NATIONAL CARDIAC AUDIT PROGRAMME

NATIONAL AUDIT OF PERCUTANEOUS CORONARY INTERVENTION (NAPCI)

2021 Summary

2021 Summary Report

(2019/20 data)

NICOR

BCIS

The National Institute for 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 workforce of around 17,000 people, 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 Hospital in Plaistow, Whipps Cross 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

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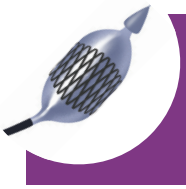
NAPCI AT A GLANCE

Data from the period April 2019 to March 2020



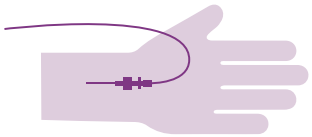
There was a slight (<1%) reduction in total PCI procedures compared to 2018/19, to 100,112 (3% drop over last 2 years)

The proportion of patients with diabetes has increased (24.3% up from 20.2% in 2012)

When a heart attack patient arrives at the hospital cath lab, a fine tube, known as a catheter, is passed to the heart arteries. Then a balloon and wire mesh stent is used to open up the blockage and restore blood flow to the heart muscle. The catheter can be inserted from either a blood vessel in the groin (femoral artery) or the wrist (radial artery).

89.5% PCI procedures were performed using radial access

Radial access is associated with fewer complications than femoral access and lower mortality in high risk patients. Radial access is not suitable for a small number of patients so 100% is not achievable.



Centre case volume

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.

In 2019/20 there was a reduction in the proportion of NHS centres performing <400 procedures a year (to 15%)

Time to treatment

76.1% of STEMI patients were treated within 60 mins of arrival at PCI centre

Call-To-Balloon times are increasing (the % of patients with a CTB < 150 mins has fallen from 75.2% in 2016 to 67.5% in 2019/20)

The % of NSTEMI patients who were treated within 72 hours has fallen from 58.4% to 54.2% during the last 3 years

Executive summary

The National Audit of Percutaneous Coronary Intervention (NAPCI) is part of the National Cardiac Audit Programme (NCAP). It is based on audit data for 2019/20 and focuses on reporting on specific metrics that address the potential for quality improvement.

KEY MESSAGES

	FOCUS OF ATTENTION	AUDIT FINDING
	**Impact of COVID-19 on the audit results**	Only the first three weeks of the COVID-19 pandemic overlapped with this audit period (April 2019 to March 2020) so it represents a pre-pandemic view of percutaneous coronary intervention (PCI) in the UK
	**Number of procedures performed**	Overall in 2019/20, the number of PCIs performed in the UK fell slightly to 100,112
	**Patient demographics and presenting clinical syndrome**	Demographic features of those treated remained similar, as has the presenting clinical syndrome (67% presenting with acute coronary syndromes)
	**Minimum PCI centre volumes**	Continued trend to reducing the number of lower volume centres (the percentage of NHS PCI centres performing less than 400 cases in a year has fallen again from 16% to 15%)
	**Treatment of STEMI: Primary PCI (PPCI) Door-To-Balloon times**	Door-To-Balloon times are generally good (76.1% of patients were treated within 60 minutes of arrival at the PCI centre), though there is still variation and room for improvement in some centres
	**Treatment of NSTEMI**	The proportion of NSTEMI patients treated within 72 hours continues to deteriorate (from 58.4% to 54.8% over the last three years). In contrast, during the COVID-19 pandemic, when there was more access to cath labs for urgent cases, delays fell. This suggests scope for improvement through reviewing capacity issues, efficiencies and prioritisations.
	**Use of radial access for PCI**	In 2019/20, 89.5% of procedures were performed using radial access (compared with 58.6% in 2011). This substantial shift has been of great benefit to patients but may now have reached a ceiling as some PCI procedures are always likely to require femoral access.
	**Drug-eluting stents (DES) as proportion of stented cases in PPCI**	Use of DES for primary PCI by centre is very high, with almost all centres at >90% usage. There remains a very small number of centres not achieving this whose practice can be improved.
	**PCI as a day case procedure**	64% of PCI cases for stable symptoms were performed as day cases but with very wide variation (from nearly 100% to almost zero) so there is considerable scope to reduce unnecessary overnight stays through local improvement

1 Introduction

1.1 There are several reports generated after analyses of the audit data provided by interventional centres across the UK

1.1.1 The full BCIS Audit slide deck (Financial year 2019/20)

For the full audit report of all adult interventional procedures performed in the UK in the year 1st April 2019 to 31st March 2020, please see the BCIS web site https://www.bcis.org.uk/audit-results/

That full report includes not only a large number of analyses of the PCI procedural data, but also other interventional activity such as transcatheter aortic valve implantation (TAVI), other valve interventions, closure of left atrial appendages and closure of 'holes' such as atrial septal defects. The data contained within the NCAP report below are a small subset of those analyses, with a focus on a few quality improvement metrics.

1.1.2 Public reports of operator and centre data – Clinical Outcomes Publication (3-year rolling data to 2019/20)

The Clinical Outcomes Publication (COP), which includes individual PCI operator reports, including assessment of risk-adjusted 30-day survival (for England and Wales), runs on a slightly different timetable. The COP analysis is not yet published. When published, it will be available on the public section of the BCIS web site https://www.bcis.org.uk/public-reports/

1.1.3 This report of the National Audit of Percutaneous Coronary Intervention as part of the National Cardiac Audit Programme (NCAP)

The report presented below is a focused view of a number of specific metrics that address quality improvement. It is based on two sets of data. The annual survey and an extract of PCI specific data dated 20/10/2020. The annual survey is sent to all centres that perform percutaneous coronary intervention (PCI) in the United Kingdom (UK). There was a 100% response to this survey across the UK.

Analysis of the PCI procedures is undertaken using procedure specific data that are uploaded to the NICOR servers by each centre. The intention has always been that every PCI procedure from every centre in the UK should be uploaded for analysis. However there are data missing from some centres. The centres and the reasons are described below.

Two English NHS Hospitals had IT problems and failed to upload their data in time for the analyses in this report: Royal United Bath and Royal Blackburn Hospital. These issues have now been addressed, and data for their COP analysis will be available when this is published.

Two hospitals in Northern Ireland were unable to send data because of information governance issues that have not yet been resolved: Altnagelvin Hospital and Royal Victoria Hospital.

Seven private Hospitals in England did not upload data: BMI Park Hospital (Notts), London Bridge Hospital, Leeds Nuffield Hospital, Spire Hospital Hull and East Riding, Wellington Hospital, Harley Street Clinic, and Nuffield Health Bournemouth Hospital.

1.2 The audit period is largely prior to the COVID-19 pandemic

The audit period to 31st March 2020 covers activity before the COVID-19 pandemic, with data to suggest that there may have been a slight drop in activity in only the last 3 weeks of the audit period. The audit data need to be interpreted within that frame.[1]

1.3 Overview of the structure of provision of PCI activity: there has been a further fall in the number of PCIs performed

In 2019/20, there were 119 PCI centres in the UK. The only change in the number of centres performing PCI was the addition of a single private centre (Spire Manchester Hospital). For the second year running there was a slight fall in the number of PCI procedures performed to 100,112. This equates to a reduced rate

of 1,499 procedures per million population (pmp) for the UK, a fall of 0.72%. This change in activity, however, has been slightly heterogeneous across the UK countries. While rates pmp have fallen in England (-0.8%) and Scotland (-1.8%), they have increased in Wales by 1.0% and Northern Ireland (1.3%).

The provision of emergency PCI for ST-elevation myocardial infarction (STEMI) – called 'primary' PCI (or PPCI) – has also not altered since the previous year, with 68 centres being the destination for paramedic crews to bring patients from the community directly for emergency 'primary' PCI. Of these, 58 offer this service all hours every day of the year (i.e. 24/7/365). Four centres link to form hybrid services, so that one or other centre is available 24/7/365, and six of them link so that one centre provides daytime emergency activity, but another takes over at night.

1.4 PCI procedure specific data

Taking note of the small amount of data missing as described above, the following general observations can be made. Overall the mean age of patients being treated by PCI has very gradually risen over the years from 64.9 in 2012 to 65.7 in 2019/20. The sex ratio of patients treated has not altered over many years (73.9% in the current analysis were male), but the proportion with diabetes has risen markedly, from 20.2% in 2012 to 24.3% currently.

The proportion of patients that had previously been treated by PCI has also risen to 28.7%, which probably simply reflects better access to PCI over recent years. The proportion of current smokers has fallen progressively to 22.0%. The percentage of aggregated Asian and Black ethnicity patients has been stable in recent years at 10% and 1.2% respectively, having changed significantly over the previous decade.

The proportion of cases performed for any acute coronary syndrome has risen slightly to 68.1%. This is due to a slight fall in those treated for stable angina; those treated as an emergency by primary PCI for STEMI has not changed (26.8%). There has been a slight fall (from 1.9% to 1.7%) in the proportion undergoing emergency PCI in the context of out-of-hospital cardiac arrest with the requirement for pre-procedural mechanical ventilator support.

1.5 Quality improvement metrics

A small number of key metrics have been selected as the focus of the quality improvement programme and these are explored in the next section.

2 | Quality improvement metrics

2.1 PCI Centre Case Volume; there are fewer low volume centres

2.1.1 Overview of QI metric

QI Metric Description/Name	PCI centre annual PCI procedure volume
Why is this important?	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. A centre that performs small numbers of procedures is described as a low volume centre.
QI theme	Safety
What is the standard to be met?	400 total. 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.[2, 3] Nevertheless, observational research into the relationship between patient survival outcomes and centre volume using the BCIS dataset of UK activity has not found that lower volume centres were putting patients at risk.[4, 5]
Key references to support the metric	References in text below are in the reference list at end of report.
Numerator	All PCI cases.
Denominator	n/a
Trend	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 to 30% (all centres), and 16% to 15% of NHS centres [Figure 2.1, Figure 2.2, Figure 2.3]. 18 centres have performed less than 200 cases on 3 successive years, all of which were private hospitals [Figure 2.4].
Variance	For the NHS, variance is largely explained by the catchment population and geographical considerations. The private sector variance is also explained by market forces.

