NATIONAL CARDIAC
AUDIT PROGRAMME (NCAP)

ANNUAL REPORT 2021

The way we were
A pre-pandemic stocktake
to help the recovery

(2019/20 or 2017/20 data)

NICOR

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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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.
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Data from the period April 2019 to March 2020

Where things were getting better

83.2% of patients with STEMI received reperfusion therapy (up from **74.3%** in 2010/11)

76.3% of patients with MI underwent in-house echocardiography (up from **57.5%** in 2010/11

81.3% of patients with MI were referred for cardiac rehabilitation (up from **78.3%** in 2017/18)

96.4% of patients with NSTEMI were seen by a specialist team (up from **90.4%** in 2010/11)

89.5% of patients had PCI performed with radial access (up from **51.6%** in 2010)

>90% of patients requiring a pacemaker received a device consistent with NICE guidance

90% of patients with HFrEF were discharged on a beta blocker; **84%** on either an ACEi or ARB

Where things were stuck

61.3% of patients with an MI were admitted to a cardiology ward (albeit up from **49.1%** in 2010/11). **43%** of those with HF were admitted to a cardiology ward (down from **49%** in 2014/15)

68% of patients with LVSD post MI (up from **40.8%** in 2010/11 but no improvement over the last 3 years) and **56%** of those with HFrEF received an MRA; only **49%** of patients with HFrEF are discharged on all three disease-modifying drugs

64% of patients undergoing elective PCI are treated as a day case (against a target of **>75%**)

50.3% of infants surviving pregnancy and requiring an intervention in the first year of life have had a pre-natal diagnosis made

40% of hospitals have not achieved **>80%** compliance with NICE guidelines for ICD implantation

16% of patients with heart failure are referred as an in-patient for cardiac rehabilitation (**22%** for those admitted to a cardiology ward, **~10%** for those admitted to other wards) – target **>85%**

Where things were getting worse

126 mins: CTB times for STEMI patients were worse: up from 110 mins in 2010/11

80 mins: CTD times for STEMI patients were worse: up from 58 mins in 2010/11

54.9% of patients with NSTEMI underwent angiography within 72 hours (down from **56.7%** in 2018/19; **54.2%** underwent PCI within 72 hours (down from **58.4%** in 2017/18

11 days: Mean time to urgent CABG had worsened (mean **10 days** in 2017/18)

104 days: Mean time to elective CABG had worsened (mean **97 days** in 2017/18)

CABG, coronary artery bypass grafting; CTB, Call-To-Balloon; CTD, Call-To-Door; DES, drug-eluting stent; HF, heart failure; HFrEF, heart failure with reduced ejection fraction; LVSD, left ventricular systolic dysfunction; MRA, mineralocorticoid receptor antagonist; NSTEMI, non-ST-elevation myocardial infarction; MI, myocardial infarction; PCI, percutaneous coronary intervention; PPCI, primary percutaneous coronary intervention; STEMI, ST-elevation myocardial infarction

Executive summary

This report summarises key findings from the National Cardiac Audit Programme (NCAP) based on data collected between 1st April 2019 and 31st March 2020 (or between 2017 and 2020 for those analyses requiring three years' consecutive data). Trends in data from 2010/11 are provided where appropriate to provide a comprehensive stocktake of progress and continuing challenges from the decade prior to the pandemic. As such, it represents the state of play up to the point we were just entering the national COVID-19 pandemic (the first lockdown occurring on the 23rd March 2020).

There was encouraging evidence of continuous improvement in performance in a wide range of measures across all the sub-specialties, demonstrating a better quality of care for patients. However, the level of variance across hospitals remained high in several areas, so there is still considerable room for improvement.

There were aspects of clinical practice where little progress was made in 2019/20 and for others, there was evidence of things getting worse. These related to important clinical targets that significantly impact on outcomes and on the quality of the patient experience.

As the pandemic moves into a new phase, there are major challenges for services faced with a backlog of cases as well as treating newly diagnosed patients. Where good practice was achieved before the pandemic, these standards should be maintained. Other results highlight where system changes are needed to tackle quality issues that were evident even before COVID-19. The choices made by system leaders and hospital teams in how they go about the recovery from the pandemic offer an opportunity to overcome some of the most important obstacles to improving the quality of cardiovascular treatment and the outcomes achieved for patients. NICOR has developed new data tools to allow hospitals to access analyses on their performance on a continuous basis, rather than just relying on the annual report. However, these tools will only be beneficial if hospitals enter their data rapidly and on a regular (preferable weekly) basis.

KEY MESSAGES

	FOCUS OF ATTENTION	AUDIT FINDING
	**Call-To-Door (CTD) times for patients with ST-elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (PPCI)**	Median CTB times deteriorated to **126 minutes** in 2019/20 (**110 minutes** in 2010/11) This is because patients are taking longer to get to hospital (CTD times had reached **80 minutes** compared with **58 minutes** in 2019/20)
	**Times to angiography, PCI and urgent Coronary Artery Bypass Graft (CABG) for patients presenting with non-STEMI (NSTEMI)**	Drop in cases undergoing angiography within 72 hours (down to **54.9%** from **56.7%** in 2018/19) Drop in patients treated with PCI within 72 hours (down to **58.4%** from 54.2%) Rise in time to urgent CABG from the date of the diagnostic angiogram (rising to **11 days** from **10 days** in 2017/18)
	**Waiting times for elective CABG**	Time to elective CABG worsened from **97 days** in 2017/18 to **104 days** in 2019/20

Patients with heart attacks or heart failure (HF) having specialist input to their care	Proportion of heart attack patients admitted to a cardiac ward, where they are more likely to get specialist input to their care, has stalled at **61.3%** Number of HF patients seen by specialists was static at **82%** (and falls to only **70%** where patients are seen on non-cardiology wards compared to **90%** in cardiology care) Given the positive impact of specialist care on outcomes, these figures remain worryingly low
Documentation of indication for implantable cardioverter-defibrillator (ICD) devices	**41%** of hospitals did not reach the target of having a documented reason for the use of ICD devices that conforms to NICE guidance
Proportion of HF patients discharged on best-practice three disease-modifying drugs	Only **49%** of relevant HF patients with reduced ejection fraction were discharged on all three disease-modifying drugs for which they were eligible, with significant variations between hospitals
Antenatal diagnosis of congenital lesions where an intervention is required within the first year of life	Diagnosis prior to birth has levelled off at **50.3%**
Backlog of cardiovascular procedures as a result of COVID-19	Backlog of cardiovascular procedures was estimated to be **45,501** at the end of May 2020 and will now be substantially greater

1 Introduction

1.1 NCAP comprises six cardiovascular specialties

This report summarises the outputs of the National Cardiac Audit Programme (NCAP) which aims to support quality improvement (QI) in cardiovascular specialties across six 'domains':

- The National Congenital Heart Disease Audit (NCHDA) referred to as the 'Congenital' audit and developed by the British Congenital Cardiac Association (BCCA) and the Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS)
- The Myocardial Ischaemia National Audit Project (MINAP) referred to as the 'Heart Attack' audit and developed with the support of the British Cardiovascular Society (BCS)
- The National Audit of Percutaneous Coronary Interventions (NAPCI) referred to as the 'Angioplasty' audit and developed by the British Cardiovascular Intervention Society (BCIS)
- The National Adult Cardiac Surgery Audit (NACSA) referred to as the 'Cardiac Surgery' audit and developed by the Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS)
- The National Heart Failure Audit (NHFA) referred to as the 'Heart Failure' audit and developed by the British Society for Heart Failure (BSH)
- The National Audit of Cardiac Rhythm Management (NACRM) referred to as the 'Heart Rhythm' audit and developed by the British Heart Rhythm Society (BHRS).

1.2 This report covers the period up to 2019/20 and largely before the COVID-19 pandemic

The audit data for this report were collected between 1st April 2019 and 31st March 2020 (or between 2017 and 2020 for those analyses requiring three years' consecutive data). As such it represents the state of play just as the UK was first affected by the COVID-19 pandemic and, for the most part, the expected detrimental impact on hospital admissions or clinical pathways for cardiovascular disease was not fully realised by this date.

However, for the results of individual cardiac surgeons, we have elected to report on the period from March 1st 2017 until 29th February 2020 (instead of April 1st 2017 until 31st March 2020) as there was uncertainty whether the results of surgery in March 2020 might have been affected by COVID-19.

Any influence on the consecutive results of outcomes over three years following Percutaneous Coronary Intervention (PCI) was deemed minimal and so the analyses from the standard three-year period from 1st April 2017 are reported.

We have included trend data from 2010/11 where appropriate to provide deeper analysis and reflection on both the progress that has been made in the last decade as well as on-going challenges.

Since then, the pandemic has had a significant impact on cardiovascular clinical pathways. The effects of the early part of the pandemic were outlined in our 2020 COVID report Rapid cardiovascular data: we need it now (and in the future).[1]

There was considerable disruption to clinical services during this period. Although the pandemic continues, the vaccination programme and social measures have allowed the restoration of services. We do not yet know how the pandemic will end, or whether we will enter an endemic or hyper-endemic phase, or how this will affect cardiovascular services.

While emergency care continued throughout the pandemic, other clinical pathways are now being restored and there is a backlog of cases to treat in addition to those newly presenting. Where standards were good or excellent, these need to be maintained. However, there were areas of clinical performance prior to the pandemic where desired standards had not been achieved.

As local systems rebuild, there is an opportunity for service redesign to focus attention on how to overcome obstacles to the changes that are necessary for these standards to be met. In our 2020 NCAP report (The ACID Test: improving cardiovascular care through aggregation, collaboration, information and delegation), we highlighted the need for a focus on quality as we head to calmer waters.[2]

In Section 4, we highlight some of the main issues and discuss the challenges ahead.

1.3 NICOR data support other national levers for QI

In Section 2, we highlight key findings that can drive QI at a specialty level at a hospital and operator level. The data collected are also useful for many other stakeholders, including patients and commissioners. In recent months, NICOR data have been used by the National Institute for Health and Care Excellence (NICE) in its NICE Impact Report on Cardiovascular Disease Management (February 2021)[3] as well as in the recent Healthcare Safety Investigation Branch (HSIB) report on delays to treatment for patients with a heart attack (HSIB Emergency response to heart attack, March 2021).[4] NICOR data were also used to support the hospital data packs for the Getting It Right First Time (GIRFT) Cardiology programme.[5]

1.4 Fast data submission allows for immediate information in return

Although this is our annual report, we have now developed online data tools that allow hospitals to use NICOR audit data continuously to:

- evaluate their data quality (hospitals can drill down to individual patients where data are missing or incomplete);
- see their performance on the designated QI metrics in the NCAP, comparing themselves against not only the national average but also the hospitals with the leading scores;
- set up bespoke data queries and to compare themselves against the national average;
- evaluate the timeliness of their data downloads.

The data timeliness tool is available to all hospitals for all domains while the analytical tools are available for the NAPCI, NACSA, MINAP and are being released currently for the NCHDA and NHFA. Roll-out to the NACRM will follow. We have provided on-line training videos to help users learn how to use these.

We are also developing QI packs to assist hospitals with improvement programmes where needed. The power of these tools is dependent on rapid data entry. For hospitals to benefit maximally, they should conform to the data input requirements. The expectation is that all data for a hospital admission should be sent to NICOR within three months, but preferably earlier. Although some hospitals only send their data after a local validation process, best practice is to send data on a weekly basis, acknowledging that altered (validated) data will subsequently over-write the first download. The professional societies have pushed for tools that support a contemporary analysis of performance rather than just an annual review, but this is only achievable if all hospitals engage with rapid data submission.

1.5 There is more focus on equity of access to care

Even prior to the pandemic, there had been much debate about inequalities in accessing healthcare and the potential drivers behind these, and this has risen to the fore with COVID-19. With the two disease-specific domains of the NCAP (the Heart Attack and the Heart Failure audits) it is possible to investigate whether certain groups are more or less likely to receive evidence-based care. For the four procedure-based domains, the ability to explore inequalities is limited because they do not capture data on patients who have not received care, whether because it was not offered, it was declined, or some other feature prevented the opportunity. Nevertheless, we have provided a number of observations from our analyses in Section 3.

In this year's Heart Failure report, there is a moving story from a Consultant Cardiologist whose suspicions about his own diagnosis were followed by the devastating confirmation of his heart failure and its severity. The impact on both him and his family is revealed. He then received rapid and excellent care from his Consultants but the importance of the support services, particularly from the Specialist Nurses, is highlighted. Not only the care provided but also the time needed for explanation and understanding are key components to better adherence to treatment and better outcomes. The expectation is that the necessary infrastructure required for optimal care should be provided for all patients.

2 | Quality improvement metrics

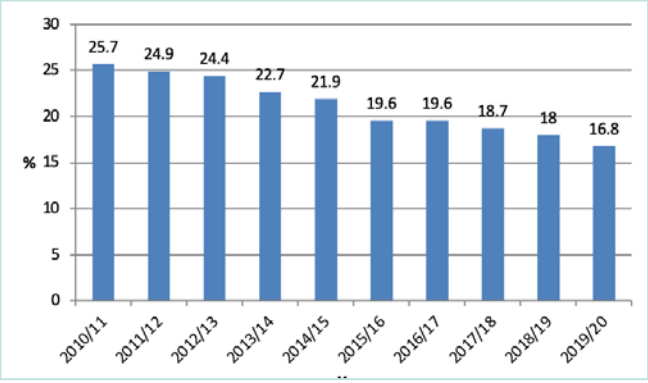
2.1 Where things were getting better

2.1.1 Proportionately more patients with ST-elevation myocardial infarction (STEMI) received reperfusion therapy

Patients with ST-elevation MI (STEMI) should receive rapid reperfusion therapy with primary percutaneous coronary intervention (PPCI) (or 'primary angioplasty') if it can be delivered within 2 hours of when thrombolysis could be given. Thrombolysis may still be used if PPCI cannot be delivered within this timeframe, but very few patients now receive this. The recent HSIB report highlighted that some patients should still be considered for thrombolysis but identified the problem that the required skills by paramedics has diminished because of reduced frequency of administration of clot-busting drugs.[4] Many ambulance trusts no longer have these available. The onus then is for rapid recognition of the diagnosis and immediate liaison with the nearest PPCI hospital.

There is an issue of timeliness of therapy which is addressed in section 2.3.1. However, overall, the proportion of patients not receiving reperfusion therapy continues to fall [Figure 2.1]. Although in small part related to missing data, this suggests that the number of patients presenting too late to achieve the benefits of treatment has fallen and physician decisions to withhold potentially harmful therapy from those with little to gain may also be a factor.

Figure 2.1: *Proportion (%) of patients with ST-elevation myocardial infarction who did not receive reperfusion therapy, 2010/11 – 2019/20 [MINAP data]*



2.1.2 Heart attack patients were more likely to undergo in-house echocardiography and to be referred to cardiac rehabilitation

Following initial treatment, patients receive secondary preventive drug therapies to reduce the risk of subsequent cardiovascular events. Administration of anti-platelet drugs, beta blockers, statins and ACE inhibitors (or angiotensin receptor blockers) has been at a high level for some years.

More recently, there has been a focus on the use of mineralocorticoid receptor antagonists (MRAs) for patients with left ventricular systolic dysfunction (LVSD). This requires an evaluation of ventricular function, usually by echocardiography, which is also important for decisions around the use of beta blockers and ACE-inhibitors. This should be done and therapy started during the index admission.

Performance had improved with more than 75% of patients undergoing in-house echocardiography [Figure 2.2]. There is still room for improvement as a significant proportion of hospitals failed to reach the standard set, especially for patients with non-ST-elevation myocardial infarction [Figure 2.3].

Figure 2.2: *Proportion (%) of patients with a heart attack undergoing pre- or planned post-discharge echocardiography, 2010/11 – 2019/20 [MINAP data]*

