NATIONAL CARDIAC AUDIT PROGRAMME

MYOCARDIAL ISCHAEMIA NATIONAL AUDIT PROJECT (MINAP)

2022 Summary Report

(2020/21 data)

NICOR

British Cardiovascular Society

BCIS

The National Institute for Cardiovascular Outcomes Research (NICOR)

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

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British Cardiovascular Society

The British Cardiovascular Society is the voice for those working in cardiovascular health, science and disease management in the UK; we aim to promote and support both the healthcare professionals who work in cardiology and the patients for whom we want to encourage the best possible treatment. Our members are healthcare professionals, working in the field of cardiovascular health.

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Barts Health NHS Trust

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

The Healthcare Quality Improvement Partnership (HQIP)

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

www.hqip.org.uk

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MINAP AT A GLANCE

Data from the period April 2020 to March 2021

During the pandemic period, there was a 14.8% fall in all heart attacks. ST-elevation myocardial infarction (STEMI) cases were down 9% and non-ST-elevation myocardial infarction (NSTEMI) 18%.

Only 37% of patients now receive primary percutaneous coronary intervention (PCI) within two hours of calling for help and the median 'Call-To-Balloon' time has increased.

Heart attack care during the pandemic

83% of STEMI patients received reperfusion treatment, maintained from previous year

81% of NSTEMI patients received an angiogram during their admission (a slight fall over the last 2 years)

66% of NSTEMI patients received an angiogram within the 72-hour quality standard.

There was a large monthly variation associated with pandemic waves and associated 'lockdowns'. However, this improvement in timeliness of these important diagnostic tests deteriorated as elective PCI picked up again.

Place of care and specialist care

Admission to a cardiac ward allows optimum cardiac monitoring and access to highly trained cardiac nursing staff. Specialist care has been associated with more positive outcomes and patients seen by specialists are more likely to be referred for recommended interventions.

62% of NSTEMI patients admitted to a cardiac ward, the highest reported level over the last 5 years

77% of STEMI cases underwent in-house echocardiography (up from 57% in 2010/11)

96% of patients were seen by a cardiologist, or their team, during the admission, a consistently high performance

Ongoing management of heart attack patients

>90% of heart attack patients are discharged on standard secondary prevention drugs and this year 74% of patients with poor left ventricular (LV) function were prescribed a mineralocorticoid receptor antagonist (MRA) on discharge (this is an improvement from 68% the previous year)

These medicines have been shown to reduce the likelihood of subsequent coronary events in those who have suffered heart attack.

85% of patients were referred for cardiac rehabilitation after their heart attack, a slight rise from the previous year.

Exercise-based cardiac rehabilitation programmes are associated with fewer cardiac deaths in patients with coronary artery disease.

Executive summary

This report summarises the care given in over 80,000 cases of heart attack patients admitted to hospitals in England, Wales and Northern Ireland during the 2020/21 financial year. The quality of care is assessed against a set of quality improvement (QI) metrics derived from national and/or international standards and guidelines. The metrics differ for those with ST-segment elevation myocardial infarction (STEMI) and admissions with non-ST-segment elevation myocardial infarction (NSTEMI).

The timeframe of the report saw periods of national 'lockdown' in response to the coronavirus disease (COVID-19) pandemic, during which there were significant personal and societal constraints, and major changes in the configuration of health and care services. It records the activity and performance of hospitals as they responded rapidly to the enormous uncertainty and upheaval that resulted.

The data used are drawn from the Myocardial Ischaemia National Audit Project (MINAP) and the National Audit of Percutaneous Coronary Intervention (NAPCI), both of which are part of the National Cardiac Audit Programme (NCAP).

KEY MESSAGES

Where things worsened/causes for concern	
A big reduction in total heart attack admissions	14.8% fall in all heart attacks. Higher risk STEMI cases down 9%, lower risk NSTEMI cases down 18%, so concerns that some cases went untreated; large monthly variation associated with periods of 'lockdown'.
Delays to primary percutaneous coronary intervention (PCI) in STEMI still increasing	Only 37% of patients now receive primary PCI within two hours of calling for help and the median 'Call-To-Balloon' time increased.
Where levels of care were maintained or remained stable	
Highest recorded levels of reperfusion sustained for higher risk STEMI patients	83% of patients received reperfusion treatment, maintained from previous year.
Only a slight fall in use of angiography for NSTEMI patients	81% of patients received an angiogram during their admission (a slight fall over the last 2 years).
Admissions to cardiac ward remained high	62% of NSTEMI patients admitted to a cardiac ward, the highest reported level over the last 5 years.
Lower risk NSTEMI patients received care from a cardiologist	96% of patients were seen by a cardiologist, or their team, during the admission, a consistently high performance.
Consistently high performance in drug treatment for secondary prevention	90% of patients were discharged on all the drugs for which they are eligible.

Where things improved/practices changed	
Substantial increase in timely angiography for lower risk NSTEMI cases	66% of patients received an angiogram within the 72-hour quality standard. Large monthly variation associated with pandemic waves and associated 'lockdowns'. Performance deteriorated with re-start of elective percutaneous coronary intervention (PCI).
Continued increase in pre-discharge echocardiography	77% of patients underwent echocardiography prior to discharge.
Increased use of mineralocorticoid receptor antagonists (MRAs) in patients with poor left ventricular (LV) function	74% of patients with poor LV function prescribed an MRA.
More people referred to cardiac rehabilitation	85% of patients referred for cardiac rehabilitation after a heart attack.

Summary of recommendations

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.**

   Since the end of the present annual audit cycle significant pressures on the ability of Ambulance Trusts to hand over care of patients upon arrival at hospital may further adversely affect this metric.

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 for 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 and 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. **Those hospitals with low rates of angiography in eligible NSTEMI patients should perform a review of their systems of data collection and submission, and their systems for managing acute coronary syndromes (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.

   Anecdotal reports suggest that since the end of the present annual audit cycle the improvements seen here have not been maintained. Any lessons regarding more timely care that have been learned during the pandemic should be incorporated within plans for post-COVID recovery of services.

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

   This could include routine distribution of cardiac rehabilitation information/invitation leaflets to all patients admitted to cardiac facilities, and the inclusion of such information in discharge checklists.

   All hospitals should ensure equitable access to cardiac rehabilitation. Rehabilitation staff who were redeployed to ward-based duties during the pandemic should return to their original practices.

1 Introduction

This report summarises the care given to over 80,000 cases of heart attack patients admitted to hospitals in England, Wales and Northern Ireland during the 2020/21 financial year. The quality of care is assessed against a set of quality improvement (QI) metrics derived from national and/or international standards and guidelines.

The timeframe of the report saw periods of national 'lockdown' in response to the coronavirus disease (COVID-19) pandemic, during which there were significant personal and societal constraints, and major changes in the configuration of health and care services. It records the activity and performance of hospitals as they responded rapidly to the enormous uncertainty and upheaval that resulted.

The data used are drawn from the Myocardial Ischaemia National Audit Project (MINAP) and, in a change to previous years, also includes a selection of data drawn from the National Audit of Percutaneous Coronary Intervention (NAPCI) audit.

For many patients suffering a heart attack, optimal care includes a percutaneous coronary intervention (PCI). This is provided as soon as possible for patients with higher risk ST-segment elevation myocardial infarction (STEMI) heart attacks and following a period of initial medical treatment for patients with lower risk non-ST-segment elevation myocardial infarction (NSTEMI) heart attacks. The PCI procedure restores coronary artery blood flow at sites of complete or partial coronary obstruction.

Working closely with the British Cardiovascular Society, MINAP is concerned with the care of people suffering a particular **condition** (heart attack) only some of whom undergo PCI as part of their care. NAPCI maintains close relationships with the British Cardiovascular Intervention Society and is concerned with the performance of interventional **procedures and tests** offered to people with coronary artery disease, only some of whom have been admitted following heart attack.

Combining data from these two audits enables us to report on **the overall care for heart attack patients** within a framework of QI metrics for the management of patients admitted to hospital with a final diagnosis of either STEMI or NSTEMI. It also offers the chance to gain a complete picture of the substantial alterations in clinical practice for heart attack patients during 2020/21 that resulted from the COVID-19 pandemic. Further information about both audits, including contact details for the NICOR project teams and details of the datasets, can be found on the NICOR website.

Neither MINAP nor NAPCI capture every element of good quality care. This includes those vital but less tangible small acts that demonstrate the thoughtfulness, sensitivity and kindness of healthcare workers and which is so important to the experiences of patients and those close to them during their time in hospital.

The rest of this report is structured as follows:

- **Section 2** highlights the principal impacts of the COVID-19 pandemic
- **Section 3** focuses on Quality Improvement (QI) metrics which should continue to be a priority, either for teams within hospital trusts or for those leading service commissioning and development at Integrated Care System (ICS) level
- **Section 4** provides some pointers towards the future direction of the audit

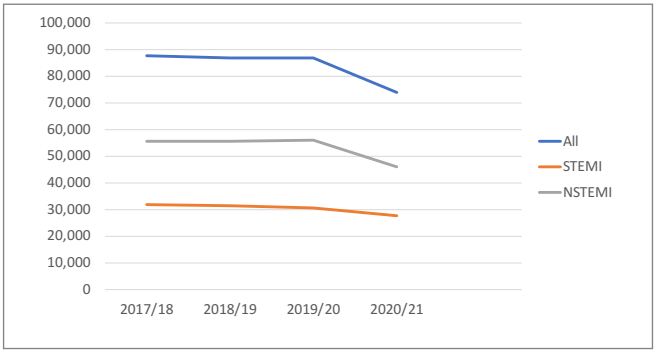
2 Principal impacts of the COVID-19 pandemic

2.1 There were significantly fewer heart attack admissions to hospital

Between 1st April 2020 and 31st March 2021, 82,471 cases of suspected heart attack hospital admissions were submitted to the audit, of which 73,867 were confirmed [Figure 2.1]. This is a 14.8% reduction on the previous year.

The reduction in the number of heart attacks was greatest in those with NSTEMI, in which there were more than 10,000 fewer cases, an 18% year-on-year reduction. STEMI cases fell by 9%.

Figure 2.1: Trend in total number of confirmed heart attack admissions to hospital 2017/18 – 2020/21 [MINAP data]



2.2 Heart attack admissions and PCI procedures fell most during lockdowns

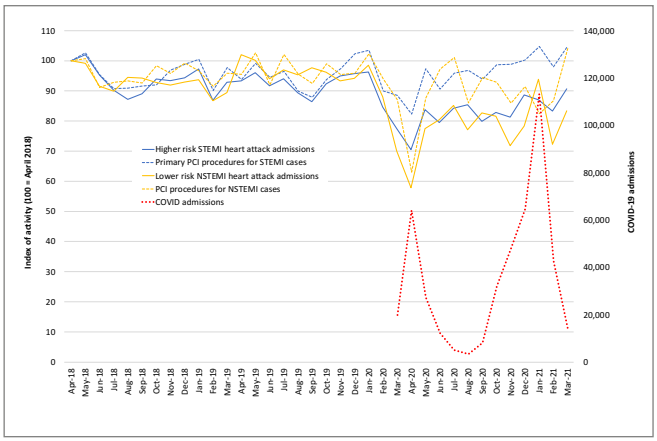
The reduction in cases was not uniform throughout the year. Figure 2.2 shows that there was a substantial fall in admissions coinciding with the first period of lockdown. Following this, the number of STEMI admissions began to return towards pre-pandemic levels before a second dip at the end of the year. NSTEMI cases also recovered after their low point but remained substantially lower than previous years. Notably, April 2020 saw the fewest and March 2021 saw the most PCI procedures for NSTEMI during the past 3 years.