2.1.2 Audit results

Figure 2.1: Number of PCIs per centre: trend in % of centres doing <400 procedures per year, 2010 – 2019/20

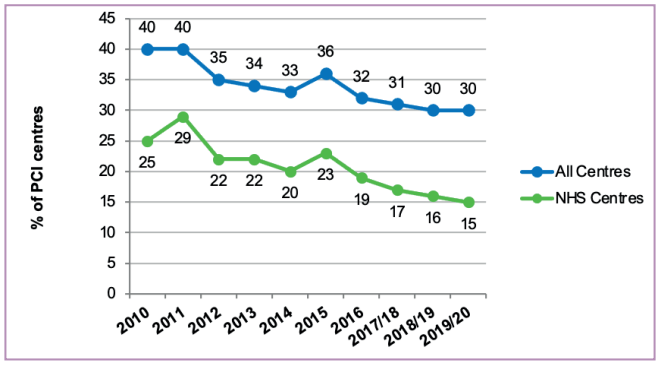


Figure 2.2: NHS centres performing <400 procedures, 2019/20

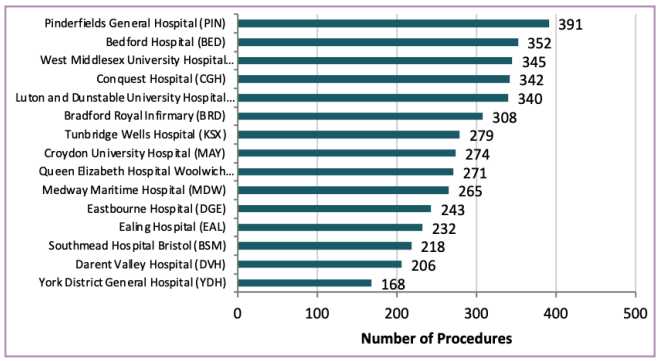


Figure 2.3: Private centres performing <400 procedures, 2019/20

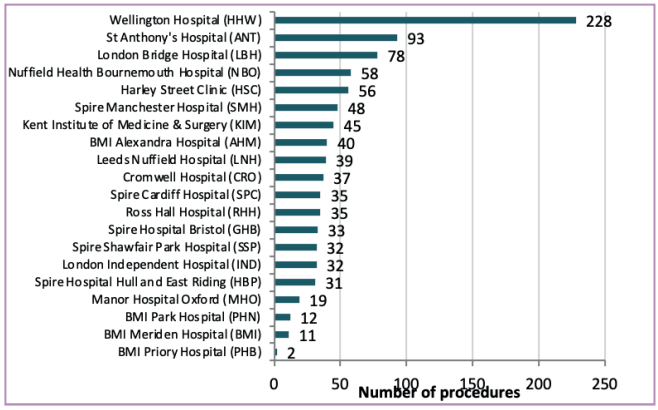
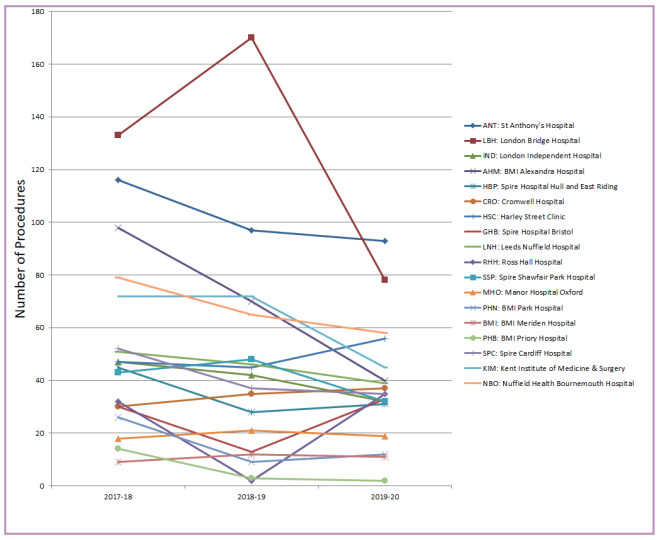


Figure 2.4: NHS and private centres performing <200 cases for each of the last 3 years to 2019/20



2.1.3 Response to centres falling below volume numbers

A letter is sent from the BCIS Clinical Standards Group to any centre whose total PCI numbers fall below 200 for 3 successive years.

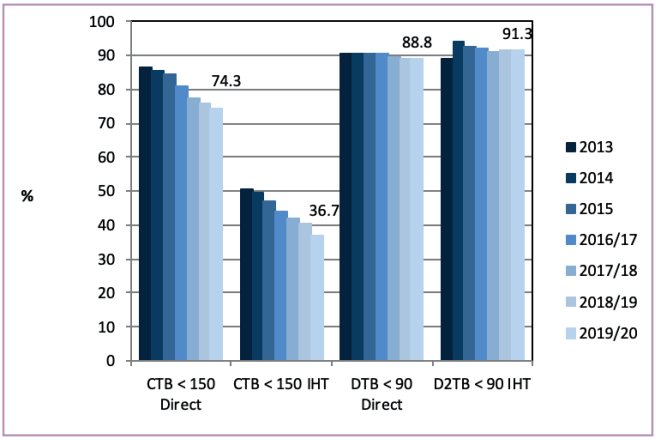
2.2 Delays to primary PCI for STEMI: Call-To-Door times are lengthening

2.2.1 Overview of QI metric

QI Metric Description/Name	Delays to treatment of STEMI by emergency PCI
Why is this important?	Mortality reduction Patients suffering a heart attack are diagnosed using electrocardiograms (ECGs) to determine whether they have ST-elevation myocardial infarction (STEMI) or non-ST elevation myocardial infarction (NSTEMI). Those with STEMI are most likely to have complete coronary occlusion and are considered to be at high risk of substantial heart muscle damage or early death. These patients require emergency primary percutaneous coronary intervention (Primary PCI or PPCI) which is a technique to re-open the blocked coronary artery causing the heart attack. Once STEMI has been recognised, the sooner that primary PCI is performed the more likely it is that significant heart muscle damage can be prevented and the greater are the chances of the patient surviving.[6] The timeliness of PPCI is therefore an important measure of the quality of care. Treatment delays are the most easily audited index of quality of care in STEMI.
QI theme	Effectiveness
What is the standard to be met?	All cases excluding shock and pre-PCI ventilation: Call-To-Balloon time (CTB): <150 minutes in ≥75% patients PPCI centre Door-To-Balloon time (DTB): <60 minutes in ≥75% of patients Call-To-PPCI centre door (CTD2 time): No current target set NICE Acute coronary syndrome in adults, Quality Standard 68 (QS68), recommends measuring the proportion of patients with acute STEMI who receive primary PCI within 150 minutes of the call for professional help (this is the CTB time).[7] The European Society of Cardiology (ESC) makes several recommendations.[8] It considers the 'STEMI diagnosis' time to be the most reliably measured and relevant point in the pathway. It recommends that for patients presenting to primary PCI capable centres, the time from 'STEMI diagnosis' at a PCI centre to balloon time (Door-To-Balloon time, or DTB) should be <60 minutes. BCIS position statement: At least 75% of all patients should have a DTB time of less than 60 minutes.[2]
Key references to support the metric	References in text below are in the reference list at end of report.
Numerator	For all Primary PCI (direct admissions and inter-hospital transfers (IHT)) but excluding patients presenting in cardiogenic shock and those requiring pre-PCI ventilation 1. % treated within target time 2. Median time delay (minutes)
Denominator	All Primary PCI, excluding patients presenting in cardiogenic shock and those requiring pre-PCI ventilation
Trends	While CTB times have continued to lengthen, DTB have remained similar (both for patients admitted direct to a PCI centre, and for those transferred from another hospital [Figure 2.5]). The percentage treated within 150 minutes of a call has fallen further from 69.2% in 2018/19 to 67.5% in 2019/20 [Figure 2.6]. This is because of increasing CTD times.
Variance	There is a variation in performance [Figure 2.7] that is not just explained by the presence or absence of a local Emergency Department (where delays can occur); many centres should be able to improve on performance.

