Managing Anaemia in Knee & Hip Replacements

A Quality Improvement Project

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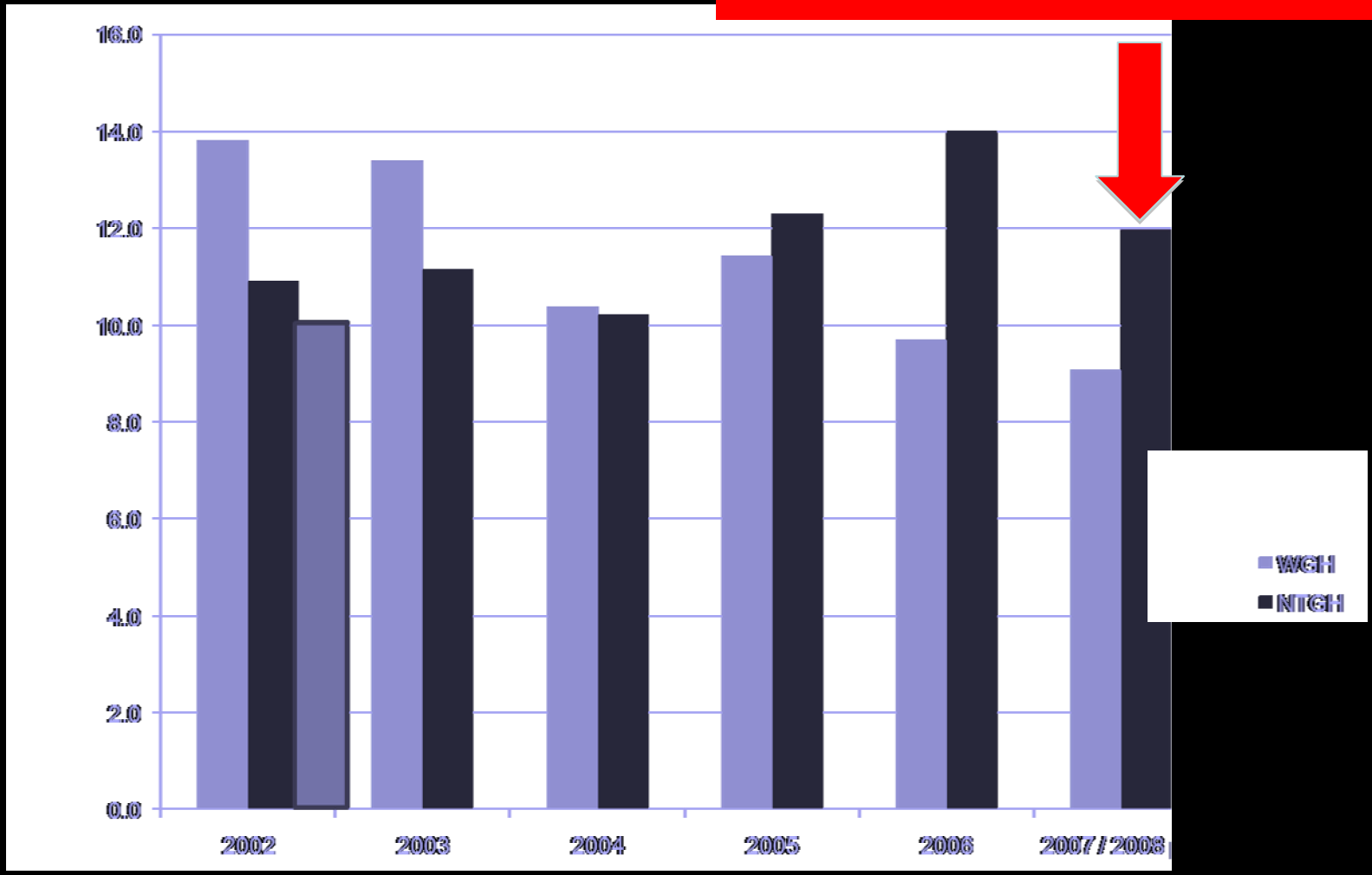
Knee replacement

- 81000 cases per year in the England and Wales
- NHS cost almost £1B on TKR

- Increasing

Hip replacements – how long do they stay ?