For STEMI cases, where primary PCI should be provided as soon as possible on admission, there was a clear reduction in the absolute number of such procedures performed in April 2020, coinciding with the first period of lockdown and mirroring the fall in hospital admissions. Such a fall was not seen during the subsequent lockdown.

Similarly, the abrupt reduction in lower risk NSTEMI heart attacks admissions led to a substantial reduction in the number of PCI procedures amongst these patients. Unlike primary PCI for STEMI, there was a second notable decline in PCI for NSTEMI, as COVID-19 hospital admissions increased during the 'second wave' of the pandemic.

This difference between STEMI and NSTEMI, whereby the monthly rate of STEMI cases largely recovered during the year to March 2021, while NSTEMI cases remained lower than before, is confirmed by an analysis of coded administrative records of hospital admissions to NHS Trusts in England.[1]

Figure 2.2: Monthly STEMI and NSTEMI admissions and PCI procedures (for England and Wales) against number of UK COVID-19 admissions, 2018/19 – 2020/21 [NCAP data]



2.3 The fall in cases was largest amongst older NSTEMI patients

Cases of lower risk NSTEMI heart attacks amongst those aged over 65 declined dramatically by just over 20% compared with a fall of 5% amongst those aged under 65 suffering a higher risk STEMI heart attack [Figure 2.3].

Patients with STEMI tend to be younger than those with NSTEMI. Half of those with STEMI are 64 years old or younger, while half of those with NSTEMI are 70 years old or older. There was a reduction by one year in median ages compared with the previous two ('pre-pandemic') years.

The failure of monthly NSTEMI case numbers to return to pre-pandemic levels is most obvious in older age groups and for males [Figure 2.4].

Figure 2.3: STEMI and NSTEMI patients by age, 2017/18 – 2020/2021 [MINAP data]

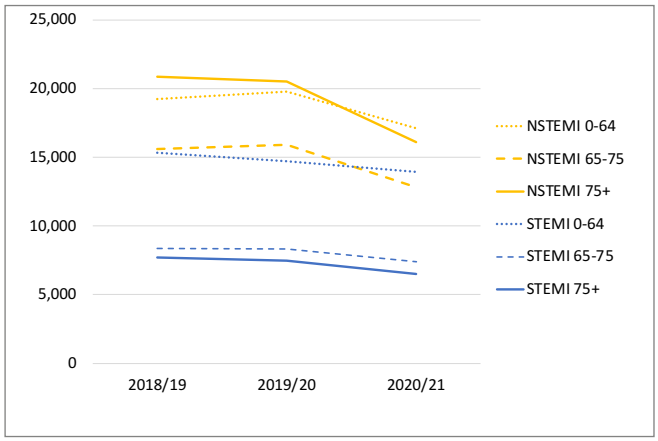
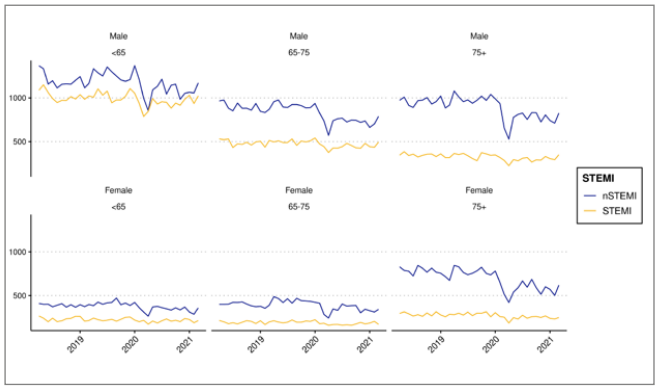


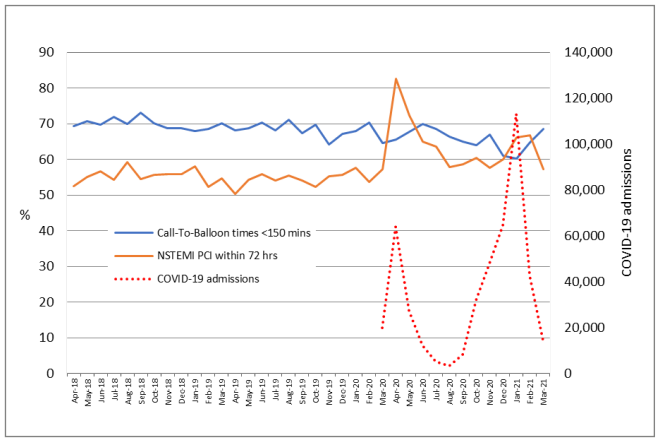
Figure 2.4: Monthly admissions for STEMI and NSTEMI by age and sex, 2018/19 – 2020/21 [MINAP data]



2.4 Increased numbers of higher risk STEMI heart attack cases had delayed primary PCI procedures during both lockdowns

Analysis of the quality metric 'Call-To-Balloon (CTB) time' reveals the continuation of a longstanding trend for poorer performance for this aspect of timely care for STEMI (see sections 3.1 and 3.2). The timeliness with which primary PCI was provided was poorest during both lockdown periods [Figure 2.5].

Figure 2.5: Percentage of patients (a) with STEMI treated by primary PCI who received the intervention within 150 minutes of call for help (excluding those presenting with shock or needing mechanical ventilation), and (b) with NSTEMI receiving PCI within 72 hours, against the number of UK COVID-19 admissions, 2018/19 – 2020/21 [NAPCI data]



2.5 Angiography and PCI for NSTEMI – fewer cases and shorter delays

There was a small fall in the number of patients with NSTEMI undergoing angiography during the index admission during the first wave (from 85% in February 2020 to 79%) [Figure 2.6]. April 2020 coincided with a substantial increase (from 54% in February 2020 to 84%) in the proportion of patients receiving an angiogram within the 72-hour standard although this fell again subsequently.

Figure 2.6: Percent of eligible patients with NSTEMI who received angiography during the admission, and the percent who did so within 72 hours, 2018/19 – 2020/21 [MINAP data]

For NSTEMI patients who consequently received PCI, there was improved access to care, with a reduction in delays to treatment. The percentage of patients treated within 72 hours of first hospital admission was higher during both of the COVID admission spikes, but especially during the first lockdown, when more than 80% received the intervention within the 72-hour quality standard [Figure 2.5].

This was almost certainly influenced by the increased capacity in catheter labs that resulted from a cessation or major reduction in the elective PCI programme during this period. The proportion receiving angiography within 72 hours fell back towards the pre-pandemic figures towards the end of the financial year when elective cases were re-started.

2.6 Other observations on the impact of the pandemic

2.6.1 Length of stay in hospital fell by a day

The median length of stay reduced during 2020/21, falling from 4 days to 3 across all cases compared with the two preceding years. For STEMI patients, 25% were discharged within 2 days, 50% within 3 days and 75% within 4 days (compared with 2, 3 and 5 days in 2019/20). With NSTEMI, a quarter of patients had been discharged within 2 days, a half within 4 days and three-quarters within 7 days (compared with 3, 5 and 8 days in 2019/20).

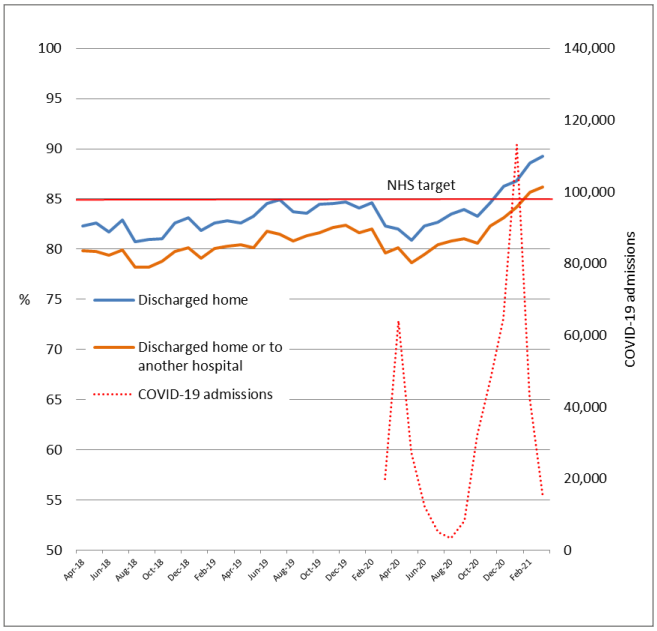
2.6.2 Fewer patients self-presented to hospital

There was a reduction in the proportion of patients who 'self-presented' to hospital without activating the ambulance service. This was particularly so for patients of non-white ethnicities, falling to 21% from 28% in 2019/20, compared with white patients (from 21.5% to 17%).

2.6.3 Small falls in referral to cardiac rehabilitation but this increased over the whole year

There was a small reduction in the proportion of patients with heart attack, either STEMI or NSTEMI, who were referred to cardiac rehabilitation services at the time of discharge from hospital during the first lockdown period, with a suggestion of a further slight reduction during subsequent periods [Figure 2.7]. Towards the end of the financial year the rate of referrals improved to above the 85% aspirational target (see section 3.11 below).

Figure 2.7: Percent of patients (STEMI and NSTEMI combined) referred for cardiac rehabilitation programmes, 2018/19 – 2020/21 [MINAP data]



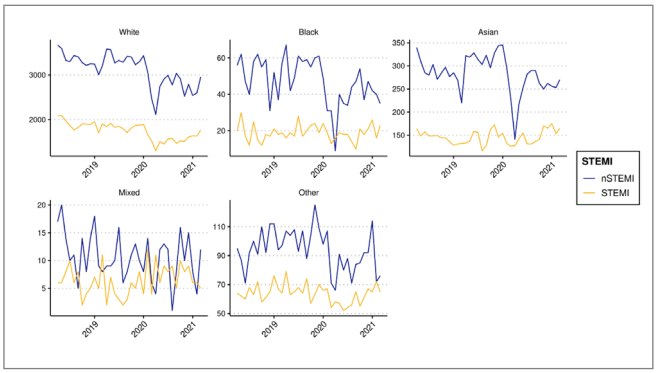
2.6.4 Ethnicity

Considering only those 57,160 cases in which ethnicity was recorded, there was a small 4% increase in the absolute number of cases of STEMI among non-white people, the vast majority of whom identify themselves within Asian or Black ethnicities [Figure 2.8].

However, there was a substantial 14% decrease in number of STEMI cases within those of white ethnicity. There were large relative reductions in cases of NSTEMI in both non-white and white groups (20% and 16% reductions respectively).

The proportion of NSTEMI and STEMI who were not of white ethnicity rose from over 8% in 2019/20 to 10% in 2020/21.