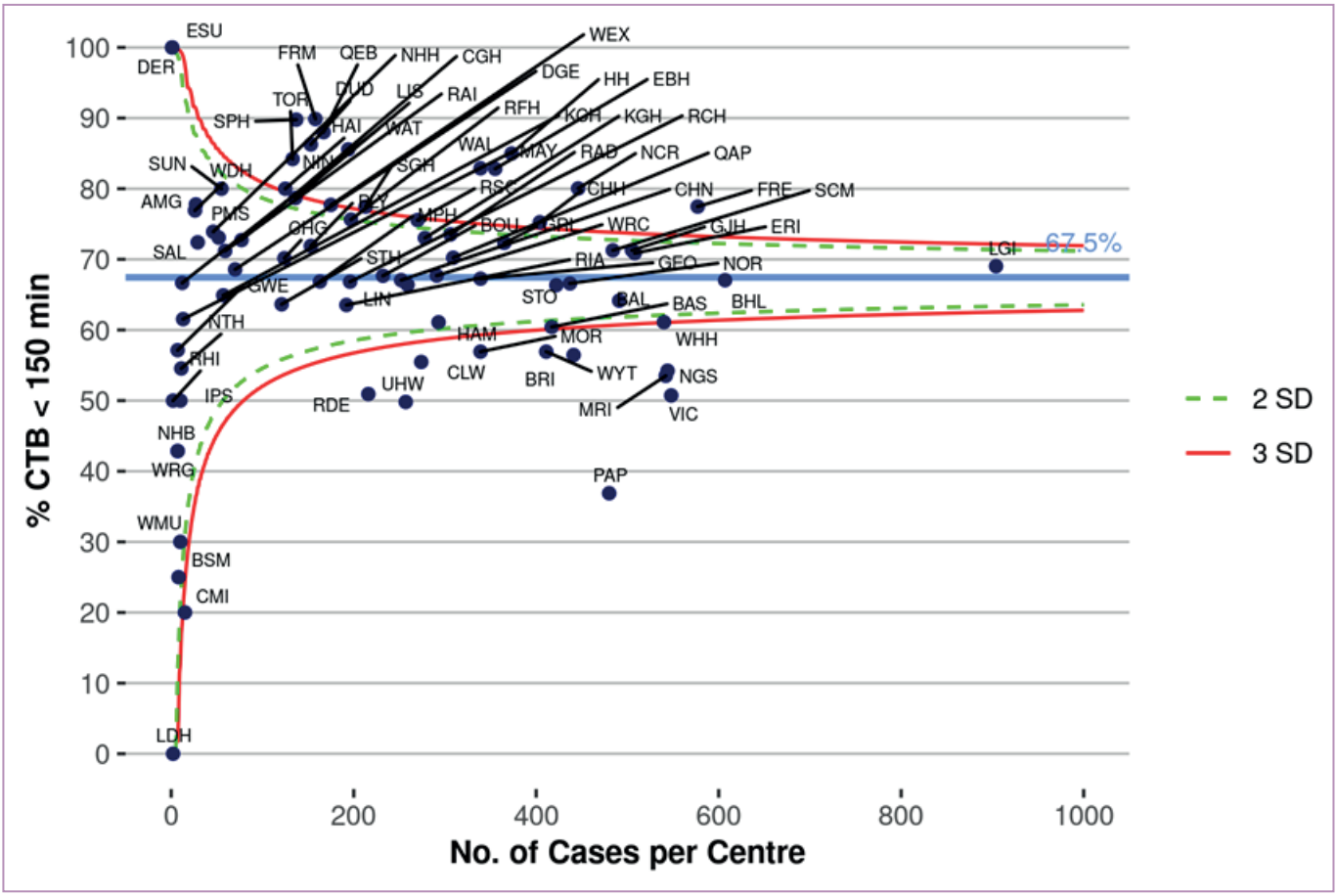
2.2.2 Audit results

Figure 2.5: Call-To Balloon (CTB) and Door-To-Balloon (DTB) times as % treated within 150 minutes and 90 minutes respectively, 2013 – 2019/2020



The data are shown for patients admitted directly to the PCI centre (Direct) and those transferred from another hospital (IHT).

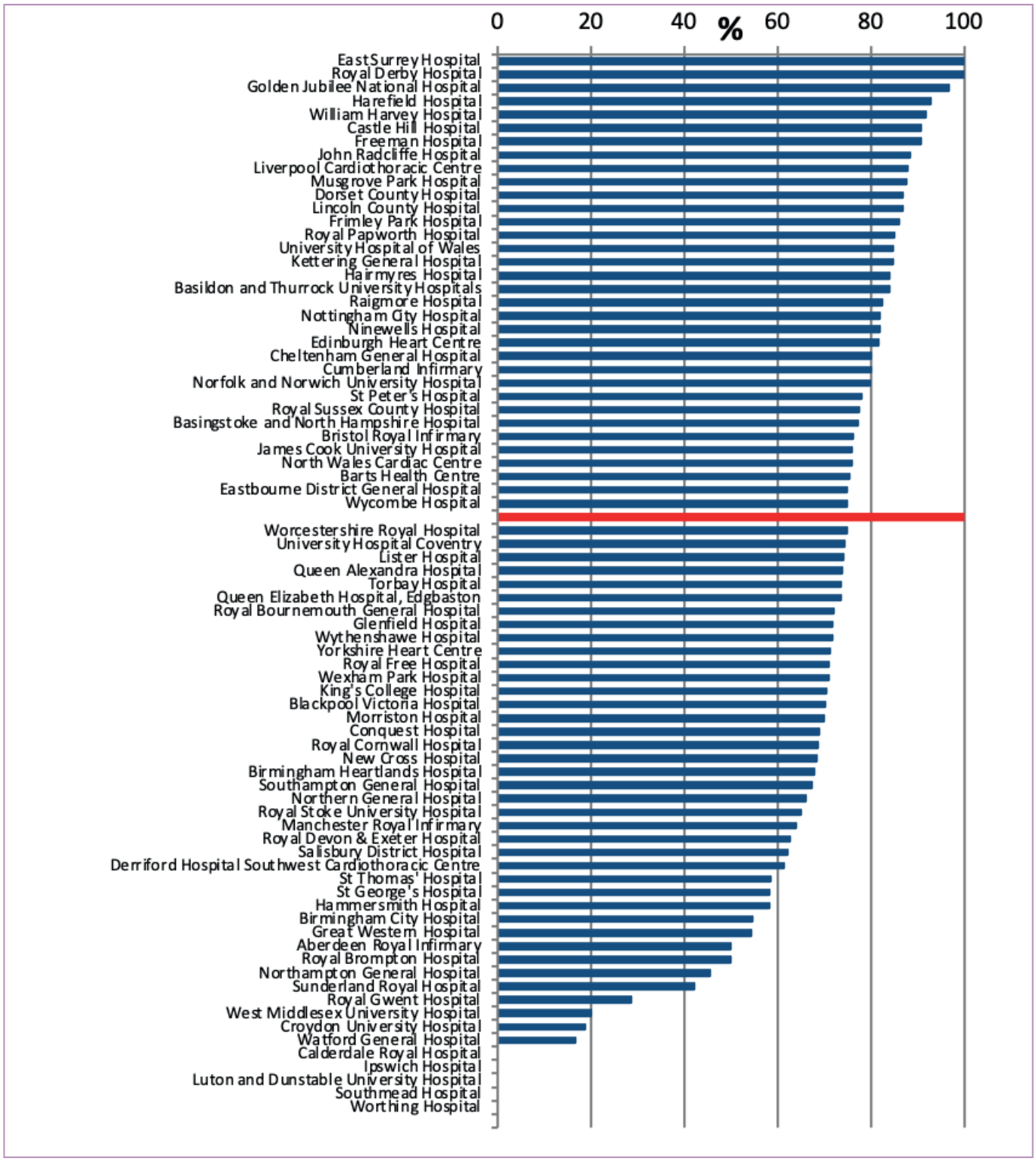
Figure 2.6: Proportion (%) of procedures performed within a CTB time of <150 minutes by hospital, according to volume of activity at each hospital, 2019/20



See end of report for site codes.

While CTB is made up of both the ambulance response and transportation times and the rapidity of treatment at the PCI centres, the DTB focuses just on the centre's performance. These data therefore suggest that there has been a progressive reduction in the ability of emergency services to respond quickly to a patient's call for help. These data are complementary to the data available in the MINAP report.

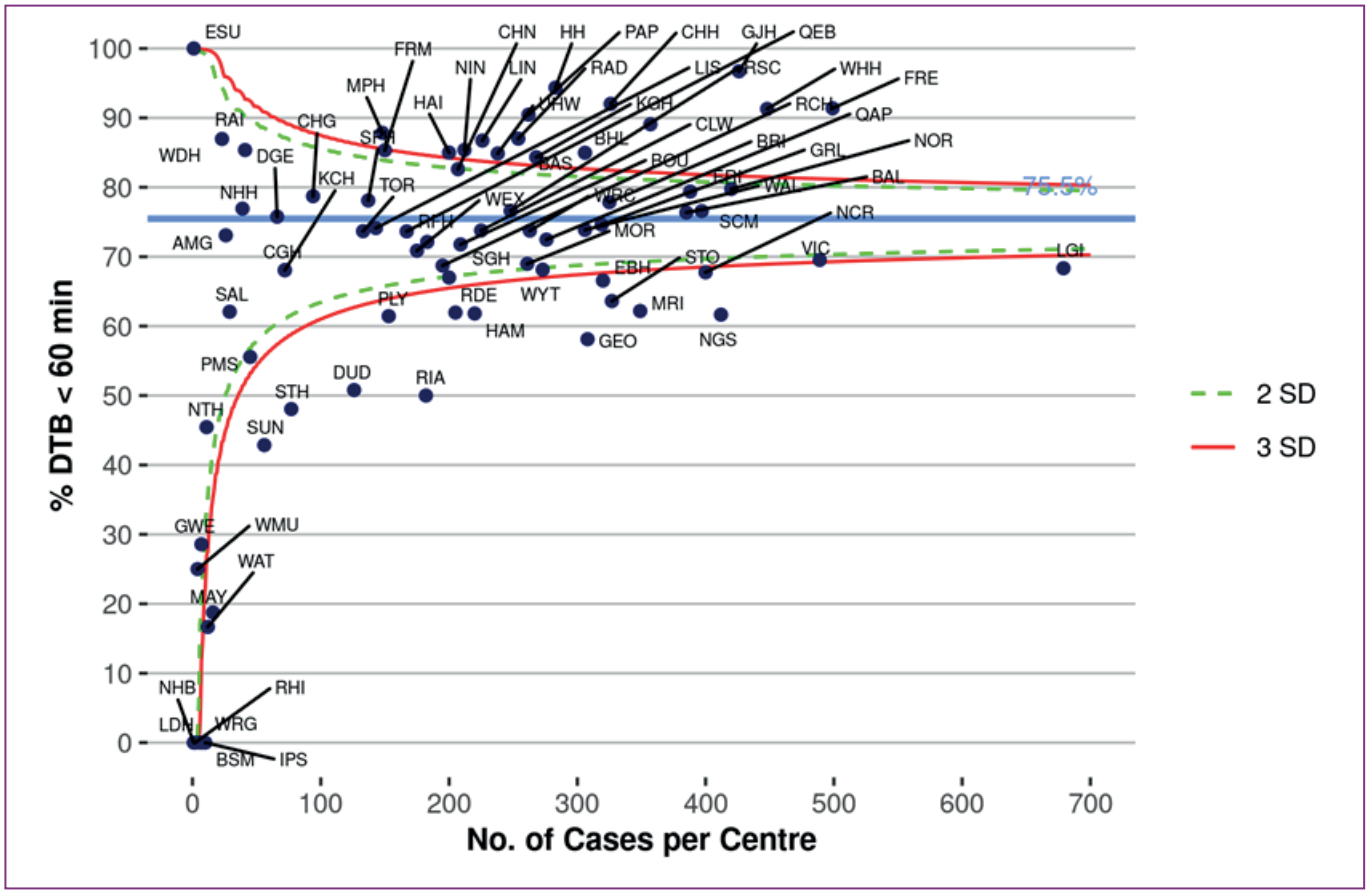
Figure 2.7: Door-To-Balloon (DTB) times: proportion (%) of procedures with a DTB time of <60 minutes by hospital, 2019/20