TRANSFUSION RATE 23%



FAST TRACK

=

ENHANCED RECOVERY

=

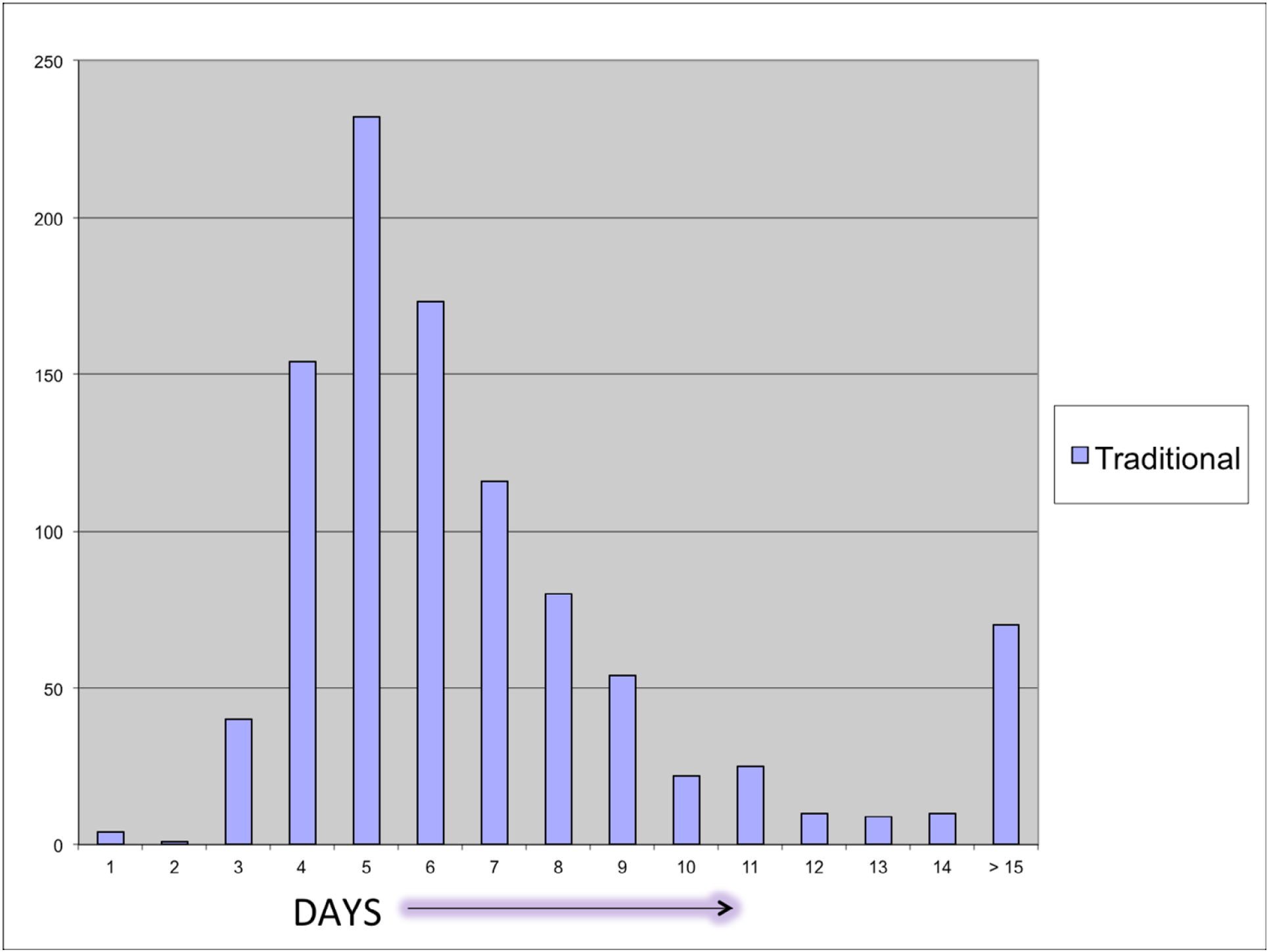
RAPID RECOVERY

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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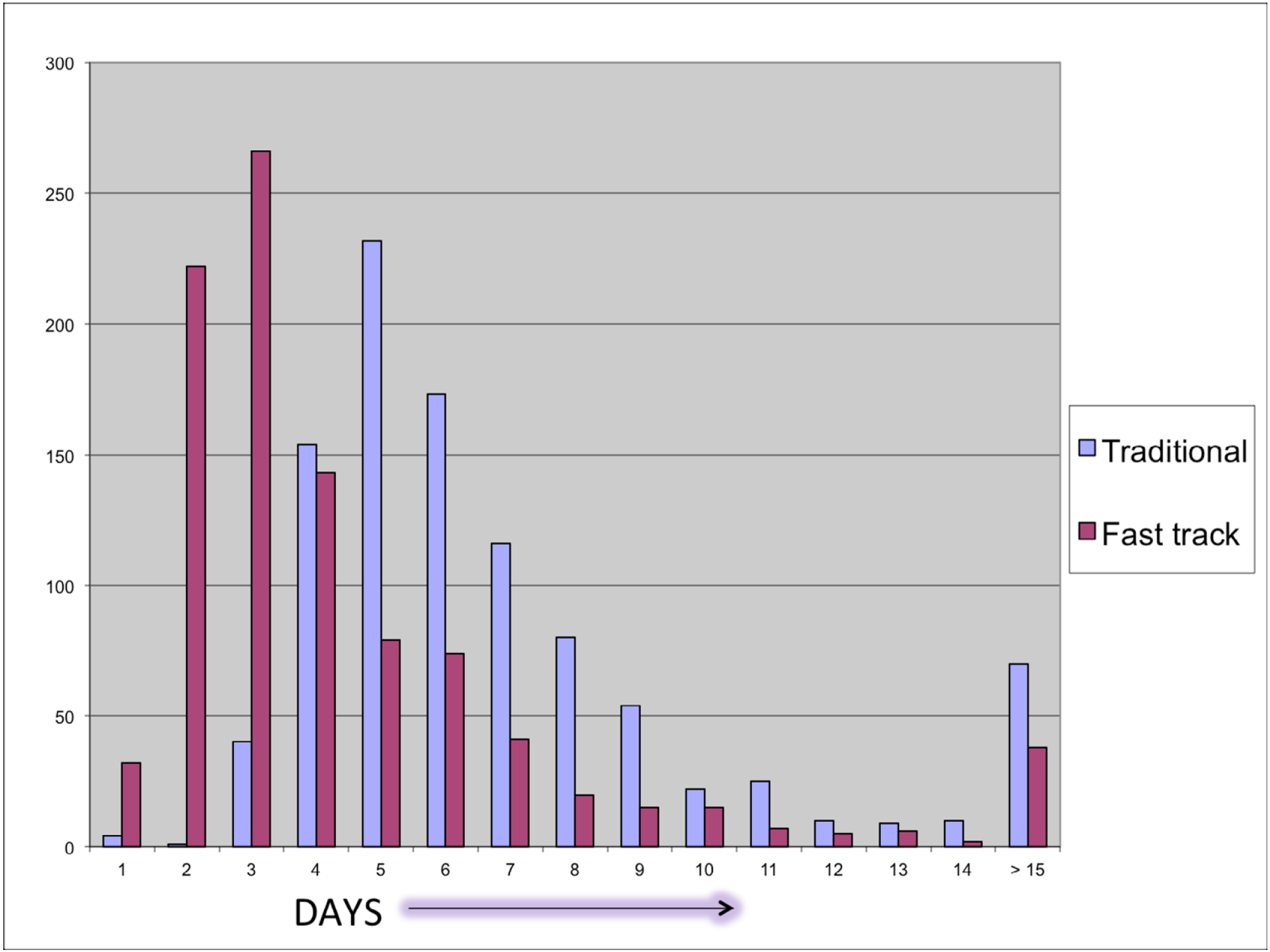
DAYS
Traditional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DAYS
Traditional
Fast track

