# NATIONAL AUDIT FOR PERCUTANEOUS CORONARY INTERVENTION

2019 SUMMARY REPORT
(2017/18 DATA)

NICOR

BCIS

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# INTRODUCTION

Overall, there were 118 PCI centres in the UK that performed a total of 102,258 PCI procedures in 2017/18. This equates to a rate of 1,548 per million population, and is a 1.2% increase on the previous year. 58 centres offer primary PCI for the emergency treatment of STEMI, 24/7 every day of the year, and a further 10 link to form a hybrid service. The proportion of cases performed for any acute coronary syndrome is stable at about 67%, of which 27% are for the emergency treatment of STEMI by primary PCI. There has been a small fall in the proportion of PCIs performed for stent thrombosis (2.9% in 2014 down to 1.8% for the last 2 years). There has been a slight increase (to 1.8%) in the proportion undergoing PCI in the context of out of hospital cardiac arrest with the requirement for pre-procedural ventilation.

For the full benchmarking audit report of PCI procedures performed in the UK in the year April 2017 to March 2018, with additional analyses funded by the British Cardiovascular Intervention Society, please see the BCIS web site.

For individual PCI operator reports, including assessment of risk-adjusted 30-day survival please see the public section of the BCIS web site.

This NCAP report, however, is focused on a few specific metrics, which are described below. In previous years, data have been reported for the calendar year but this and future reports provide data for the 2017/18 financial year.

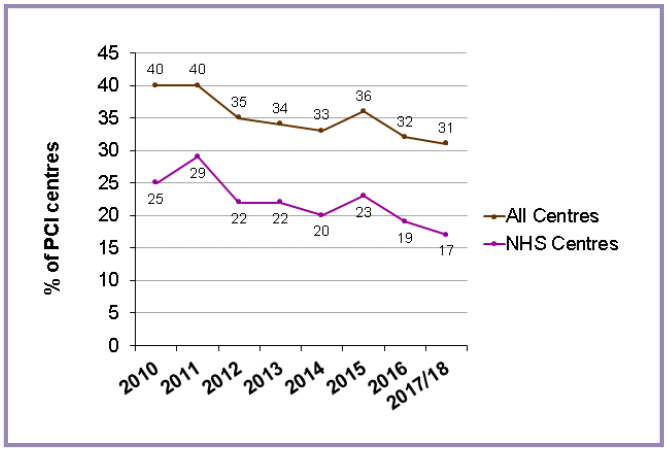
# 1. NUMBER OF CASES PER HOSPITAL

The treatment of patients needing PCI is complex as it requires the interaction of a number of different team members to optimise care. It is therefore important that these teams are performing enough procedures for them to remain familiar with all the processes involved. While there is no clear cut off below which a hospital will be too inexperienced to provide optimal care, current recommendations from the British Cardiovascular Intervention Society (BCIS) are that centres should perform more than 400 cases a year. There has been a progressive trend to reducing the number of lower volume centres and the percentage of PCI centres performing less than 400 cases in a year has fallen again, from 32% to 31% (all centres), 19% to 17% (NHS centres) (see Figures 1-3).

19 centres have performed less than 200 cases on 3 successive years, of which Ealing was the only NHS centre (Figure 4).

Thus, there remain a number of relatively low volume centres, though this has reduced slightly. It should be noted that observational research into the relationship between patient survival outcomes and centre volume in the UK has not found that lower volume centres were putting patients at risk.[1,2]

**Figure 1:** *Number of PCIs per centre: Trend in % of centres doing <400 procedures per year 2010 – 2017/18*




*[Note: Data for 2010-2016 are for calendar years but data for 2017/18 are for the financial year. This applies to all slides with data on temporal trends.]*

