

BCIS Audit Returns Adult Interventional Procedures

Jan 2006 to Dec 2006



Peter F Ludman

BCIS National Audit Officer

On behalf of

British Cardiovascular Intervention Society

Dublin 2007

Structure



2006 data: Ludman



New Angiography Centres (2006)

Basildon
Countess of Chester Hospital
Glan Clwyd
Mid Stafford general
Milton Keynes General
Queen Elizabeth the Queen Mother
Royal Blackburn Hosp
Royal Preston
Stepping Hill Hospital
University of Hartelpool
Warrington
Weston-Super -Mare

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Changes in Activity (2006)



2006 data: Ludman

PCI Stopped

King Edward VII (stopped after some 2006 activity)

PCI → angio

{ BUPA Lea (Cambridge)
BUPA Leicester

Cath centres start PCI (2006)



- Craigaven, Northern Ireland
- East Surrey Hosp (Surrey and Sussex NHS trust)
- Great Western Swindon
- Lister, Stevenage
- Mayday University Hospital
- Norfolk and Norwich
- Royal United Bath
- Sunderland Royal Hospital
- Wexham, Slough
- William Harvey, East Kent Hospitals
- Worthing Hospital

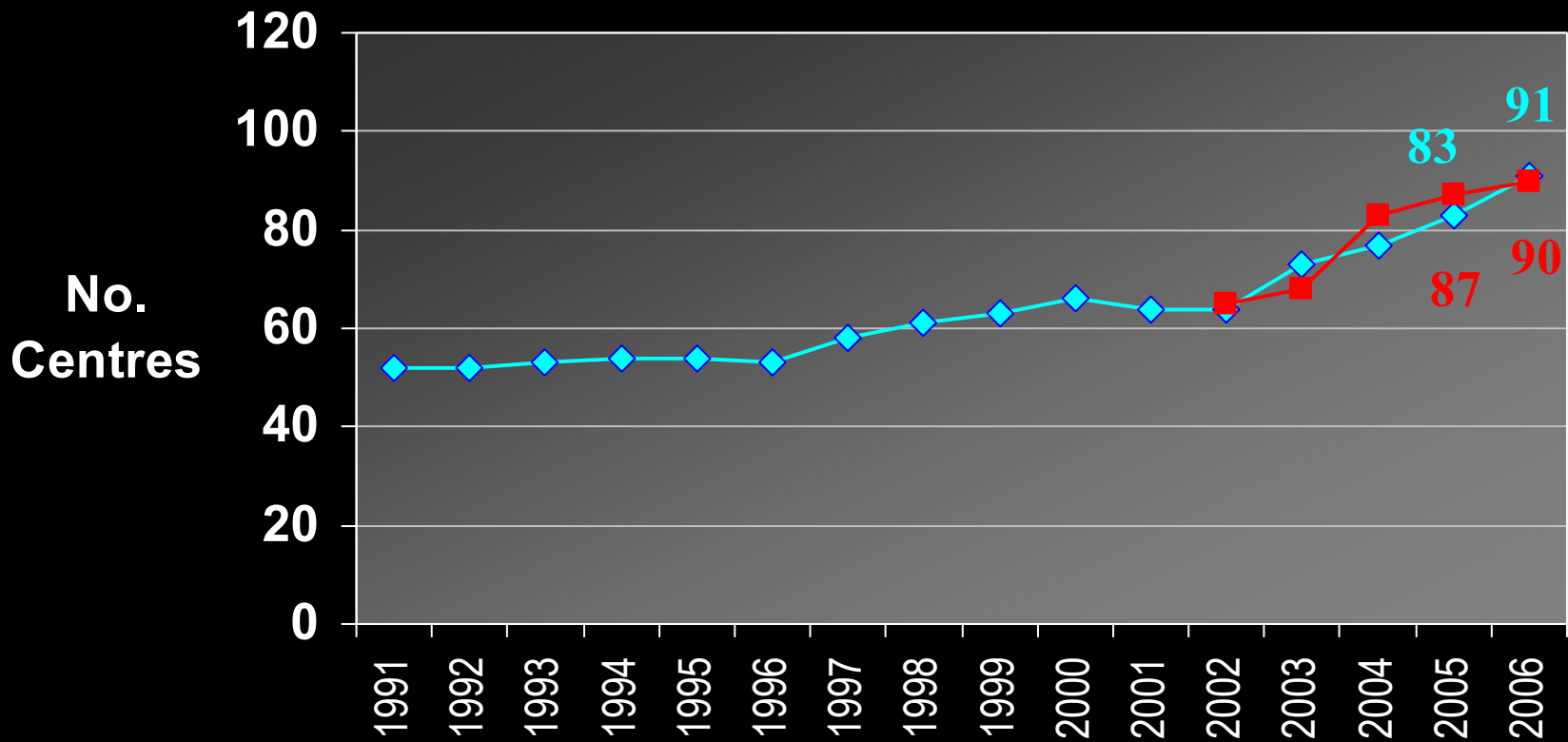
11

UK Centres - 2006



2006 data: Ludman

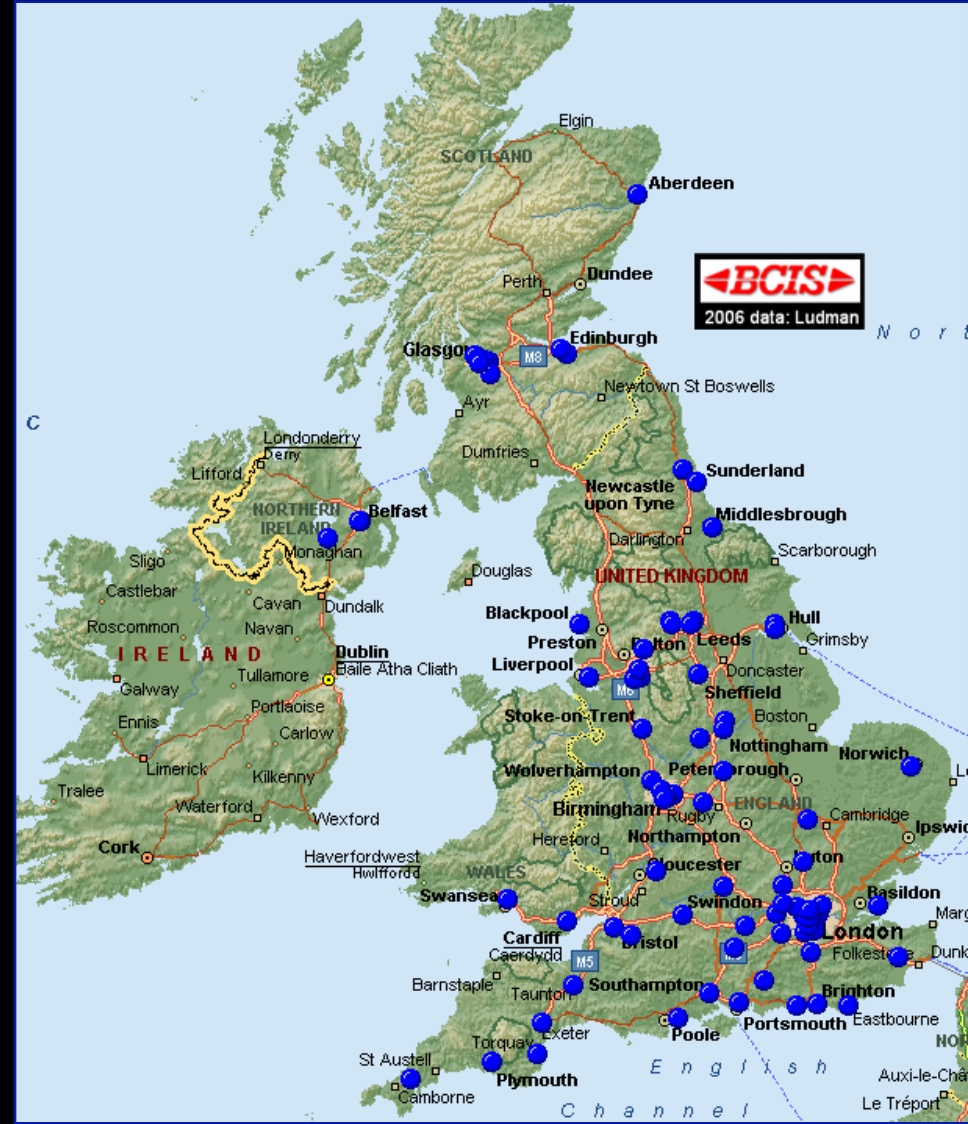
◆ PCI ■ Angio only



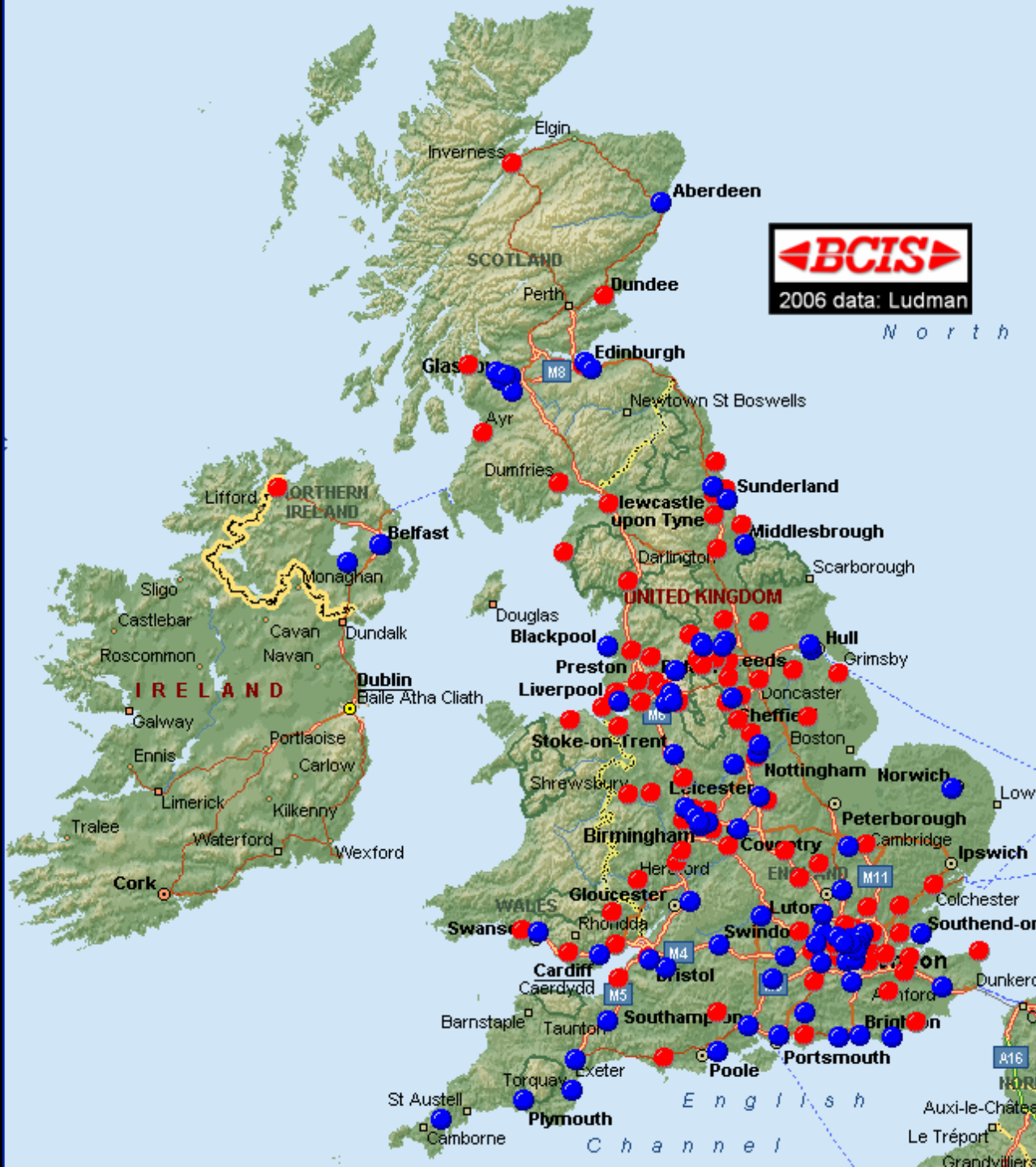
UK Centres - 2006

Angiography (90)

PCI (91)



2006

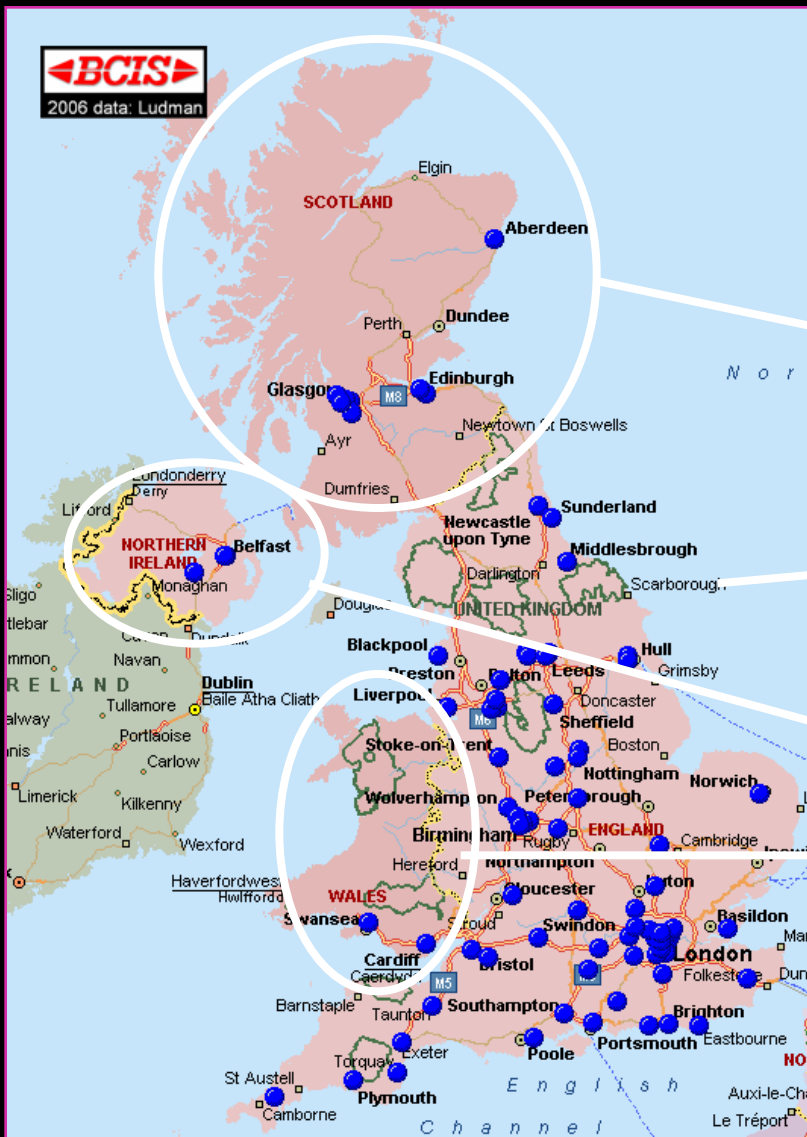





● Angiography (90)

● PCI (91)

UK Countries

PCI Centres in 2006



	Scotland	NHS	7
		Private	1
	England	NHS	63
		Private	15
	N Ireland		3
	Wales		2
	Total		91

PCI Data Requested

England and Wales
(Northern Ireland)

Form A & B

BCIS ANNUAL RETURN OF INTERVENTIONAL PROCEDURES
January 1st 2005 to December 31st 2005
(Forms A and B modified and combined)

1. Centre details

1.1	Name of Centre	
1.2	Your name	
1.3	Your position	
1.4	Contact phone	
1.5	Contact email	
1.6	Surgical cover (circle correct answer)	On site / off site / none
1.7	Is there an accident and emergency department on the same site as your interventional cath lab? (circle correct answer)	Yes / No

2. Your catheter labs

2.1	Number of cath labs used for adult cath or PCIs	
2.2	Number of labs in Q 2.1 that are biplane labs	
2.3	Number of sessions used for adult cath or PCIs per week	

3. Diagnostic procedures

3.1	Number of diagnostic adult coronary procedures	
NB If a cath? procedure becomes a PCI, this would count as one diagnostic procedure and one PCI procedure		
3.2	Number of local consultant cardiologists performing diagnostic coronary procedures	
3.3	Number of visiting consultant cardiologists performing diagnostic coronary procedures	
3.4	Number of consultant radiologists performing diagnostic coronary procedures	

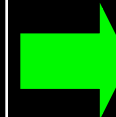
4. Interventional procedures

4.1	Number of local cardiologists performing PCI	
4.2	Number of visiting cardiologists performing PCI	
4.3	Number of radiologists performing PCI	
4.4	Number of SpRs being given subspecialty training in PCI (number in your hospital, not the total in your training scheme)	

Form C

BCIS ANNUAL RETURN OF PROCEDURES (continued - only complete if 2005 data are not in CCAD)
January 1st - December 31st 2005
(Form C)

	No. of procedures	No. of vessels attempted	No. of procedures requiring stents	No. of procedures involving Reperfusion	Procedural success*	Partial success	Procedure failure without complication	Q wave MI or re MI ***	Repeat P/CA for acute closure	Emerg. CABG	Death
Total angioplasty procedures:											
Electric Single vessel P/CA excluding chronic occlusions											
Electric Multivessel P/CA excluding chronic occlusions											
Electric Single vessel P/CA of chronic occlusions											
Electric Multivessel P/CA for chronic occlusions											
Transcatheter aortic P/CA in vessel											
Transcatheter aortic P/CA multivessel											



CCAD

PCI Data Requested

Scotland

Form A & B

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January 1st 2005 to December 31st 2005
(Forms A and B modified and combined)

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1.7	Is there an accident and emergency department on the same site as your interventional cath lab? (circle correct answer)	Yes / No

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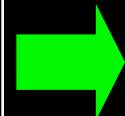
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Form C

BCIS ANNUAL RETURN OF PROCEDURES (continued - only complete if 2005 data are not in CCAD)
January 1st - December 31st 2005
(Form C)

	No. of procedures	No. of procedures attempted	No. of procedures completed	Procedural success*	Partial success	Procedure failure without complication	Q wave MI	Repeat P/CA for acute closure	Emerg. CABG	Death
Total angioplasty procedures:										
Elective Single vessel P/CA excluding chronic occlusions										
Elective Multivessel P/CA excluding chronic occlusions										
Elective Single vessel P/CA of chronic occlusions										
Elective Multivessel P/CA of chronic occlusions										
Transcatheter aortic valve replacement										
Transcatheter mitral valve repair										
Transcatheter aortic valve repair										
Transcatheter mitral valve repair										



Scottish database

Link

CCAD

Data from Paper Returns

Form A & B

BCIS ANNUAL RETURN OF INTERVENTIONAL PROCEDURES

January 1st 2005 to December 31st 2005
(Forms A and B modified and combined)

1. Centre details		
1.1	Name of Centre	
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1.4	Contact phone	
1.5	Contact email	
1.6	Surgical cover (each correct answer)	On site / off site / none
1.7	Is there an accident and emergency department on the same site as your interventional cath lab? (circle correct answer)	Yes / No
2. Your catheter labs		
2.1	Number of cath labs used for adult cath or PCI	
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4.1	Number of local cardiologists performing PCI	
4.2	Number of visiting cardiologists performing PCI	
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4.4	Number of SpR's being given subspeciality training in PCI (number in your hospital, not the total in your training scheme)	

Some data from ALL

Minimal data from:

BMI Park, Nottingham

UK Interventional and Diagnostic centres 2006



2006 data: Ludman

	No.	No cath data	No PCI data	Caths (% of total)	PCIs (% of total)
NHS Interventional	75	0	0	148,978	
Private Interventional	16	0	0	8,229	
Diagnostic only	90	0	na	58,368	
TOTAL	181			215,575	

UK Interventional and Diagnostic centres 2006



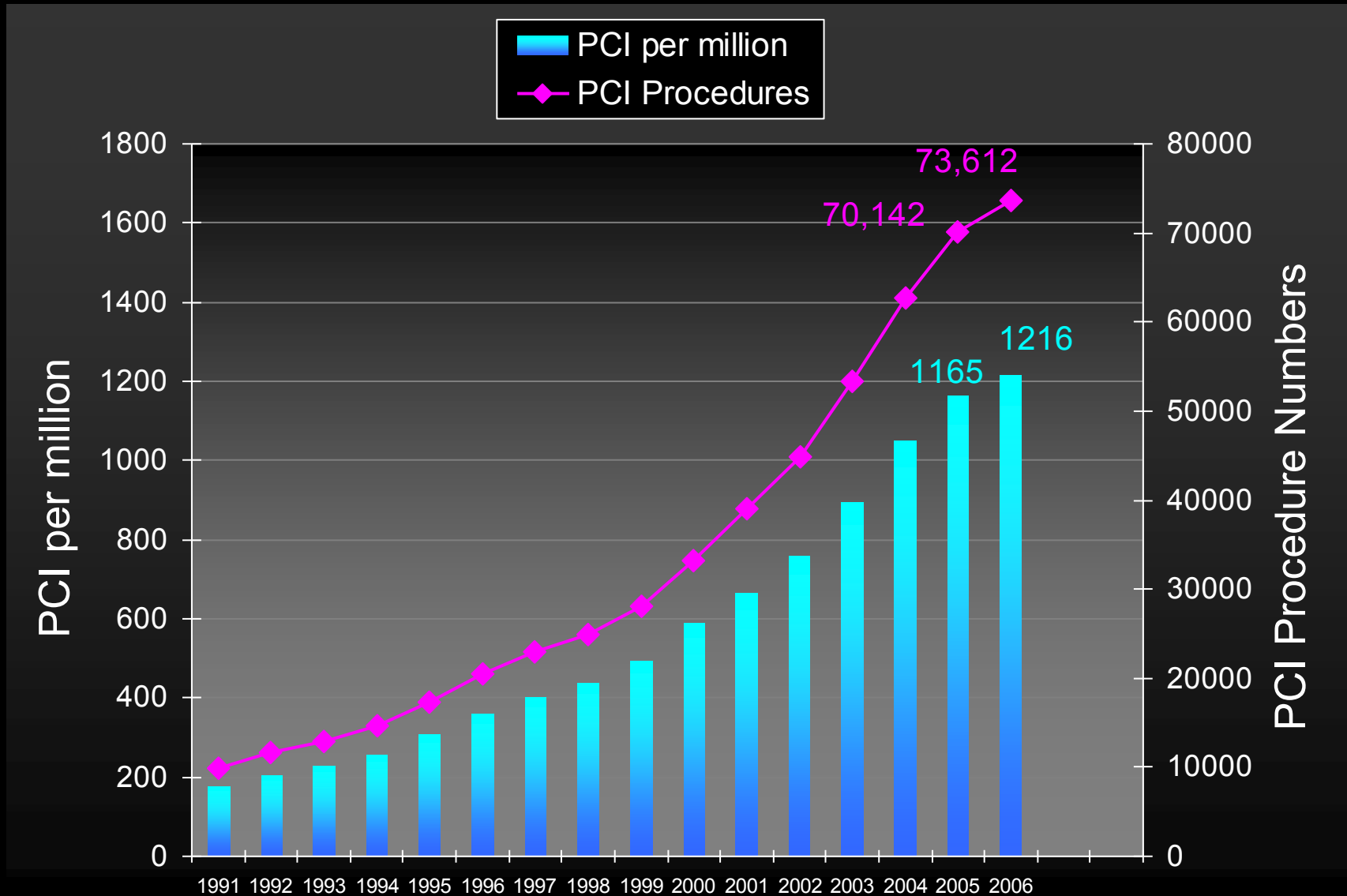
2006 data: Ludman

	No.	No cath data	No PCI data	Caths (% of total)	PCIs (% of total)
NHS Interventional	75	0	0	148,978	70,830
Private Interventional	16	0	0	8,229	2,862
Diagnostic only	90	0	na	58,368	0
TOTAL	181			215,575	73,692

PCI activity to 2006 (UK)



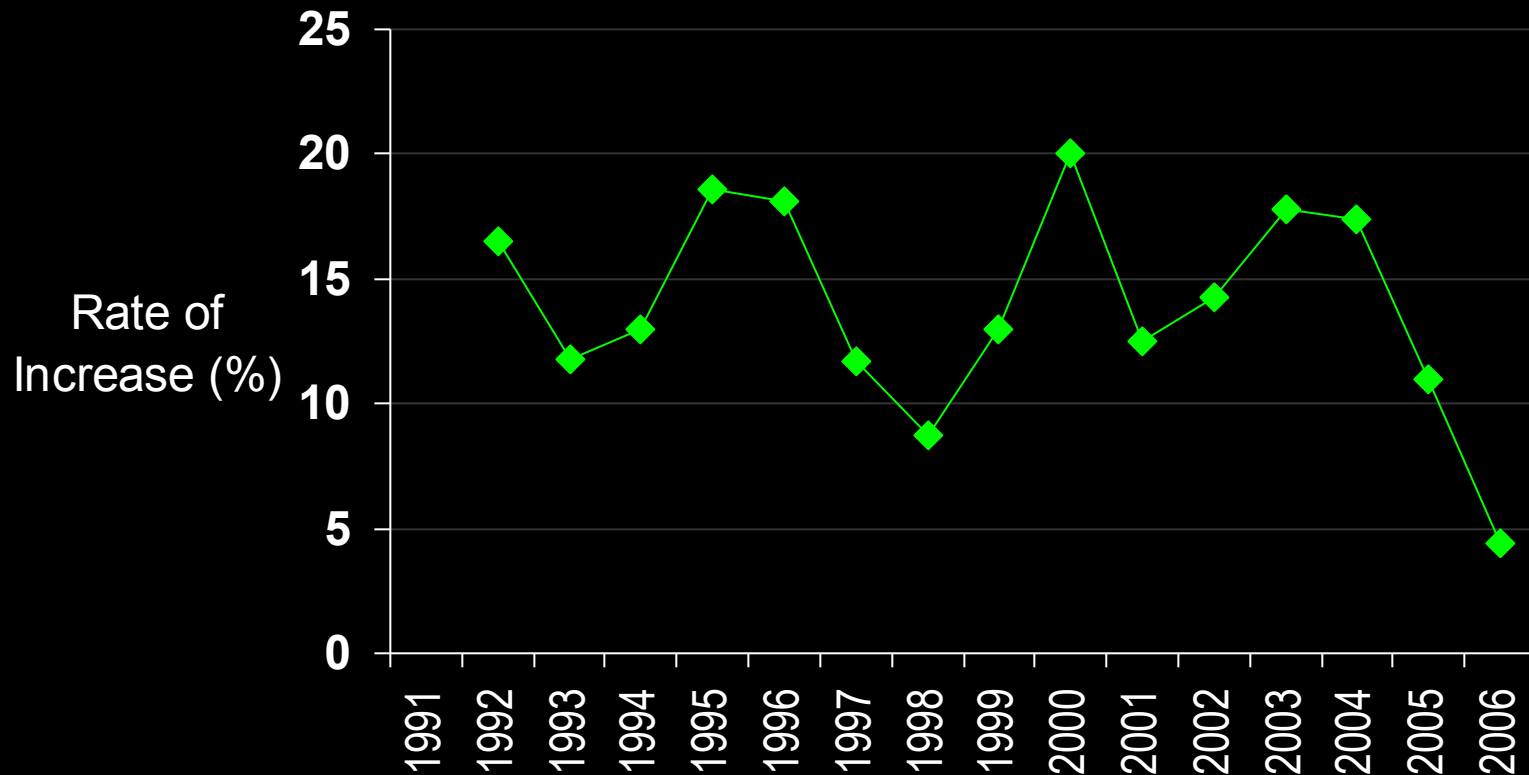
2006 data: Ludman



Rate of increase in PCI numbers pmp



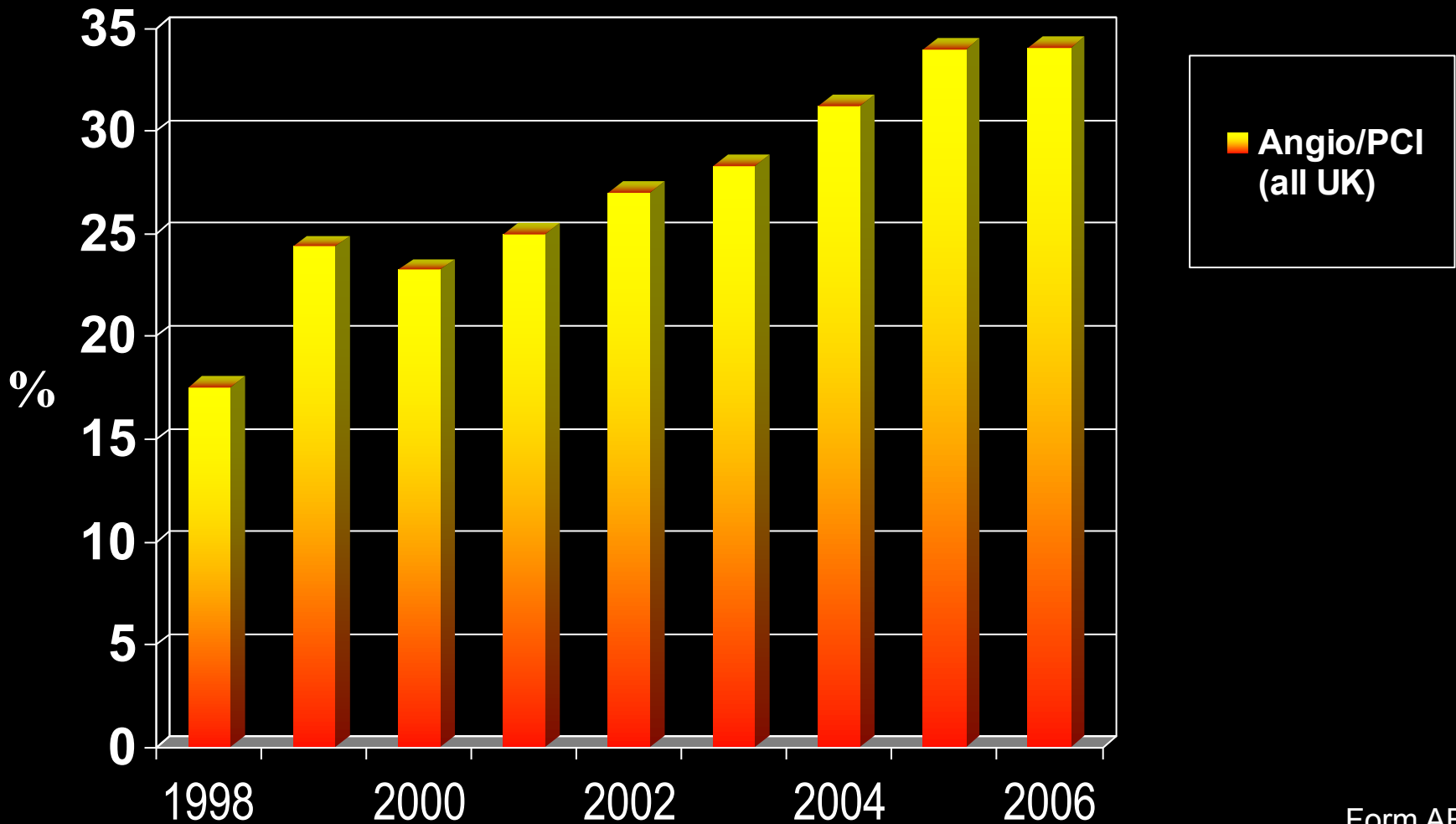
2006 data: Ludman



PCI per Angiogram ratio



2006 data: Ludman



Population estimates

Mid 2006



2006 data: Ludman



Total UK: 60.9 m

Scotland 5.12 m

Northern Ireland 1.74 m

England 50.76 m

est: Welsh Rx in England 0.8 m

Total Rx in England 51.56 m

Wales 2.97 m

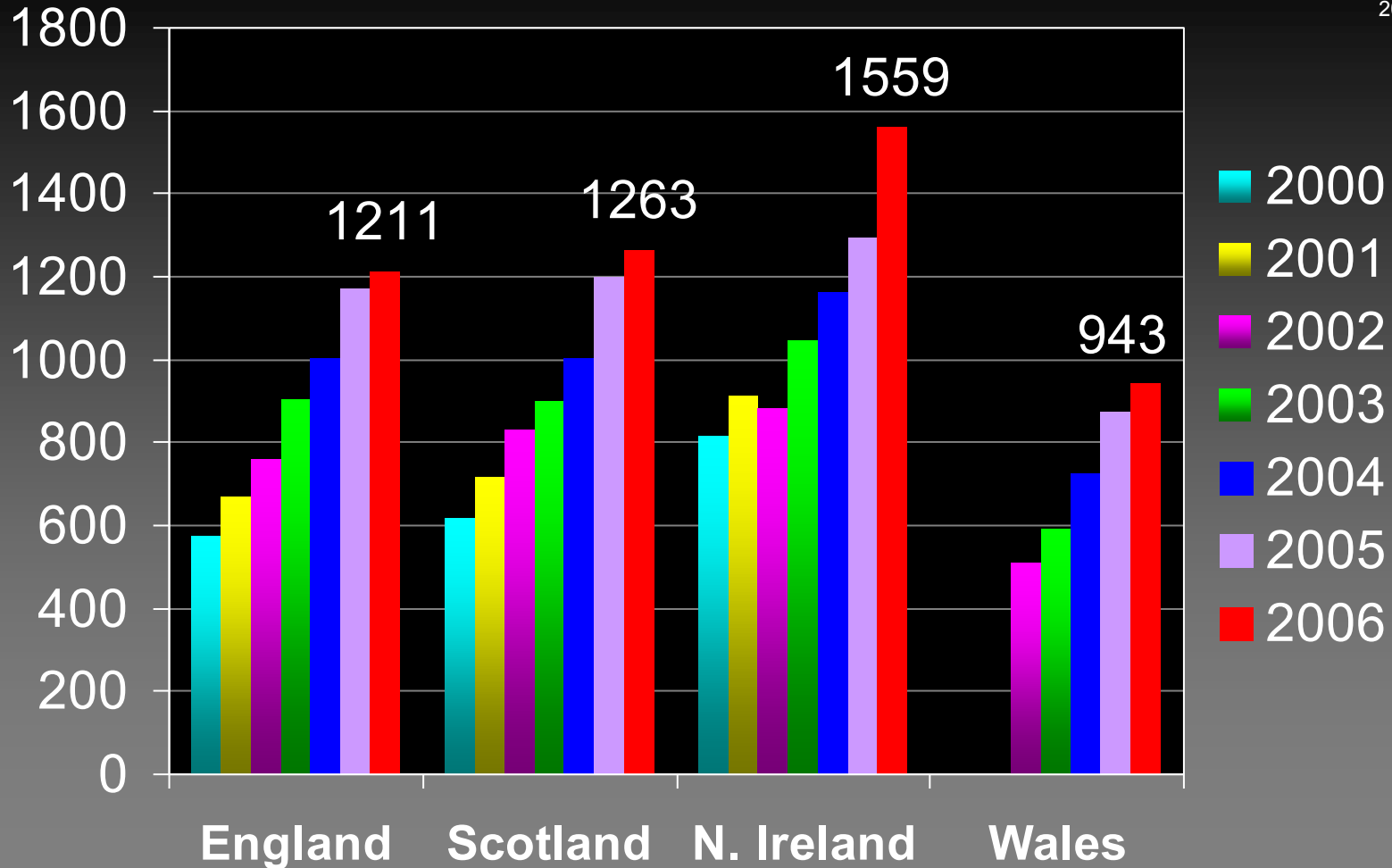
est: Rx in Wales: 2.2 m

PCIs/million UK Countries

(2000 to 2006)

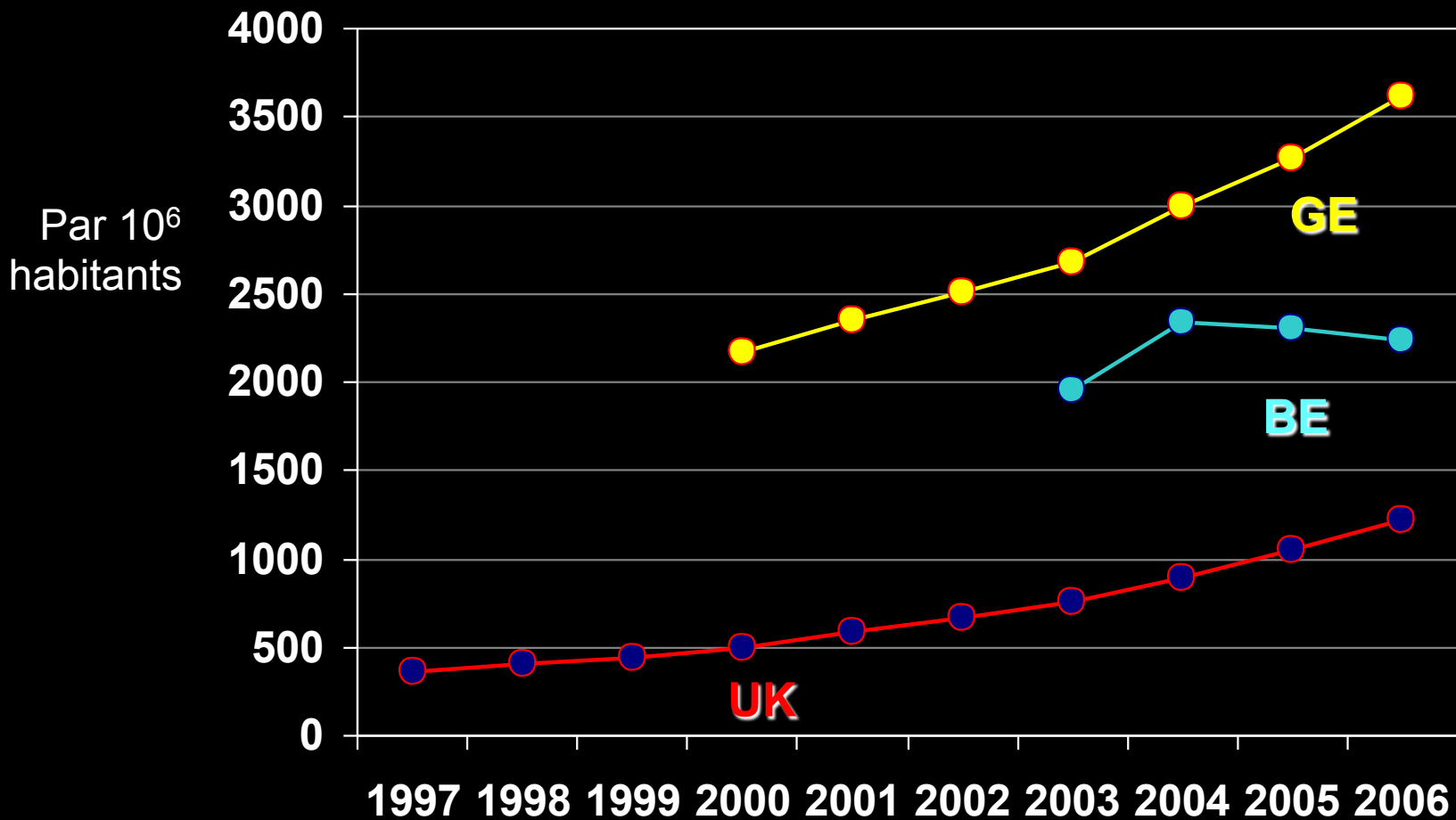


2006 data: Ludman



Nombres de PCI dans certains pays Européens

Bernard De Bruyne, Aalst, Belgium

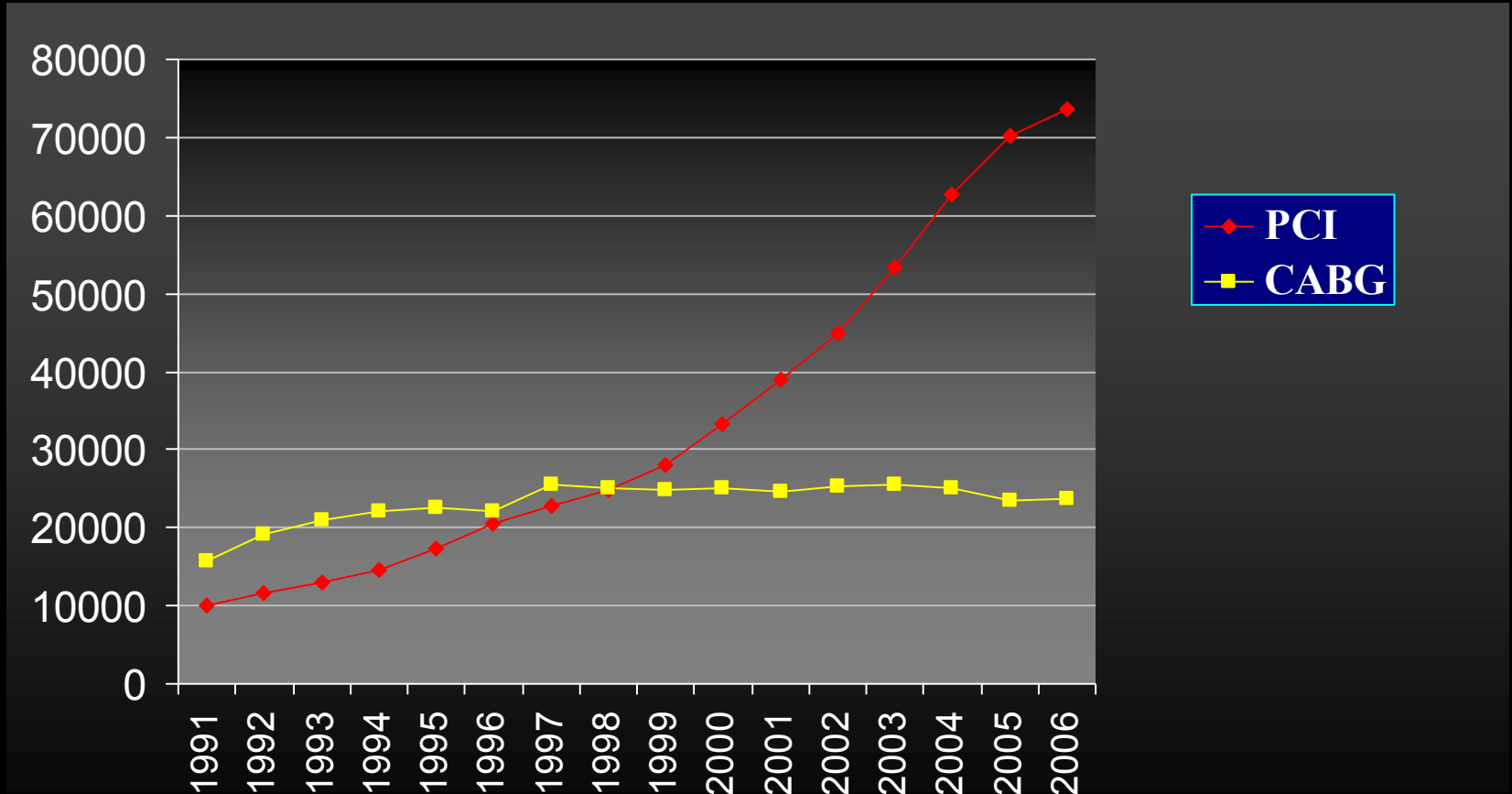


PCI vs Isolated CABG Numbers (UK)