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.*

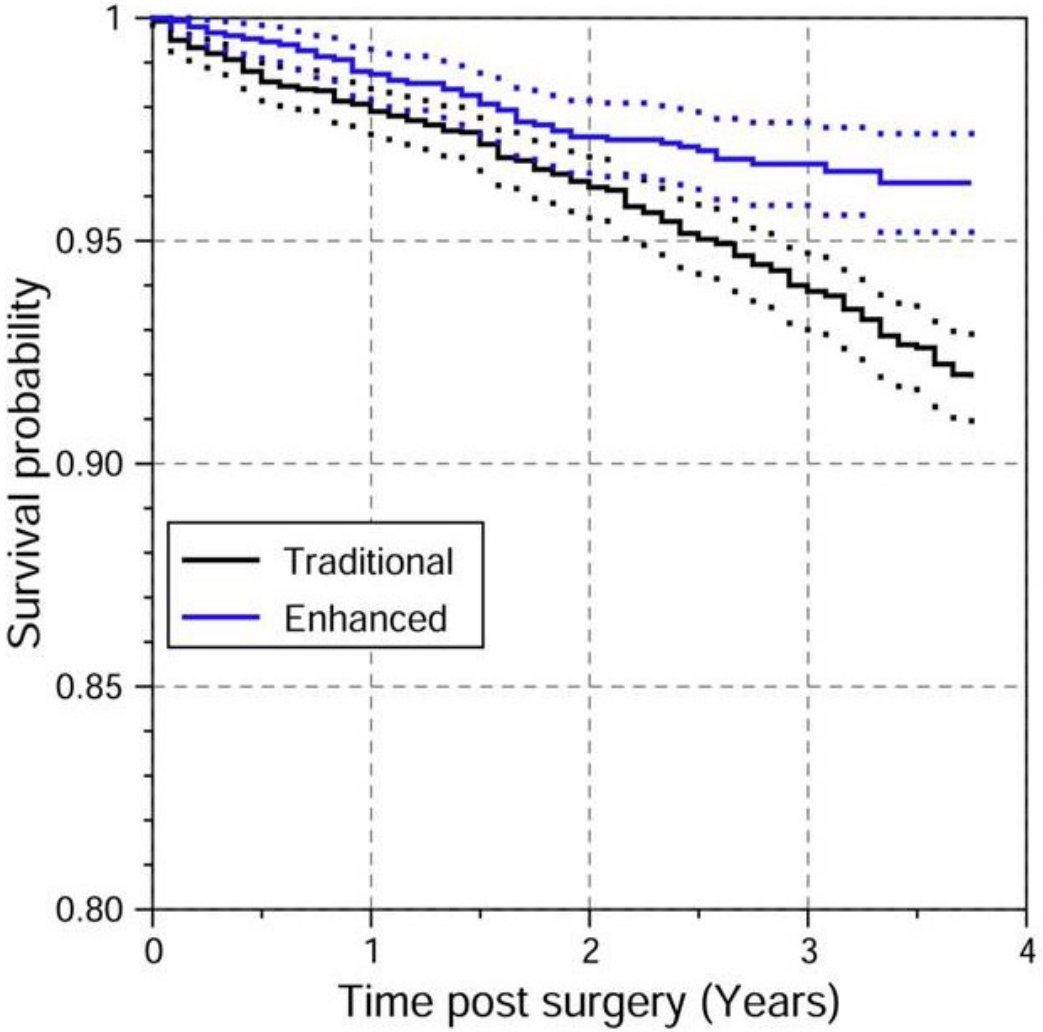
Hips and Knees

	Traditional	Fast track	P value (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:

Office for National Statistics

Survival Probabilities ±95% C.I.

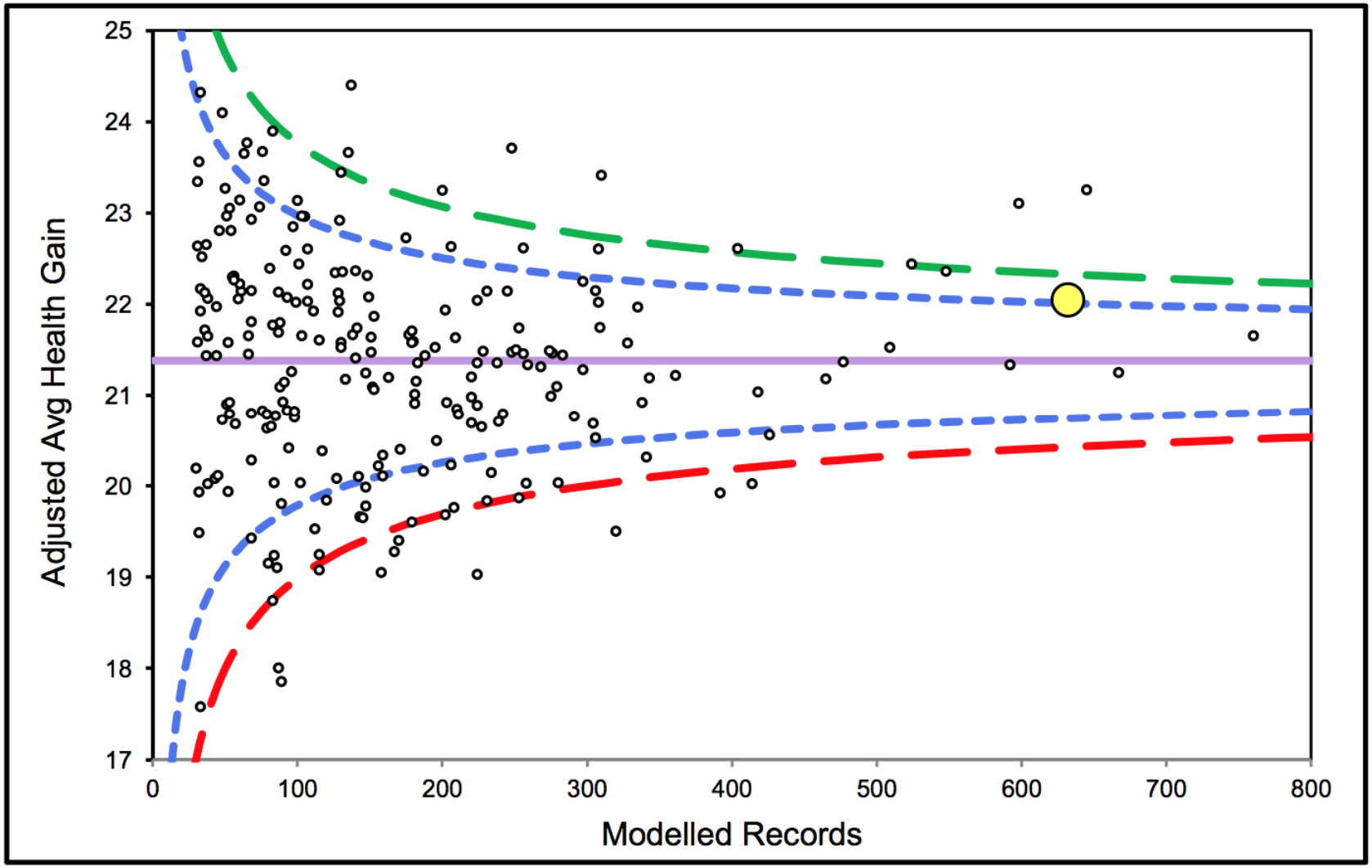
	Months		Years			
	1	3	1	2	3	≈4
TRAD	0.995(0.025)	0.992 (0.003)	0.979 (0.005)	0.962 (0.007)	0.939 (0.009)	0.919 (0.01)
ER	0.999 (0.0013)	0.997 (0.0029)	0.987 (0.006)	0.973 (0.008)	0.967 (0.009)	0.963 (0.011)

Hips

6b. PROMs - Improvement in Oxford Hip Score (Primary only)

Timeframe: 2013/14 (August 2015 release - Finalised)