**Figure 2:** *NHS centres performing <400 procedures during 2017/18*

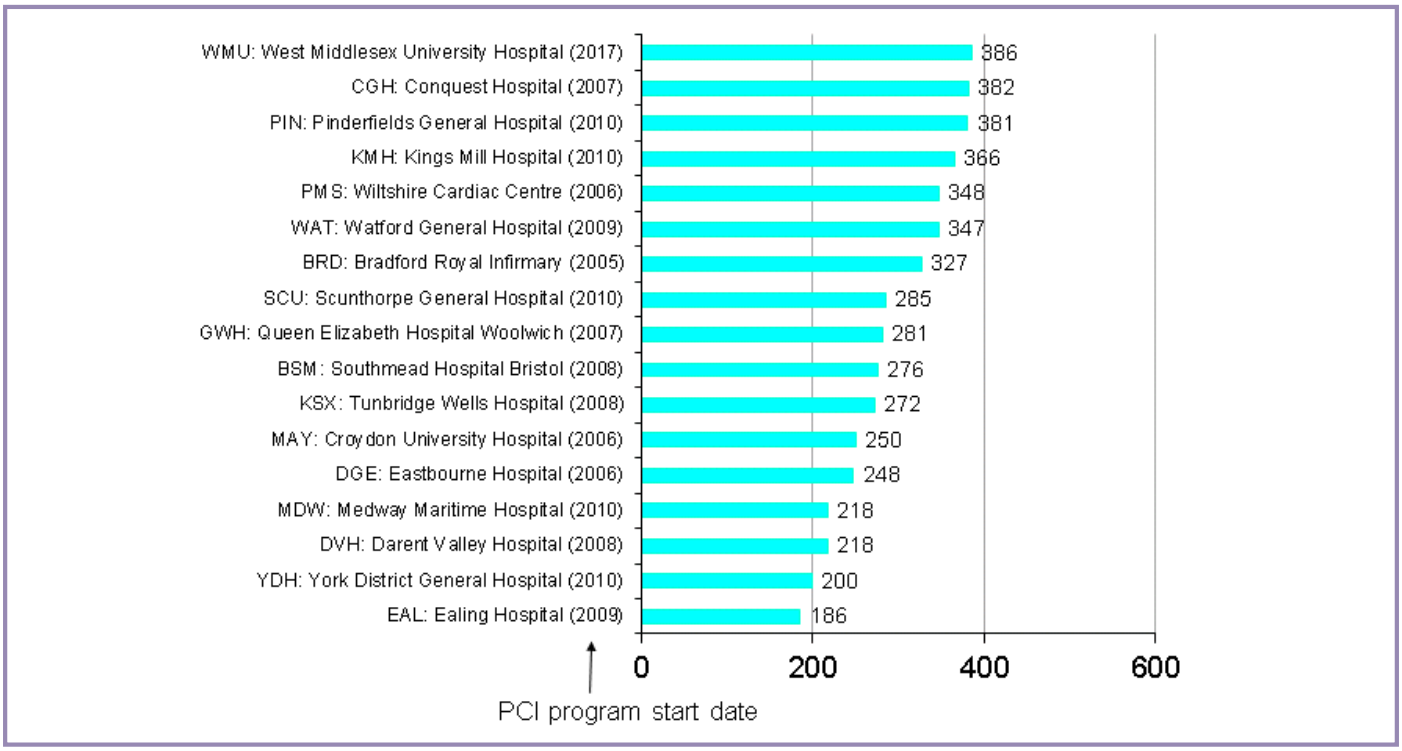



**Figure 3:** *Private centres performing <400 procedures during 2017/18*

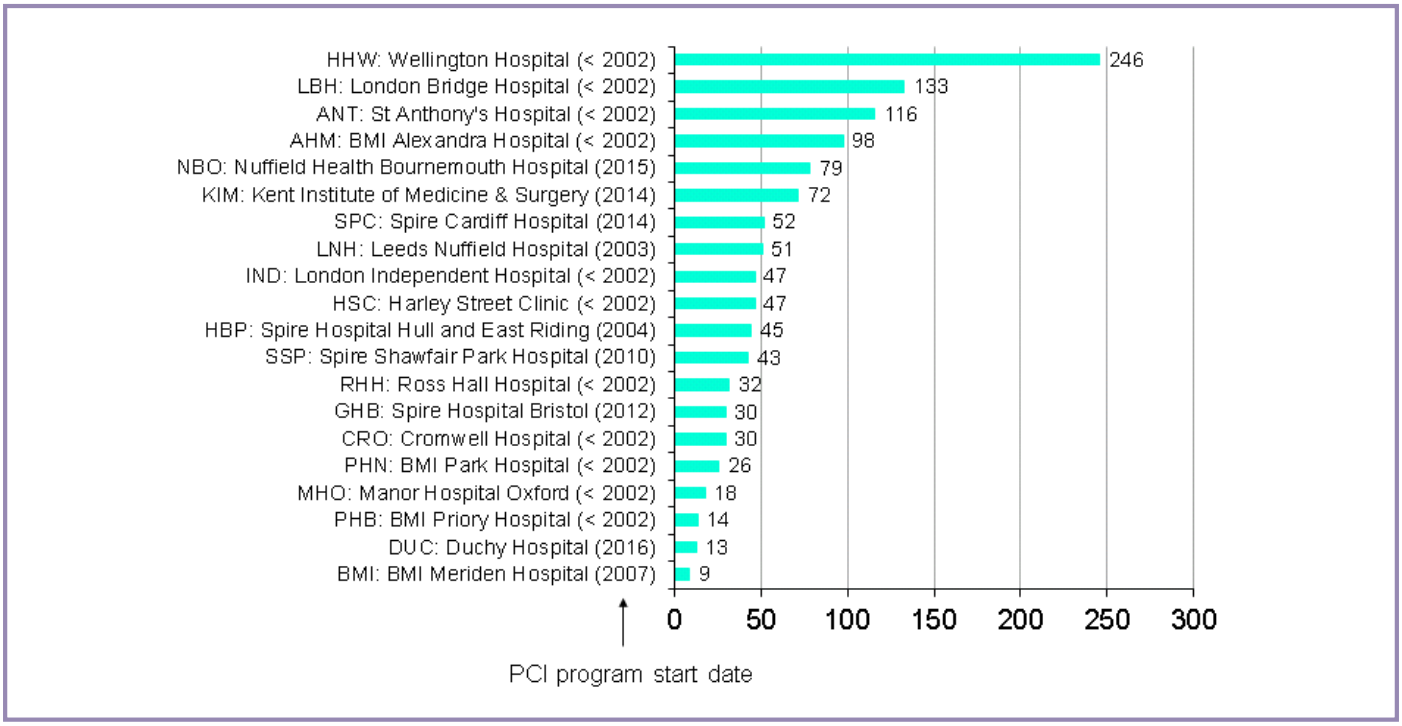
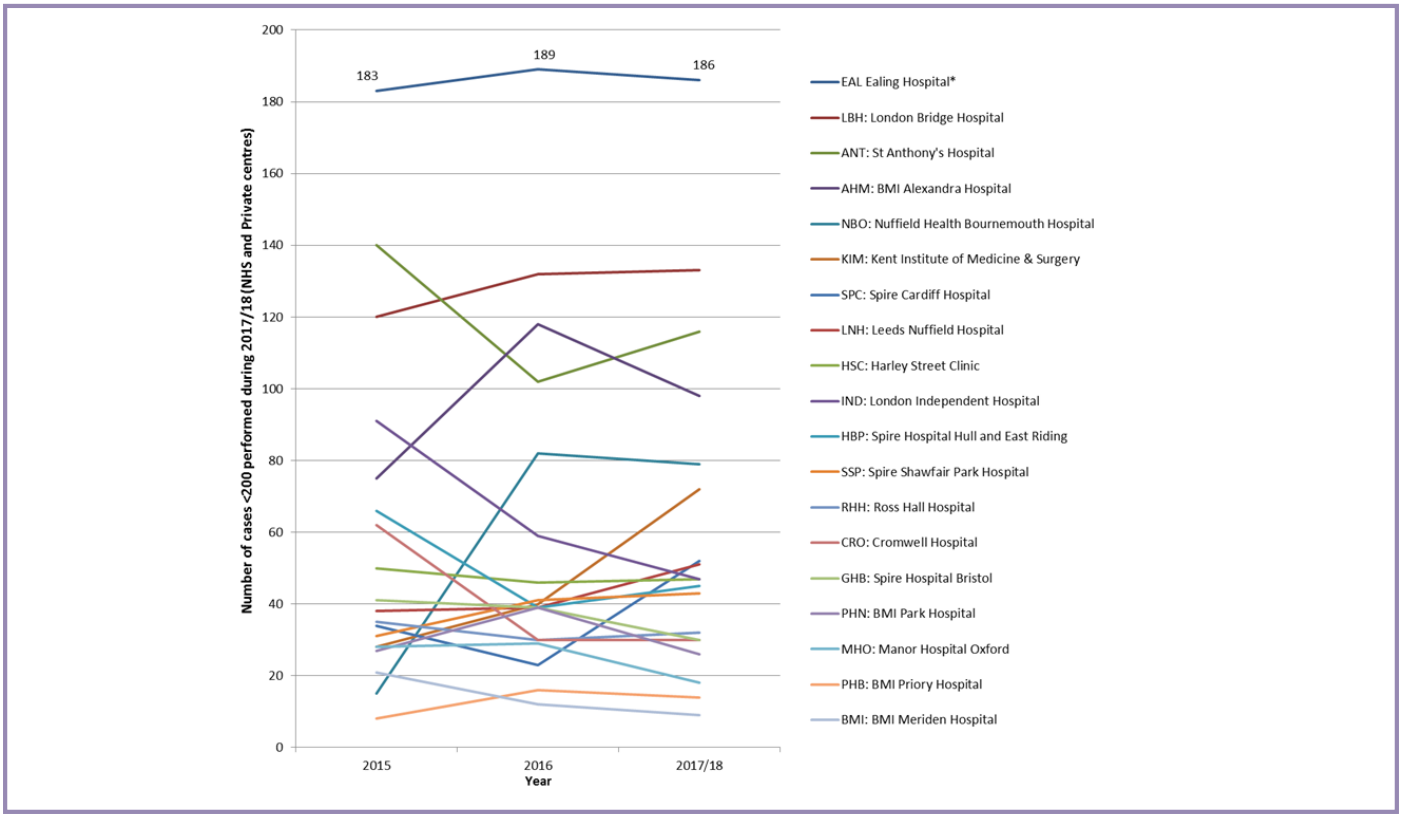


**Figure 4:** *NHS and private centres performing <200 cases during 2017/18 and trend from 2015*




*[*Note: Ealing was the only NHS centre.]*

# 2. DELAYS TO PRIMARY PCI FOR STEMI

Call-to-balloon (CTB) times are a good metric to evaluate the whole system of care from the time the patient calls for help or presents to a local hospital. The CTB time is made up of the call-to-door (CTD) time and the door-to-balloon (DTB) time.

CTB times have progressively lengthened. The percentage treated within 150 minutes of a call has fallen from 78.8% in 2014, to 77.9% in 2015, 75.2% in 2016 and lowest ever in 2017/18 at 70.7%. Median CTB time has increased by 9 minutes since 2015 (Figure 5). CTB times for services around each PPCI centre are shown in Figure 6.