1991 to 2006



2006 data: Ludman



Note:

CABG data for financial yr
all PCI v NHS CABG

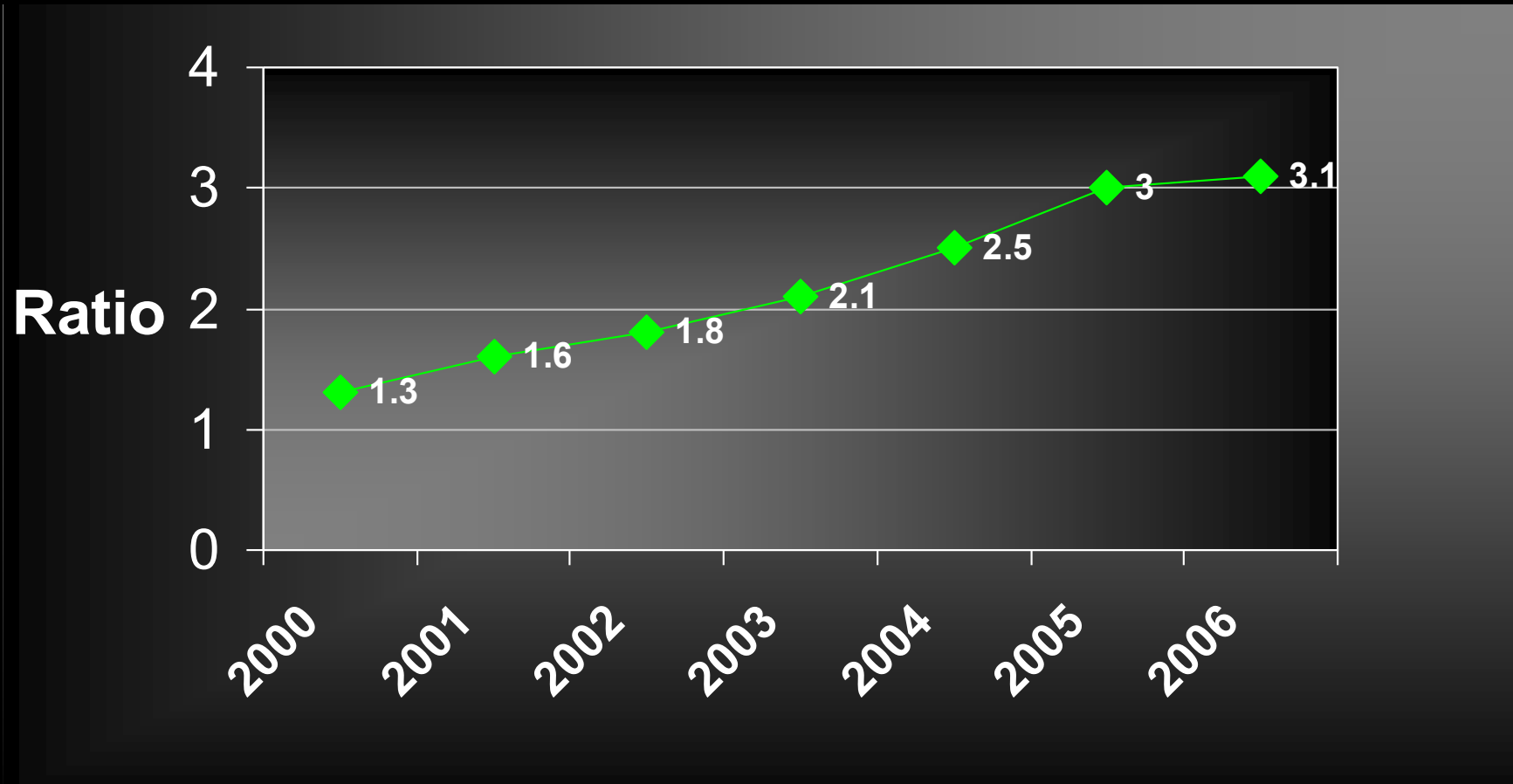
Form AB

PCI vs Isolated CABG Ratio (UK)

2000 to 2006



2006 data: Ludman



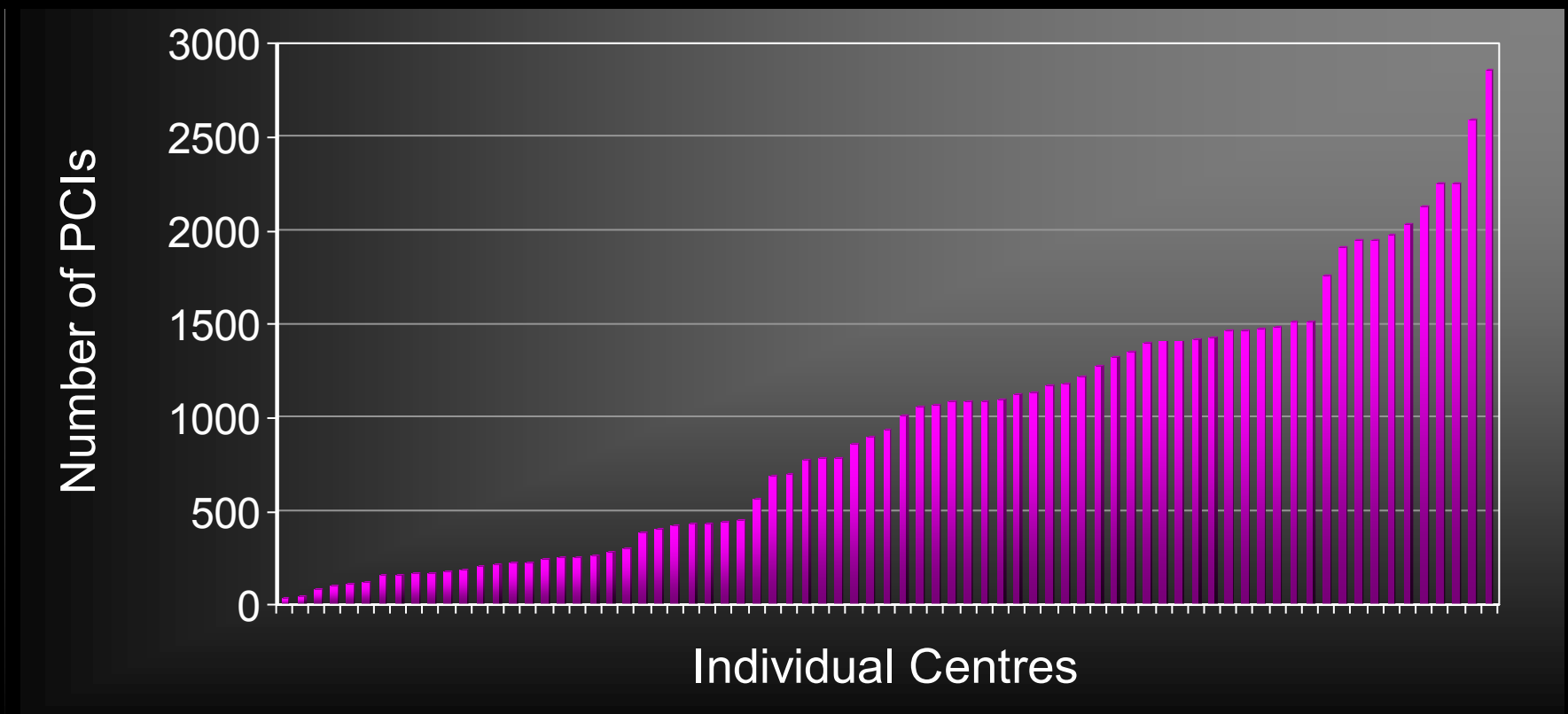
Number of PCIs performed in 2006

(per NHS Centre)

Mean = 944



2006 data: Ludman



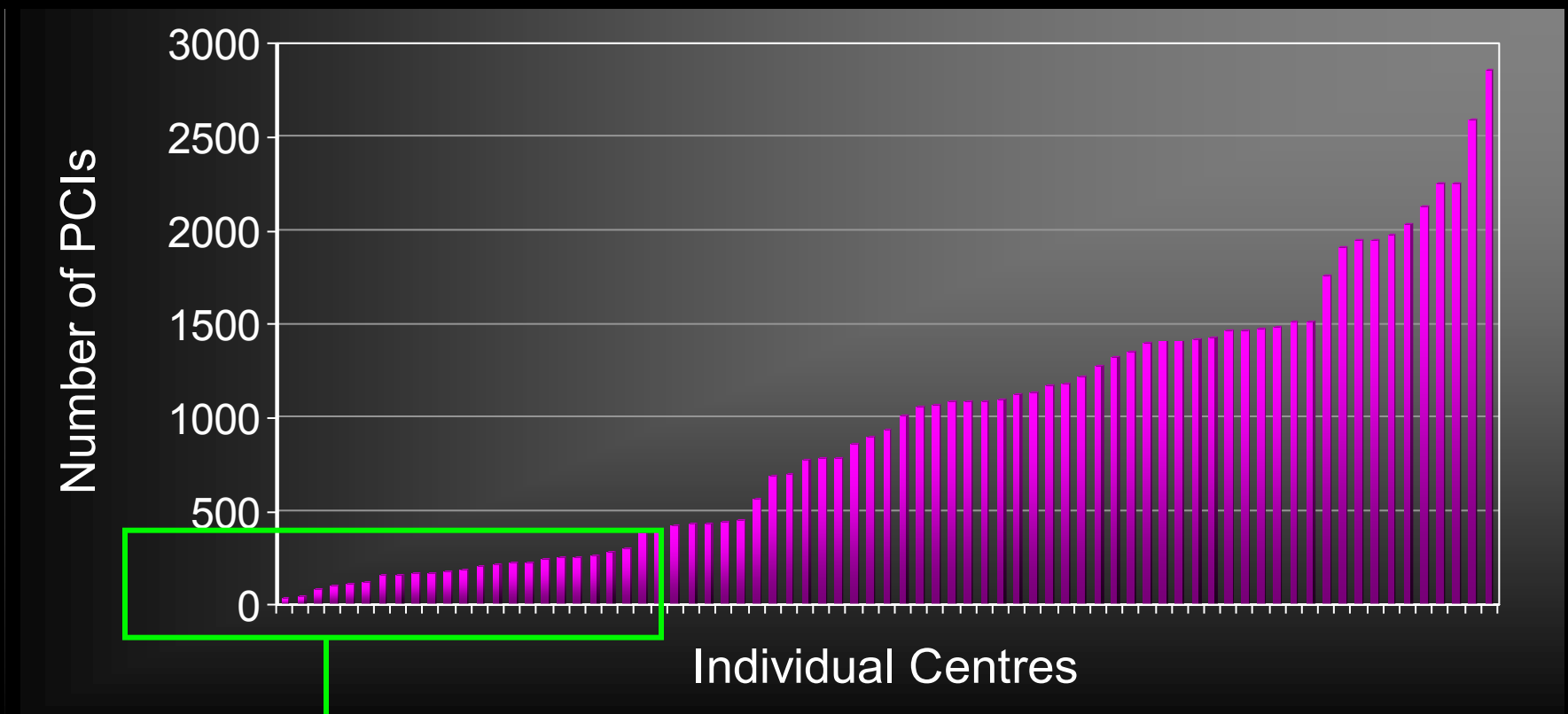
Number of PCIs performed in 2006

(per NHS Centre)



2006 data: Ludman

Mean = 944



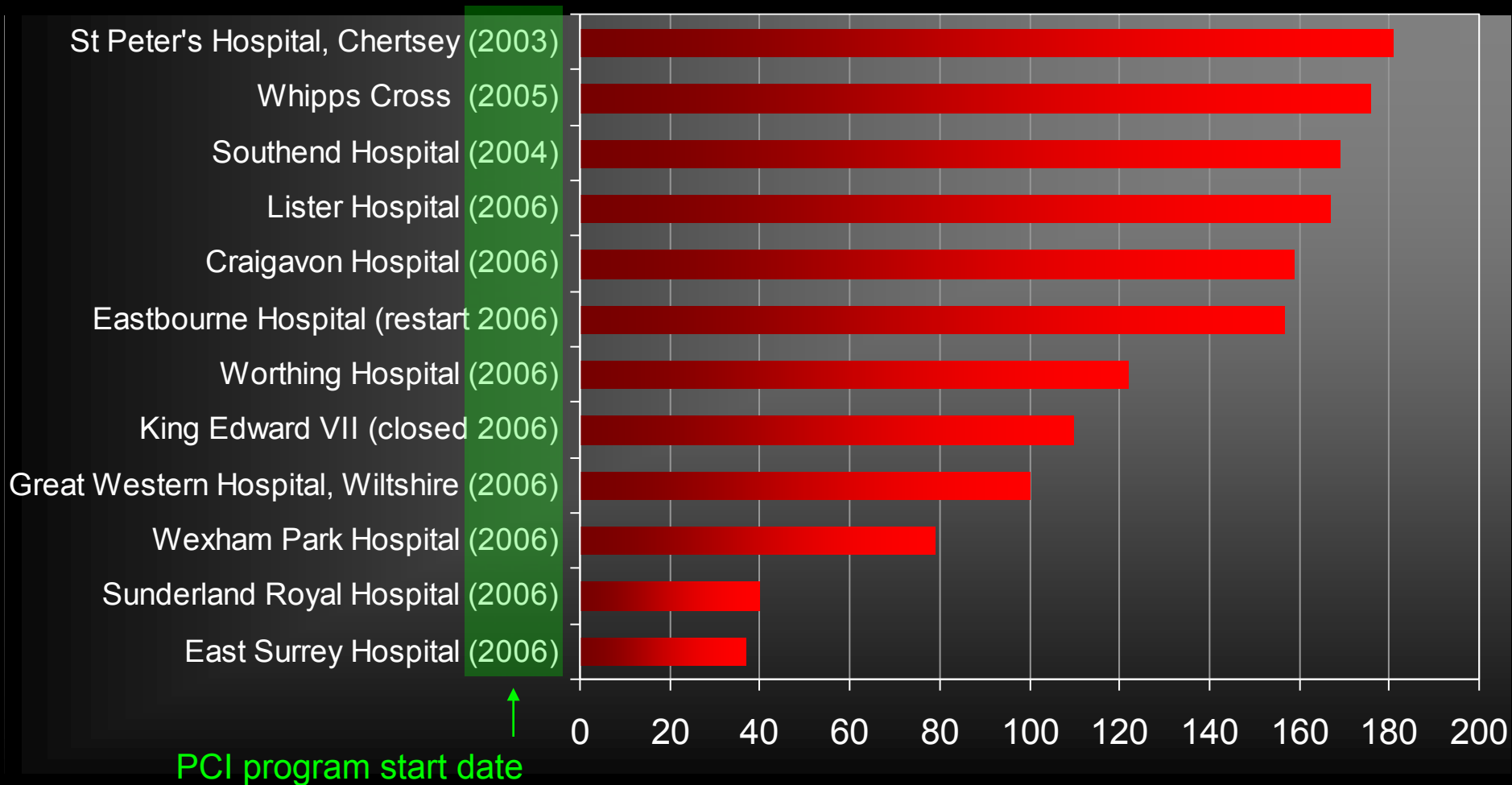
Centres performing < 400 cases

Number of PCIs performed in 2006



2006 data: Ludman

Centres performing < 200 procedures

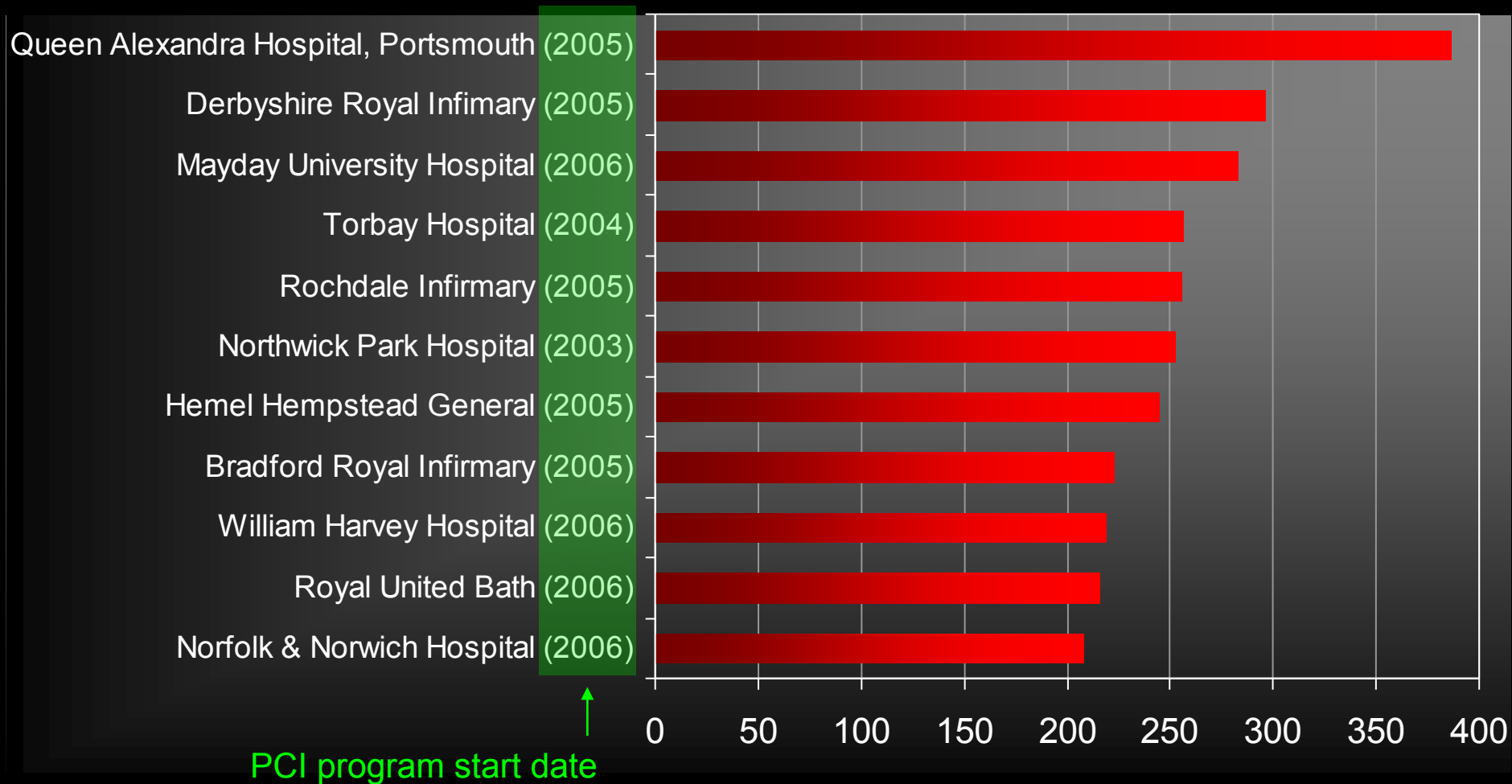


Number of PCIs performed in 2006



2006 data: Ludman

Centres performing 200 to 400 procedures

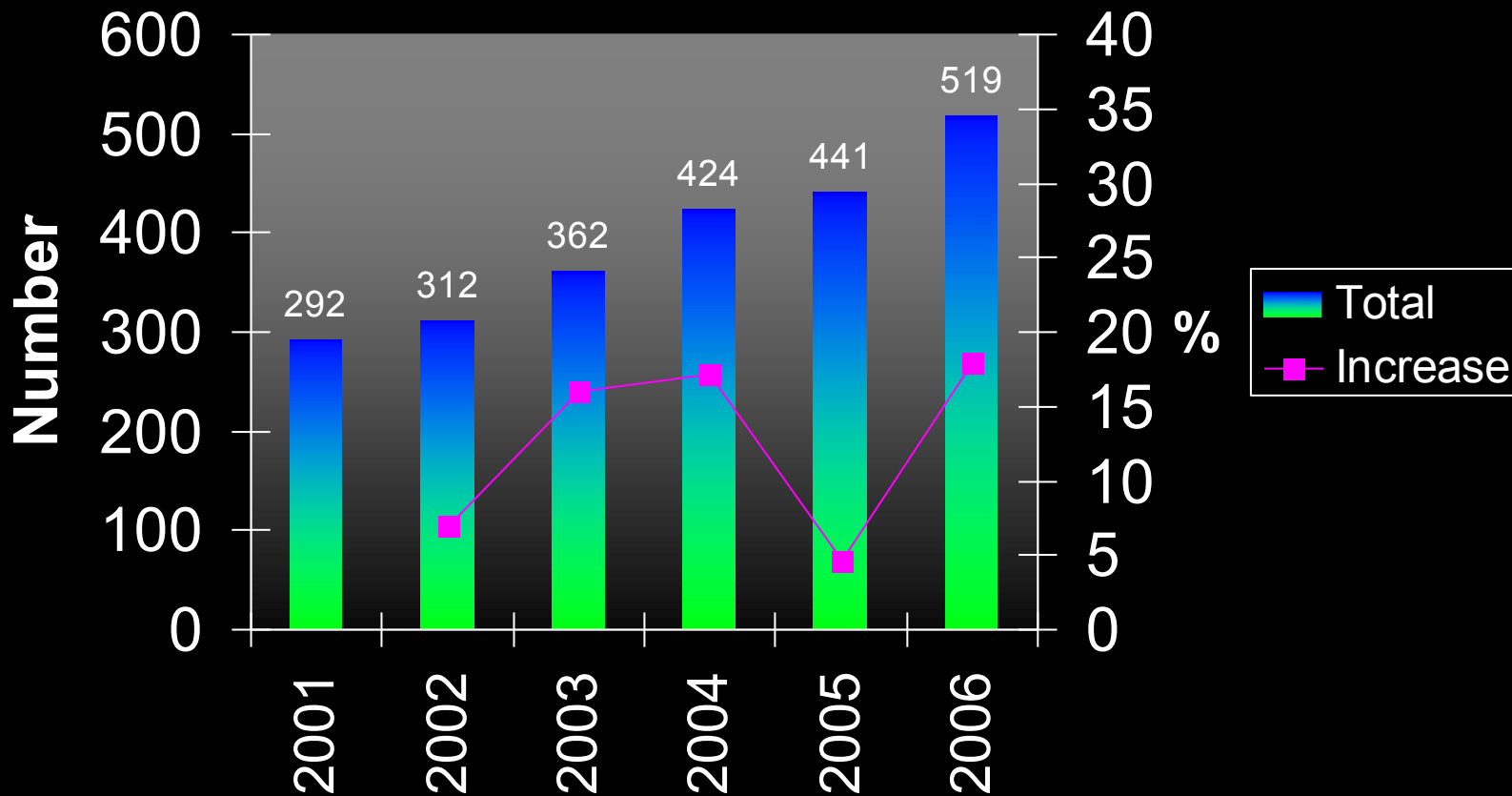


No. of Interventional Consultants

(NHS centres – data from all 75)



2006 data: Ludman

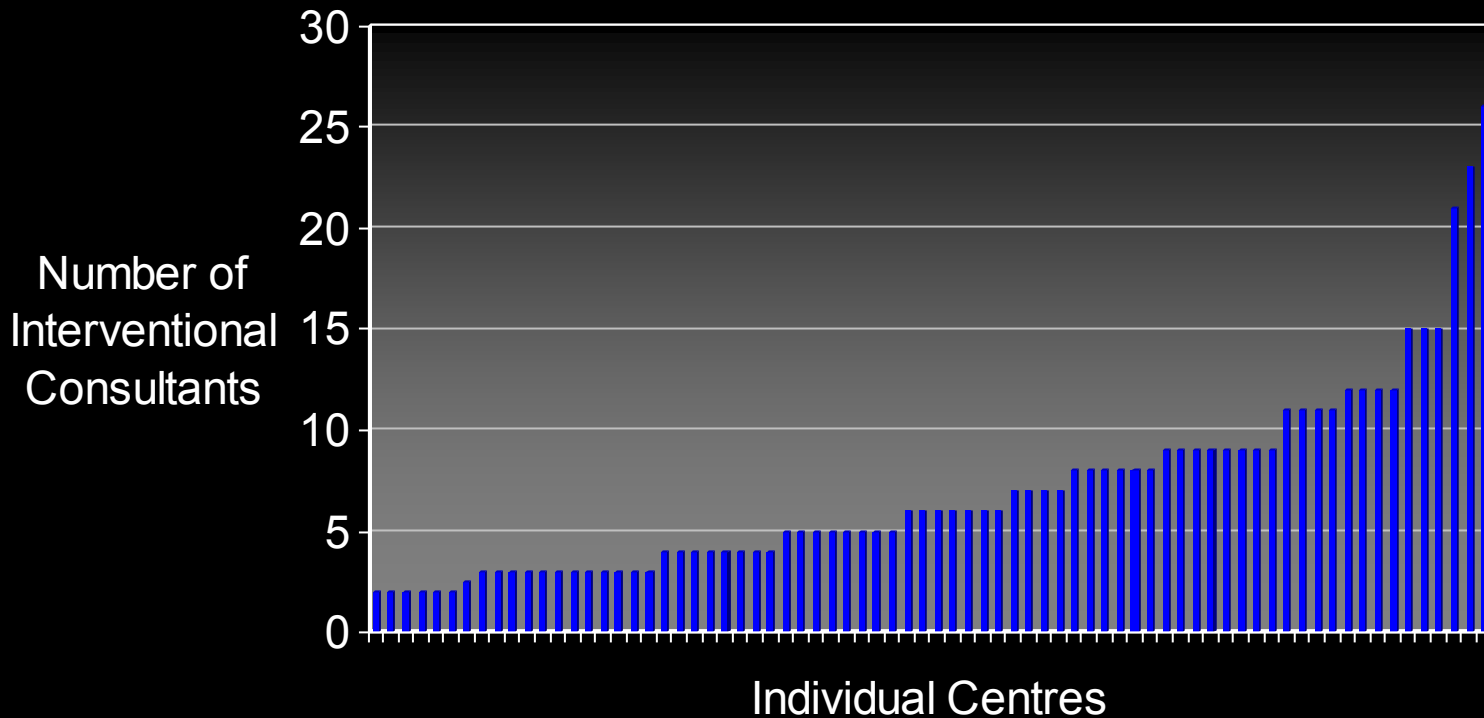


Note: if work at two NHS centres will be counted twice
Includes cardiologists and radiologists

No. of Interventional Consultants (NHS centres 2006)



2006 data: Ludman



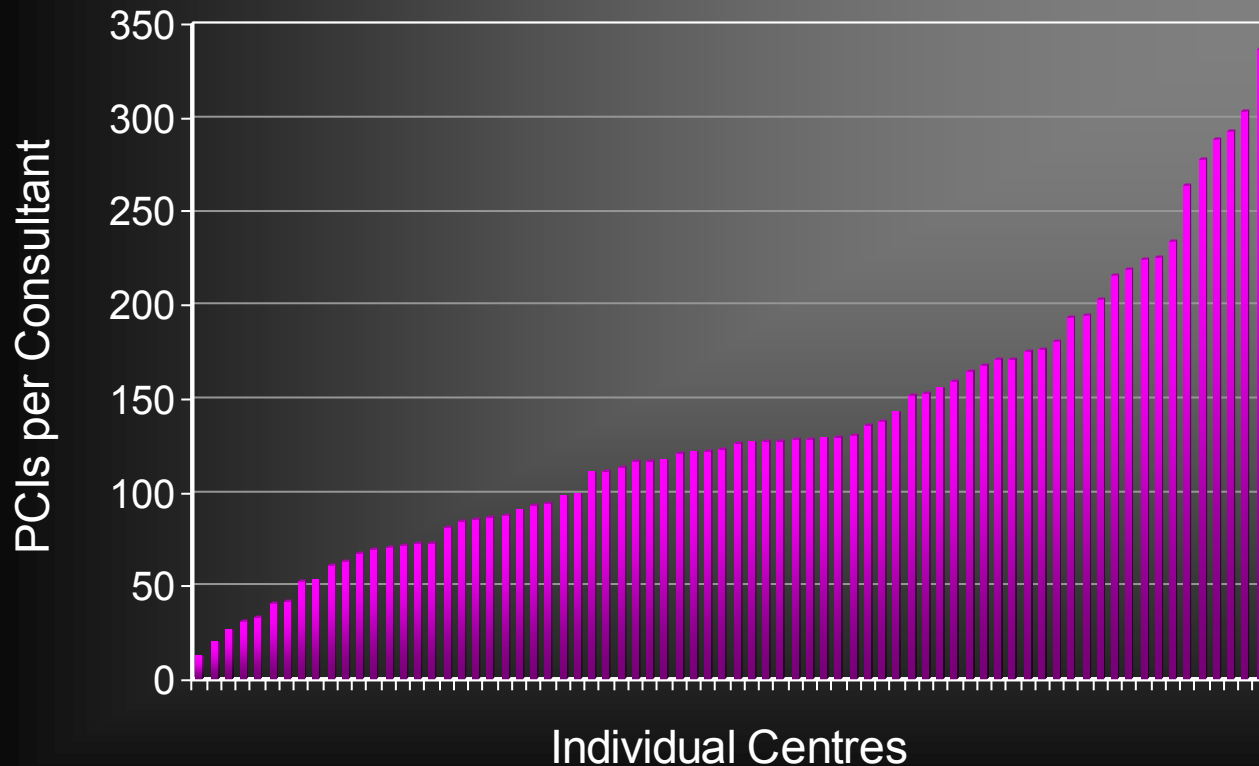
Mean	
2000	5.5
2001	6.1
2002	6.5
2003	6.7
2004	7.4
2005	7.0
2006	6.9

Note: if work at two NHS centres will be counted twice

No. of PCIs per Consultant (NHS Centres)



2006 data: Ludman



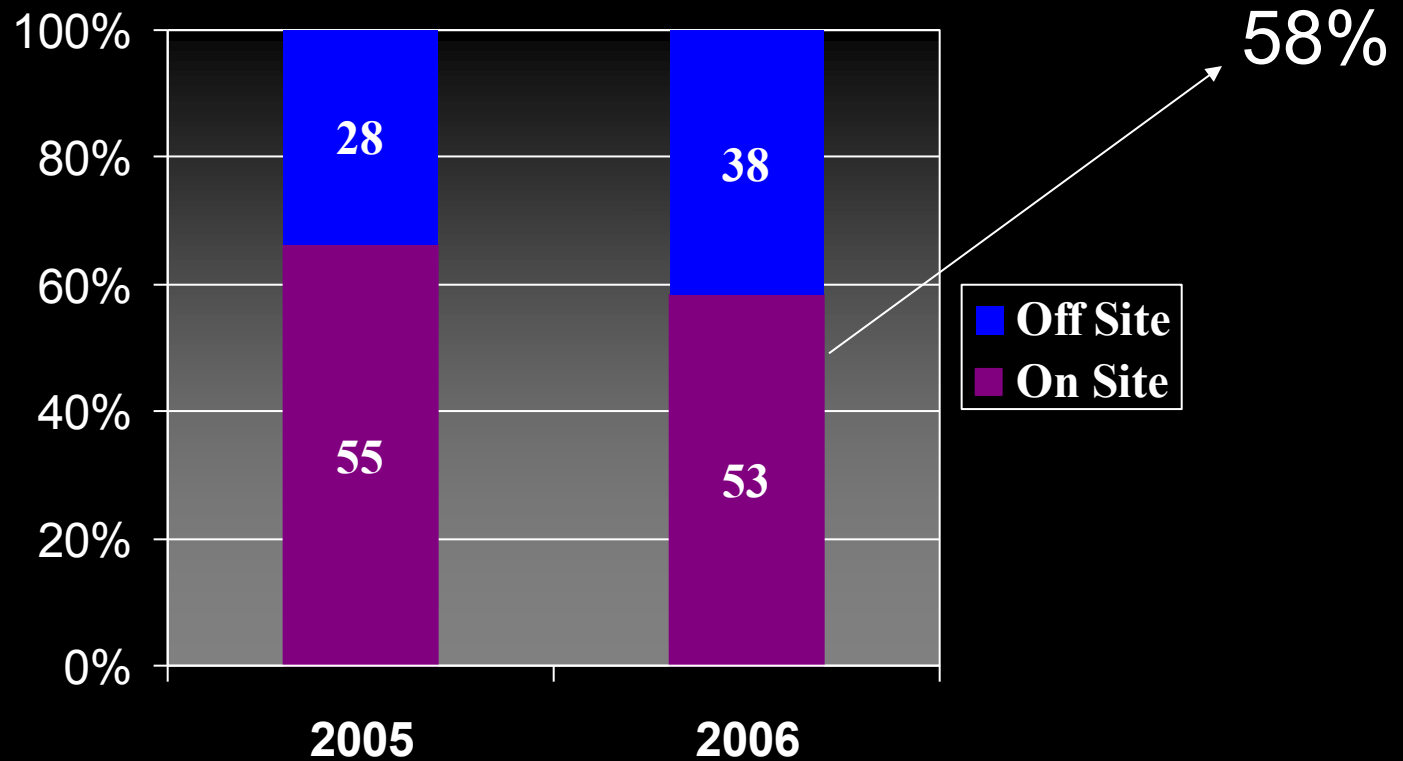
Year	Mean PCI/consultant
2000	125
2001	126
2002	138
2003	139
2004	143
2005	145
2006	133

Note:

Data from institutional volume divided by No operators per institution
Some consultants work in multiple institutions

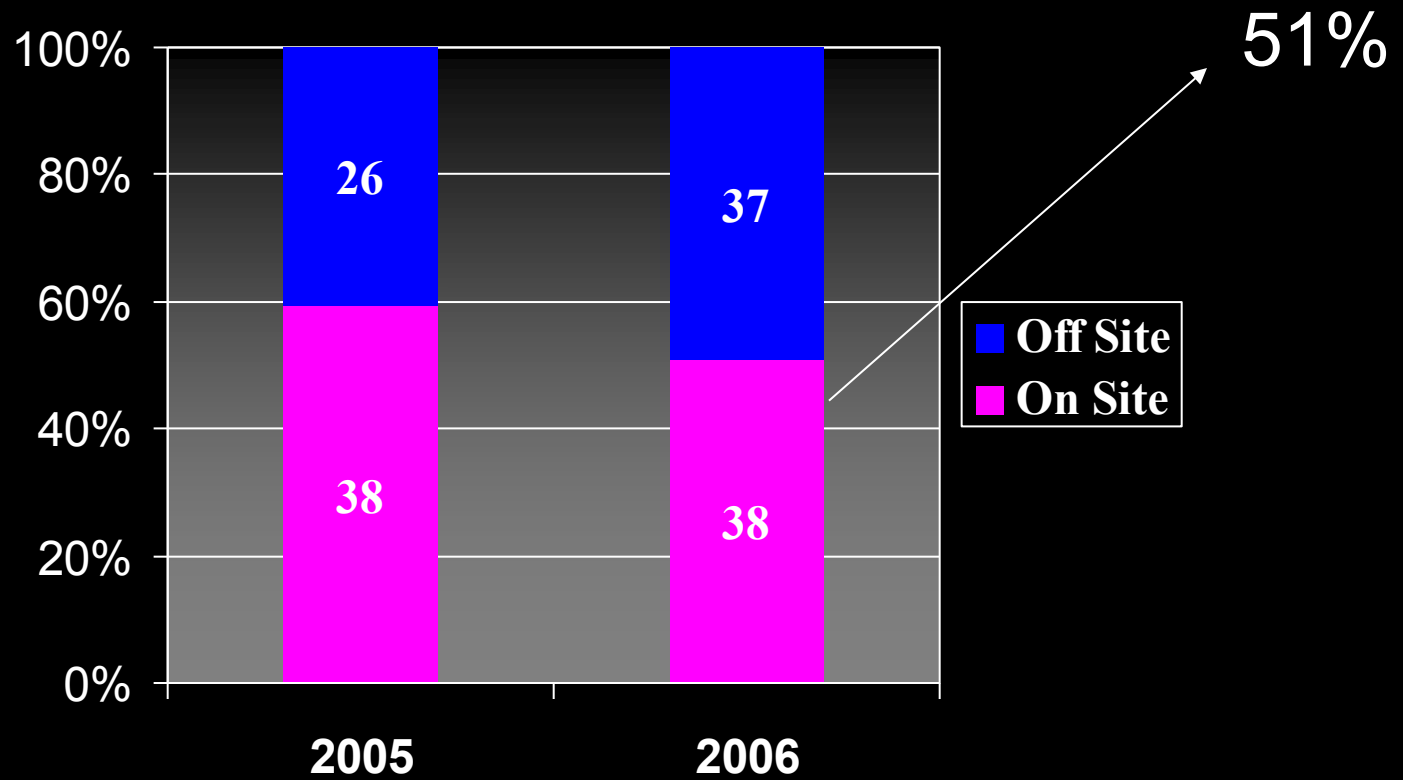
On v Off Site Surgery

All Centres (NHS and private)