Adjusted mean health gain for primary operations



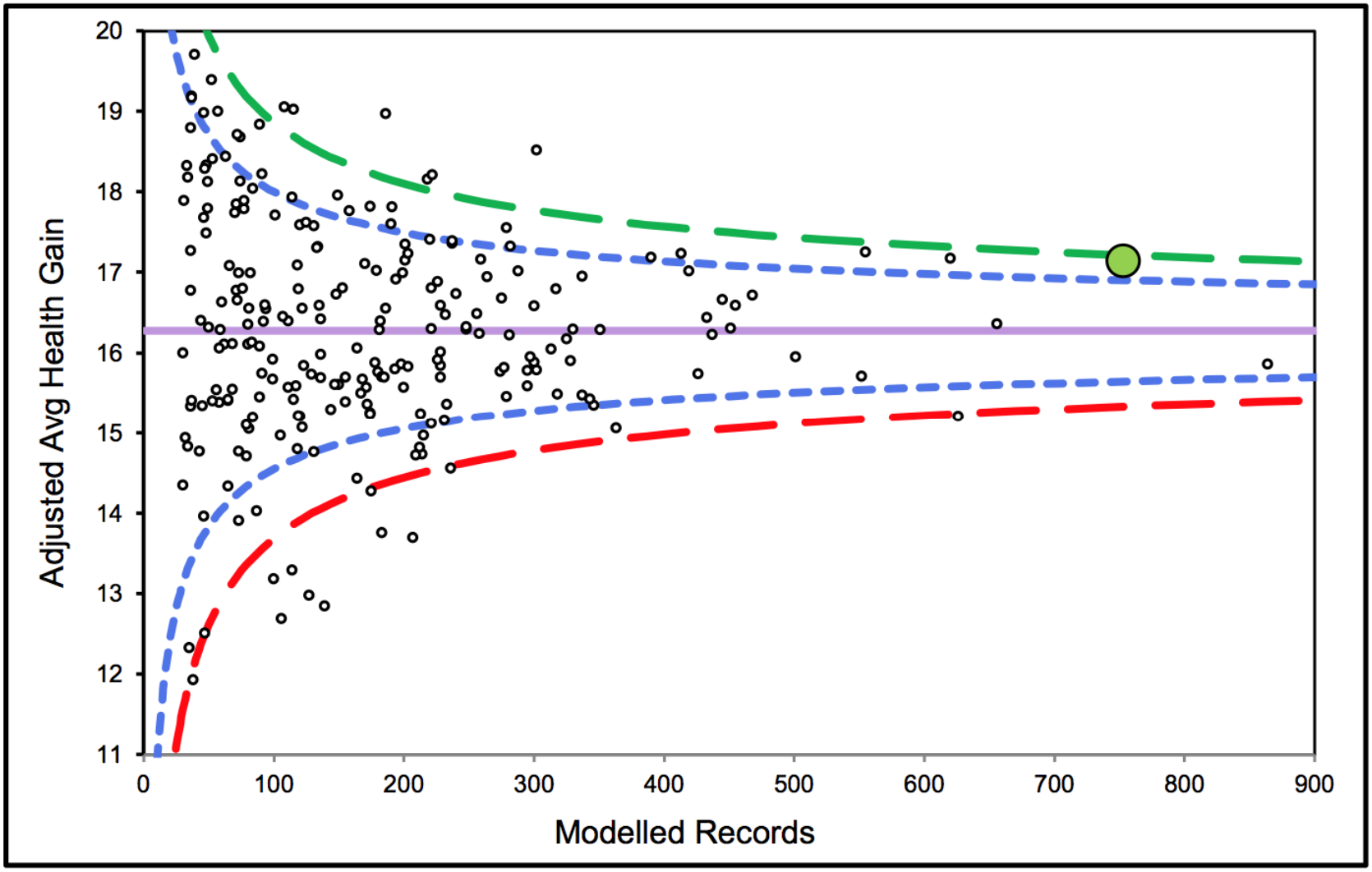
Modelled Record Rates	<20%	20-40%	40-60%	60-80%	80%+

Knees

6a. PROMs - Improvement in Oxford Knee Score (Primary only)

Timeframe: 2013/14 (August 2015 release - Finalised)

Adjusted mean health gain for primary operations



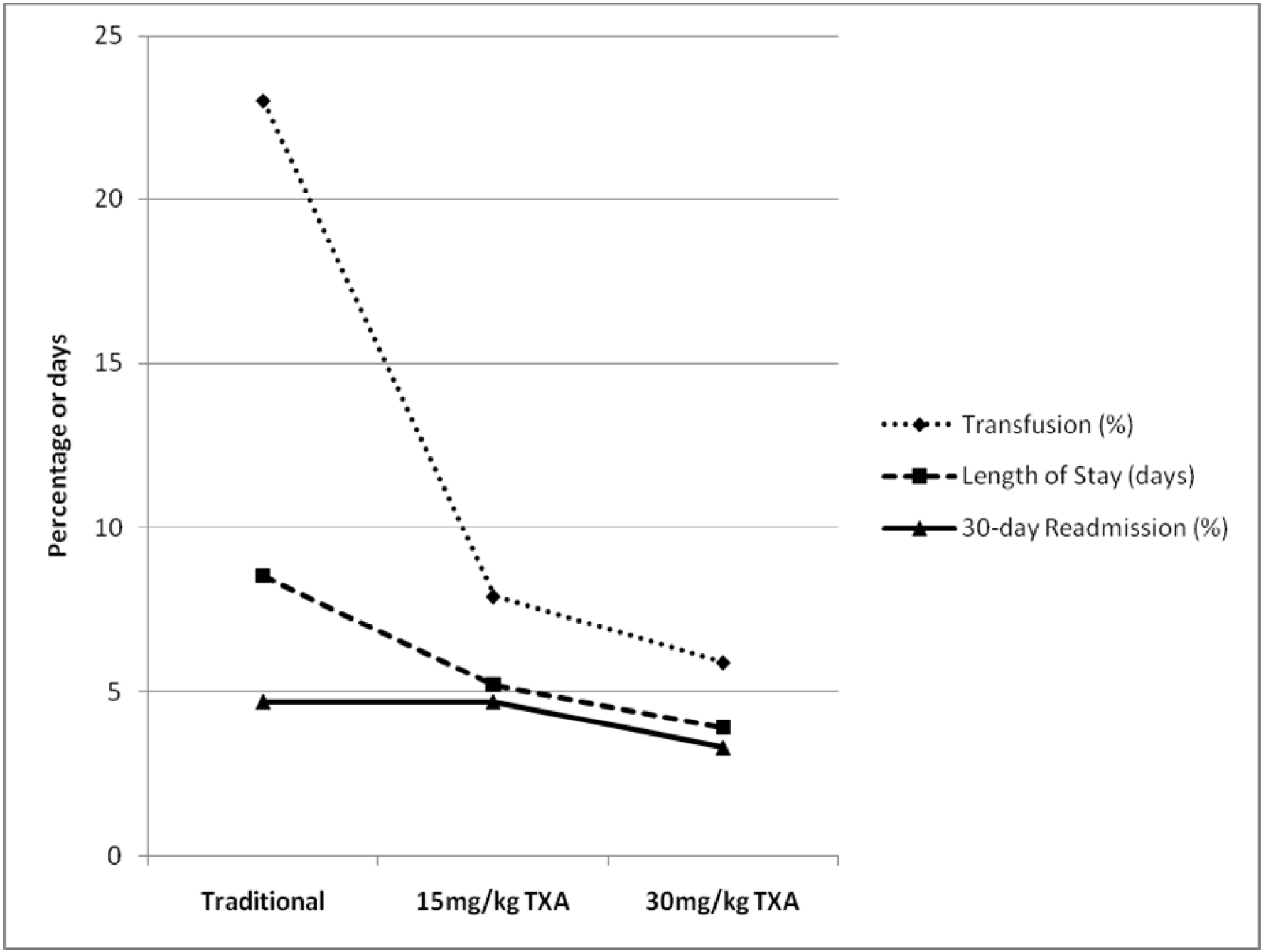
Modelled Record Rates	<20%	20-40%	40-60%	60-80%	80%+

Reduction in post-op Hb drop

Tranexamic acid

- 15mg/kg iv at induction
- Or that the correct dose?