**Figure 5:** *Proportion of procedures performed within a CTB time of <150 minutes and a DTB time of <90 minutes by hospital, 2017/18 (this analysis includes patients admitted directly to a PCI centre and those transferred from another hospital to the PCI centre)*

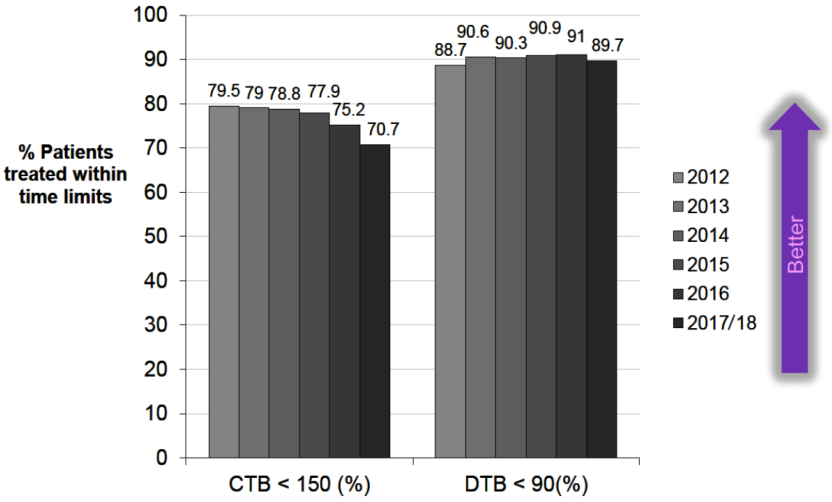
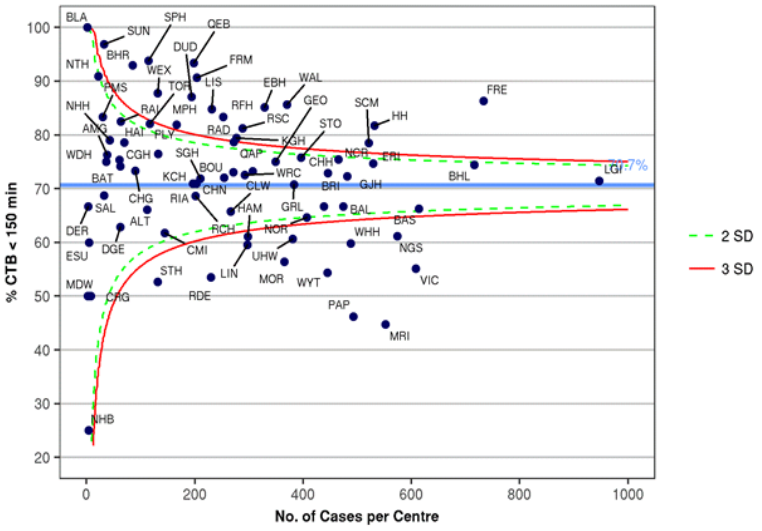


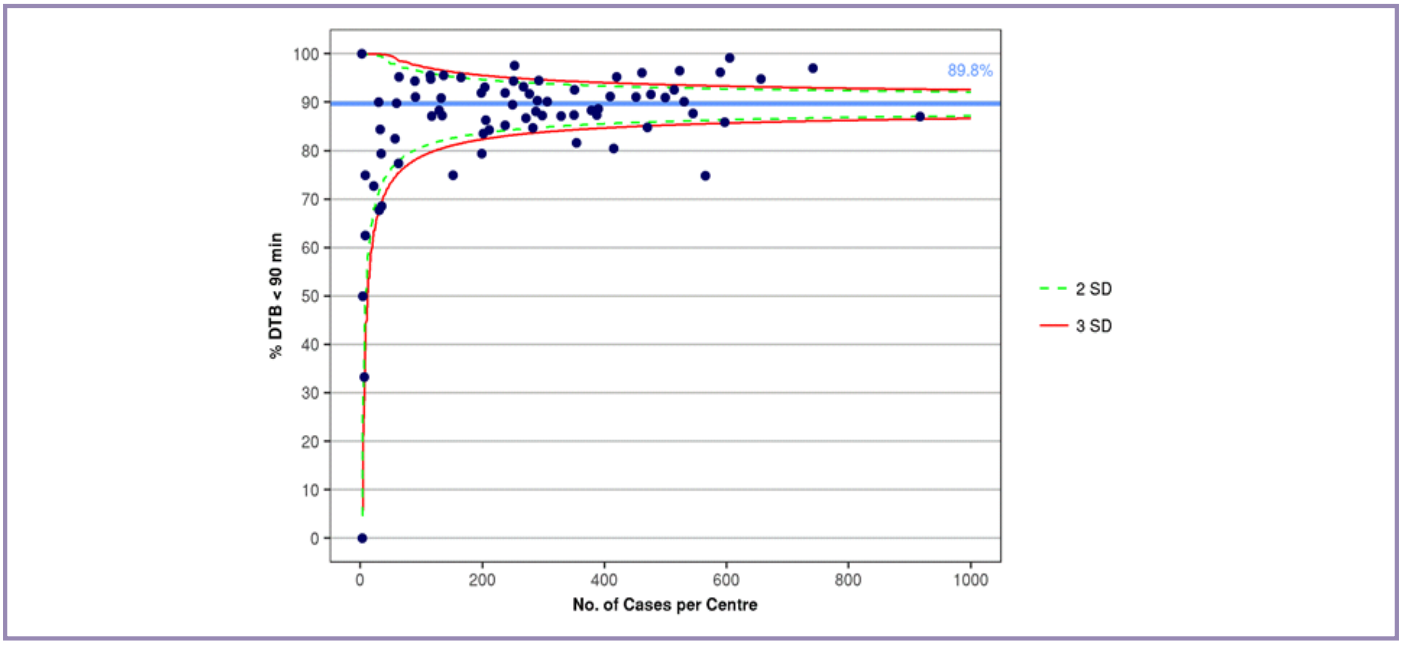

**Figure 6:** *Funnel plot showing procedural volume and median CTB time for PPCI hospitals*




*[All procedures analysed excluding shocked and ventilated patients; includes both direct admissions and inter-hospital transfers. Find hospital codes here]*