On v Off Site Surgery

NHS Centres only



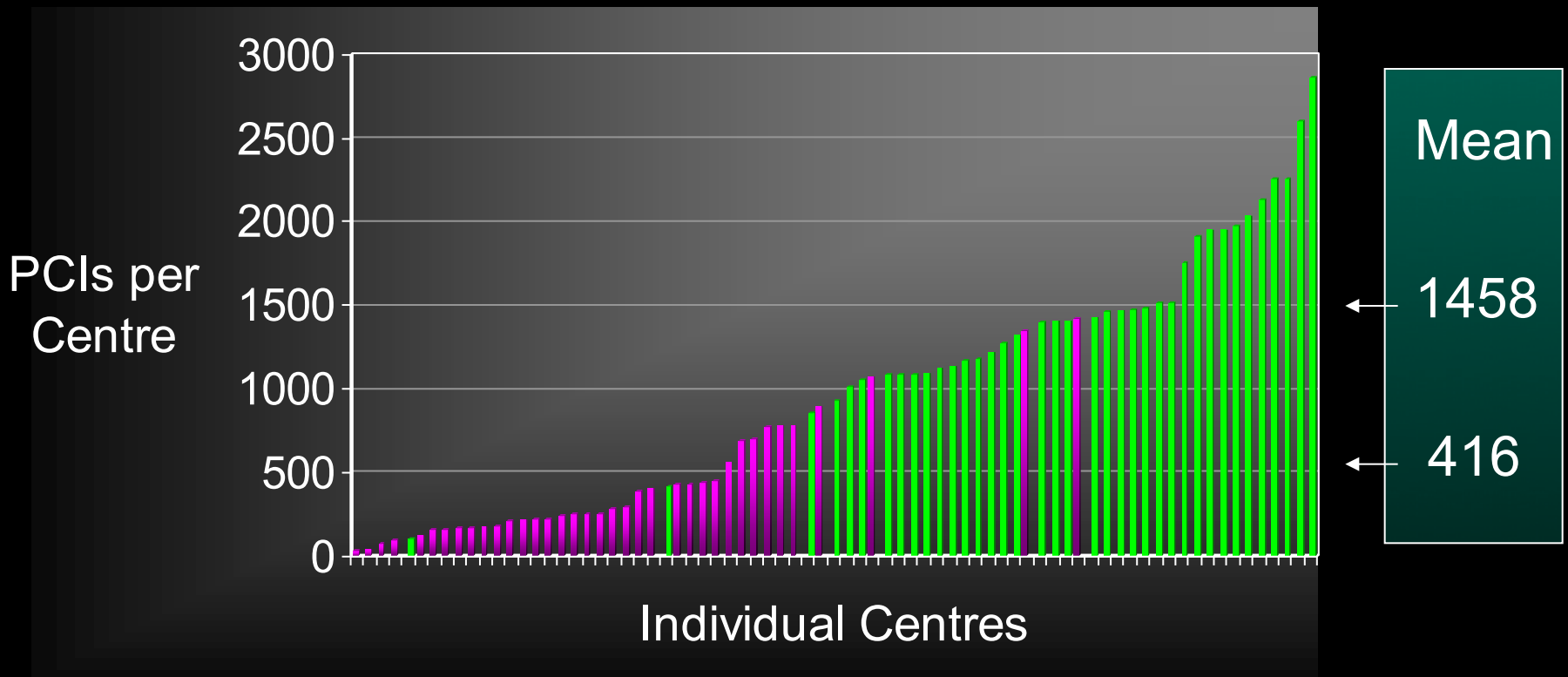
Surgical Cover

(2006 - all 75 NHS centres)



2006 data: Ludman

Off site On Site



Surgical Cover

(all 91 NHS and Private Centres)



2006 data: Ludman

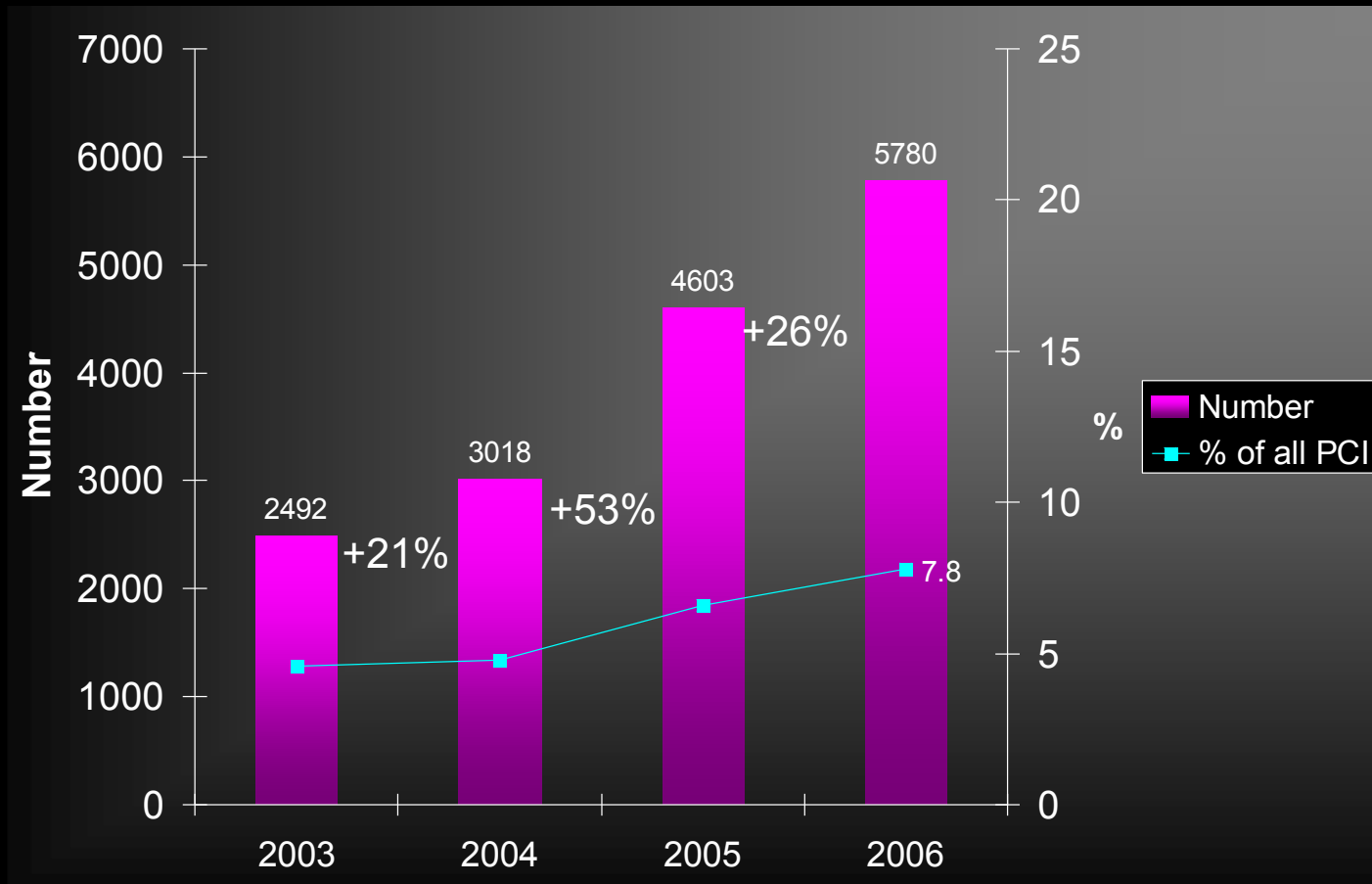
	On site	Off site
No of centres	53 (58%)	38 (42%)
No. of PCI (% of total)	58,153 (79%)	15,539 (21%)
Mean No. PCI per centre (all)	1097	409
Mean No. PCI per centre (NHS)	1458	416

Day Case PCI



2006 data: Ludman

- 38 of 81 Units performing day case PCI



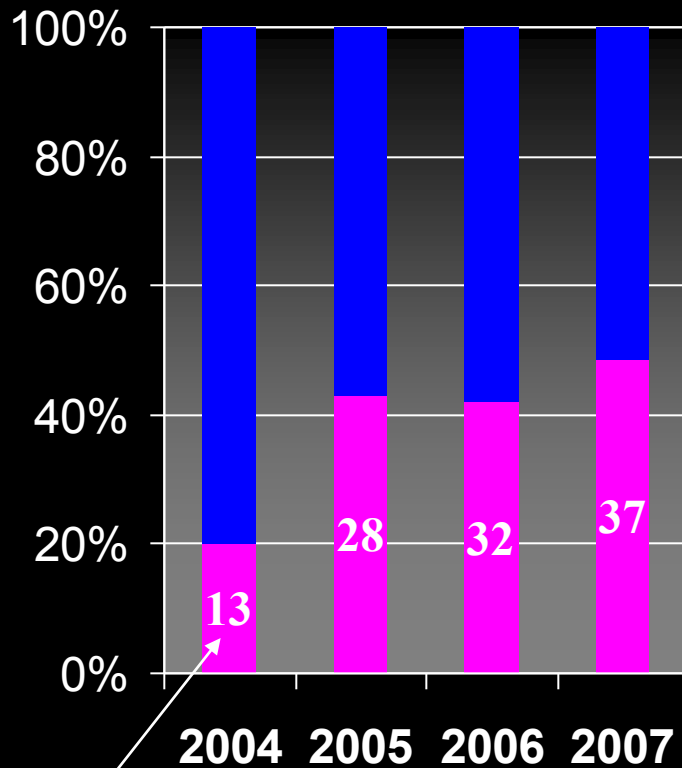
Data from: 81 of 91 centres

Primary PCI Routine Rx for STEMI

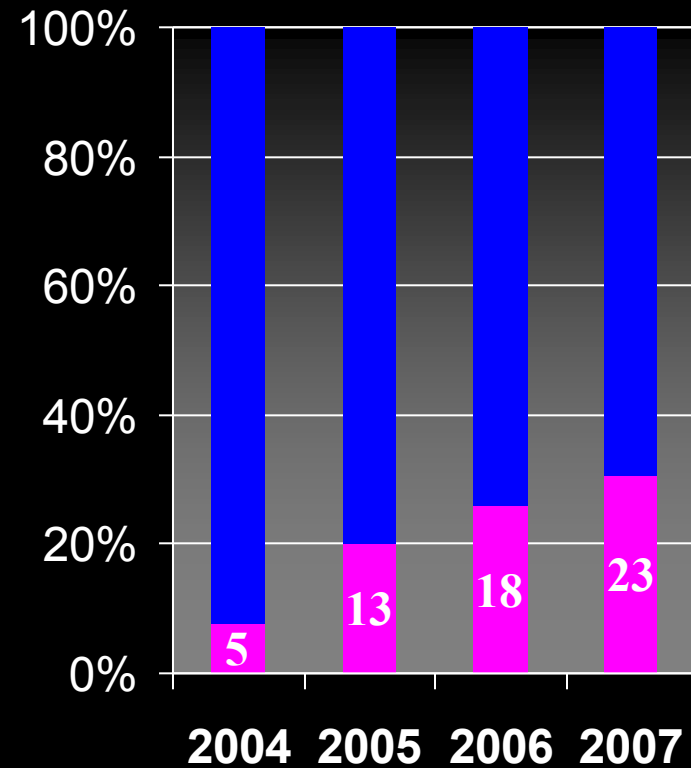


2006 data: Ludman

Working Hours



24/7



Number of centres

NHS Centres only

Working Hrs includes all 24/7 sites

Procedure Specific Analysis

CCAD



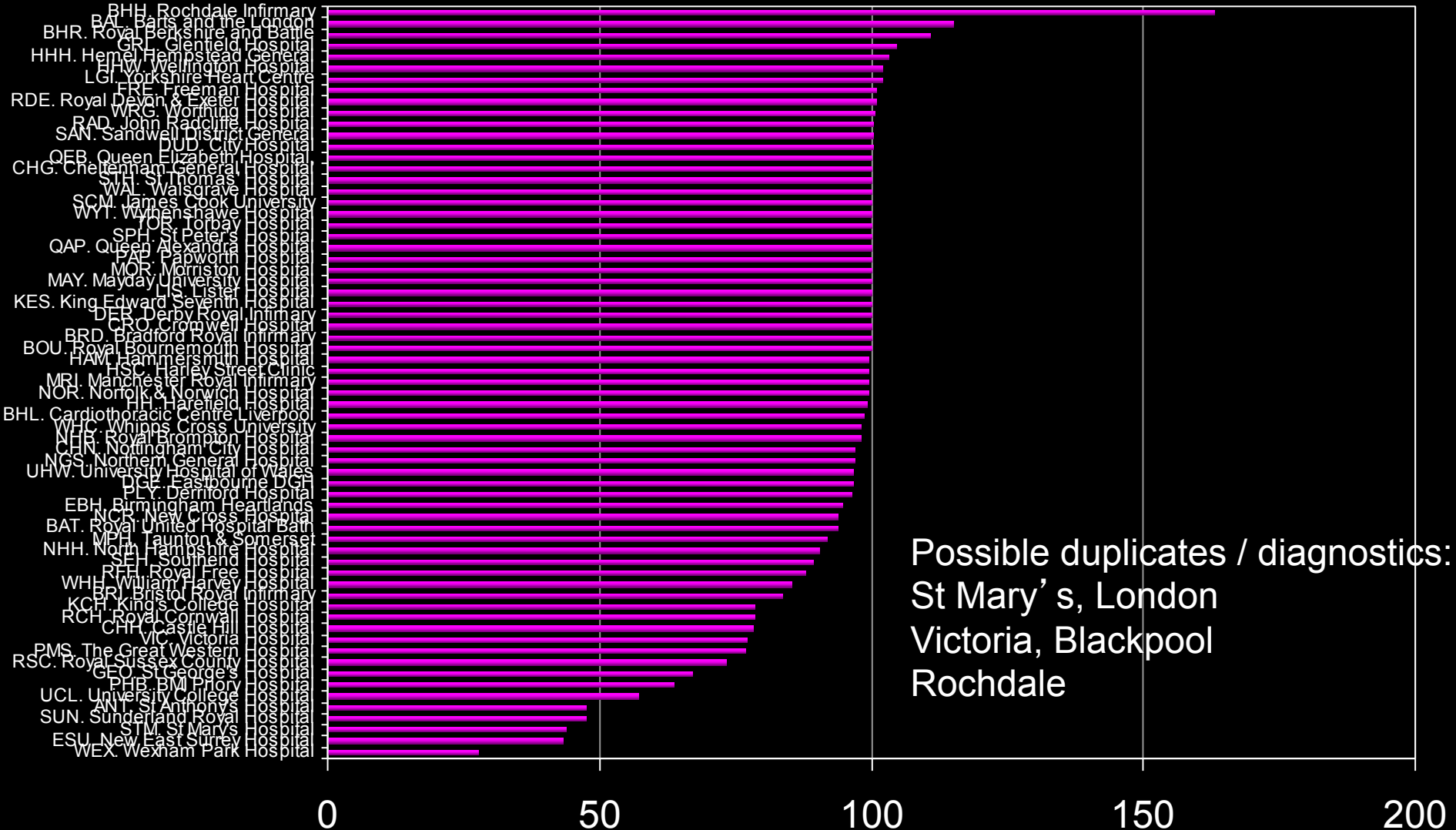
2006 data: Ludman

Participation

		Total No. of Centres	Data to CCAD	Participation
England	NHS	63	60	95%
	Private	15	5	33%
Wales		2	2	100%
N Ireland		3	0	0
Scotland		local electronic collection: linkage to CCAD awaited		(100%)

CCAD data quality

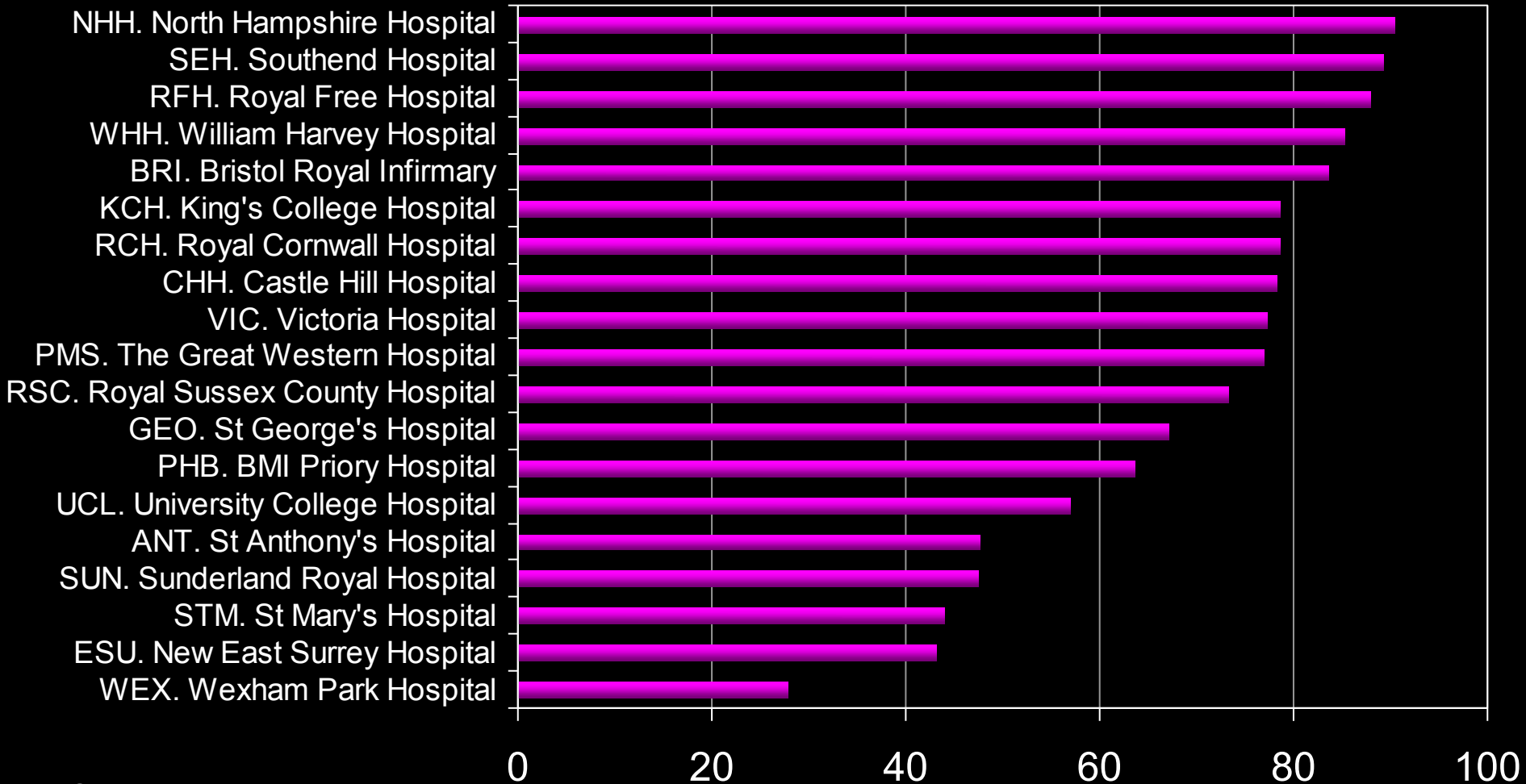
PCI data in CCAD as % of Reported Totals



CCAD data quality

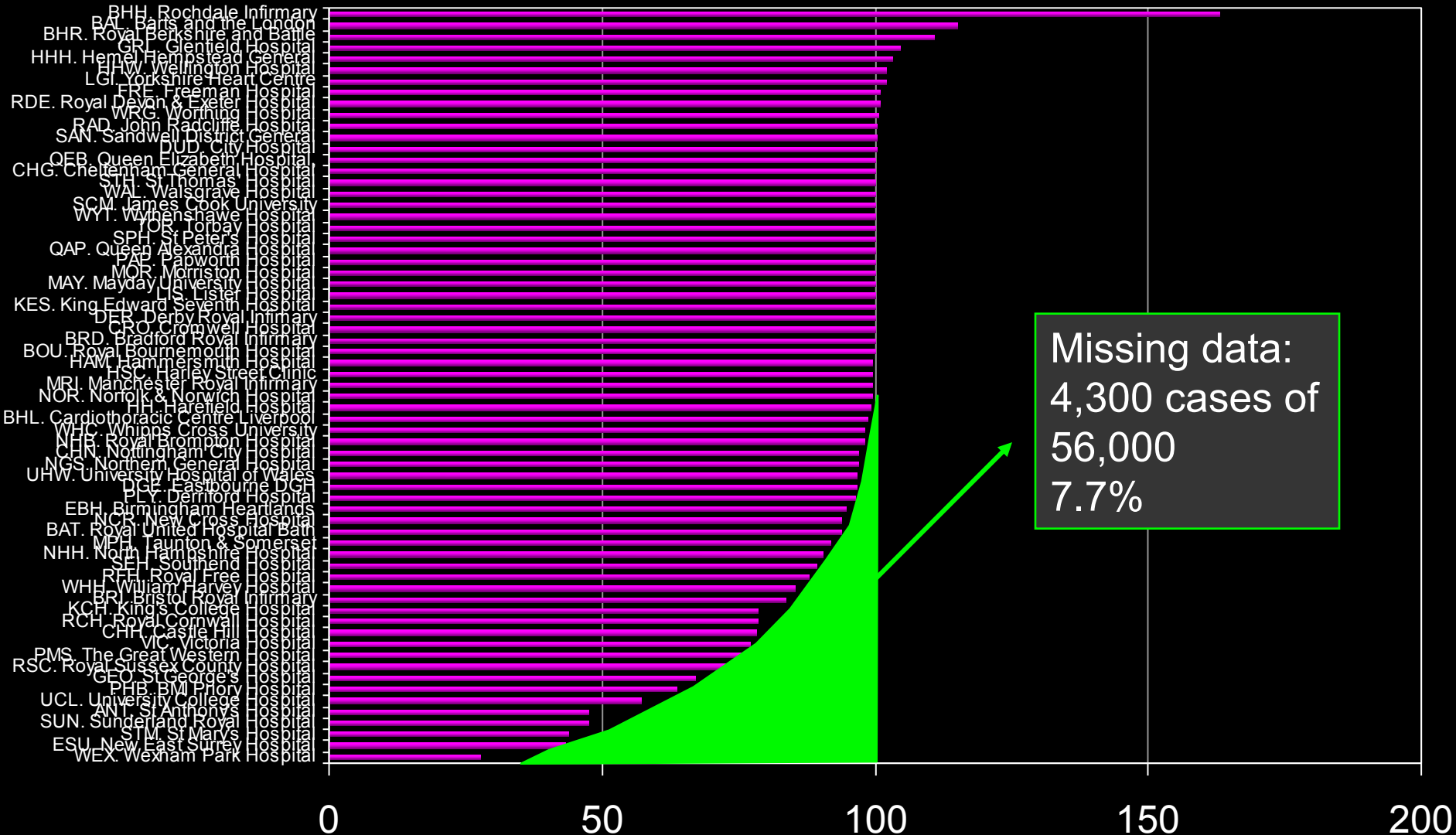
PCI data in CCAD as % of Reported Totals

Centres with < 90% of their activity in CCAD



CCAD data quality

PCI data in CCAD as % of Reported Totals





Top Dogs



2006 data: Ludman

	Date of Birth	Sex	Medical History	Pre-procedure shock	Procedure urgency	Vessels treated	Renal disease	Diabetes	Discharge date	Discharge status	PCI hospital outcome	NHS number
SUN. Sunderland Royal Hospital	100	100	100	100	100	100	100	100	100	100	100	100
TOR. Torbay Hospital	100	100	100	99.6	100	100	100	100	100	100	100	99.2
SCM. James Cook University Hospital	100	100	99.5	100	100	100	99.6	99.9	100	100	100	100
HSC. Harley Street Clinic	100	100	99.3	100	100	100	100	99.7	100	100	100	0
HHW. Wellington Hospital	100	100	99.4	100	100	100	98.4	100	100	100	100	0
SEH. Southend Hospital	100	100	100	98.7	100	100	99.3	99.3	100	100	100	100
QEB. Queen Elizabeth Hospital, Edgbaston	100	100	100	100	100	98.8	99.9	99.9	99.5	99.5	99.5	97.5
SAN. Sandwell District General Hospital	100	99.5	100	100	100	99.5	98.8	100	98.3	100	100	99.8
DUD. City Hospital	100	99.8	100	100	100	98.6	98.6	99.1	99.5	99.5	100	98.6
EBH. Birmingham Heartlands Hospital	100	99.9	99.6	100	100	97.6	98.8	98.9	99.7	99.5	100	98.4
SPH. St Peter's Hospital	100	100	98.3	95.6	100	100	100	99.4	100	100	100	98.3
DGE. Eastbourne DGH	100	100	94.7	100	100	98	95.4	99.3	100	100	100	98.7
GEO. St George's Hospital	100	100	99.9	86.5	100	100	99.5	99.5	99.8	99.8	99.9	75.3
GRL. Glenfield Hospital	100	100	98.3	99.7	100	100	86.1	98.7	100	100	99.7	99.8
CRO. Cromwell Hospital	100	100	97.5	100	100	95	100	92.5	95	100	100	2.5
CHG. Cheltenham General Hospital	100	100	85.6	99.5	100	98.4	98.8	97.2	100	100	100	99.8
FRE. Freeman Hospital	100	100	97.3	98.8	100	97.6	98.7	95.2	100	100	91.3	99.5
WHC. Whipps Cross University Hospital	100	100	89	100	100	100	99.4	76.9	99.4	100	100	91.9
PHB. BMI Priors Hospital	96.4	98.2	100	100	100	92.2	96.4	98.2	91.1	91.1	100	7.1
LGI. Yorkshire Heart Centre	100	99.5	88.2	100	100	99.5	88	89.8	98.9	98.3	97.8	97.7
CHH. Castle Hill Hospital	100	100	94	74.6	99.5	100	96.6	96.8	99.5	99.8	98.5	94.8
DER. Derby Royal Infirmary	100	100	76.4	100	100	100	94.6	94.9	92.6	97.6	97.6	96

In order of total percentage completeness (omitting NHS number score)

Middling



2006 data: Ludman

	Date of Birth	Sex	Medical History	Pre-procedure shock	Procedure urgency	Vessels treated	Renal disease	Diabetes	Discharge date	Discharge status	PCI hospital outcome	NHS number
WAL. Walsgrave Hospital	100	100	82.6	95.4	100	99.6	90.6	95.1	99.1	90.5	99.9	93.8
QAP. Queen Alexandra Hospital	97.2	99.2	100	100	100	95.8	97.4	96.6	69.5	73.6	100	64.3
MAY. Mayday University Hospital	98.2	98.2	100	100	99.6	97.5	58.3	76.3	100	100	100	99.3
MRI. Manchester Royal Infirmary	100	100	64.7	100	100	99.4	99.1	96.8	100	100	60.6	97.7
NHB. Royal Brompton Hospital	100	100	95.7	29.9	100	99.8	96.9	98	99.9	99.9	99.9	61.8
NCR. New Cross Hospital	100	100	84.7	65.8	99.8	99.8	84.7	87.8	99.5	99.8	96.9	74.3
STH. St Thomas' Hospital	100	94	99.7	100	100	96.5	57	90.8	100	77.4	100	92.3
BRI. Bristol Royal Infirmary	100	100	69.4	94.5	100	98.7	99.1	100	99.4	100	51.5	99.2
HHH. Hemel Hempstead General Hospital	100	99.6	100	100	100	93	70.8	96.4	75.9	76.7	100	83.4
KES. King Edward Seventh Hospital	100	100	99.1	54.5	100	100	97.3	100	51.8	99.1	99.1	4.5
BOU. Royal Bournemouth Hospital	100	100	92.6	100	100	100	95.1	95	8.2	99.9	100	99.8
WRG. Worthing Hospital	100	100	99.2	100	100	100	98.4	78	56.1	58.5	100	100
RAD. John Radcliffe Hospital	100	100	100	75.6	100	95.7	49.4	71.7	100	96.6	100	98.4
UHW. University Hospital of Wales	100	100	67.3	83.5	100	99.6	74.1	75.2	94.1	95.7	98.4	97.8
CHN. Nottingham City Hospital	100	99.9	0	100	100	100	85.1	100	100	100	100	99.5
BAL. Barts and the London	100	100	75.3	92	100	97.2	79.7	90.6	55.7	100	85.8	90.7
MPH. Taunton & Somerset	100	99.3	100	100	100	99	100	99.8	38.5	35.4	100	91.4
RSC. Royal Sussex County Hospital	100	99.9	81.4	100	99.4	91	100	100	14.1	99.8	78.1	65.8
BRD. Bradford Royal Infirmary	99.6	99.6	100	100	100	99.6	96.9	96	31.4	33.6	99.6	97.8
KCH. King's College Hospital	100	98.6	81.9	99.3	99.9	97.3	91.9	99	5.6	86.4	91.1	44.8
HH. Harefield Hospital	100	99.7	56.9	35.6	100	99.6	65.9	80.3	100	100	100	54.8
PMS. The Great Western Hospital	100	100	67.5	92.1	82.9	100	90.9	100	97.4	98.7	6.6	94.8
WEX. Wexham Park Hospital	100	100	86.4	100	100	100	100	86.4	18.2	36.4	100	100

Under Dogs



2006 data: Ludman

	Date of Birth	Sex	Medical History	Pre-procedure shock	Procedure urgency	Vessels treated	Renal disease	Diabetes	Discharge date	Discharge status	PCI hospital outcome	NHS number
ANT. St Anthony's Hospital	100	98.8	74.5	3.3	100	99.3	59	95.7	98.1	98.1	100	17.4
BAT. Royal United Hospital Bath	100	100	80.3	100	100	100	97.5	69.5	36.5	37.9	100	1.5
RCH. Royal Cornwall Hospital	100	100	99.5	100	99.8	100	92.3	21	43.2	45.8	100	99.5
BHL. Cardiothoracic Centre Liverpool	100	100	92.7	100	100	100	100	100	0	100	3.5	97.9
UCL. University College Hospital	100	100	96.6	99.7	99.8	97.5	75.5	60.4	20.9	40.6	100	90
WYT. Wythenshawe Hospital	100	100	100	39.7	100	99.9	6	31.5	100	98.9	100	98.7
BHH. Rochdale Infirmary	100	86.1	3.6	16.3	99.8	100	74.2	85.9	99.8	99.8	100	54.1
ESU. New East Surrey Hospital	100	87.5	100	42.9	100	100	6.2	37.5	100	87.5	100	100
BHR. Royal Berkshire and Battle Hospital	100	93.5	98.2	89.6	100	89.6	76.4	65.4	17.1	28.3	100	98.4
LIS. Lister Hospital	100	97.6	58.1	32.9	99.4	98.8	88	79.6	64.1	65.3	69.6	70.7
PAP. Papworth Hospital	100	100	64.9	20.9	100	90.7	0.3	63.8	100	100	100	97.3
WHH. William Harvey Hospital	100	96.3	26.2	52.4	100	98.8	41.7	36.9	87.2	97.9	99.4	95.2
HAM. Hammersmith Hospital	99.7	99.7	100	9.5	100	100	0.4	11.9	100	96.6	100	71.3
NHH. North Hampshire Hospital	100	100	100	1.3	100	100	0.3	14.4	100	99.5	100	94.8
PLY. Derriford Hospital	100	100	47.9	25.9	99.9	98.3	1.3	47.1	100	96.5	97.1	98.2
STM. St Mary's Hospital	100	98.5	75.2	100	100	0	6.5	100	12.1	100	100	0
MOR. Morriston Hospital	100	99.9	0.3	98.4	0	98.6	1.6	87.8	99.9	99.9	94.9	99.4
VIC. Victoria Hospital	100	98.4	28.1	100	100	75.8	0.4	7.4	67.6	100	100	77.6
NGS. Northern General Hospital	100	100	18.9	17.8	99.9	99.7	40.1	47.7	67.7	68.2	8.9	98.4
NOR. Norfolk & Norwich Hospital	100	100	49.8	99.5	0	99.5	54.1	52.7	0	0	0	99
RFH. Royal Free Hospital	100	100	0	99.3	99.5	98.3	0	0	0	0	39.4	88.8
RDE. Royal Devon & Exeter Hospital	100	99.9	0	0	100	100	0.1	0.1	0.4	1.6	25.7	0

Demographics



2006 data: Ludman

Age (mean)	64.2 yrs
Diabetic	17.5%
Previous CABG	8.9%

Ethnic Origin	
Caucasian	91.2%
Asian	7.5%
Black	1.1%
Oriental	0.2%

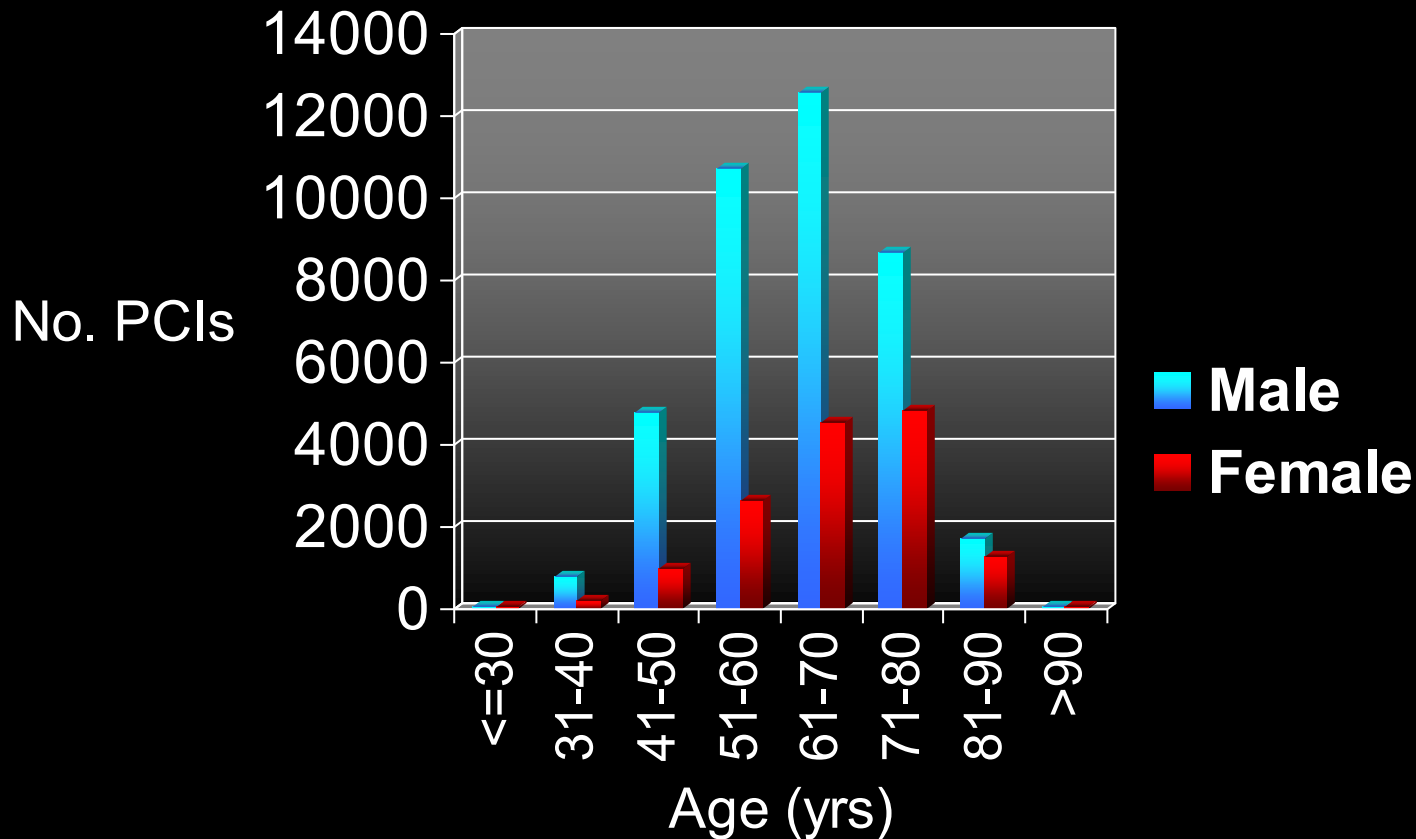
Demographics - Age

Male: mean = 62.3

Female: mean = 67.4



2006 data: Ludman

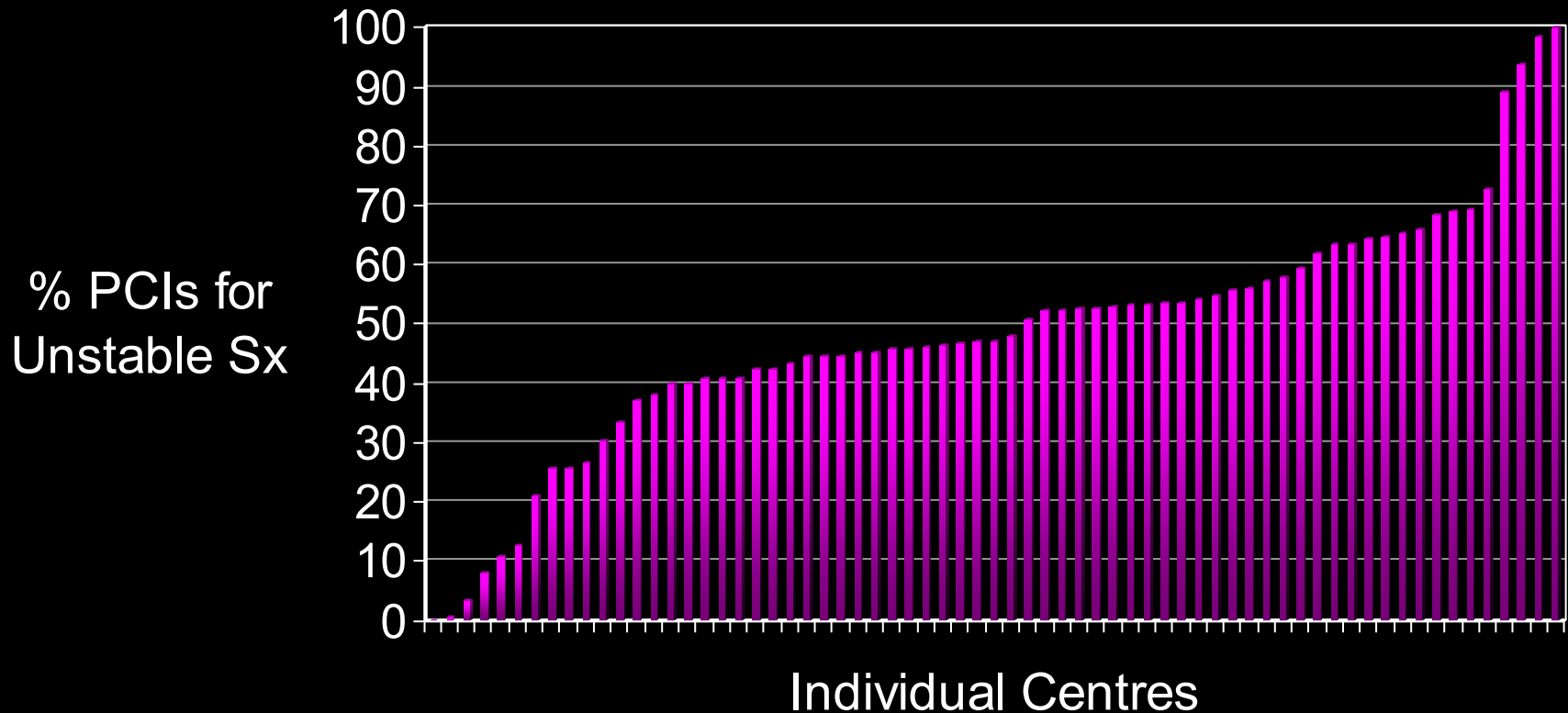


Clinical Syndrome

- 51.5% Stable
- 48.5% Unstable



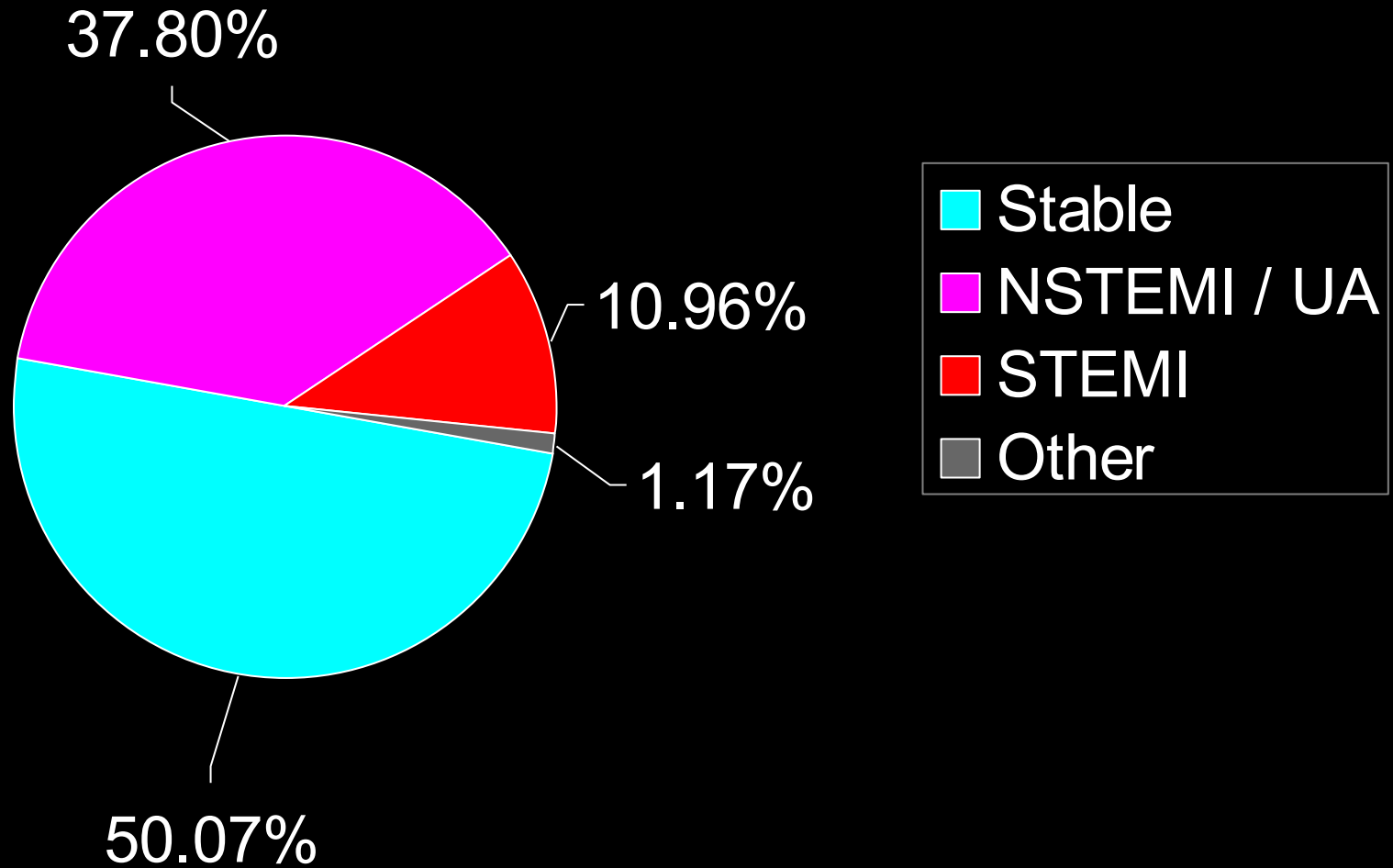
2006 data: Ludman



Indication for PCI



2006 data: Ludman

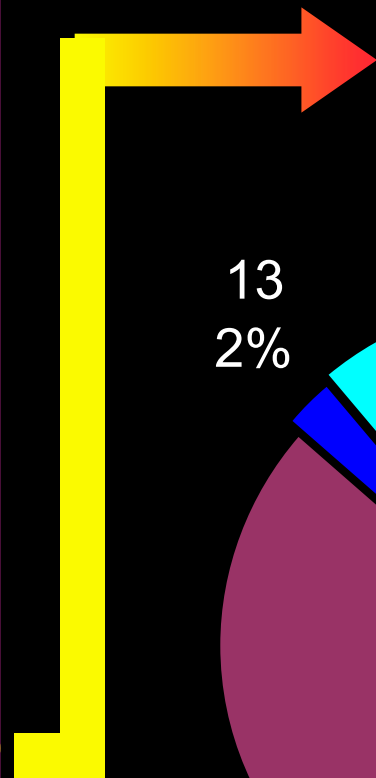
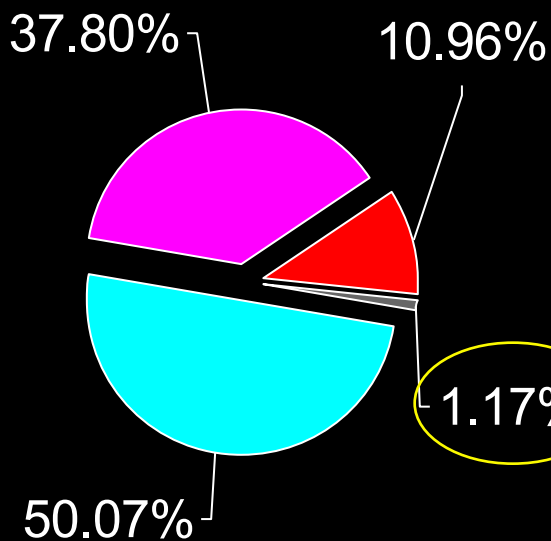


