

# Audit of Angioplasty Procedures 2009



This fourth report for the National Audit of Angioplasty Procedures presents key findings and recommendations from the audit. The audit provides a mechanism to collect procedure-specific data based on the current minimum British Cardiovascular Interventional Society dataset. The main objective of this audit is to improve the care of patients who undergo Percutaneous Coronary Intervention (PCI) procedures in the UK. In addition it allows clinicians to assess key aspects of the quality of their care when performing these procedures. This audit project is being delivered in collaboration with the British Cardiovascular Interventional Society. This is a United Kingdom wide audit performed by the Audit Lead of the British Cardiovascular Intervention Society (BCIS) with participation from hospitals performing PCI procedures. The data included in the report was submitted between January 2008 and December 2008. Aimed at healthcare professionals, medical directors, managers and clinical governance leads the report describes progress to date, key clinical findings and patient outcomes.

Electronic copies of this report can be found at [www.ic.nhs.uk](http://www.ic.nhs.uk). For further information about this report please contact The NHS Information Centre for health and social care 0845 300 6016 or email: [enquiries@ic.nhs.uk](mailto:enquiries@ic.nhs.uk) quoting document reference IC17020110

Prepared in partnership with:



**The British Cardiovascular Intervention Society (BCIS)** BCIS is an affiliated group of the BCS and has charitable status. The Charity's objects are the advancement of education for the benefit of the public by research into coronary angioplasty, cardiac valvuloplasty and other interventional cardiovascular procedures and the dissemination of the useful results of such research.



**The Healthcare Quality Improvement Partnership (HQIP)** promotes quality in healthcare. HQIP holds commissioning and funding responsibility for the National Angioplasty Procedures Audit and other national clinical audits.



**The NHS Information Centre for Health and Social Care (The NHS IC)** is England's central, authoritative source of essential data and statistical information for frontline decision makers in health and social care. The NHS IC managed the publication of the 2009 annual report.

# Audit of Angioplasty Procedures 2009

The 2009 report of the National Audit of Percutaneous Coronary Intervention in the United Kingdom. For the audit period between January 2008 and December 2008.

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## Foreword

Percutaneous coronary intervention (PCI) activity continues to grow in the UK but the rate of growth is slowing. The reduction in growth rate is perhaps surprising at a time when we are undergoing a transition from the use of thrombolytic agents (clot-busting drugs) to primary PCI (PPCI) as the main form of reperfusion therapy for patients presenting with acute ST elevation myocardial infarction (STEMI). We have previously recognised the underprovision of PCI in Wales, and it is perhaps gratifying that its rate of growth is faster than elsewhere in the UK, so the gap is narrowing.

We have used the BCIS audit programme to look successfully at issues to do with structure and process as well as appropriateness and outcomes, but hitherto our analyses have been somewhat crude. We have not yet been able to provide one of the ultimate markers of quality, that is the provision of a risk-adjusted mortality model for PCI but we are currently working on that. However, we have been able to develop a risk-adjusted model for in-hospital major adverse cardiovascular and cerebro-vascular events (MACCE). Moreover, for the first time, we have used statistical process control plots to report such outcomes for individual hospitals and compare them to the expected results given the case mix reported. This is a major step for a national quality-control agenda. Peter Ludman and the staff at CCAD (especially Andrew Donald) are to be congratulated for setting up the process whereby we can now automatically produce these plots and send them to the individual hospitals. We can also provide “funnel plots” summarising the activity of all units, and an example of such a plot is provided in this report.

It is essential in such a model that each hospital provides us with information about all the relevant complications, and we have been gratified to see a major improvement in data collection over recent years. Some units seem to out-perform the model we use, but we believe that the most likely explanation for this in some hospitals is an under-reporting of events and we urge all units to conform to the demands of the national data collection exercise. Trusts should provide the audit infrastructure needed for this exercise. Developing a mortality model where we can get the essential information from ONS is an important next step.

We are looking at other markers of quality of PCI programmes. For those units providing PPCI for patients with STEMI, we can look at door-to-balloon and call-to-balloon times looking at the speed with which emergency services are provided. These times have been shown to relate to outcomes, and so the faster the better. The early figures are gratifying and suggest that units have learned the lessons of those who have led the way in designing systems of care that can provide an optimal service. Although there is a good start, we need to do better and we will be using the national audit programme to help us drive up the standards. This will improve outcomes for patients. We are working closely with MINAP on these and other quality markers.

What has been achieved this year is very exciting. For the first time, we can now generate reports and feed back to the participating centres in the way that was always envisaged when CCAD was first set up. This is a lasting testament to those who saw what we could achieve and who have worked over many years to create and fund this process.



**Mark de Belder**  
President, British Cardiovascular Society

A handwritten signature in black ink that reads "Mark de Belder". The signature is written in a cursive style and is followed by a long, horizontal flourish line that extends to the right.

# Acknowledgements

The National Percutaneous Coronary Intervention Audit has been developed and run by the British Cardiovascular Intervention Society (BCIS) since 1988 and more recently has received support from The Information Centre for health and social care (The IC) and the Healthcare Quality Improvement Partnership (HQIP). The analysis on which this report is based was undertaken by the BCIS Audit Lead, Dr Peter Ludman author of the National Coronary Angioplasty Audit.

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We would like to acknowledge the important contribution of NHS Trusts and the individual clinicians, nurses and audit teams who are participating in the audit.

## Executive Summary

Coronary heart disease accounts for about one in five deaths in men and one in six deaths in women. In addition, the British Heart Foundation estimate that there are over 1 million men living in the UK who have or have had angina (heart-related chest pain), and over 840,000 women.

Percutaneous coronary intervention (PCI) is a rapidly evolving technique used to treat patients whose coronary arteries – which supply the heart with blood – are narrowed or blocked. The procedure works by mechanically improving blood flow to the heart. First, the doctor uses x-ray images of the heart arteries to make the position and shape of any narrowing or blockages visible (a 'coronary angiogram'). If the clinical circumstances and the angiogram findings suggest that something needs to be done to physically modify the blood flow to the heart, then the majority of patients are treated by PCI. A small balloon is inserted which, when inflated, squashes the fatty tissue out of the way and widens the artery. In most cases a 'stent' is then implanted – a metal mesh that stays permanently in place to keep the artery wall open. Treatment thus aims to prevent the arteries blocking (which might cause a heart attack) and improve flow to the heart muscle to alleviate the symptoms of angina.

The audit described here allows clinicians to assess key aspects of the patterns and quality of their care when performing coronary angiogram and PCI. This is a United Kingdom wide audit performed by the Audit Lead of the British Cardiovascular Intervention Society (BCIS). This audit is enhanced by the Central Cardiac Audit Database (CCAD) which allows electronic transfer of much more detailed information. This data collection and analysis for centres in England and Wales has project management and specialist IT support provided by the National Clinical Audit Support Programme (NCASP), which is part of the NHS Information Centre for health and social care (The NHS IC).