Figure 2.8: Monthly submissions for STEMI and NSTEMI by ethnicity, 2018/19 – 2020/21 [MINAP data]



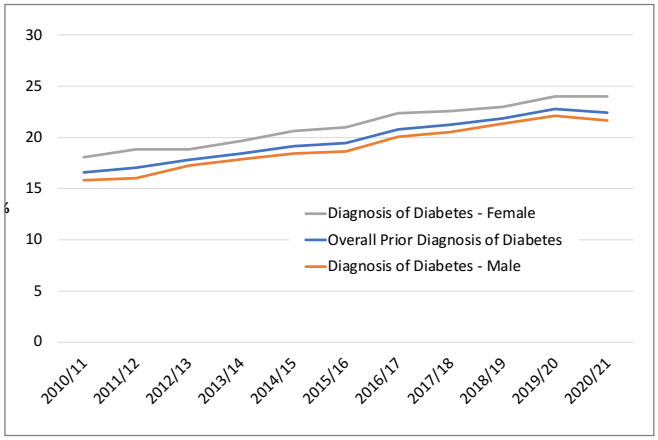
Patients of non-white ethnicities tended to be younger than white patients (median age for STEMI 58 years vs. 66 years; for NSTEMI 64 years vs. 71 years) and were twice as likely to have been diagnosed with diabetes before their heart attack (40% vs 20%), albeit the proportion with diabetes among non-white ethnic groups fell from 42.5% the previous year and did not change among white patients. Conversely, of those patients whose smoking status was recorded, while only one third (33.5%) of white patients had never regularly smoked tobacco; a little over a half (52%) of people of other ethnicities had never smoked.

2.6.5 Trend in diabetes

Considering all patients and excluding those already known to have coronary artery disease, the proportion of patients with a prior diagnosis of diabetes fell, albeit only slightly, for the first time in ten years, being 22.4% overall, 21.6% in males and 24% in females [Figure 2.9].

This reversal in a long-standing trend of increasing prevalence of diabetes in MINAP may be explained through an association between diabetes with increasing age. The recorded reduction in relative numbers of older patients during the pandemic would be expected to be accompanied by the reduced prevalence of diabetes reported here.

Figure 2.9: Trend in prior diagnosis of diabetes in patients with both STEMI and NSTEMI, excluding those with previous angina, heart attack, PCI and cardiac surgery, 2010/11 – 2020/21 [MINAP data]

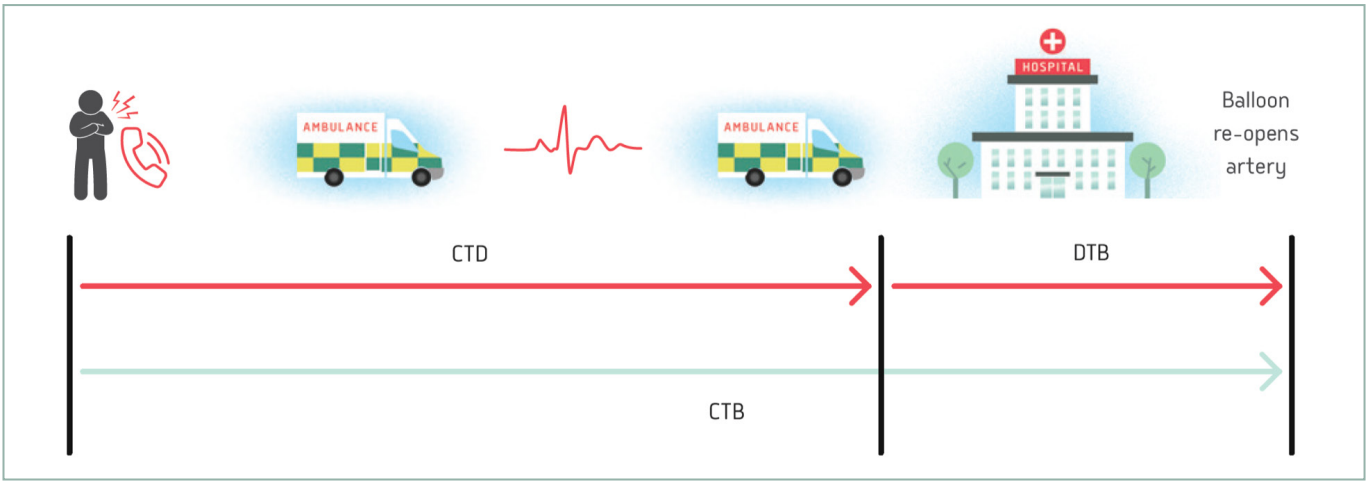


3 | Selected quality improvement metrics

This section expresses quality of care using various performance measures or 'metrics' that are based upon descriptors of optimal care.

For the first two metrics, which concern the timeliness of primary PCI in cases of STEMI, Figure 3.1 presents the relevant time intervals.

Figure 3.1: Time intervals relevant to reperfusion treatment for those receiving primary PCI



Call-To-Balloon time (CTB): the global response of the health service from the time the patient calls for help until the PCI. This consists: a) Call-To-Door time (CTD) during which the ambulance service must respond to the call, make a pre-hospital assessment, provide appropriate treatments and convey the patient to hospital. This is a measure of ambulance service response; b) Door-To-Balloon time (DTB) during which hospital staff must confirm the diagnosis, assess the patient's suitability for PCI, prepare for and begin to perform the PCI. This is a measure of the hospital response.

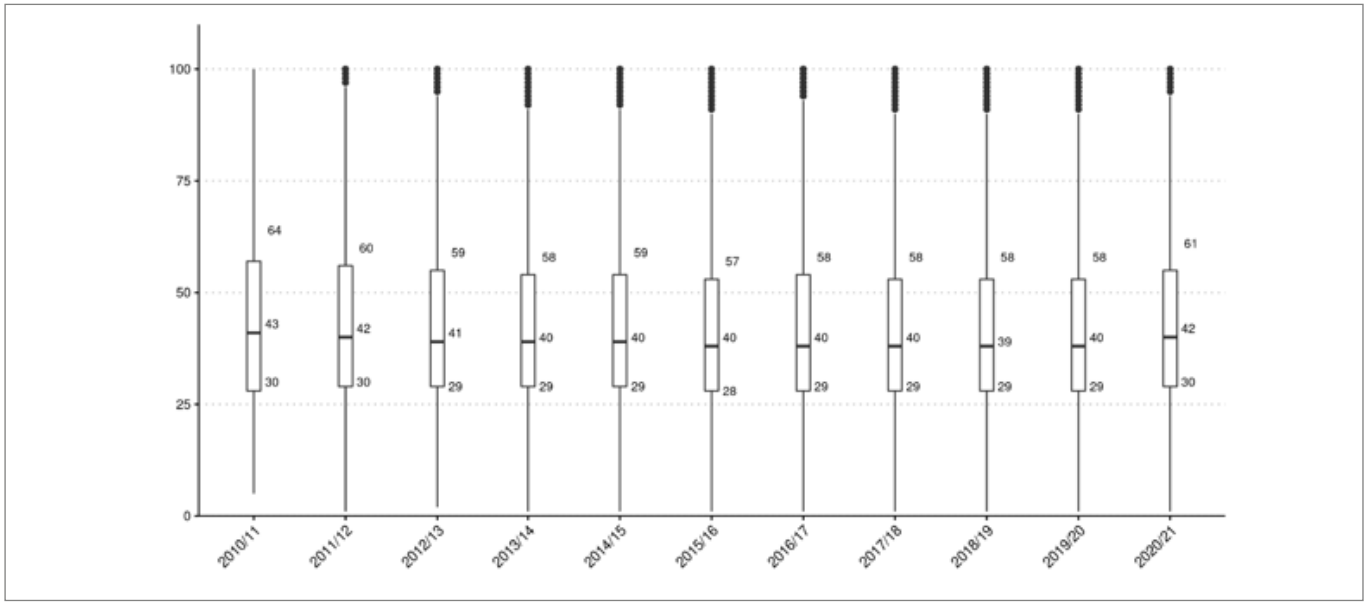
3.1 Door-To-Balloon times have changed little over 10 years

3.1.1 Overview of QI metric

QI Metric Description/Name	Door-To-Balloon time for STEMI
Why is this important?	Shorter Door-To-Balloon times (DTB) should be associated with better outcomes following STEMI.
QI theme	Effectiveness/timeliness.
What is the standard to be met?	a) DTB <60 minutes. b) DTB <90 minutes.
Key references to support the metric	European Society of Cardiology (ESC) guidelines for STEMI: 'important time targets' – 'Maximum time from STEMI diagnosis to wire crossing the lesion in patients presenting at primary PCI hospital ≤60 minutes'.[2]
Numerator	a) All with STEMI who underwent primary PCI within 60 minutes of arrival at PPCI centre. b) All with STEMI who underwent primary PCI within 90 minutes of arrival at PPCI centre.
Denominator	All with STEMI who underwent primary PCI for whom a DTB can be calculated.
Trend	Median DTB has varied little over a decade, but the last three years reveal a worsening trend and a 3 minute lengthening to 42 minutes [Figure 3.2].
Variance	The top five hospitals achieved DTB 60 minutes in 86%, and DTB 150 minutes in 95%, patients. The lowest five hospitals achieved DTB 60 minutes in fewer than 51%, and DTB 90 minutes in fewer than 70%, patients [Figure 3.3].

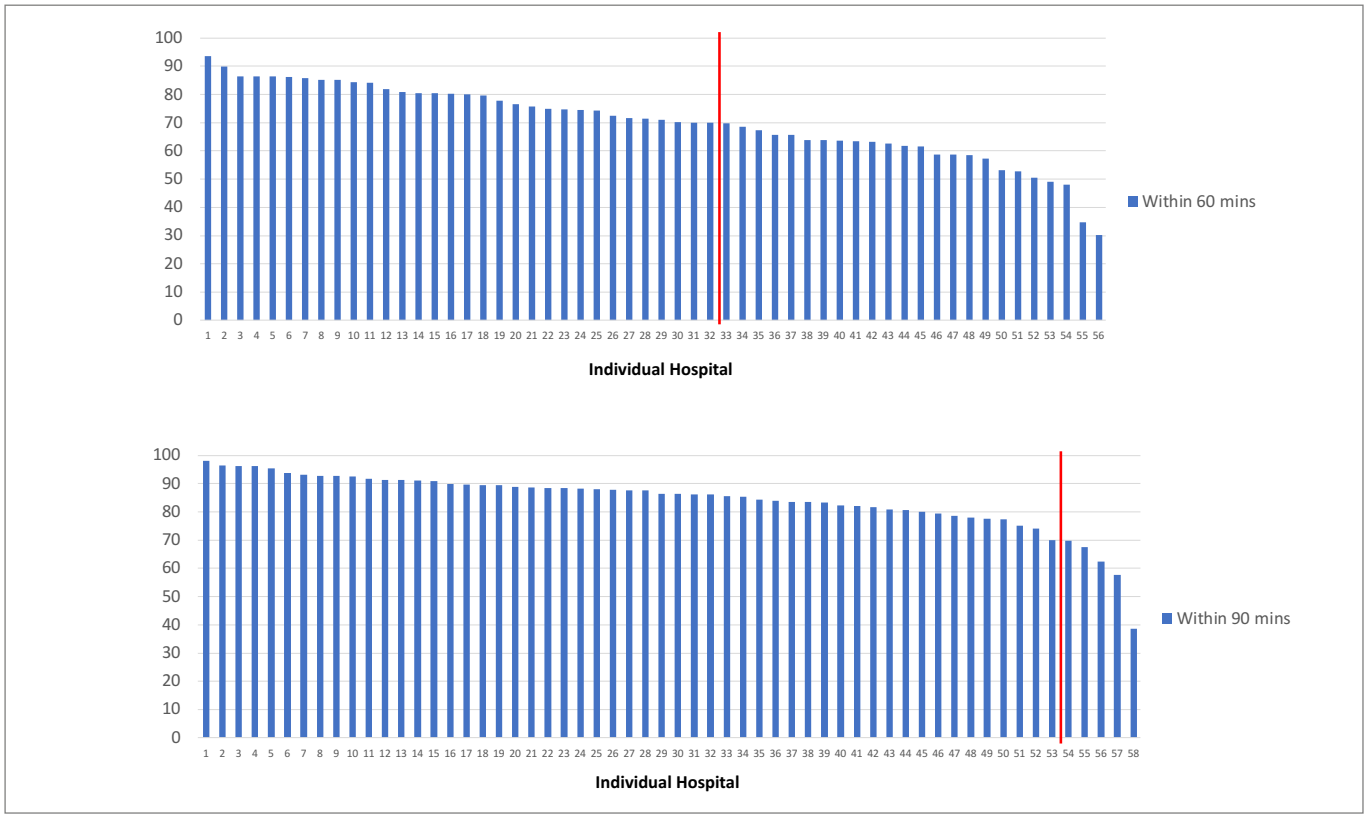
3.1.2 Audit results

Figure 3.2: Door-to-Balloon times (minutes), with median and interquartile ranges, 2010/11 – 2020/21 [MINAP data]



Each box encompasses the middle 50% of patients. The number adjacent to the lower border of each box is the DTB achieved in up to 25%, that adjacent to the upper border is the DTB achieved in at least 75%. The bold line within each box is the DTB achieved in 50% (i.e. the median value).