Indication for PCI

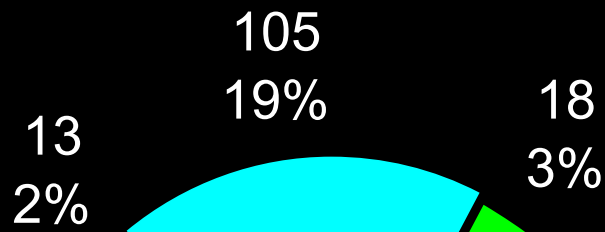


2006 data: Ludman

- Stable
- NSTEMI / UA
- STEMI
- Other



OTHER



- Staged
- Hybrid
- For SAT
- Bail out*

* Bail out following diagnostic angiography

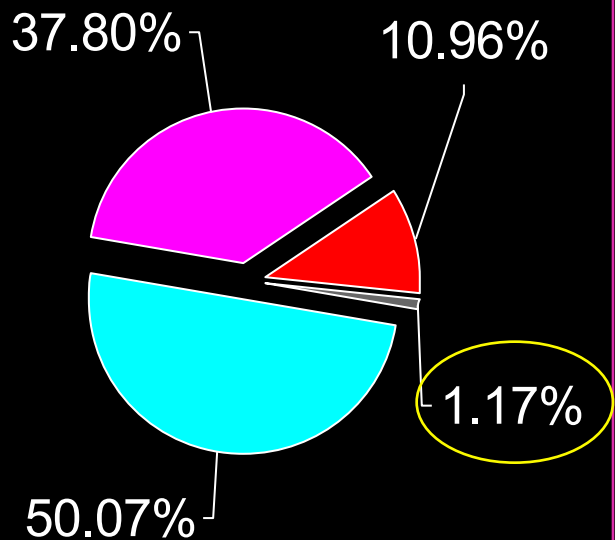
Indication for PCI



2006 data: Ludman

OTHER

- Stable
- NSTEMI / UA
- STEMI
- Other



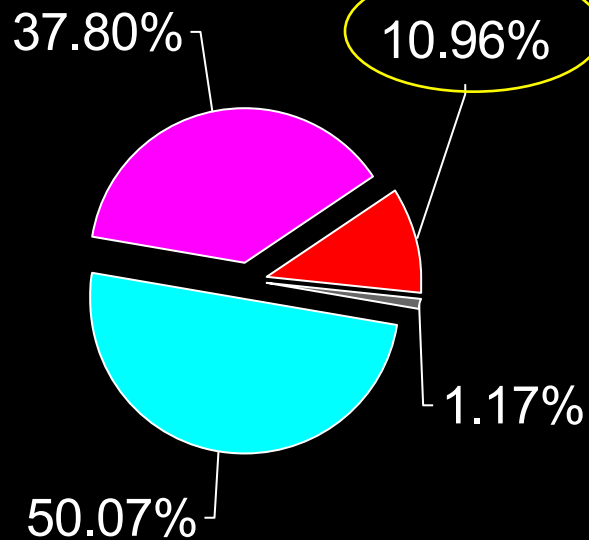
PCI for Stent Thrombosis:
105 of 47,970
0.22%

Indication for PCI

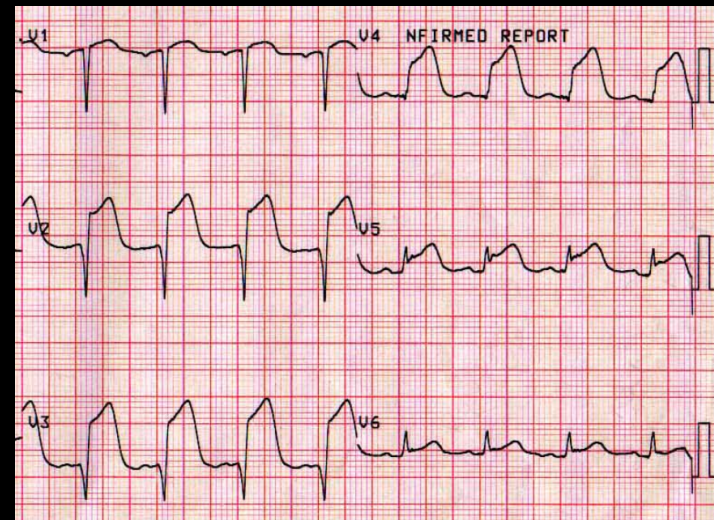


2006 data: Ludman

- Stable
- NSTEMI / UA
- STEMI
- Other



STEMI

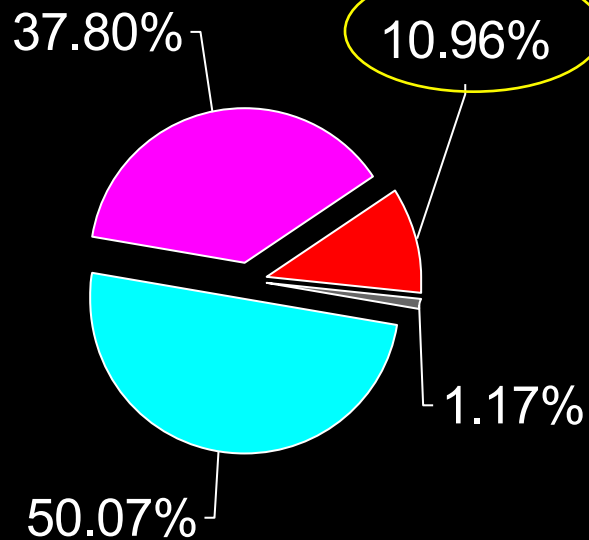


Indication for PCI



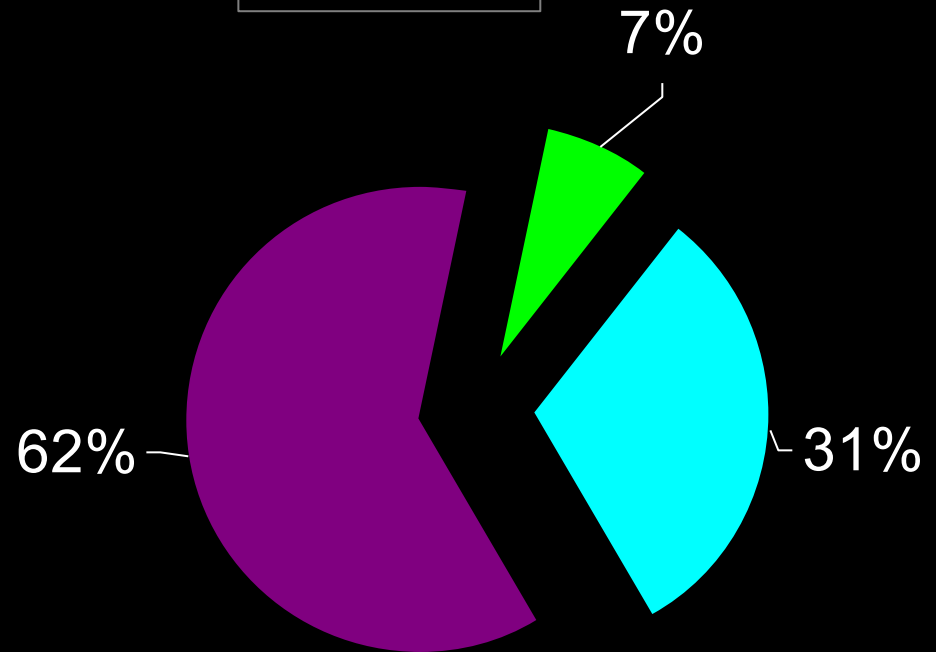
2006 data: Ludman

- Stable
- NSTEMI / UA
- STEMI
- Other



STEMI

- Primary
- Facilitated
- Rescue

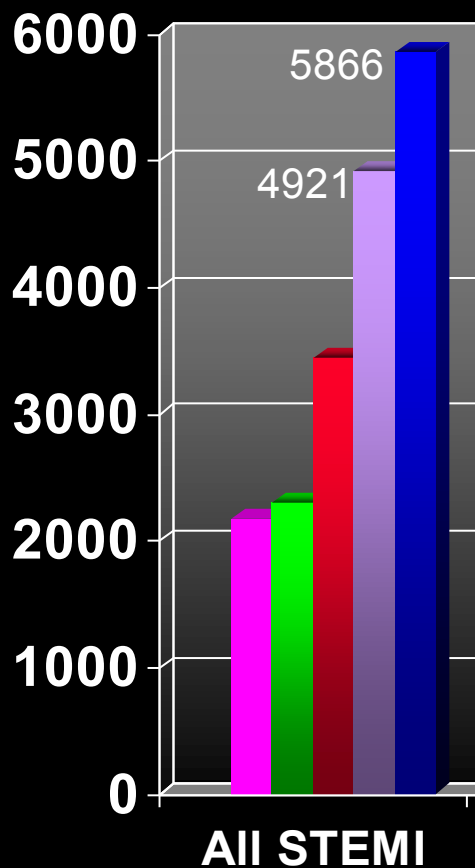


PCI for STEMI

2006



2006 data: Ludman



8% of all UK PCI
(7% 2005)