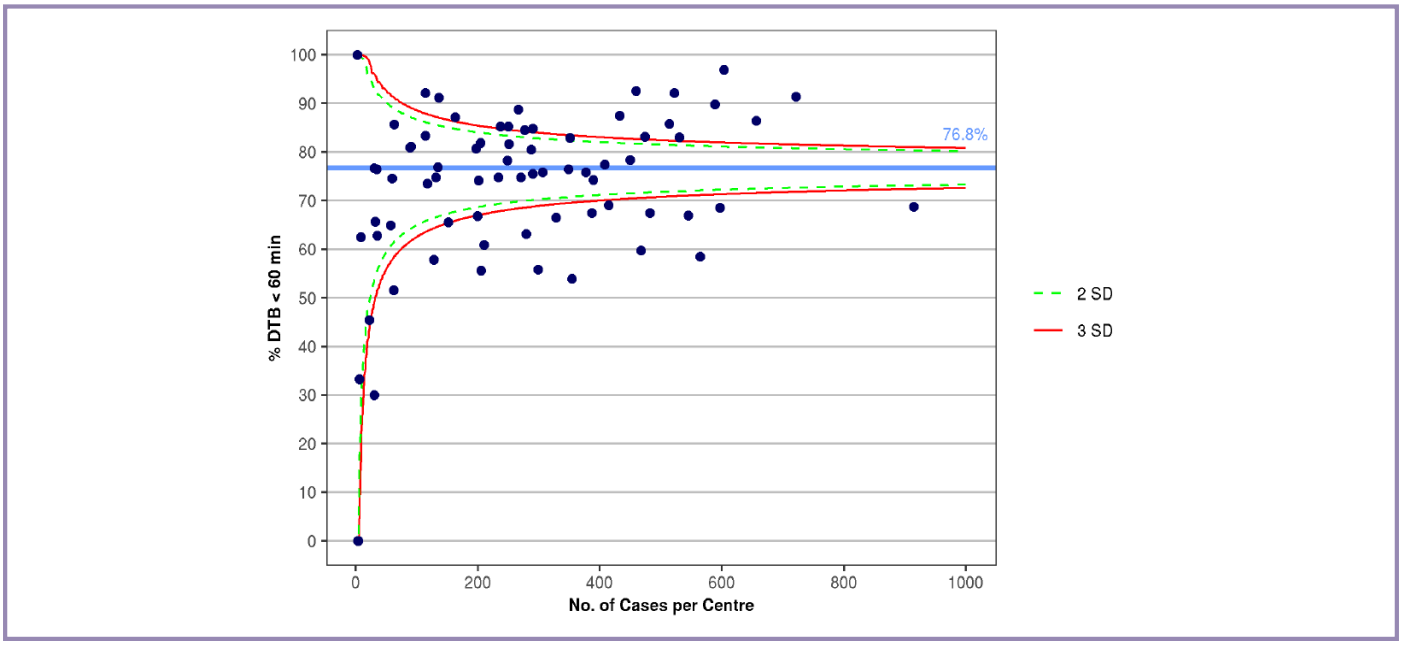
Door-to-balloon times remain stable, with 89.8% of patients treated within 90 minutes of arrival at PCI centre (Figure 7). However, only 76.8% of procedures overall are performed with a DTB time of <60 minutes with considerable variation between hospitals (Figures 8 and 9). This suggests there is scope for improvement if the poorer performing centres could match the better performing centres.

**Figure 7:** *Door-to-balloon (DTB) times: proportion of procedures with a DTB time of <90 minutes by hospital (patients with cardiogenic shock or on a ventilator excluded)*



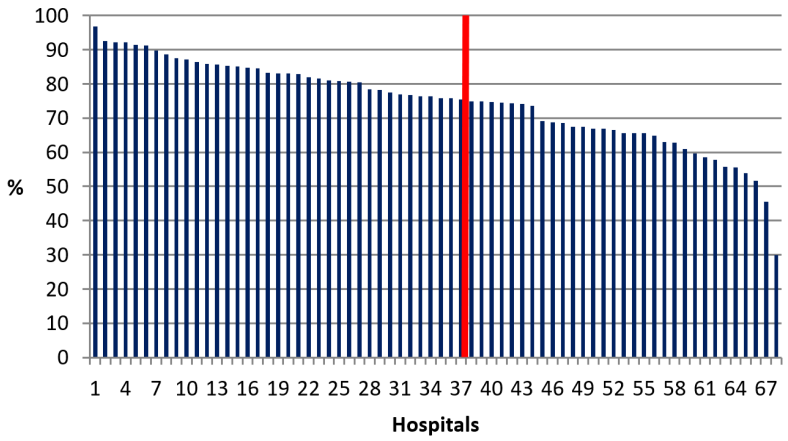

*[All procedures analysed excluding shocked and ventilated patients; includes both direct admissions and inter-hospital transfers.*

**Figure 8:** *Door-to-balloon (DTB) times: proportion of procedures with a DTB time of <60 minutes by hospital (patients with cardiogenic shock or on a ventilator excluded)*




*[Analysis includes both direct admissions and inter-hospital transfers]*

**Figure 9:** *Proportion of procedures with a DTB <60 minutes by hospital, 2017/18*




*[Note: Hospitals to the right side of the red line are those that fail to achieve a DTB time of less than 60 minutes in ≥75% of PPCI procedures.]*

DTB times have been stable regardless of admission route, but CTB times have lengthened for both those patients admitted directly to a PCI centre and those who require inter-hospital transfer (IHT). The increase in delay has been higher for IHT cases than for those with direct admissions. Compared with 2016, the 2017/18 patients have waited an extra 4 minutes (direct admission cases – median times from 115 to 119 minutes) or 8 minutes (IHT cases – from 164 to 172 minutes).

Given that CTB times have lengthened and DTB times have been very similar, the reason that CTB times have lengthened must relate to lengthening CTD times. These are evaluated in more detail in the MINAP report.

A focus is needed to reverse the deterioration in ambulance response times. In addition, although the overall DTB times are good, there is still considerable variation between hospitals. Improvement in the slower centres is therefore also needed to improve patient care.

# 3. DELAYS TO PCI FOR PATIENTS PRESENTING TO HOSPITAL WITH NON-ST-ELEVATION MYOCARDIAL INFARCTION (NSTEMI)

Median delay for IHT patients was 79.7 hours, and for direct admissions 55.8 hours in 2017/18 (Figure 10). This compares with 84 hours and 61.8 hours in 2016 respectively and so represents a slight improvement. The additional delay for patients transferred has also slightly improved from 6 hours to 4.3 hours.

There are slight improvements in the overall percentage of all patients (direct and IHT) treated within 72 hours, increasing from 54.3% (2014) to 58.4% (2017/18) (Figure 11).

Thus time to PCI, when indicated, is improving over the last few years but even so only 55% of patients undergo treatment within 72 hours. There is also marked variation with substantial delays in some hospitals, suggesting considerable scope for improvement if centres could achieve the performance of the better performing hospitals (Figure 12).

**Figure 10:** *Delays to PCI, when indicated, in patients with NSTEMI, 2014 – 2017/18 (Direct = direct admissions; IHT = inter-hospital transfers)*

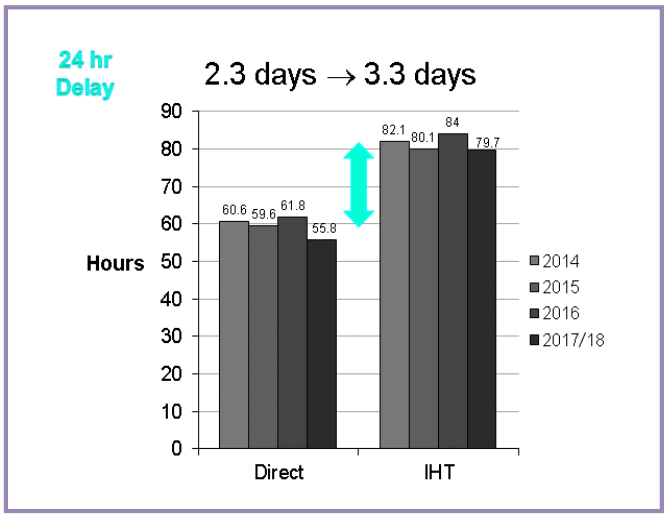



**Figure 11:** *Delays to PCI, when indicated, in patients with NSTEMI, 2010 – 2017/18, showing data for direct admissions and inter-hospital transfers*