*Hospitals below the red line do **not** perform ≥75% of PPCI procedures within 60 minutes. Patients with cardiogenic shock or on a ventilator excluded.*

Though Door-To-Balloon times have remained more stable, with 89.1% of patients treated within 90 minutes of arrival at the PCI centre, there does remain considerable variation between hospitals, with 75.5% achieving a DTB <60 minutes [Figure 2.8]. This suggests there is scope for improvement if the poorer performing centres could match the better performing centres.

Figure 2.8: Funnel plots of proportion treated within 60 minutes of arrival at hospital, 2019/20



See end of report for site codes. Min = minutes

2.2.3 Recommendations for those not achieving the standards

A focus is needed to reverse the deterioration in ambulance response times. In addition, although the overall Door-To-Balloon times are good, there is still considerable variation between hospitals. Improvement in the slower centres is therefore also needed to improve patient care. These centres should contact centres that perform well to see what lessons can be learned.

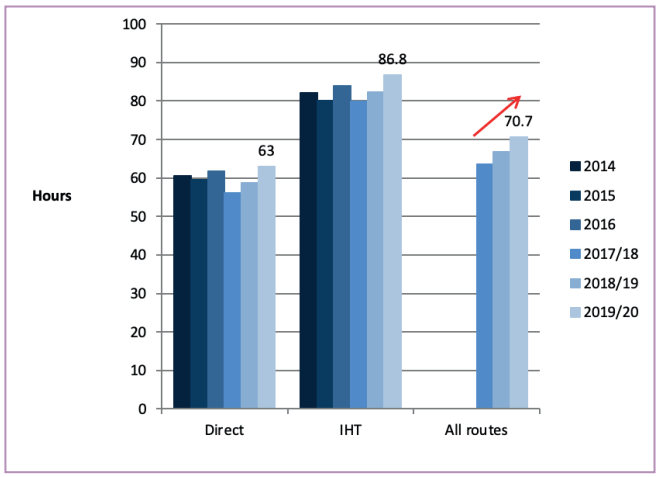
2.3 Delays to PCI for patients presenting to hospital with non-ST-elevation myocardial infarction (NSTEMI): no improvement, in fact a slight deterioration in performance

2.3.1 Overview of QI metric

QI Metric Description/ Name	Time delays from admission to first hospital with symptoms of NSTEMI to time of PCI (if this is required for treatment of NSTEMI)
Why is this important?	In people with an intermediate or higher risk of future adverse cardiovascular events, coronary angiography with coronary revascularisation as appropriate offers advantages over an initial conservative strategy. Studies have shown no advantage to delaying such investigation and treatment while optimising medical therapy. Conversely waiting for longer times before performing angiography +/- revascularisation does not appear to be associated with increased mortality.[9] However there are several disadvantages for patients if they have to wait for in-patient investigations. Apart from the negative impact this has on the patient experience, they are at risk of further myocardial infarction, and the increase in length of stay puts them at risk of the dangers of being in a hospital environment such as hospital acquired infections. It is also a waste of scarce NHS resource.
QI theme	Effectiveness
What is the standard to be met	NICE Quality Standard (QS68): <72 hours in >75% of patients NICE suggest that patients at intermediate or higher risk of future cardiovascular events should be seen by cardiac specialists and offered coronary angiography (with follow-on PCI if indicated) within 72 hours of first admission to hospital. This is captured in the NICE Acute coronary syndromes in adults Quality Standard [QS68].[7]
Numerator	PCI indication 'NSTEMI', treated within 72 hours of arrival at first hospital (whether PCI centre or referring centre – i.e. direct and IHT)
Denominator	PCI indication 'NSTEMI'
Trend	Median delay for patients transferred from another hospital (inter hospital transfers or IHT) was 86.8 hours, and for patients admitted directly to the PCI centre, 63 hours in 2019/20 [Figure 2.9]. This equates to approximately a full day's additional delay for patients whose admission starts in a non-PCI centre and require transfer before PCI. Overall the delays have deteriorated particularly in the past 3 years.
Variance	In addition to the lack of improvement, there is considerable variation between centres, as previous years.

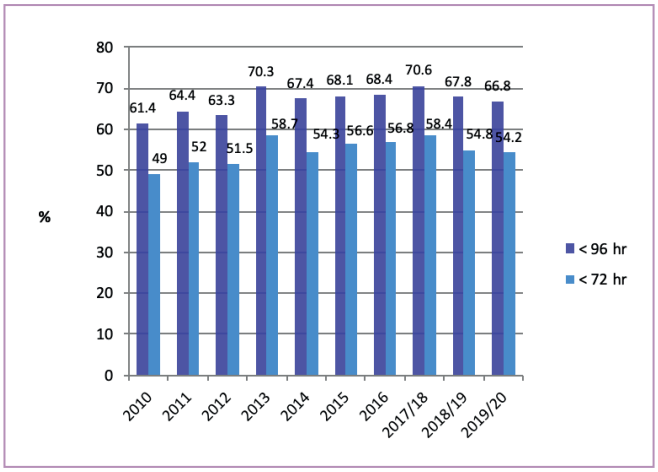
2.3.2 Audit results

Figure 2.9: Delays (hours) to PCI, when indicated, for patients with NSTEMI, for direct admissions and those requiring an inter-hospital transfer (IHT), and combined, 2014 – 2019/20



As would be expected from these findings the proportion of patients who are treated within either 96 hours (previous NICE standard) or 72 hours of admission to the first hospital remains poor and has deteriorated further over the last 3 years [Figure 2.10].

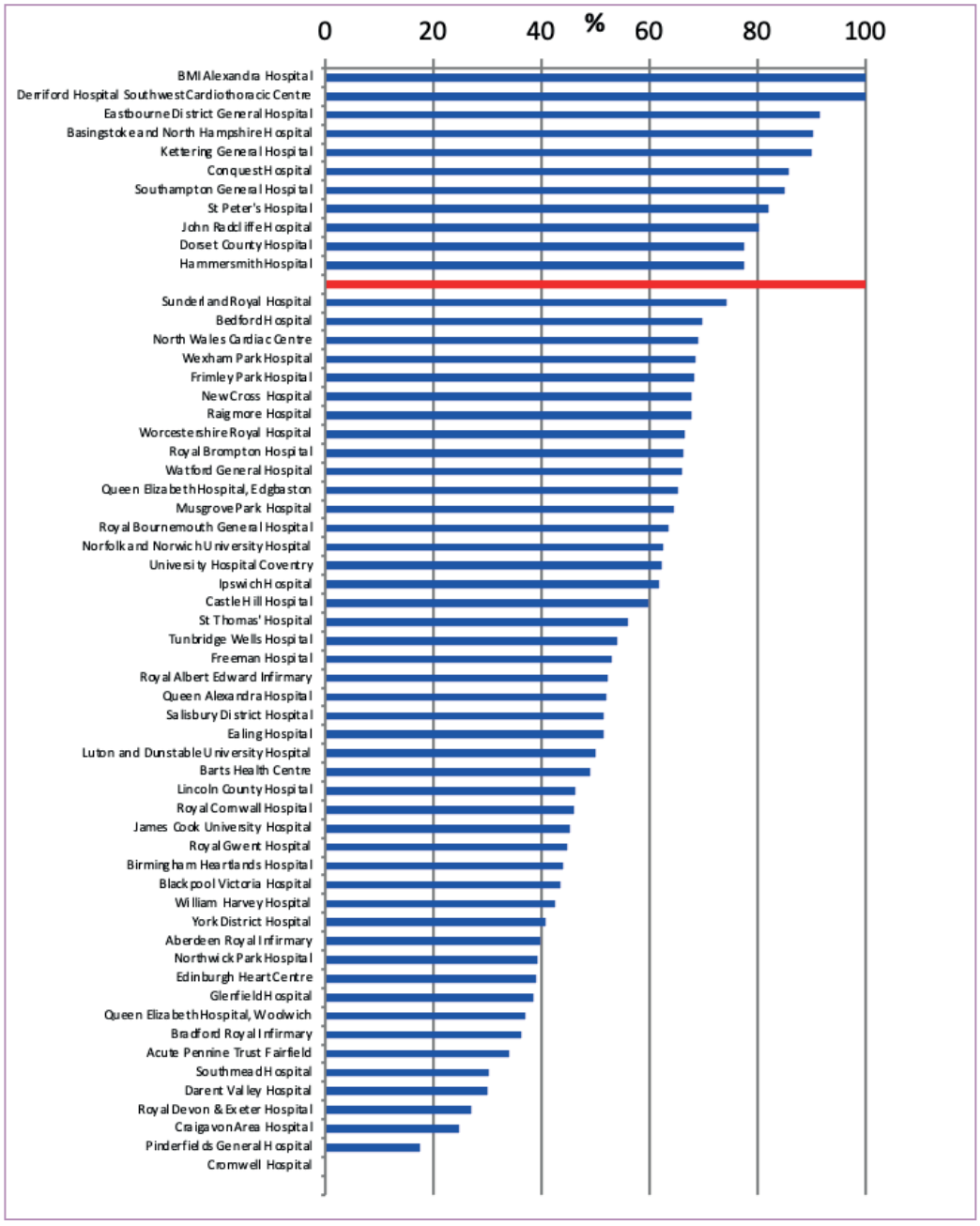
Figure 2.10: Delays to PCI, when indicated, in patients with NSTEMI showing data for all patients whether initial admission was to a PCI centre or not, 2010 – 2019/20