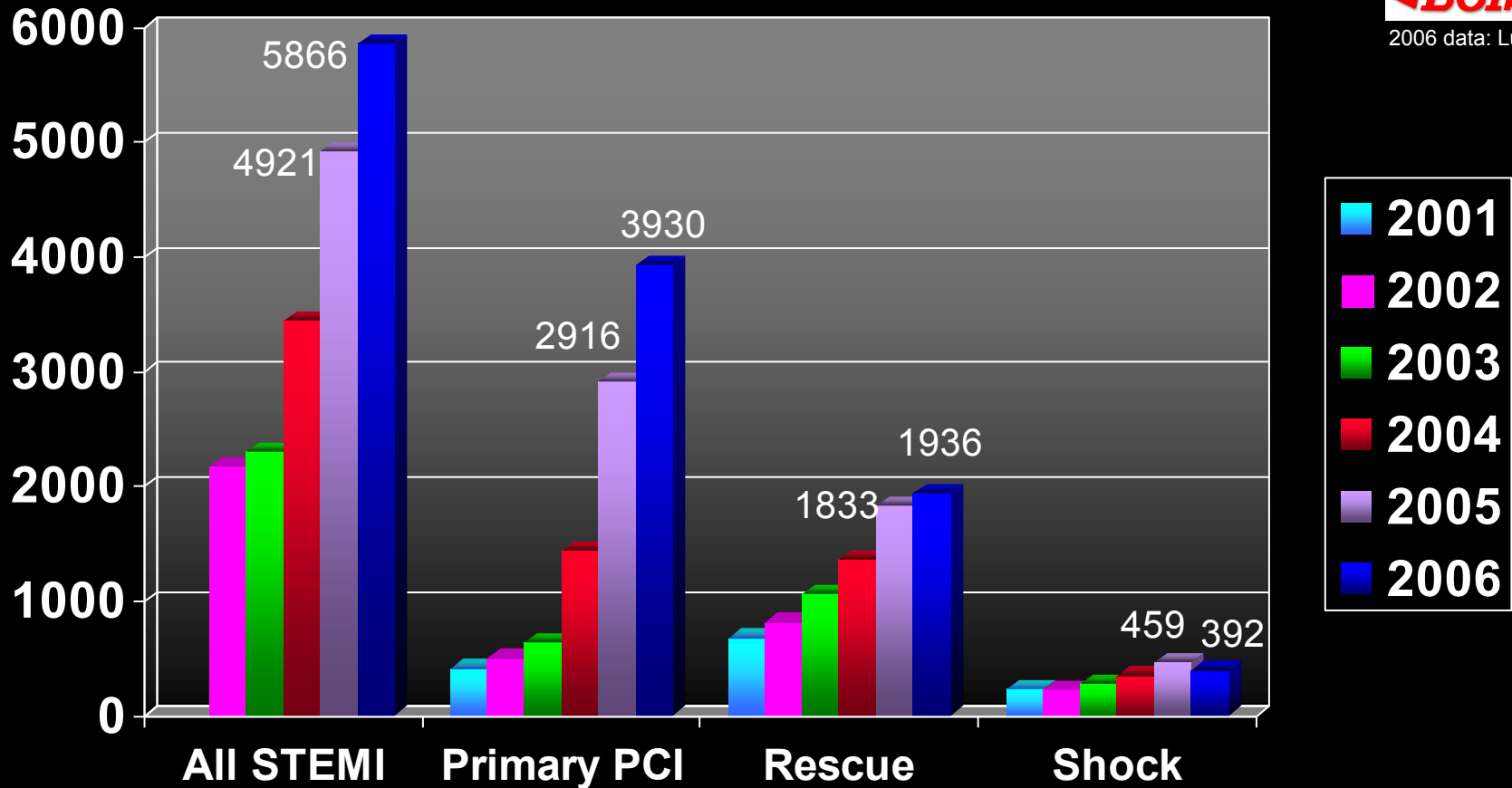


PCI for STEMI

2006



2006 data: Ludman



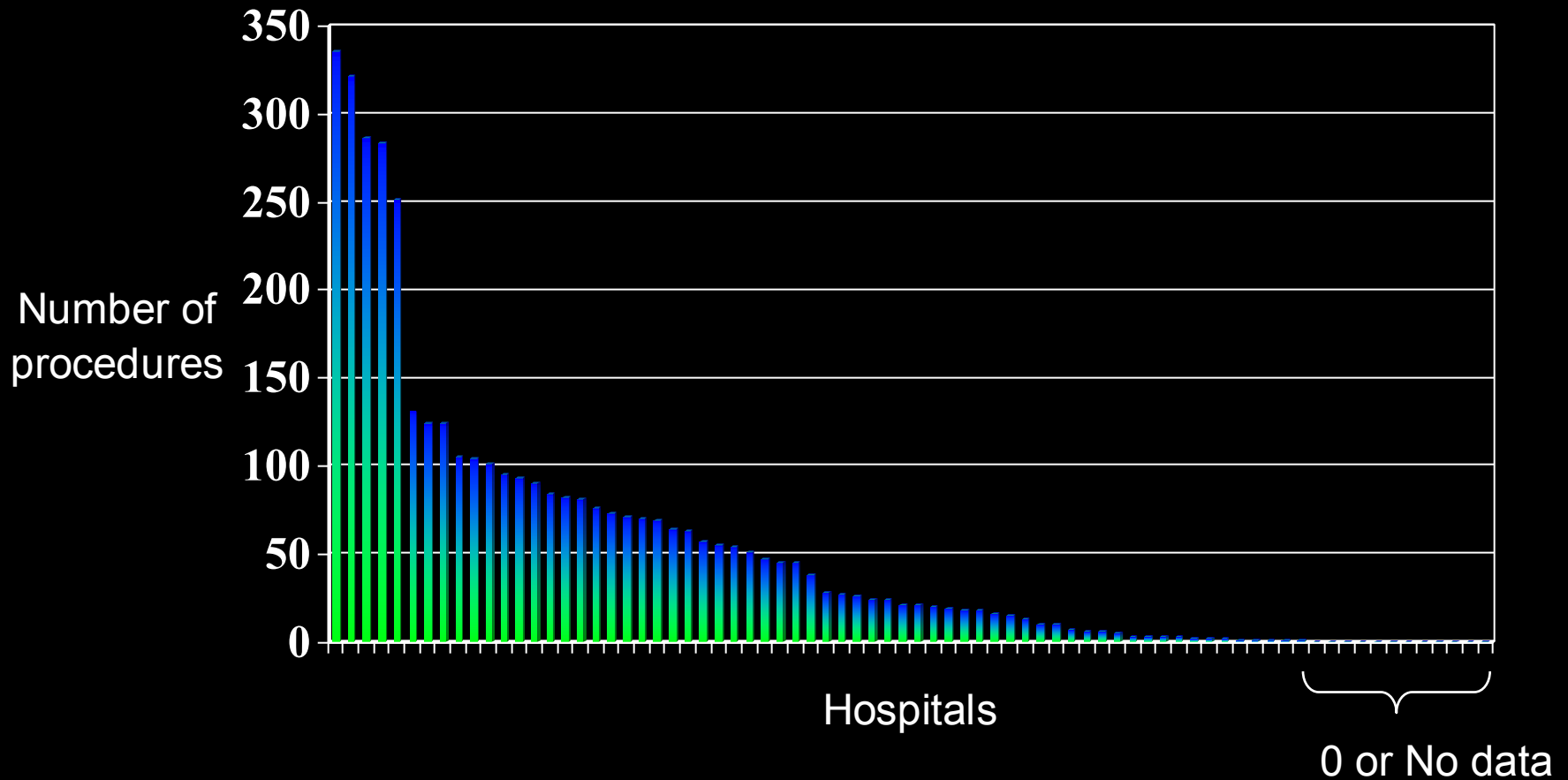
Primary PCI for STEMI

2006 data from NHS Centres

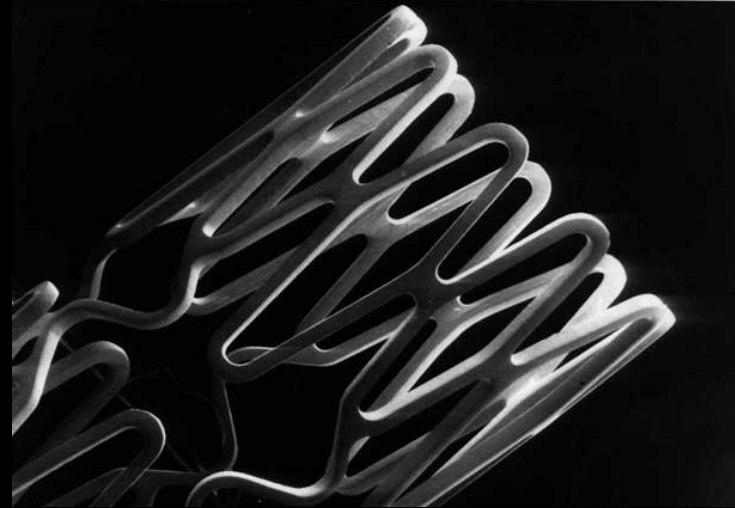
Total 3930 procedures



2006 data: Ludman



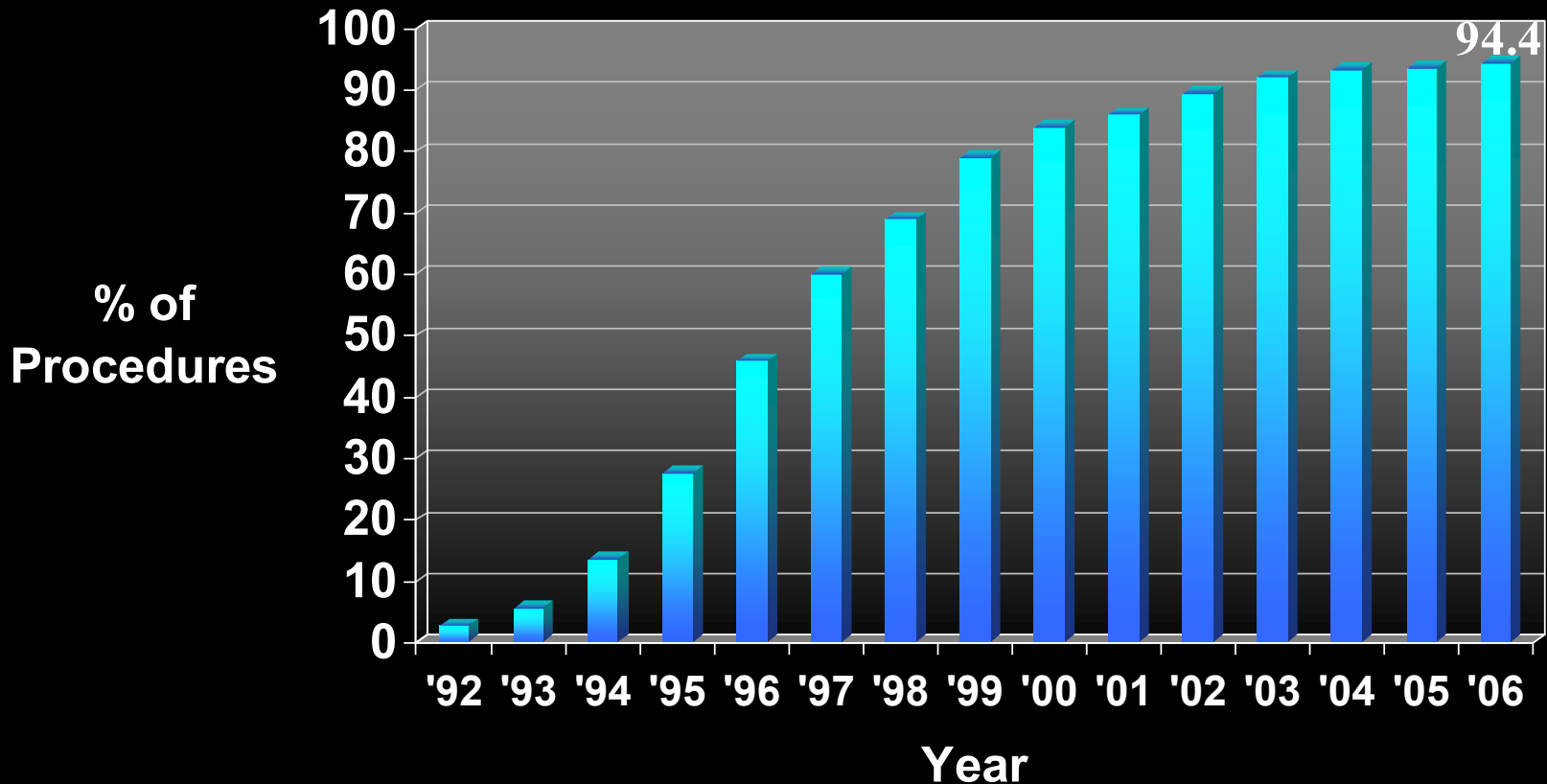
Stents



Procedures using Stents



2006 data: Ludman





September 2006



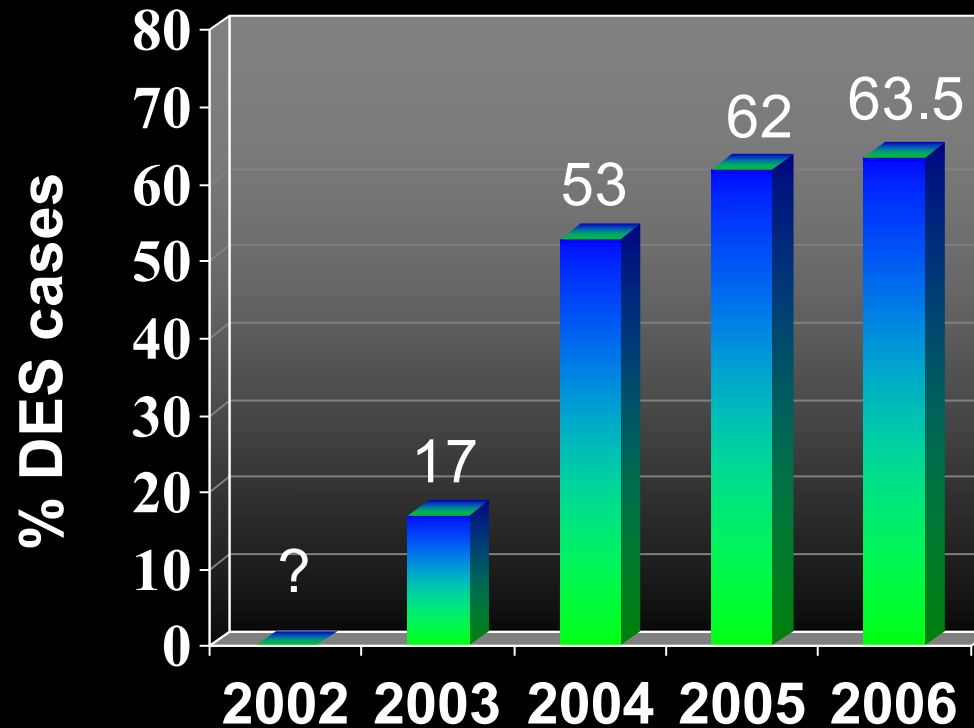
Drug Eluting Stent cases

2006 data from 86 of 91 centres



2006 data: Ludman

Mean of % use by Centres



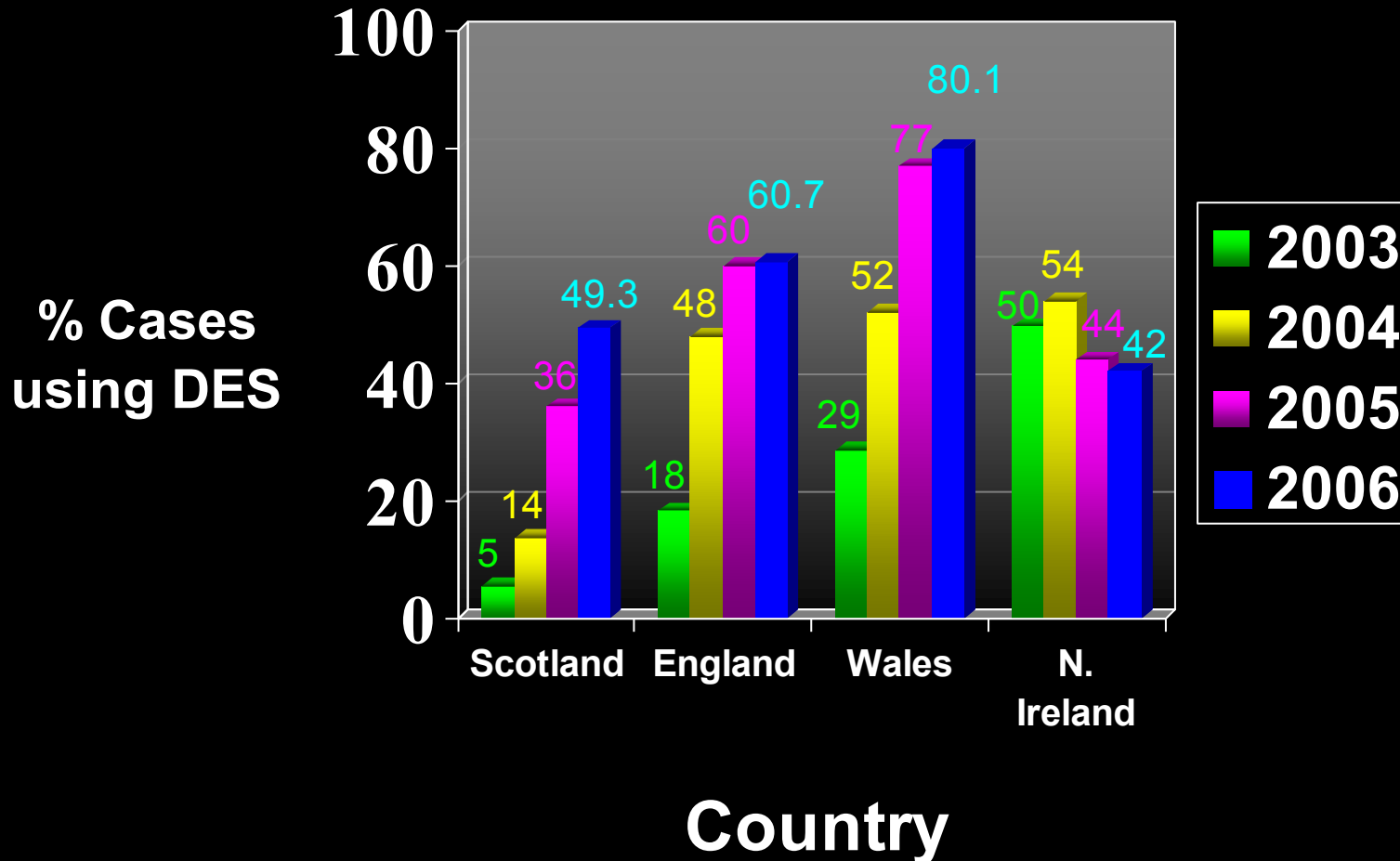
NHS and private

Drug Eluting Stent cases - NHS

2006 data from 71 of 75 NHS centres



2006 data: Ludman



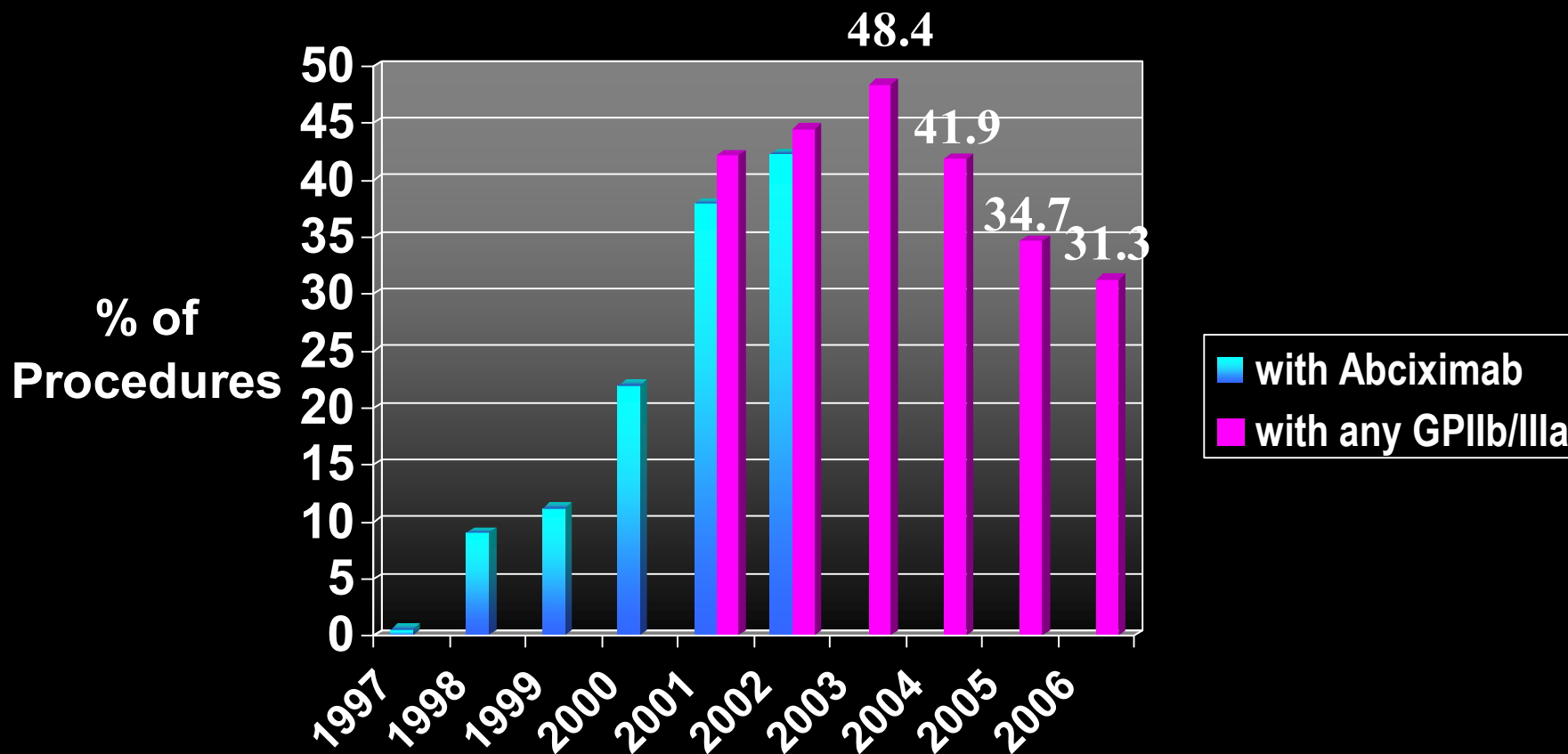
Use of GP IIb/IIIa blockers

2006 data from 87 of 91 centres



2006 data: Ludman

Overall mean % use

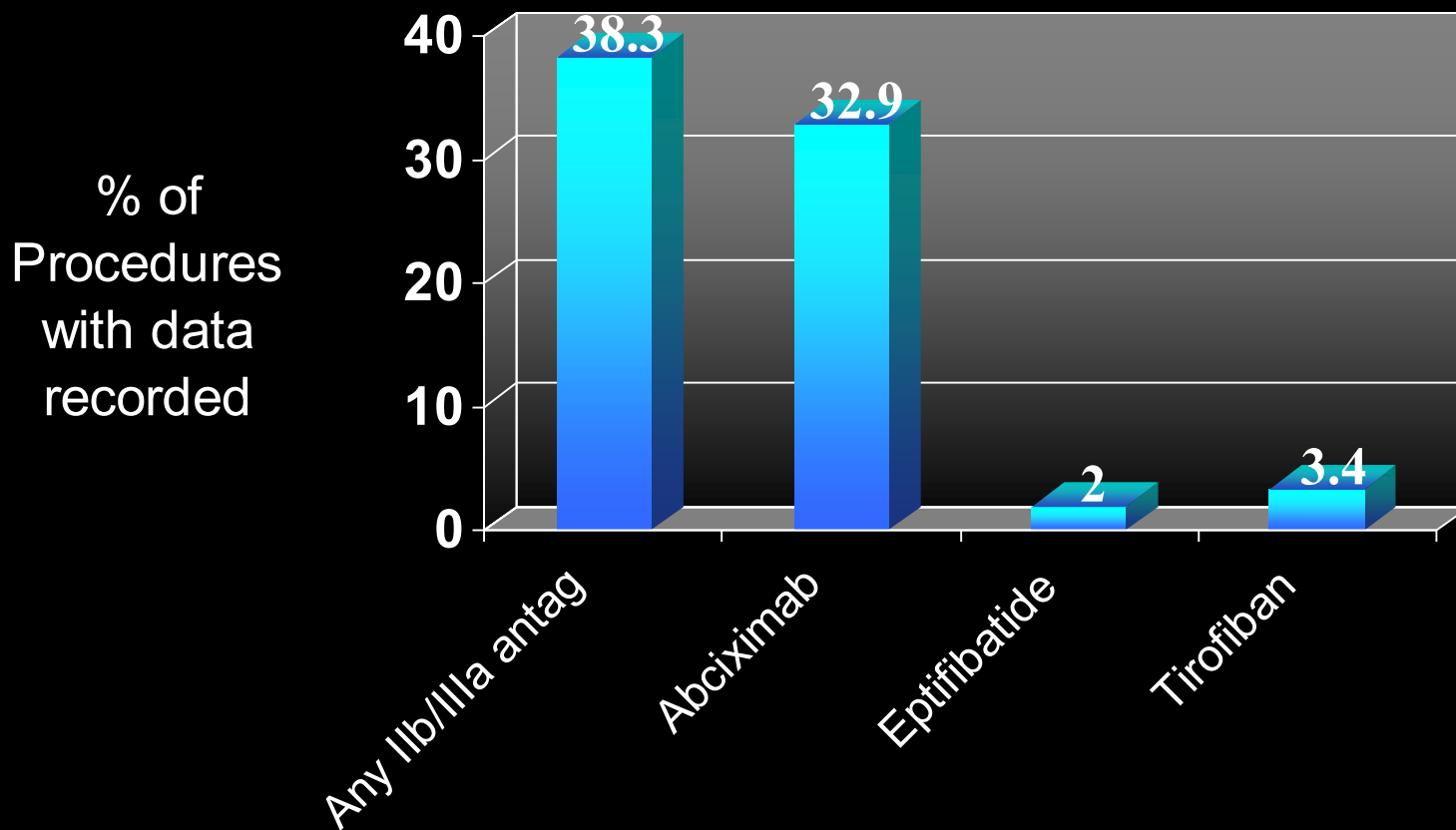


GP IIb/IIIa Antagonists

Use by Type



2006 data: Ludman



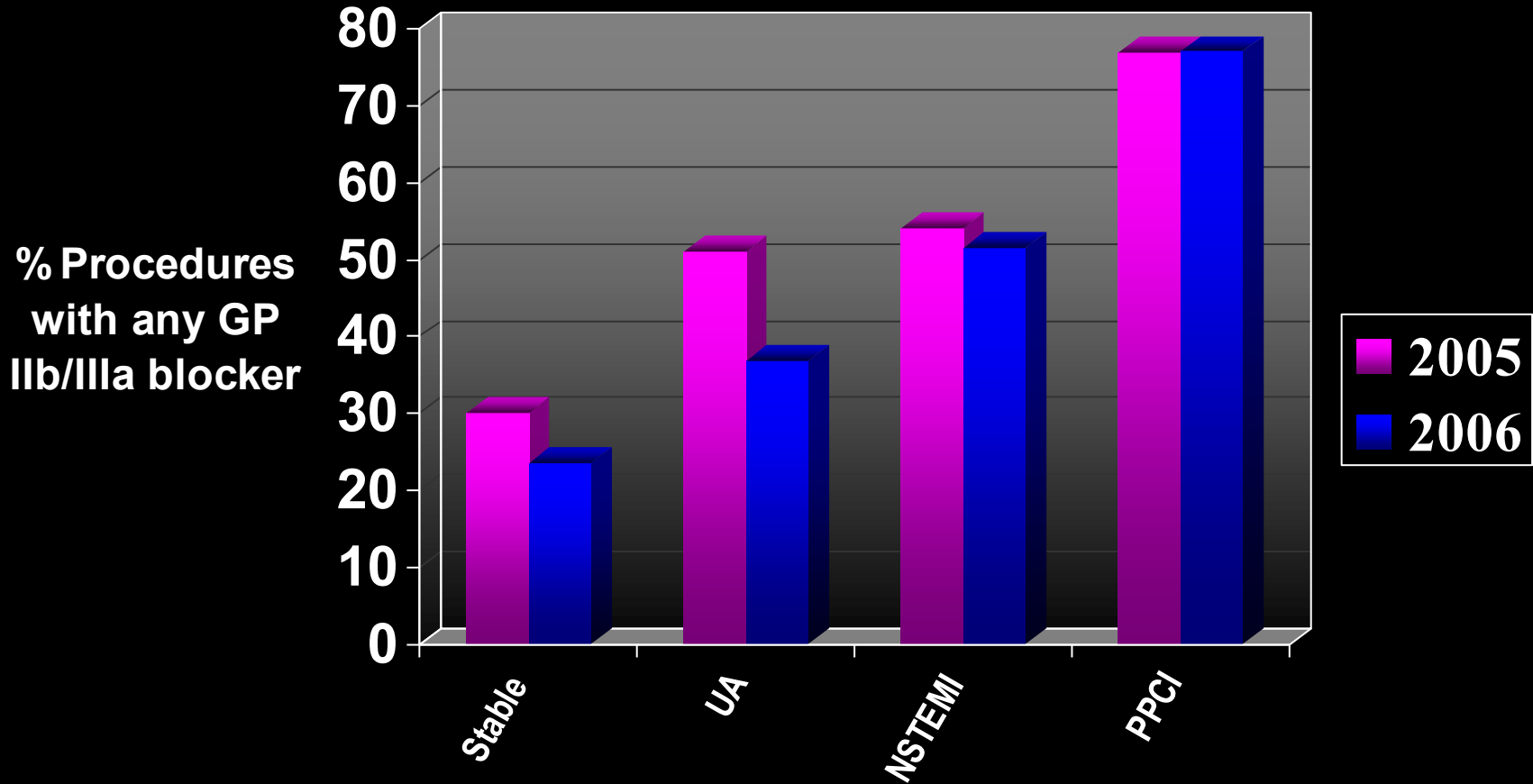
Note: source CCAD E&W mainly NHS

GP IIb/IIIa Antagonists

Use by Presentation



2006 data: Ludman



Note: source CCAD: E&W mainly NHS

Multi-vessel Disease

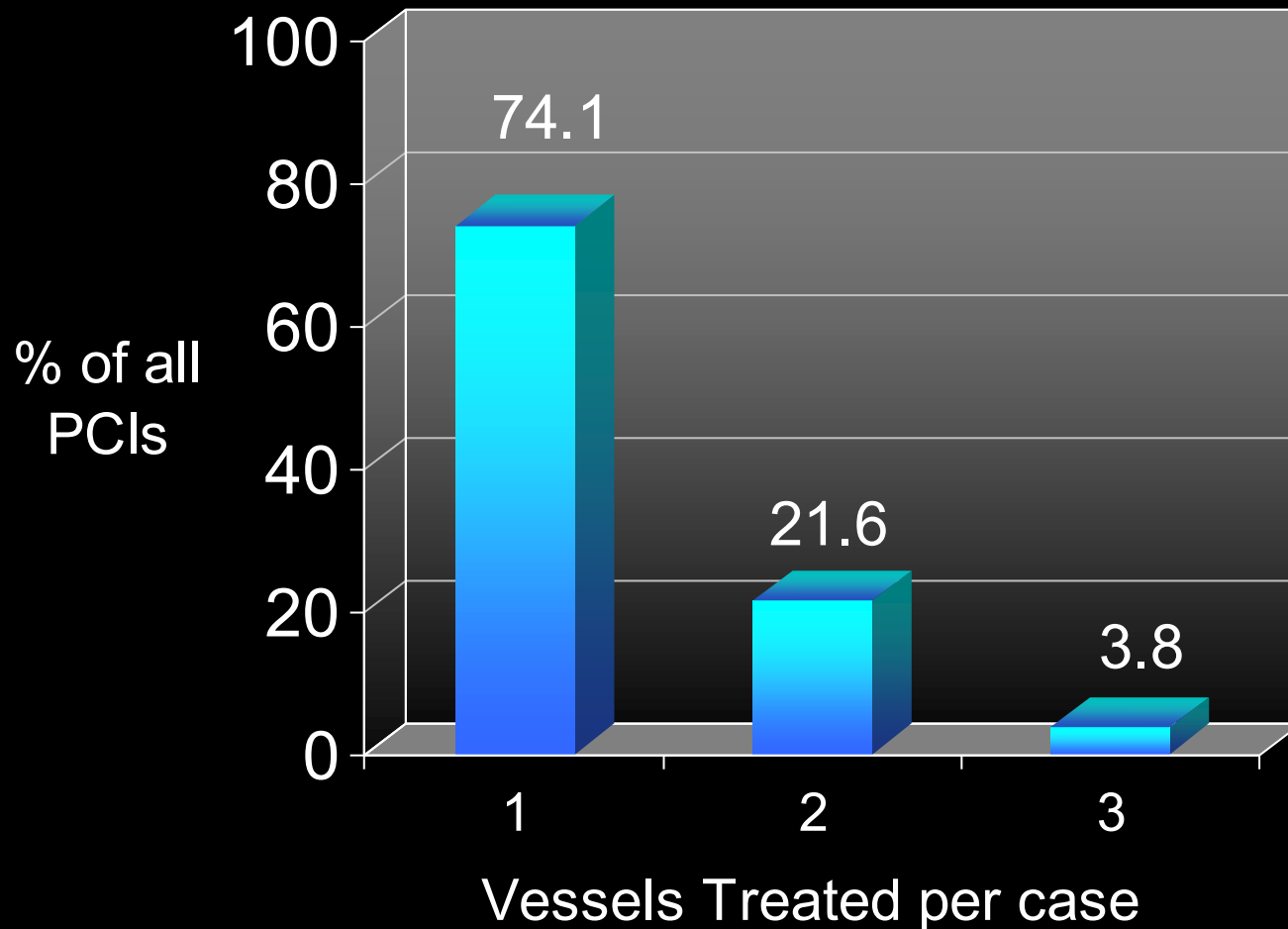


Multi-vessel Treatment



2006 data: Ludman

Mean = 1.28 vessels per case

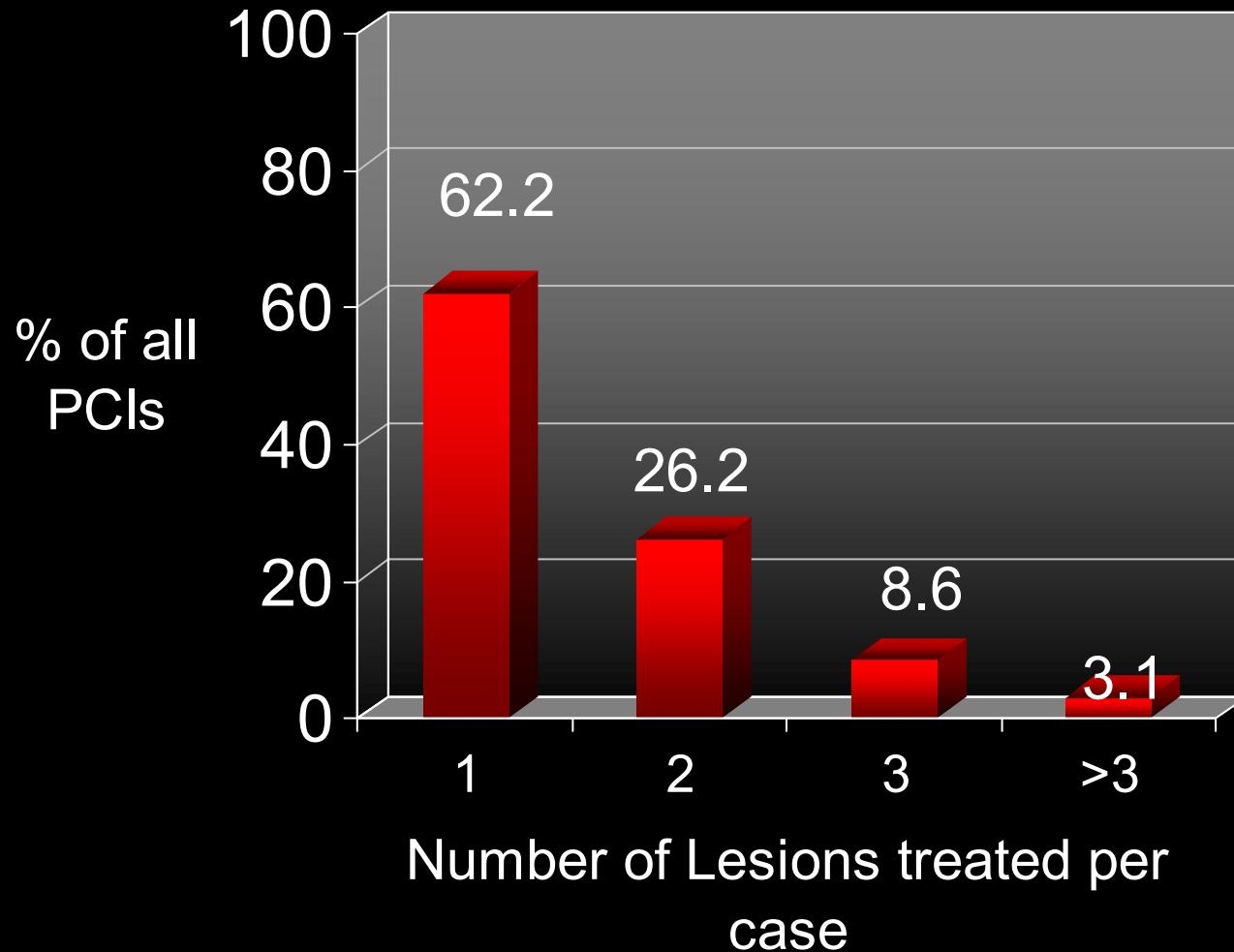


Multi-Lesion Treatment

Mean = 1.53 lesions per case



2006 data: Ludman

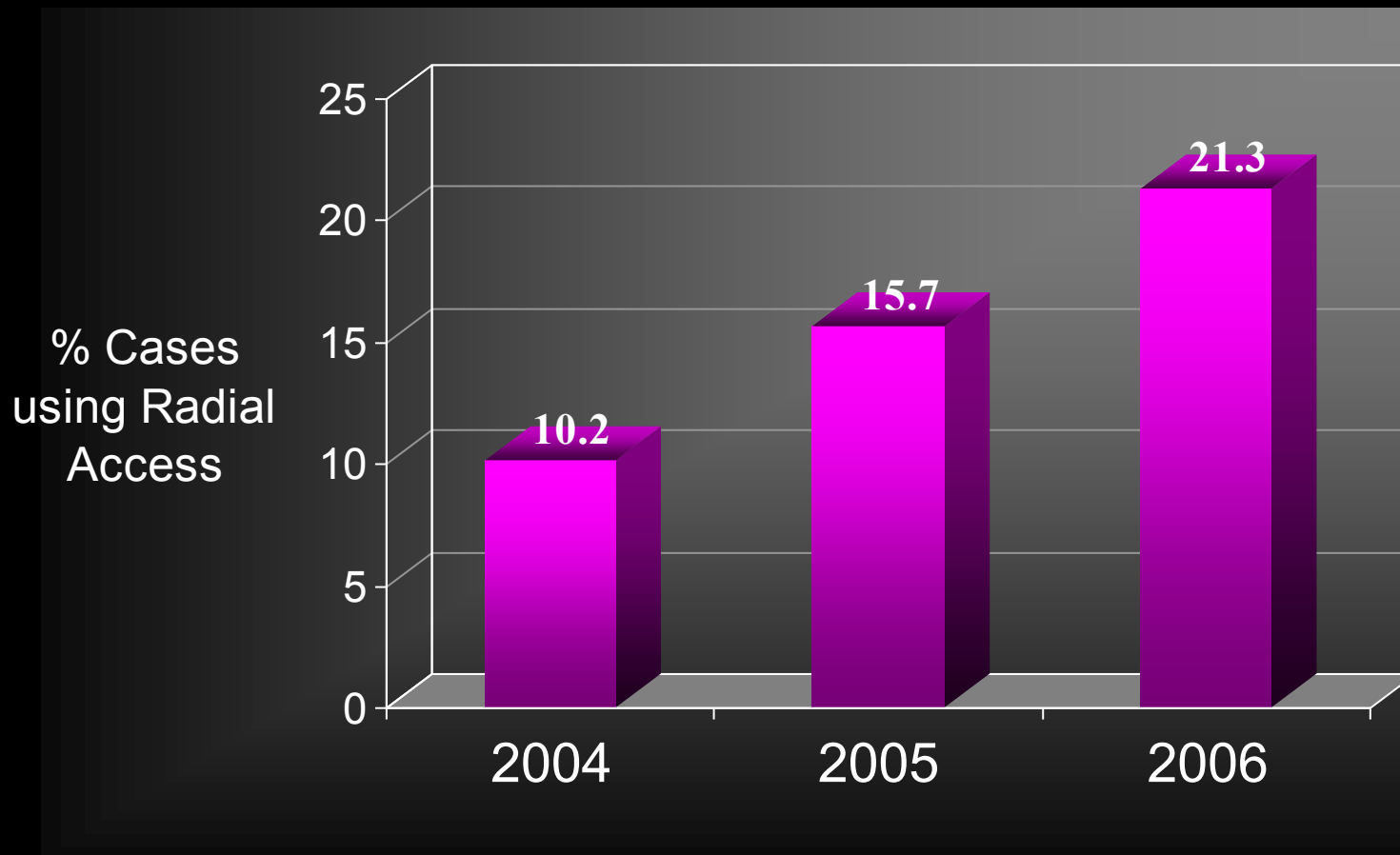


Radial Artery Access

Data from 85 of 91 Centres



2006 data: Ludman

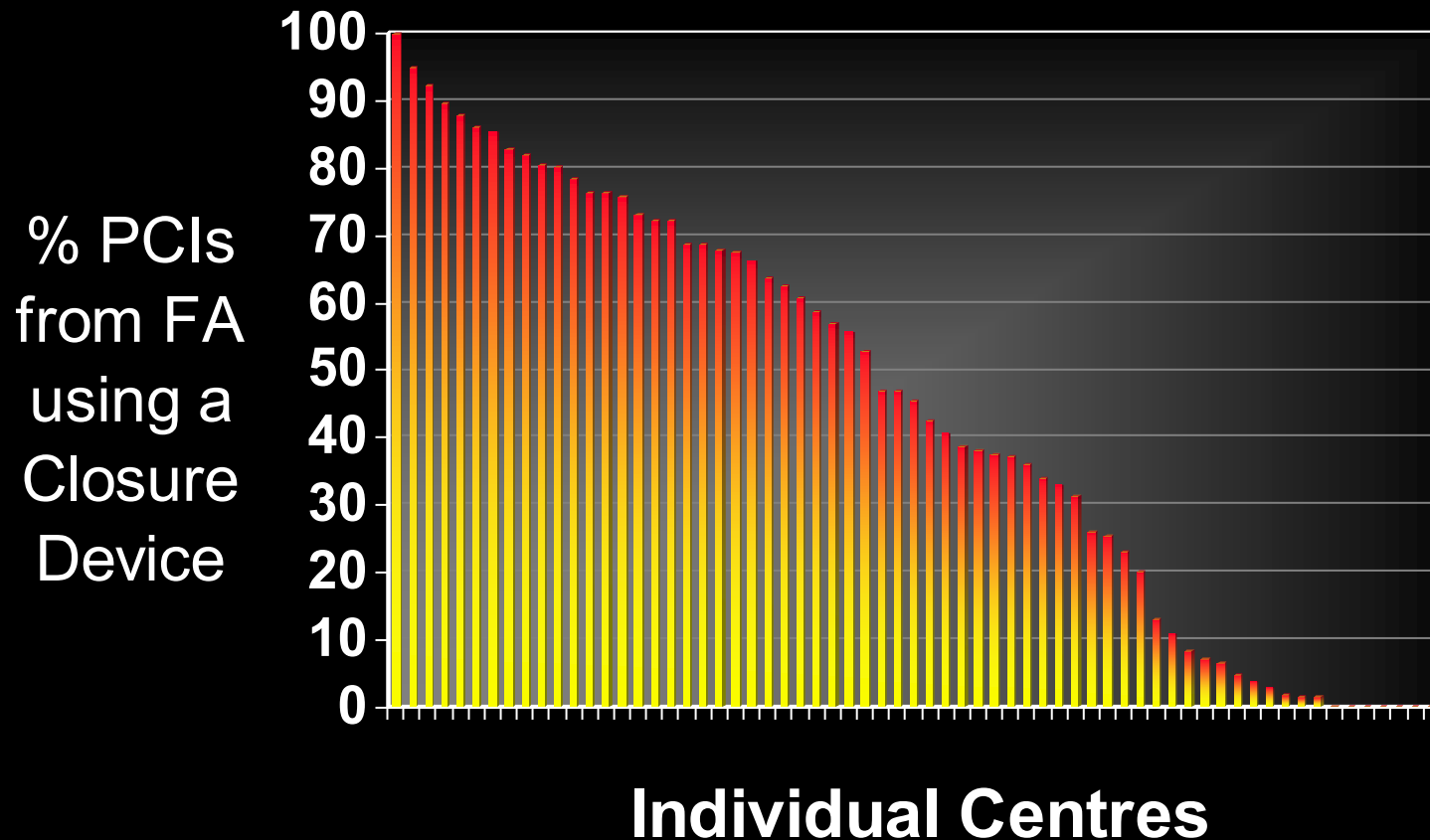


Femoral artery closure devices



2006 data: Ludman

FA closure in 39.6% of all PCIs from FA



Time Delays to Treatment



Time Delays to Treatment

- Data collected in BCIS dataset:
 - Date/time arrival at FIRST hospital (of chain)
 - Date/time first balloon inflation



Symptom



Door 1



Door 2



Balloon



Home

Time Delays to Treatment

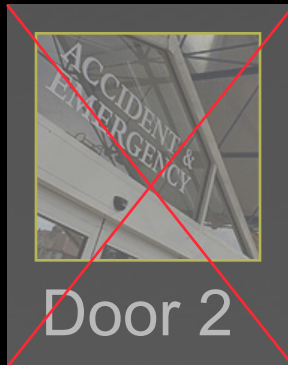
- Data collected in BCIS dataset:
 - Date/time arrival at FIRST hospital (of chain)
 - Date/time first balloon inflation
- Not collected
 - Date/time arrival at PCI hospital
 - (unless this is the first hospital in chain)



Symptom



Door 1



Door 2



Balloon



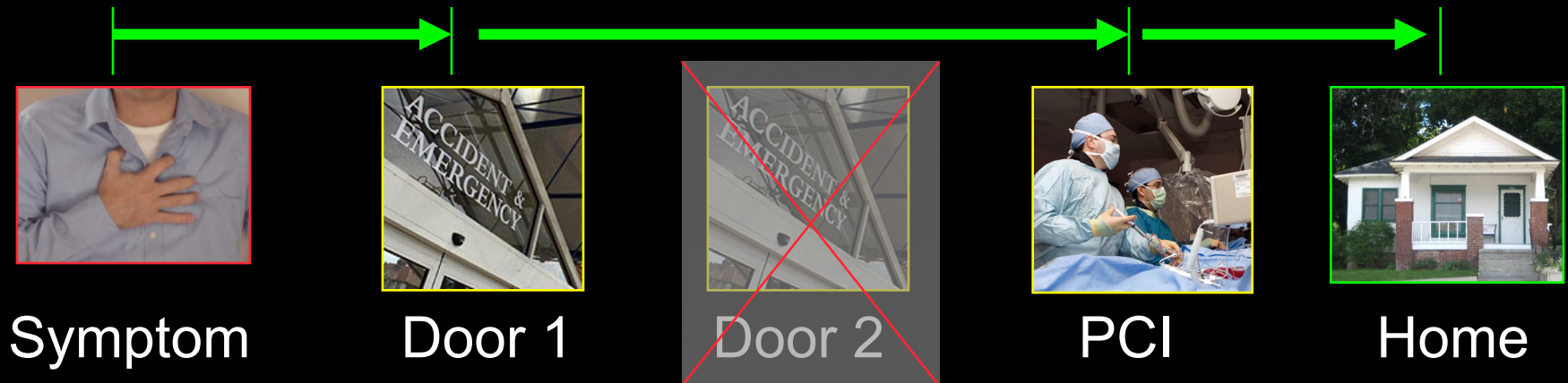
Home

NSTEMI / UA / Convalescent STEMI

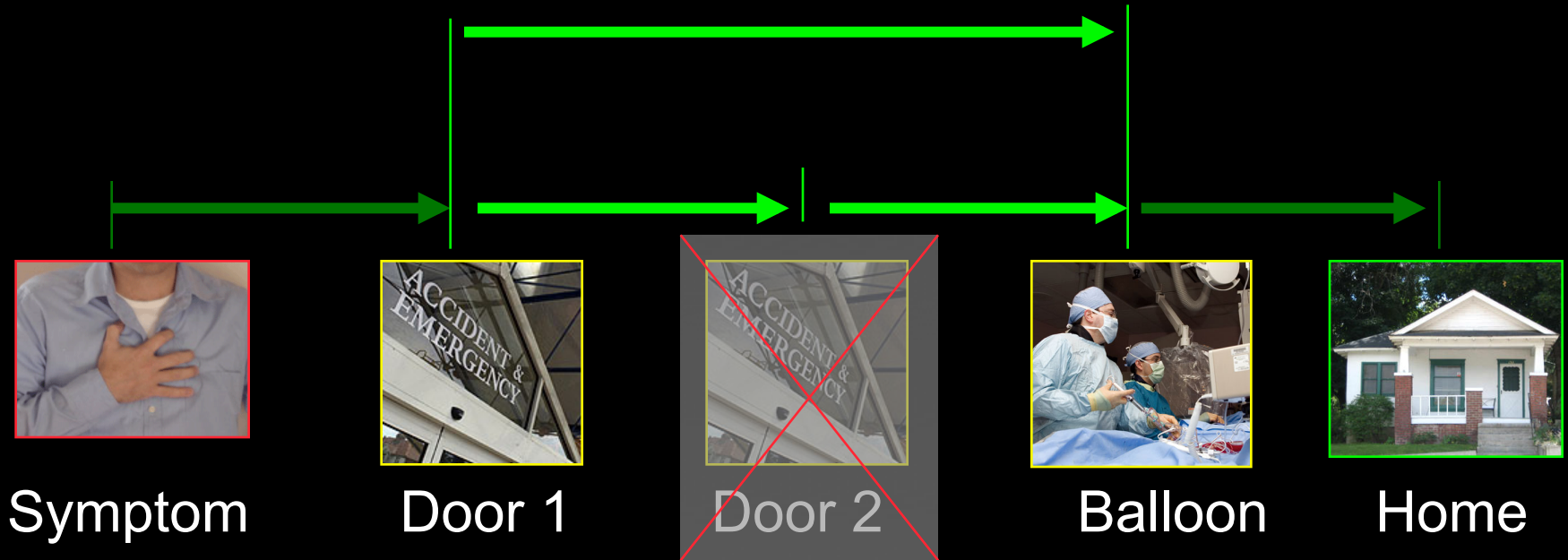
- Data from CCAD
 - only analysed units with > 50 case with time information
 - 30 centres

NSTEMI / UA / Convalescent STEMI

- Symptom to arrival: 5.2 hours (n=5,093)
- Arrival D1 to PCI: 5.0 days (n=5,093)
- PCI to Dx: 0.9 days (n=3,935)
- LOS: 6.4 days (n=3,935)



Primary PCI



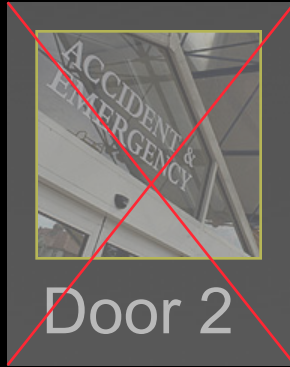
Primary PCI



Symptom



Door 1



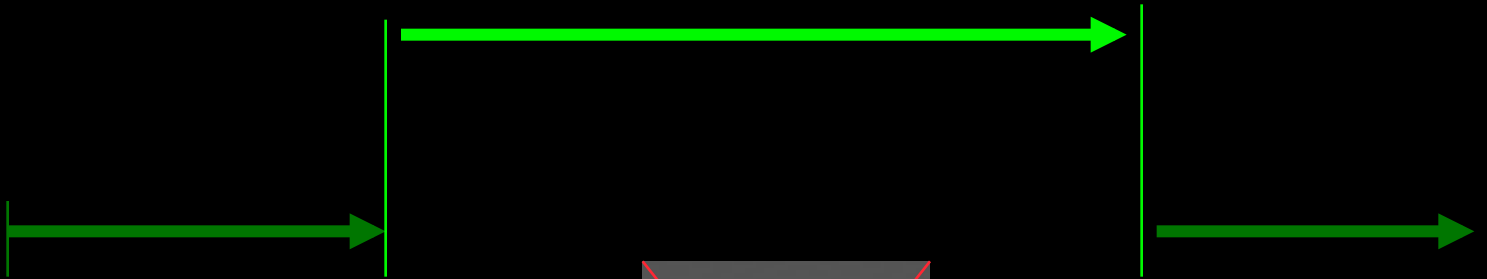
Door 2



Balloon



Home



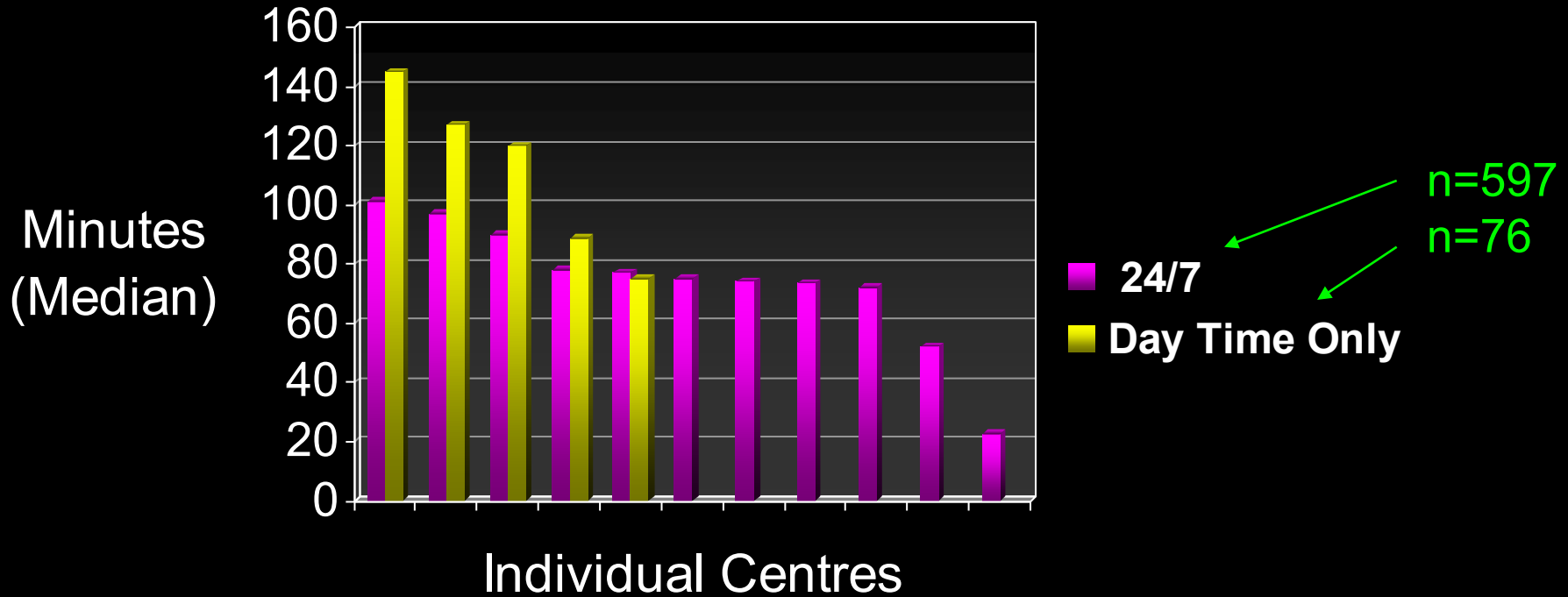
Door to Balloon Time

From Community direct to PCI centre



2006 data: Ludman

Units with PPCI as default strategy for Rx of STEMI



no data from 3 '24/7' units, 4 'day time only' units

Non Coronary Intervention

Additional Interventional Coronary Techniques (1)



2006 data: Ludman

	Units	No	Δ % cf 2005	Mean**	Range
Rotablation	43	630	+32%	15	1-49
Atherectomy (DCA)	2	3	-57%	1.5	1-2
TEC	4	8	167%	2	1-4
Laser	4	21	75%	5.3	1- 12
Cutting balloon	54	748	-27%	13.9	1-342

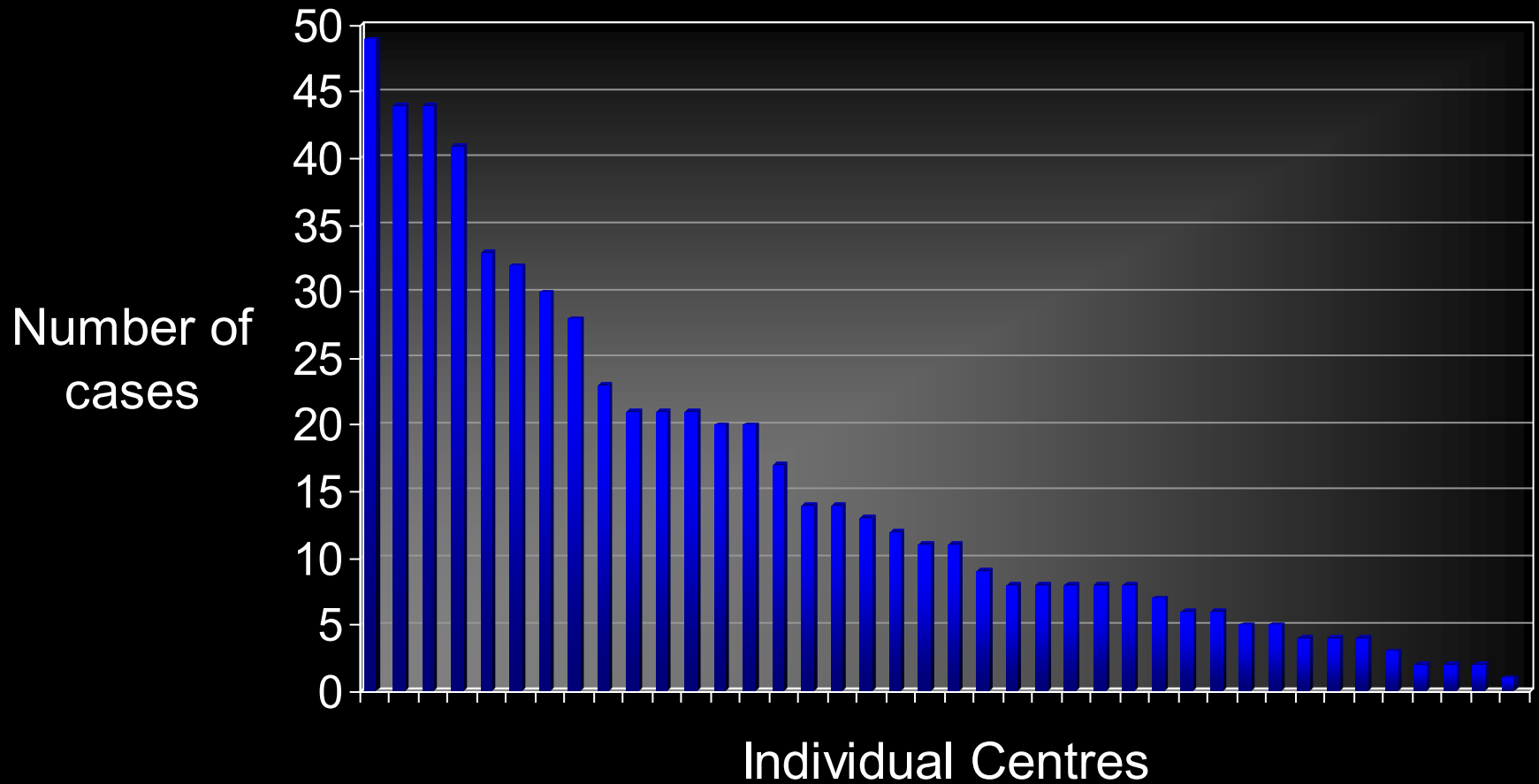
*% of all UK interventional procedures

**Mean number in units using the technique

Rotablation



2006 data: Ludman



Additional Interventional Coronary Techniques (2)



2006 data: Ludman

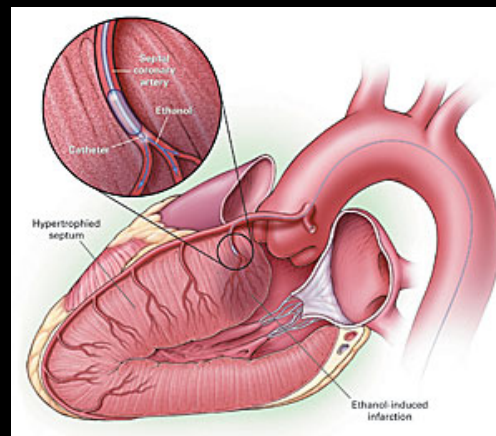
	Units	No	Δ cf 2005	Mean	Range
Thrombectomy	40	748	+47.2 %	19	1-123
Distal protection	55	517	+0.6%	9.4	1-38
Brachytherapy	0	0			

Other Interventional Techniques



2006 data: Ludman

	Units	No	Δ cf 2004	Mean	Range
PTMR	0	0			
Septal ablation	14	51	-14%	3.9	1-10

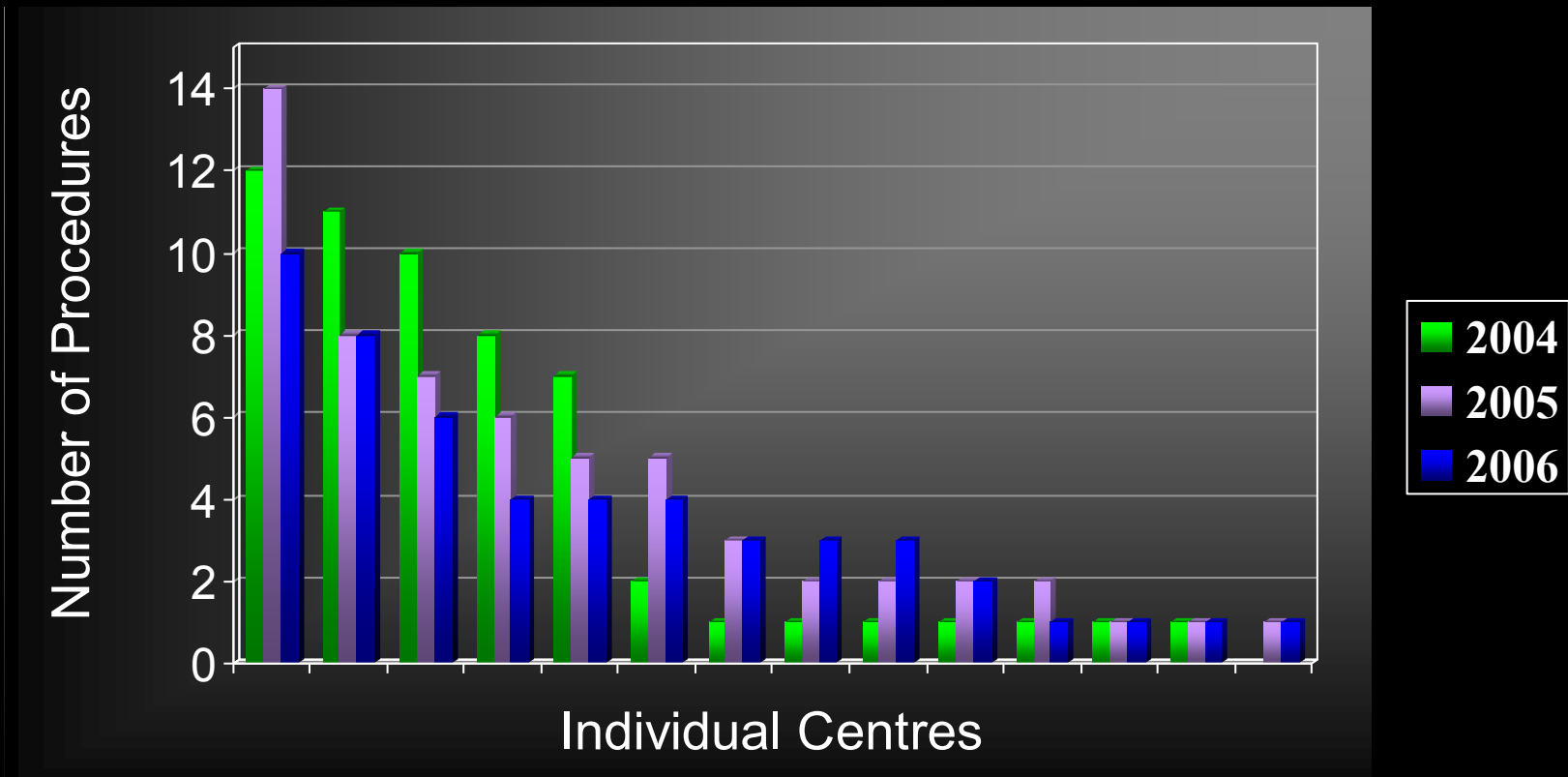


Alcohol Mediated Septal Ablation (HOCM)