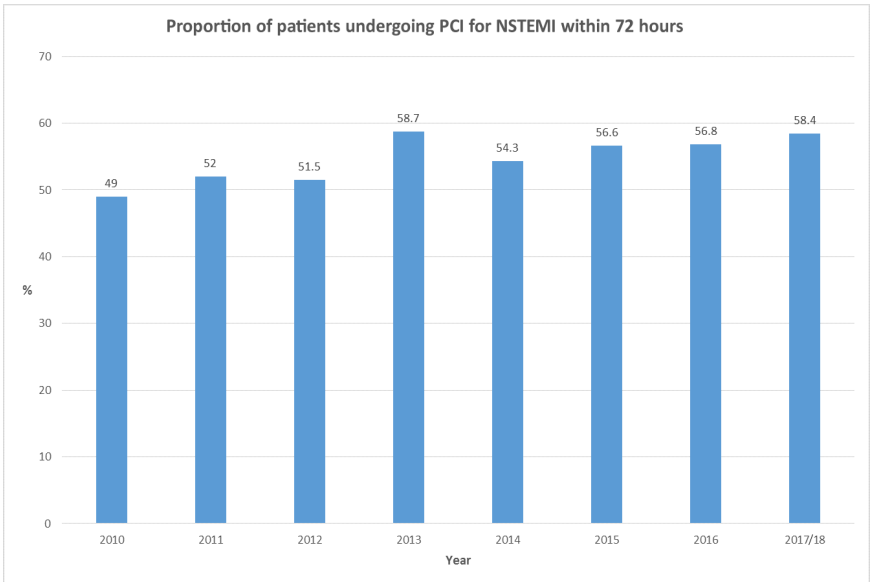
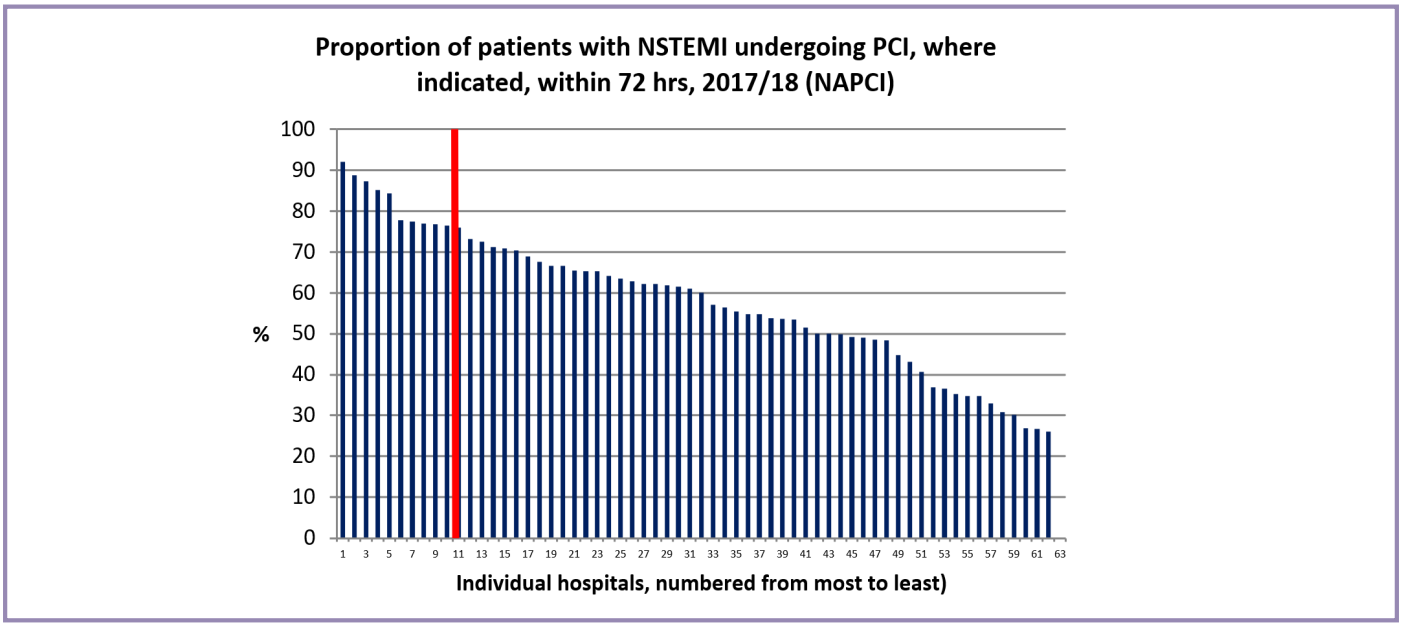


**Figure 12:** *Proportion of patients with NSTEMI undergoing PCI within 72 hrs, 2017/18*




*[Note: Hospitals to the right of the red line fail to achieve the target of ≥75% of PCI procedures for patients with NSTEMI within 72 hours.]*

# 4. RADIAL ACCESS

To perform PCI, a tube (catheter) needs to be inserted into the patient's arterial system. This can be inserted into the artery at the top of the leg (called the femoral artery), or in the wrist (called the radial artery). During the early development of PCI, before full miniaturisation of equipment, large bore tubes had to be used, and so could only be inserted into a large artery (such as the femoral). In recent years the equipment needed for PCI procedures has become smaller, and is now thin enough to be inserted into the smaller radial artery.

There are several advantages to using the radial artery for access. For example, unlike the femoral artery it does not have other critical structures close by that could be damaged (the femoral artery is surrounded by the femoral vein and nerve). It is easier to compress the radial artery to stop bleeding after the tubes are removed, and if any bleeding does occur it is more obvious and so can be corrected more quickly. Furthermore the use of the radial route enables quicker mobilisation after the procedure.

Complications are lower if it is possible to use the radial rather than the femoral route, and radial access results in better long term outcomes and lower mortality. Nevertheless, the radial route is technically more challenging especially if the operator's previous training and experience has been limited to transfemoral access.

Because of the advantages of transradial access we have reported the radial versus femoral access rates for all operators and PCI hospitals. However it is not possible to treat all patients using a radial approach. Some patient's radial arteries are still too small, and some PCI techniques still require large bore equipment that cannot fit into an average radial artery. As a result operators who attempt to use a radial route in all appropriate patients will not have 100% radial rates, but rather rates that are likely to be between about 80% and 95%.

This audit shows that there has been a further improvement, measured as an increase in the percentage of patients whose PCI is performed via the radial route (rather than femoral) from 84.3% in 2016 to 87.3% in the current analysis (Figure 13).

Nevertheless, 10 NHS hospitals in England still have radial rates less than 75% (Figure 14).

**Figure 13:** *Growth in the use of radial access for PCI, 2004 – 2017/18*

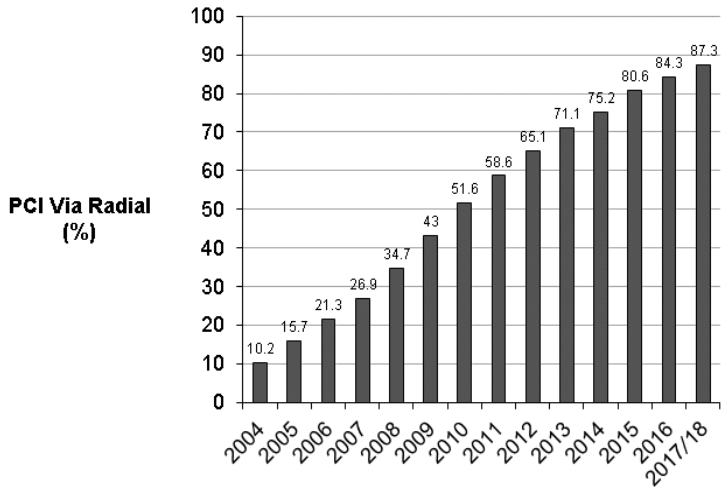
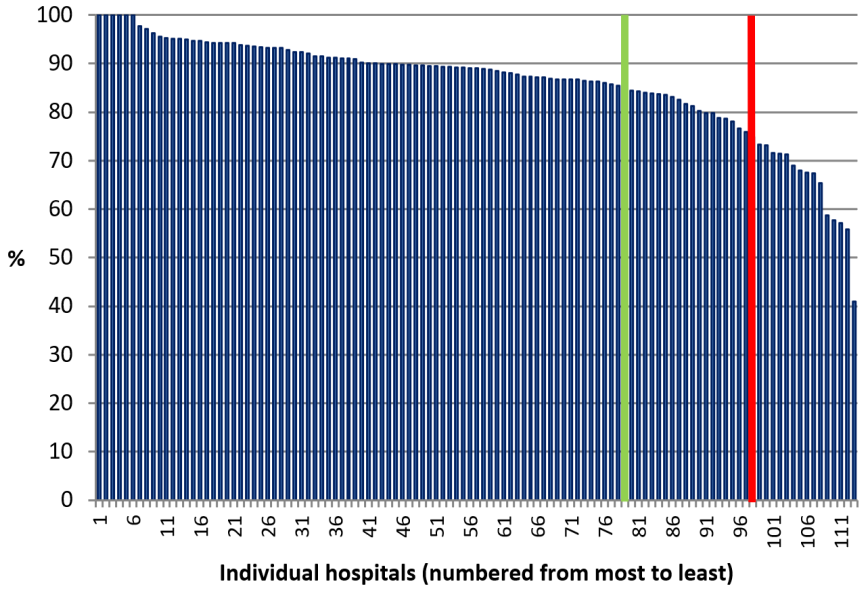