## Key findings

- There are now 105 PCI centres in the United Kingdom
- The number of PCIs in the UK was 1,308 per million population (pmp). These numbers remain less than in most other developed European countries. The number of angiograms and PCI procedures are also less than that recommended by the British Cardiovascular Society (BCS), but both exceed the numbers expected by the National Service Framework (NSF) for Coronary Heart Disease.<sup>1</sup> For PCIs, the NSF target in 2000 was 750 pmp, and the BCS 2003 target was 1,400 pmp, with expectations that the level might need to be 2-3,000 pmp.
- There has been an increase in PCI activity in all the UK countries except N. Ireland. Wales has seen the greatest increase, but still has the poorest provision at 1143 pmp compared with the highest in Northern Ireland at 1626 pmp.
- For the past 3 years the rate of increase in overall number of PCI procedures performed remains at the lowest level since records began in 1992, at under 5%.
- Centre size: there is evidence that suggests improved outcomes for patients being treated in higher volume PCI centres, particularly those that perform at least 400 procedures pa. This forms part of the recommendations of the Joint Working Group on PCI of BCIS and the British Cardiovascular Society.<sup>2</sup> In 2008 25% of PCI units were performing 400 or less cases pa, but the majority of these were new units undertaking a gradually increasing volume of work.
- The National Institute for Health and Clinical Excellence (NICE) recommend that "Stents should be used routinely where PCI is the clinically appropriate procedure for patients with either stable or unstable angina or with acute myocardial infarction".<sup>3</sup> The great majority of procedures do now involve stent insertion (95 per cent), suggesting that this aspect of good practice is being met.
- Following concerns about the safety of drug eluting stents in September 2006, there was a fall in their use to 55 per cent across the UK. Data from 2008 suggest a gradual increase in their use now that safety issues are better understood. These levels still fall short of what might be expected from the National Institute for Health and Clinical Excellence (NICE) updated guidelines.<sup>4</sup> Research suggests that compliance with the NICE guidance would result in about 70 to 80 per cent of patients being treated with a drug eluting stent,<sup>5</sup> which is in keeping with the rates observed in this audit prior to the down turn induced by concerns about possible long term safety.
- The overall rate of death before discharge from hospital following PCI has gradually risen over the past few years. This is due to a change in case mix. There has been no evidence of a change in the outcomes when patients in similar clinical presentations are compared. For stable elective patients, in hospital mortality is less than 0.2%, for patients with unstable angina or NSTEMI, the in hospital mortality is less than 1 per cent. For patients with STEMI the mortality is higher at about 5 per cent.
- Analysis of risk adjusted outcome (major adverse cardiac and cerebrovascular events) from the 2007 and 2008 data combined shows that all units in the United Kingdom are performing as well or better than would be predicted from the model used for risk adjustment.
- National and International guidelines recommend that in the emergency treatment of patients with ST elevation MI, angioplasty treatment should be performed within 90 minutes of arrival of the patient at the angioplasty site (DTB time), and within 150 minutes of a patient's call for help (CTB time). The data for units performing PPCI as a default treatment for STEMI are presented as funnel plots. A DTB < 90 min was achieved in 81.3% and CTB < 150 min in 78.8% of cases. This compares very favourably with international statistics.
- There has been a further improvement in the number of centres sending data to CCAD for electronic collection and analysis, and a marked improvement in the quality of data submitted.

The rest of this report contains more details and graphs of the audit findings. The complete set of data from the 2008 audit was presented at the British Cardiovascular Intervention Society's annual meeting (BCIS) in autumn 2009 and is available for download at the society's web site [www.bcis.org.uk](http://www.bcis.org.uk).

# Data completeness

All NHS PCI centres in England and Wales submitted 2008 data to CCAD, with the exception of one of the new centres (QE hospital, Woolwich), and one that started activity part of the way through 2008. All of the Scottish NHS centres submitted data, one of the 3 centres in Northern Ireland, and five of 16 private hospitals in England also submitted data via CCAD.

There has been a further improvement in the completeness of the fields for each of the procedures entered into CCAD for the 2008 data. The actual percentage completeness for hospitals in England and Wales is listed in [Table 1](#) below:

## Key for Table 1

- ▲ Completeness less than 50%
- Completeness 50-90%
- Completeness exceeds 90%
- ◆ No data submitted

**Table 1**  
Data completeness

Hospital	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
FRM. Frimley Park Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●
WRC. Worcestershire Royal Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●
BHL. Liverpool Heart and Chest Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	99.7 ●
CGH. Conquest Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	99.6 ●
DGE. Eastbourne DGH	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	99.6 ●
BHR. Royal Berkshire and Battle Hospital	100 ●	99.7 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	99.5 ●
NHH. North Hampshire Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	99.2 ●
SCM. James Cook University Hospital	100 ●	100 ●	99.6 ●	100 ●	100 ●	100 ●	100 ●	99.9 ●	100 ●	100 ●	100 ●	99.6 ●
SUN. Sunderland Royal Hospital	100 ●	100 ●	99.7 ●	100 ●	100 ●	100 ●	100 ●	100 ●	99.2 ●	99.5 ●	100 ●	100 ●
TOR. Torbay Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	99.4 ●	100 ●	100 ●	100 ●	100 ●	100 ●	98.7 ●
SPH. St Peter's Hospital	100 ●	99.6 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	98.5 ●
WYT. Wythenshawe Hospital	100 ●	100 ●	100 ●	99.6 ●	100 ●	99.8 ●	99.8 ●	99 ●	100 ●	100 ●	100 ●	99.9 ●
RCH. Royal Cornwall Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	98.7 ●	99.5 ●	100 ●	99.9 ●	100 ●	99.2 ●
SAN. Sandwell District General Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	98.2 ●	99.1 ●	100 ●	100 ●	100 ●	100 ●	99.5 ●
NOR. Norfolk & Norwich Hospital	100 ●	100 ●	98.4 ●	100 ●	100 ●	100 ●	100 ●	98.7 ●	100 ●	100 ●	100 ●	99.7 ●
RFH. Royal Free Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	98.8 ●	100 ●	100 ●	100 ●	100 ●	100 ●	97.5 ●
MRI. Manchester Royal Infirmary	100 ●	100 ●	100 ●	100 ●	100 ●	99.8 ●	99.8 ●	97.6 ●	99.9 ●	100 ●	99.7 ●	98.8 ●
CHG. Cheltenham General Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	96.8 ●	99.1 ●	99.6 ●	100 ●	100 ●	100 ●	100 ●
HH. Harefield Hospital	100 ●	100 ●	99.8 ●	99.7 ●	100 ●	100 ●	99.1 ●	99.7 ●	100 ●	100 ●	99.7 ●	97.1 ●
CHH. Castle Hill Hospital	100 ●	100 ●	96.7 ●	100 ●	100 ●	100 ●	100 ●	100 ●	99.5 ●	99.7 ●	99.5 ●	99.6 ●
QAP. Queen Alexandra Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	96.5 ●	99.9 ●	100 ●	99.4 ●	99.4 ●	100 ●	99.4 ●
KGH. Kettering General Hospital	100 ●	100 ●	99.6 ●	96.2 ●	100 ●	100 ●	99.2 ●	99.6 ●	100 ●	100 ●	100 ●	99.2 ●
SGH. Southampton General Hospital	100 ●	99.9 ●	95.3 ●	100 ●	100 ●	99.6 ●	99.7 ●	99.7 ●	100 ●	100 ●	99.8 ●	99.5 ●
BRI. Bristol Royal Infirmary	100 ●	100 ●	97.2 ●	99.3 ●	100 ●	99.8 ●	98.3 ●	99.3 ●	100 ●	99.9 ●	100 ●	99.4 ●
MOR. Morriston Hospital	100 ●	100 ●	99.9 ●	98.1 ●	100 ●	99.2 ●	100 ●	99.4 ●	100 ●	98.1 ●	98.9 ●	99.5 ●
GRL. Glenfield Hospital	100 ●	100 ●	99.5 ●	100 ●	100 ●	100 ●	94 ●	99.3 ●	100 ●	100 ●	99.9 ●	99.5 ●
DUD. City Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	94.1 ●	98.5 ●	100 ●	100 ●	100 ●	99.7 ●	98.5 ●
NGS. Northern General Hospital	99.9 ●	100 ●	94.9 ●	99.5 ●	100 ●	100 ●	98.7 ●	98.9 ●	99.9 ●	99.9 ●	99.5 ●	99.2 ●
DER. Derby Royal Infirmary	100 ●	100 ●	98.9 ●	100 ●	100 ●	100 ●	98.4 ●	99.5 ●	94.5 ●	100 ●	99.4 ●	99.5 ●
HHW. Wellington Hospital	100 ●	100 ●	91.7 ●	100 ●	100 ●	100 ●	99 ●	99.2 ●	100 ●	100 ●	100 ●	99.7 ●

