|------|---------|--------------------|
| 17 Jan 2013 11:57:49 | ESR, FBC, Ferritin, eGFR, U & E  | Routine  | OAC  | sumrd   | REQ                |
| 09 Jan 2013 11:36:55 | Calcium, Creatinine, U&E, Liver Function Tests (LFT), Urine Calcium Excretion Index (CEI)                      | Routine  | WBIO | padtu   | <a href="#">RR</a> |
| 08 Jan 2013 09:26:27 | Calcium, Creatinine, Random Urine Calcium, Random Urine Creatinine, Urine Calcium Excretion Index (CEI), U & E | Routine  | NBIO | padtu   | <a href="#">RR</a> |

**Mike Reed** Sex: **Male**

Help Home Notepad

Logout

Patient Name: **, PATIENT, , DUMMY** Hospital Number: **T8888888**

Date of Birth: **25 December 1988** NHS Number: **111 222 3339**

Address: **A House, A Street, The Town, NE46 1QJ** Telephone No:

Common ▼ Services

**Patients** Please complete the following details regarding your request. Once you have completed the details, click the 'Accept Request' button to continue or 'More Tests' to add more background are mandatory.

- Demographic Search
- Inpatient Search
- Outpatient Search
- Recent Patients
- Worklists
- New Patient Search
- Worklists
- Pharmacist Worklists

**General Details:**

User: **sumrd**

Bleep / Contact No:

Requesting Consultant / GP:  ...

Location:  ...

Category: 

- Anaemia clinic - ortho
- Anderson Court, Berwick
- ANSWER
- Anti-Coagulation Service
- Appleby Surgery
- Assertive Outreach Cramlington
- Avenue Medical Practice
- Balliol Centre
- Battle Hill Health Centre
- Beaumont Park HC
- Bedlingtonshire M.G.