2006 data: Ludman

2006 - Total 51 procedures



Other Diagnostic Techniques



2006 data: Ludman

	Units	No	Δ cf 2005	Mean	Range
IVUS	48	1098	+ 30.7%	23	1-84

Press wire	68	2829	+ 35.4%	42	169
Flow wire	8	65	+ 117%	8	1-26

Adult non coronary intervention



2006 data: Ludman

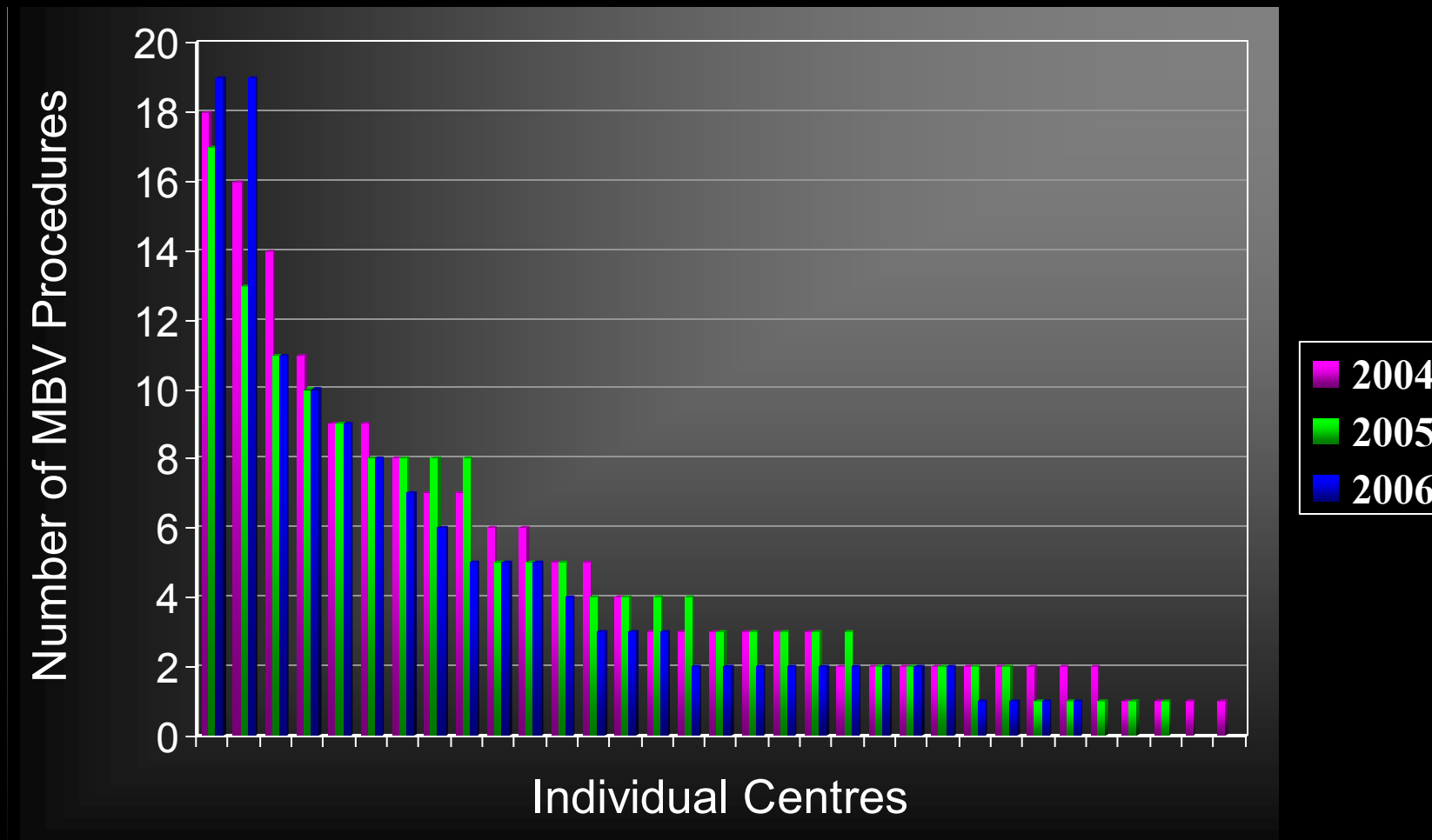
	Units	No.	Δ cf 2005	Mean	Range
MV plasty	28	139	-9.2 %	5.0	1-19
AV plasty	9	23	-36%	2.6	1-7
PV plasty	6	12	-42.9%	2	1-4
TV plasty	1	1	-50%	1	1
PDA	11	46	-40.3%	4.2	1-18
ASD + PFO	39	1000	+14.1%	29	1-126

Mitral Balloon Valvuloplasty



2006 data: Ludman

Total 153



Adult non coronary intervention



2006 data: Ludman

	Units	No	Δ cf 2005	Mean	Range
VSD congen	9	23	-17.9%	2.6	1-5
VSD post MI	9	17	-10.5%	1.8	1-4
LAA occlusion	1	1	-90.9%	1	1

Adult great vessel intervention



2006 data: Ludman

	Units	No	Δ cf 2005	Mean	Range
Coarct / Re-coart	11	69	+53.3%	6.3	1-17
Carotid	3	63	+80%	21	1-54
Aorta	2	12	+300%	6	1-10
Pulm art	8	21	-54%	2.6	1-5
SVC	5	23	-28.1%	4.6	1-10

Other procedures



2006 data: Ludman

Percutaneous Valve Replacement

	Units	No	Δ % cf 2005	Mean	Range
Aortic Valve	0				
Pulmonary Valve	3	38		12.7	1-36
Mitral Valve Repair	0				

Audit Domains

- Outcome

Paper Forms → CCAD

- Mortality and Emergency CABG
 - CCAD
 - Scottish DB
 - Direct questions from hospitals not in CCAD
- QMI
 - CCAD + Scottish db
 - Denominator: PCI Indication – all except PCI for STEMI
- NQMI
 - CCAD only
 - Denominator: PCI Indication – all except PCI for STEMI or NSTEMI

Mortality - All PCIs

All Data from CCAD + Scotland DB + private + N Ireland



2006 data: Ludman

Year	Data From	Total with mortality data	Mortality %	Range %
1995	35/54	11,365 (17,344)	0.69	0-3.4
1996	37/53	14,476 (20,511)	0.72	0-3.2
1997	41/58	17,577 (22,902)	0.91	0-10
1998	44/61	16,946 (24,899)	0.80	0-9.1
1999	48/63	20,975 (28,133)	0.61	0-4
2000	48/66	24,323 (33,652)	0.64	0-2.6
2001	45/64	29,001 (38,992)	0.75	0-2.8
2002	53/64	37,437 (44,913)	0.54	0-1.9
2003	64/73	49,194 (53,261)	0.53	0-2.0
2004	66/78	56,027 (62,780)	0.56	0-2.2
2005	81/83	61,037 (70,142)	0.59	0-3.6
2006	83/91	69,151 (73,692)	0.74	0-3.0

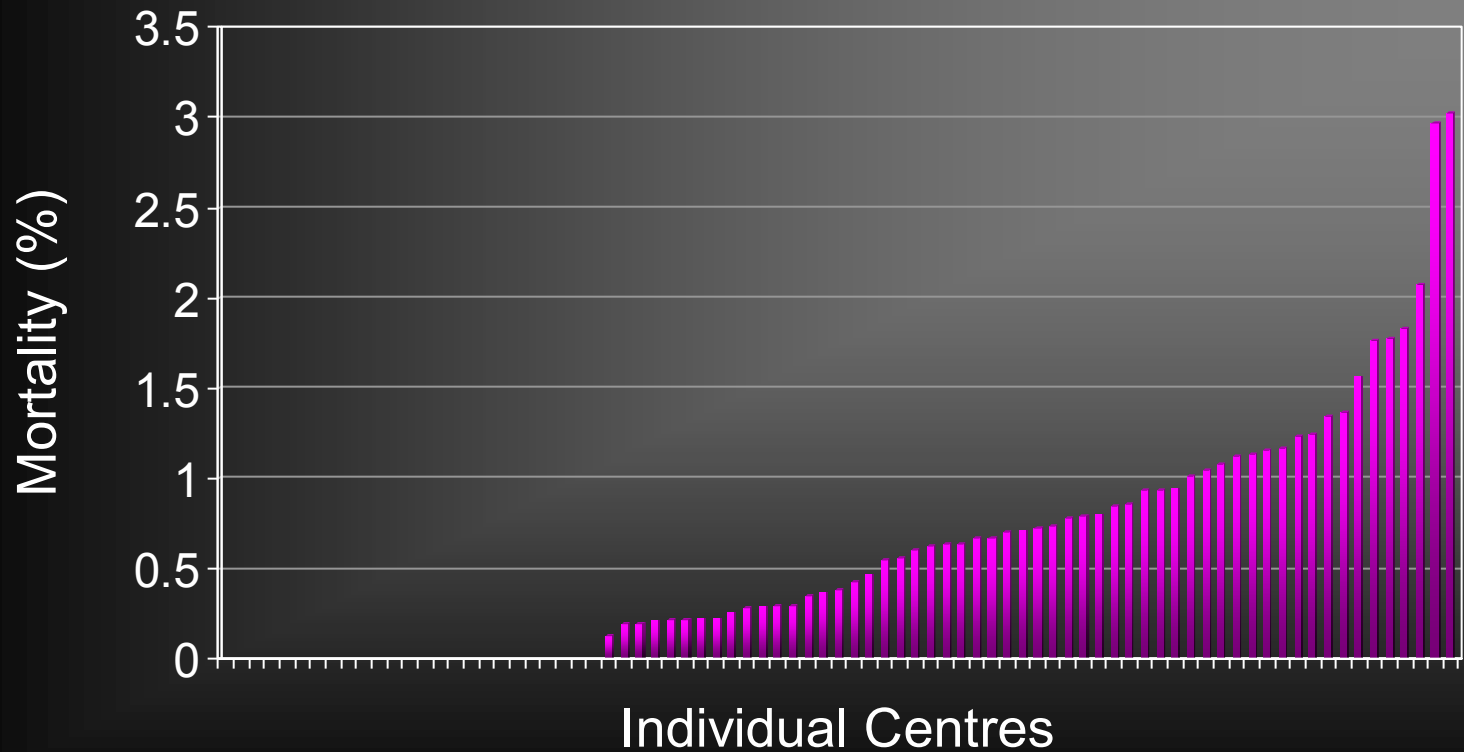
Total Mortality

2006 data from 83 of 91 centres

Mean all PCI = 0.74%



2006 data: Ludman



MACE - All PCIs



2006 data: Ludman

All Data from CCAD + Scotland DB

Year	% Procedure Success	% QMI	% NQMI (stable)	% Em. CABG	Mortality (%)
1997	92	1.2		1.1	0.89
1998	92	0.8		0.7	0.80
1999	90	0.57		0.48	0.61
2000	92	0.6		0.4	0.64
2001	94	0.5		0.4	0.75
2002	92 (51 of 64)	0.57 (49 of 64)		0.28 (53 of 64)	0.54 (53 of 64)
2003	92 (62 of 73)	0.36 (56 of 73)		0.29 (64 of 73)	0.53 (64 of 73)
2004	93.5 (63 of 78)	0.30 (57 of 78)		0.21 (64 of 78)	0.56 (66 of 78)
2005	90.2	0.24		0.12	0.59
2006	95.5	0.15	0.74	0.09	0.74

Surgical Cover

(all 91 NHS and Private Centres)



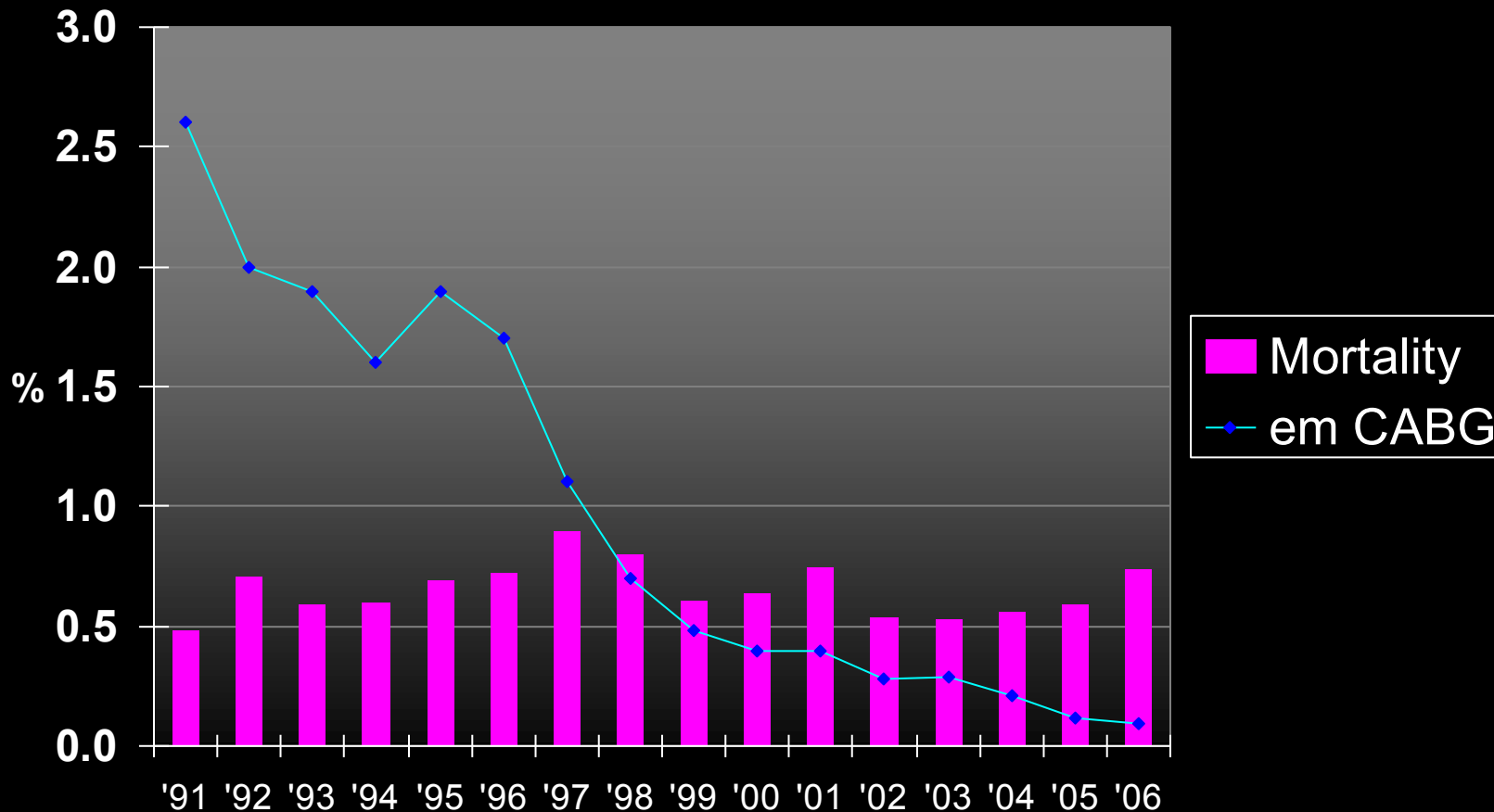
2006 data: Ludman

	On site	Off site
No of centres	53	38
No. of PCI (% of total)	58,153	15,539
Emergency CABG (number)	56	8
Emergency CABG (% of activity)	0.1%	0.05%

All Procedures: Outcome



2006 data: Ludman



Outcome - Success

Definition

Lesions attempted = lesions successful

AND

No in hospital MACE

II Vessels attempted - Integer (integer)	II Lesions attempted - Integer (integer)	II O atte (int
1		
1		
1		
2		
1		
1		
1		
1		
1		
1		
1		
1		
1		
1		

II Lesions success - Integer (integer)	II P (

No lesions attempted, no success.....

Outcome by Subtype

All CCAD but POOR DATA excluded from:

	Overall PCI Success
St Anthony' s, London	28%
Rochdale	15%
CTC Liverpool	0%
East Surrey	43%
Hammersmith	23%
Papworth	26%
John Radcliffe	58%
Devon and Exeter	34%
Royal Sussex Brighton	76%
University College London	79%
Victoria, Blackpool	0%

Outcome 2006

CCAD data only



2006 data: Ludman

All Patients

No.	Success	NQMI	QMI	Em CABG	Death
50,388	95.5%	0.74%	0.2%	0.09%	0.87%

Outcome 2006

CCAD data only



2006 data: Ludman

Elective Patients

All as %	No. cases	Success	Partial success	Fail no comp	Re-PCI	QMI	Em CABG	Death
Stable SV (no CTO)	11,948	96.1		2.5	0.19	0.18	0.07	0.14
MV (no CTO)	4395	94.9	4.2	0.41	0.18	0.34	0.05	0.34
SV CTO	1743	68.3		30.1	0.2	0.1	0.1	0.1
MV CTO	759	69.5	28.6	1.2	0.13	0	0	0.4

Overall Stable

ALL	18,845	92.2%			0.19	0.2	0.06	0.2
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Outcome 2006

CCAD data only



2006 data: Ludman

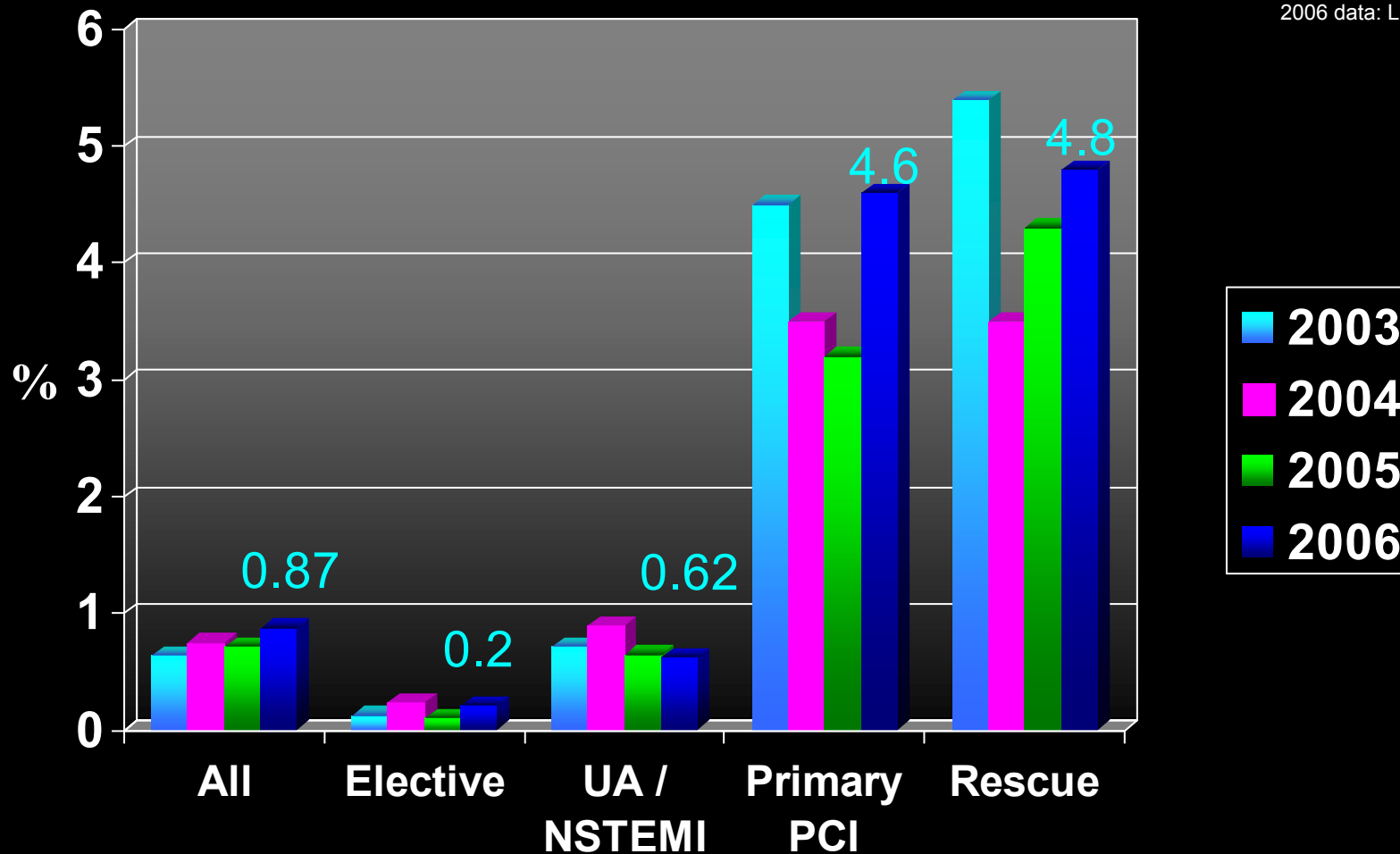
All as %	No.	Success	Partial success	Fail no comp	Re-PCI	QMI	Em CABG	Death
NSTEMI / UA no shock	13667	93.5	2.7	3.0	0.3	0.2	0.09	0.62
All STEMI no shock	3656	93.0	2.0	2.4	0.6		0.14	2.5
Primary PCI	2549	90.4	2.2	2.7	0.5		0.2	4.6
Rescue PCI	1187	91.1	1.9	2.6	0.4		0	4.8
Shock	430	65.6	4.1	2.2	0.5		0.93	30.2

Summary: Mortality

Risk Stratified by Syndrome



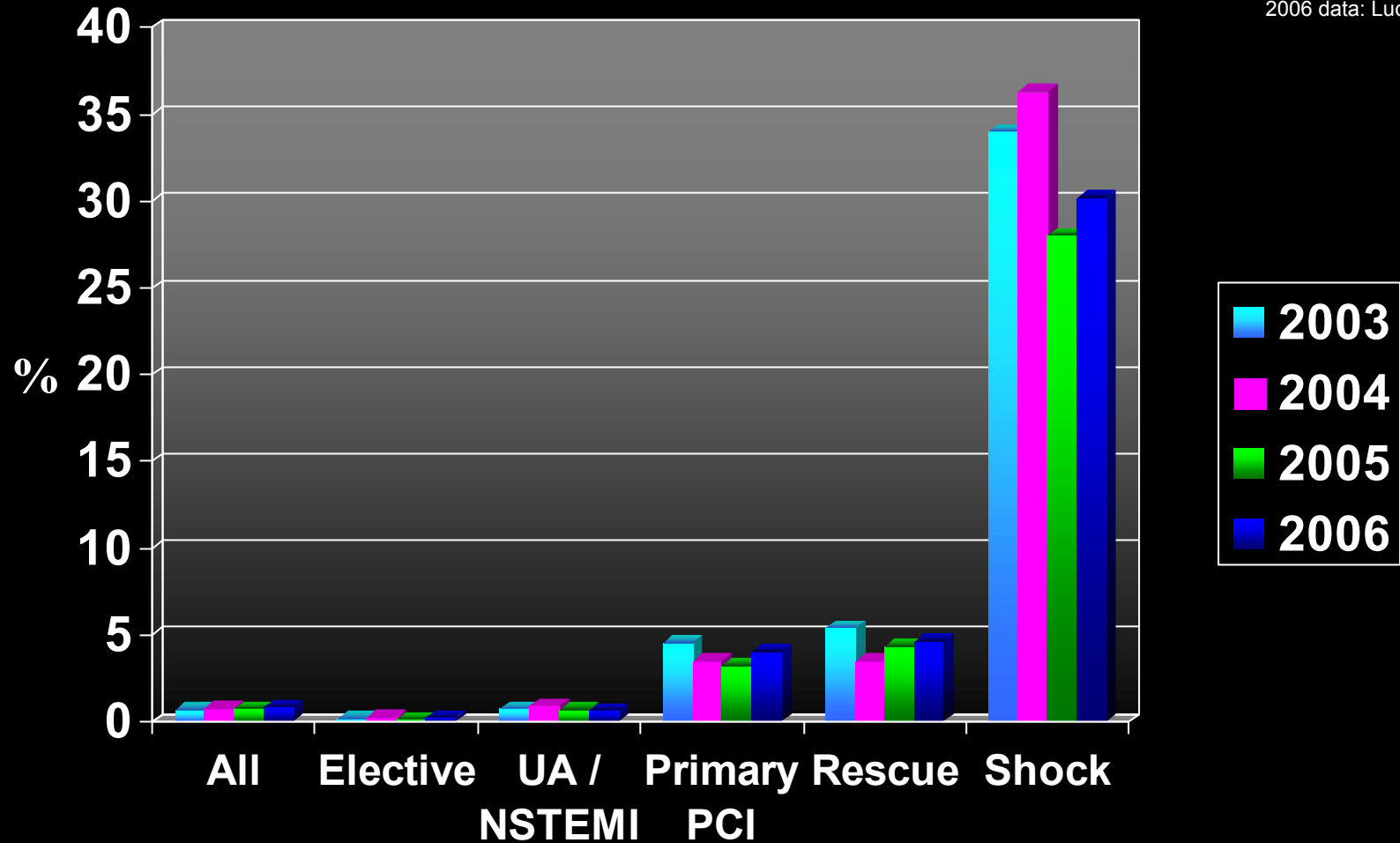
2006 data: Ludman



Mortality by Syndrome



2006 data: Ludman



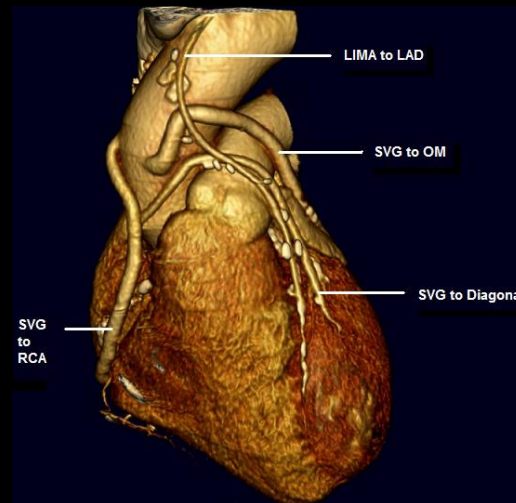
Bypass grafts

PCI of SVG and Arterial



2006 data: Ludman

All as %	No.	Success	Partial success	Fail no comp	Re-PCI	QMI	Em CABG	Death
Bypass Grafts	1486	91.6	3.2	3.8	0.1	0.27	0	1.2



Chronic Total Occlusions



2006 data: Ludman

All as %	No.	Success	Partial success	Fail no comp	Re-PCI	QMI	Em CABG	Death
Chronic Total Occlusion	3899	67.3	10.6	18.2	0.4	0.18	0.15	1.0

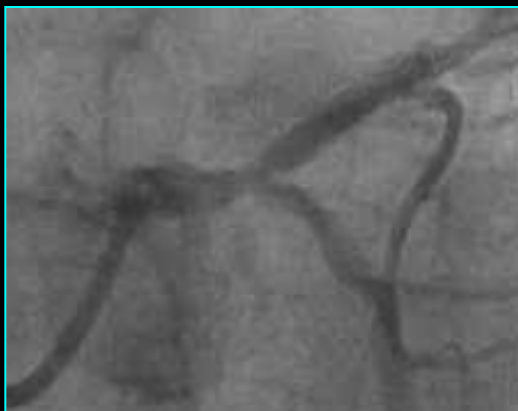


Unprotected LMS



2006 data: Ludman

All as %	No.	Success	Partial success	Fail no comp	Re-PCI	QMI	Em CABG	Death
Unprotected LMS	583	86.8	4.5	0.9	0.3	0.51	0.17	7.0

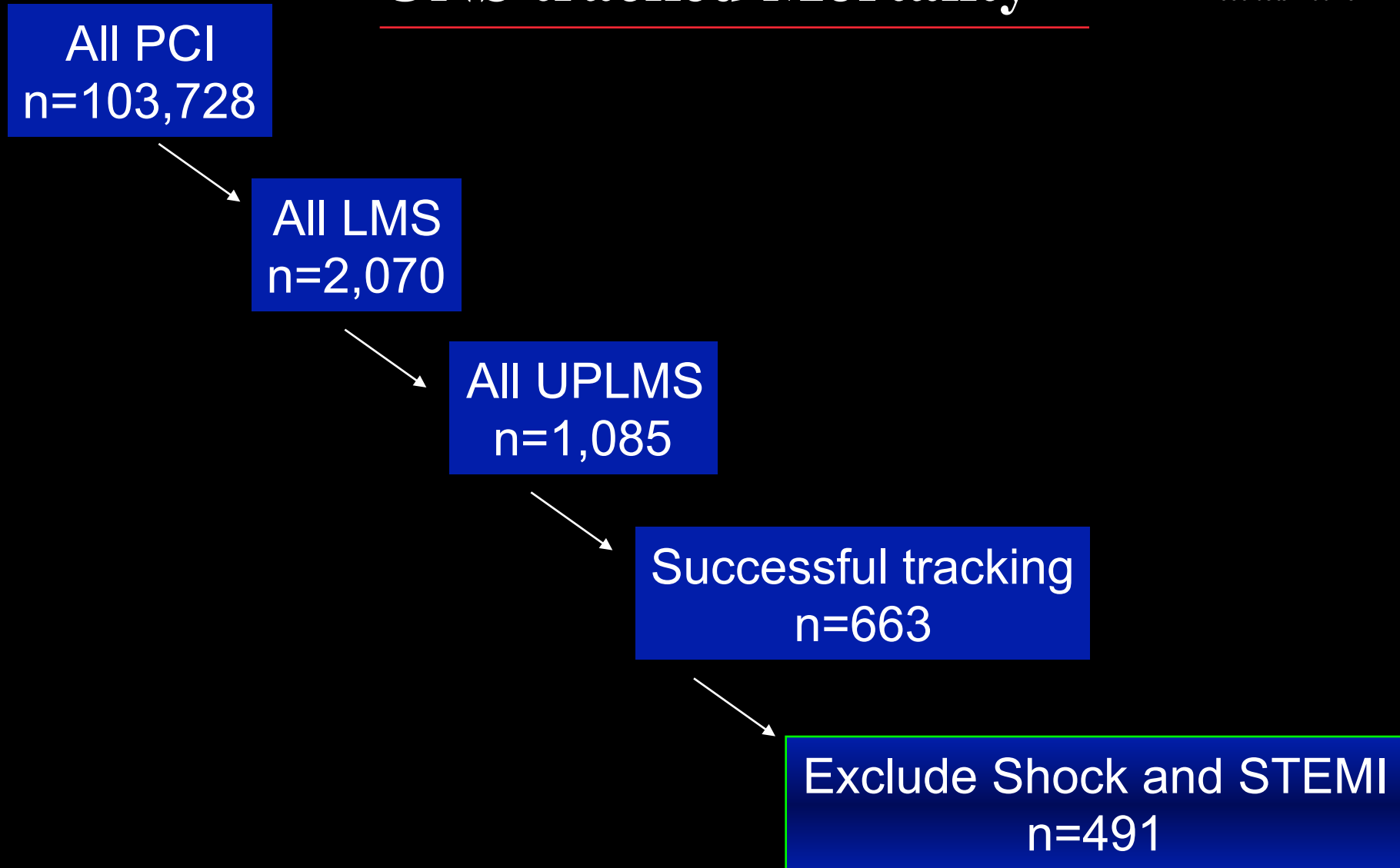


N.B.

Includes all clinical presentations (including shock)
In hospital outcome

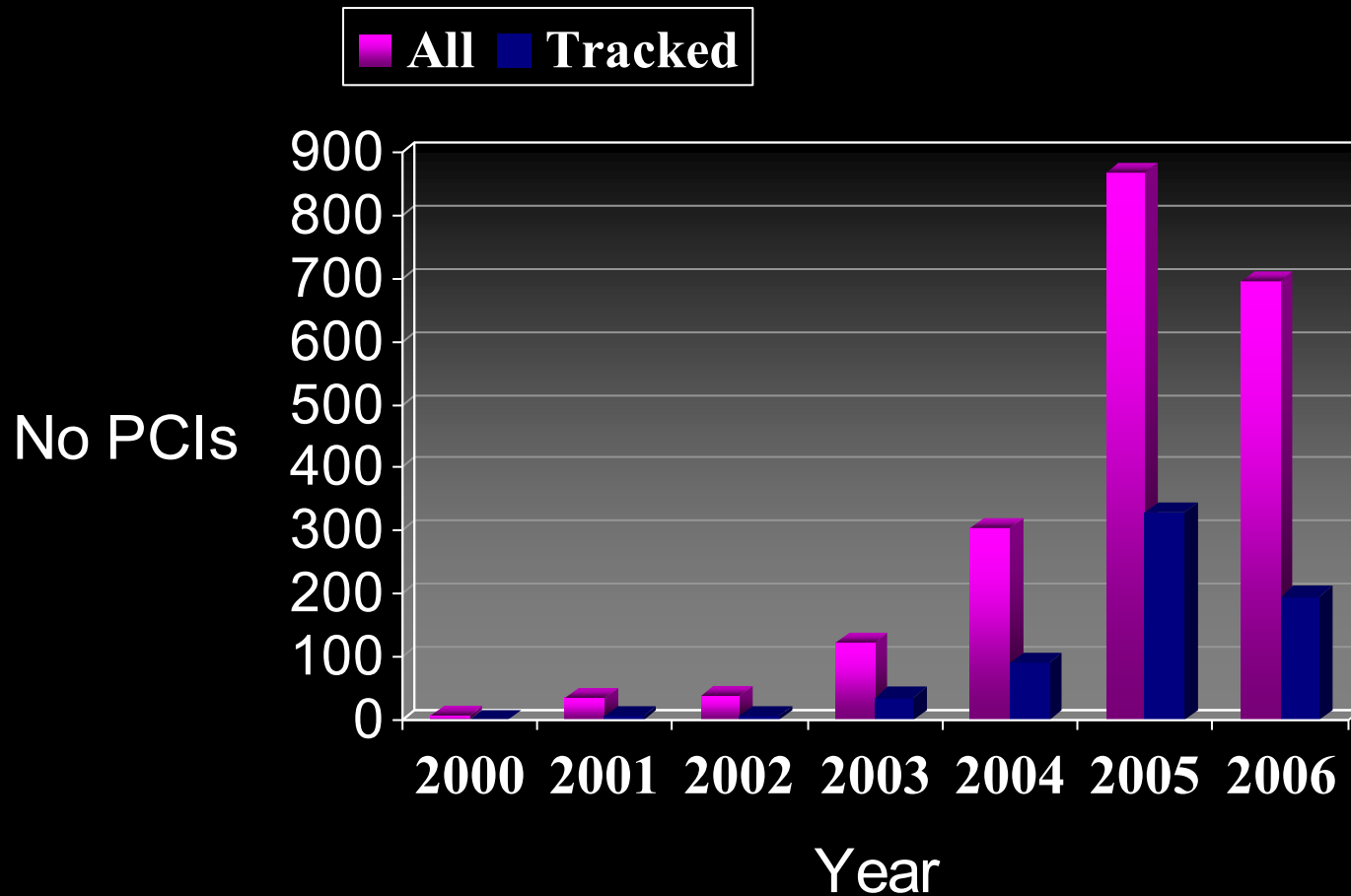
Longer term outcome

ONS tracked Mortality



LMS cases ONS Tracked

By year of procedure

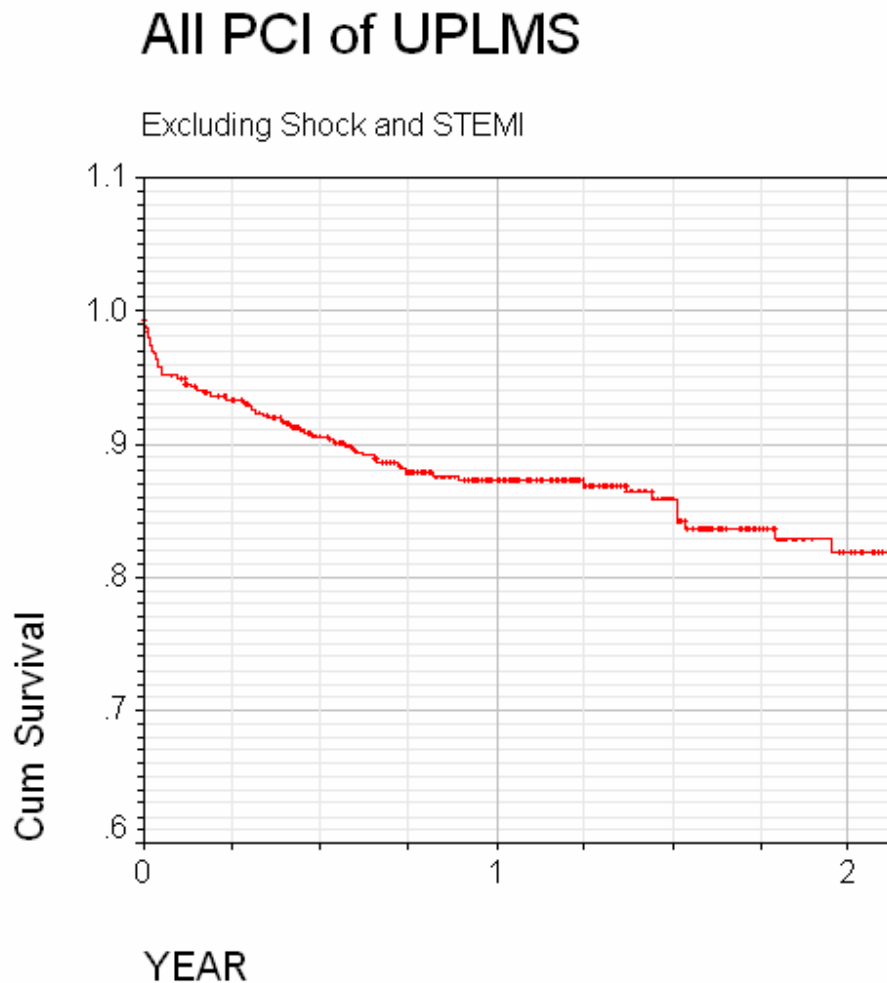


UPLMS

(no STEMI or shock)



2006 data: Ludman



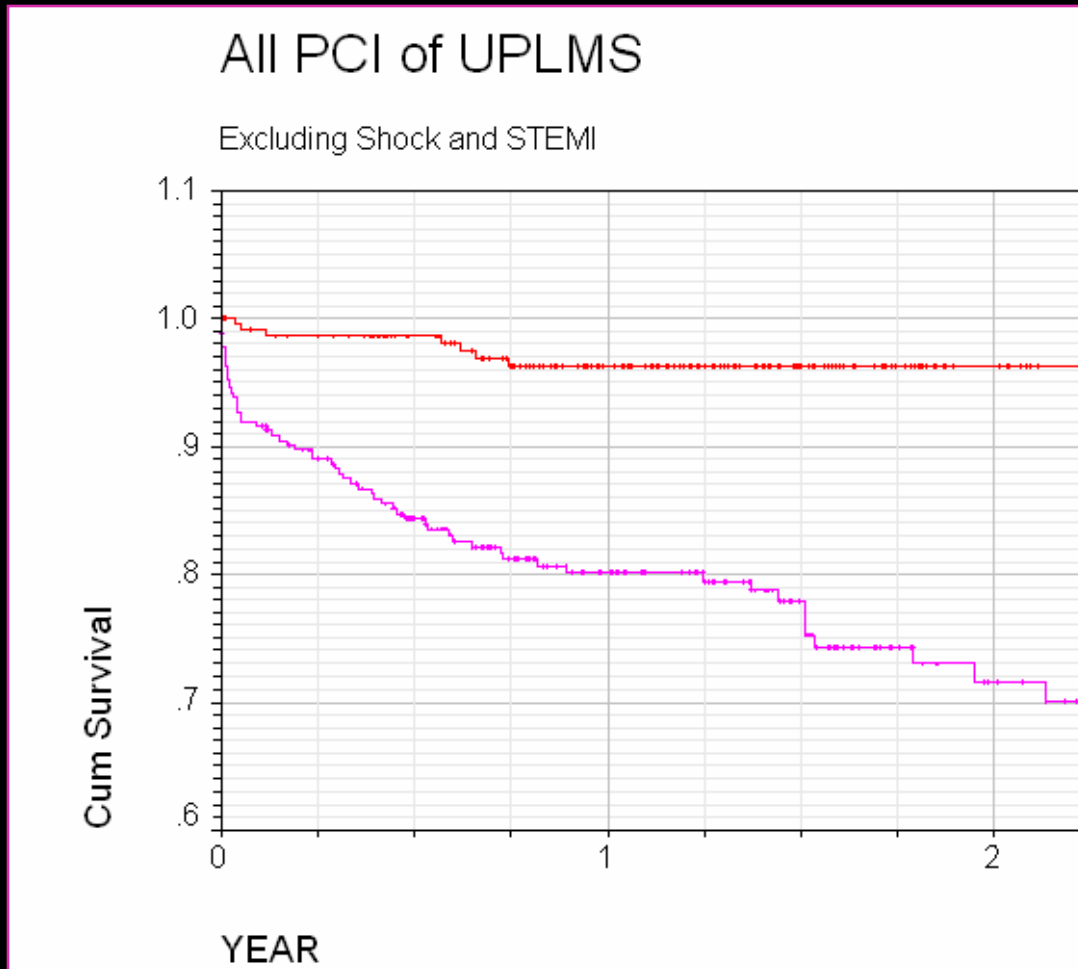
n=491

UPLMS

(no STEMI or shock)