Where the initial admission is not to a PCI centre, an inter-hospital transfer is necessary. Hr = 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 2.11 and Figure 2.12]. See also the MINAP report for details of delays to angiography for patients with NSTEMI.

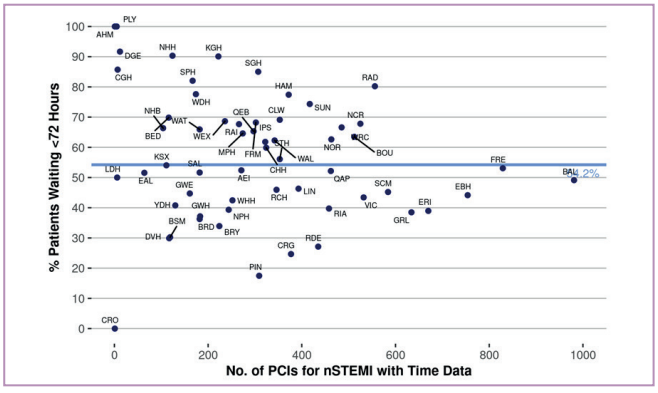
Figure 2.11: Proportion (%) of patients with NSTEMI undergoing PCI within 72 hours, 2019/20



*Note: Hospitals below the red line are **not** performing ≥75% of PCI procedures for patients with NSTEMI within 72 hours.*

Figure 2.12: Delays to PCI in patients presenting with NSTEMI, as % treated within 72 hours by centre, 2019/20

See end of report for site codes.



2.3.3 Case study: Improving times to PCI for NSTEMI patients

Dr Tom Snow, *Interventional Cardiologist*

Dr Andrew Ludman, *Cardiology Clinical Lead, Royal Devon & Exeter NHS Foundation Trust*

The Royal Devon & Exeter Foundation Trust cardiology department provides services for a large rural area across North and East Devon. Primary PCI was established early in the evolution of this emergency service in the United Kingdom and currently we perform 300-400 emergency procedures each year along with a further 800-900 acute coronary syndrome and elective cases. We have three cardiac catheter labs and aim to offer "state of the art" coronary intervention including a fully integrated intravascular imaging suite (incorporating intravascular ultrasound (IVUS) and optical coherence tomography (OCT)), rotational atherectomy, intra-coronary lithotripsy and a programme to treat patients with chronic total occlusions (CTOs) alongside our electrophysiology colleagues who provide complex arrhythmia and device services to the same patient group. Delivery of care in a timely fashion is challenging due to our local geography and transfer times from rural areas. We serve as the primary referral centre for our colleagues in Barnstaple (North Devon District Hospital) and local demand can impact the time to procedure for these patients presenting to a non-interventional hospital. This has been evidenced in previous annual returns to BCIS.

To address the delays in the delivery of invasive coronary angiography +/- PCI for patients attending North Devon District Hospital (NDDH) with a non-ST elevation acute coronary syndrome we have developed and refined a "Treat & Return" service. This has significantly improved patient care and the proportion of patients receiving invasive therapy within 72 hours of their initial presentation. Close inter-departmental working and early identification of possible restrictions to this patient pathway has seen a promising early reduction in "time to treatment" of approximately 30 hours on average.

Using a daily inter-hospital transport service between Barnstaple and Exeter and a "hot bed" approach to these patients we have streamlined the transfer of stable inpatients presenting to NDDH with a Troponin positive acute coronary syndrome. This pathway runs in parallel to our emergency STEMI/PPCI Pathway. On admission to NDDH patients are reviewed by a Consultant Cardiologist and identified as needing invasive coronary angiography. A structured referral is then emailed to the Bed Co-ordinator at the RD&E and patients are listed in date order unless clinical priority dictates otherwise. An early morning ambulance brings two patients each day from NDDH to the RD&E, who are then prepared for procedures on their arrival (formal consent, clinical review by Cath Lab operator etc.) before having their procedure performed that afternoon. The ambulance repatriates the two patients from the day before on their return journey to North Devon and each patient therefore remains in the Cath Lab centre overnight for observation before their return and ongoing care in NDDH.

There is no doubt that understanding the demands on the system locally and engaging all stakeholders has brought significant improvements in patient care and a more successful service. We continue to refine our approach to try and ensure all patients can receive prompt invasive treatment for their non-STEACS and not be disadvantaged by geography.

2.3.4 Recommendations for those not achieving the standard

It is important that many centres improve the rapidity of patient access to invasive cardiology investigation and treatment.

This would benefit the patient's experience and save wasted bed days. Given the wide variation, lessons from the poorer performing centres could be learnt from the top performing centres. The 'best practice tariff' introduced in 2017-19 may begin to address these issues but does not yet appear to have had any impact.

A systematic review across regions is necessary if improvements are to occur with this aspect of clinical care. This can include capacity issues, efficiencies and prioritisations.

2.4 Radial access for PCI Procedures: reaching a ceiling?

2.4.1 Overview of QI metric

QI Metric Description/ Name	Use of radial access for PCI
Why is this important?	Radial access is associated with fewer complications than femoral access, and in high risk patients this has been shown to translate to improved survival – see additional detail below.
QI theme	Safety and outcomes
What is the standard to be met?	>75% of all cases to be performed via radial route 2018 ESC/EACTS Guidelines on myocardial revascularization:[10] Radial access is recommended as the standard approach, unless there are overriding procedural considerations. Recommendation Class 1, level of evidence A 2017 European Society of Cardiology Guidelines for management of acute myocardial infarction in patients presenting with STEMI:[7] Radial access is recommended (for primary PCI) over femoral access if performed by an experienced radial operator. Recommendation Class 1, level of evidence A The NAPCI Domain Expert Group advised an audit standard cut off of 75% radial rate to allow for variations in an operator's case mix (for example, those treating chronic total occlusions are more likely to need to use transfemoral access).
Numerator	Arterial access route includes right or left radial artery
Denominator	All PCI procedures (defined as procedures in the dataset where number of lesions/ vessels attempted >0)
Trends	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 87.2% in 2017/18 to 89.5% in the current analysis [Figure 2.13].
Variance	See Figure 2.14 and Figure 2.15. There are still some centres with a relatively low rate of radial procedures but fewer centres fail to meet the standard. The number of hospitals in England with radial rates less than 75% has fallen to four.

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 on the other hand 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 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%.