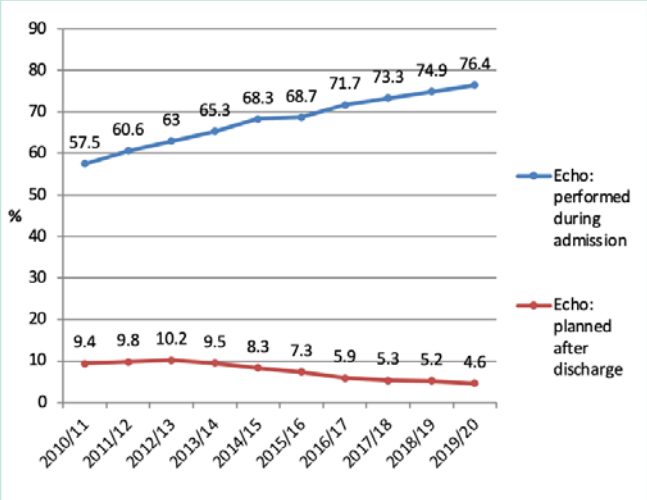
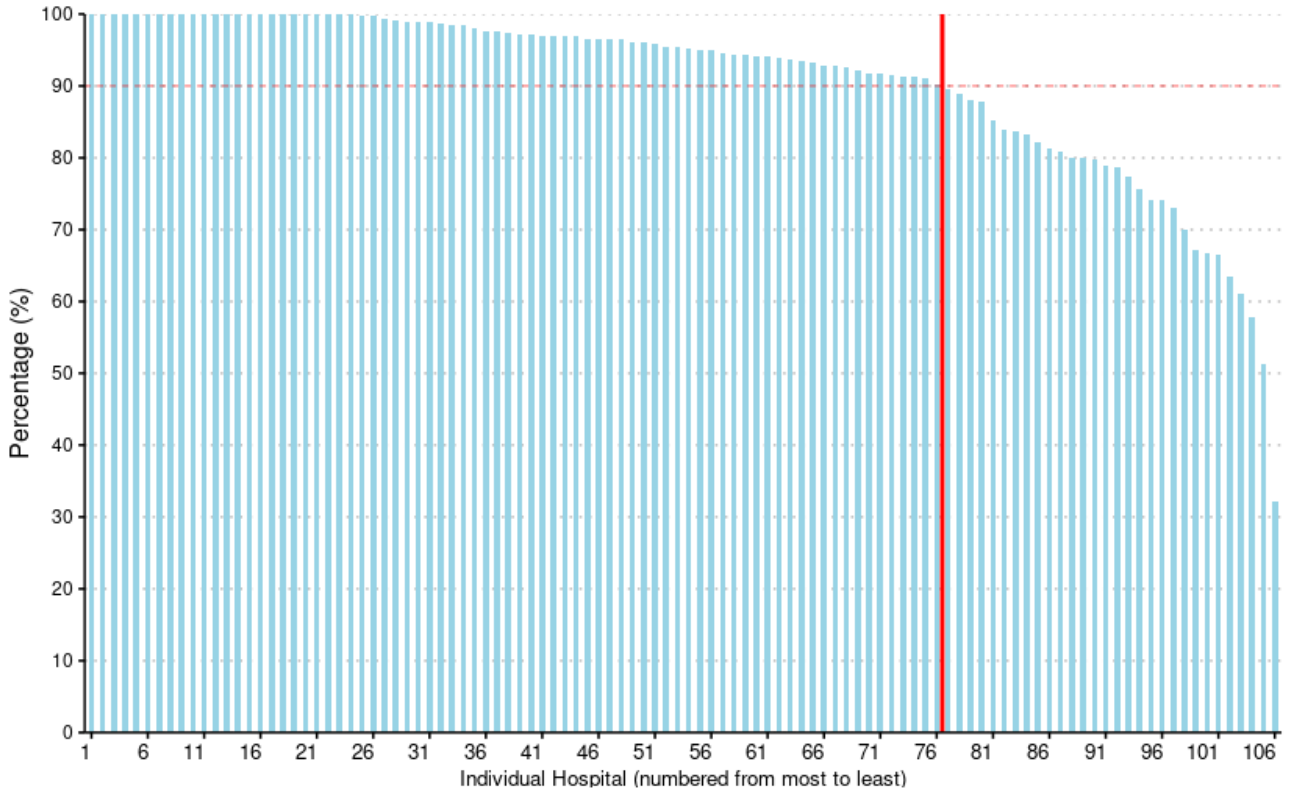
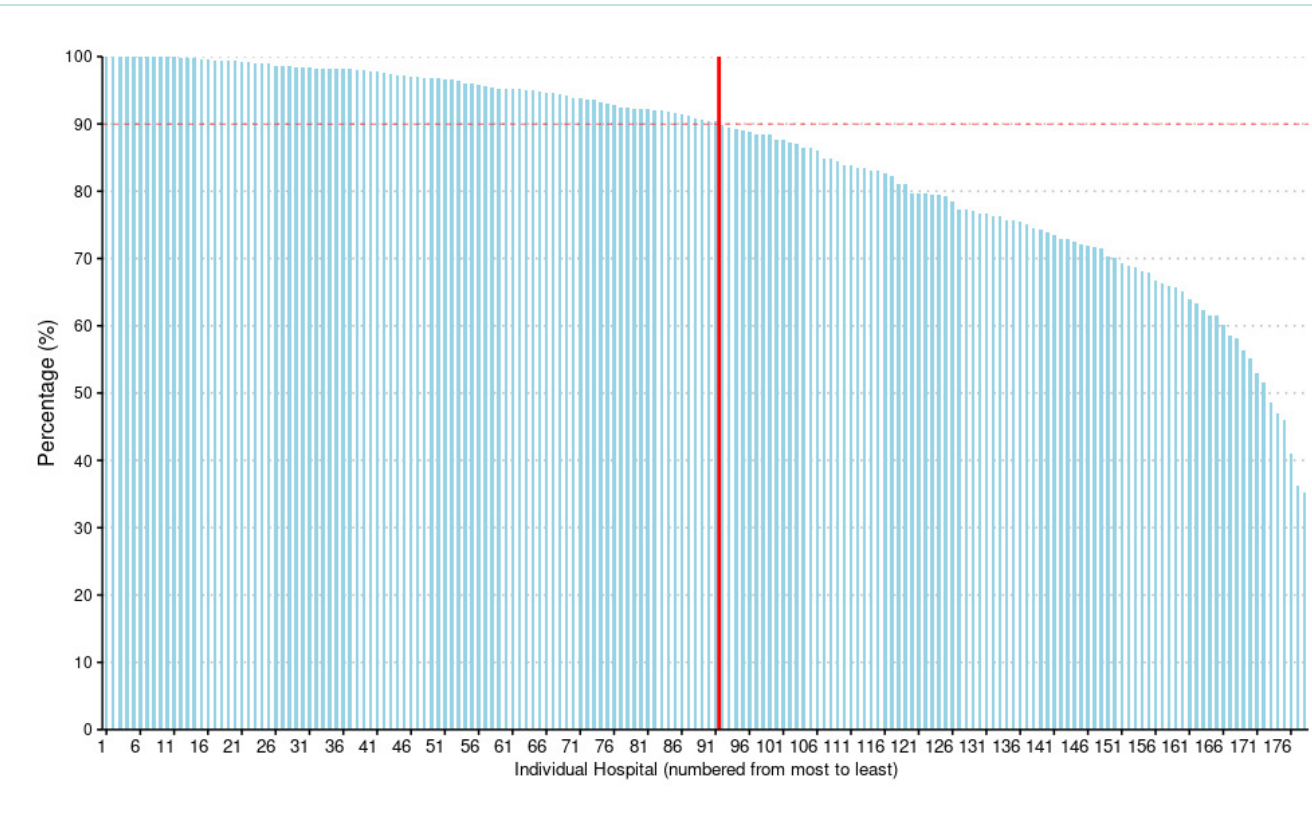


Figure 2.3: *Pre-discharge echocardiography in patients with (a) ST-elevation myocardial infarction and (b) both ST- and non-ST-elevation myocardial infarction, by hospital 2019/20 [MINAP data]*

STEMI cases only





STEMI and NSTEMI cases

Hospitals to the right of the red line have not achieved the target of 90% of patients undergoing pre-discharge echocardiography.

The vast majority of patients admitted with a heart attack gain from referral to the cardiac rehabilitation service. Referrals have increased but remain short of the 85% target set by the NHS Long Term Plan [Figure 2.4].[6] Improved performance should be the aim of the one third of hospitals that did not achieve this target [Figure 2.5].

Figure 2.4: *Pre-discharge referrals (%) to cardiac rehabilitation for patients following a heart attack, 2010/11 – 2019/20 [MINAP data]*

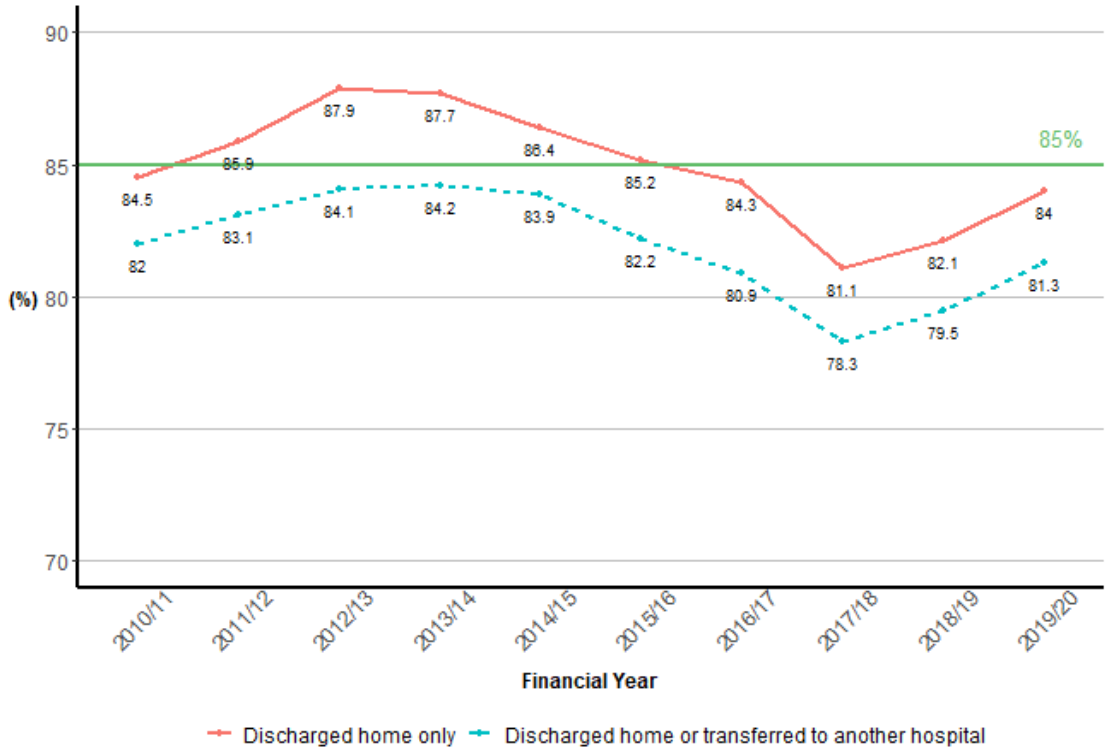
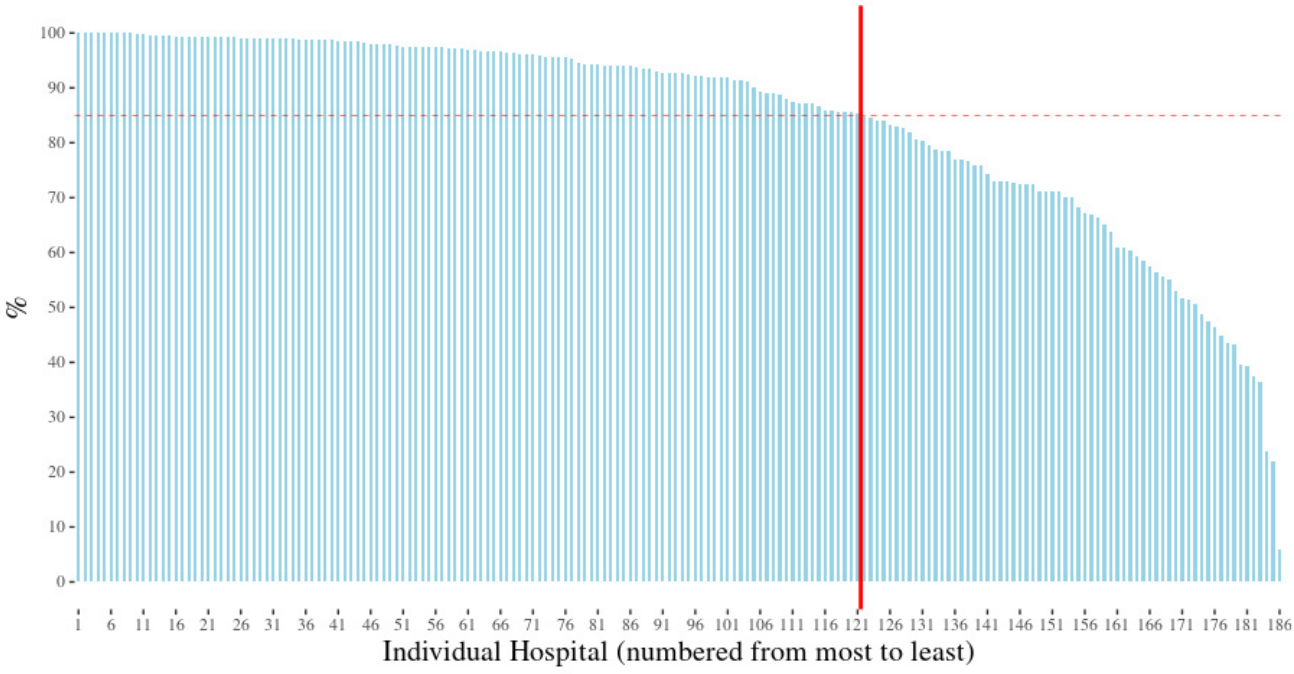


Figure 2.5: *Pre-discharge referral of patients with a heart attack for cardiac rehabilitation, by hospital 2019/20 [MINAP data]*



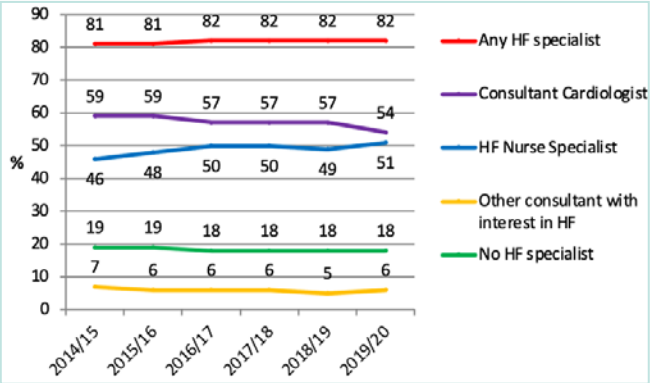
Hospitals to the right of the red line have not achieved the target of 85% of patients referred to cardiac rehabilitation prior to discharge.

2.1.3 A high proportion of patients with heart failure was seen by a heart failure specialist and received prognostically important treatments, but more can be done

The NHFA report shows that patients who are seen by specialists whilst in hospital are more likely to receive treatments that have a favourable impact on outcomes and quality of life. In section 2.2.1, we highlight that proportionately fewer HF patients were admitted to a cardiology ward. Outreach services compensate for this, but these cannot achieve the same level of care provided by daily contact with the focussed skills of the nurses on cardiology wards and regular input from the cardiology consultants and their trainee staff.

More than 80% of patients with heart failure were seen by a member of the specialist teams [Figure 2.6]. Although more patients were being seen by the outreach teams and the Specialist Nurses, Pharmacists and others do a formidable job, it is noticeable that proportionately fewer patients nursed in General Medical and other wards were being seen by Consultant Cardiologists.

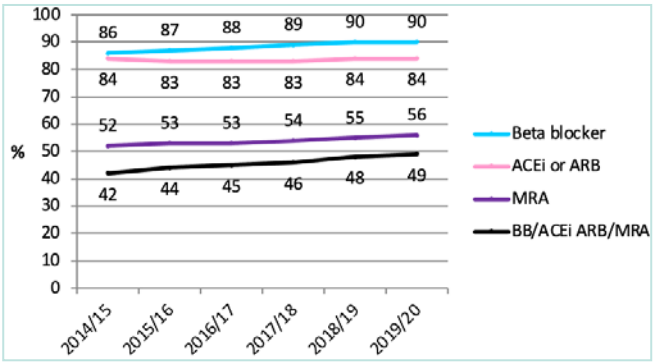
Figure 2.6: *Proportion (%) of heart failure patients seen by a member of the HF specialist team, 2014/15 – 2019/20 [NHFA data]*



HF = heart failure.

In line with these efforts, patients with heart failure with reduced ejection fraction (HFrEF) were highly likely to receive a beta blocker and either an ACE inhibitor or angiotensin receptor blocker prior to discharge [Figure 2.7] and there had been a gradual increase in the prescription of mineralocorticoid receptor antagonists (MRAs) (but see also section 2.2.2).

Figure 2.7: *Proportion (%) of patients with HFrEF prescribed disease-modifying drug therapies on discharge, 2014/15 – 2019/20 [NHFA data]*



ACEi = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker; MRA = mineralocorticoid receptor antagonist; BB = beta blocker.

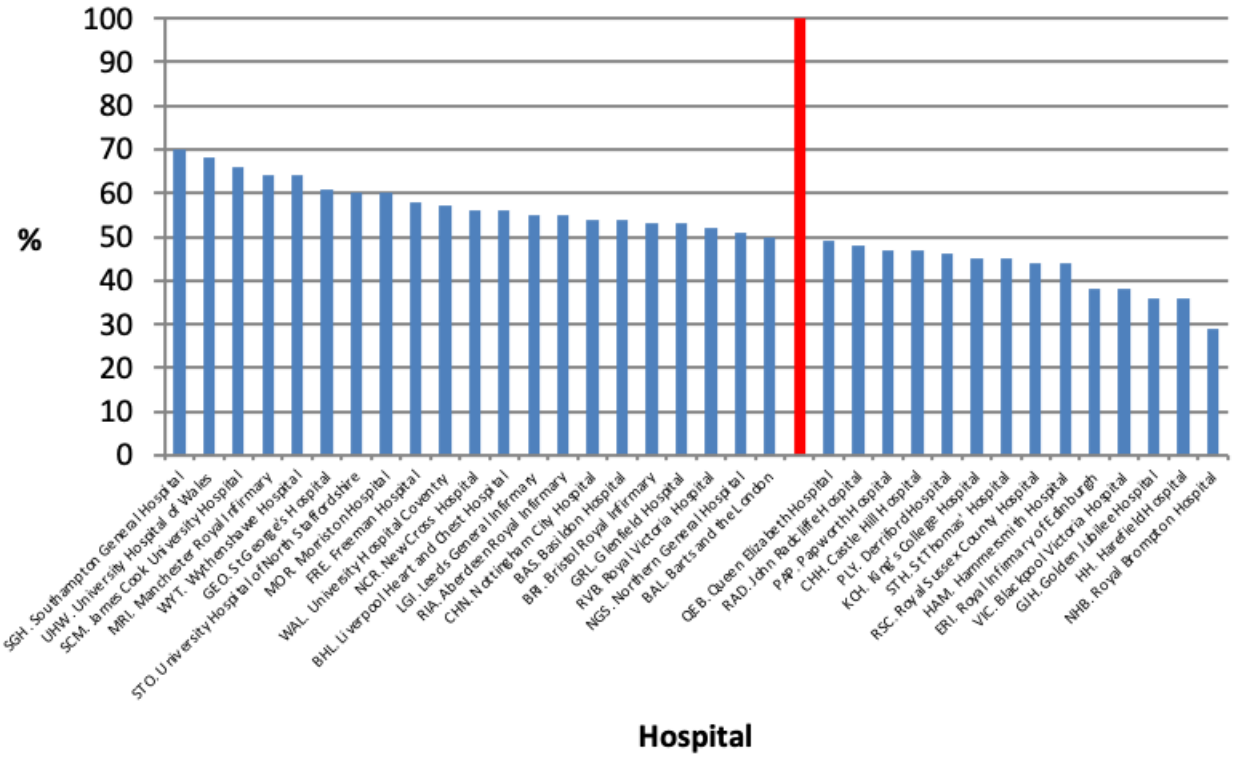
2.1.4 There had been a greater focus on providing CABG for urgent cases

Following an acute coronary syndrome, patients may require percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG) or a decision made for optimal medical therapy without the need for a revascularisation procedure. For those in whom CABG is preferred, urgent surgery provided in the same hospital admission is recommended rather than discharging the patient to be readmitted later for an elective procedure.

Some progress had been made, either because of this focus on urgent cases but perhaps aided by a reduction overall in the number of patients undergoing elective CABG (although this is partly cause and effect). Overall, urgent cases represented 50.7% of all cases (a 3.3% increase over 3 years) [Figure 2.8]. There was considerable variation amongst centres (29-70% in NHS centres) suggesting considerable room for improvement [Figure 2.9].

Figure 2.8: *Proportion (%) of first-time CABG patients operated on urgently, 2017/18 – 2019/20 [NACSA data]*

Figure 2.9: *Proportion (%) of first-time CABG patients operated on urgently, by NHS hospital 2019/20 [NACSA data]*



Hospitals to the right of the red line have not achieved the target of at least 50% of patients operated on urgently.