2006 data: Ludman



n=491

Stable

NSTEMI

Age
Stable: 67.6
NSTEMI: 72.9

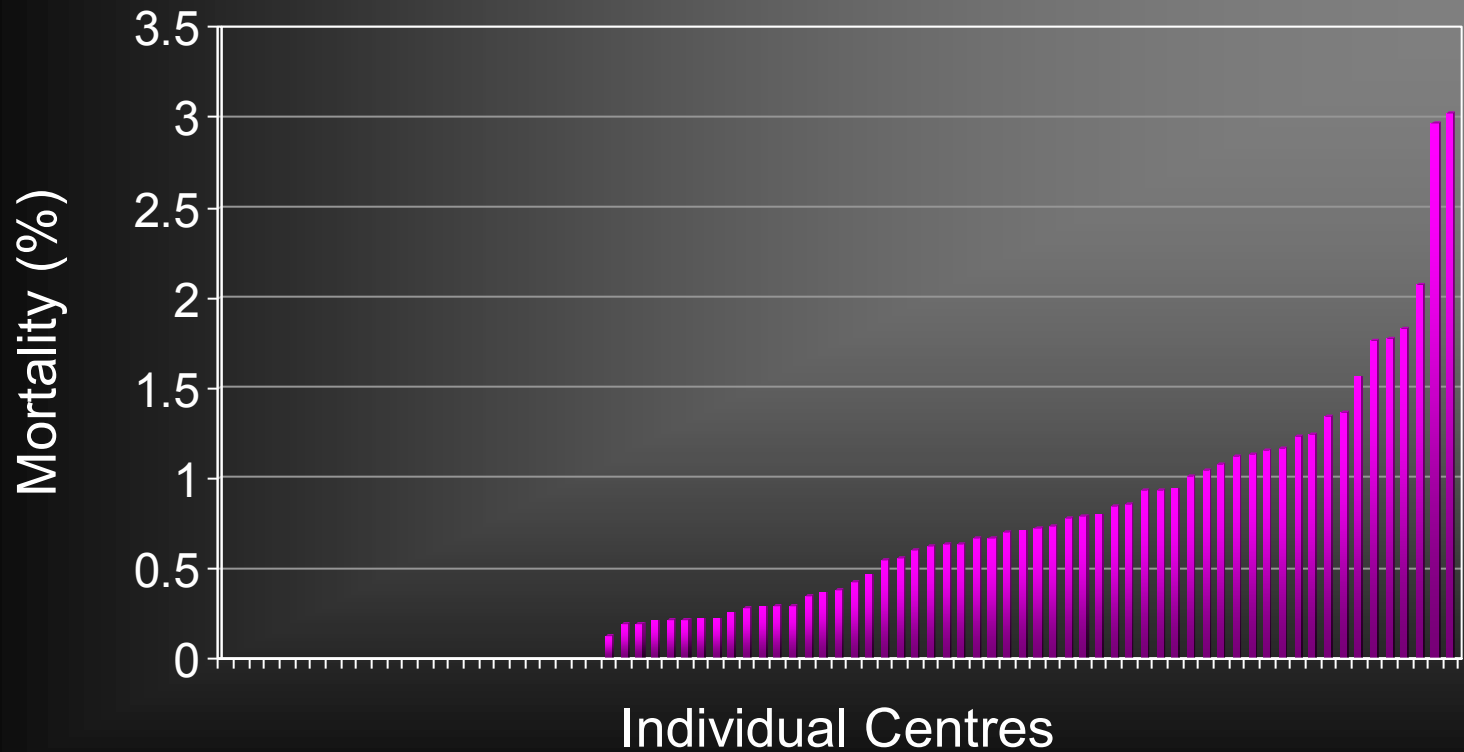
Total Mortality

2006 data from 81 of 91 centres

Mean all PCI = 0.73%



2006 data: Ludman



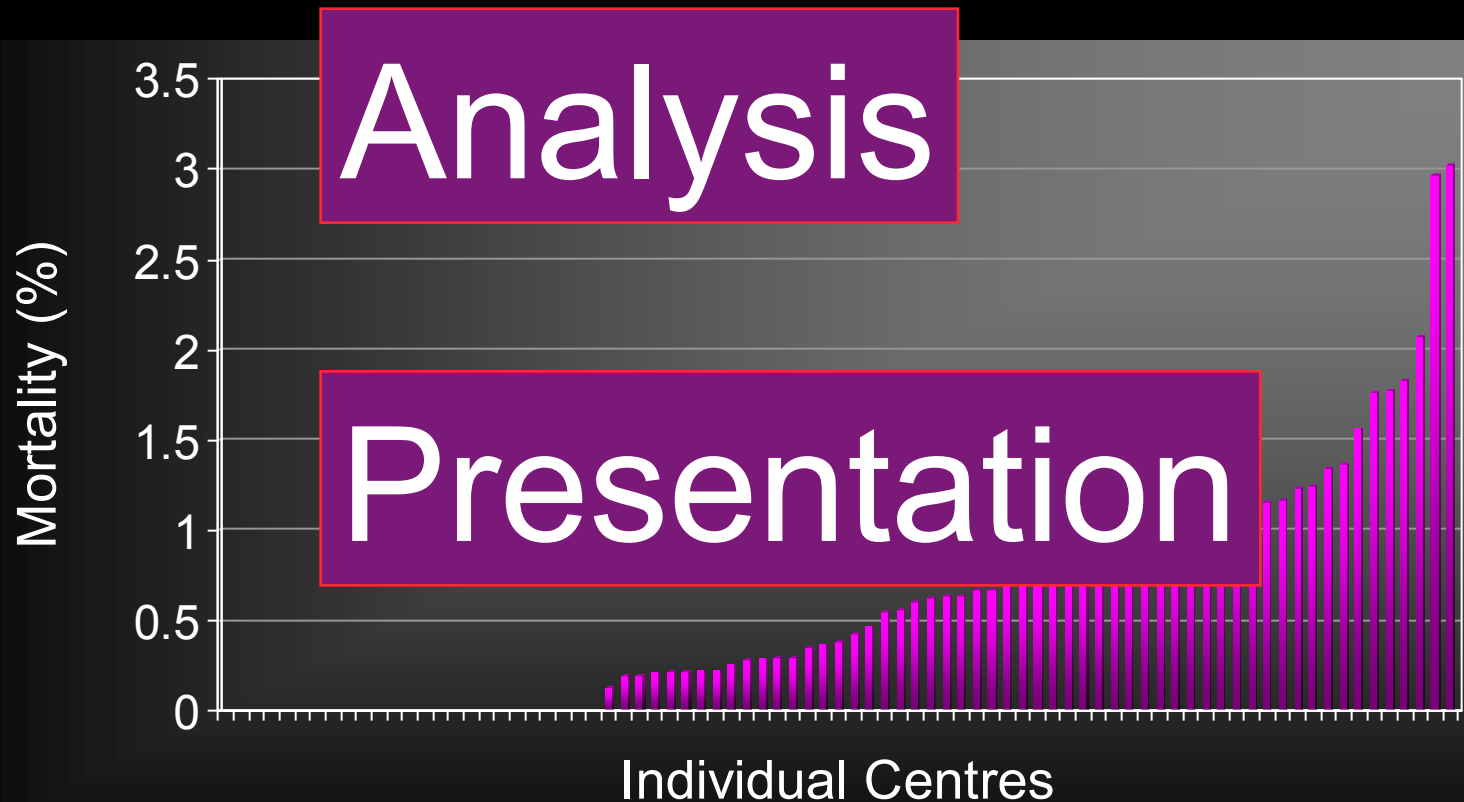
Total Mortality

2006 data from 81 of 91 centres



2006 data: Ludman

Mean all PCI = 0.73%



Total Mortality

2006 data from 81 of 91 centres

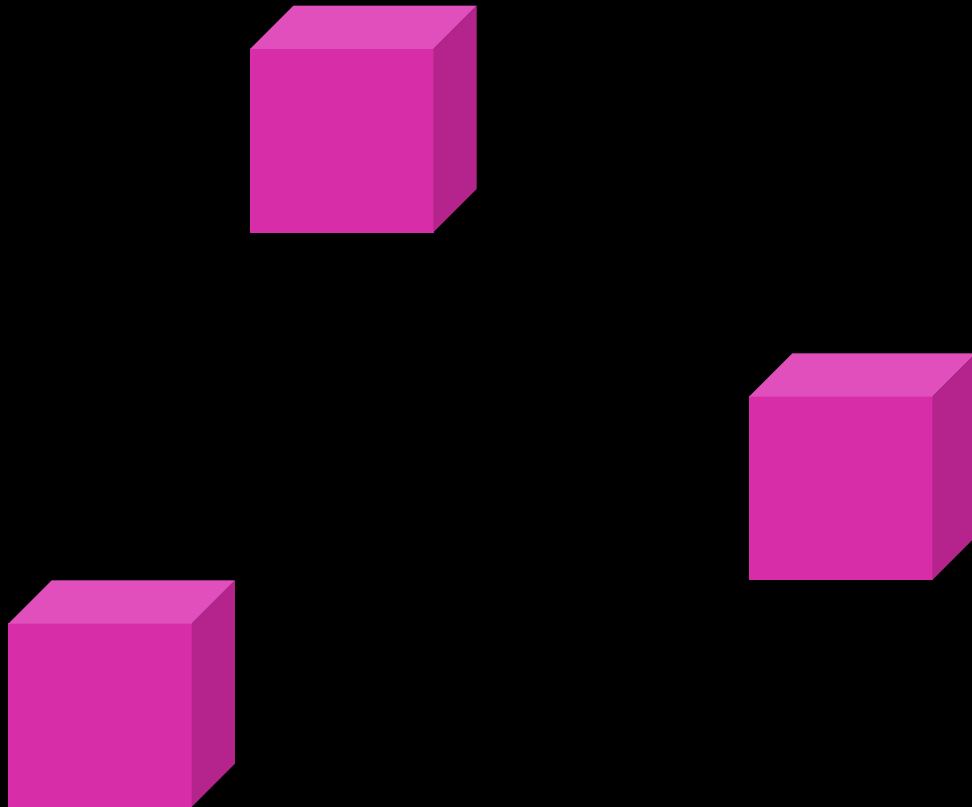
Mean all PCI = 0.73%

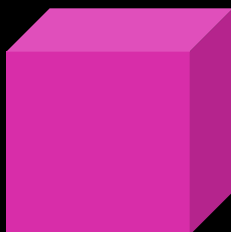
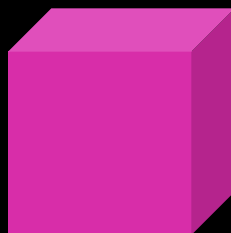
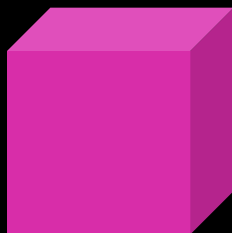


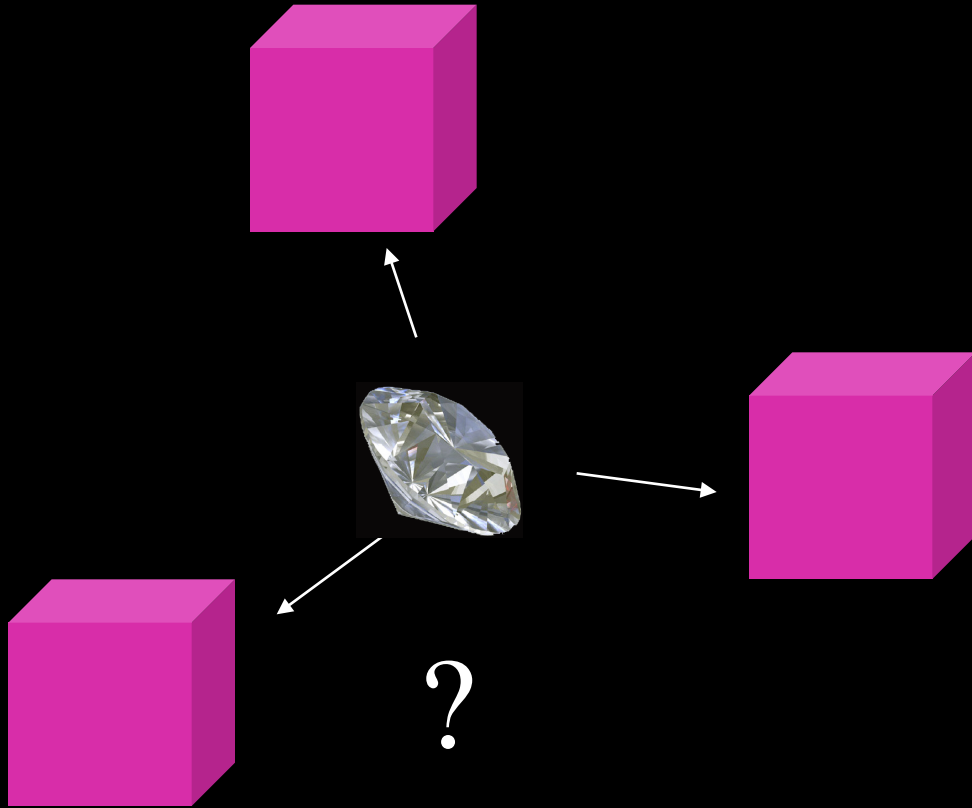
2006 data: Ludman

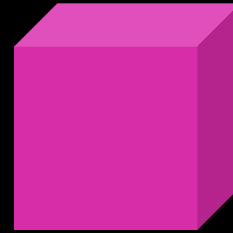
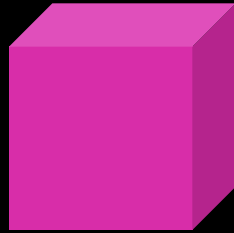
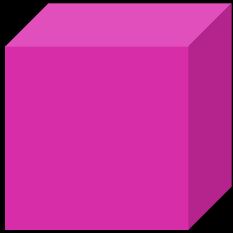
Presentation

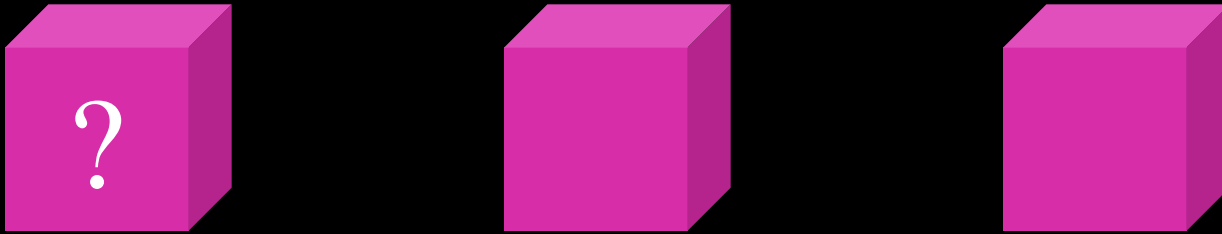
Probability Interpretation



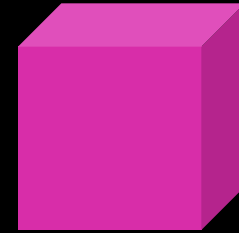
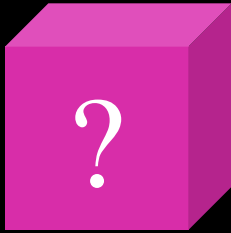


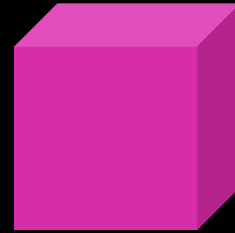
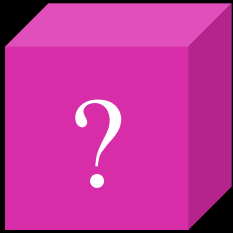


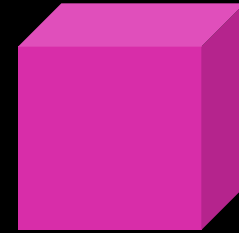
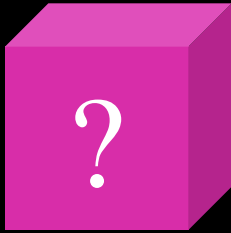




Pick a cube







Do you stick or do you switch?

Total Mortality

2006 data from 81 of 91 centres

Mean all PCI = 0.73%



2006 data: Ludman

Analysis

Risk Stratified Outcome

A D Grayson et al Heart 2006;92:658–663

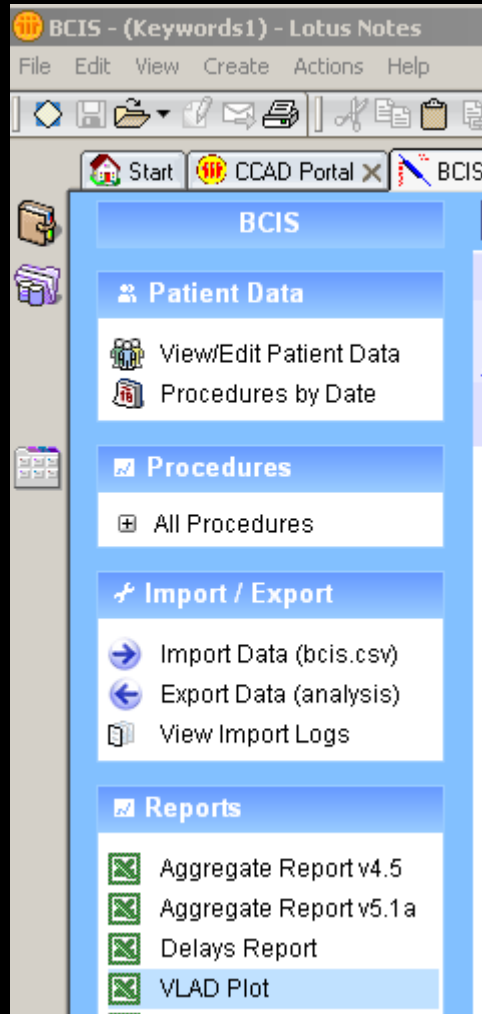
- NWQIP risk score

Age 70–79 years
Age \geq 80 years
Female sex
Cerebrovascular disease
Cardiogenic shock
Urgent PCI
Emergent PCI
LMS lesion treated
Graft lesion treated

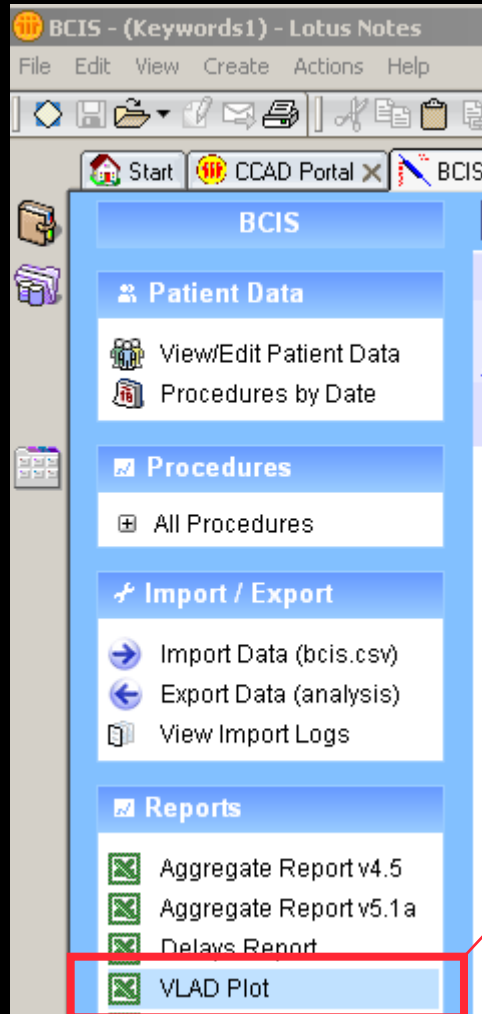
“All models are wrong
but
some are useful”

Box-Jenkins

Risk Adjusted Outcome

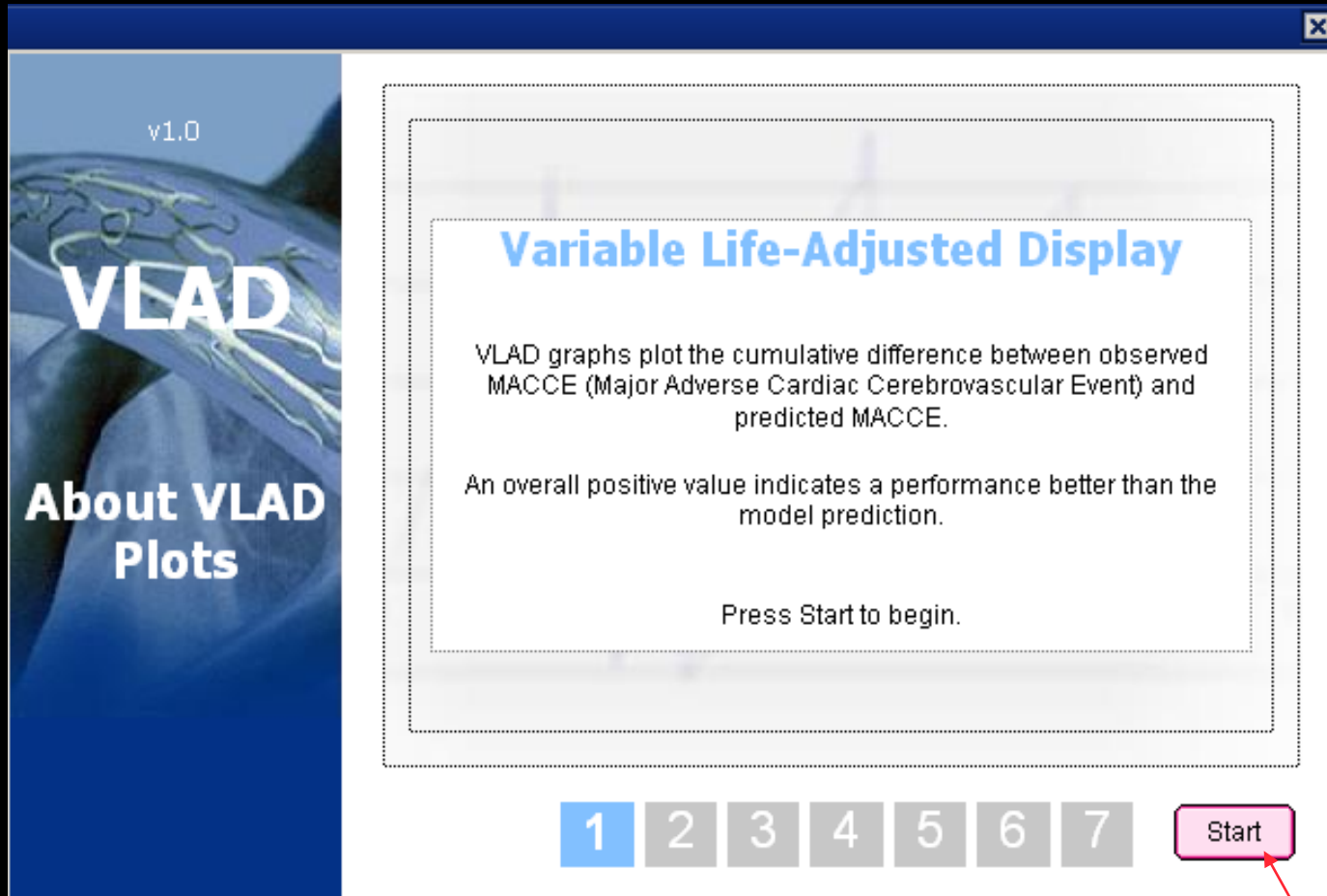


Risk Adjusted Outcome



VLAD Plot

Risk Adjusted Outcome



v1.0

VLAD

About VLAD Plots

Variable Life-Adjusted Display

VLAD graphs plot the cumulative difference between observed MACCE (Major Adverse Cardiac Cerebrovascular Event) and predicted MACCE.

An overall positive value indicates a performance better than the model prediction.

Press Start to begin.

1 2 3 4 5 6 7 Start

The screenshot shows a software window titled 'VLAD v1.0' with a blue sidebar on the left containing the text 'About VLAD Plots'. The main content area is a white window with a blue title bar and a close button in the top right corner. Inside this window, the text 'Variable Life-Adjusted Display' is centered at the top. Below it, two paragraphs of text explain that VLAD graphs plot the cumulative difference between observed and predicted MACCE, and that a positive value indicates better performance than the model prediction. At the bottom of the window, there is a row of seven numbered buttons (1-7) and a pink 'Start' button. A red arrow points to the 'Start' button.

Risk Adjusted Outcome

The screenshot displays the VLAD v1.0 software interface. On the left, a blue sidebar contains the text "v1.0", "VLAD", and "Risk Factors" over a background image of a hand holding a blue mesh. The main window shows a configuration screen for a VLAD plot. At the top, "Intercept Coefficient" is set to -5.4959. Below, a list of risk factors is shown with checkboxes, all of which are checked. To the right, a list of coefficients is displayed, with a double-headed arrow pointing to the coefficient for "2.03 Procedure Urgency = 3. Emergency". At the bottom, there are navigation buttons: "Back", a series of numbered buttons (1-7) with button 3 highlighted in blue, and "Next".

v1.0

VLAD

Risk Factors

Intercept Coefficient: -5.4959

Base VLAD plot on the following Risk Factors

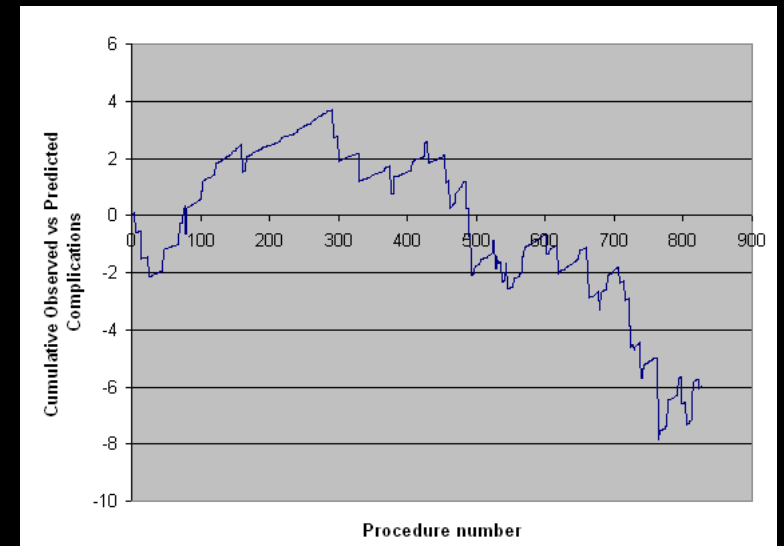
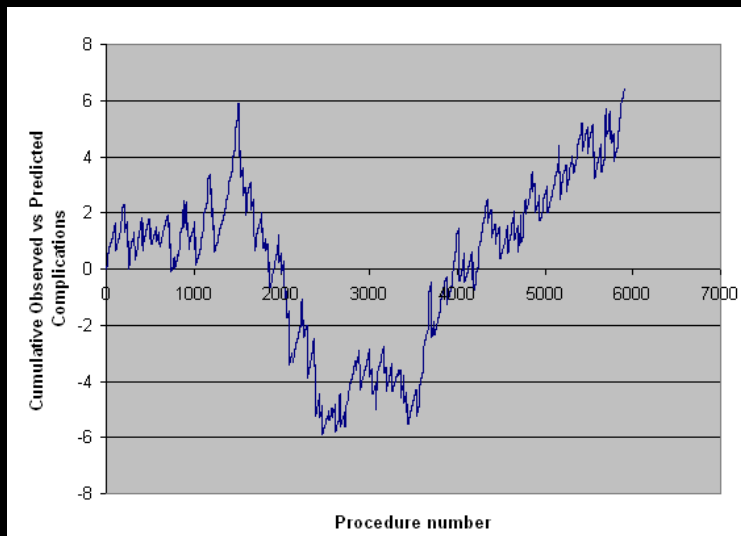
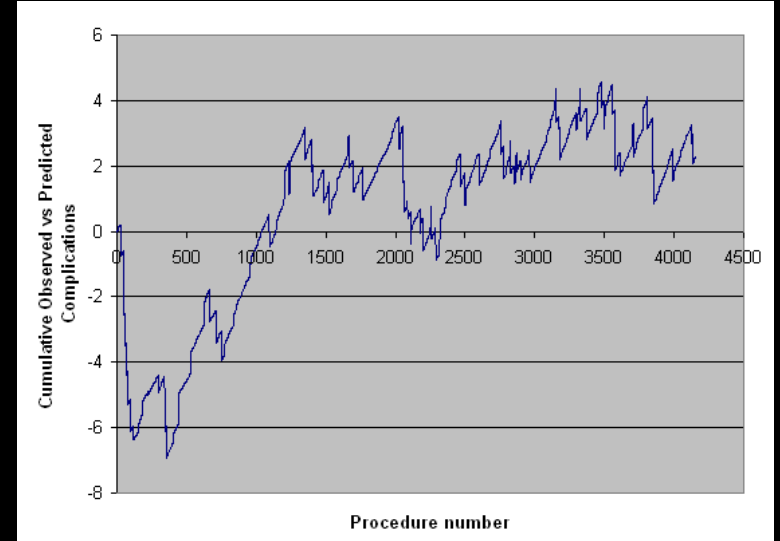
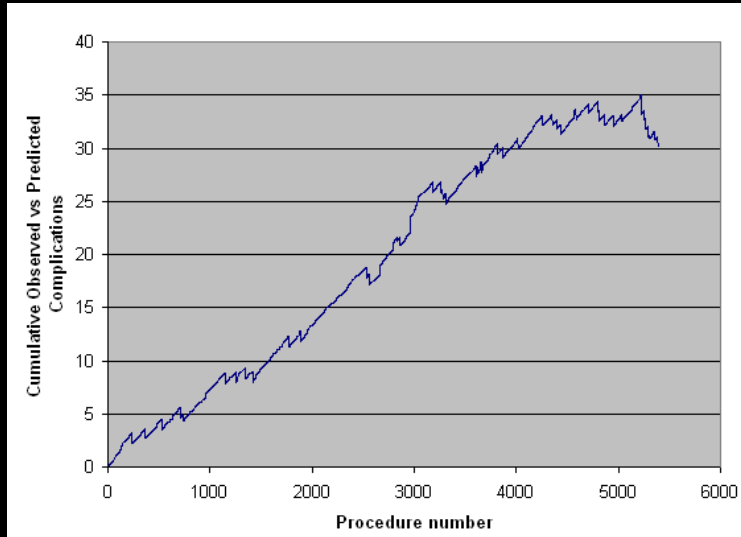
Risk Factor	Coefficients
<input checked="" type="checkbox"/> Age = 71 to 79	0.7048
<input checked="" type="checkbox"/> Age > 80	1.0106
<input checked="" type="checkbox"/> 2.04 Cardiogenic shock = 1. Yes	3.2636
<input checked="" type="checkbox"/> 2.03 Procedure Urgency = 2. Urgent	0.4788
<input checked="" type="checkbox"/> 2.03 Procedure Urgency = 3. Emergency	<=> 1.3625
<input checked="" type="checkbox"/> 3.09 Vessels Attempted = 2. LMain	1.6502
<input checked="" type="checkbox"/> 1.07 Gender = 2. Female	0.4586
<input checked="" type="checkbox"/> 5.05 Medical History = 4. Cerebro event	0.8618
<input checked="" type="checkbox"/> 3.09 Vessels Attempted = 1. Graft(s)	0.9101

Back 1 2 3 4 5 6 7 Next

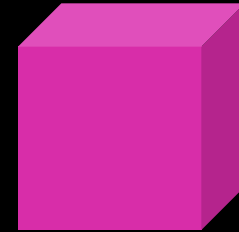
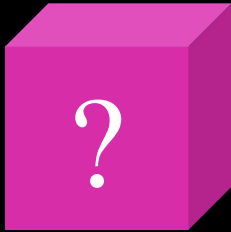
Risk Adjusted Outcome

The image shows a screenshot of a web application interface. On the left side, there is a blue vertical banner with the text "v1.0" at the top, "VLAD" in large white letters in the middle, and "Filter" in white letters at the bottom. The main content area is white and contains a search filter section. This section has a checkbox labeled "Date Range?" which is checked. Below the checkbox, there are two date input fields. The first is labeled "From" and contains the date "01/04/2005" with a small "16" in a box to its right and a calendar icon. The second is labeled "To" and contains the date "12/09/2007" with a small "16" in a box to its right and a calendar icon. Below the date range section, there is a large, faint, and mostly illegible area that appears to be a table or a list of data. At the bottom of the interface, there is a navigation bar with a "Back" button on the left, a series of numbered buttons (1, 2, 3, 4, 5, 6, 7) in the center, and a "Next" button on the right. The button "4" is highlighted with a blue background.

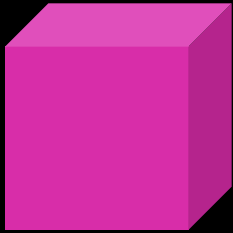
VLAD - Examples



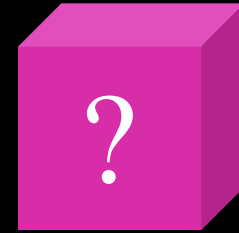
Interpretation of Probability



Do you stick or do you switch?

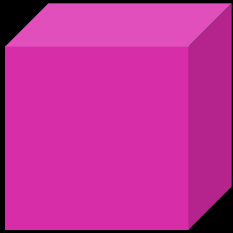


Odds 1:3



Odds 2:3

Always switch



Odds 1:3

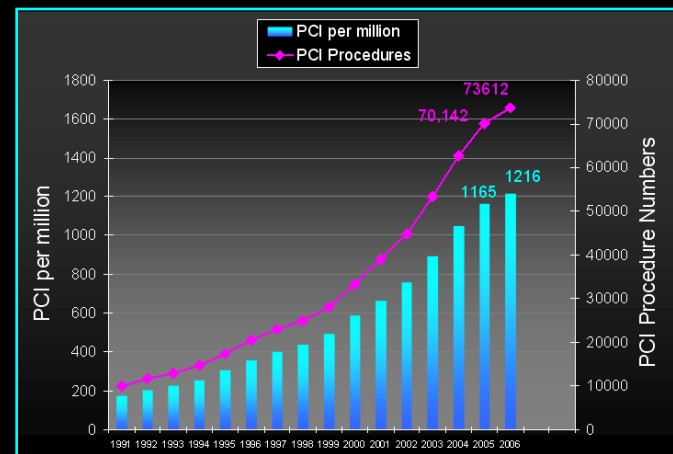
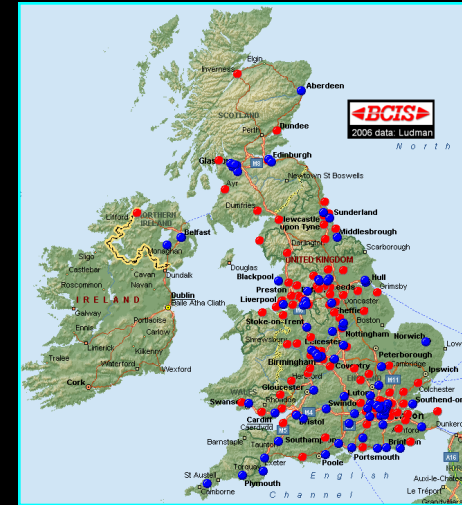


Odds 2:3

Always switch

Summary 2006 (UK)

- 91 PCI centres in UK
- 1,216 PCI pmp in UK
- Smaller rise in PCI
- CCAD
 - 95% of E&W
- Outcomes similar to 2005
- Plans
 - Link Scottish data to CCAD
 - Risk adjusted outcome
 - Process audit
 - Modify dataset...
- **Additional data on the web site**



Additional Analyses

Total UK PCI Procedures



2006 data: Ludman

Year	Centres	Total Procedures	Rate per million	Increase (%)
1991	52	9,933	174	
1992	52	11,575	203	16.5
1993	53	12,937	227	11.8
1994	54	14,624	256	13.0
1995	54	17,344	304	18.6
1996	53	20,511	359	18.1
1997	58	22,902	402	11.7
1998	61	24,899	437	8.7
1999	63	28,133	494	13
2000	66	33,652	590	20
2001	64	38,992	664	12.5
2002	64	44,913	759	14.3
2003	73	53,261	894	17.8
2004	77	62,780	1050	17.4
2005	83	70,142	1165	11.0
2006	91	73,612	1216.3	4.3