Outcome	15mg/kg (n = 2698)	30mg/kg (n = 1814)	p-value
Transfusion (n, %)	215 (7.9)	108 (5.9)	0.01*
MI 30 days (n, %)	12 (0.4)	3 (0.2)	0.18
Stroke 30 days (n, %)	6 (0.2)	3 (0.2)	0.94
GIB 30 days (n, %)	9 (0.3)	3 (0.2)	0.44
Readm.. 30 (n, %)	123 (4.7)	59 (3.3)	0.02*
LOS (mean) (range)	5.2 (0 to 82)	3.9 (0 to 93)	<0.01*
Critical care (n, %)	73 (2.7)	23 (1.3)	0.01*
DVT 60 days (n, %)	13 (0.5)	7 (0.4)	0.81
PE 60 days (n, %)	29 (1.1)	13 (0.7)	0.28
Death (30-day) (n, %)	3 (0.1)	0 (0.0)	0.40
Death (90-day) (n, %)	10 (0.4)	1 (0.1)	0.07


25
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Percentage or days
Traditional
15mg/kg TXA
30mg/kg TXA
Transfusion (%)
Length of Stay (days)
30-day Readmission (%)

Are anaemic patients at high risk of transfusion?

- **Improving the protocol…**

—— Optimising outcomes for anaemic patients undergoing total hip & total knee replacement surgery

Northumbria QIC

'Trust Improvement Way' - Our Strategy for Quality

Best possible outcomes for all patients, at all times

Comorbidity – before we operate

	Anaemic N=388 (13%)	Non-anaemic N=2552 (87%)	Chi square P=
COPD	21	112	0.44
NIDDM	53	237	**0.01**
			0.04
IHD	58	189	**0.0001**
			0.01
RA	18	55	**0.006**
			0.0001

Complications - after we operate

	Anaemic N=388 (13%)	Non-anaemic N=2552 (87%)	
Stroke (30-day)	0.5%	0.2%	0.5
GI Bleed (30-day)	0.25%	0.35%	0.7
PE (60-day)	1.5%	1%	0.5

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 February 2013
- Now standardised screening & treatment
- Data collection on-going

- 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 N = 388 (13%)	Non-anaemic 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 since 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

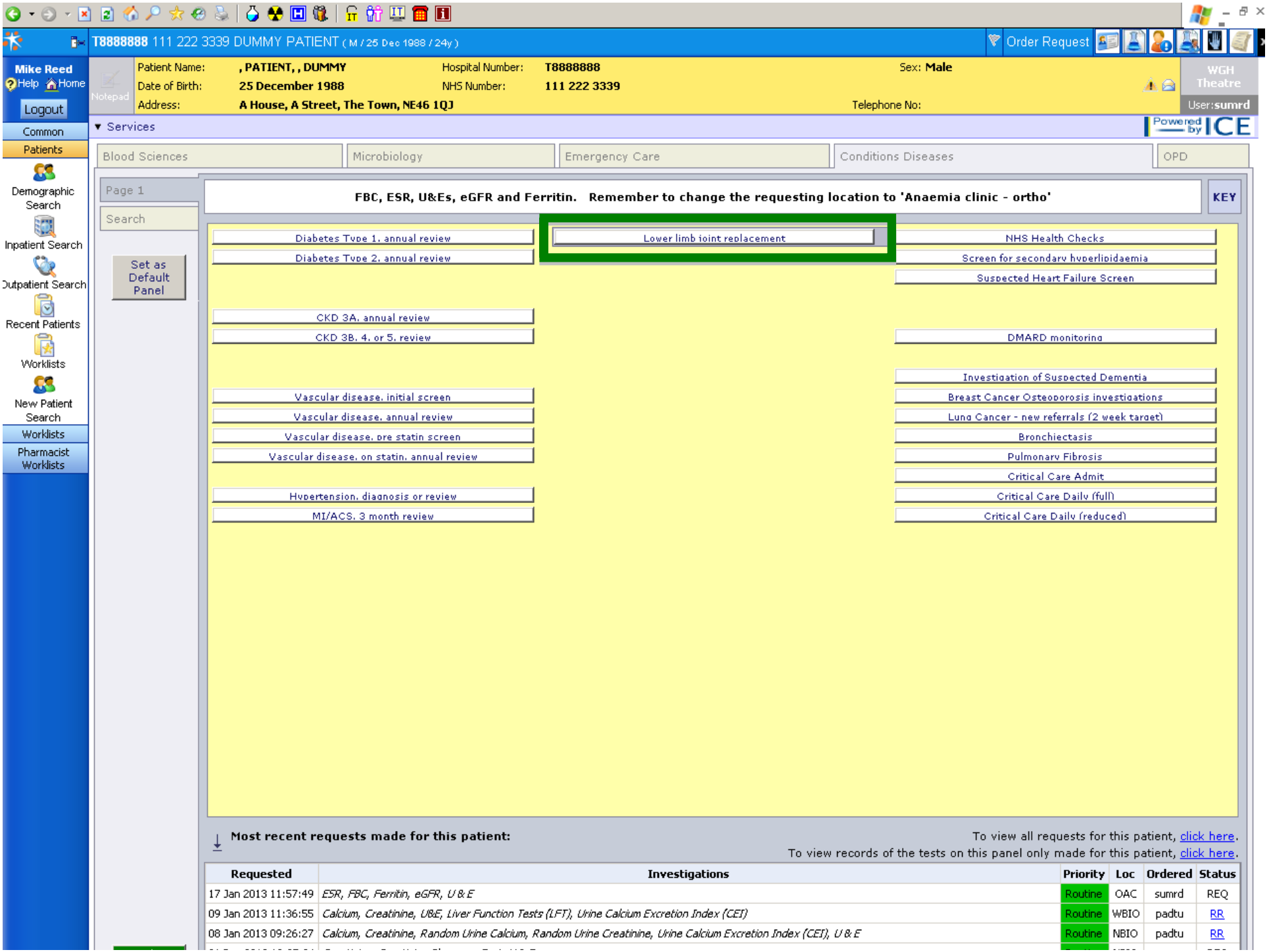
Ambulatory care payments v Cost of iron

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)