Figure 3.3: Distribution of hospitals with respect to the percentage of patients with STEMI who undergo primary PCI within 60 minutes and within 90 minutes of arrival at hospital, 2020/21 [MINAP data]



These analyses are for hospitals providing primary PCI services for STEMI and exclude hospitals recording 20 or fewer patients within the relevant DTB metric. Those hospitals to the right of the red line did not provide primary PCI to at least 70% of patients for the relevant DTB metric.

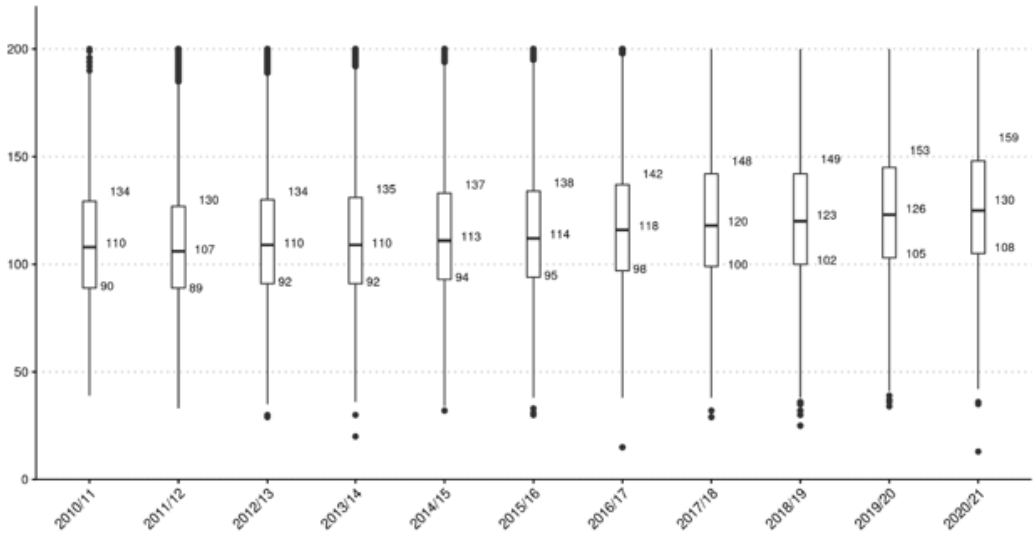
3.2 Call-To-Balloon times continued to lengthen with fewer patients receiving timely primary PCI

3.2.1 Overview of QI metric

QI Metric Description/Name	Call-To-Balloon time for STEMI
Why is this important?	Shorter Call-To-Balloon times (CTB) are associated with better outcomes.
QI theme	Effectiveness/timeliness.
What is the standard to be met?	a) CTB <120 minutes. b) CTB <150 minutes.
Key references to support the metric	National Institute for Health and Care Excellence (NICE) quality standard (QS 68) 'Adults with acute ST-segment-elevation myocardial infarction (STEMI) who present within 12 hours of onset of symptoms have primary percutaneous coronary intervention (PCI), as the preferred coronary reperfusion strategy, as soon as possible but within 120 minutes of the time when fibrinolysis could have been given.[3] [Given that pre-hospital fibrinolytic therapy may take 30 minutes to start – this leads to a standard of 'within 150 minutes'].
Numerator	a) All with STEMI who underwent primary PCI within 120 minutes of call for help. b) All with STEMI who underwent primary PCI within 150 minutes of call for help.
Denominator	All with STEMI who underwent primary PCI for whom a CTB can be calculated.
Trend	Progressive lengthening of CTB over last 7 years. Smaller proportion of patients receiving timely primary PCI – 37% within 120 minutes, 65% within 150 minutes [Figure 3.4 and Figure 3.5].
Variance	The top five hospitals achieved CTB 120 minutes in 70%, and CTB 150 minutes in 87% patients. The lowest five hospitals achieved CTB 120 minutes in fewer than 25%, and CTB 150 minutes in fewer than 36%, patients [Figure 3.6].

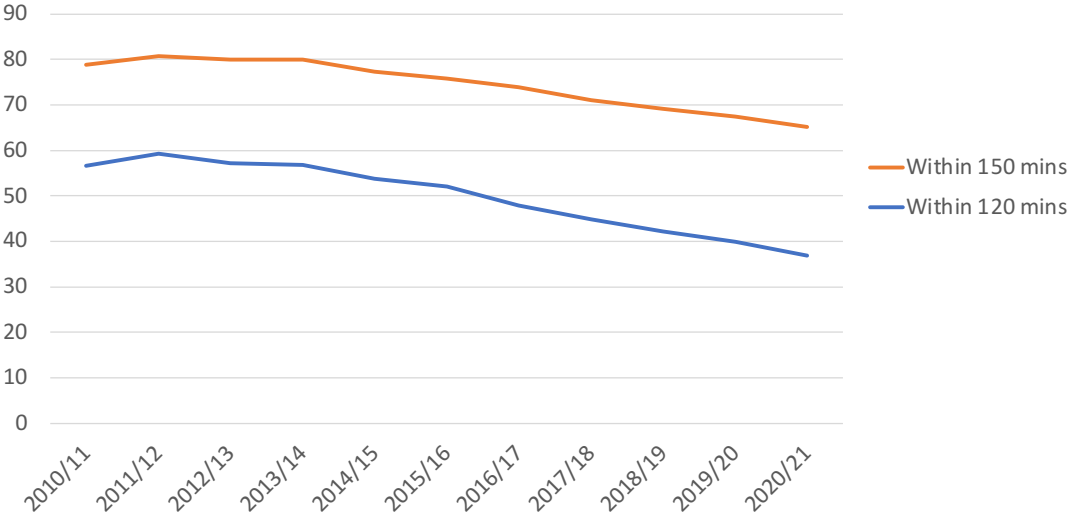
3.2.2 Audit results

Figure 3.4: Call-to-Balloon (CTB) times (minutes) with median and interquartile ranges, 2010/11 – 2020/21 [MINAP data]



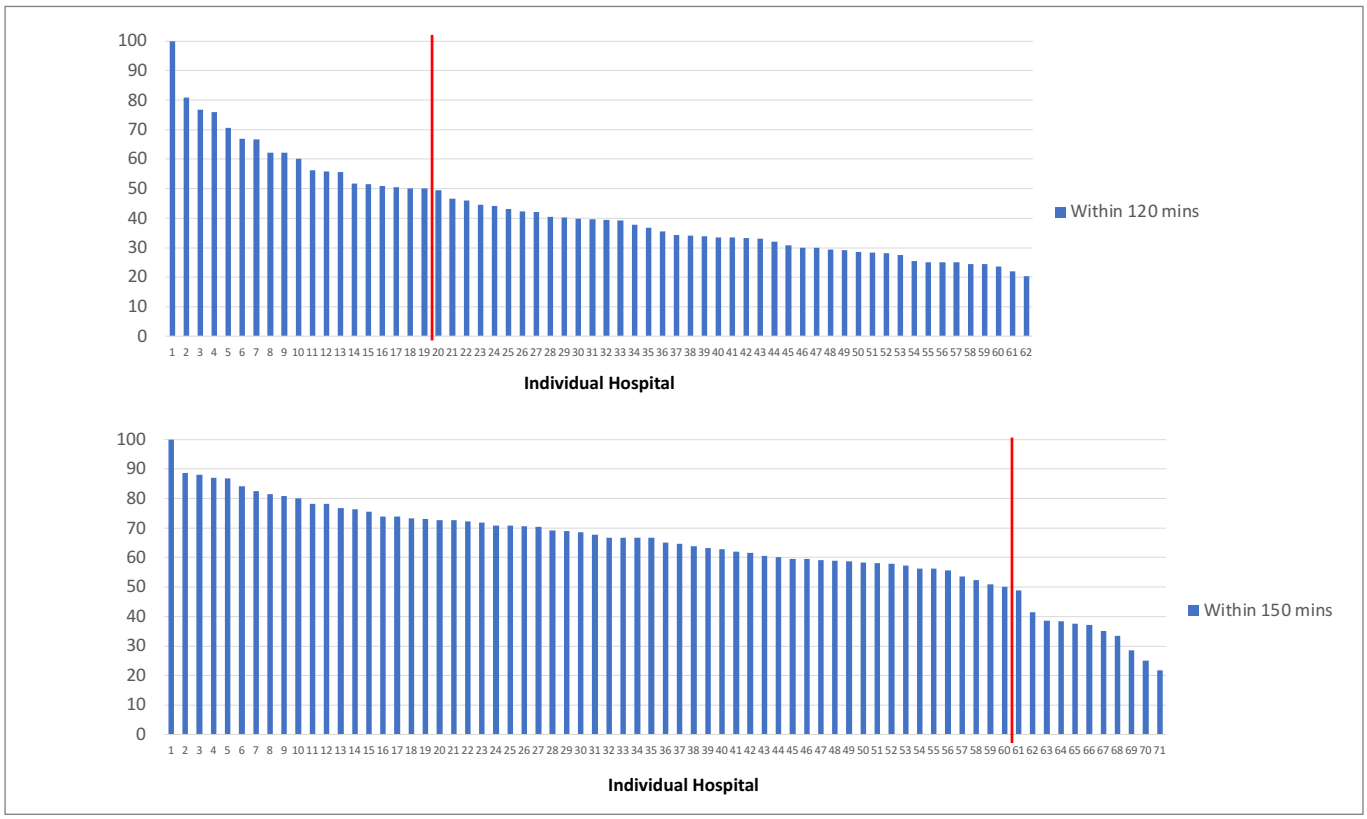
Each box encompasses the middle 50% of patients. The number adjacent to the lower border of each box is the CTB achieved in up to 25%, that adjacent to the upper border is the CTB achieved in at least 75%. The bold line within each box is the CTB achieved in 50% (i.e. the median value).