**Order Details:**

↑ **Blood Sciences (green pouch)**

*Tests in this order: FBC, ESR, U & E, e-GFR, Ferritin*

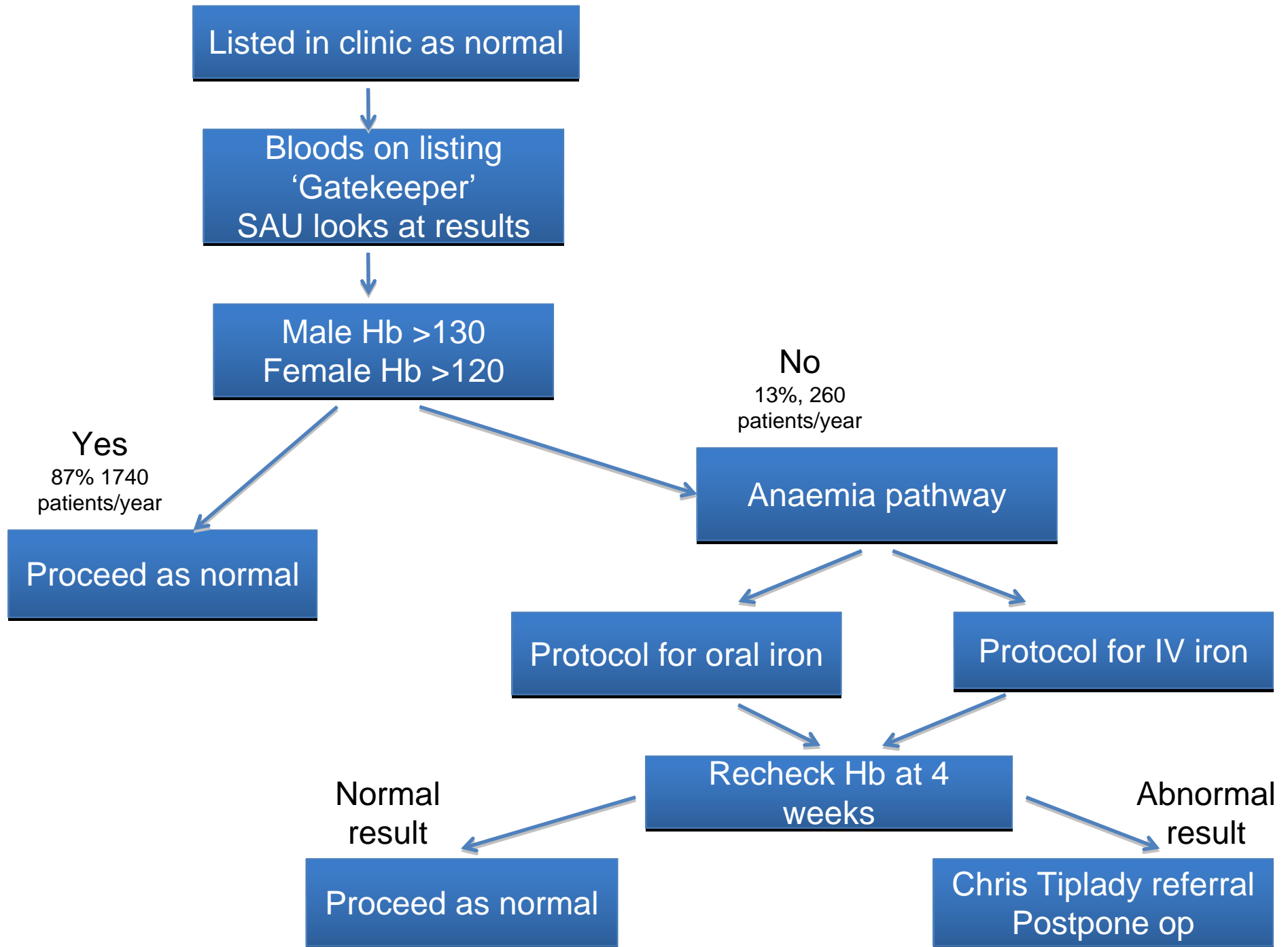
Priority:  ▼

Order Clinical Details:

Sample collection options:

Collect sample now

Collect(ed) at specified time and date





# Current phase

Data collection & monitoring of the effectiveness of the algorithm & pathway with the following quality account:

| <b>Surgical endpoints</b> | <b>Medical complications</b> | <b>Mortality</b> |
|---------------------------|------------------------------|------------------|
| Length of stay            | Stroke (30-day)              | Death (30-day)   |
| Blood transfusion         | GI bleed (30-day)            | Death (60-day)   |
| Critical care admission   | MI (30-day)                  | Death (1-year)   |
| Readmission               | DVT (60-day)                 |                  |
| Return to theatre         | PE (60-day)                  |                  |
| Deep infection            | Pneumonia (30-day)           |                  |

- **Is it working...**

# Progress to date

1035 patients screened from Feb 1st to Sept 17<sup>th</sup>

138 patients (13.3%) had a low Hb (<120 ♀ <130 ♂)

76 (55.1%) ♀                      62 (44.9%) ♂

36/ 138 were referred to their GP for further investigations

87/ 138 were suitable for treatment with IV or oral iron

6 patients for IV treatment

81 patients for oral treatment

4 patients had chronic anaemia, no treatment needed

1 patient had normal bloods on repeat sample

1 patient required urgent surgery – protocol not applied

1 further patient for haematology review

Surgeon Indicators for Publication

Your consent for the publication of your consultant-level data in 2013 for THR and TKR

In December 2012, NHS England (then NHS Commissioning Board) announced that through the 'Everyone Counts' initiative, the activity and outcomes of surgery at individual consultant-level would be published by 30 June 2013 for ten clinical areas including orthopaedics. The National Joint Registry, as the appointed national clinical audit, has been supporting the corresponding professional body, the British Orthopaedic Association, in meeting the requirements of the initiative. [i](#)

Following the agreement of the activity and outcome indicators for publication by the BOA, the BHS, BASK and other specialist surgical societies, you can now preview your consultant-level data for publication on this page. After previewing your data, please give your response to the request to consent for processing and publication by 30 June 2013. The information will be published by 30 June 2013 on the NJR website, with supporting narrative against each of the indicators.

Surgeon Details  
**Michael Richard Reed**  
 GMC Number : 3657106

Please choose one of the three response buttons :