Table 1 (continued)

## Data completeness

Hospital	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
QEB. Queen Elizabeth Hospital Edgbaston	99.9 ●	99.9 ●	99.9 ●	100 ●	100 ●	98.1 ●	99.5 ●	99.8 ●	99.9 ●	99.9 ●	96.8 ●	94.8 ●
WRG. Worthing Hospital	100 ●	100 ●	99.7 ●	100 ●	100 ●	100 ●	97.8 ●	99.2 ●	97.8 ●	97.8 ●	100 ●	95.1 ●
BHH. Rochdale Infirmary	100 ●	100 ●	91.8 ●	97.4 ●	100 ●	99.8 ●	98.4 ●	99.7 ●	100 ●	100 ●	100 ●	99.7 ●
FRY. Frenchay Hospital	100 ●	99.6 ●	97.9 ●	100 ●	100 ●	100 ●	99.2 ●	97.1 ●	100 ●	100 ●	100 ●	92.9 ●
WAL. Walsgrave Hospital	100 ●	100 ●	96 ●	99.5 ●	100 ●	99.6 ●	96.8 ●	98.7 ●	99.6 ●	99.3 ●	98.7 ●	97.6 ●
GEO. St George's Hospital	100 ●	99.9 ●	99.1 ●	99.2 ●	100 ●	100 ●	99.1 ●	99.2 ●	99.9 ●	99.9 ●	100 ●	87.6 ■
STO. North Staffordshire Hospital	99.4 ●	98.5 ●	98.4 ●	100 ●	100 ●	97.5 ●	94.2 ●	97.9 ●	99.8 ●	99.5 ●	99 ●	99.7 ●
KCH. King's College Hospital	100 ●	99.9 ●	98.5 ●	100 ●	100 ●	96.2 ●	97.8 ●	99.1 ●	97.5 ●	99.2 ●	99.9 ●	95.5 ●
FRE. Freeman Hospital	100 ●	100 ●	97 ●	99.6 ●	100 ●	96.8 ●	96.4 ●	98 ●	100 ●	100 ●	96.2 ●	99.6 ●
NHB. Royal Brompton Hospital	100 ●	99.9 ●	99.2 ●	100 ●	100 ●	99.9 ●	99.6 ●	99.7 ●	99.3 ●	99.5 ●	99.9 ●	85.8 ■
UCL. University College Hospital	100 ●	100 ●	99.9 ●	100 ●	100 ●	100 ●	94.8 ●	93.2 ●	97.4 ●	99.4 ●	100 ●	97.9 ●
WHH. William Harvey Hospital	100 ●	100 ●	94.6 ●	100 ●	100 ●	98.7 ●	94.6 ●	95.3 ●	100 ●	100 ●	99.3 ●	98.7 ●
VIC. Victoria Hospital	100 ●	99.7 ●	95.3 ●	97.2 ●	100 ●	97.9 ●	97.1 ●	97.3 ●	98.6 ●	99.8 ●	99.1 ●	97.5 ●
PMS. The Great Western Hospital	100 ●	100 ●	96.4 ●	99.5 ●	97.9 ●	100 ●	95.4 ●	97.4 ●	98 ●	98 ●	97.6 ●	99 ●
UHW. University Hospital of Wales	100 ●	100 ●	98.5 ●	98.6 ●	100 ●	99.9 ●	99.2 ●	99.4 ●	92.4 ●	98.9 ●	98.7 ●	93.6 ●
BOU. Royal Bournemouth General Hospital	100 ●	100 ●	91.8 ●	100 ●	100 ●	100 ●	98 ●	97.6 ●	91.2 ●	100 ●	100 ●	99.8 ●
PAP. Papworth Hospital	100 ●	100 ●	91.4 ●	99 ●	99.8 ●	100 ●	95.8 ●	99.7 ●	98.6 ●	100 ●	99.7 ●	94 ●
RSC. Royal Sussex County Hospital	100 ●	100 ●	92.1 ●	100 ●	100 ●	98.8 ●	99.7 ●	99.8 ●	99.9 ●	99.8 ●	90.9 ●	96.2 ●
STH. St Thomas' Hospital	100 ●	99.9 ●	96.9 ●	100 ●	100 ●	100 ●	92.5 ●	93.7 ●	100 ●	100 ●	100 ●	93.7 ●
NCR. New Cross Hospital	100 ●	99.9 ●	96.6 ●	98.9 ●	100 ●	100 ●	97.4 ●	98.6 ●	95.7 ●	97 ●	95.4 ●	96.8 ●
HRI. Hull Royal Infirmary	100 ●	100 ●	95 ●	100 ●	100 ●	100 ●	99.1 ●	99.1 ●	99.1 ●	99.5 ●	99.1 ●	84.8 ■
MAY. Mayday University Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	96.9 ●	83.1 ■	93.2 ●	100 ●	100 ●	100 ●	96.7 ●
BRD. Bradford Royal Infirmary	100 ●	99.3 ●	97.8 ●	100 ●	100 ●	95.4 ●	93.3 ●	95.1 ●	98.9 ●	98.5 ●	91.6 ●	99.6 ●
EBH. Birmingham Heartlands Hospital	99.9 ●	99.1 ●	99.6 ●	100 ●	99.9 ●	92.9 ●	91.5 ●	96.9 ●	99.3 ●	99.1 ●	100 ●	90.4 ●
LIN. Lincoln County Hospital	100 ●	100 ●	100 ●	83.9 ■	96.6 ●	100 ●	95.5 ●	91 ●	100 ●	98.9 ●	100 ●	100 ●
CHN. Nottingham City Hospital	99.9 ●	99.7 ●	70.4 ■	100 ●	100 ●	100 ●	100 ●	100 ●	97.1 ●	97.1 ●	100 ●	98.9 ●
LGI. Yorkshire Heart Centre	100 ●	99.8 ●	90.6 ●	100 ●	99.9 ●	99.4 ●	91.5 ●	94.8 ●	97.6 ●	99.5 ●	94.9 ●	94.4 ●
AEI. Royal Albert Edward Infirmary	98.9 ●	99.6 ●	94.7 ●	100 ●	100 ●	83.9 ■	92.4 ●	98.5 ●	99.6 ●	99.6 ●	94.6 ●	99.6 ●
RDE. Royal Devon & Exeter Hospital	100 ●	99.7 ●	95.1 ●	90.2 ●	99.9 ●	86.4 ■	98.1 ●	96.4 ●	99.6 ●	99.9 ●	95 ●	99.6 ●
DVH. Darent Valley Hospital	100 ●	98.1 ●	96.3 ●	100 ●	100 ●	100 ●	82.2 ■	78.5 ■	98.1 ●	98.1 ●	100 ●	98.1 ●
AMG. Wycombe General Hospital	100 ●	100 ●	63.6 ■	100 ●	100 ●	100 ●	99.1 ●	98 ●	94 ●	94 ●	100 ●	99.8 ●
RAD. John Radcliffe Hospital	100 ●	99.9 ●	100 ●	99.9 ●	100 ●	100 ●	78.9 ■	70.2 ■	100 ●	99.9 ●	100 ●	98.5 ●
WHC. Whipps Cross University Hospital	100 ●	99.4 ●	82.6 ■	100 ●	100 ●	100 ●	99.4 ●	75.4 ■	100 ●	100 ●	100 ●	86.8 ■
LIS. Lister Hospital	100 ●	100 ●	86.6 ■	98.6 ●	100 ●	99.7 ●	95.5 ●	91.4 ●	85.6 ■	90.7 ●	92.3 ●	100 ●
BAS. Basildon Hospital	100 ●	100 ●	84.1 ■	98.9 ●	99.9 ●	100 ●	97.2 ●	95.5 ●	72.2 ■	92.5 ●	100 ●	93.6 ●
BAL. Barts and the London	100 ●	99.9 ●	93.7 ●	97.1 ●	99.9 ●	99.3 ●	90.7 ●	98 ●	93.7 ●	92.8 ●	91.4 ●	76.1 ■
WEX. Wexham Park Hospital	100 ●	100 ●	87.4 ■	100 ●	99.5 ●	91.7 ●	80.4 ■	74.7 ■	91.2 ●	97.7 ●	100 ●	98.4 ●
WDH. Dorset County Hospital	100 ●	100 ●	78.6 ■	100 ●	100 ●	68.1 ■	97.4 ●	98.5 ●	98.2 ●	99.1 ●	70.7 ■	97.8 ●
MPH. Taunton & Somerset	100 ●	100 ●	96.2 ●	100 ●	100 ●	96.2 ●	100 ●	100 ●	57.7 ■	57.7 ■	96.2 ●	100 ●
HSC. Harley Street Clinic	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	0 ▲