PCI for STEMI

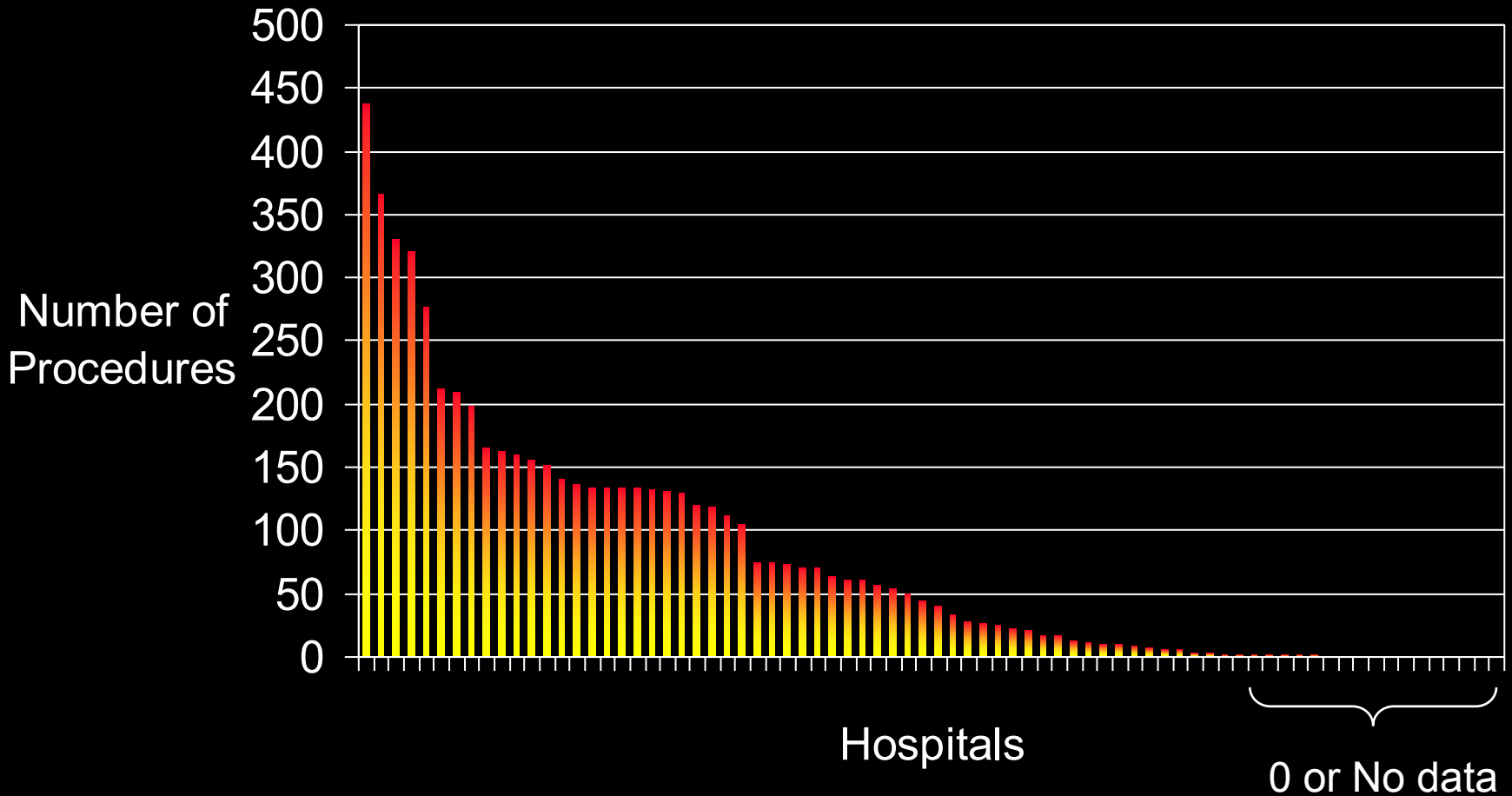
PCI for All STEMI

2006 data from NHS centres



2006 data: Ludman

Total 5866 procedures

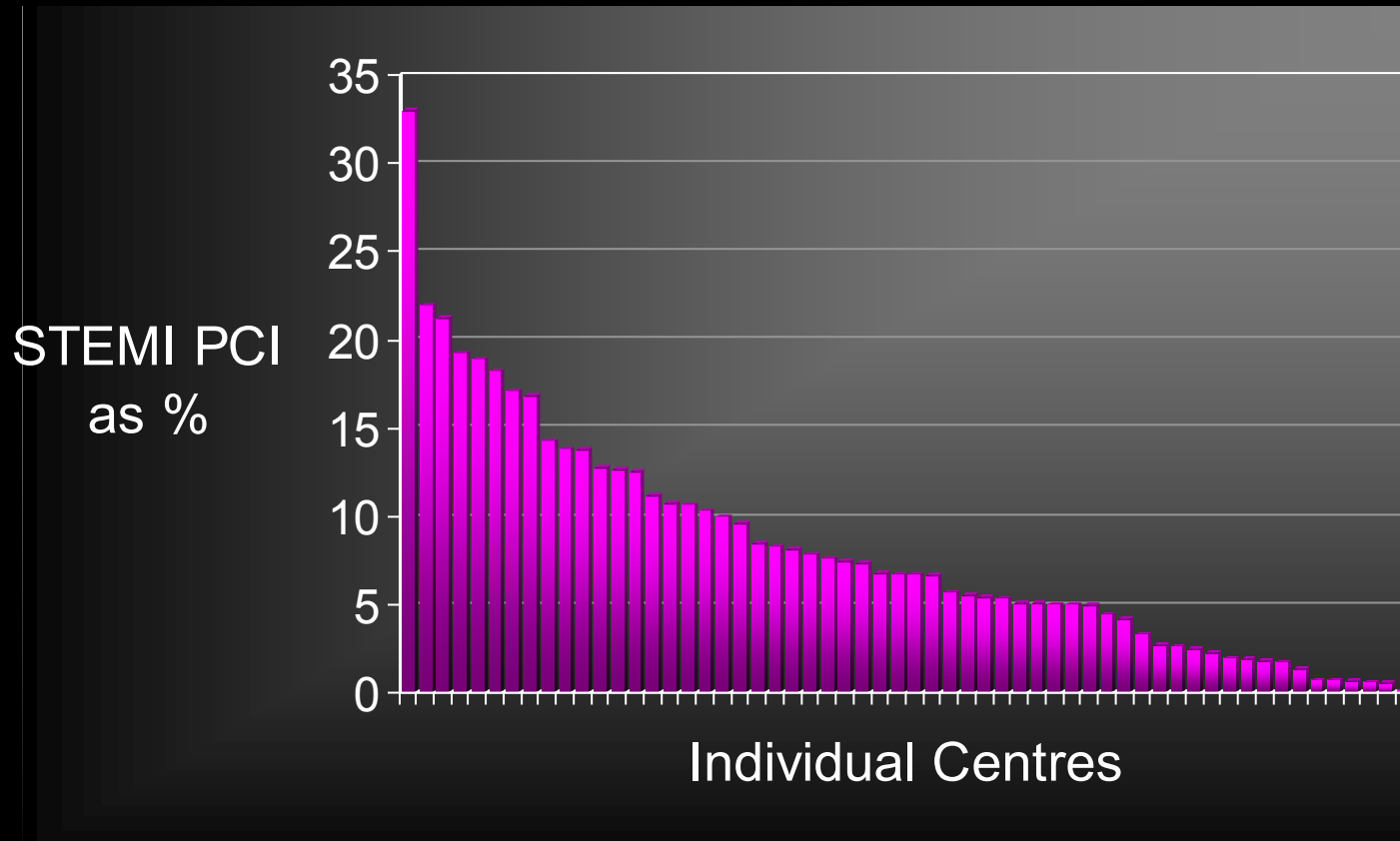


PCI for STEMI



2006 data: Ludman

As Percentage of Each Centre's PCI Activity



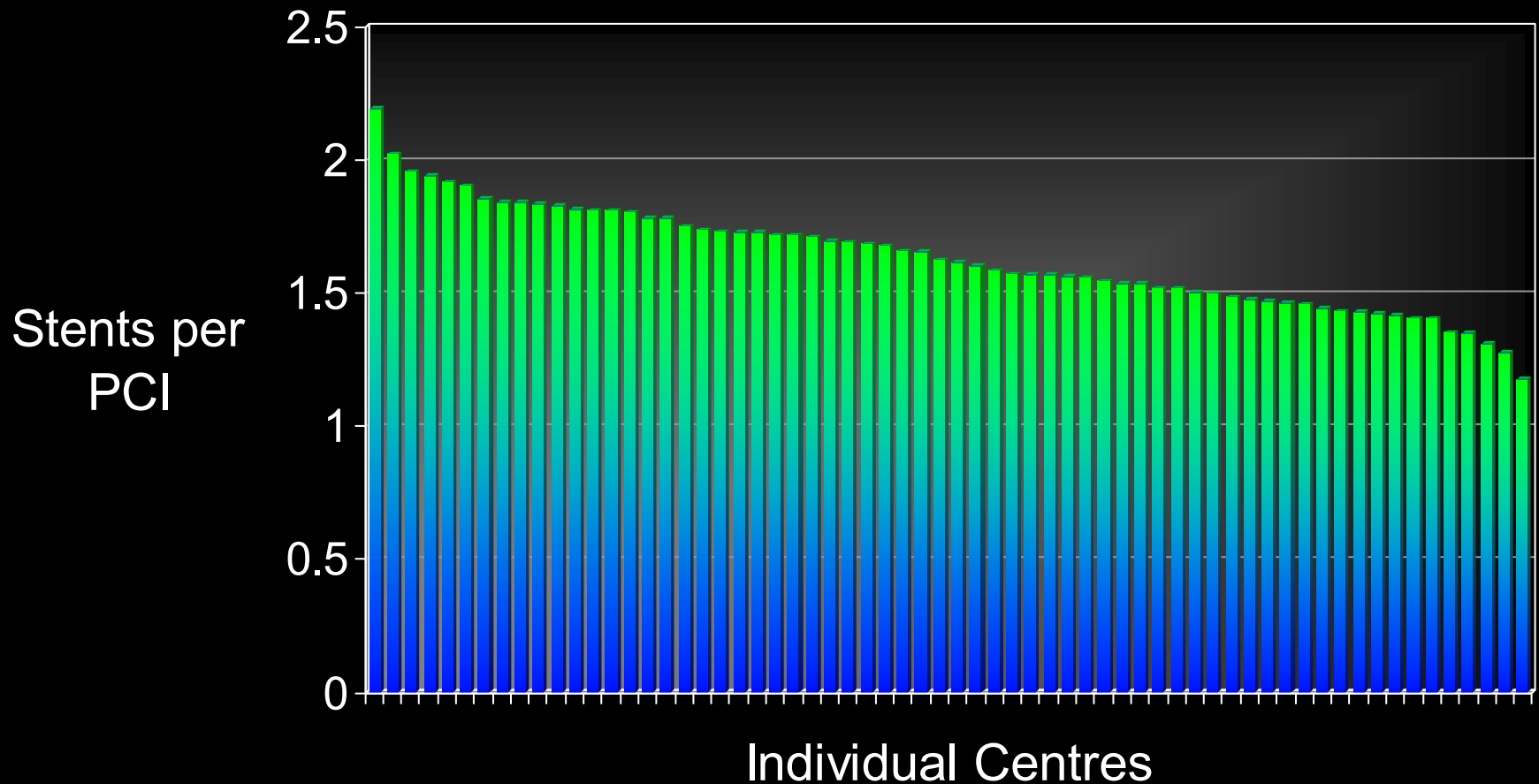
Stents

Stents per Case



2006 data: Ludman

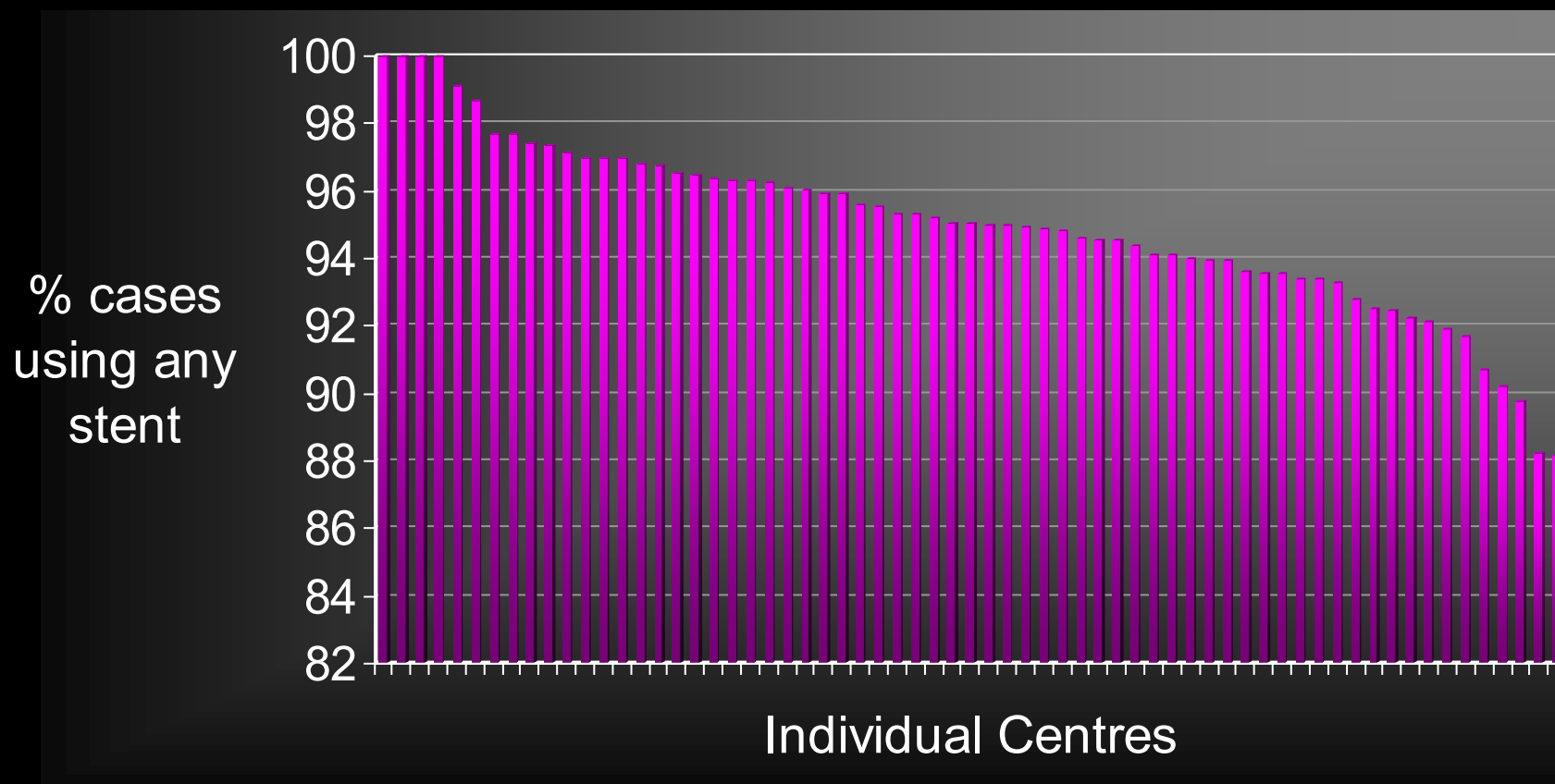
Mean: 1.63 Stents per case (1.62 in 2005)



PCI using any Stent Type



2006 data: Ludman

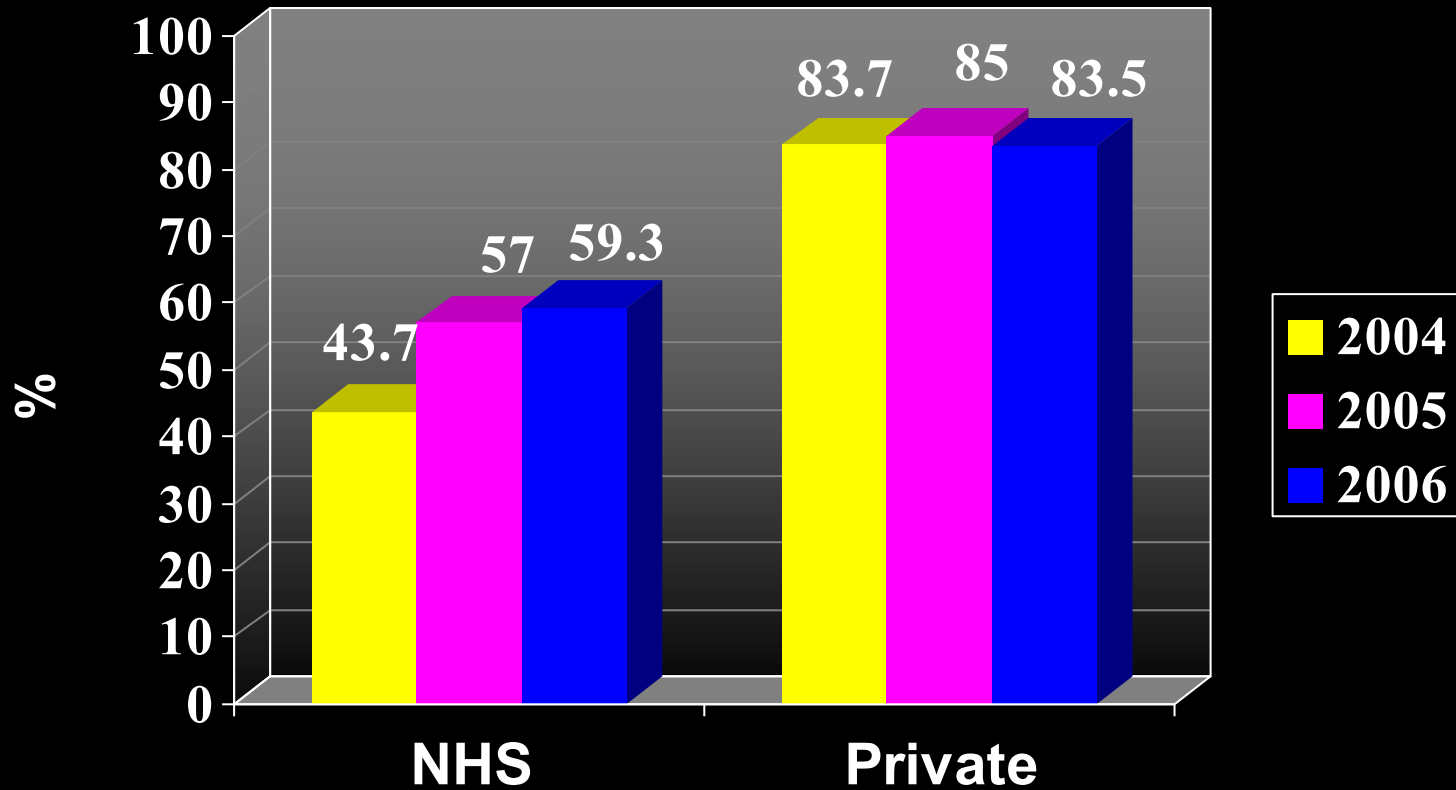


Drug Eluting Stent cases

2006 data from 86 of 91 centres



2006 data: Ludman

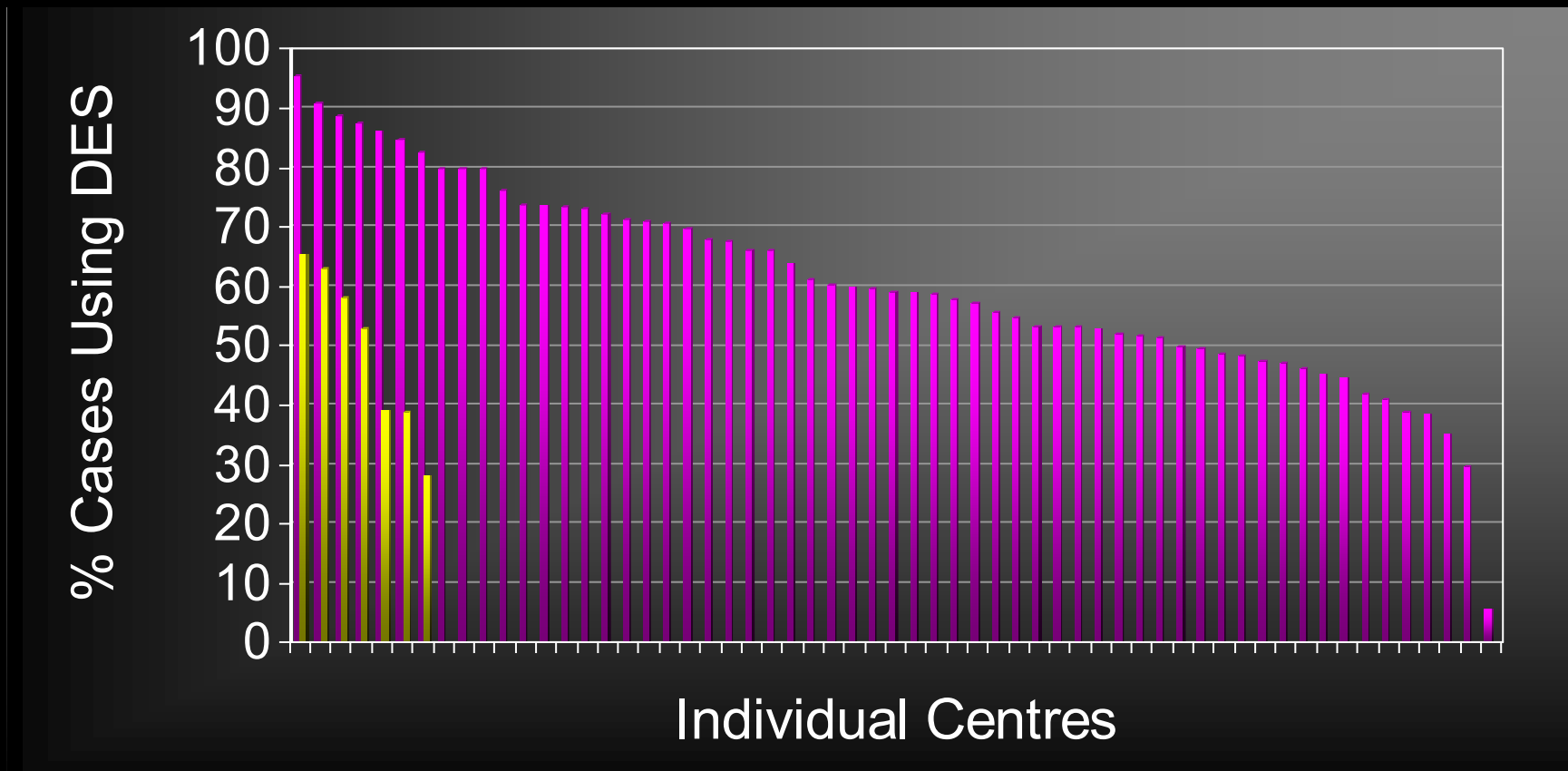


DES use by Centre (NHS)



2006 data: Ludman

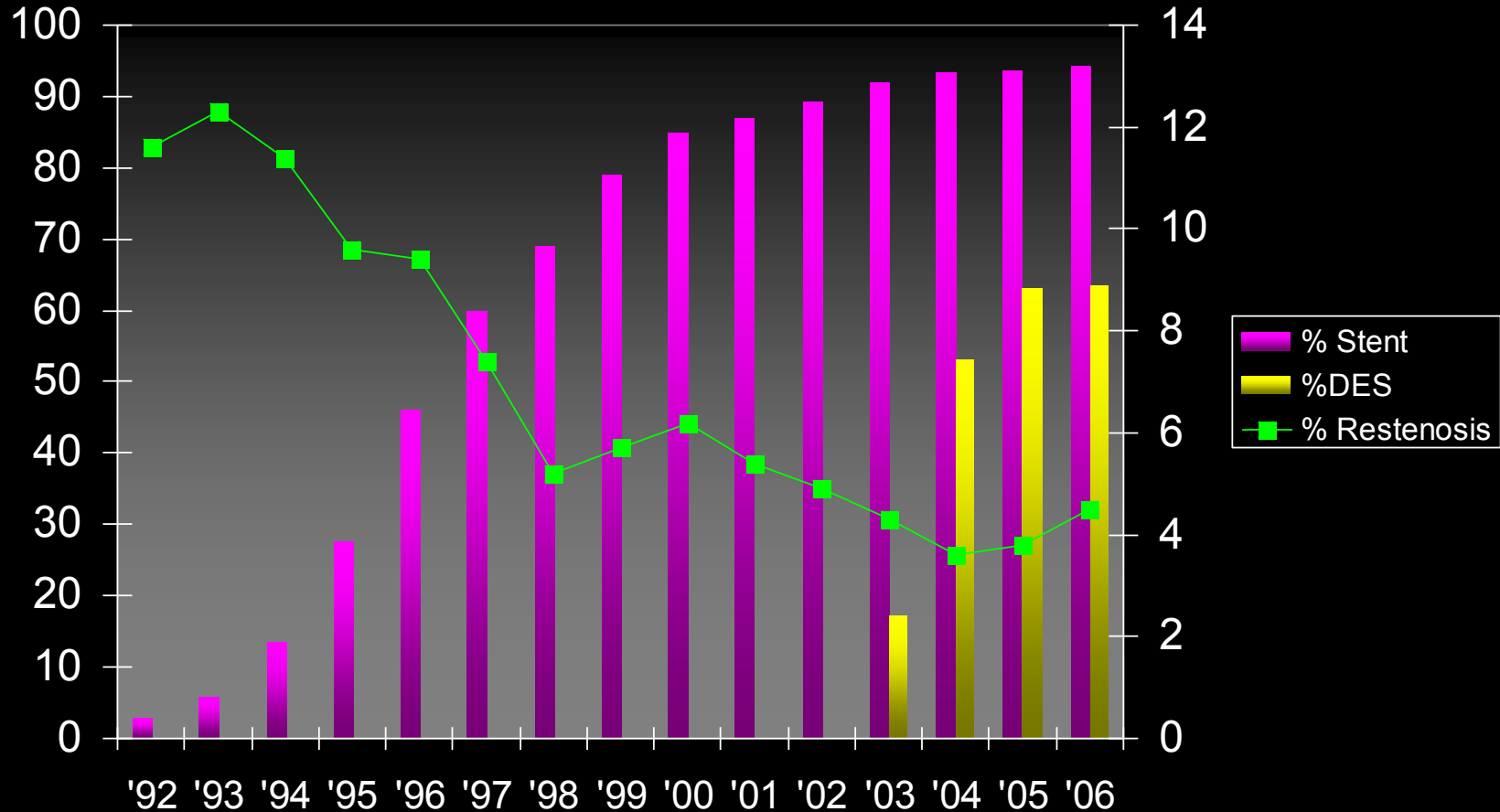
■ England ■ Scotland



BMS and DES use v PCI for Restenosis



2006 data: Ludman

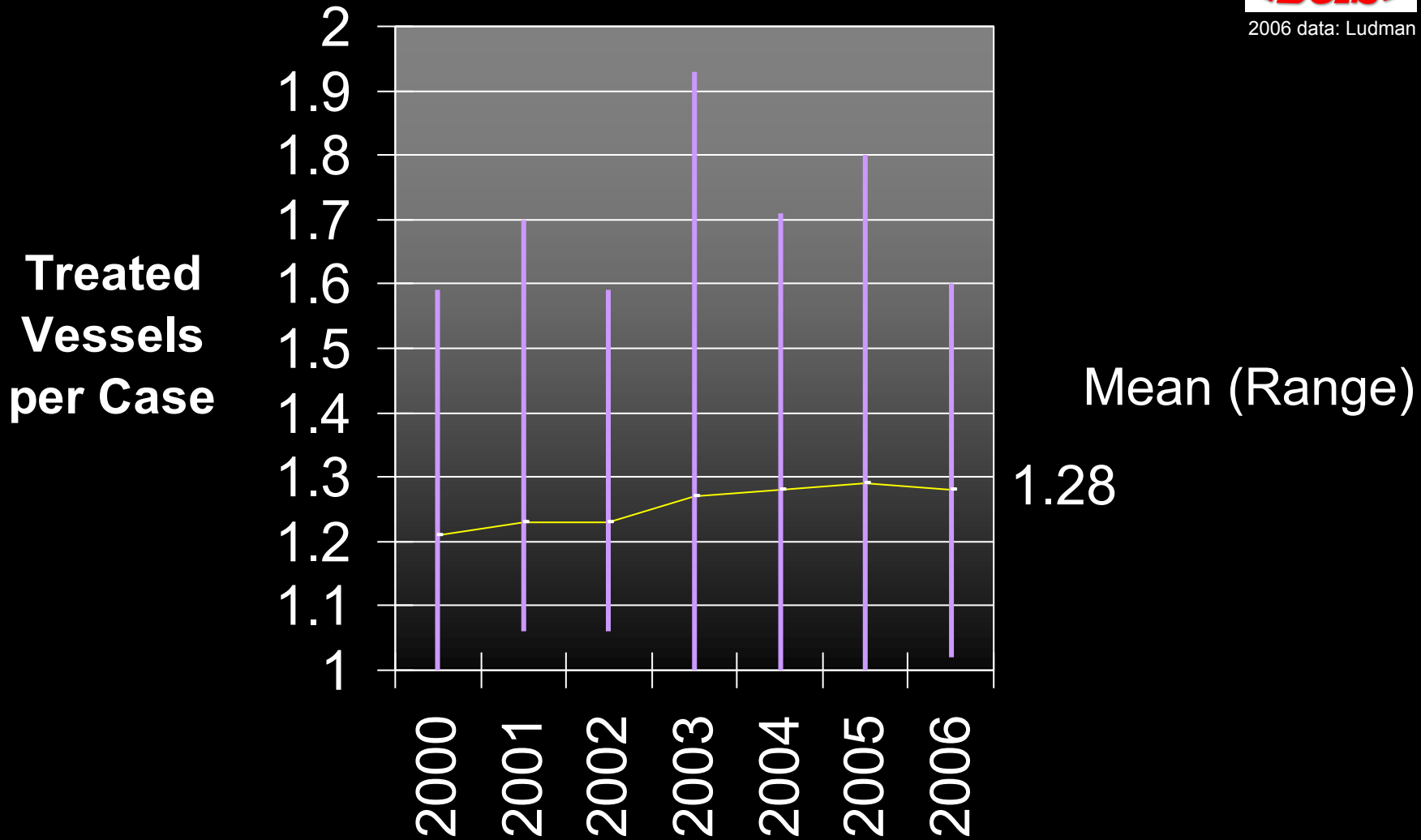


Treatment multiples

Multi-vessel Treatment



2006 data: Ludman

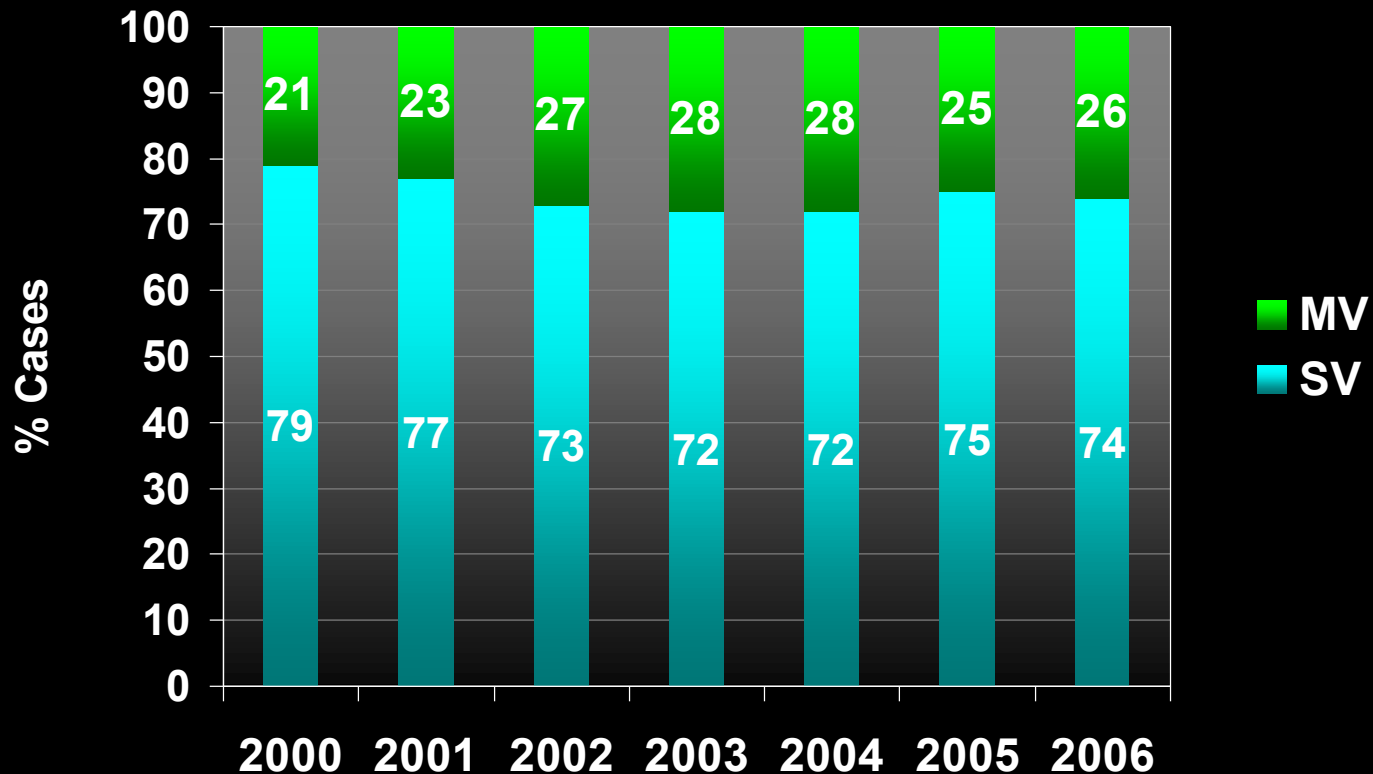


Multi-vessel Treatment

All clinical syndromes



2006 data: Ludman

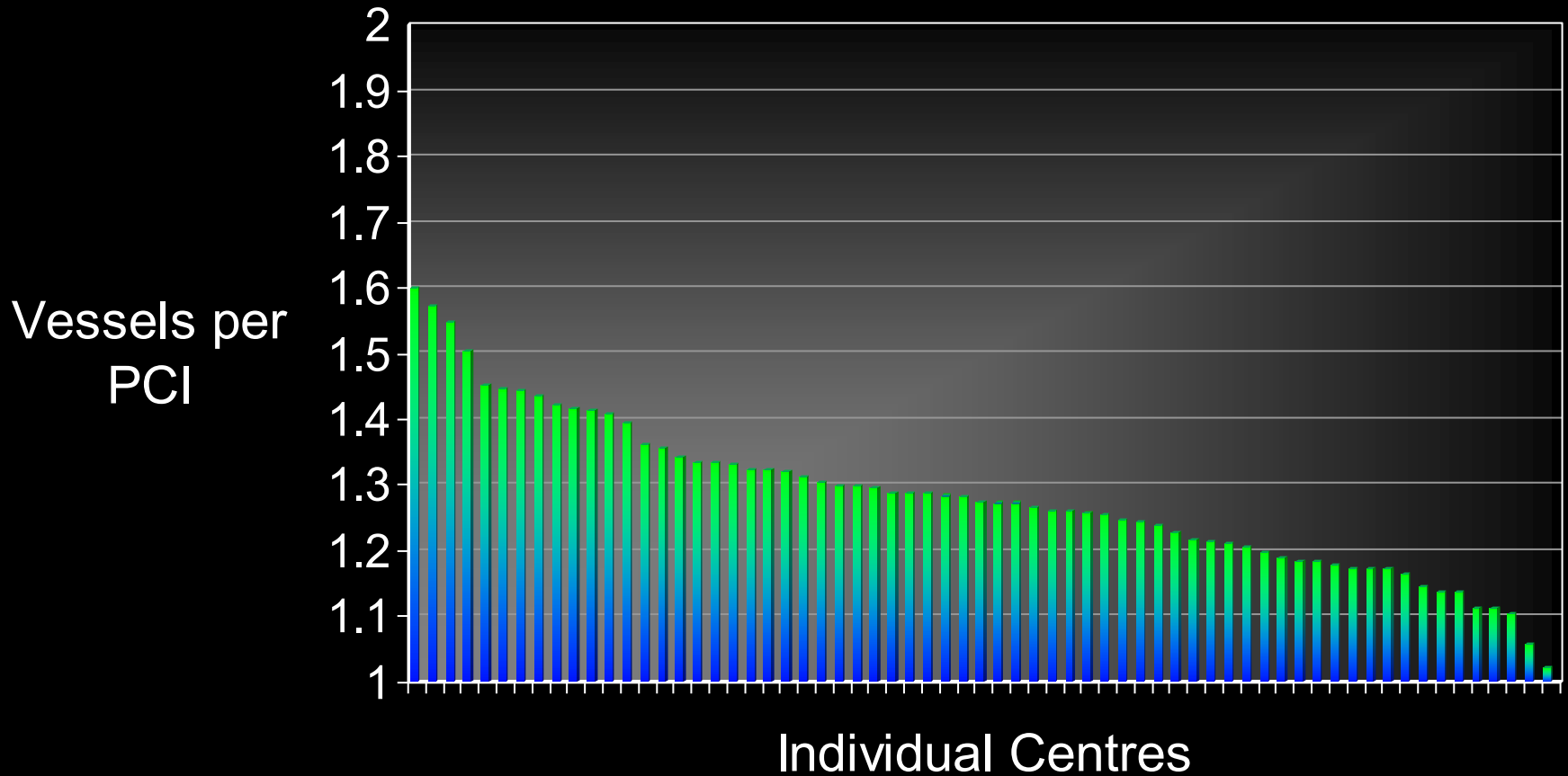


Multi-vessel Treatment

By centre - 2006



2006 data: Ludman

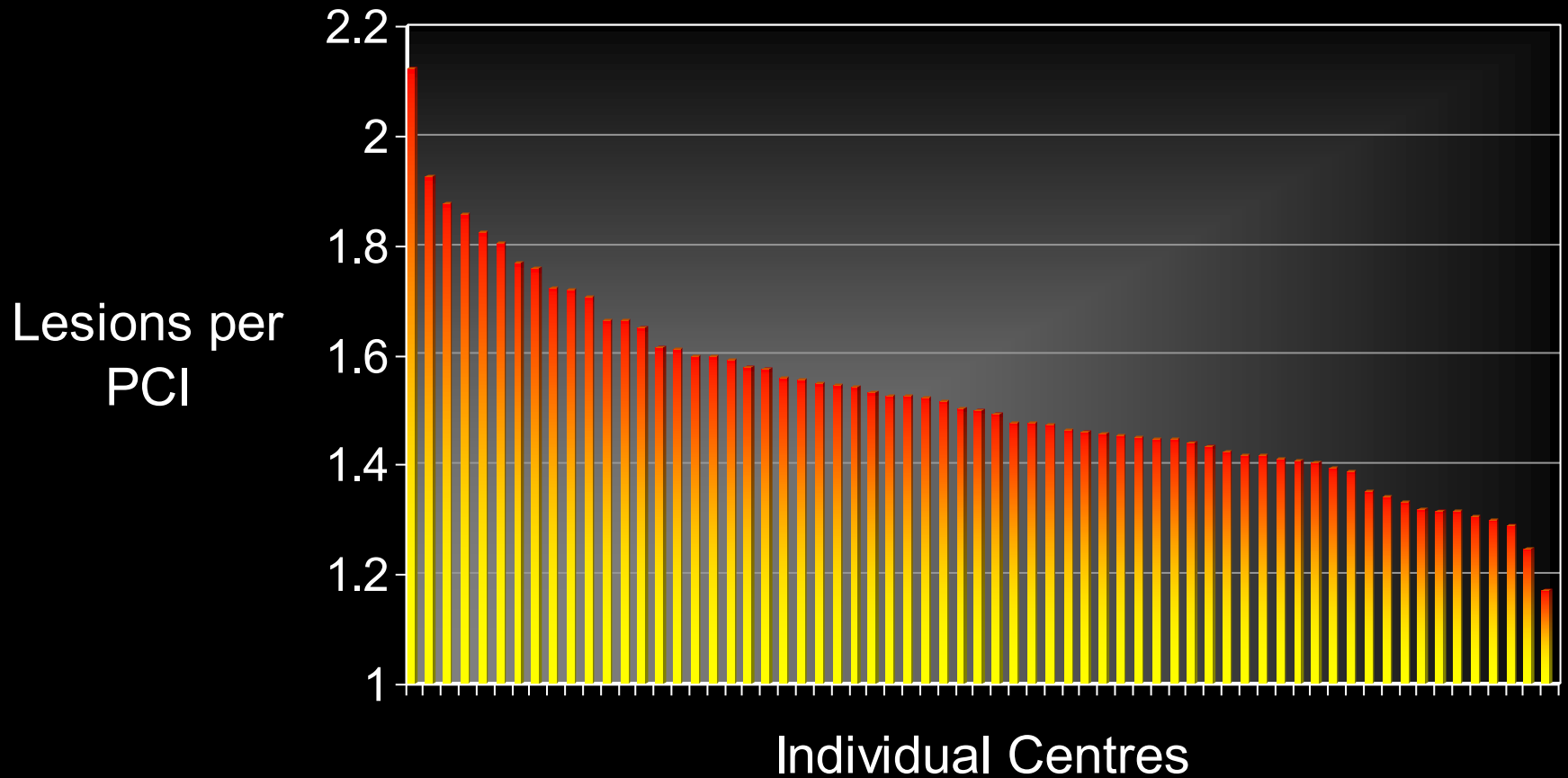


Multi-Lesion Treatment

By centre - 2006



2006 data: Ludman



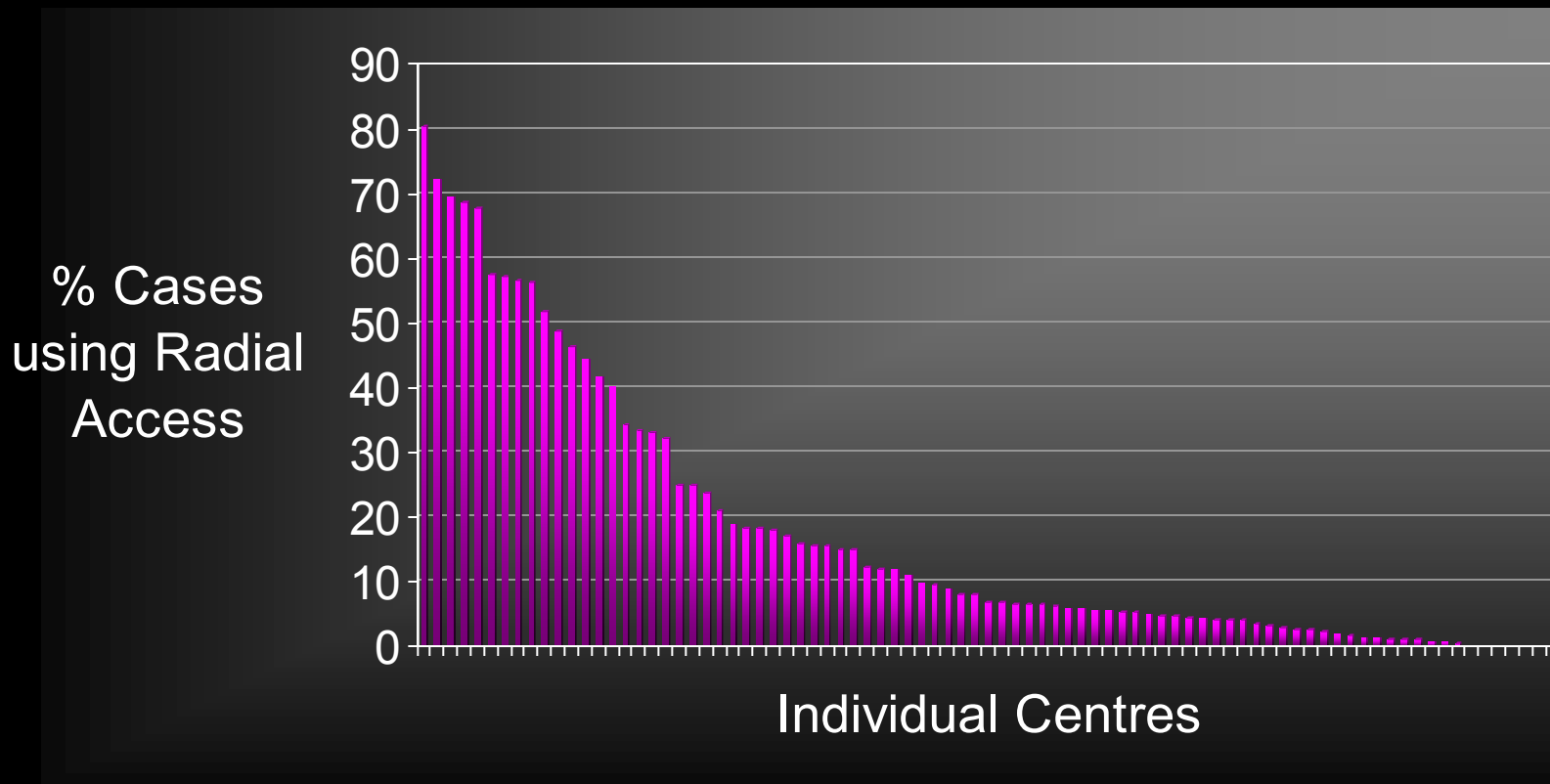
Access

Radial Artery Access

Data from 85 of 91 Centres



2006 data: Ludman



Day Case PCI

(2006 Data from 81 of 91 centres)



2006 data: Ludman