2.1.5 More patients undergoing first time elective CABG were admitted on the same day as surgery

The SCTS has promoted the use of day-of-surgery admissions (DOSA) for elective CABG. This provides a better patient experience and aids efficiency. Although well short of the 50% target set, the proportion increased from 10.8% to 18.5% over two years but this was entirely down to changes in England (from 11.4% to 20.8% [Figure 2.10]). There was considerable variation amongst centres (0.3-71.4% in NHS centres [Figure 2.11]) and many surgical units could learn from the steps taken by those who have championed this change in practice.

Figure 2.10: *Proportion (%) of patients undergoing elective CABG with day-of-surgery admission (DOSA), 2017/18 – 2019/20 [NACSA data]*

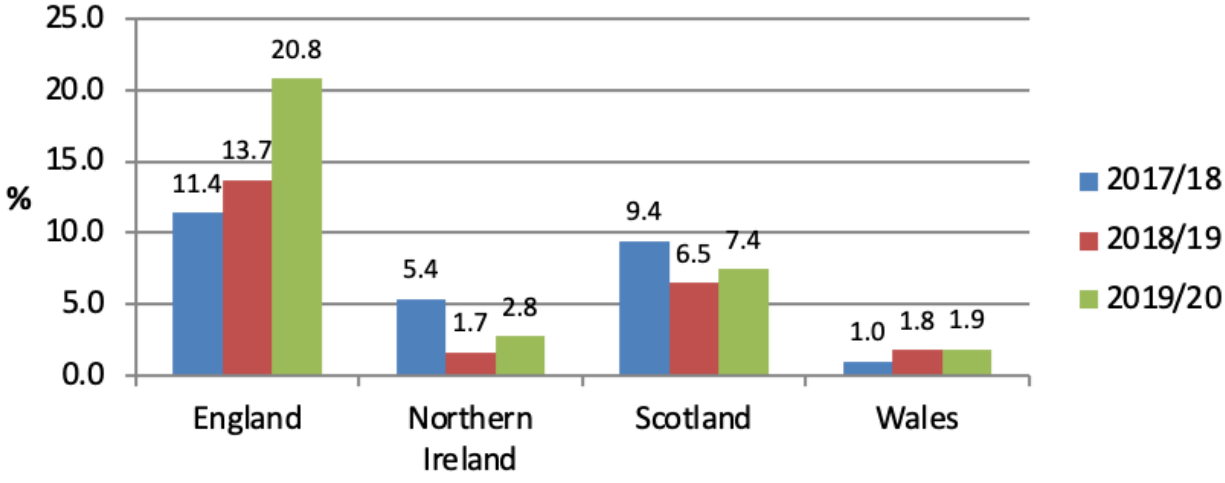
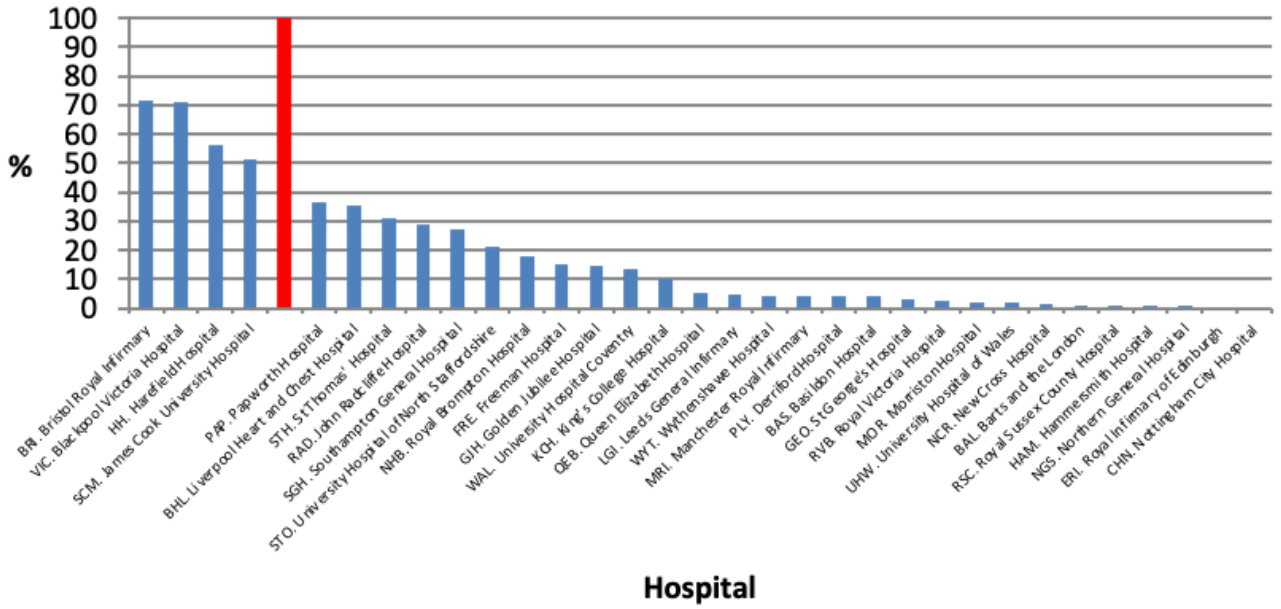


Figure 2.11: *Proportion (%) of patients with day-of-surgery admission (DOSA) for elective CABG, by NHS hospital 2019/20*



Hospitals to the right of the red line have not achieved the target of 50% of elective patients admitted on the day of surgery.

2.1.6 Fewer patients required re-operation for bleeding following CABG

Two years ago, the NACSA focussed on complications following CABG. Across the UK, rates of complications are gratifyingly low but the initial review demonstrated a worrying variance in some aspects of care. Since then, there has been a reduction in re-operation rates for bleeding from 2.59% to 1.83% over two years [Figure 2.12]. The variance seen in NHS hospitals (range 0-3.57% in centres providing adequate data [Figure 2.13]) suggests that further improvements are possible.

Figure 2.12: *Proportion (%) of patients requiring re-operation for bleeding after CABG, 2017/18 – 2019/20 [NACSA data]*

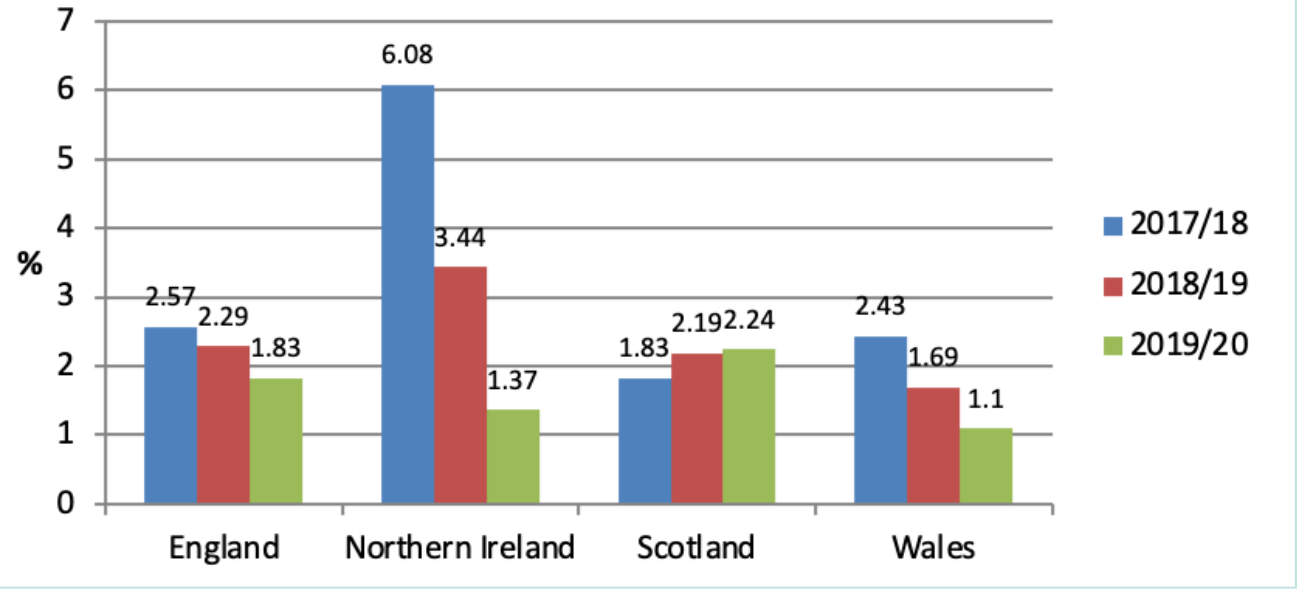
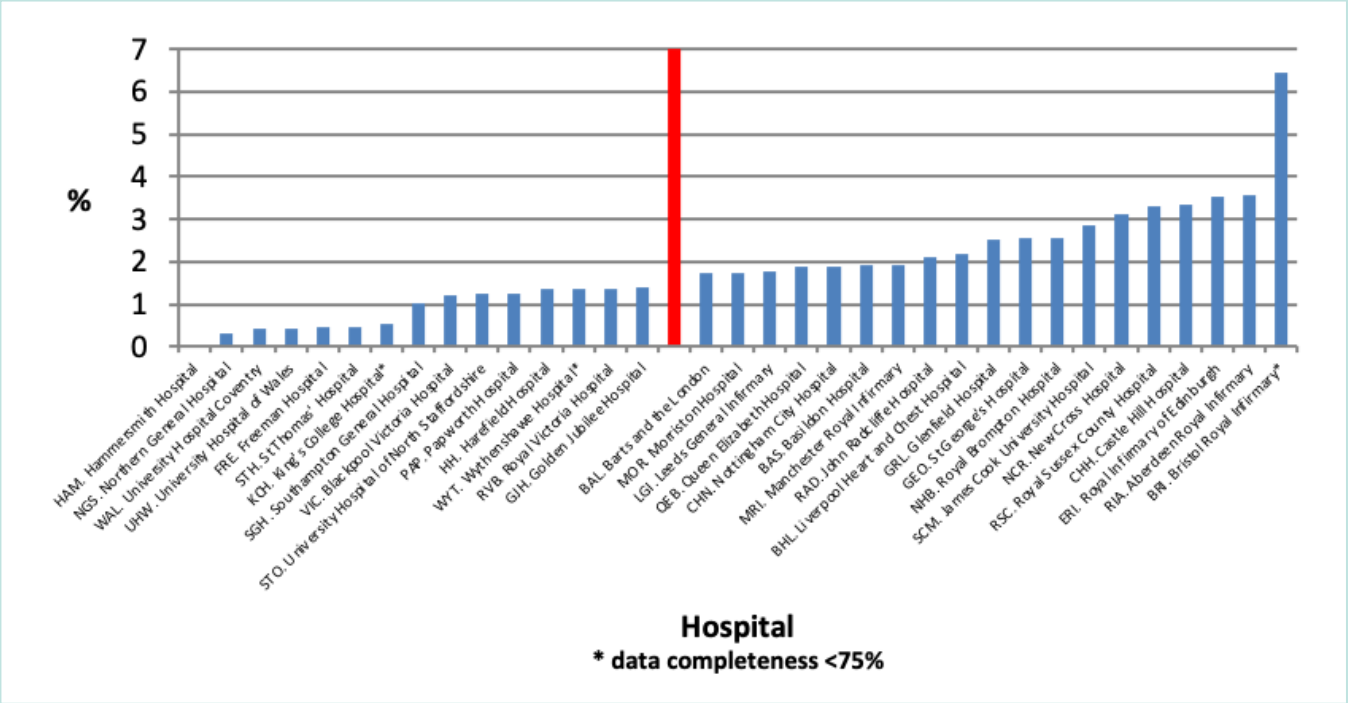


Figure 2.13: *Proportion (%) of patients undergoing re-operation for bleeding following CABG, by NHS hospital 2019/20 [NACSA data]*

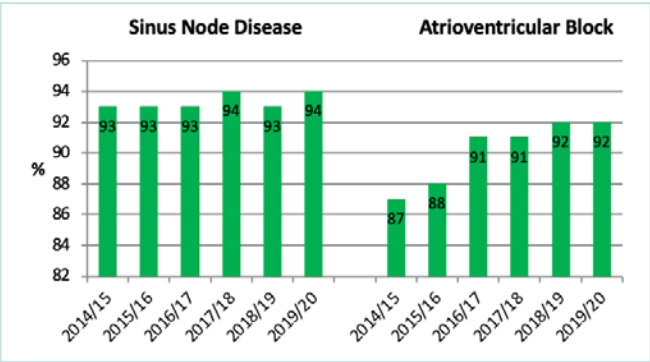


Target <1.65% (based on top quartile for 3 years 2017/20 aggregate data). Hospitals to the left of the red bar achieve this.

2.1.7 Compliance with NICE guidelines for pacemaker implants for sinus node disease and atrioventricular block has been high (but not in all hospitals)

For optimal physiological performance, it is appropriate to use atrial or atrial and ventricular pacing systems rather than a right ventricular single lead pacing system. The latter remain appropriate for some patients but, overall, compliance with NICE guidelines has been high and has improved for patients with atrioventricular block [Figure 2.14]. However, the NACRM report demonstrates that the compliance was not uniformly seen across all hospitals.

Figure 2.14: *National compliance with NICE guidance on pacemaker prescription (Proportion (%) of patients with PM selected according to guidance), 2014/15 – 2019/20 [NACRM data]*



2.1.8 Compliance with NICE guidelines for ICD implants was improving but many hospitals still do not follow the guidance to the desired level

Similarly, there had been a gradual improvement in the compliance with NICE guidelines for the use of an implantable cardioverter-defibrillator (ICD), whether for primary prevention or secondary prevention [Figure 2.15]. However, the analysis of compliance at hospital level demonstrates that many hospitals need to improve on this [Figure 2.16].

Figure 2.15: *National compliance with NICE guidance on ICD implantation, 2015/16 – 2019/20 (NACRM data)*

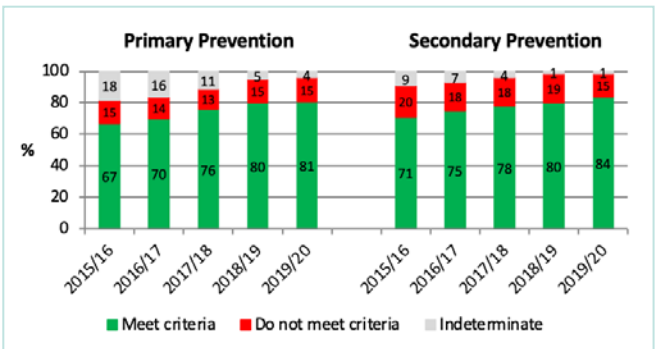
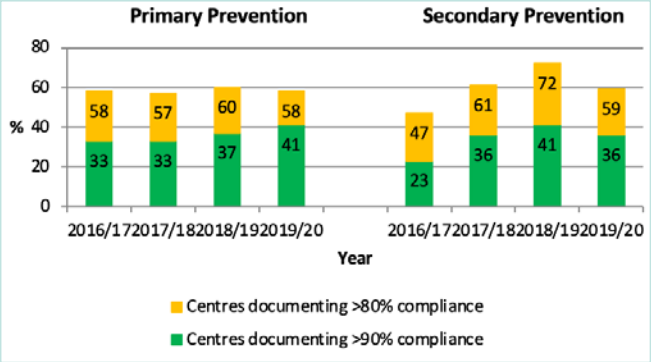


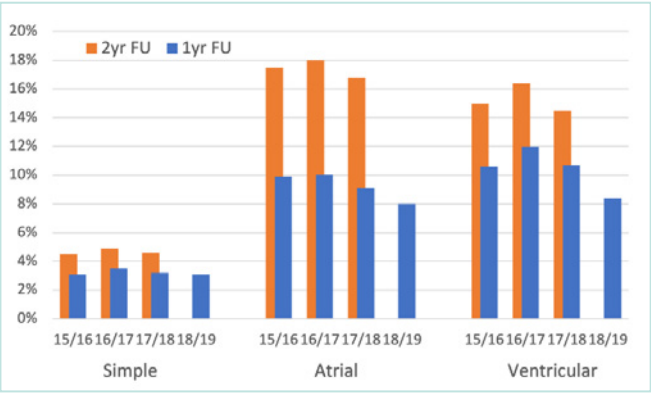
Figure 2.16: *Hospital compliance with NICE guidance on ICD implantation, 2016/17 – 2019/20 [NACRM data]*



2.1.9 Re-intervention rates after cardiac ablation procedures had fallen

There had been a fall in both one-year and two-year re-intervention rates after ablation procedures [Figure 2.17]. Although the fall in re-intervention rates at one year does not exclude a waiting list issue, the concomitant fall in the two year rates suggests other factors are more likely to explain this. Re-intervention does not necessarily reflect poor practice or poor case selection. The nature of the underlying cardiac condition is such that some additional procedures will be required after specific ablation procedures but the re-intervention rates have been encouragingly low. The change may reflect new modes of treatment, better experience and more appropriate case selection. There is however a variance in performance between centres which suggests a non-uniform approach.

Figure 2.17: *Mean 1- and 2-year re-intervention rates following simple, complex atrial, and ventricular ablations, 2015/16 – 2019/20 [NACRM data]*



FU = follow-up. Years refer to date of index procedure. 2-year re-interventions from 2018/19 will be in the 2020/21 report.

2.2 Where things have stalled

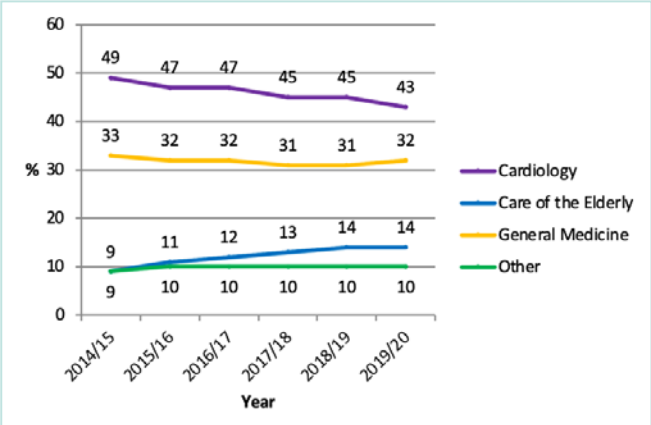
2.2.1 Too few patients with NSTEMI or heart failure were admitted to a cardiac ward

The number of patients with NSTEMI admitted to a cardiac ward had levelled off at 61.3% [Figure 2.18]. It is not clear whether this is a ceiling or whether further improvements can occur through a process of re-designation of hospital beds. Although cardiology teams have adapted to this by developing out-reach services, patients nursed on non-cardiology wards have the disadvantage of not seeing the consultant and skilled nursing teams on a daily basis and are less likely to receive a full range of evidence-based treatments.