Table 1 (continued)  
Data completeness

Hospital	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
LBH. London Bridge Hospital	100 ●	100 ●	100 ●	100 ●	100 ●	100 ●	98.9 ●	100 ●	100 ●	100 ●	100 ●	38.4 ▲
NPH. Northwick Park Hospital	100 ●	100 ●	97.8 ●	99.6 ●	99.7 ●	97.9 ●	75.4 ■	74.4 ■	47.9 ▲	95.5 ●	99.7 ●	100 ●
HAM. Hammersmith Hospital	100 ●	99.9 ●	100 ●	62.1 ■	100 ●	97.7 ●	65.2 ■	66.5 ■	100 ●	99.4 ●	100 ●	82.5 ■
ANT. St Anthony's Hospital	100 ●	100 ●	75.4 ■	0 ▲	100 ●	100 ●	91.3 ●	97.1 ●	99.3 ●	99.3 ●	99.3 ●	89.9 ■
ESU. East Surrey Hospital	100 ●	99.1 ●	100 ●	57.3 ■	95.7 ●	100 ●	44.4 ▲	63.2 ■	100 ●	98.3 ●	100 ●	90.4 ●
PLY. Derriford Hospital	100 ●	100 ●	59.5 ■	98.8 ●	100 ●	99.4 ●	98.4 ●	98.9 ●	94.8 ●	94.4 ●	2.6 ▲	98.8 ●
HHH. Hemel Hempstead General Hospital	100 ●	99.1 ●	62.5 ■	100 ●	100 ●	65.7 ■	95.8 ●	100 ●	73.1 ■	73.6 ■	65.7 ■	99.1 ●
PHB. BMI Priory Hospital	100 ●	100 ●	55 ■	100 ●	100 ●	58.8 ■	100 ●	100 ●	97.5 ●	97.5 ●	58.8 ■	5 ▲
KSX. Kent & Sussex Hospital	100 ●	98.1 ●	86.5 ■	100 ●	100 ●	100 ●	100 ●	90.4 ●	1.9 ▲	3.8 ▲	100 ●	78.4 ■
BAT. Royal United Hospital Bath	100 ●	100 ●	36.4 ▲	100 ●	100 ●	100 ●	87.9 ■	75.1 ■	45.6 ▲	45.9 ▲	100 ●	59 ■
STM. St Mary's Hospital	100 ●	99.6 ●	76.1 ■	100 ●	100 ●	0 ▲	4.2 ▲	100 ●	8.5 ▲	100 ●	100 ●	57 ■
AHM. BMI Alexandra Hospital	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
BMI. BMI Meriden Hospital	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
CBS. BUPA Hospital Southampton	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
CRO. Cromwell Hospital	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
GWH. Queen Elizabeth Hospital, Woolwich	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
HBP. BUPA Hospital, Hull & East Riding	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
IND. London Independent Hospital	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
KMH. Kings Mill Hospital	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
LEB. BUPA Hospital Leeds	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
LNH. Leeds Nuffield Hospital	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
MHO. Manor Hospital	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
PHN. BMI Park Hospital	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
YKC. Capio Yorkshire Clinic	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆
CLW. Glan Clwyd DGH Trust	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆	- ◆

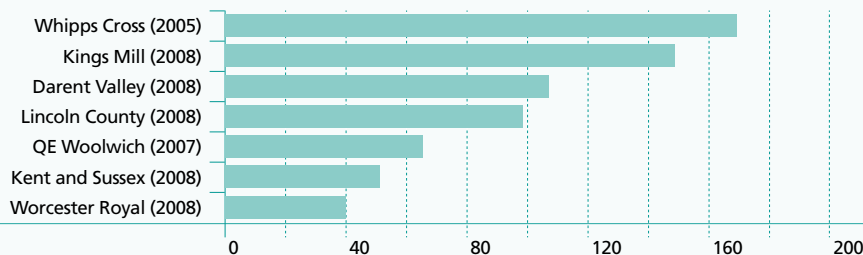
# Infrastructure

There was a further expansion in the number of sites performing percutaneous coronary intervention, and a fall in the number of sites performing angiography only. Thus in the United Kingdom there were a total of 105 PCI centres, and 81 angiography only centres in 2008. There are data from many countries that suggest improved outcomes for patients being treated in higher volume centres, particularly those that perform at least 400 procedures per annum. This recommendation therefore forms part of the report by the Joint Working Group on Percutaneous Coronary Intervention of the British Cardiovascular Intervention Society and the British Cardiovascular Society entitled 'Recommendations for good practice and training'.<sup>2</sup>

The majority of units perform considerably greater numbers than 400 pa. The 25% of units performing less than 400 pa are shown in figures 1 and 2 below. In the majority of cases this is because the unit is new, and undertaking a gradually increasing volume of work. The start date for the unit's PCI program can be seen in the figures.