**Figure 14:** *Use of radial access in PCI by hospital, 2017/18*




*[Note: Hospitals to the right of the red line* **fail** *to achieve the target of ≥75% of PCI procedures using radial artery access. Hospitals to the right of the green line* **fail** *to achieve the target of ≥85% of PCI procedures using radial artery access. Data from 113 hospitals; two hospitals with inadequate data excluded.]*

# 5. DAY CASE PCI

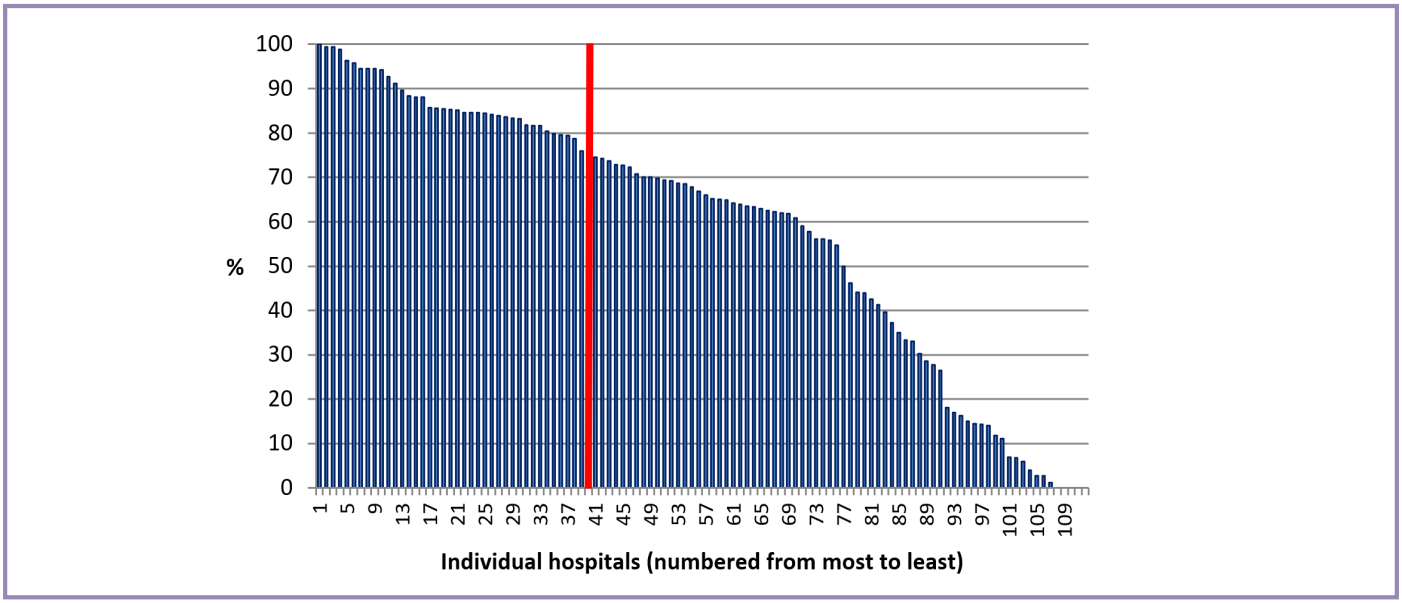
When PCI was first introduced, in the first few hours after the procedure there were frequent complications requiring emergency treatment in about 1 in 20 cases. As a result all patients were kept in hospital overnight to monitor for any complications. However the procedure has evolved and become much safer, mainly due to the use of stents and special anti-platelet (blood-thinning) drugs, and the use of radial access which reduces the risk of bleeding from the puncture site.

While patients who need PCI for a heart attack usually still need to stay in hospital overnight, patients who are being treated electively for symptoms of stable angina usually do not.

The safety of same day discharge following uncomplicated PCI for stable symptoms has been demonstrated in several trials[3]. Greater adoption of same day discharge has the potential to improve patient satisfaction, increase bed availability, and reduce hospital costs without increasing adverse patient outcomes.

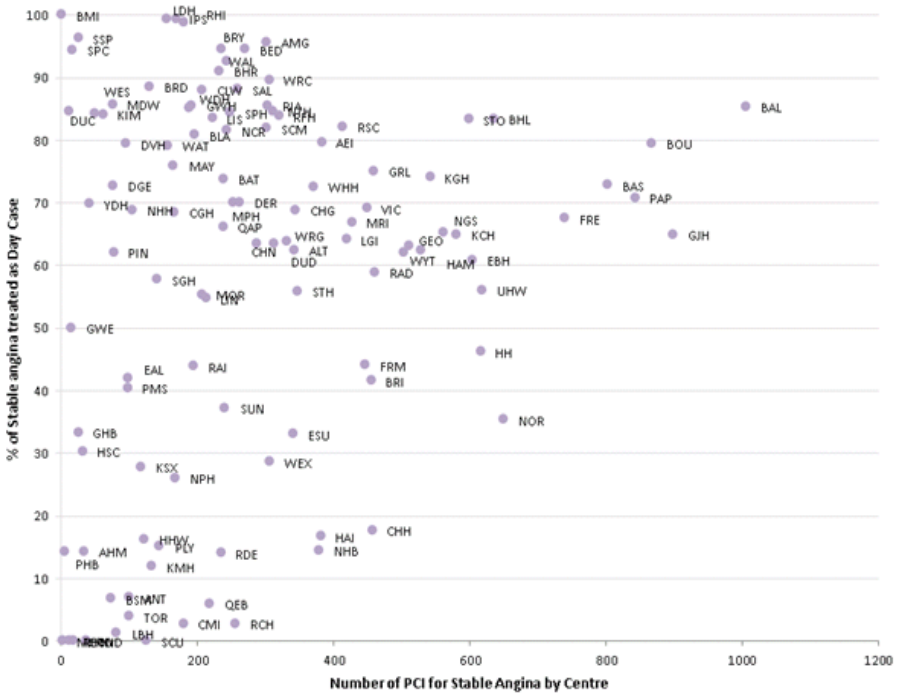
This audit has demonstrated that there is extremely wide variation in day case rates, with some centres performing day case PCI in almost all elective cases, and some where almost all patients are kept in overnight following their procedure (Figures 15 and 16). The explanation will include differences in the management of wards and day units, pressure on beds from emergency admissions and differences in patient pathways.