2.4.2 Audit results

Figure 2.13: Growth in the use of radial access for PCI, 2004 – 2019/20

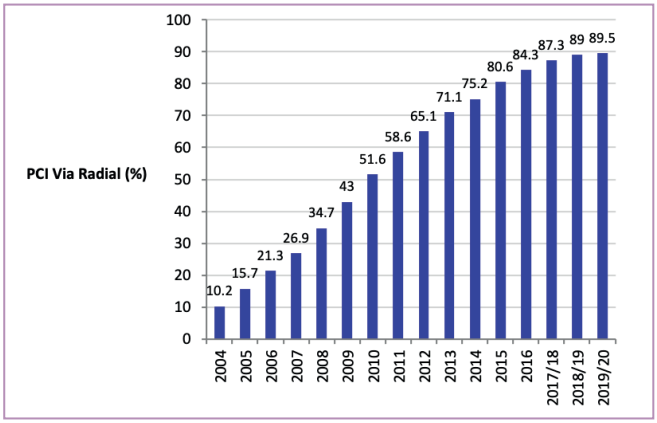
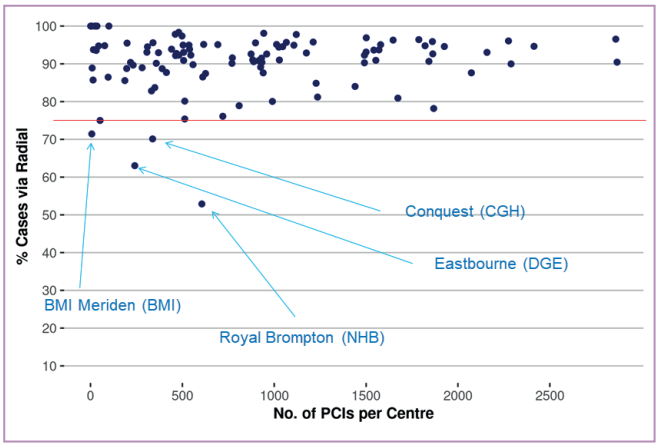
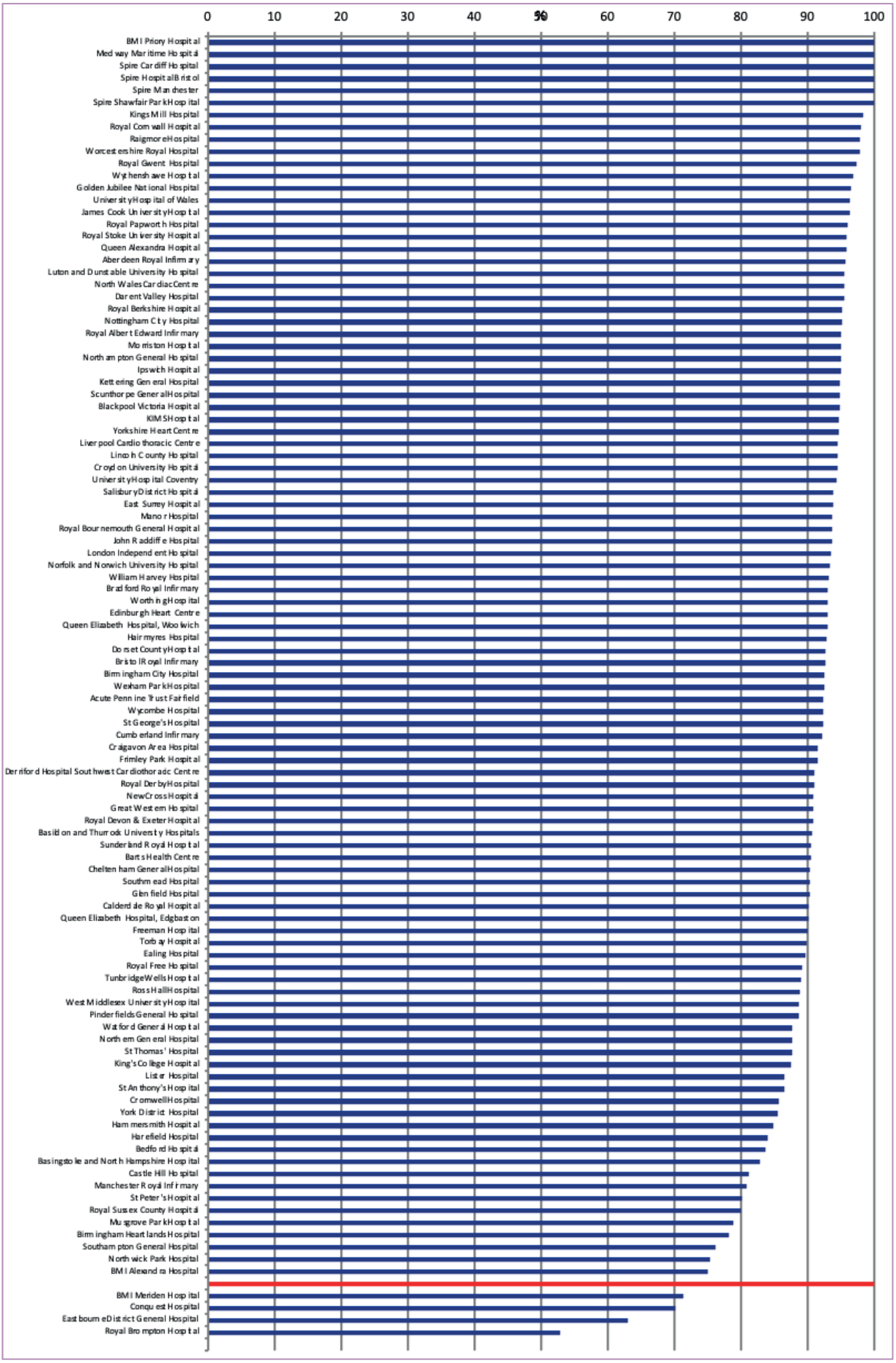


Figure 2.14: Use of radial access in PCI by hospital, 2019/20



See end of report for site codes.

Figure 2.15: Radial access rates (% of total cases) by hospital, 2019/20



*Note: Hospitals below the red line are **not** achieving ≥75% of PCI procedures using radial artery access.*

2.4.3 Recommendations for those not achieving the standard

There has been a substantial shift in practice of which the UK can be proud. The few operators who have yet to change their practice should be encouraged to make use of the educational resources available in the UK and, given the high percentages of the large majority, are very likely to have colleagues who can help support their shift in practice.

2.5 Day case PCI: much more could be done to offer this opportunity

2.5.1 Overview of QI metric

QI Metric Description/Name	Proportion of patients treated by PCI for stable symptoms who are treated as a day case
Why is this important?	Patient experience – see additional detail below
QI theme	Effectiveness
What is the standard to be met?	>75% as day cases The BCIS Domain Expert Working Group recommended that >75% of PCI procedures performed electively for stable symptoms should be discharged the same day as the procedure.
Key references to support wthe metric	References in text below are in reference list at end of report.
Numerator	Day case procedure for PCI for stable elective patients defined as: 2.03 Procedure Urgency = 1. Elective & 3.11 Number of lesions attempted >0 AND 3.01 Date and time of operation = same DATE as 4.04 Discharge Date
Denominator	PCI for stable elective patients defined as: 2.03 Procedure Urgency = 1. Elective & 3.11 Number of lesions attempted >0
Trends	No obvious trend over last 3 years
Variance	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 [Figure 2.16 and Figure 2.17].

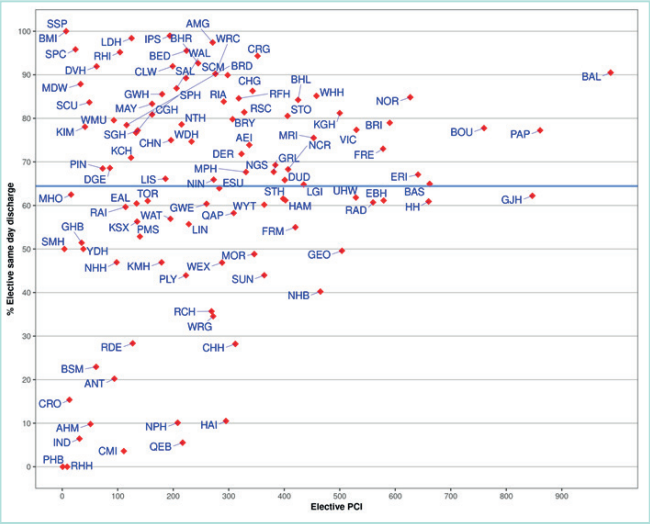
When PCI was first introduced, in the first few hours after the procedure serious complications would occur in about 5% of cases, requiring emergency intervention including surgery. As a result all patients were kept in hospital overnight and monitored carefully. However, the PCI has evolved and has become a much safer treatment. This is due to a number of developments including the use of stents, special anti-platelet (blood-thinning) drugs, and the use of radial artery access (see above).

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,[12] and analyses of the NAPCI dataset.[13, 14, 15, 16] 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.

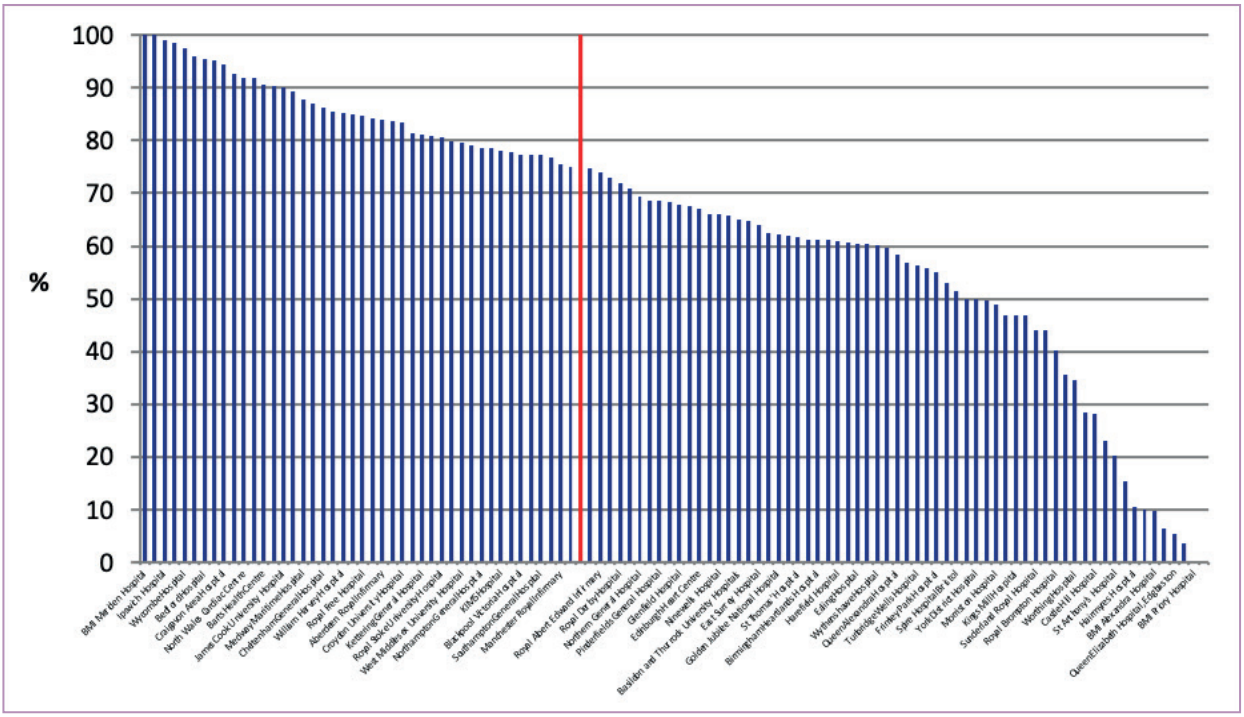
2.5.2 Audit results

Figure 2.16: Proportion (%) of elective PCI performed as a day case by hospital, according to overall hospital PCI activity, 2019/20



See end of report for site codes.