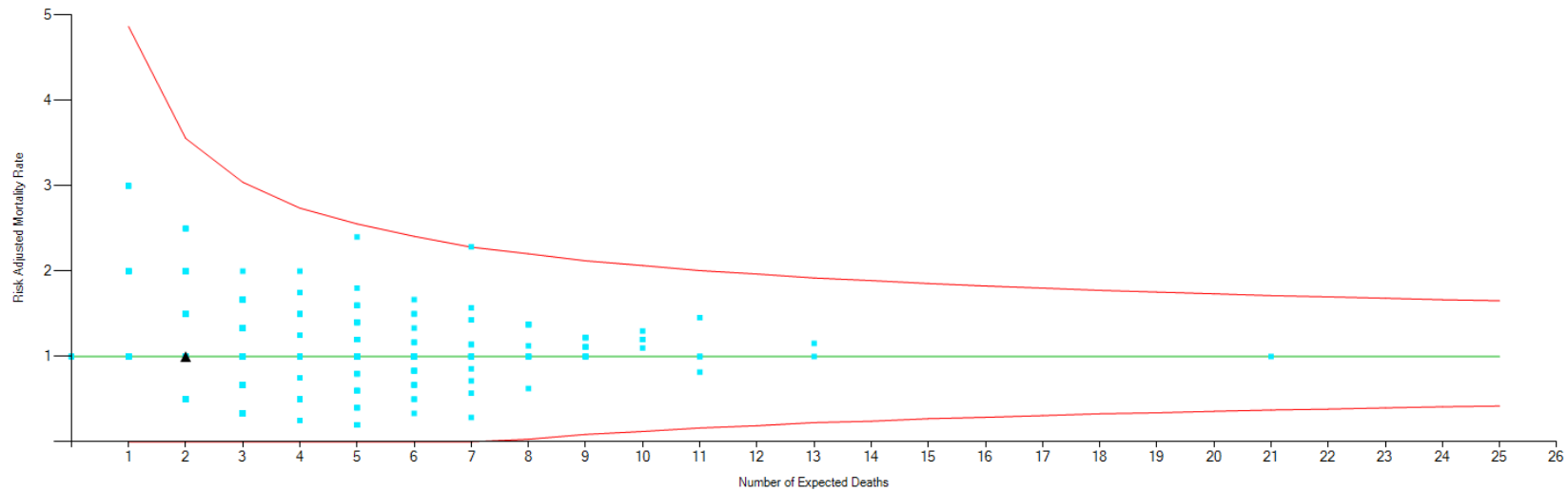
If no response is given by 17 June 2013, your data will be published at consultant-level on 30 June 2013 under the mandate of NHS England.

Your Practice Profile for the period 1<sup>st</sup> Jan 2012 to 31<sup>st</sup> Dec 2012

| Operation Type | Sub Category                                      | Total Procedures | NJR Average |
|----------------|---|------------------|-------------|
| Hip Primary    |   | 53               | 12          |
| Hip Revision   |   | 19               | 5           |
| Knee Primary   | Primary Total Prosthetic Replacement using cement | 56               | 22          |
| Knee Revision  |   | 18               | 3           |

Mortality for the period 1<sup>st</sup> April 2003 to 5<sup>th</sup> March 2013

Hips



# Results

# Population

|                            | Pre protocol | Post protocol |
|----------------------------|--------------|---------------|
| <b>Numbers of patients</b> | <b>480</b>   | <b>579</b>    |
| Age                        | 69           | 68            |
| Hypertension               | 51.67%       | 56.99%        |
| AF                         | 5.63%        | 6.22%         |
| Chr IHD                    | 7.92%        | 8.98%         |
| Hypothyroidism             | 7.29%        | 7.60%         |
| Hyperthyroidism            | 0.21%        | 0.86%         |
| IDDM                       | 0.42%        | 0.69%         |
| NIDDM                      | 10.83%       | 10.54%        |
| COPD                       | 6.88%        | 5.35%         |
| Dementia                   | 0.00%        | 0.00%         |
| Pressure sores             | 0.00%        | 0.00%         |
| Psoriatic arthritis        | 0.83%        | 0.00%         |
| Reumatoid arthritis        | 2.08%        | 2.42%         |
| Hypercholesterolemia       | 5.63%        | 7.43%         |

# Post op complications

|                            | Pre Iron Treatment | Post Iron Treatment |
|----------------------------|--------------------|---------------------|
| Death at 30 days           | 0                  | 1                   |
| LOS                        | 4                  | 4                   |
| HDU/ITU                    | 0.63%              | 1.04%               |
| Readmission                | 6.46%              | 1.55%               |
| Back to theatre at 30 days | 1.04%              | 0.00%               |
| DVT at 60 days             | 0.42%              | 0.35%               |
| PE at 60 days              | 0.83%              | 0.52%               |
| Stroke at 30 days          | 0.21%              | 0.17%               |
| TIA at 30 days             | 0.21%              | 0.00%               |
| GI bleed at 30 days        | 0.21%              | 0.17%               |

Data supplied by: Andrea Pujol Nicolas

# Post op complications

|                         | Pre Iron Treatment | Post Iron Treatment |
|-------------------------|--------------------|---------------------|
| UTI at 30d              | 0.42%              | 0.17%               |
| MI at 30d               | 0.00%              | 0.00%               |
| Pneumonia at 30d        | 0.42%              | 0.17%               |
| Thrombocytopenia at 30d | 0.00%              | 0.00%               |
| Cdiff                   | 0.00%              | 0.00%               |
| Ileus at 30d            | 0.00%              | 0.52%               |

Data supplied by: Andrea Pujol Nicolas



# Summary

- Similar population groups
- Mean LOS remains 4 days
- Readmission at 30 days reduced from 6.46% to 1.55%
- Complication rates – no dramatic changes but early days..

# Thank you

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