Similarly, the proportion of patients admitted with heart failure cared for on a cardiology ward was less than 50% and was falling [Figure 2.18]. Outreach services are required if patients cannot be admitted to a cardiology ward, but the creation of outreach services may themselves discourage the reconfiguration of beds that would allow more patients to be cared for in a specialist environment. Place of admission is associated with levels of care as well as outcomes. However, this has to be balanced against the fact that many patients with heart failure are elderly, frail and have comorbidities and Elderly Care teams may be best placed to provide holistic care.

Although outreach services are in place, 94% of those in a cardiology ward are seen by a specialist consultant versus 28% of those admitted to a general medical ward. More Elderly Care physicians with an interest in heart failure may ensure these patients are considered for optimal treatment. There is considerable inter-hospital variation.

Figure 2.18: *Proportion (%) of patients admitted with heart failure admitted to specific wards, 2014/15 – 2019/20 [NHFA data]*

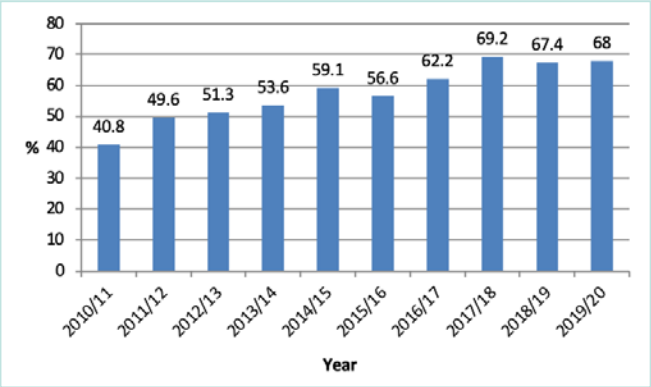


2.2.2 Too few patients with left ventricular systolic dysfunction following a heart attack or those admitted with heart failure were prescribed a mineralocorticoid receptor antagonist (MRA)

The identification of patients with significant left ventricular systolic dysfunction (LVSD) following a heart attack is important. They have a worse prognosis and should be considered for additional treatment with an MRA. They also require careful follow-up and to see if LVSD fails to improve as some of these patients will be candidates for therapy with CRT-P/CRT-D or ICD devices over the subsequent few months.

In addition, some may need additional work-up to see if late revascularisation therapy or cardiac transplantation/cardiac assist devices may be beneficial. Although in-house echocardiography is used more frequently, MINAP also monitors the prescription of MRAs for patients with LVSD. Although this has improved, performance had levelled off at 68% with considerable inter-hospital variance [Figure 2.19].

Figure 2.19: *Trend in use of aldosterone antagonists in those with STEMI and significant left ventricular systolic impairment, 2010/11 to 2019/20 [MINAP data]*



Although patients with HFrEF are likely to be discharged taking a beta blocker and either an ACE inhibitor or ARB, section 2.1.3 highlighted the fact that there was a much lower level for the prescription of an MRA. More than 70% of patients younger than 55 were discharged taking an MRA but this fell off considerably (as with the other disease-modifying drugs) in older patients [Figure 2.20]. As elderly patients are more likely to have a reason not to receive some drugs, the estimate is calculated taking account of those for whom there is a contra-indication.

A 'bundle of care' analysis demonstrates that there are clearly many patients who are not discharged on optimal therapy, with the lowest proportion seen in those who are not seen by a specialist team and there is a very large inter-hospital variation [Figure 2.21]. This does not just apply to patients ≥75 years old (28% of hospitals achieve a target of 60% on all three drugs) but also to younger patients (51% of hospitals reach the target). This may relate in part to concerns about the ability to provide early monitoring of potassium levels and renal function and a desire to add in a third tier of treatment later as an outpatient.

A complete pathway of care requires agreed protocols and an effective interface between hospital and community care. Changes to the way data are collected will be needed to monitor this in greater detail. The NHFA has also recently changed its dataset to allow an audit of new therapies such as sodium glucose cotransport inhibitors.

Figure 2.20: *Proportion (%) of patients with HFrEF discharged on disease-modifying drugs and loop diuretics, 2019/20 by age group [NHFA data]*

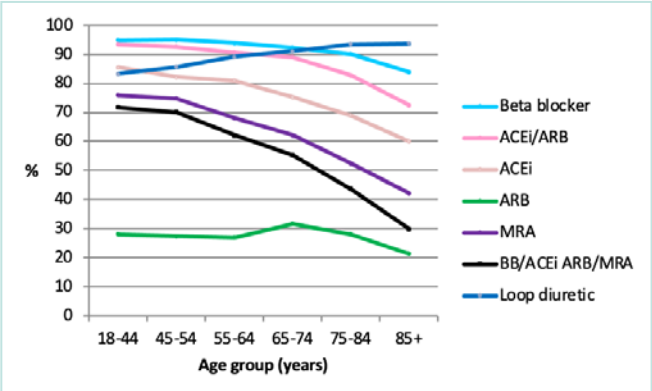
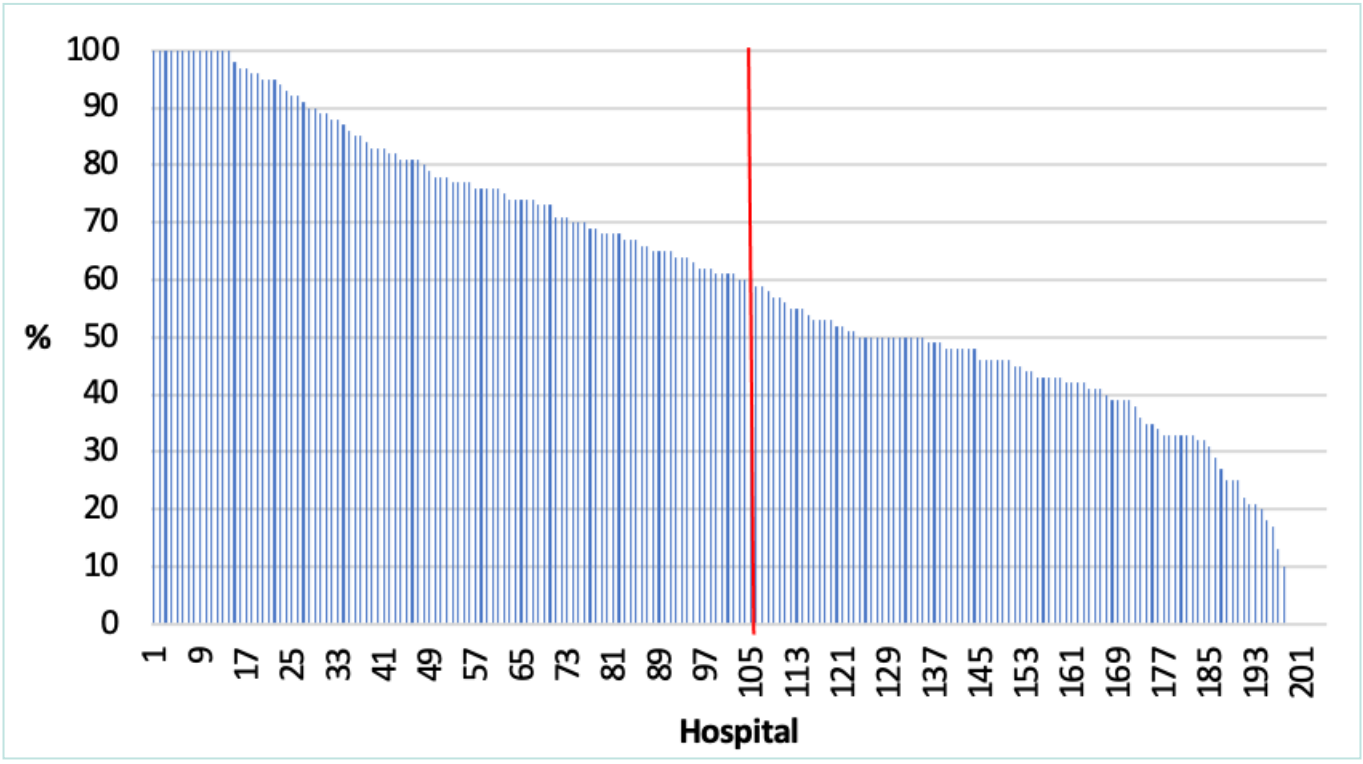
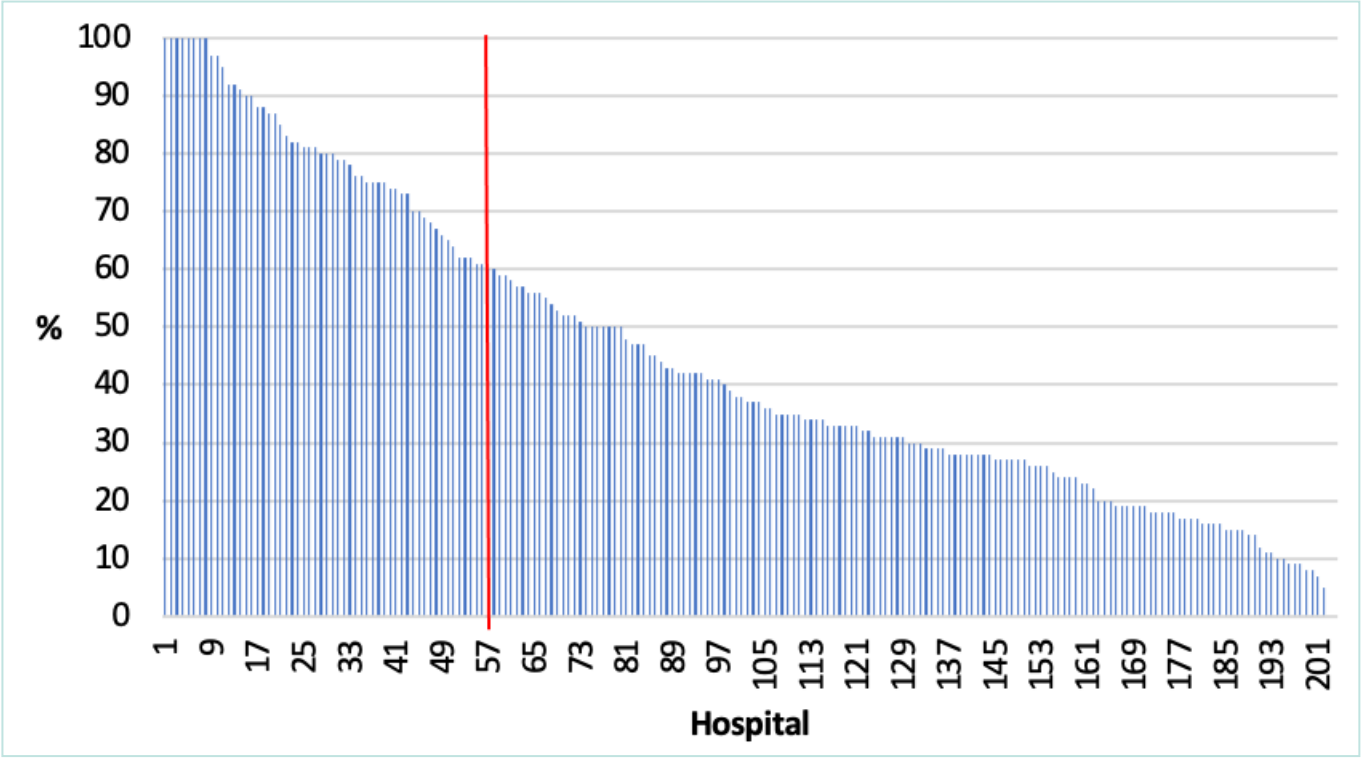


Figure 2.21: *Proportion (%) of patients with HFrEF discharged on all three disease-modifying drug classes, 2019/20 by hospital, by age group [NHFA data]*

Patients aged 18-74 years



Patients aged ≥75 years



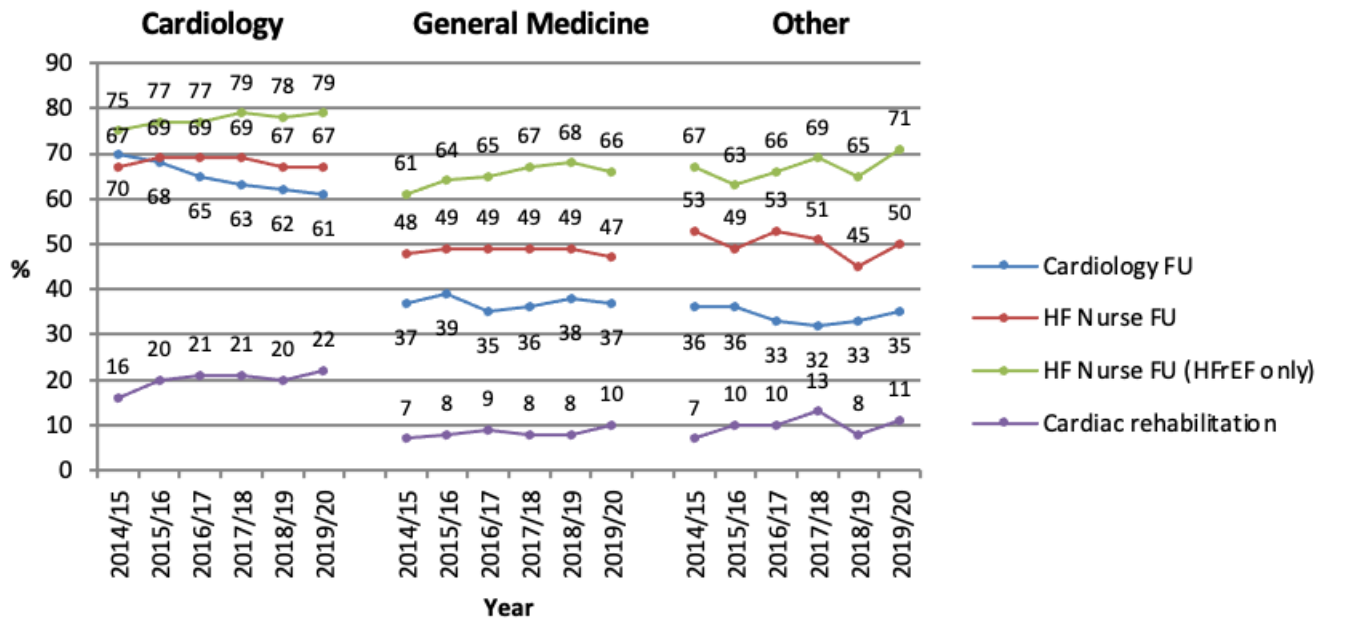
Hospitals to the right of the red line have not achieved a target of 60% of patients discharged on all three drug classes. Hospitals discharging fewer than 20 patients are excluded from analysis.

2.2.3 Too few patients with heart failure received specialist follow-up and cardiac rehabilitation

Early specialist follow-up of patients with heart failure is associated with better outcomes, as is referral for cardiac rehabilitation. The case study in the NHFA report highlights the importance of communication, monitoring and follow-up.

There has been a gradual increase in those receiving Specialist Nurse follow-up, especially for those admitted to a cardiology ward [Figure 2.22]. Too few patients with HF are referred as an in-patient for cardiac rehabilitation. A concerted national effort coordinated by ICSs is required if this is to improve.

Figure 2.22: *Proportion (%) of heart failure patients referred for early follow-up and cardiac rehabilitation, 2014/15 – 2019/20 [NHFA data]*

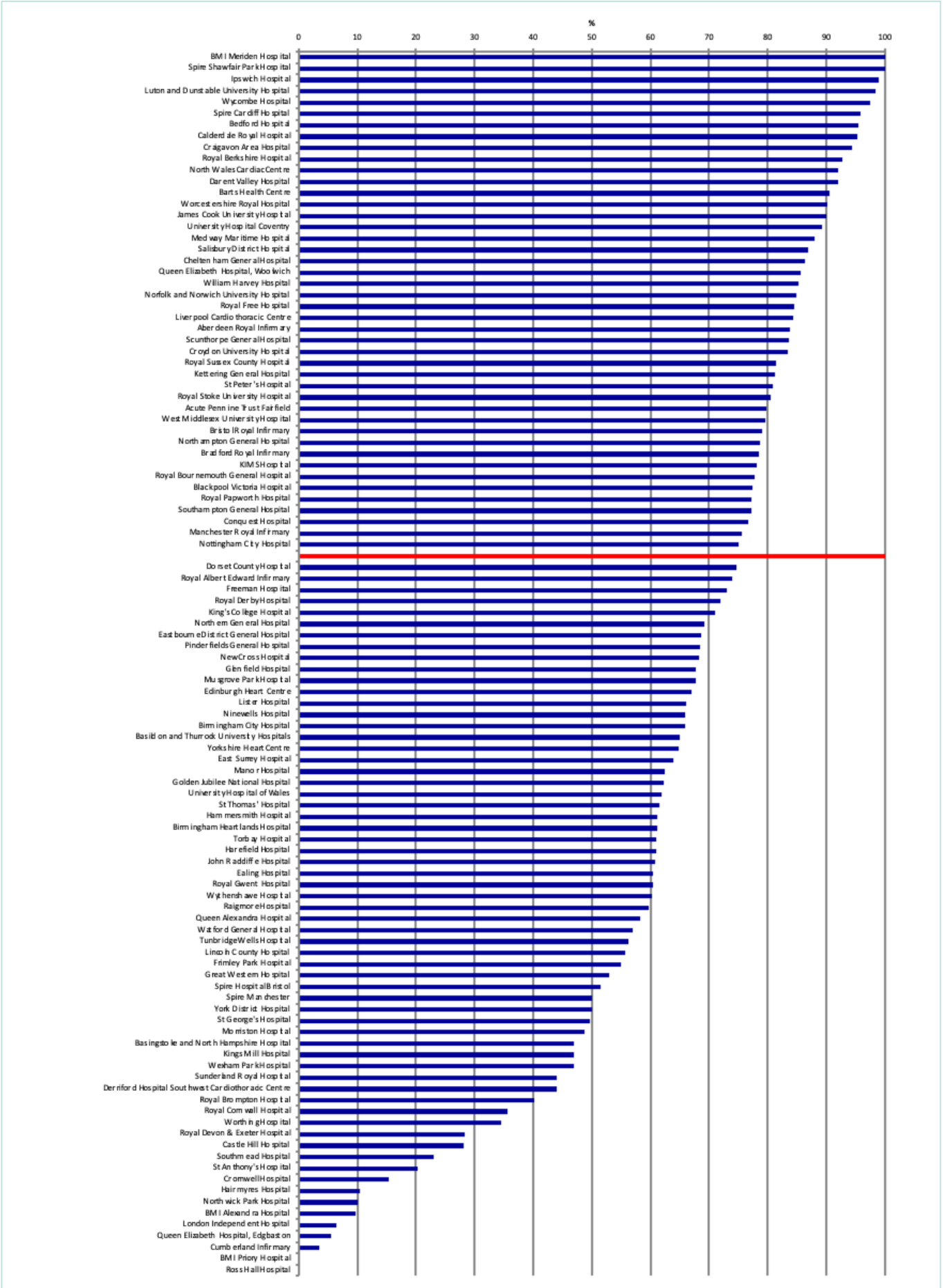


2.2.4 Too few patients undergoing elective PCI were offered a day case procedure

The BCIS has championed the use of day case PCI for most elective cases. It is not possible for all patients as a full admission may be required for those undergoing specific complex procedures or those suffering a complication of treatment. However, modern techniques and the use of anti-platelet therapy have made it safe for most patients and it improves the patient experience and aids efficiency of services.