Figure 3.5: Percentage of patients with STEMI who underwent primary PCI within CTB 120 minutes and CTB 150 minutes, 2010/11 – 2020/21 [MINAP data]



These analyses are for hospitals providing primary PCI services for STEMI and exclude hospitals recording 20 or fewer patients within the relevant DTB metric. Those hospitals to the right of the red line did not provide primary PCI to at least 70% of patients for the relevant DTB metric.

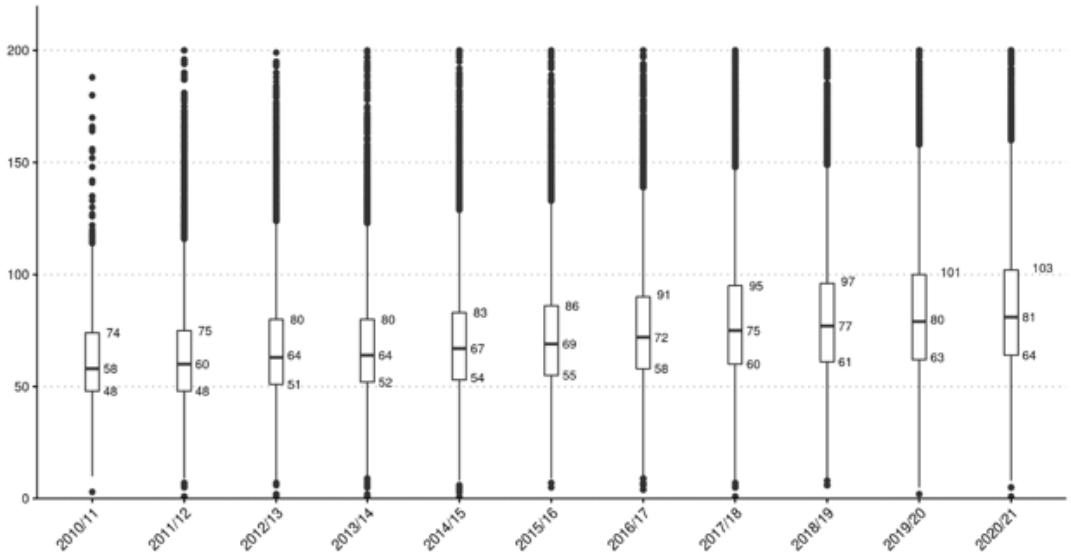
Figure 3.6: Distribution of hospitals with respect to the percentage of patients with STEMI who undergo primary PCI within CTB 120 minutes and CTB 150 minutes, 2020/21 [MINAP data]



These analyses are for hospitals providing primary PCI services for STEMI and exclude hospitals recording 20 or fewer patients within the relevant CTB metric. Those hospitals to the right of the red line did not provide primary PCI to at least 50% of patients for the relevant CTB metric.

The lengthening CTB appears to reflect both a slight lengthening of hospital DTB compared to the year before and a more established trend, over seven years, of year-on-year lengthening of pre-hospital CTD times [Figure 3.7]. There has been a 23-minute prolongation of median CTD during the last decade, but only one minute extra during 2020/21.

Figure 3.7: Trend in Call-To-Door (CTD) times (minutes) – median and interquartile ranges, 2010/11 – 2020/21



The number adjacent to the lower border of each box is the CTD achieved in up to 25%, that adjacent to the upper border is the CTD achieved in at least 75%. The bold line within each box is the CTD achieved in 50% (i.e. the median value).

3.2.3 Ethnicity and sex

Median DTB was longer in those of non-white ethnicities (47 min (33-66 min)) compared with that for white patients (43 min (30-64 min)), and for female patients (44 min (31-64 min)) compared with males (42 min (30-62 min)).

Median CTB was shorter in those of non-white ethnicities (124 min (interquartile range 101-156 min)) compared with those white patients (131 min (108-164 min)), and for male patients (129 min (106-161 min)) compared with females (138 min (114-171 min)).

This should be considered in the context of research up to the end of May 2020, which included MINAP data, that showed a longer delay to primary PCI in non-white ethnicities. However, this included the time taken from onset of symptoms to call for help, which was longer in non-white people (1.7 hr vs. 1.5 hours during the early lockdown period).[4]

3.2.4 Recommendations for those not achieving the standard

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.

Since the end of the present annual audit cycle significant pressures on the ability of Ambulance Trusts to hand over care of patients upon arrival at hospital may further adversely affect this metric.

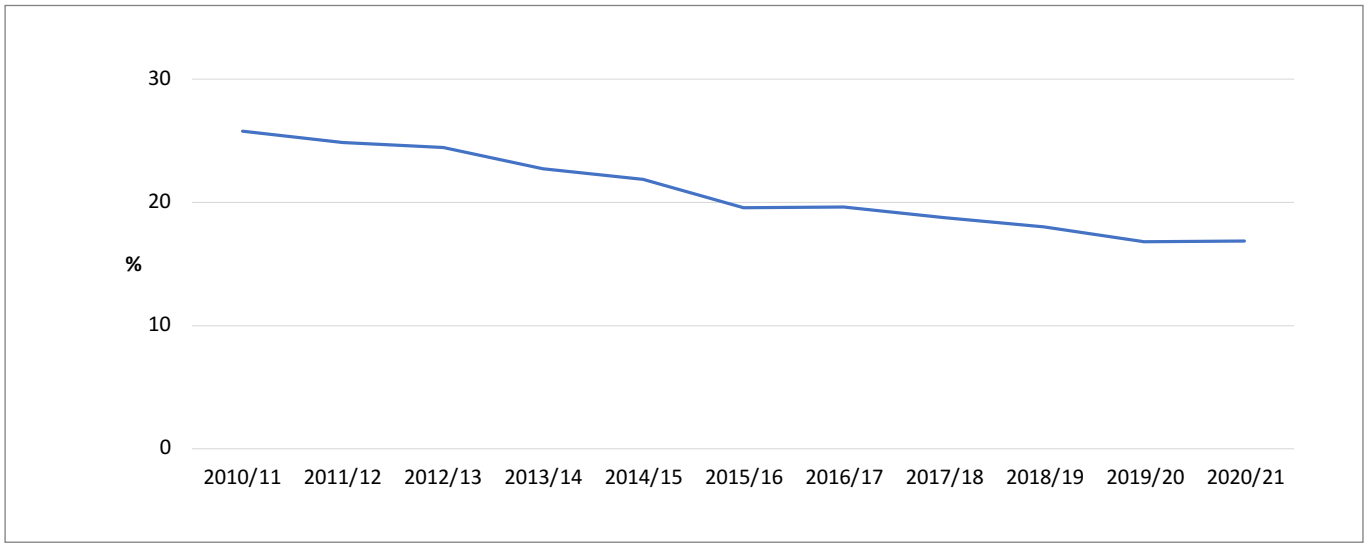
3.3 A greater proportion of STEMI treated with reperfusion therapy

3.3.1 Overview of QI metric

QI Metric Description/Name	No reperfusion for STEMI
Why is this important?	Reperfusion of a completely or partially occluded coronary artery is associated with reduced myocardial damage.
QI theme	Effectiveness.
What is the standard to be met?	All patients with ST elevation within 12 hours of onset of symptoms should be considered for reperfusion. No specific target rate for 'no reperfusion'.
Key references to support the metric	ESC guideline for management of STEMI recommends 'Reperfusion therapy is indicated in all patients with symptoms of ischaemia of ≤ 12 hour duration and persistent ST segment elevation'.[2] ESC Quality Indicator – Proportion of STEMI patients arriving in the first 12 hours receiving reperfusion therapy.[5]
Numerator	Those patients with ST elevation myocardial infarction who do not receive reperfusion therapy.
Denominator	All patients with STEMI for whom reperfusion is not judged to be 'too late' by the admitting team.
Trend	Substantial reduction in the proportion of patients with STEMI who do not receive reperfusion therapy over 10 years, from 25.7% to 16.8% [Figure 3.8].
Variance	Not reported for individual hospitals.

3.3.2 Audit results

Figure 3.8: Proportion of patients with STEMI who do not receive reperfusion therapy (neither primary PCI nor thrombolysis), 2010/11 – 2020/21 [MINAP data]



3.3.3 Ethnicity and sex

Rates of reperfusion treatment provision was higher among those (relatively younger) people of non-white ethnicities with STEMI (no-reperfusion in 15%) compared with white patients (no-reperfusion in 18%), and in male patients (no-reperfusion in 14.5%) compared with females (no-reperfusion in 23%).

3.4 More patients with STEMI underwent pre-discharge echocardiography

3.4.1 Overview of QI metric

QI Metric Description/Name	Echocardiography after STEMI
Why is this important?	Performance of echocardiography allows assessment of left ventricular (LV) function and targeted treatments of heart failure – it also identifies patients who might benefit from 'device therapy'.
QI theme	Safety/other.
What is the standard to be met?	No national standard has been published, but aim for 90% achievement.
Key references to support the metric	ESC guideline for management of STEMI recommends 'routine echocardiography to assess resting LV and right ventricular (RV) function, detect early post-MI mechanical complications, and exclude LV thrombus…in all patients'.[2]
Numerator	Patients undergoing echocardiographic assessment during the index admission.
Denominator	Patients with STEMI who survived to discharge home (i.e. did not die during the index admission, and were not transferred to another hospital) in whom echocardiography was not identified as 'not indicated'.
Trend	Increase in proportion undergoing echocardiogram prior to discharge, continuing trend for 'year-on-year' improvement – now 77% compared with 57% in 2010/11 [Figure 3.9].
Variance	44 hospitals arranged echocardiography in at least 90% of STEMI cases treated. The top ten hospitals performed an echocardiogram in at least 97%, and the lowest ten hospitals in fewer than 52%, patients with STEMI [Figure 3.10]. 37 hospitals arranged echocardiography in at least 90% of either STEMI or NSTEMI cases treated. The top ten hospitals performed an echocardiogram in at least 97%, and the lowest ten hospitals in fewer than 37%, patients [Figure 3.10].