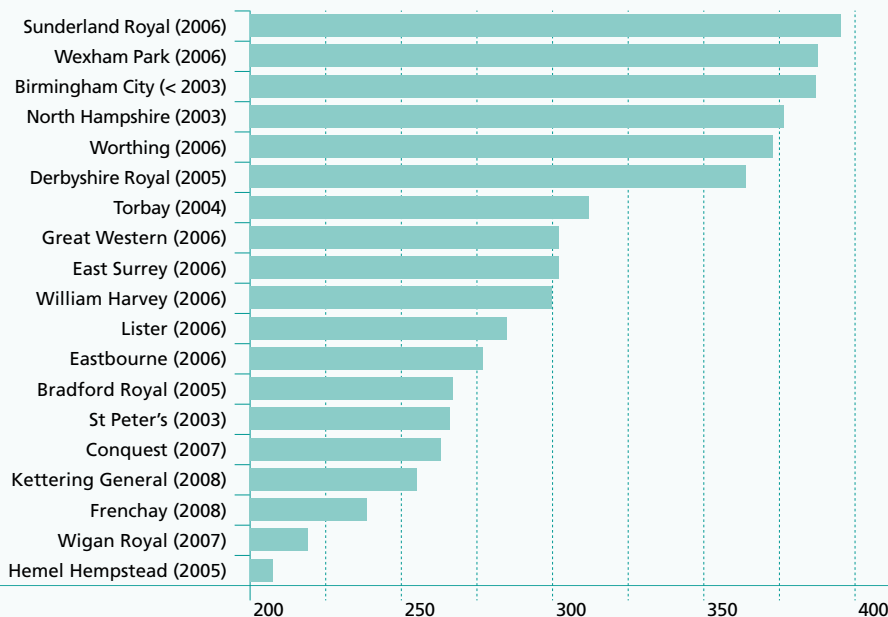
**Figure 1**  
Centres performing less than 200 PCI procedures in 2008, and the start year of the PCI program.

PCI program start date shown in brackets



**Figure 2**  
19 Centres performing 200 to 400 procedures

PCI program start date shown in brackets



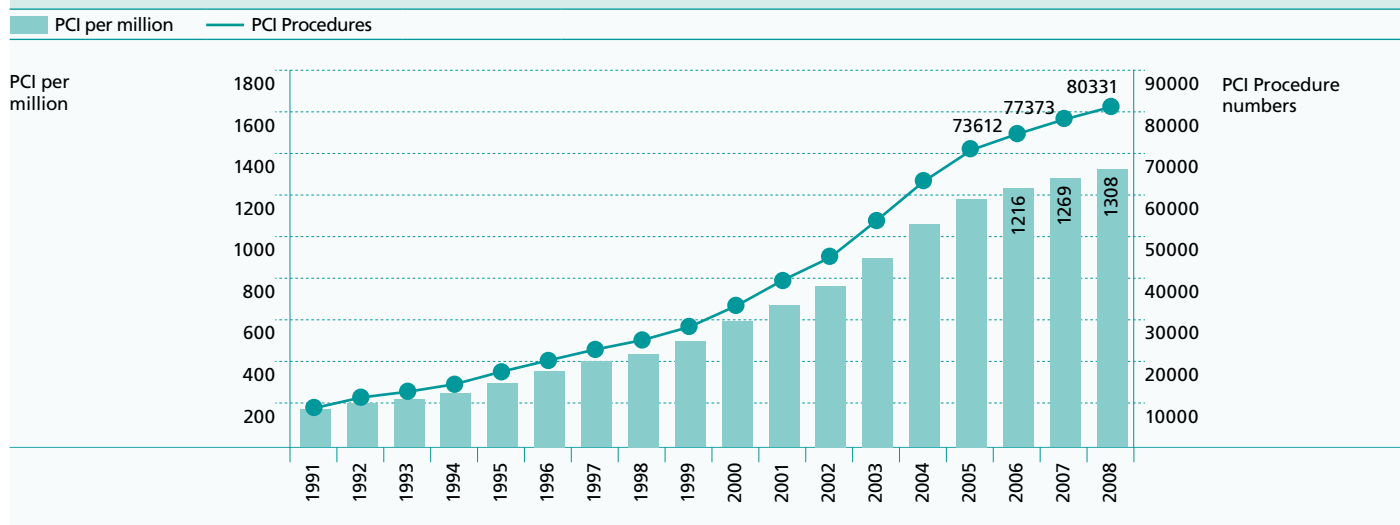
# PCI rates in the United Kingdom

There was a total of 80,331 PCIs performed in the calendar year 2008. This represents a rate of 1,308 PCI pmp.

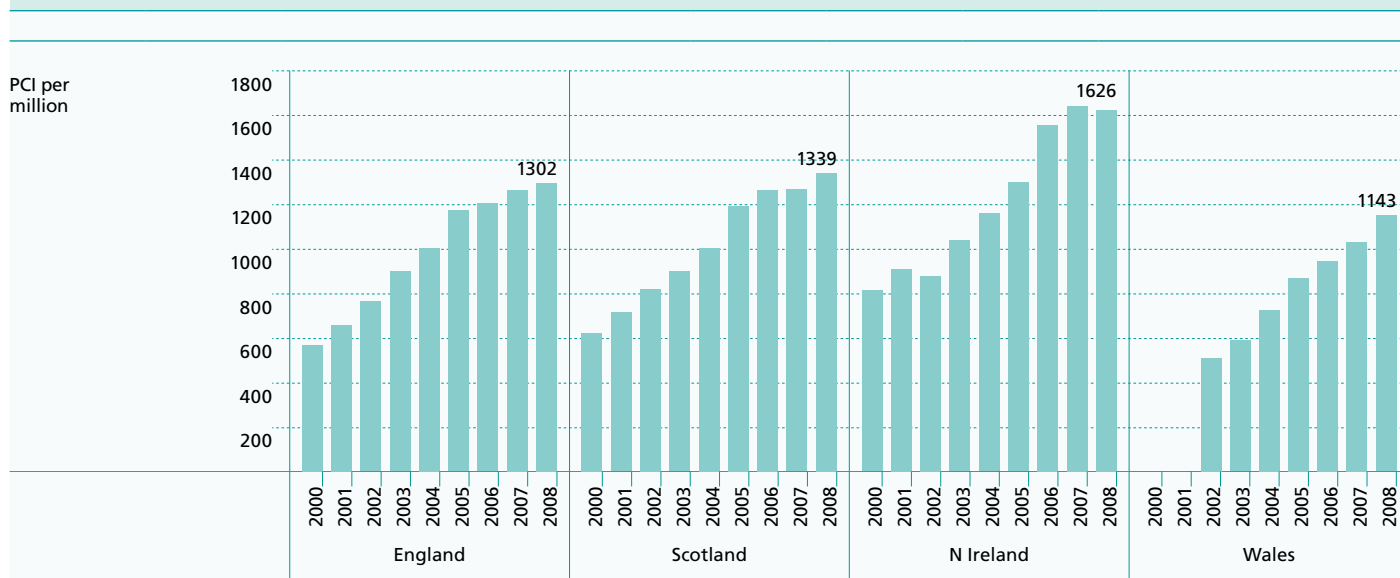
While the most appropriate rate of PCI pmp is difficult to judge, and will depend on many factors including the varying demographic profiles of populations in different countries, the UK has a lower rate than most of the rest of the developed European countries. The rate of increase in PCI in the UK over the last 3 years remains at its lowest level that at any time since records began in 1992, at under 5%.