This is the default approach for some hospitals but nationally progress has stalled with considerable inter-hospital variation [Figure 2.23]. Many hospitals could learn how those centres with leading performance safely changed their clinical pathway.

Figure 2.23: *Proportion (%) of patients undergoing elective PCI as a day case, by hospital 2019/20 [NAPCI data]*

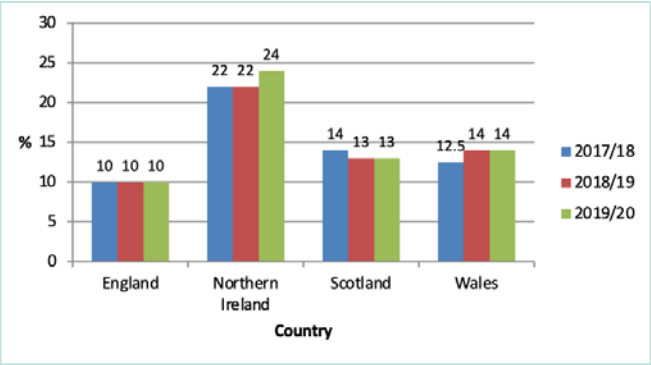


Hospitals below the red line are not achieving ≥75% of elective PCI patients treated as a day case.

2.2.5 Times to urgent CABG were not improving

The time to urgent CABG had not improved. In fact, it had slightly worsened with an increase in the mean of 1 day overall [Figure 2.24]. There was considerable variation between centres (7-24 days for NHS centres). No centre reached the target proportion of 75% within 7 days; 7 hospitals (including 1 private centre) operated on >50% within 7 days.

Figure 2.24: *Time (mean days) to urgent CABG after diagnostic angiography, by country 2017/18 – 2019/20 [NACSA data]*



Post-operative length of stay following CABG has also not shortened. It was lower in England (mean of 7.8 days) compared with Scotland (8.3 days), Northern Ireland (8.5 days), and Wales (9.2 days). The range for all NHS centres was 6.5-10.7 days.

2.2.6 Procedure numbers remained lower than nationally recommended volumes in many hospitals

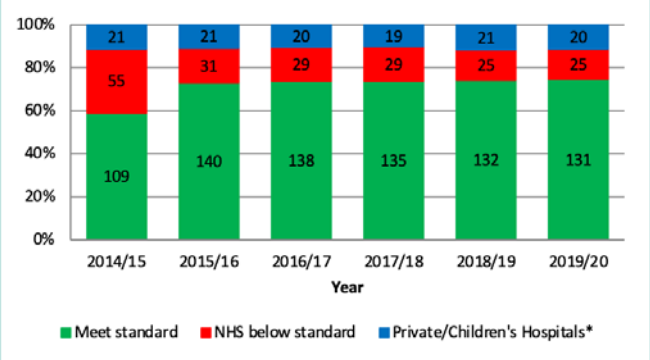
The NAPCI report showed that 15% of PCI centres perform fewer than 400 procedures annually. The NACRM report showed a reduction over the last five years in numbers of hospitals with relatively low case volume but there were still many hospitals that perform fewer procedures than agreed in the national guidelines [Figure 2.25, Figure 2.26, Figure 2.27, Figure 2.28]. In addition, although the NACRM is working to improve data quality from hospitals, there appear to be many individual operators who do not conform to the minimum expected case volumes.

The focus on procedural numbers is generated by an accepted view that performance is related to volume of practice and that highlighting a minimum expected number helps to maintain standards. In addition, there are important considerations around the staffing levels and infrastructure required for safe delivery of particular procedures.

There are however competing issues. Patients prefer local treatment when that can be delivered safely and effectively. There may be geographical reasons in more sparsely populated areas where commissioners accept lower levels of activity. Data collection on safety and efficacy becomes particularly relevant to reassure patients. PCI services have been set up in the UK such that a volume-outcomes relationship reported in other healthcare systems is not demonstrable.

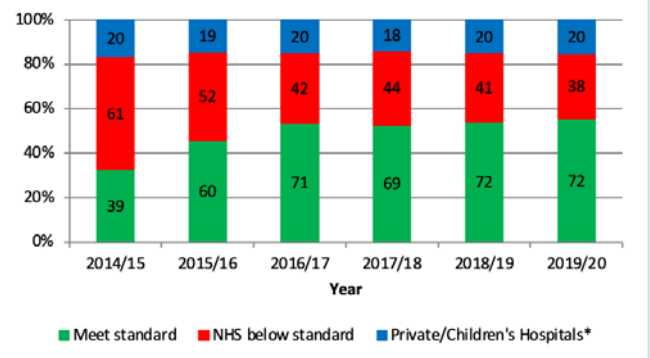
Further research on this issue with respect to cardiac rhythm management services would support commissioning decisions.

Figure 2.25: *Six-year trend of proportion of hospitals meeting the standard for number of pacemaker implants, 2014/15 to 2019/20 [NACRM data]*



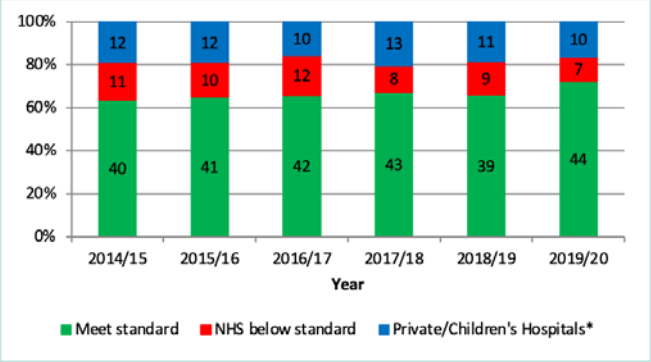
Numbers in columns represent number of hospitals.
**Standards do not apply to Children's Hospitals.*

Figure 2.26: *Six-year trend of hospitals meeting the standard for number of complex implants/upgrades, 2014/15 [NACRM data]*



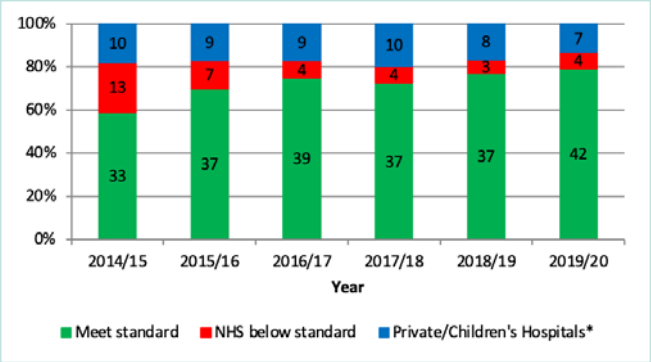
Numbers in columns represent number of hospitals.
**Standards do not apply to Children's Hospitals.*

Figure 2.27: *Six-year trend of hospitals meeting the standard for number of simple ablation procedures, 2014/15 – 2019/20 [NACRM data]*



Numbers in columns represent number of hospitals.
**Standards do not apply to Children's Hospitals.*

Figure 2.28: *Six-year trend of hospitals meeting the standard for numbers of AF ablations, 2014/15 – 2019/20 [NACRM data]*



Numbers in columns represent number of hospitals.
**Standards do not apply to Children's Hospitals.*

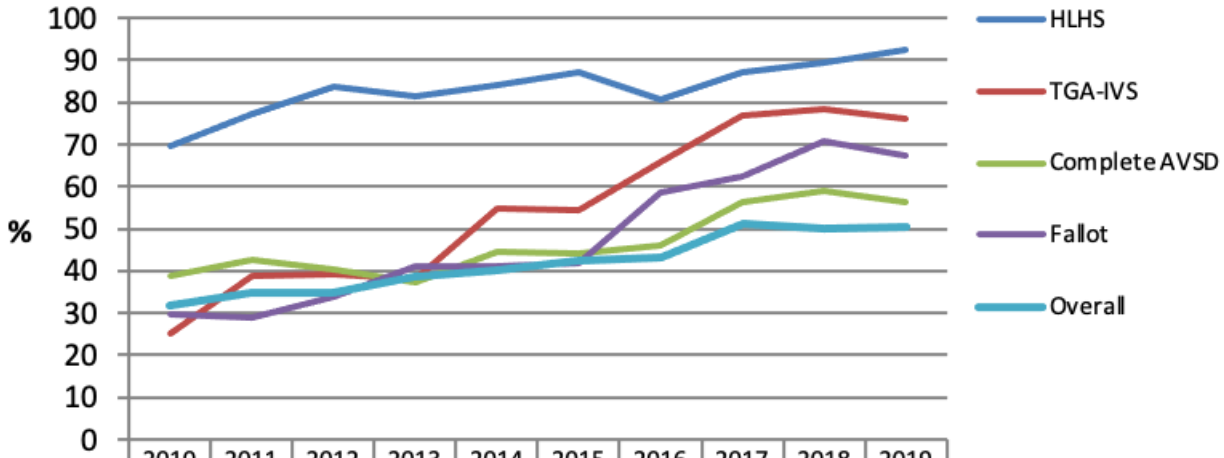
2.2.7 Antenatal diagnosis of congenital lesions requiring a procedure in the first year of life had levelled off

Over the last few years we have seen improvements in the numbers of infants surviving pregnancy and requiring interventions in the first year of life who had their conditions diagnosed prior to birth. The current level is 50.3% [Figure 2.29]. It is high for hypoplastic left heart syndrome but there had been a slight fall in performance for transposition of the great arteries with intact ventricular septum, complete atrioventricular septal defects and those with Fallot's tetralogy.

It is essential to understand that these data underestimate prenatal detection rates as they do not take account of other possible outcomes following diagnosis (fetal death, termination of pregnancy, death prior to intervention, a decision not to intervene or diagnoses not requiring intervention). There is a need for better documentation of this important service and the ability to extend the NCHDA dataset to allow this is an important aspiration.

The NCHDA and its sponsoring professional societies are happy to work with commissioners and the National Congenital Anomaly and Rare Disease Registration Service on these matters and to advise regions on steps to be taken to improve performance.

Figure 2.29: *10-year temporal trend in proportion of infants who underwent a procedure and were diagnosed antenatally, 2010/11 – 2019/20*



	2010 /11	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20
HLHS	69.5	77.3	83.7	81.3	84	87.2	80.5	87.3	89.3	92.3
TGA-IVS	25	39	39.3	38.1	54.7	54.4	65.7	76.8	78.3	76
Complete AVSD	39	42.7	40.3	37.2	44.4	44.2	46	56.2	58.8	56.4
Fallot	29.8	28.8	33.8	41.1	41.1	42	58.5	62.3	70.8	67.2
Overall	31.6	35	35	38.8	40.3	42.4	43.2	51.2	50.1	50.3

Overall = any cardiac malformation; HLHS = hypoplastic left heart syndrome; TGA-IVS = transposition of great arteries with intact ventricular septum; Complete AVSD = complete atrioventricular septal defect; Fallot = tetralogy of Fallot.

2.3 Where things were getting worse

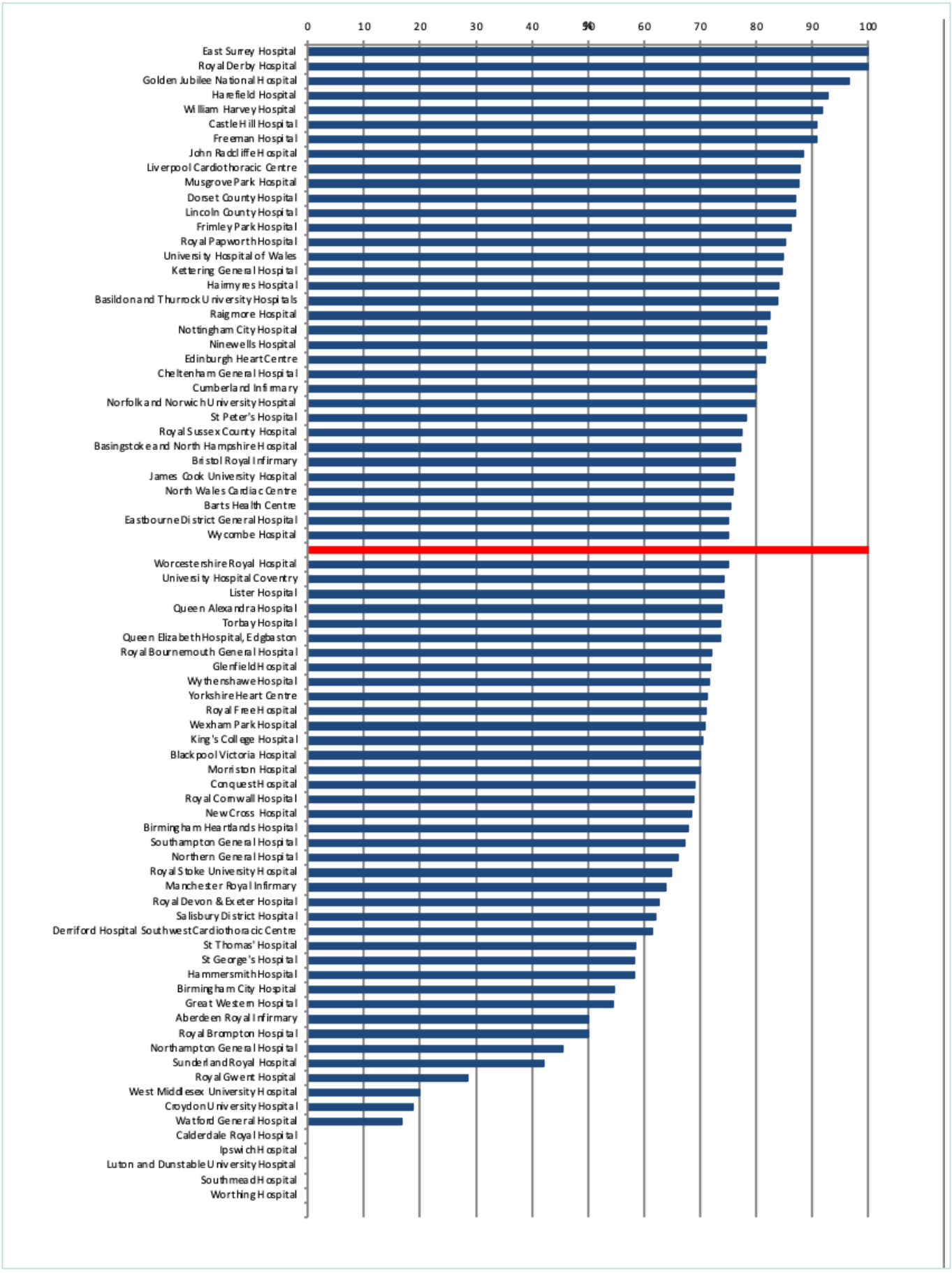
Unfortunately, we have seen the performance of some aspects of clinical practice worsen over time. The metrics chosen in the NCAP are selected by specialist groups with input from patient and carer representatives.

Many relate to optimal therapy to improve both short- and long-term survival and others look at different facets of the quality of care. When national performance worsens this raises difficult questions but these problems have to be addressed.

2.3.1 Times to treatment for patients with STEMI continued to worsen.

Although the proportion of patients admitted with STEMI who receive reperfusion therapy has increased [see section 2.1.1 and Figure 2.1], times to treatment have been worsening, in spite of this being an area of focus for the MINAP and NAPCI for some years. It has also been the focus of the recent HSIB report.[4] The slippage in times has not been explained by worsening Door-To-Balloon (DTB) times, which have been constant (at a median of 40 minutes). However, there are still 25 centres not reaching the 60 minute DTB target suggesting room for improvement [Figure 2.30]. Hospitals should not be complacent and assume that the problem lies elsewhere. Many hospitals could improve by learning from hospitals with the best performance.

Figure 2.30: *Proportion (%) of PPCI procedures with a Door-To-Balloon time of <60 minutes (patients with cardiogenic shock or on a ventilator excluded), by hospital, 2019/20 [NAPCI data]*

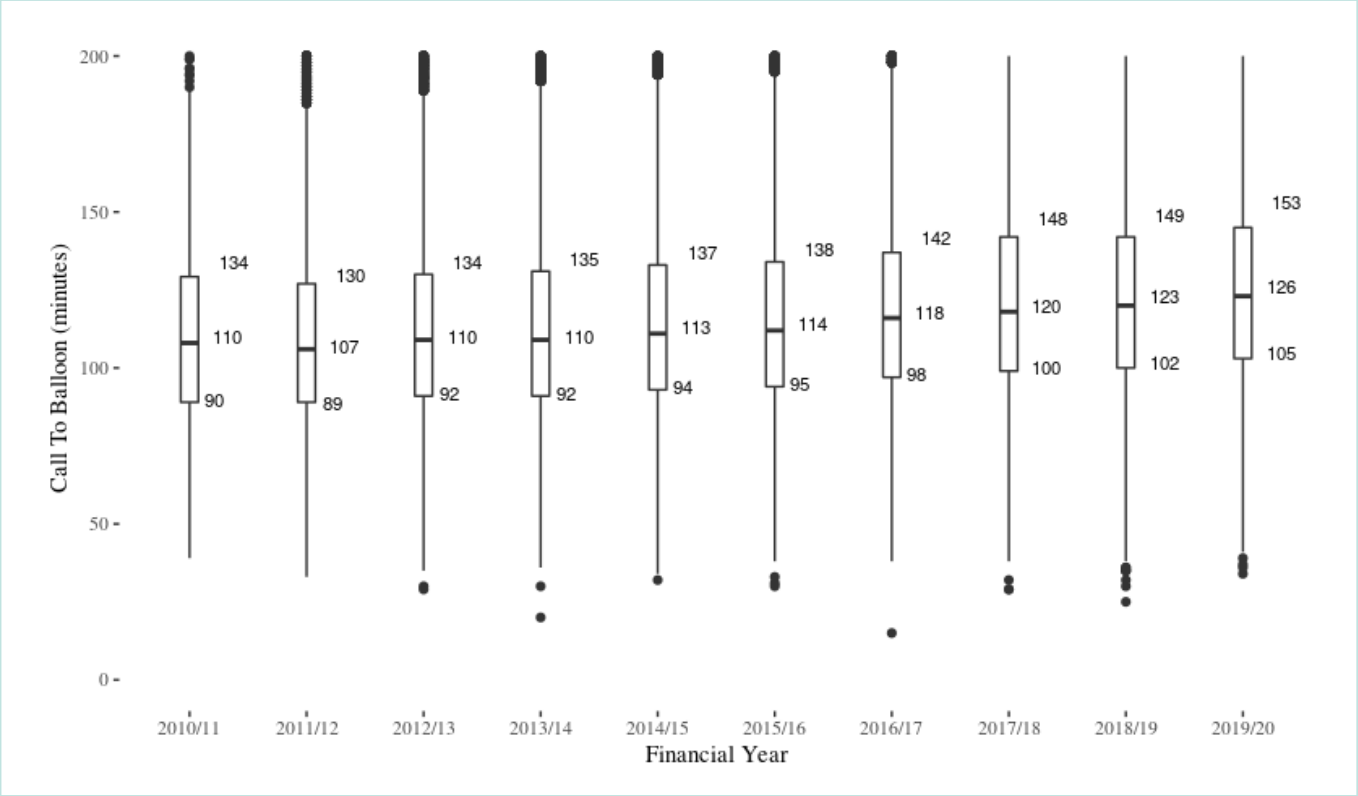


Hospitals below the red line do not achieve the standard of providing PPCI to ≥75% of patients within 60 minutes of arrival.