T8888888 111 222 3339 DUMMY PATIENT (M / 25 Dec 1988 / 24y)
Order Request
Mike Reed
Help Home
Logout
Common
Patients
Demographic Search
Inpatient Search
Outpatient Search
Recent Patients
Worklists
New Patient Search
Worklists
Pharmacist Worklists
Notepad
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
Services
Powered by ICE
Blood Sciences
Microbiology
Emergency Care
Conditions Diseases
OPD
Page 1
Search
Set as Default Panel
FBC, ESR, U&Es, eGFR and Ferritin. Remember to change the requesting location to 'Anaemia clinic - ortho'
KEY
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)
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.
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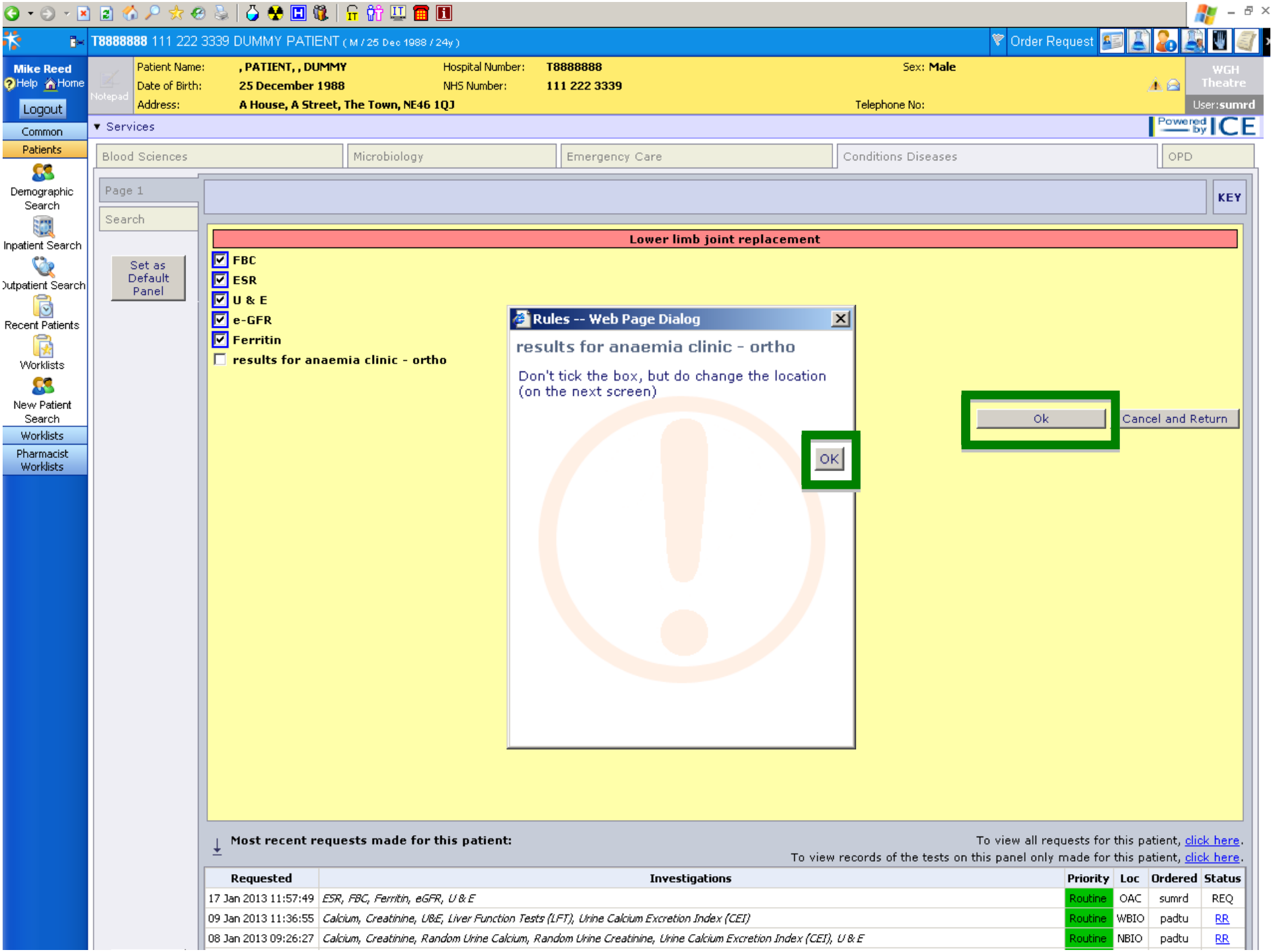
17 Jan 2013 11:57:49 ESR, FBC, Ferritin, eGFR, U & E Routine OAC sumrd REQ
09 Jan 2013 11:36:55 Calcium, Creatinine, U&E, Liver Function Tests (LFT), Urine Calcium Excretion Index (CEI) Routine WBIO padtu RR
08 Jan 2013 09:26:27 Calcium, Creatinine, Random Urine Calcium, Random Urine Creatinine, Urine Calcium Excretion Index (CEI), U & E Routine NBIO padtu RR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Emergency Care
Conditions Diseases
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Page 1
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Lower limb joint replacement
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e-GFR
Ferritin