Figure 2.17: Proportion (%) of elective PCI performed as a day case by hospital, 2019/20



Hospitals to the right of the red line *are* ***not*** *achieving ≥75% of elective PCI patients treated as a day case.*

2.5.3 Recommendations for those not achieving the standard

Hospitals should seek to modify their pathways and ward structures to reduce unnecessary overnight stays for patients.

The explanation for this wide variation will include differences in the management of wards and day units, pressure on beds from emergency admissions and differences in patient pathways.

2.6 Drug eluting stents (DES) use during Primary PCI (PPCI): high adherence to the expected standard

2.6.1 Overview of QI metric

QI Metric Description/Name	DES as proportion of stented cases in PPCI
Why is this important?	Evidence of benefit over bare metal stents. 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 of the latest (third generation) drug eluting stents.[17, 18] These trials show that new generation drug eluting stents maintain the benefits of reduced restenosis, without increasing the risk of stent thrombosis. In fact, the most recent trials show DES are associated with less stent thrombosis than bare metal stents.
QI theme	Effectiveness, outcomes
What is the standard to be met?	>90% use of DES where a stent is deployed to treat STEMI. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation:[7] Stenting with new-generation DES is recommended over BMS for primary PCI. Class 1, Level of evidence A
Key references to support the metric	References as above are in the reference list at end of report.
Numerator	Primary PCI where the stent used is a DES, defined as: 3.11 Number of lesions attempted >0 AND 2.02 Indication for Intervention = 4. ACS – Primary PCI for STEMI (no lysis) AND 3.15 Number Stents used >0 AND DES = 3.16 Number of Drug-eluting stents used >0
Denominator	Primary PCI where a stent is used, defined as: 3.11 Number of lesions attempted >0 AND 2.02 Indication for Intervention = 4. ACS – Primary PCI for STEMI (no lysis) AND 3.15 Number Stents used >0
Trends	There has been a small drop overall in the proportion of patients receiving a stent during PCI over the last few years, possibly because of an emerging evidence around the use of drug-eluting balloons. This technology was only added to the dataset in 2019, so it is too soon to use the dataset to address this issue although analyses are planned in the future (provisional data are presented in the full slide deck on the BCIS web site). Where a stent is used, there remains a very high use of DES [Figure 2.18 and Figure 2.19]. Assessing stent type use by presenting syndrome shows consistently high use in all [Figure 2.19]. Use of drug eluting stent for primary PCI by centre shows almost all centres with >90% usage [Figure 2.20 and Figure 2.21].
Variance	This audit has assessed the use of DES during PPCI for all centres, and shown very high levels of compliance with these recommendations in almost all centres. A plot of any stent and drug eluting stent use over the years shows that almost all stents now used are drug eluting [Figure 2.20 and Figure 2.21].

2.6.2 Audit results

Figure 2.18: Trends in stent use during all PCI procedures 1992 – 2019/20, with DES use since 2003

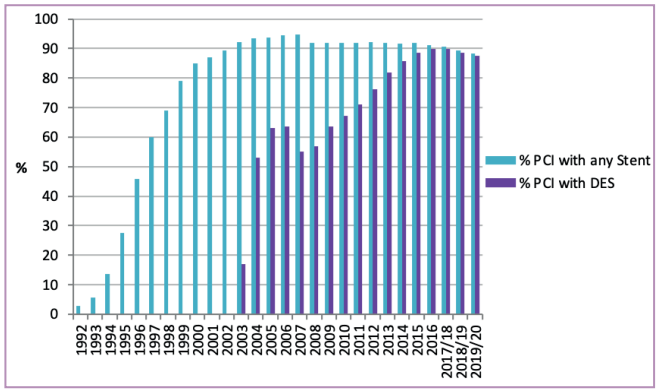


Figure 2.19: Use of DES during PCI procedures in specific syndromes, 2008 – 2019/20

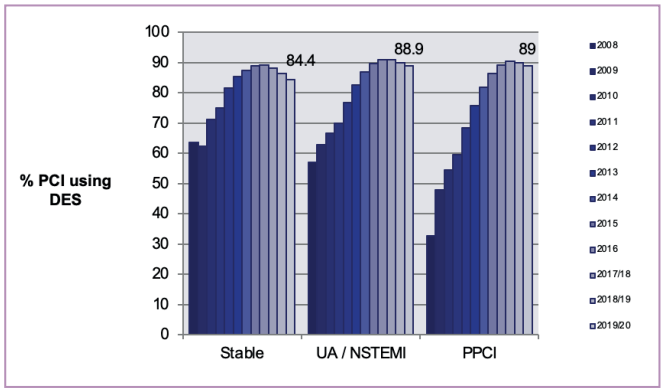
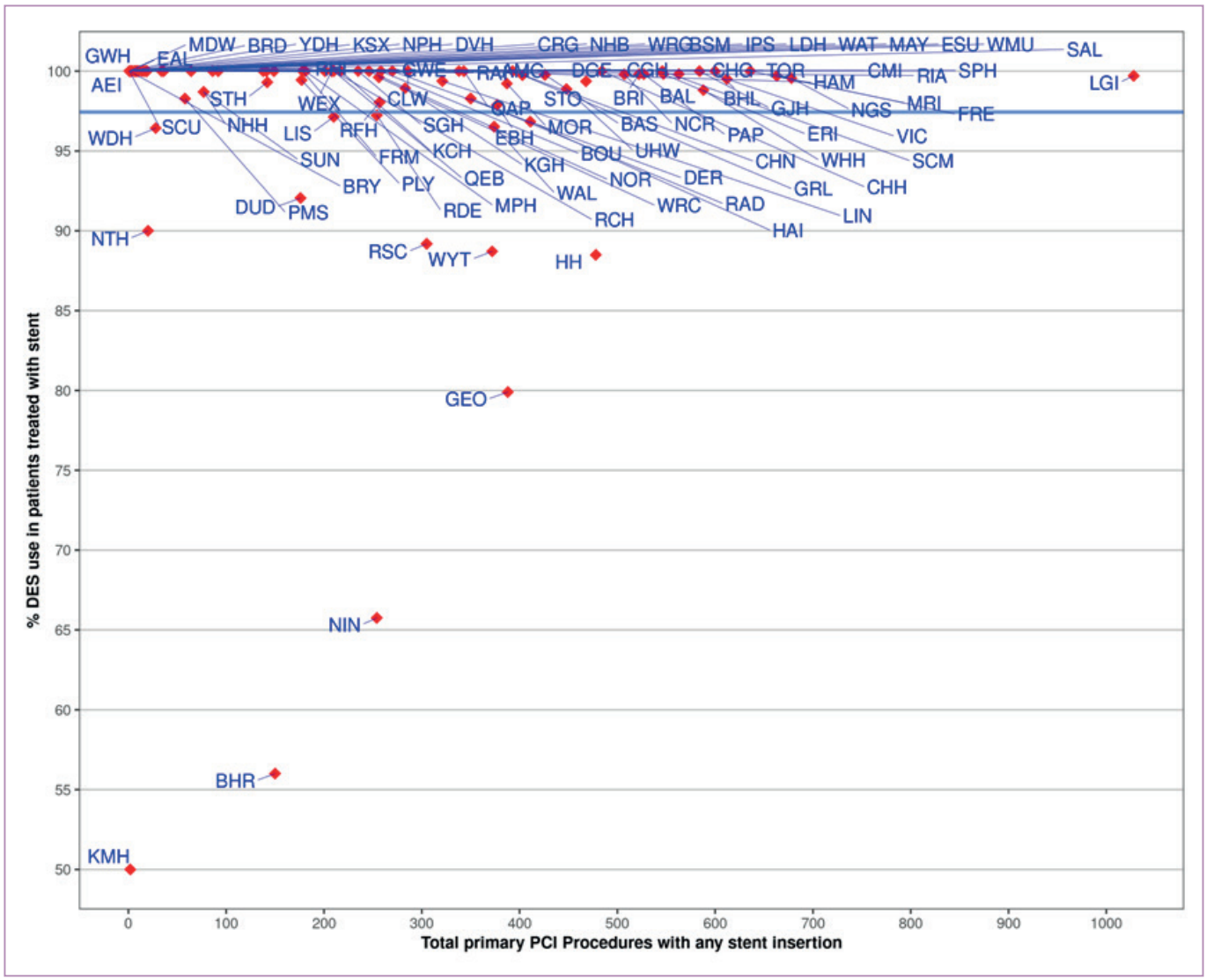
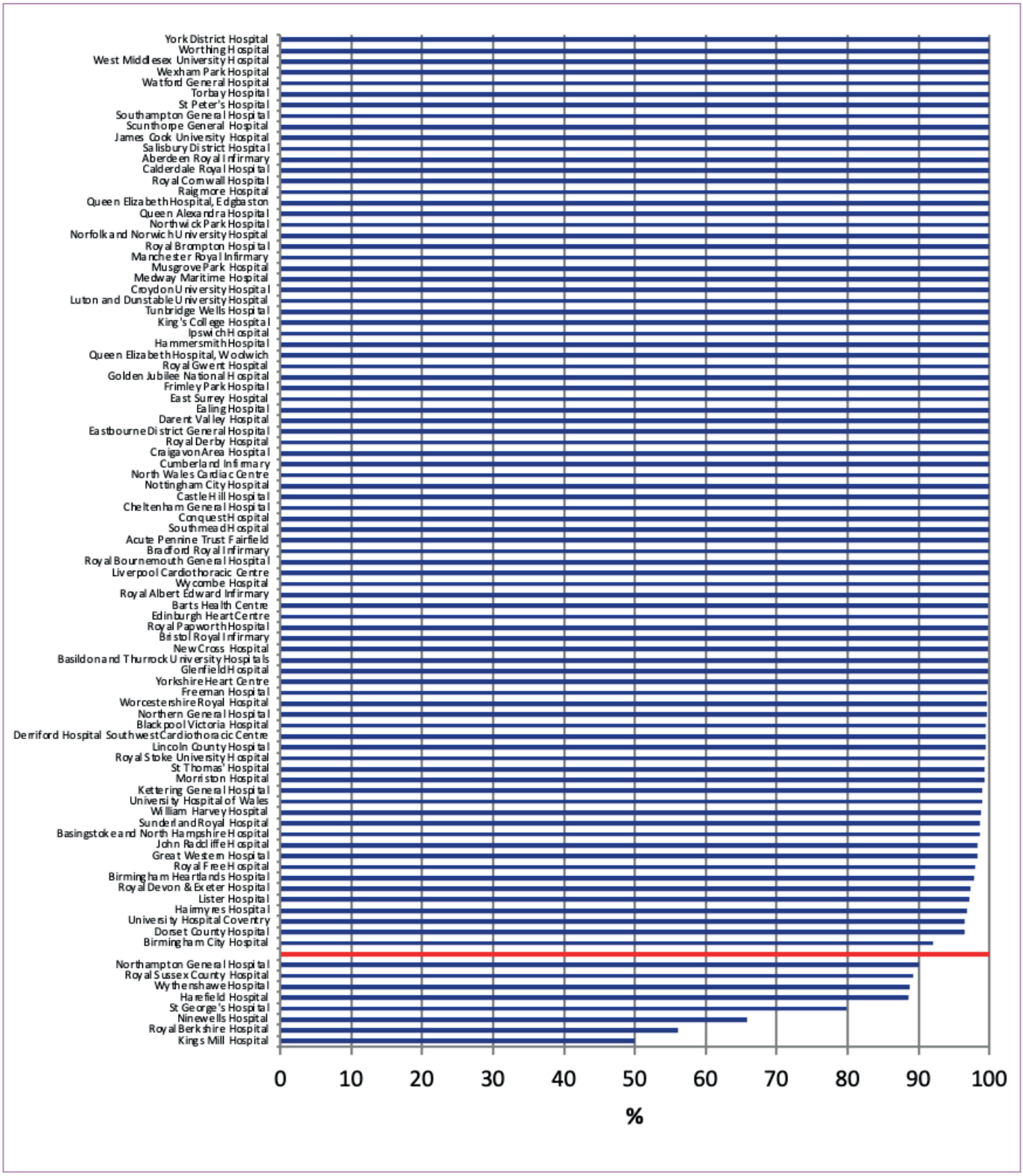