3.4.2 Audit results

Figure 3.9: Proportion (%) of patients who undergo echocardiography following STEMI, 2010/11 – 2020/21 [MINAP data]

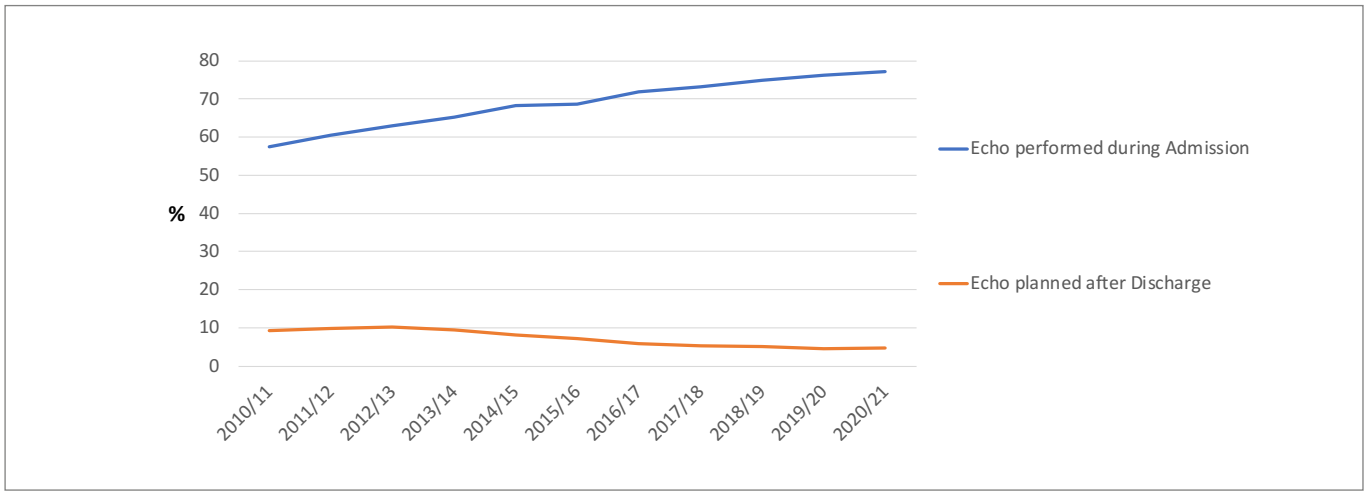
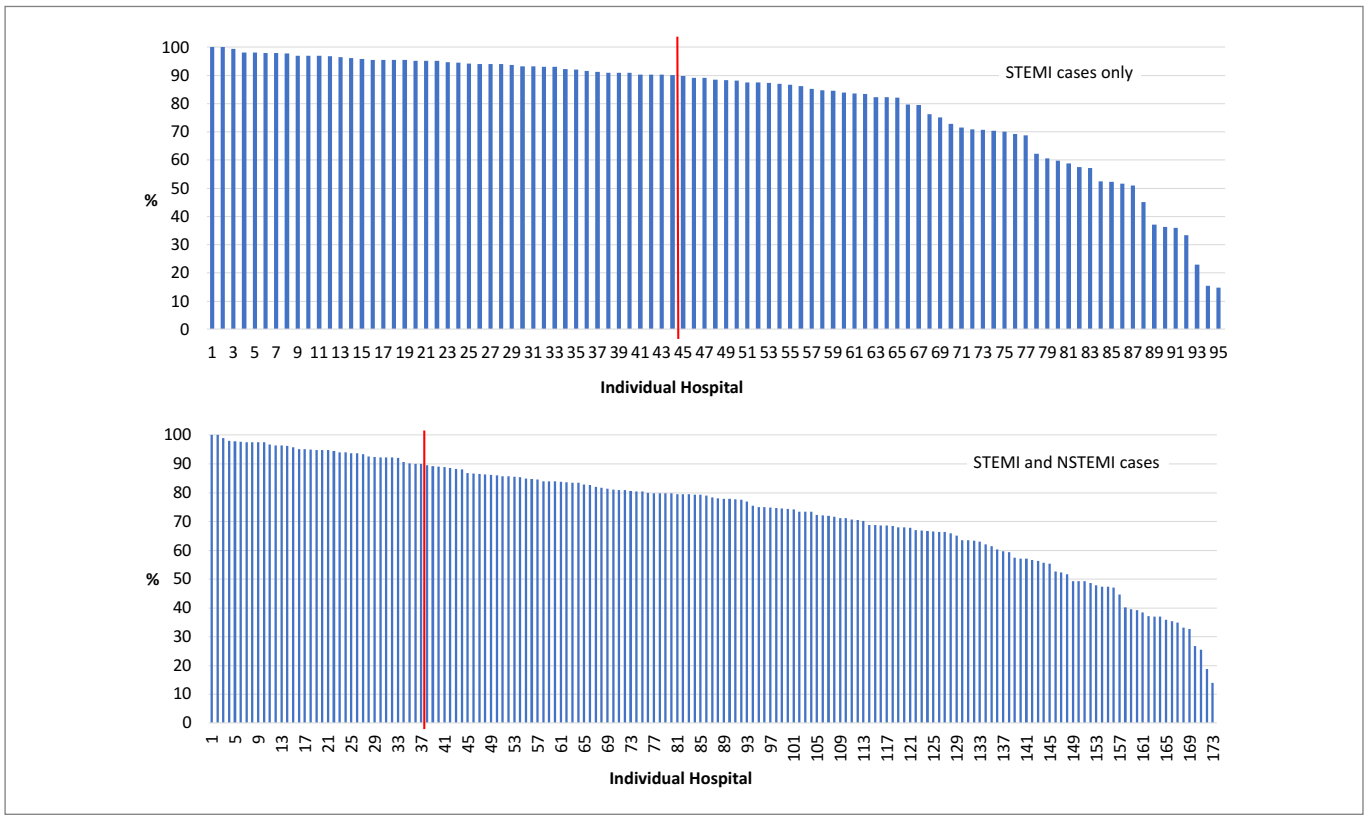


Figure 3.10: Distribution of hospitals with respect to the percentage of patients with STEMI and NSTEMI who undergo an echocardiogram during admission, 2020/21 [MINAP data]



Hospitals to the right of the red line have not achieved ≥ 90% of patients undergoing echocardiography as an in-patient. For STEMI, data from 93 hospitals. For STEMI and NSTEMI cases, data from 171 hospitals. Hospitals reporting fewer than 20 cases excluded.

3.4.3 Ethnicity and sex

An echocardiogram was performed prior to discharge in 81.5% of STEMI cases with people of non-white ethnicities compared with 77% of white patients, and for 76% of male patients compared with 72% females.

3.4.4 Recommendations for those not achieving the standard

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.

3.5 No change in proportion of NSTEMI cases admitted to cardiac wards

3.5.1 Overview of QI metric

QI Metric Description/Name	Admitted to cardiac ward after NSTEMI
Why is this important?	Admission to a cardiac ward allows optimum cardiac monitoring and access to highly trained cardiac nursing staff.
QI theme	Safety.
What is the standard to be met?	No national standard has been published, but aim for 80% achievement.
Key references to support the metric	Patients with NSTEMI admitted to a cardiac ward on admission are more likely to receive guideline directed management and have better clinical outcomes.[6] ESC Guidelines advise that patients with NSTEMI should be admitted to a monitored unit – coronary care, intensive care or intermediate care depending on risk – and managed by personnel adequately trained to manage life-threatening arrhythmias.[7]
Numerator	All patients with a final diagnosis of NSTEMI who were admitted to a cardiac care unit or cardiac ward or intensive care unit.
Denominator	All patients with a final diagnosis of NSTEMI who did not die in the Emergency Department before admission to a hospital ward.
Trend	Increases in the proportion of patients with NSTEMI who are admitted to a cardiac ward, while at the highest reported level (62.1%) have changed little over the last 5 years [Figure 3.11].
Variance	In 52 of 160 hospitals at least 80% of patients with NSTEMI were admitted to a cardiac ward. At least 96% of patients with NSTEMI were admitted to a cardiac ward in the top ten performing hospitals and fewer than 23% in the lowest ten hospitals [Figure 3.12].

3.5.2 Audit results

Figure 3.11: Proportion of patients with NSTEMI who are admitted to a cardiac ward and who are seen by a cardiologist during their admission, 2010/11 to 2020/21 [MINAP data]

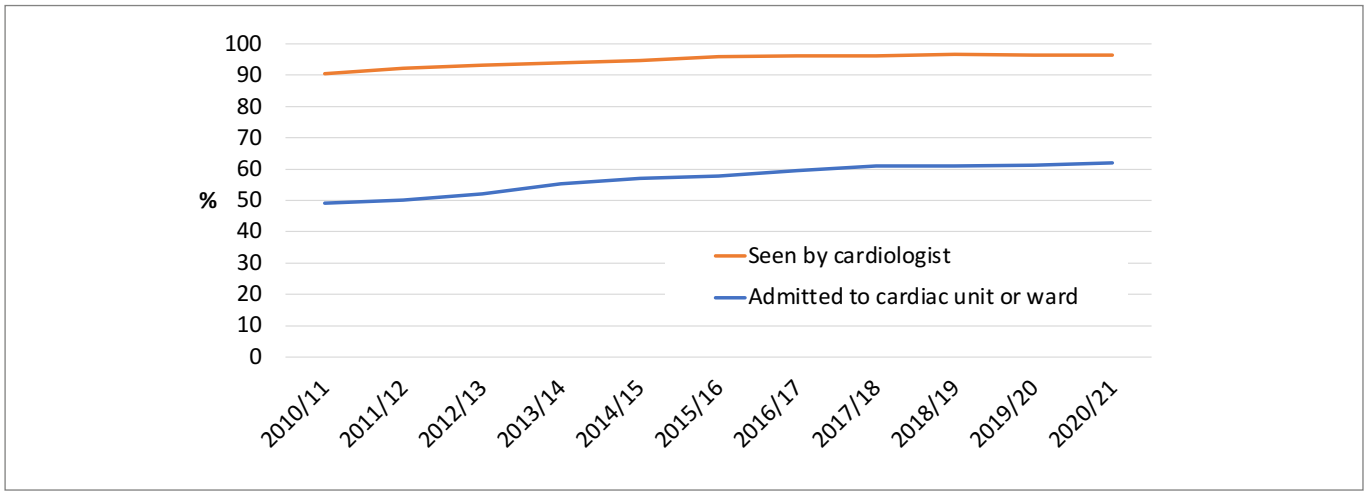
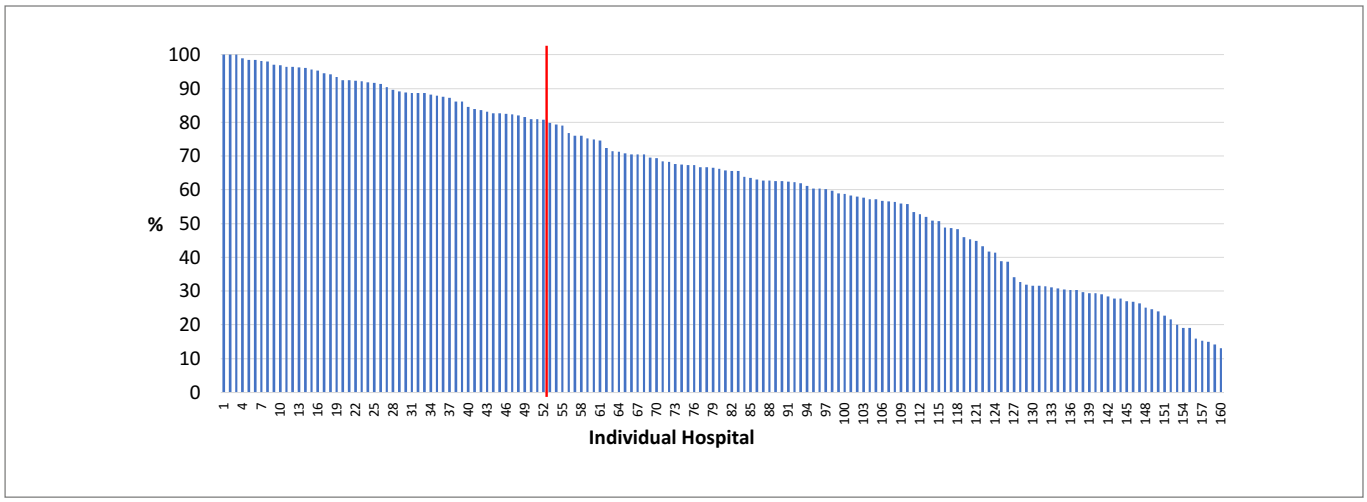


Figure 3.12: Distribution of hospitals with respect to the proportion of patients with NSTEMI who are admitted to a cardiac ward, 2020/21 [MINAP data]



Hospitals to the right of the red line have not achieved ≥ 80% of patients admitted to a cardiac ward. Hospitals reporting fewer than 20 cases excluded.