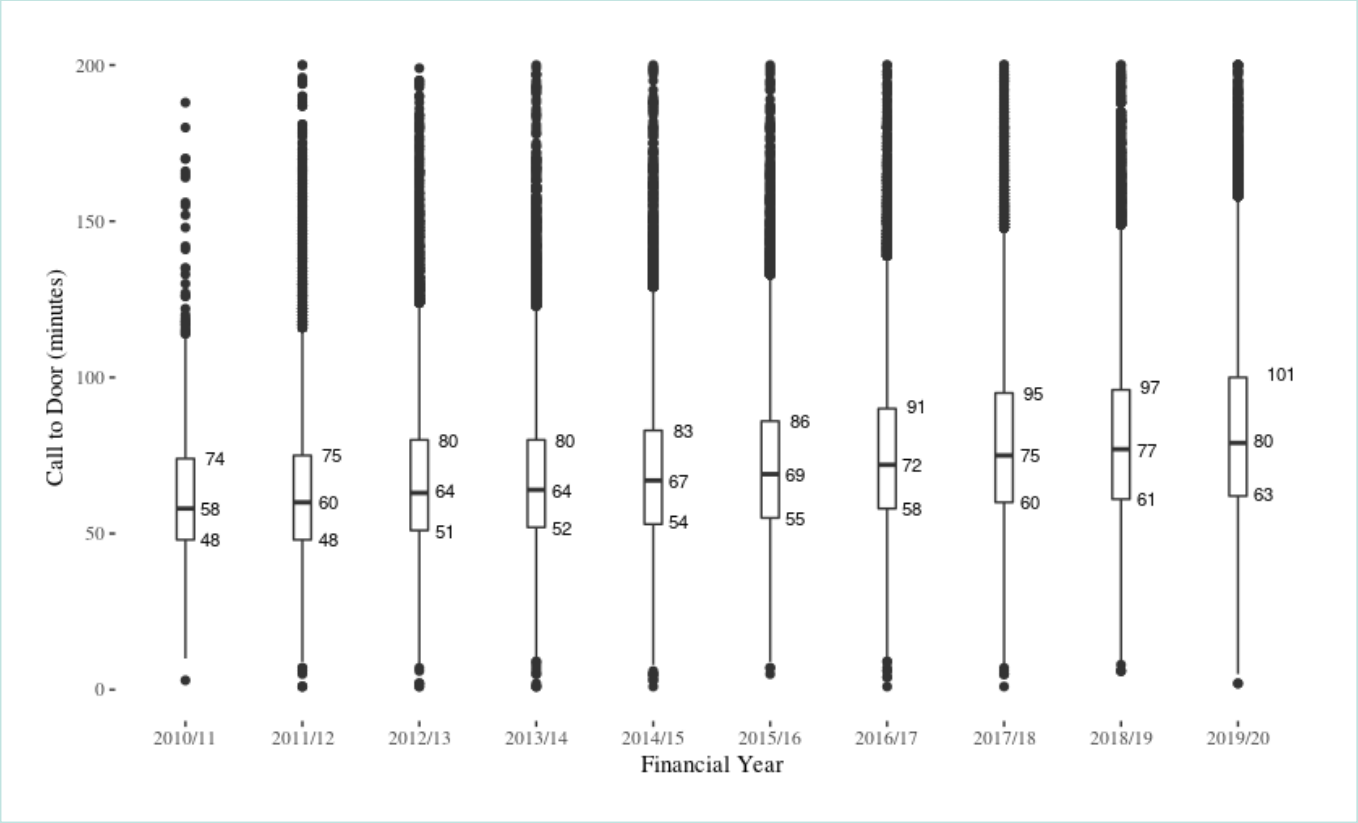
The lengthening Call-To-Balloon (CTB) times appears to be explained by lengthening Call-To-Door (CTD) times [Figure 2.31].

Figure 2.31: *Lengthening median (a) Call-To-Balloon (CTB) and (b) Call-To-Door (CTD) times for patients presenting with ST-elevation MI, 2010/11 to 2019/20 [MINAP data]*

CTB times



CTD times



These are important as any delay increases the mortality for these patients. Some work has been done to improve the ability of Ambulance Trusts to enter their own times into the MINAP database, although this is dependent on timely data entry from hospitals. However, the data entry systems have been consistent for some years and it is unlikely that this worsening performance is just a quirk of inaccurate data.

The median CTB time in 2019/20 was 126 minutes (123 minutes in 2018/19 but 110 minutes in 2010/11). The median CTD time was 80 minutes (73 minutes in 2018/19 but 58 minutes in 2010/11).

A systematic review of the diagnosis and speed of delivery of treatments is necessary. NHS England & Improvement has incorporated the management of STEMI as one of the work streams in its Critical Care Standards programme to drive improvements in this area.

2.3.2 Too few patients with NSTEMI received timely angiography and PCI where indicated.

Although 83.5% of NSTEMI patients were being offered angiography before discharge, only 55% underwent the procedure within the guideline recommended time of 72 hours [Figure 2.32]. The proportion receiving angiography within 72 hours has been stuck at 54-56% for the last decade, and indeed has worsened slightly [Figure 2.32 and Figure 2.33]. Similarly, the proportion receiving PCI, when indicated, within 72 hours has fallen [Figure 2.34]. There is also a lot of variance between hospitals.

This performance can only improve if the hospitals not achieving the target change their systems to reach the performance of the leading centres. This is in contrast to the performance seen during the initial period of the COVID-19 pandemic,[7] where the median time to angiography was 26 hours. This was due to a major reduction in elective cases and a reduction in admissions with an acute coronary syndrome, coupled with a desire for rapid treatment and discharge.

This highlights what can be achieved when the system has the capacity to focus on the urgent and emergency cases. As things return to normal, capacity constraints may be such that performance is likely to move back to those seen in the 2019/20 period.

Figure 2.32: *Proportion (%) of patients with non-ST-elevation MI undergoing in-house angiography, and angiography within 72 hours of admission, 2010/11 - 2019/20 [MINAP data]*

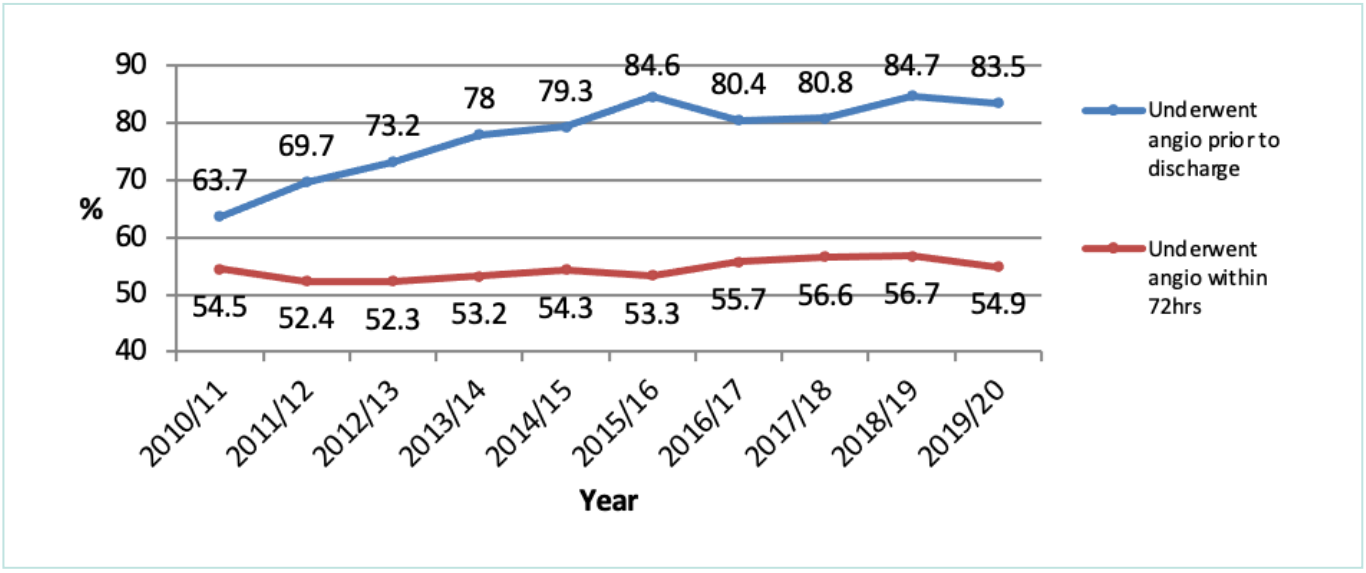
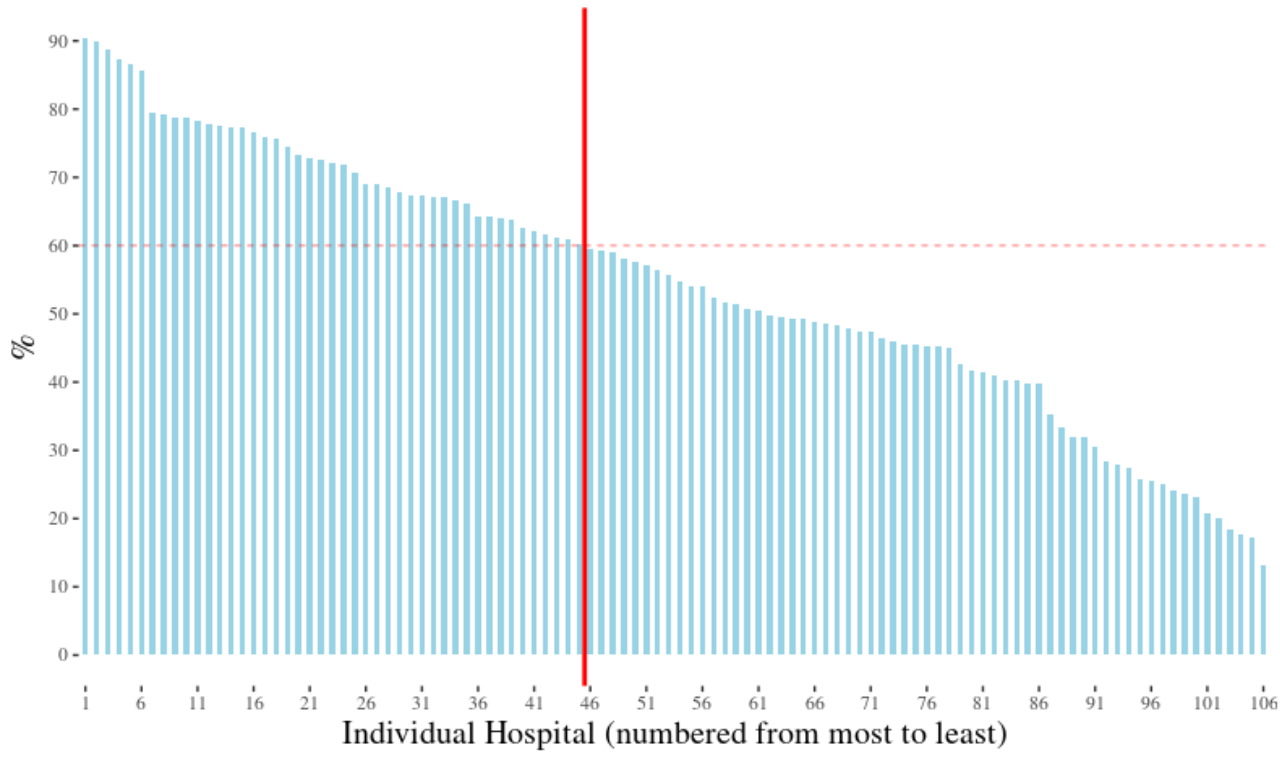
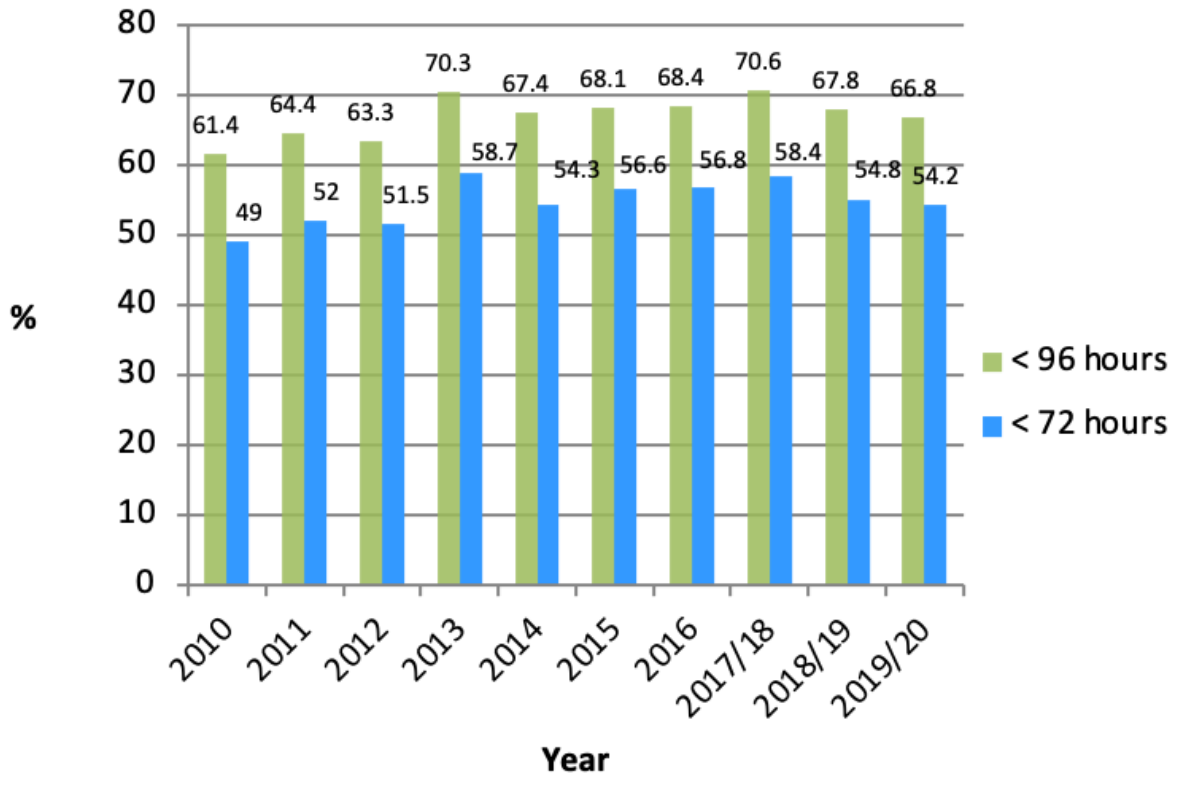


Figure 2.33: *Proportion (%) of patients with non-ST-elevation MI undergoing angiography within 72 hours of admission, by hospital 2019/20 [MINAP data]*



Hospitals to the right of the red line have not achieved a target of 60% of patients undergoing angiography within 72 hours of admission.

Figure 2.34: *Proportion (%) of patients with non-ST-elevation MI undergoing PCI, when indicated, within 72 hours of admission (includes data on direct admissions and inter-hospital transfers), 2010 to 2019/20 [NAPCI data]*



Although the overall number of patients with acute coronary syndromes has fallen slightly in recent years, the number of admissions for NSTEMI has risen very slightly, but this is not thought to explain this deterioration in performance. This is complicated because of the need to look at times both for those receiving local treatment and those who have to be transferred for treatment.

Regional systems-level reviews will be needed to unlock this problem. Although hospitals have pressures to balance urgent and elective caseloads, the reviews should include which ambulance teams are sent to patients with chest pain, which hospitals are designated as destinations for ambulance crews who suspect a patient has an acute coronary syndrome, bed capacity, staffing levels, number and use of catheter laboratories including weekend working and use of risk scores and prioritisation of specific groups for early treatment.

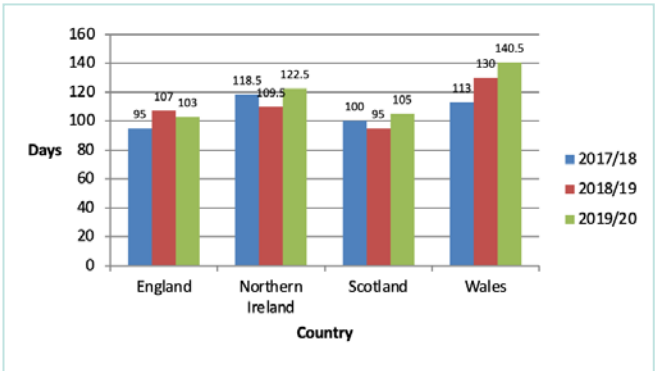
2.3.3 Times to elective CABG had worsened

Section 2.2.5 demonstrated that times for urgent CABG had not improved and had actually worsened a little. Given that there has been a reduction in numbers of patients undergoing CABG over the last few years, this might have been explained by a desire to improve waiting times for elective CABG.

However, there was also a worsening of times to elective CABG, suggesting that other factors were involved. Over three years, the mean time to elective CABG in NHS hospitals worsened by 7 days (from 97 to 104 days) [Figure 2.35]. There is considerable variation amongst NHS centres (range 46-150 days).

A nationwide systems-level approach will be needed to determine the factors behind this worsening performance and to take corrective steps.