**Figure 15:** *Elective PCI performed as a day case by hospital*




*[Hospitals to the right of the red line* **fail** *to achieve the target of ≥75% of elective PCI patients treated as a day case. Data from 112 hospitals; three hospitals with inadequate data excluded.]*

**Figure 16:** *Elective PCI performed as a day case with hospital data, 2017/18 (find hospital codes here)*



# 6. THROMBUS ASPIRATION IN PRIMARY PCI

A number of small-scale or single-centre studies[4] suggested that there could be benefits from routine manual thrombus (clot) aspiration during primary PCI. However two large randomized controlled trials[5,6] have now been published, which showed no benefit of routine aspiration strategy overall. Indeed one of the trials raised the possibility that aspiration might increase the risk of stroke. As a result the 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation have recommended that routine aspiration should not be performed. Nevertheless it was recognised that it may still have a role in certain specific settings – such as in cases of large residual thrombus burden after opening the vessel.

As a result, the use of thrombus aspiration in the UK has fallen from about 50% in 2012 to 19.5% in 2017/18 (Figure 17). There is still quite a wide variation in practice ranging from over 30% in some centres, to under 10% in others (Figure 18). The data are presented to help units benchmark their activity relative to their peers.

**Figure 17:** *Reduction in use of extraction atherectomy (thrombectomy) during PPCI, 2012 – 2017/18*

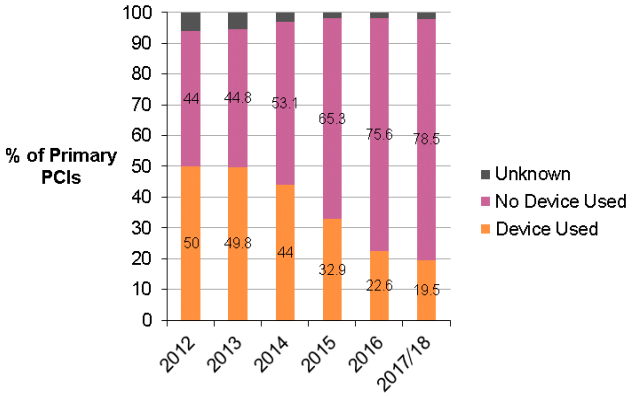
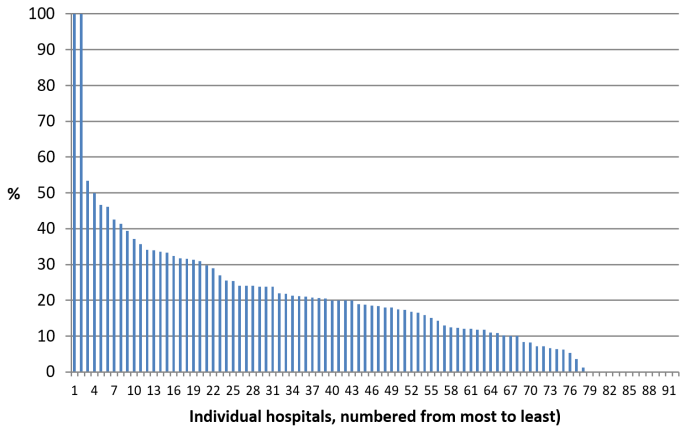



**Figure 18:** *Proportion of PPCI procedures using thrombectomy by hospital, 2017/18*



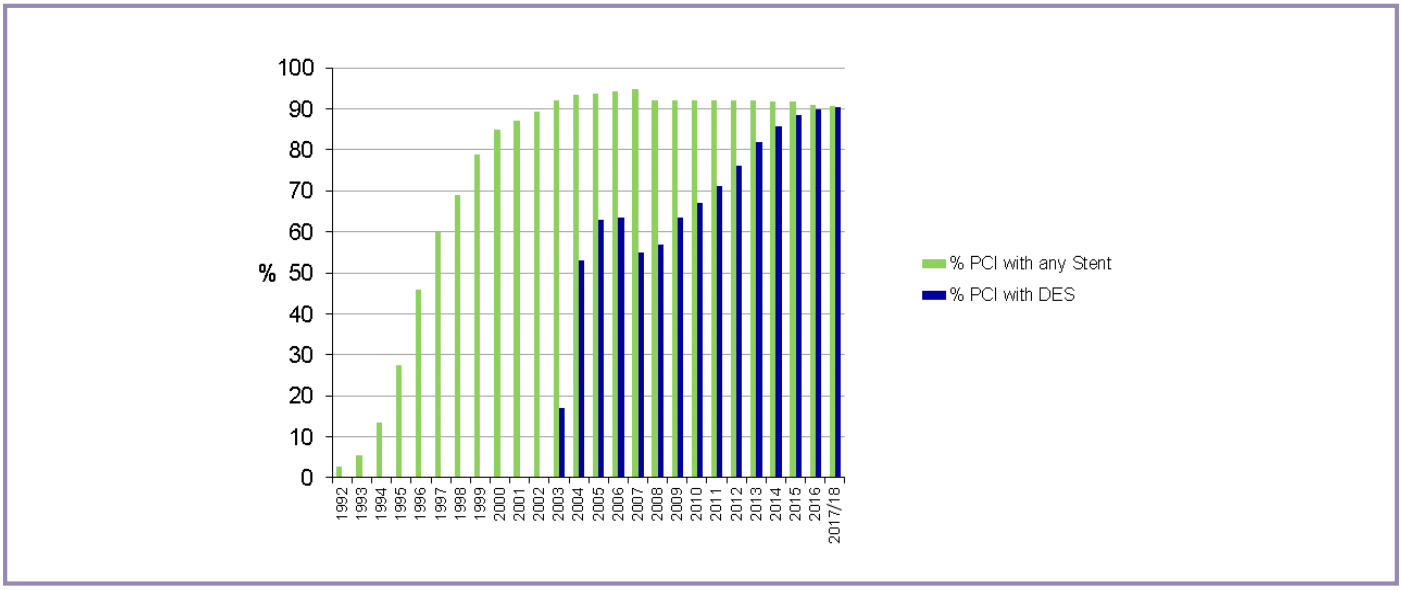

*[Note: Data from 92 centres (no data available for 23 centres). The hospitals with 100% use had very few cases.]*

# 7. DRUG ELUTING STENTS (DES) USE DURING PPCI

When drug eluting stents were first developed to reduce the rate of restenosis observed with bare metal stents, there were concerns about the potential for these new stents to be at increased risk of later thrombotic occlusion (stent thrombosis). These concerns have now been assuaged by recent trials[7,8] of the latest (third generation) drug eluting stents. These trials show that new generation drug eluting stents maintain the benefits of reduced restenosis, without increasing the risk of stent thrombosis. In fact in the most recent trials, DES are associated with less stent thrombosis than bare metal stents. As a result the 2017 European Society of Cardiology (ESC) Guidelines[9] for the management of acute myocardial infarction in patients presenting with ST-segment elevation have recommended that stenting with new-generation DES is recommended over BMS for primary PCI.

This audit has assessed the use of DES during PPCI for all centres, and shown very high levels of compliance with the ESC recommendations in almost all centres (Figures 19-22).