There remain large differences in PCI rates between the UK countries, with the poorest provision in Wales at 1143 pmp compared with the highest in Northern Ireland at 1626 pmp. However the biggest increase in provision since 2007 has been in Wales (figure 4).

**Figure 3**  
Graph of absolute number of PCIs and rates pmp



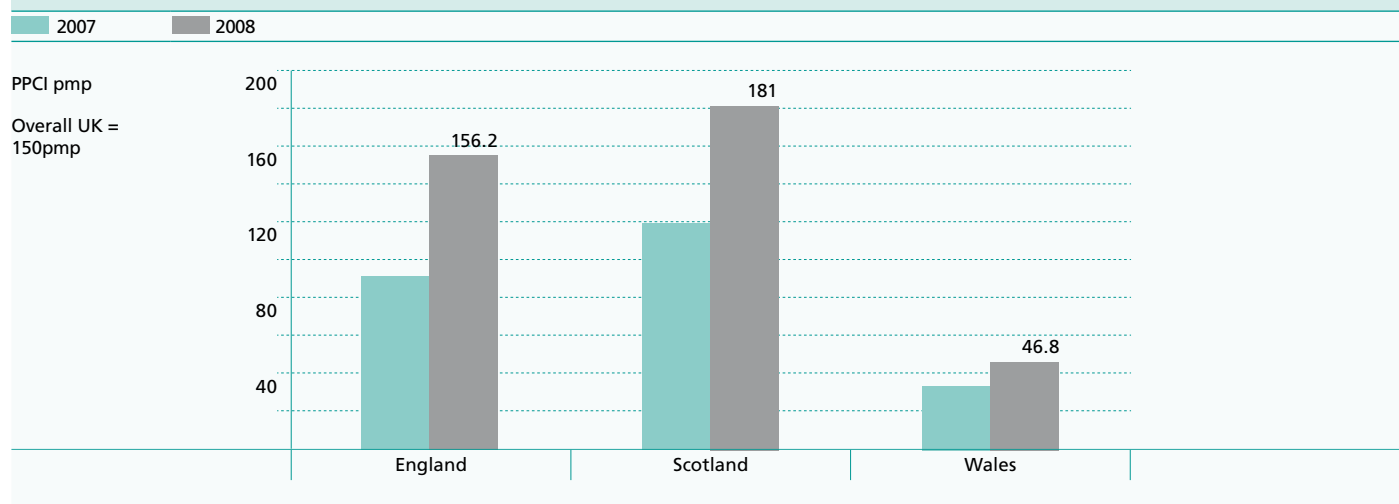
**Figure 4**  
PCI activity per million population in the UK countries.



There has been a big increase in the use of primary PCI in place of thrombolysis to treat patients presenting with ST elevation MI. As with overall PCI rates, there are differences in the provision of primary PCI between the UK countries, with Wales again having the lowest rates per million population (figure 5). The growth in the use of PPCI in the UK is extremely fast, and if all patients with STEMI were treated by PPCI we might expect a rate of approximately 500 to 700 pmp.

There has been a gradual increase in the percentage of patients treated with drug eluting stents now that initial concerns about long term safety have been better understood (figure 6).

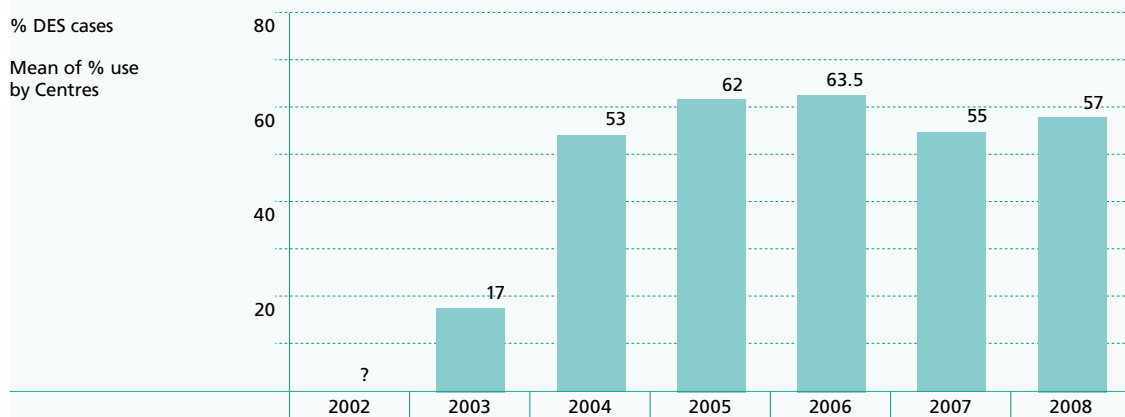
**Figure 5**  
Rates of Primary PCI activity for ST elevation MI, per million population in the UK countries



# Stents

The complications from PCI have fallen progressively as techniques have evolved. Nevertheless this has also meant that the procedure can be offered to patients who are considerably sicker, and in whom a higher risk of complications is expected. The rate of requirement for emergency CABG remains very low at less than 1%. The overall rate of death before discharge from hospital following PCI has, however, gradually increased over the past few years.