Figure 2.35: *Mean times (days) from diagnostic angiography to elective CABG, by country 2017/18 to 2019/20 [NACSA data]*

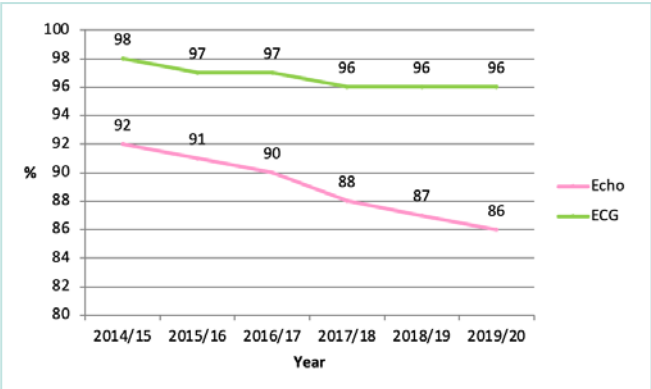


2.3.4 Fewer patients admitted with heart failure were investigated with in-hospital echocardiography

Patients with suspected heart failure should undergo investigation with an ECG and an echocardiogram. This has been achieved in a high proportion of patients over recent years but there had been a slight decline [Figure 2.36]. The reasons for this are not clear. Although it may reflect worsening performance, it may be that some patients are investigated by other imaging modalities (such as MRI) or else hand-held echocardiography devices are being used at the bedside but not recorded in the audit.

Alternatively, the NHFA may be collecting data on more patients who are in a palliative phase of care, for whom investigation might not be deemed appropriate. This requires additional investigation. The NHFA recently changed its dataset to allow for an audit of new patients with acute heart failure, and sufficient data are expected for an analysis in the next audit cycle.

Figure 2.36: *Proportion (%) of patients admitted with heart failure investigated with an ECG or echocardiography, 2014/15 to 2019/20 [NHFA data]*



3 | Summary of recommendations

The following recommendations have been made in the specialty reports:

NCHDA

1. Hospitals should aim to increase the rate of antenatal diagnosis of conditions requiring intervention in the first year. Individual congenital heart disease networks should improve rates of antenatal diagnosis by reviewing staffing, infrastructure, education and training requirements.
2. In order to fully support the national clinical audit activity, it is recommended that all centres have provision of sufficient resources and processes in place including local information technology and software updates supporting NCHDA datasets for timely submission and data verification. This should also include supporting database managers to improve accuracy of data submission.

MINAP

1. In the management of STEMI, staff in hospitals where Call-To-Balloon time standards are not being met should work with partner Ambulance Trusts, emergency departments, neighbouring non-interventional hospitals and cardiologists to better understand delays in provision of primary PCI. This may include making improvements to the hospital response to the arrival of a patient, but may also focus on ways to improve pre-hospital Call-To-Door times.
2. In the management of both STEMI and NSTEMI, staff in hospitals with lower rates of provision of an echocardiogram should undertake a review of data collection processes – to ensure that the reported rate accurately reflects practice – and then review the patient pathway to identify opportunities for echocardiography during the index admission.
    - Consideration should be given to performing a limited 'bedside' echocardiogram if there are difficulties obtaining timely detailed 'departmental' studies.
    - Where patients are discharged early to another hospital before an echocardiogram can be performed there must be a clear request to perform the test at the receiving hospital.
3. Those hospitals not reaching recommended levels with respect to admitting patients with heart attack to a cardiac ward should review their systems and bed allocations to maximise access to cardiac care. This may require novel use of dedicated multi-specialty 'high-care' beds.
    - This might involve the provision of cardiac outreach services to those nursed outside cardiac facilities.
4. Those hospitals with low rates of cardiology involvement in the care of patients with heart attack should undertake a review of their data collection processes – to ensure that the submitted data reflects practice. If it does, there should be consideration of improved provision of cardiac care during admissions.
    - This might require increased staffing or more flexible use of members of the cardiology team – for example Nurse Specialists and Physician Associates.
5. In the management of NSTEMI staff in those hospitals with low rates of angiography in eligible patients, hospitals should perform a review of their systems of data collection and submission, and their systems of managing ACS.
6. In those hospitals where the 72 hour quality standard for angiography following admission with NSTEMI is not met commissioning groups, managerial and clinical leaders should engage in a process of system review, economic appraisal and quality improvement. This may require changes within hospitals, across referral networks and/or in the overall commissioning of services.
    - There should be an emphasis on early reliable identification of suitable patients, streamlined referrals, and adequate capacity for transferring patients into (and out of) interventional hospitals; this may involve weekend angiography lists for such patients.
7. In the management of both STEMI and NSTEMI, staff in hospitals not meeting the standard for prescription of all secondary prevention medication prior to discharge should first explore data completeness and ensure that their data is a valid representation of practice. If suboptimal

performance is confirmed quality improvement programmes should be implemented.

- These might include the use of discharge pro-forma or checklists, direct involvement of specialist cardiac pharmacists or 'ACS nurse specialists'.

8. Those hospitals with lower rates of prescription of aldosterone antagonists should ensure that patients with impaired LV function are identified by echocardiography (or some other reliable assessment method) and that such patients are considered for appropriate treatment.

- This might require the use of discharge pro-forma or checklists and the direct involvement of specialist cardiac pharmacists, 'ACS nurse specialists' and specialist sonographers.

9. Staff in hospitals not meeting the standards for referral of patients to cardiac rehabilitation following either STEMI or NSTEMI should review the provision of services and the early identification of patients who might benefit.

- They might consider the routine distribution of cardiac rehabilitation information/invitation leaflets to all patients admitted to cardiac facilities, and the inclusion of such information in discharge checklists.

NAPCI

1. 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. It is important that many centres improve the rapidity of access to invasive cardiology investigation and treatment for patients with NSTEMI acute coronary syndromes.

- 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.

3. There has been a substantial shift in practice to the use of radial artery access for PCI, 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.

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

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

5. 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.

NACSA

1. Hospitals with prolonged waiting times for elective CABG surgery should review their processes and referral pathways to identify the causes of any delays. If necessary, advice should be sought from centres with evidence of the best performance. A QI action plan should be instigated to achieve this target.

- Patients should be offered surgery in neighbouring hospitals with shorter waiting times if reductions in waiting times cannot be demonstrated.

2. Hospitals not reaching the day of surgery admission (DOSA) target should undertake a review of their processes to identify the barriers to achieving this target (such as introducing pre-assessment clinics). If necessary, advice should be sought from centres with evidence of the best performance.

- A QI action plan should be instigated to achieve this target.

3. Hospitals with low rates of urgent CABG surgery should review their processes and referral pathways to identify the causes. If necessary, advice should be sought from centres with evidence of the best performance.

- A QI action plan should be instigated to achieve this target.

4. Hospitals not reaching the 75% target of urgent CABG performed within 7 days of coronary angiography should undertake a review of their processes to identify where delays occur and how these can be avoided. If necessary, advice should be sought from centres with evidence of the best performance.
    - A QI action plan should be instigated to reduce delays.
5. Hospitals not reaching the 7 day target of urgent CABG performed after coronary angiography should undertake a review of their processes to identify where delays occur and how these can be avoided. If necessary, advice should be sought from centres with evidence of the best performance.
    - A QI action plan should be instigated to reduce delays.
6. Hospitals with prolonged post-operative length of stays (PLOS) following CABG should review their processes and care pathways following surgery.
    - Systemic causes of prolonged stay should be identified. If necessary, advice should be sought from centres with evidence of the best performance.
    - A QI action plan should be instigated to reduce lengths of stay.
7. Hospitals with high rates of reopening following CABG should review their processes before, during and after surgery. Systemic causes of the need for reoperation should be identified.
    - Data on bleeding rates should be regularly presented at team audit meetings. If necessary, advice should be sought from centres with evidence of the best performance.
    - A QI action plan should be instigated to reduce reopening and bleeding rates.
8. Hospitals with poor data compliance should collect and submit data for deep sternal wound infection (DSWI).
    - Hospitals with high rates of DSWI following CABG should review their processes before, during and after surgery. A root cause analysis should be performed for every patient with DSWI so that lessons are learnt. Systemic causes should be identified. Data on DSWI should be regularly presented at team audit meetings. If necessary, advice should be sought from centres with evidence of the best performance.
    - A QI action plan should be instigated to reduce DSWI.
9. All hospitals should submit accurate stroke data for 100% of patients.
    - Hospitals with poor data compliance should investigate the reason for this. They should put in place systems to collect and submit accurate data for post-operative neurological complications.
10. Hospitals with poor data completeness should collect and submit complete and accurate data for post-operative renal complications.
11. Hospitals not collecting new variables within the NACSA dataset need to identify the reasons for this.
    - Hospitals need to ensure that there is adequate funding for IT infrastructure, timely database software upgrades and support for audit teams.
12. All hospitals performing mitral surgery should regularly audit their mitral valve repair rate within their team. Repair rates in each hospital should be used to inform multidisciplinary team meetings and patient consent processes.
    - Hospitals with low mitral repair rates should identify the causes for this. Hospitals with low rates of repair should consider referring patients with mitral regurgitation to centres with expertise in mitral surgery and with high rates of repair.
13. Units wishing to attribute cases to Dual Consultant Operating (DCO) should ensure that their IT/databases are up to date with the data-fields required.

NHFA

1. Hospitals not achieving the recommended standard of the use of in-house echocardiography for patients with acute heart failure should review their clinical pathways and ensure that echocardiography is performed.
2. Hospitals should ensure that high-risk cardiac patients have access to cardiology wards. Heart failure patients are often the highest risk.
3. Hospitals not achieving the standards for ensuring a patient with acute heart failure is managed on a cardiology ward or seen by a heart failure team should review their pathways of care and consider

a quality improvement programme to improve on their current performance.

- Hospitals that do not have a Clinical Lead for Heart Failure should appoint one: ideally a Consultant Cardiologist.
- Hospitals that do not have access to Specialist Heart Failure Nurses within their hospital team or in the community should urgently seek to appoint them.

4. Greater attention is needed to ensure all patients with HFrEF receive the disease-modifying drugs that they should be on unless there is a contra-indication. This can be increased by patients being managed on cardiology wards or being seen by a HF specialist team. Those hospitals not meeting the expected standards should perform a clinical pathway review to investigate where improvements can be made.
5. More attention to follow-up arrangements is required so that patients are referred for Cardiology and Specialist Heart Failure Nurse follow-up, if required. Hospitals should review their pathways for referral to cardiac rehabilitation to allow greater access and uptake for heart failure patients.

NACRM

1. Hospitals with apparently very low volumes of activity should engage with the validation process to ensure they are not misrepresented. Device clinics should not submit records of follow-up patients they have 'inherited' from other implanting centres.
   - The appropriateness and sustainability of centres with low volumes should be discussed locally and at network level.
2. Consultants are reminded that submission of correct and complete data for procedures is their responsibility.
   - Clinical directors should investigate whether low operator volumes are the result of poor data submission, or genuinely low activity. Genuinely low volume operators should be subject to close local audit for complications, and the sustainability of their practice should be examined.
3. Centres failing to achieve the 90% data compliance goals (identified as red in their individual hospital reports) should require the clinical leads to analyse their poor performance.
   - Complete data submission for audit is the hallmark of a centre with good governance. Failure to comply also results in underestimates of clinical activity for the centre and the doctors working there.
4. Centres with low scores on data validity for devices and ablation should undertake an urgent root cause analysis. Low validity often reflects simple data entry errors and can have serious effects on a centre's performance throughout this report. Misunderstanding of the key fields appears to be a common problem and can be dealt with by training of those completing records.
5. Centres achieving <90% compliance with NICE guidance for pacemaker prescription (in particular those achieving <80% compliance) should consider carefully whether some operators are less confident with dual chamber implants and may be prioritizing expediency over the best treatment for their patients.
6. It is not expected that 100% of patients receiving ICDs will meet NICE indications, however at least 90% documented compliance is expected. Centres not achieving this standard should consider whether this is an issue of poor documentation or whether their threshold for ICD implantation is unduly low. Low volume centres in particular should examine their case selection and documentation.
7. Centres with reported re-intervention rates after device implantation that remain high year-on-year, and those above the 97.5% control limit, should examine the reasons for re-interventions. In most cases, these will chiefly be complications, and centres should look at procedure times, protocols, operator procedure volumes, and whether juniors are adequately supervised.
   - 'Tier 2' centres must improve reporting of NHS No. for each case: their true re-intervention rates are likely to be higher than reported.
8. Centres with high re-intervention rates after ablation procedures should examine the techniques and endpoints for their procedures, and in particular case selection.

4 Changes in volumes, demographics and equity of access

4.1 The number of heart attacks and revascularisation treatments were falling

Overall, there had been a 3% reduction in the numbers of patients admitted with a heart attack over the last two years of the audit data (down to a total of 86,547). This is mainly because of a reduction in the more serious STEMI cases. There had been a slight rise in NSTEMI admissions.

There has also been a 3.5% drop over two years in PCI procedures and a 13% fall in all surgical activity over 5 years.

These falls mainly reflect a fall in elective procedures and may be a result of the impact of primary and secondary preventive drug therapy, supported by research that suggests the influence of revascularisation on prognosis may be lower in some settings than was previously considered. This heightens the need to audit the prescription and take-up of key drug treatments such as anti-platelet therapy, statins, ACE-inhibitors and other prognosis-altering medications.

They may also be driven by changes in lifestyle, with a reduction in smoking, although there are continuing concerns about the impact of diabetes and obesity.

4.2 Asian and Black patients with a heart attack are younger

The median age of those admitted with STEMI (65 years) was 6 years lower than for those admitted with NSTEMI (71 years). There were about two male patients with a heart attack for every female patient and they presented at a younger age. This was seen across all ethnicities, although it is of note that the median age of aggregated Black and Asian patients admitted with a heart attack was 7 years younger than for White ethnicity patients (63 years versus 70 overall, 58 vs 66 for STEMI pts, 69 vs 75 for NSTEMI).

Non-White ethnicities account for 9.7% of patients and the Black and Asian cohorts together account for 97% of these.

4.3 Worrying trends were being seen in diabetes and obesity

There has been a progressive rise in the proportion of patients admitted with a heart attack with diabetes – now 22.7% versus around 17% in 2010/11 [Figure 4.1]. Just over a third of patients in the NHFA have diabetes. It is not clear whether this just reflects the rising national prevalence of diabetes or is in part because fewer non-diabetics are being admitted. For those with no prior history of coronary disease, 22.1% of males had diabetes vs 24% females.

Whereas 20.4% of White ethnicity patients had diabetes, 44% of the aggregated Black and Asian patients had a known history of diabetes. The aggregated Black and Asian patients had a higher prevalence of hypertension (56% vs 48%) and known hyperlipidaemia (39.5% vs 29%), although they were less likely to be current or ex-smokers. The proportion who had never smoked was higher than for White patients (53% vs 33.5%). Given that the median age of smokers admitted with a heart attack is about 10 years lower than for those who are ex-smokers and non-smokers, this demonstrates that factors other than smoking appear to be driving the premature events in the non-White ethnicities.

An evaluation of demographic changes in the NHFA audit is underway but not available for this report. However, the NHFA has noted a rise in the mean age of patients to 78.4 years, that for men being lower (76.5) than for women (80.8). There are more HF admissions for men in all age groups except for those aged 85 years or more.

In MINAP, there has also been a growing rise in the proportion with obesity (now 31.4% compared with 25.8% in 2010/11) [Figure 4.2].

Figure 4.1: *Prevalence of diabetes (%) in patients admitted with a heart attack but with no prior evidence of coronary artery disease, 2010/11 – 2019/20 [MINAP data]*

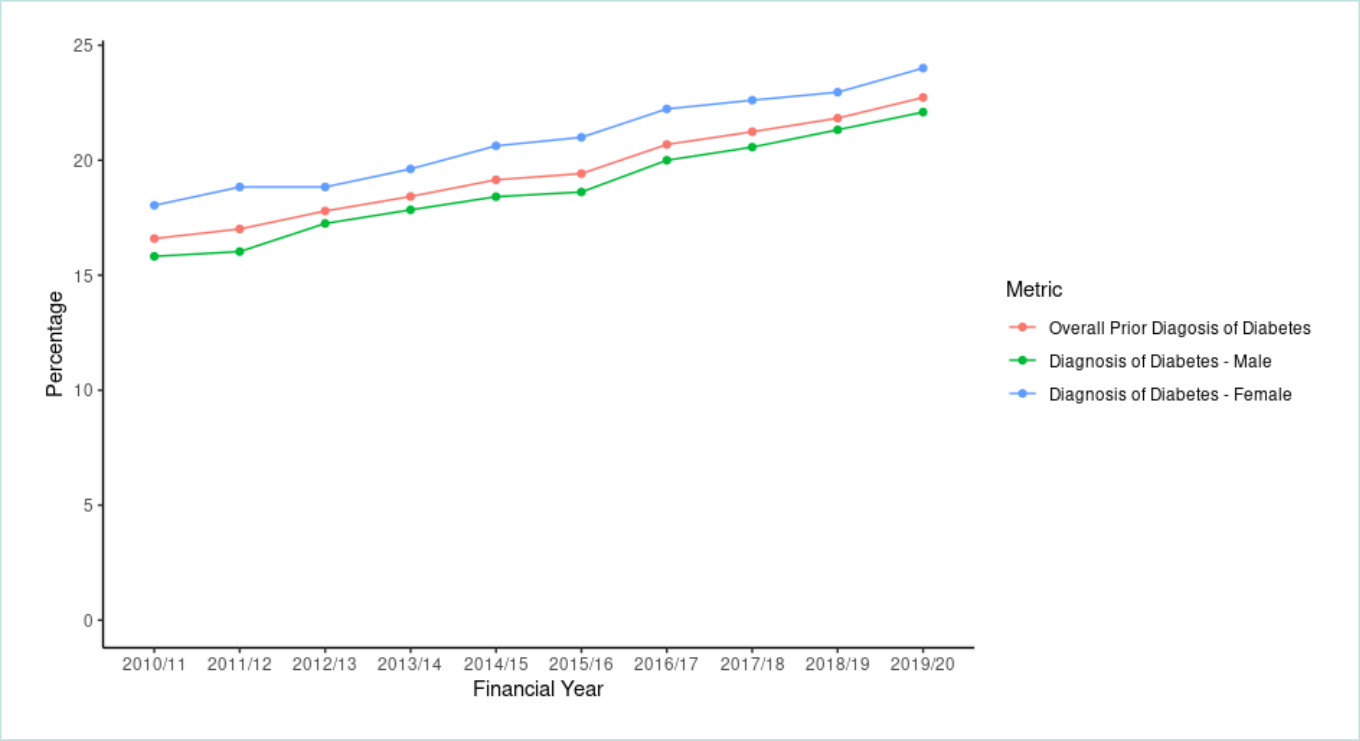
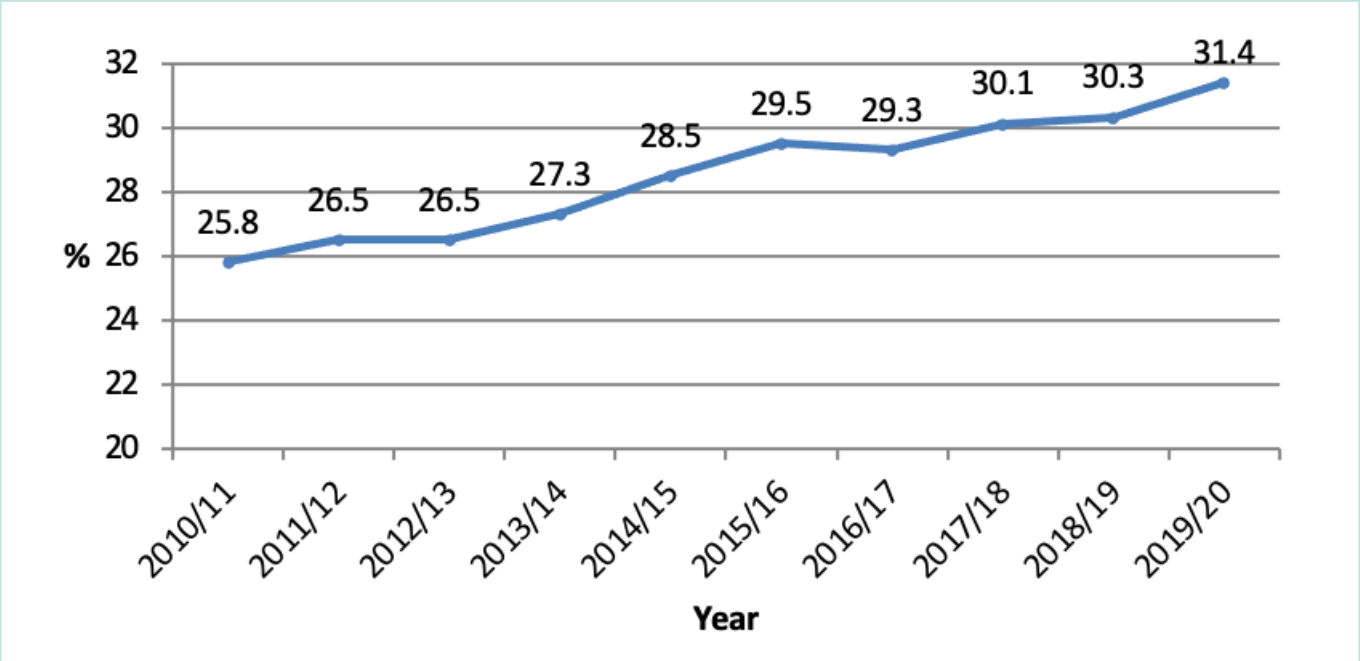