Figure 2.20: Use of DES in PPCI by hospital, 2019/20



See end of report for site codes.

Figure 2.21: Use of DES (% of total cases) in PPCI in individual hospitals, 2019/20



*Hospitals below the red line do **not** use DES in ≥90% of PPCI procedures requiring a stent.*

2.6.3 Recommendations for those not achieving the standard

Hospitals not meeting the standards for the use of drug-eluting stents during primary PCI should review their cases to see where improvements can be made.

2.7 Data Completeness

2.7.1 Overview of QI metric

An assessment of data completeness forms part of the Clinical Outcomes Publication that will be available later in the year. For completeness the rationale and description is provided below.

QI Metric Description/Name	1. Data completeness of key fields required for risk adjusted outcome analysis 2. Data completeness for time delays to STEMI treatment 3. Data completeness for time delays to NSTEMI treatment
Why is this important?	1. To allow accurate assessment of outcomes 2. To allow accurate assessment of delays to PCI in ACS
QI theme	Safety and effectiveness and surrogate for outcomes
What is the standard to be met?	>95% completeness of each of the key fields
Key references to support the metric	BCIS data monitoring group recommendation

3 | Future direction

We continue to strive for more contemporaneous data, so that these can be available to hospitals in as close to real time as possible. A suite of analytic tools that interrogate and analyse the live NICOR dataset has been developed and continues to be enhanced.

In the short term, we plan to address differential access to PCI and quality of PCI provided by exploring rates of procedures and their quality at a regional level (using the Clinical Commissioning Group in which a patient lives), and report these data to commissioners, hospitals and patients, thereby trying to identify and address geographic inequity of care.

We will work with the British Cardiovascular Intervention Society and other agencies for change, as well as directly with NHS England/Improvement, to support national and regional strategies to make the changes that our report calls for, especially with respect to the management of patients suffering a heart attack.

4 | PCI Centre codes

Hospital code	Hospital Name
AEI	Royal Albert Edward Infirmary (Wigan)
AHM	BMI Alexandra Hospital
ALT	Altnagelvin Hospital
AMG	Wycombe Hospital
ANT	St Anthony's Hospital
BAS	Basildon and Thurrock University Hospitals
BAT	Royal United Hospital Bath
BED	Bedford Hospital
BHL	Liverpool Cardiothoracic Centre
BHR	Royal Berkshire and Battle Hospital
BLA	Royal Blackburn Hospital
BMI	BMI Meriden Hospital
BOU	Royal Bournemouth Hospital
BRD	Bradford Royal Infirmary
BRI	Bristol Royal Infirmary
BRY	Acute Pennine Trust Fairfield
BSM	Southmead Hospital Bristol
CGH	Conquest Hospital
CHG	Cheltenham General Hospital
CHH	Castle Hill Hospital
CHN	Nottingham City Hospital
CLW	North Wales Cardiac Centre
CMI	Cumberland Infirmary
CRG	Craigavon Hospital
CRO	Cromwell Hospital
DER	Royal Derby Hospital
DGE	Eastbourne Hospital
DUC	Duchy Hospital
DUD	Birmingham City Hospital
DVH	Darent Valley Hospital

Hospital code	Hospital Name
EAL	Ealing Hospital
EBH	Birmingham Heartlands Hospital
ERI	Edinburgh Heart Centre
ESU	East Surrey Hospital
FRE	Freeman Hospital
FRM	Frimley Park Hospital
GEO	St George's Hospital
GHB	Spire Hospital Bristol
GJH	Golden Jubilee National Hospital
GRL	Glenfield Hospital
GWE	Royal Gwent Hospital
GWH	Queen Elizabeth Hospital Woolwich
HAI	Hairmyres Hospital
HAM	Hammersmith Hospital
HBP	Spire Hospital Hull and East Riding
HH	Harefield Hospital
HHW	Wellington Hospital
HSC	Harley Street Clinic
IND	London Independent Hospital
IPS	Ipswich Hospital
KCH	Kings College Hospital
KGH	Kettering General Hospital
KIM	Kent Institute of Medicine & Surgery
KMH	Kings Mill Hospital
KSX	Tunbridge Wells Hospital
LBH	London Bridge Hospital
LDH	Luton and Dunstable University Hospital
LGI	Yorkshire Heart Centre
LIN	Lincoln County Hospital
LIS	Lister Hospital

Hospital code	Hospital Name
LNH	Leeds Nuffield Hospital
MAY	Croydon University Hospital
MDW	Medway Maritime Hospital
MHO	Manor Hospital Oxford
MOR	Morriston Hospital
MPH	Musgrove Park Hospital
MRI	Manchester Royal Infirmary
NBO	Nuffield Health Bournemouth Hospital
NCR	New Cross Hospital
NGS	Northern General Hospital
NHB	Royal Brompton Hospital
NHH	Basingstoke and North Hampshire Hospital
NIN	Ninewells Hospital
NOR	Norfolk and Norwich University Hospital
NPH	Northwick Park Hospital
NTH	Northampton General Hospital
PAP	Papworth Hospital
PHB	BMI Priory Hospital
PHN	BMI Park Hospital
PIN	Pinderfields General Hospital
PLY	Derriford Hospital, Southwest Cardiothoracic Centre
PMS	Great Western Hospital, Wiltshire Cardiac Centre
QAP	Queen Alexandra Hospital
QEB	Queen Elizabeth Hospital, Birmingham
RAD	John Radcliffe Hospital
RAI	Raigmore Hospital
RCH	Royal Cornwall Hospital
RDE	Royal Devon & Exeter Hospital
RFH	Royal Free Hospital
RHH	Ross Hall Hospital

Hospital code	Hospital Name
RHI	Calderdale Royal Hospital
RIA	Aberdeen Royal Infirmary
RSC	Royal Sussex County Hospital
RVB	Royal Victoria Hospital
SAL	Salisbury District Hospital
SBH	Barts Health Centre, St Bartholomew's Hospital
SCM	James Cook University Hospital
SCU	Scunthorpe General Hospital
SGH	Southampton General Hospital
SPC	Spire Cardiff Hospital
SPH	St Peter's Hospital
SSP	Spire Shawfair Park Hospital
STH	St Thomas' Hospital
STO	University Hospital of North Staffordshire
SUN	Sunderland Royal Hospital
TOR	Torbay Hospital
UHW	University Hospital of Wales
VIC	Blackpool Victoria Hospital
WAL	University Hospital Coventry
WAT	Watford General Hospital
WDH	Dorset County Hospital
WEX	Wexham Park Hospital
WHH	William Harvey Hospital
WMU	West Middlesex University Hospital
WRC	Worcester Royal Hospital
WRG	Worthing Hospital
WYT	Wythenshawe Hospital
YDH	York District General Hospital

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