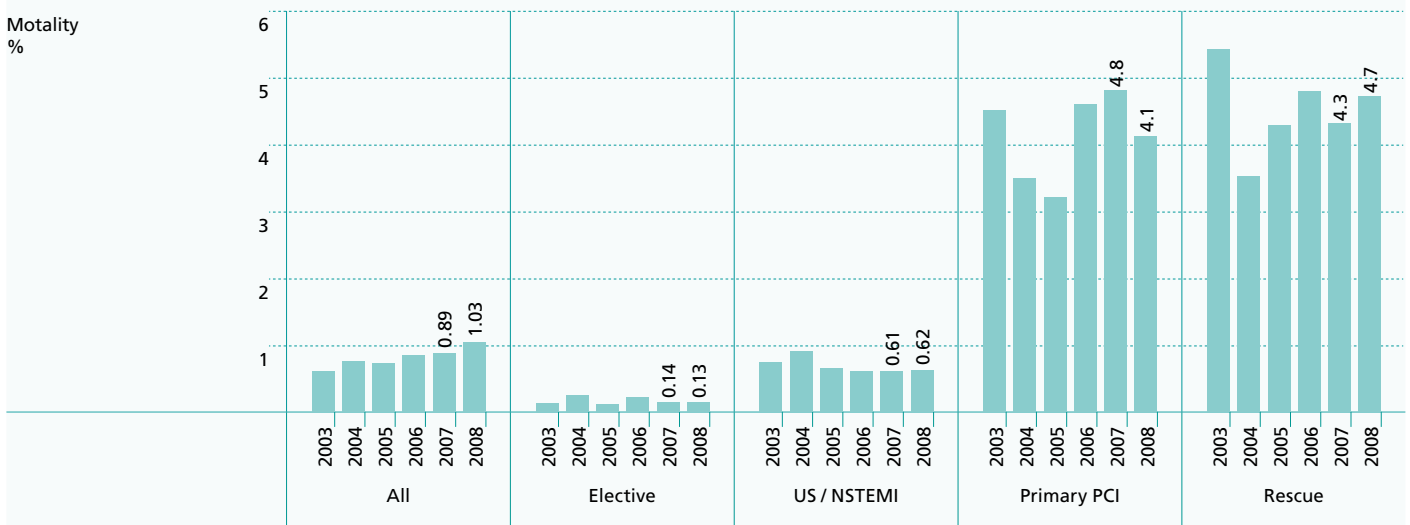
**Figure 6**  
**Drug eluting stent cases (NHS and private)**



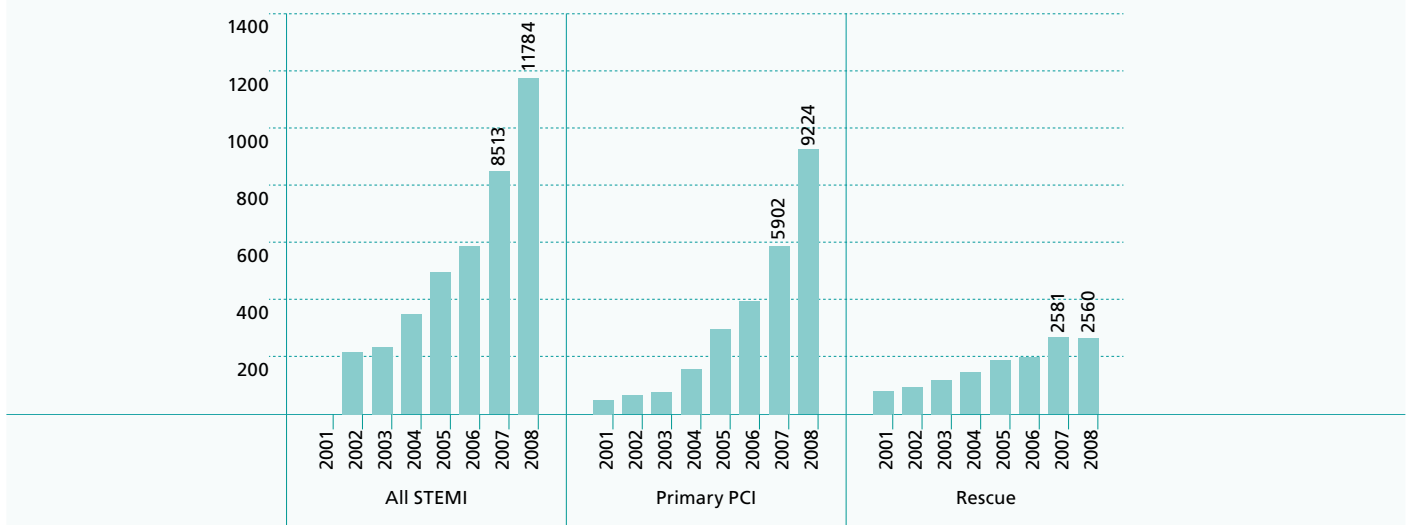
# Outcome

By looking at mortality for each of the major presenting syndromes it can be seen that the outcomes for each of these groups have remained stable (figure 7). Thus the increase in overall mortality is due to an increasing proportion of sicker patients being treated by PCI. This change in case mix is being driven by a big increase in the use of emergency PCI to treat ST elevation MI, primary PCI (figure 8).

**Figure 7**  
Outcome by syndrome



**Figure 8**  
Changing case mix



This analysis clearly demonstrates the importance of risk adjustment in the assessment of outcome to help avoid misleading conclusions. To assess the performance of all UK units PCI centres, we analysed their outcome data for a 2 year period (2007 and 2008 data combined). The North West Quality Improvement Program (NQWIP)<sup>6</sup> model was used to adjust for varied case mix. The results of this analysis are shown in figure 9, and demonstrate that no unit is performing less well than would be predicted by the model.

All models have limitations and these sort of results must be interpreted with caution. The results are not only dependant on the model, but also on the accuracy of data entry, both in recording a patient's risk factors, and to capture adverse outcomes. To try to avoid the problem of under reporting of adverse outcomes we plan to use a mortality only model, with the CCAD link to the Office of National Statistics to validate outcomes.

**Figure 9**  
Risk adjusted major adverse cardiac and cerebrovascular events (MACCE) for each UK unit with data in CCAD (2007 and 2008)



# Delays to treatment

In the treatment of STEMI by PCI, any delay in the performance of a PCI is associated with a worse outcome for the patient. There are 2 important procedural measures. The time taken from the patient's call for help to the start of PCI treatment (call-to-balloon time) measures the entire process of care, and the time taken from a patient's arrival at a PCI centre to the time of PCI treatment (door-to-balloon time) assesses how quickly the PCI unit can respond to the emergency. The percentage of cases treated within a target time are presented in figures 10 and 11.