3.5.3 Recommendations for those not achieving the standard

Those hospitals not reaching recommended levels for 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 and provision of cardiac outreach services to those nursed outside cardiac facilities.

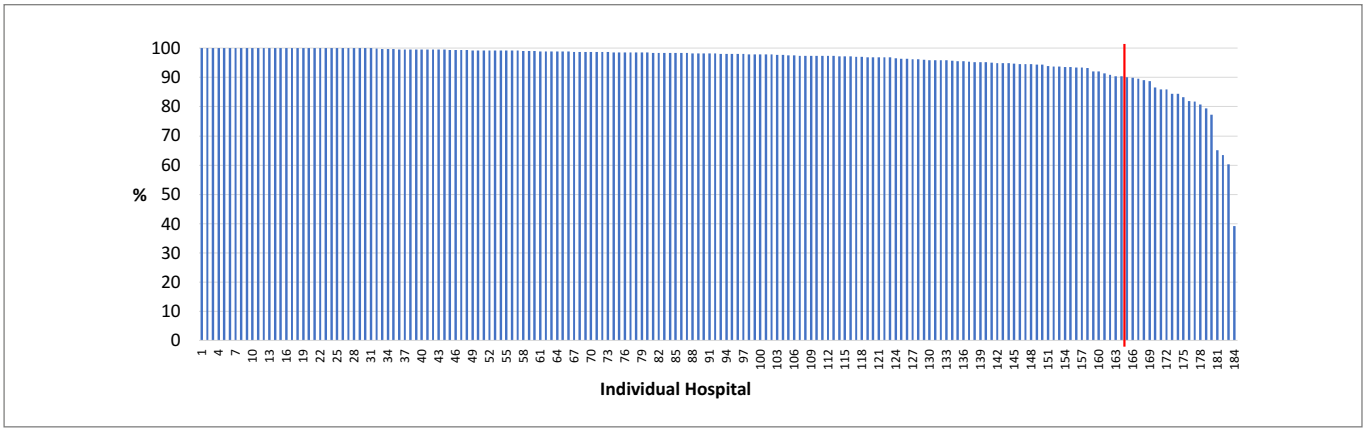
3.6 Cardiologists were involved in the care of most patients with NSTEMI

3.6.1 Overview of QI metric

QI Metric Description/Name	Seen by cardiologist following NSTEMI
Why is this important?	Specialist involvement should ensure increased and more timely access to recommended interventions.
QI theme	Effectiveness.
What is the standard to be met?	All patients with NSTEMI felt to be caused by an acute coronary event should be reviewed by a cardiologist during the index admission.
Key references to support the metric	Patients with NSTEMI admitted under a cardiologist within 24 hours of hospital admission are more likely to receive guideline directed management and have better clinical outcomes.[8]
Numerator	Patients with NSTEMI who were seen by a cardiologist (or a member of the clinical team working under the supervision of a consultant cardiologist) during admission.
Denominator	All patients with final diagnosis of NSTEMI who are admitted to hospital.
Trend	Proportion of patients with NSTEMI who are seen by cardiologists during admission remains high – now 96.5% [Figure 3.11].
Variance	Little variation – 165 of 184 hospitals reported at least 90% of patients with NSTEMI seen by a cardiologist during admission [Figure 3.13].

3.6.2 Audit results

Figure 3.13: Distribution of hospitals based on percentage of NSTEMI seen by a member of a specialist cardiology team during admission, 2020/21 [MINAP data]



Hospitals to the right of the red line have not achieved ≥ 90% of patients being seen by a member of the specialist team. Hospitals reporting fewer than 20 cases excluded.

3.6.3 Recommendations for those not achieving the standard

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.

3.7 Slight fall in provision of coronary angiography following NSTEMI

3.7.1 Overview of QI metric

QI Metric Description/Name	Coronary angiogram during admission with NSTEMI
Why is this important?	Angiography allows confirmation of the diagnosis and is a precursor for coronary interventions such as PCI and CABG.
QI theme	Effectiveness.
What is the standard to be met?	No national standard has been published, but aim for 100% given that the denominator excludes those judged to be ineligible for angiography.
Key references to support the metric	NICE quality standard (QS 68): 'Coronary angiography is important to define the extent and severity of coronary disease'.[9] ESC Guidelines: '[Coronary angiography] allows confirmation of the diagnosis, identification of the culprit lesion in a coronary artery, establishment of suitability for PCI or CABG, and stratification of short-term and long-term risk'.[7]
Numerator	All those for whom a coronary angiogram was performed during index admission (either in the admitting hospital or in another hospital).
Denominator	All patients with a final diagnosis of NSTEMI, excluding those who refused an angiogram and those for whom an angiogram was judged to be 'not applicable'.
Trend	Improvements in rate of angiography seen between 2010 and 2015 have 'levelled-off', with a slight fall over the last two years – now 81% [Figure 3.14].
Variance	At least 90% of eligible patients with NSTEMI underwent an angiogram in 91 hospitals. In eleven hospitals fewer than 50% of patients with NSTEMI underwent an angiogram [Figure 3.15].

3.7.2 Audit results

Figure 3.14: Percentage of eligible patients with NSTEMI who undergo angiography during admission and in which the angiogram is performed within 72 hours of admission, 2010/11 – 2020/21 [MINAP data]

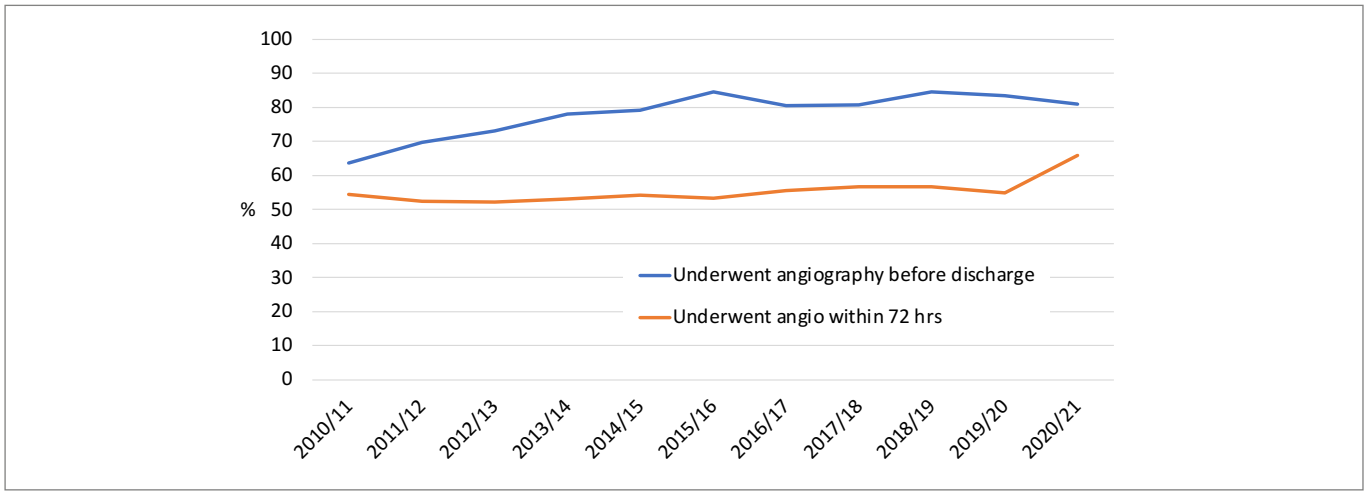
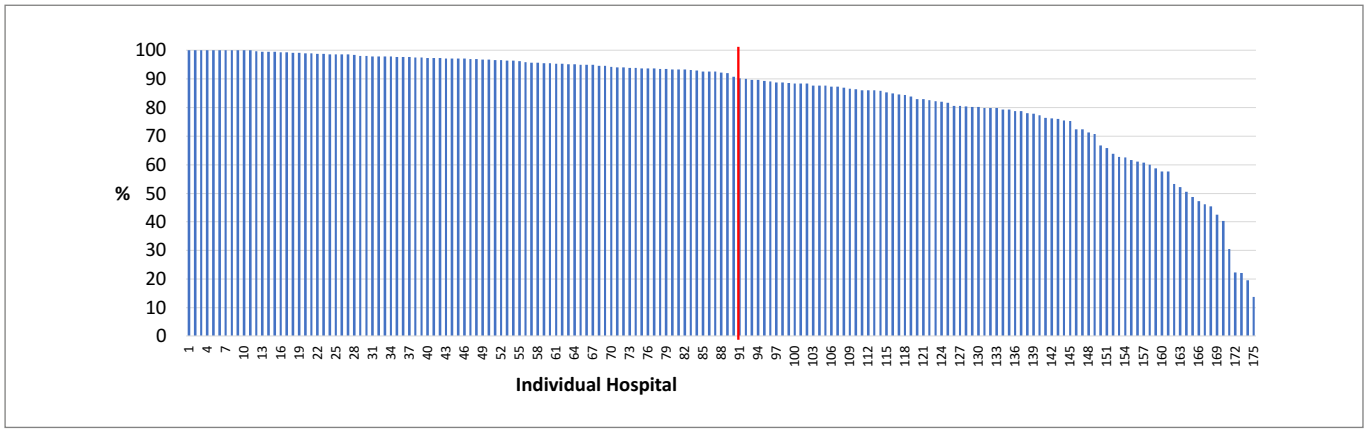


Figure 3.15: Distribution of hospitals based on the percentage of eligible patients with NSTEMI who undergo an angiogram during admission, 2020/21 [MINAP data]



Hospitals to the right of the red line have not provided a coronary angiogram to ≥ 90% of eligible patients following NSTEMI. Hospitals reporting fewer than 20 cases excluded.

3.7.3 Ethnicity and sex

Considering only those cases in which both ethnicity and sex was recorded, of those patients with NSTEMI who were eligible for angiography, 85% of patients of non-white ethnicities and 83% of white patients received angiography during admission. The figure for males was 83% and 77% for females.

3.7.4 Recommendations for those not achieving the standard

Those hospitals with low rates of angiography in eligible NSTEMI patients should perform a review of their systems of data collection and submission, and their systems for managing ACS.

3.8 Significant improvement in delays to coronary angiography

3.8.1 Overview of QI metric

QI Metric Description/Name	Proportion of patients undergoing angiography within 72 hours of admission to hospital with NSTEMI
Why is this important?	Early angiography leads to early revascularisation with better outcomes in high risk patients and shorter hospital stays.
QI theme	Effectiveness/timeliness.
What is the standard to be met?	Angiography within 72 hours of admission to hospital in all cases unless angiography is deemed inappropriate.
Key references to support the metric	NICE quality standard (QS 68): 'Adults with non-ST-segment elevation myocardial infarction (NSTEMI) or unstable angina who have an intermediate or higher risk of future adverse cardiovascular events are offered coronary angiography (with follow-on percutaneous coronary intervention [PCI] if indicated) within 72 hours of first admission to hospital'.[3]
Numerator	Those patients in whom the time to angiography – Interval from admission to angiography – is shorter than 72 hours.
Denominator	All patients with final diagnosis of NSTEMI who undergo angiography during admission and for whom the interval from admission to angiography can be calculated.
Trend	Following ten years during which the proportion of patients with NSTEMI who receive angiography within 72 hours of admission was between 52 and 57%, an 'abrupt' increase to 65.9% [Figure 3.14].
Variance	In 61 hospitals at least 60% of patients with NSTEMI underwent an angiogram within 72 hours of admission. In the top ten hospitals at least 85% of patients with NSTEMI underwent an angiogram within 72 hours of admission. In the lowest ten hospitals fewer than 38% patients did so [Figure 3.16 and Figure 3.17].