results for anaemia clinic - ortho
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results for anaemia clinic - ortho
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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.
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ESR, FBC, Ferritin, eGFR, U & E
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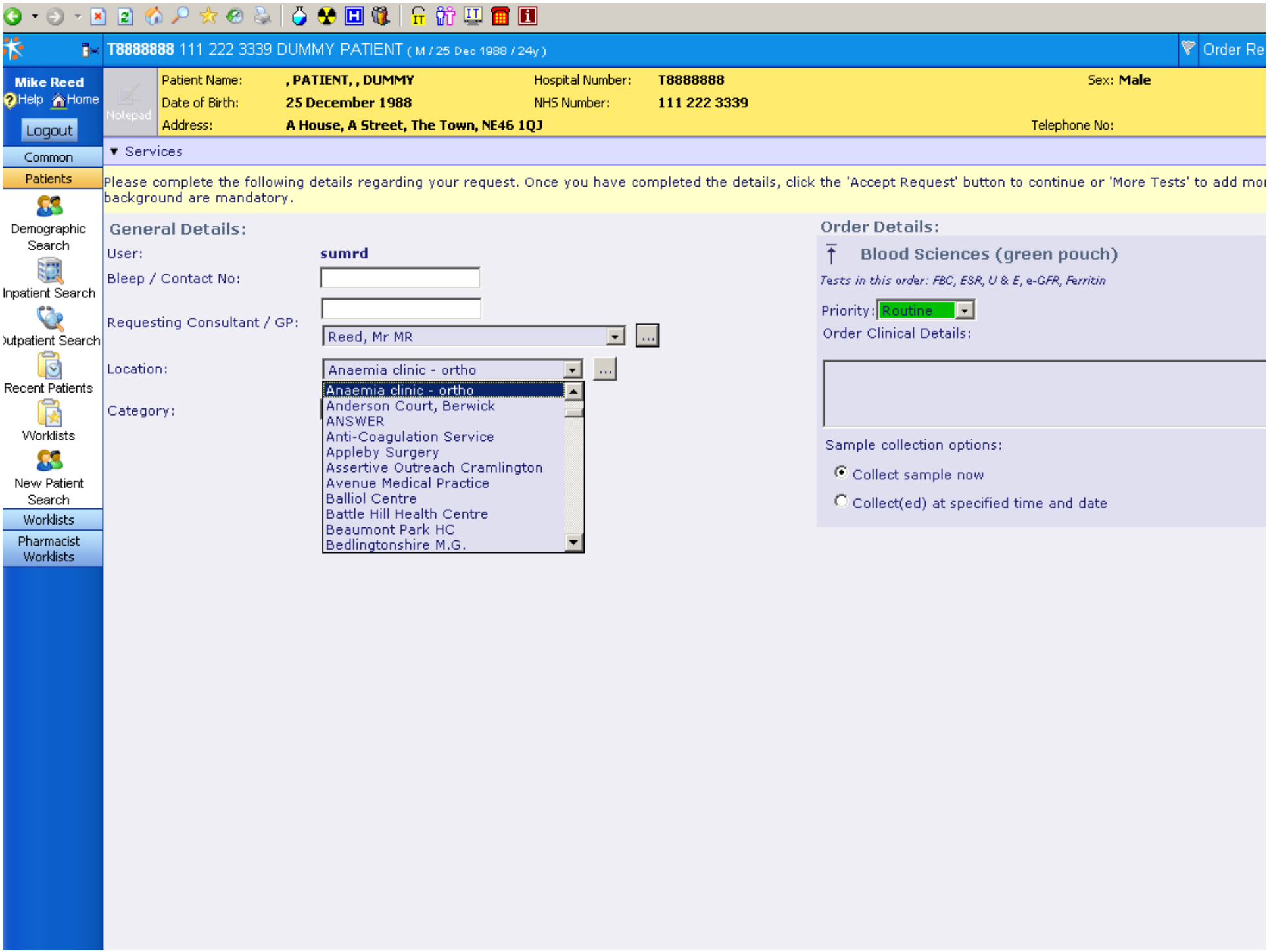
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Address: A House, A Street, The Town, NE46 1QJ
Telephone No:
Services
Please complete the following details regarding your request. Once you have completed the details, click the 'Accept Request' button to continue or 'More Tests' to add mor
background are mandatory.
General Details:
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Requesting Consultant / GP:
Reed, Mr MR
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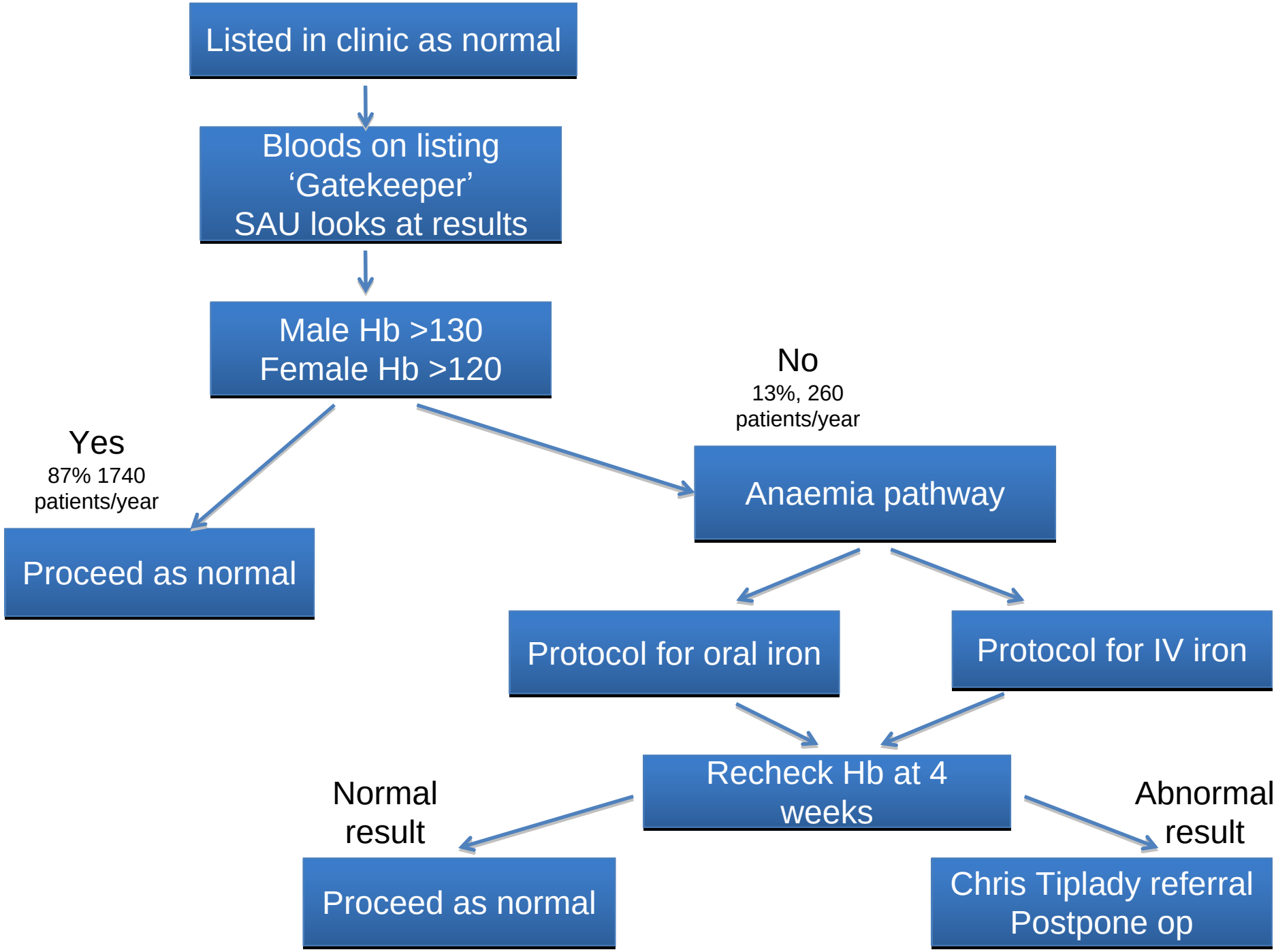
Anaemia clinic - ortho
Category:
Anaemia clinic - ortho
Anderson Court, Berwick
ANSWER
Anti-Coagulation Service
Appleby Surgery
Assertive Outreach Cramlington
Avenue Medical Practice
Balliol Centre
Battle Hill Health Centre
Beaumont Park HC
Bedlingtonshire M.G.
Order Details:
Blood Sciences (green pouch)
Tests in this order: FBC, ESR, U & E, e-GFR, Ferritin
Priority: Routine
Order Clinical Details:
Sample collection options:
Collect sample now
Collect(ed) at specified time and date