**Figure 19:** *Trends in stent use during all PCI procedures 1992 – 2017/18, with demonstration of use of DES since 2003*




*[Note: Data from 92 centres (no data available for 23 centres). The hospitals with 100% use had very few cases.]*

**Figure 20:** *Use of DES during PCI procedures in specific syndromes, 2008 – 2017/18 (UA = unstable angina; NSTEMI = non-ST-elevation MI; PPCI = primary PCI)*

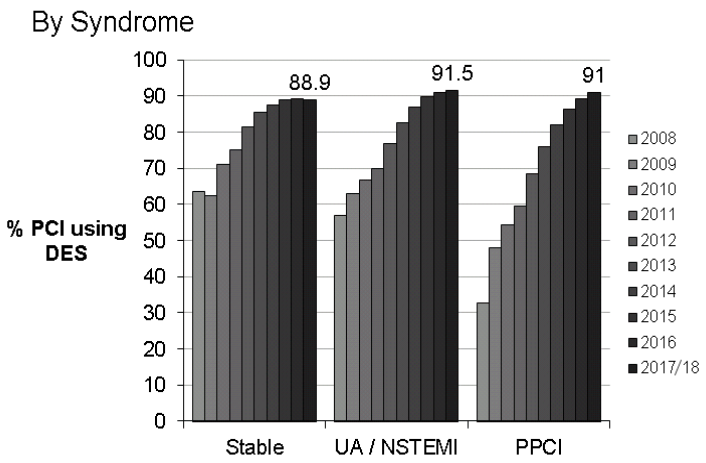



**Figure 21:** *Use of DES in PPCI by hospital, 2017/18*

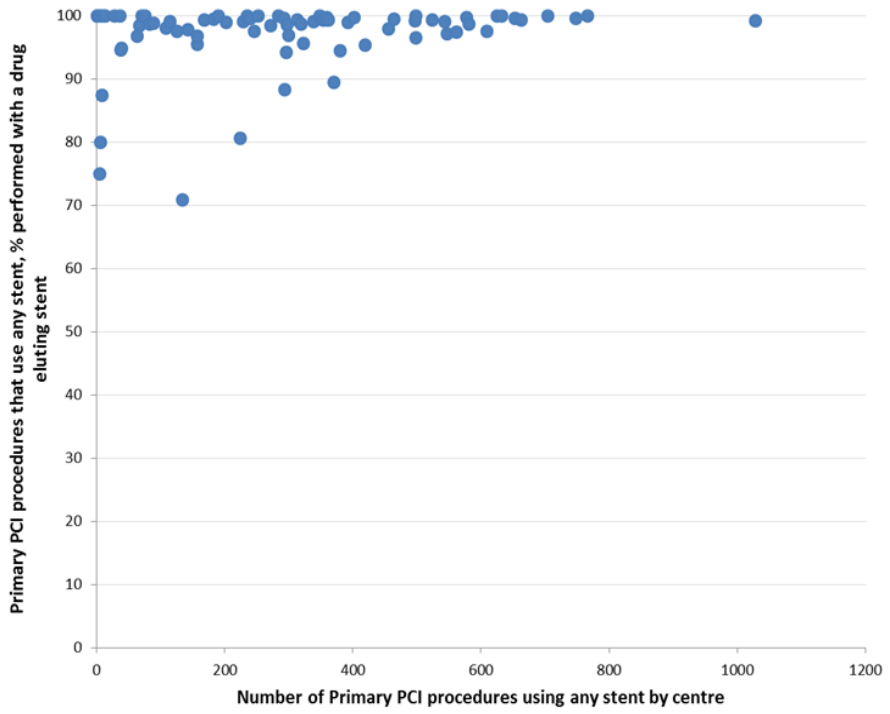
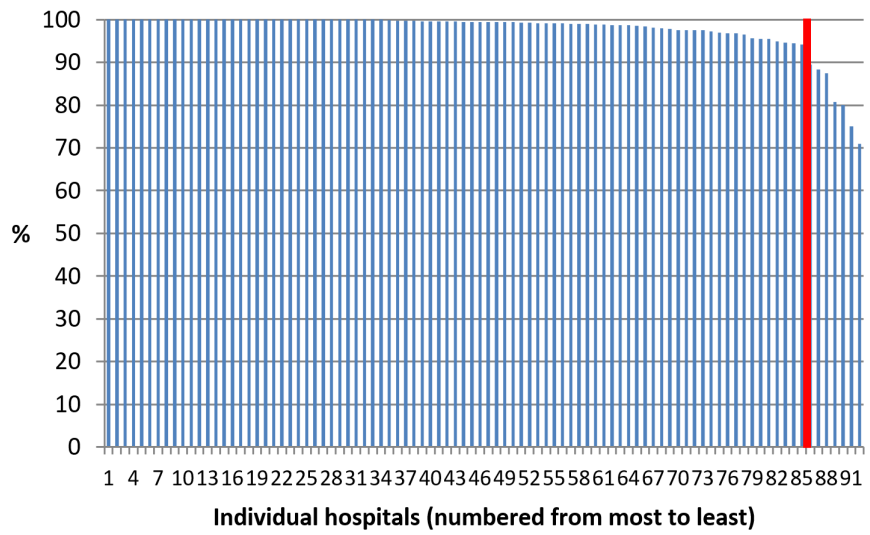


**Figure 22:** *Use of DES in PPCI in individual hospitals, 2017/18*




*[Note: Hospitals to the right of the red line do not use DES in ≥90% of PPCI procedures requiring a stent. Data from 92 hospitals; data from 23 centres reporting no cases or inadequate data excluded.]*

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- Our patient representatives on the NCAP Operational and Methodology Group and the NICOR Patient Advisory Group and Panel for their contribution to the programme and their help in determining the content of this report.

This report was prepared by Peter Ludman, Clinical Lead for the National Audit of Percutaneous Coronary Intervention (NAPCI), and audit lead for the British Cardiovascular Intervention Society (BCIS) and the NCAP analytical team: Devina Khambhaita (Project Manager), Sunil Rai (Analyst) and Aminat Shote (Analyst) together with additional input from other NCAP colleagues. Additional input was provided from members of the NAPCI Domain Expert Group.

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Please go to www.hqip.org.uk for more information.
Email: bartshealth.nicor-generalenquiries@nhs.net

This report is available online at https://www.nicor.org.uk/adult-percutaneous-coronary-interventions-angioplasty-audit/



This report was published on 12 September 2019

## NATIONAL INSTITUTE OF CARDIOVASCULAR OUTCOMES RESEARCH (NICOR)

NICOR is a partnership of clinicians, IT experts, statisticians, academics and managers who, together, are responsible for six cardiovascular clinical audits (the National Cardiac Audit Programme – NCAP) and a number of new health technology registries, including the UK TAVI registry. Hosted by Barts Health NHS Trust, NICOR collects, analyses and interprets vital cardiovascular data into relevant and meaningful information to promote sustainable improvements in patient well-being, safety and outcomes. It is commissioned by the Healthcare Quality Improvement Partnership (HQIP) with funding from NHS England and GIG Cymru /NHS Wales, and additional support from NHS Scotland.

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## BRITISH CARDIOVASCULAR INTERVENTION SOCIETY

The British Cardiovascular Intervention Society promotes education, training and research in cardiovascular intervention and develops and upholds clinical and professional standards.

www.bcis.org.uk

## BARTS HEALTH NHS TRUST

With a turnover of £1.5 billion and a workforce of around 17,000, Barts Health is a leading healthcare provider in Britain and one of the largest NHS Trusts in the country. The Trust's five hospitals – St Bartholomew's Hospital in the City, including the Barts Heart Centre, The Royal London Hospital in Whitechapel, Newham University Hospital in Plaistow, Whipps Cross University Hospital in Leytonstone and Mile End Hospital – deliver high quality compassionate care to the 2.5 million people of east London and beyond.

## THE HEALTHCARE QUALITY IMPROVEMENT PARTNERSHIP (HQIP)

HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations and crown dependencies.

www.hqip.org.uk/national-programmes