Figure 4.2: *Prevalence of obesity (%) in patients admitted with a heart attack with no prior evidence of coronary artery disease, 2010/11 – 2019/20 [MINAP data]*



The prevention of diabetes and obesity should be a primary goal of the healthcare system. For those with these conditions, there is a growing recognition of the potential benefits of sodium-glucose co-transporter 2 (SGLT2) inhibitors, dipeptidyl-peptidase-4 (DPP-4) inhibitors, glucagon-like peptide (GLP)-1 analogues and other new drug therapies, or approaches such as bariatric surgery but more research is required.

4.4 The volume of PCI procedures was falling and patients were getting older

The fall in PCI numbers was mainly in those undergoing elective procedures. Perhaps surprisingly, there was a slight fall in emergency procedures for patients admitted after an out-of-hospital cardiac arrest (OOHA) from 1.9% to 1.7% of all cases over two years (279 fewer procedures for this indication). One might have expected this to increase with the drive for a more equitable approach for this cohort but this may be balanced by a wait for additional evidence for the benefits of emergency treatment for NSTEMI patients (compared with a delayed approach) and an acceptance of futility in some patients.

The mean age of patients undergoing PCI had increased a little over time (65.7 vs 64.9 years in 2012) but the distribution by sex has been unchanged. Proportionately more were diabetic (24.3% in 2019/20 vs 20.2% in 2012). Although the proportion of Asian and Black ethnicity has been stable over recent years (10% and 1.2% respectively) this has grown over the last decade (7.2% and 0.83% respectively in 2011).

The number of patients with a prior PCI had risen to 28.7% but this was not due to an increase in the proportion of patients requiring additional PCI for restenosis (4.9% of procedures were performed for this indication). It may have been accounted for by a number of factors.

There is growing evidence for 'complete revascularisation' for patients undergoing PPCI for STEMI, which is often achieved by planned secondary procedures rather than a more complex index procedure. PCI is also the most frequent revascularisation treatment for repeat acute coronary syndromes and it is possible that the greater long-term survival of patients impacts this with an intermittent need for acute therapy.

4.5 The volume of cardiac surgery procedures was falling

Overall, there has been a 13% fall in cardiac surgical procedures over the last 5 years (representing 4,645 fewer procedures each year). There have been falls in all nations (13.8% for England, 6.5% for Scotland, 11.8% for Wales and 8.3% for Northern Ireland). There was a fall by 6% from 2018/19 to 2019/20 (1,977 fewer procedures, with a 5-7% fall in England and Wales, no change in Scotland and a marginal increase of 5.3% in Northern Ireland).

These changes have been seen in both NHS and private centres, with a fall in activity in 26/35 NHS hospitals. There was an increase in activity associated with the developments at the Barts Heart Centre (combining two former individual centres) and a slight increase over the previous year in four other English, two Scottish, one Welsh and the Belfast centre.

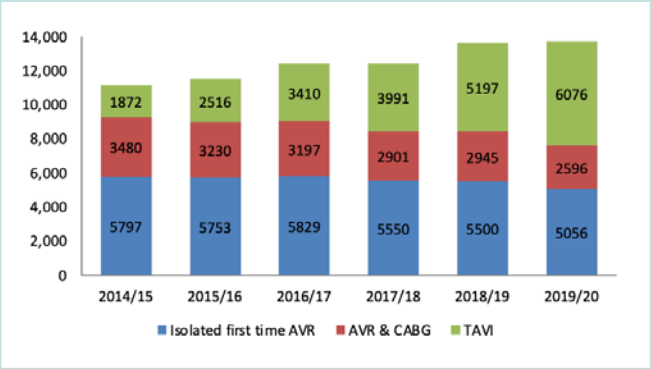
The mean age of patients undergoing surgery had fallen slightly (except in Wales) from 66.7 to 66.2 years (with a noticeable variation between centres). This was made up of a 10% fall in all procedures for those under 60 years, a 15% fall in those 60-69 years, and an 8% fall for those 70 years or older.

Although there have been similar falls in activity for males and females under 70 years, there had been a 23% drop in cardiac surgical procedures for females 70 years or older compared to an 8% drop in males in this age group. There had been a proportionate drop overall in female surgery in England, Scotland and Northern Ireland (but not Wales) following a gradual increase in proportion from 2014/15 to 2017/18. The reasons for this are not fully clear although the growing use of Transcatheter Aortic Valve Implantation (TAVI) in patients with aortic stenosis may go some way to explain this.

Overall, there had been an 18% fall in elective CABG over 5 years (seen across all age groups) and a 13% fall in isolated surgical Aortic Valve replacement (AVR). Although there had been a 7% growth in AVR for those under 60 years, there had been a 9% fall for 60-69 year olds and a 20% fall for those 70 years or older (presumably reflecting the impact of TAVI) [Figure 4.3].

Although numbers of patients undergoing surgical aortic valve replacement had fallen, there had been a year-on-year increase in the number of TAVI procedures, such that the overall number of patients undergoing interventions for aortic valve disease has continued to rise. Over 5 years, nearly 25% more cases have been treated. However, rates of intervention in the UK still fell well short of the rates seen in many European countries.

Figure 4.3: *UK procedures numbers for symptomatic aortic stenosis, 2014/15 – 2019/20 [NACSA data and data from the UK TAVI Registry, coordinated by the BCIS and the SCTS]*



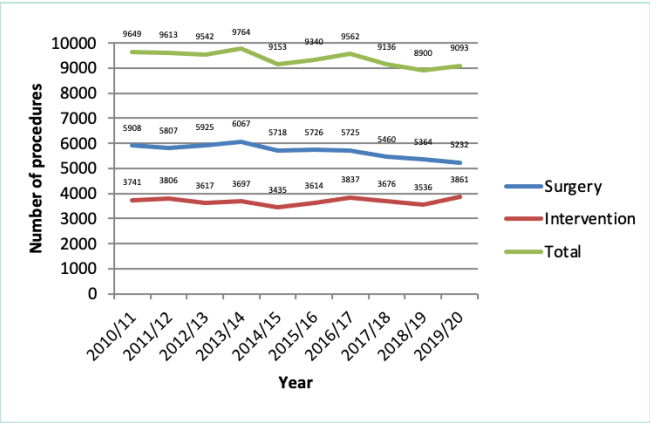
In this year's NACSA report, there is a focus on patients undergoing mitral valve operations. Over 5 years, there was a 32% fall in mitral procedures, a 27% fall in mitral valve repairs and a 16% fall in mitral valve replacements. Numbers of mitral valve procedures combined with CABG were also down.

Overall, there were proportionately fewer mitral valve repairs as a proportion of all isolated mitral valve procedures (64.6% to 61.6% over 5 years). The latest proportion in each country was 62.2% for England, 51.4% for Scotland, 61.5% for Wales and 68.3% for Northern Ireland, with considerable variation between NHS centres (22% to 91%). More research will be needed to determine whether this variance is explicable and appropriate or whether a more consistent approach should be expected.

4.6 There has been a gradual decline in paediatric surgical procedures for congenital heart disease

Over time, there has been a fall in the number of surgical procedures for congenital heart disease [Figure 4.4], predominantly in the paediatric cohort. The level of the fall is not matched by a compensatory rise in interventional procedures. The reasons for the change are not clear. Whether it reflects changes in epidemiology, indications for treatment, single complex procedures replacing sequential staged procedures, other treatment options or other factors is not fully understood. This may have relevance to discussions about expected standards, especially at a time when there have been challenges to recruitment into this vitally important specialty.

Figure 4.4. *Number of surgical and interventional procedures for patients with congenital heart disease, 2010/11 – 2019/20 [Data from the NCHDA]*



5 COVID-19 and hospital services for cardiovascular patients

5.1 What we have learned

Data collected by NICOR for the NCAP have been used extensively in determining the early impact of the COVID-19 pandemic. Analyses were performed by the academic groups led by Professor Baigent (Oxford), Professor Mamas (Keele) and Professor Gale (Leeds).

There were significant falls in the numbers of patients who were admitted to hospital with acute coronary syndromes and acute heart failure.[7 8 9] Not only was this seen during the first wave but, after a gradual rise to about 90% of the previous level of admissions in June 2020, a second fall in admissions occurred in October 2020 during the second wave.[10] Although some true reduction in the incidence of acute events due to lockdown cannot be excluded, the magnitude of the fall, associated with information around an increase in community deaths, suggests that many patients with acute symptoms avoided admission, possibly because of fears about acquiring infection in hospital.

With a reduction in admissions with acute coronary syndromes, there was a concomitant fall in the number of PCIs and CABGs offered to these patients, more so with CABG. In addition, elective admissions for procedures fell considerably, some more than others.[11 12 13] This related to hospital policies to allow services to maintain urgent and emergency care whilst also dealing with the impact of the pandemic. By the end of May 2020, there was an estimated deficit of 45,501 major cardiovascular procedures and the backlog is likely to be significantly greater now.

The biggest impact was seen with admissions for cardiac ablations and there was over a 40% reduction in cardiac device therapy. Far fewer surgical valve operations were offered, especially for aortic stenosis.[14] TAVI services were also reduced but to a lesser extent and were offered more to the most symptomatic or urgent cases. Restoration of services will be essential to reduce avoidable deaths.

Primary PCI was maintained as the default reperfusion therapy for patients with STEMI albeit with a slight increase in DTB times.[7 12] However, fewer cases were treated during the first wave. Times to treatment for minority ethnicities, which have been found to be longer pre-COVID, were even longer in the first part of the pandemic.

For the NSTEMI population, there were fewer admissions and a disproportionate fall in patients who self-presented.[7 8 11] There was a change in case mix with an under-representation of females, older patients, diabetics and those with other comorbidities. There were fewer inter-hospital transfers. Fewer underwent angiography, but for those who underwent angiography, times to treatment were significantly reduced as was length of stay in hospital. Standards of care overall were maintained.

Although overall acute coronary syndrome admissions fell, there was an increase in the proportion presenting after an out-of-hospital cardiac arrest (OHCA) and, compared to the pre-COVID period, these patients were more often female, older, and more likely to be from minority ethnicities.[15] In addition, the minority ethnicities were proportionately more likely to present with ST-elevation myocardial infarction during the pandemic and their treatment times were longer.[16]

Patients who were coded as having both an acute coronary syndrome (mostly NSTEMI cases) and COVID-19 were at especially high risk. 30-day mortality for patients with both diagnoses was around 40%.[17]

By 27th March 2020, there was a nadir of acute heart failure admissions (60% fewer admissions compared to the expected numbers) with a gradual increase thereafter but with rates remaining significantly lower than expected.[9 10]

Overall, there was an increase in mortality related to heart failure (estimated 280 excess deaths by 31st May 2020). Deaths in hospital due to heart failure had reduced by 29% but there was a 31% increase in deaths at home and a 28% rise in deaths in care homes and hospices due to heart failure. For those admitted with heart failure, all-cause mortality rates were similar in hospital compared to the pre-COVID period but were slightly higher by 30-days (15% versus 13%).

The first wave saw a rise in CV deaths as well as an excess in overall deaths due to COVID-19 itself.[18 19 20]

However, fewer deaths occurred in hospital, with more occurring in care homes and hospices and also at home. The excess cardiovascular deaths seen during the first wave were not however seen during the second wave, where excess deaths were dominated by COVID-19. In a report from the Office of National Statistics summarising overall deaths during 2020, deaths at home were higher by 33% compared to pre-pandemic.

Deaths in hospital overall were 4% higher, but this was dominated by deaths due to COVID – deaths would have been 16% lower in hospital overall without COVID-19.[21] However, by April 2021, monthly mortality rates were lower than the five year average, and ischaemic heart disease was the leading cause of death (10-11% of all deaths) registered in England and Wales.[22]

5.2 Considerations for recovery

Huge changes were needed in the healthcare system to deal with the pandemic. There was a major redeployment of staff and new ways of working were introduced. Some of these will persist beyond the pandemic. For some specialties it is likely that a continuation of virtual outpatient consultations will be appropriate and may reduce times to consultations for the majority of patients.

Other specialties, including the cardiovascular services will probably develop a hybrid model of virtual and face-to-face consultations. Community services may have to be strengthened for cardiac rehabilitation, heart failure and cardiac arrhythmias and more nurse specialists and cardiac physiologists may be required.

The pandemic has highlighted inequalities and more work will be needed to reduce the variance seen. Although we saw improvements in some measures during the early part of the pandemic (e.g. times to angiography for NSTEMI patients), these are likely to be lost as workloads normalise and the elective patients require attention, especially as there is a large backlog. A major restructuring of services is deemed necessary to deal with the deficit.

This will be a challenge to integrated care services, but at a time when service redesign will clearly be required, this is also an opportunity to see if the problems highlighted in this report can be tackled. This is especially so if we are to:

1. Reduce Call-To-Balloon times for PPCI;
2. Reduce times to angiography, PCI and CABG for patients with non-STEMI;
3. Reduce waiting times for elective cardiac surgery;
4. Ensure all acute patients admitted with a heart attack or heart failure are seen by specialists teams;
5. Improve the proportion of patients with HFrEF who are prescribed disease-modifying drug therapy; and
6. Deal with the substantial backlog of patients requiring all types of cardiovascular procedures whilst dealing with those newly presenting.

There will be a need to review capacity and staffing levels, and the use of the private sector to treat NHS patients may be required. Some hospitals may need to be designated as elective centres, to help deal with the backlog. Clinical pathways should undergo a process review and redesign. Quality improvement programmes should be put in place to tackle these issues, especially as the problems highlighted are associated with a worse outcome for patients and, importantly, lead to a significant deterioration in the patient experience.

Given the backlog, returning to the status quo will be associated with significant problems. For example, some sobering modelling work has considered potential lives lost in the setting of aortic stenosis should new ways of working not be introduced.[23] Seven-day working and changes in treatment options may have some impact in preserving lives that would otherwise be lost, as may extended uses of current capacity or alterations in current capacity for different treatments, but this is dependent on whether there is sufficient workforce to enable this.

We will continue to push for rapid input of data into the NCAP to help monitor performance and reassure the public as this work is undertaken. The linkage of the NCAP data with national mortality and hospital episode statistics will provide additional insights and hopefully demonstrate that improved performance in clinical pathways is reflected in improvement outcomes, greater efficiencies and services that are focussed on what patients need. It will also aid further exploration around which measures of performance can be met using coding data.

The NHS has major challenges ahead and accurate and timely data collection will be essential to reassure the public that high quality services with good outcomes are maintained and, where needed, improved.

6 | Future direction

The NCAP aims to complete its major objectives by June 2022, putting in place the groundwork for a rapid reporting system back to hospitals and commissioners, and ensuring that patients and carers can identify the performance of their local hospitals.

The emphasis is to highlight good practice and to encourage those whose performance has room for improvement to learn from others. We hope to demonstrate progressive improvement, but we will also report on areas of clinical practice where a national, regional or local review is necessary to overcome hurdles to progress.

Over the next year, we aim to:

- roll out the new data tools to all of our specialty domains
- develop a new system for reporting back to hospitals
- reinforce quality improvement methodology
- make it easier for commissioners and patients and carers to review this information
- bring forward the timing of the annual report
- develop means of exploring regional variations in access to specific procedures; this will include linkage processes to explore variance in the use of device therapy for patients with left ventricular systolic function, either following myocardial infarction or an admission with heart failure
- explore which measures of cardiac care can be derived from routine coding data
- work to include additional private sector providers.

We will:

- continue to review the content and relevance of our dataset and, understanding the time lag to national coverage, implement changes as necessary
- work with national and international partners to enhance our analytical capacity on quality improvement initiatives
- work with national and international partners to enable research from the national registries.

Longer-term plans, dependent on appropriate funding, include:

- the development of our current (TAVI) and future technology registries
- utilisation of other routinely collected national databases, including prescribing and primary care databases in addition to mortality and hospital episode statistics
- ability to provide rapid information on specific questions to our commissioners and other national bodies (e.g. NICE)
- linkage to other nationally important clinical databases
- an organisation and workforce development plan.

7 | References

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8 | Glossary

A glossary of relevant terminology, abbreviations and acronyms is available here.

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