Listed in clinic as normal
Bloods on listing
'Gatekeeper'
SAU looks at results
Male Hb >130
Female Hb >120
Yes
87% 1740
patients/year
Proceed as normal
No
13%, 260
patients/year
Anaemia pathway
Protocol for oral iron
Protocol for IV iron
Recheck Hb at 4
weeks
Normal
result
Proceed as normal
Abnormal
result
Chris Tiplady referral
Postpone op

- **Is it working…**

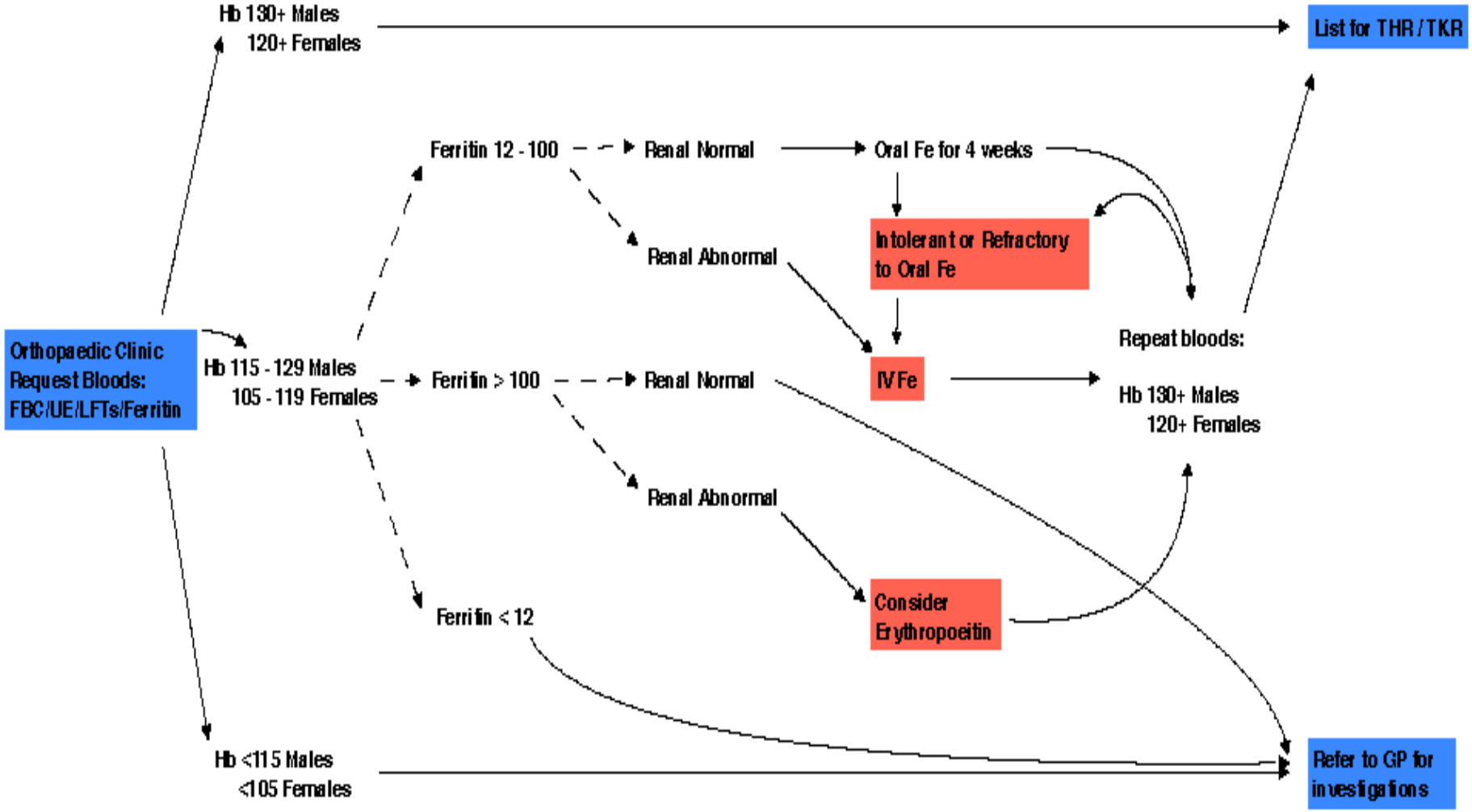
Introduction

Northumbria Healthcare

NHS Foundation Trust

- Prospective observational cohorts.
- Both groups 30mg/ kg IV TXA - max 2.5g at "induction".
- Two series of primary elective hip and knee arthroplasty:
  - Control group: from February 2012 to January 2013 (1814 patients)
  - Intervention group: from February 2013 and May 2014 (1622 patients)
  - Oral iron: 200mg Ferrous sulphate TDS/ 4 weeks
  - IV iron: <50kg-500mg / >50kg-1000mg Ferric carboxymaltose

Anaemia screening program algorithm



Northumbria Healthcare

NHS Foundation Trust

NHS

Northumbria Healthcare

NHS Foundation Trust

Anaemia

- Control group - before the protocol:
  - 265 anaemic patients (14.6%)
- Intervention group:
  - 196 anaemic patients (14%)
    - 61% oral iron
    - 6% IV iron
    - 33% referral to haematology/ GP

Characteristic	Control (n = 1814)	Intervention (n = 1622)	p-value
Mean age (years)	68.4	68.9	0.176
Female (%)	56.8	55.24	0.327
THR (%)	44.5	46.60	0.173
Mean pre-op HB (g/dL)	13.7	13.7	0.980
Hypertension (%)	52.4	56.1	0.031 *
AF(%)	5.8	5.9	0.932
IHD(%)	7.6	9.8	0.019 *
Type I diabetes (%)	0.6	0.3	0.281
Type II diabetes (%)	10.7	12.5	0.106
COPD(%)	4.4	5.4	0.194

Outcome	Control (n = 1814)	Intervention (n = 1622)	p-value
Transfusion (%)	5.9	3.9	0.005*
Transfused units (median)	2	2	0.2095
MI 30 days (%)	0.17	0.12	1.0000
Stroke 30 days (%)	0.17	0.37	0.3220
Readmission 30 days (%)	4.47	2.9	0.02*
GIB 30 days (%)	0.17	0.4	0.3220
DVT 60 days (%)	0.4	0.1	0.1850
PE 60 days (%)	0.7	0.8	0.7750
Death (30-day) (%)	0.00	0.20	0.2081
Death (90-day) (%)	0.06	0.66	0.4564
LOS (mean days)	3.9	3.64	0.021*
Critical care admission (%)	1.3	0.55	0.03*

Cost analysis of anaemia intervention cohort

Northumbria Healthcare

NHS Foundation Trust

COSTS	
Oral iron treatment	£384
IV iron treatment	£2,780
Pre-op blood test	£40,550
Repeat blood test	£3,300
TOTAL	£47,014

SAVINGS	
Critical care 23 v 9	£19,460
Units transfused saved (121)	£34,380
LOS < 0.4 days	£249,52
TOTAL	£313,360

- Protocol management: £4,608/year

Cost per patient

£31.83

Savings per patient

£193.20

TOTAL savings per patient £161.37

Northumbria Healthcare NHS
NHS Foundation Trust

Conclusion

- Pre operative anaemia screening programs is effective in reducing:
  - RBC transfusion
  - Re-admissions
  - Critical care admission rates
  - Length of stay
  - Costs
    - Annual savings £387,288

Thank you

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