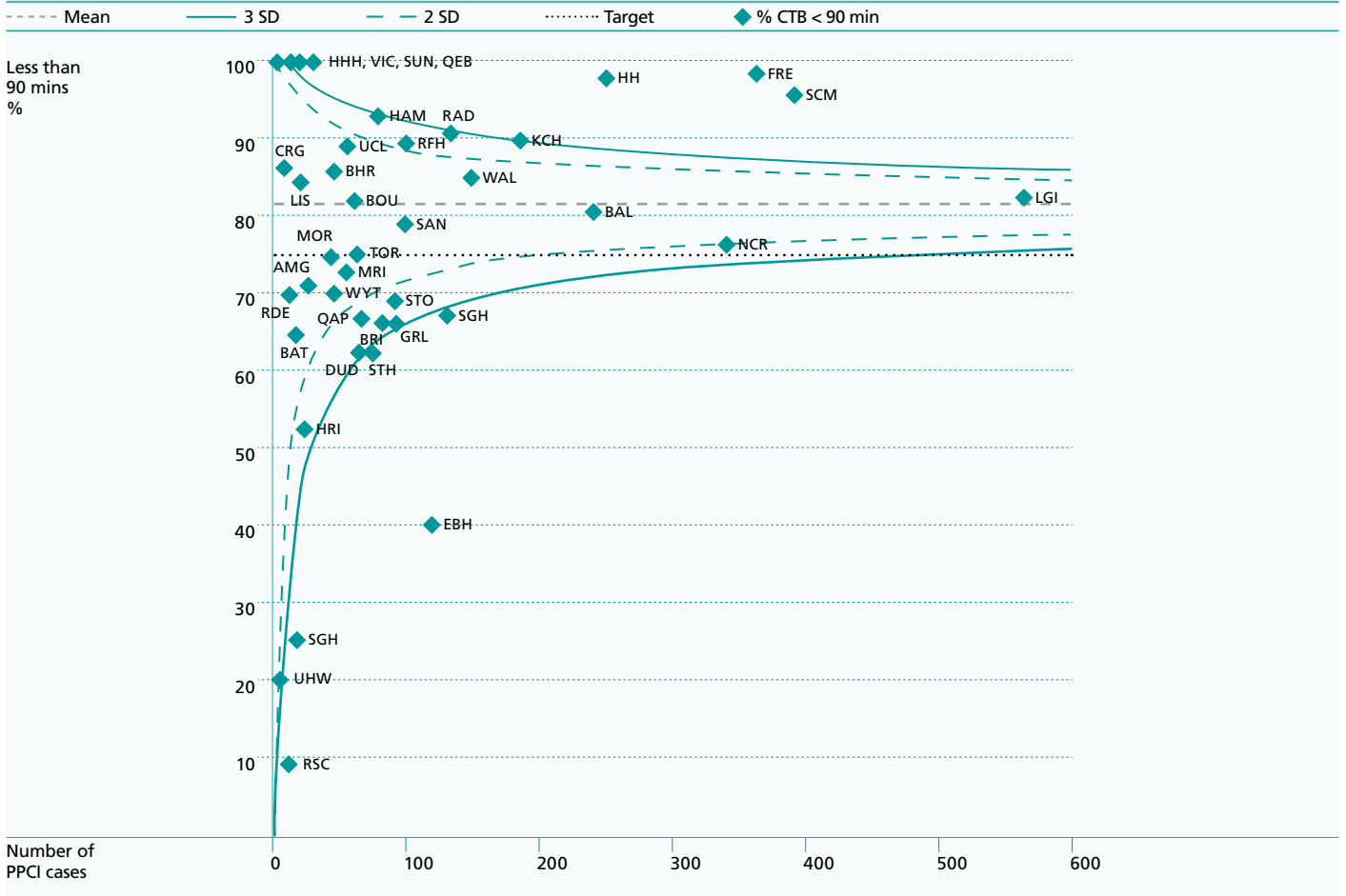
**Table 2**  
PCI unit codes for figure 10 and 11

AMG.	Wycombe General Hospital	HHH.	Hemel Hempstead General Hospital	RSC.	Royal Sussex County Hospital
BAL.	Barts and the London	HRI.	Hull Royal Infirmary	SAN.	Sandwell District General Hospital
BAT.	Royal United Hospital Bath	KCH.	King's College Hospital	SCM.	James Cook University Hospital
BHR.	Royal Berkshire Hospital	LGI.	Yorkshire Heart Centre	SGH.	Southampton General Hospital
BOU.	Royal Bournemouth Hospital	LIS.	Lister Hospital	STO.	University Hospital of North Staffordshire
BRI.	Bristol Royal Infirmary	MOR.	Morrison Hospital	STH.	St Thomas' Hospital
CRG.	Craigavon Area Hospital	MRI.	Manchester Royal Infirmary	SUN.	Sunderland Royal Hospital
DUD.	City Hospital	NCR.	New Cross Hospital	TOR.	Torbay Hospital
EBH.	Birmingham Heartlands Hospital	NHH.	North Hampshire Hospital	UCL.	University College Hospital
ERI.	Royal Infirmary of Edinburgh	QEB.	Queen Elizabeth Hospital, Edgbaston	UHW.	University Hospital of Wales
FRE.	Freeman	QAP.	Queen Alexandra Hospital	VIC.	Victoria Hospital, Blackpool
GRL.	Glenfield Hospital	RAD.	John Radcliffe Hospital	WAL.	Walsgrave Hospital
HAM.	Hammersmith Hospital	RDE.	Royal Devon & Exeter Hospital	WIG.	Glasgow Western Infirmary
HH.	Harefield Hospital	RFH.	Royal Free Hospital	WYT.	Wythenshawe Hospital

**Figure 10**  
Call to balloon time: percentage of patients treated within 150 minutes of calling for help (direct admissions only)



**Figure 11**  
**Door to balloon time: percentage of patients being treated within 90 minutes of arriving at a PCI centre (direct admissions only)**



## The future

Reports of speed of treatment of patients with STEMI are now being sent to each PCI centre monthly. Reports of risk adjusted outcomes for each unit will be sent in a similar way every 3 months. We plan to look at different risk adjustment models, including a mortality only model to allow ONS based validation of outcome.

Links with the MINAP audit will be strengthened so that data from both audits can be combined to enhance the completeness of the description and measurement of patient care.

# Appendices

# Glossary

A number of terms are essentially synonymous and used to describe the same procedure: thus a **coronary angioplasty** is also called a **percutaneous coronary intervention**, abbreviated to **PCI**.

**Coronary artery bypass surgery**, sometimes abbreviated to **bypass surgery** or **CABG**.

## Other abbreviations in alphabetical order:

### **BCIS**

British Cardiovascular Intervention Society

### **CCAD**

Central Cardiac Audit Database

### **DES**

Drug eluting stent

### **NHS IC**

NHS Information Centre for health and social care

### **MINAP**

Myocardial Ischaemia National Audit Project

### **NCASP**

National Clinical Audit Support Program

### **NSTEMI**

Non ST elevation myocardial infarction

### **STEMI**

ST elevation myocardial infarction

### **ONS**

Office for National Statistics

## References

1. Department of Health. National service framework for coronary heart disease: modern standards and service models. London: Department of Health, 2000.
2. Dawkins KD, Gershlick T, de Belder M et al. Percutaneous coronary intervention: recommendations for good practice and training. *Heart* 2005; 91 Suppl 6:vi1-27.
3. Ischaemic Heart Disease – Coronary Artery Stents. NICE Guidance 2003;TA 71.
4. Drug-eluting stents for the treatment of coronary artery disease. NICE Guidance 2008;TA 152.
5. Doshi SN, Ludman PF, Townend JN, Buller N. Estimated annual requirement for drug eluting stents in a large tertiary referral centre, according to new NICE criteria. *Heart* 2004; 90(Suppl II):A41.
6. Grayson AD, Moore RK, Jackson M et al. Multivariate prediction of major adverse cardiac events after 9914 percutaneous coronary interventions in the north west of England. *Heart* 2006; 92(5):658-663.

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