3.8.2 Audit results

Figure 3.16: Distribution of delays (% in each time group) from admission to angiography in patients with NSTEMI, 2010/11 to 2020/21 [MINAP data]

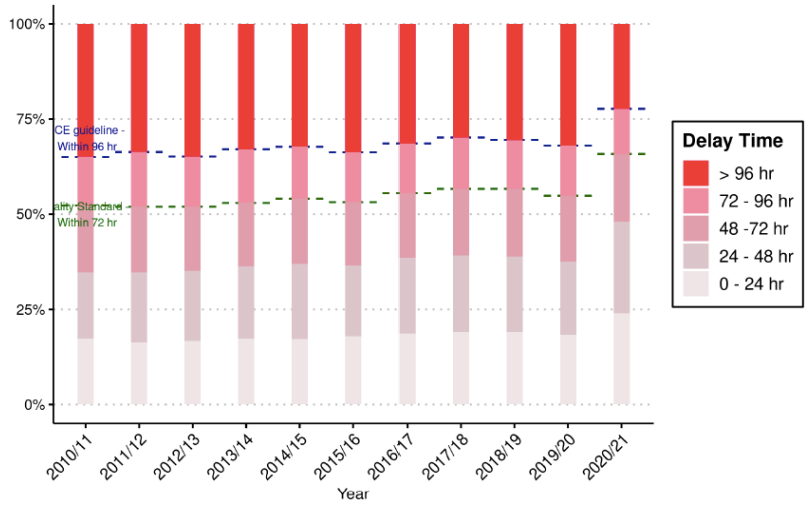
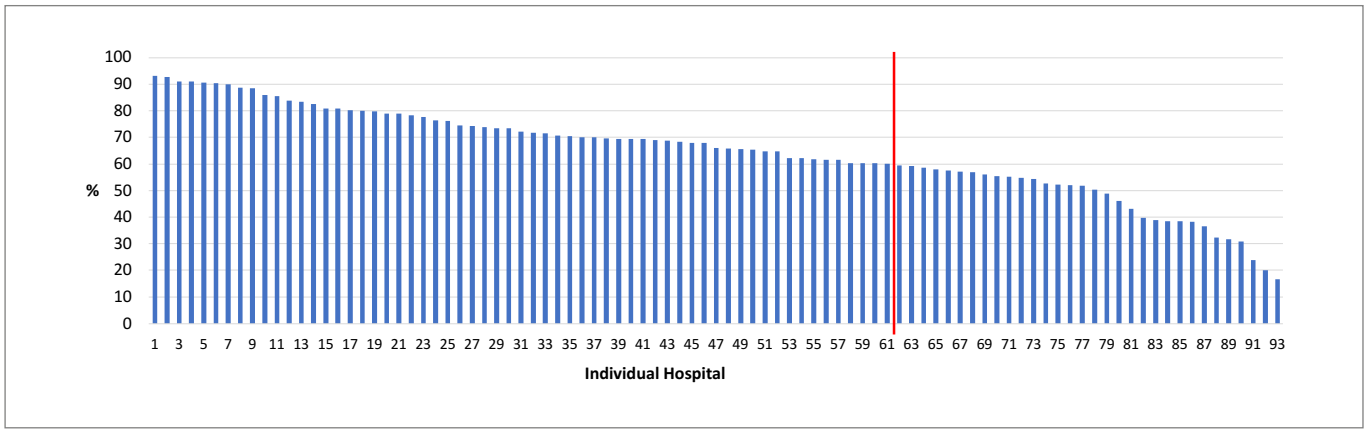


Figure 3.17: Distribution of hospitals with respect to the percentage of patients who undergo an angiogram within 72 hours, 2020/21 [MINAP data]



Hospitals to the right of the red line have not provided a coronary angiogram within 72 hours of admission in at least 60% of patients following NSTEMI. Hospitals reporting fewer than 20 cases excluded.

Note also Figure 2.5 above. Early in the reporting period (during the first lockdown) the proportion of patients with NSTEMI who received an angiogram followed by PCI within 72 hours of admission peaked at a little over 80% before falling back.

3.8.3 Ethnicity and sex

Angiography was provided within 72 hours of admission with NSTEMI in 65% of patients of non-white ethnicities and 61% of those white patients, in 62% of males and 59% of females.

3.8.4 Recommendations for those not achieving the standard

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.

Anecdotal reports suggest that since the end of the present annual audit cycle the improvements seen here have not been maintained. Any lessons regarding more timely care that have been learned during the pandemic should be incorporated within plans for post-COVID recovery of services.

3.9 Most patients leave hospital on all eligible prevention medication

3.9.1 Overview of QI metric

QI Metric Description/Name	Percentage of patients discharged on all secondary prevention drugs for which they are eligible following either STEMI or NSTEMI
Why is this important?	These medicines have been shown to reduce the likelihood of subsequent coronary events in those who have suffered heart attack.
QI theme	Effectiveness.
What is the standard to be met?	No specified standard – so suggest 90% of relevant patients should receive all secondary prevention drugs for which they are eligible at time of discharge from hospital following STEMI and NSTEMI.
Key references to support the metric	NICE Guideline (CG 172): Offer all people who have had an acute MI treatment with the following drugs: ACE (angiotensin converting enzyme) inhibitor; dual antiplatelet therapy (aspirin plus a second antiplatelet agent); beta-blocker; statin.[10]
Numerator	Patients discharged on all secondary prevention drugs for which they were judged to be eligible.
Denominator	All patients with a final diagnosis of either STEMI or NSTEMI who were discharged home (i.e. not transferred to another hospital or who died during admission), excluding patients who were ineligible/unsuitable or declined to receive each one of the following drugs or drug classes: aspirin, beta blocker, statin, either ACE inhibitor or angiotensin receptor antagonist, and either thienopyridine or ticagrelor.
Trend	Consistently high performance over the past ten years – now 90.3% of patients are discharged on all secondary prevention drug classes for which they are eligible [Figure 3.18].
Variance	More than 90% of patients were discharged on all secondary prevention medication for which they were eligible in 108 hospitals. In 4 hospitals fewer than 50% of patients were discharged on all eligible medication [Figure 3.19].

3.9.2 Audit results

Figure 3.18: Proportion of patients discharged on all secondary prevention medication for which they are eligible, 2010/11 – 2019/20 [MINAP data]

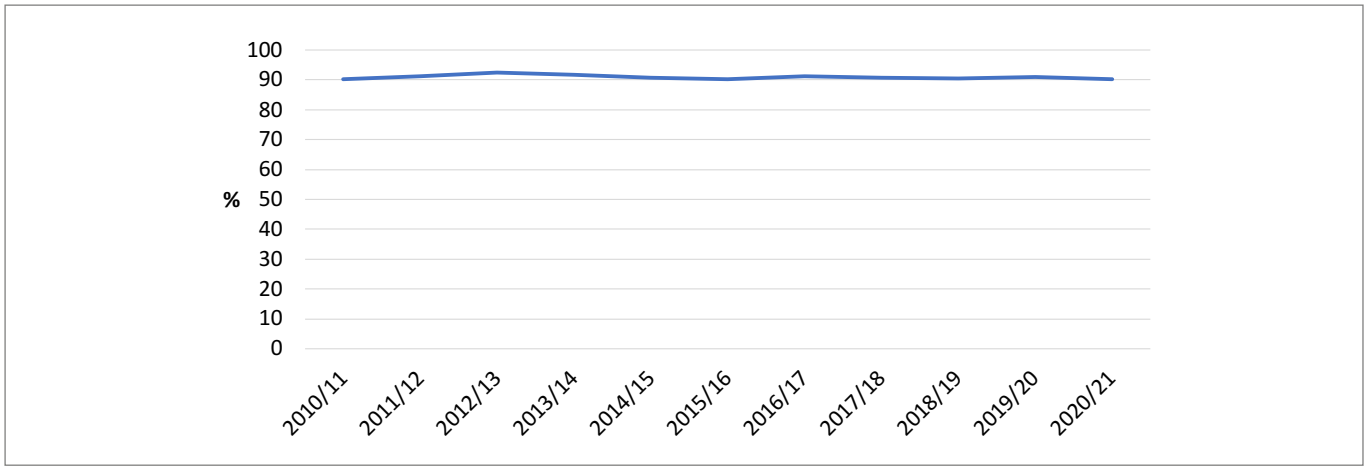
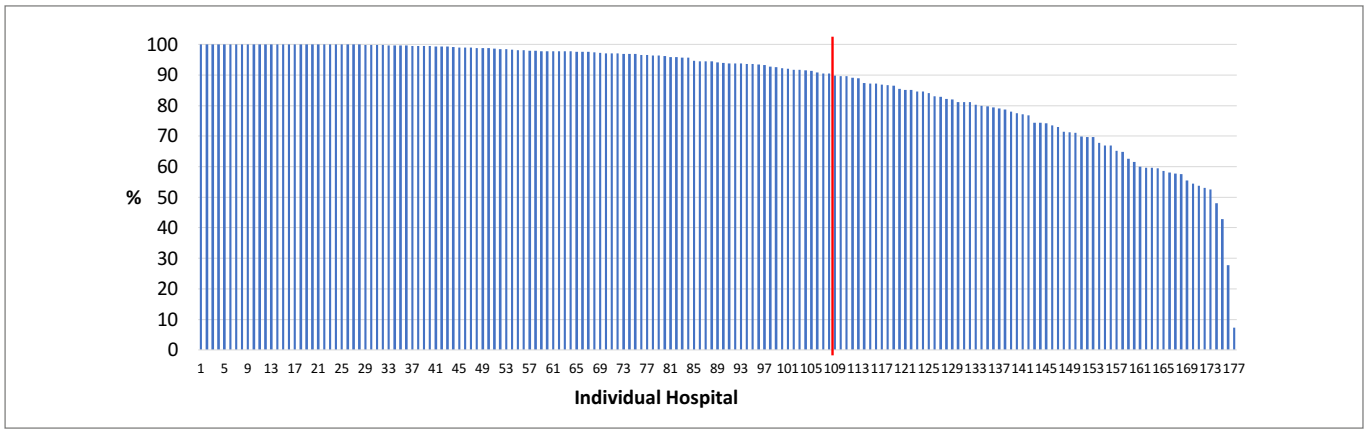


Figure 3.19: Distribution of hospitals with respect to the percentage of patients with STEMI and NSTEMI who are discharged home on all secondary prevention drugs for which they are eligible, 2020/21 [MINAP data]



Hospitals to the right of the red line have not achieved ≥ 90% of patients being discharged on all secondary prevention drugs for which they were eligible. Hospitals reporting fewer than 20 cases excluded.

Considering prescription of individual secondary prevention drugs at the time of discharge: 94.8% who were eligible received either an Angiotensin Converting Enzyme inhibitor or angiotensin receptor antagonists; 98.1% received aspirin; 97.9% received another antiplatelet agent (thienopyridine inhibitor or ticagrelor); 96.7% received a beta blocker; 97.8% received a statin.

3.9.3 Recommendations for those not achieving the standard

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 are 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'.

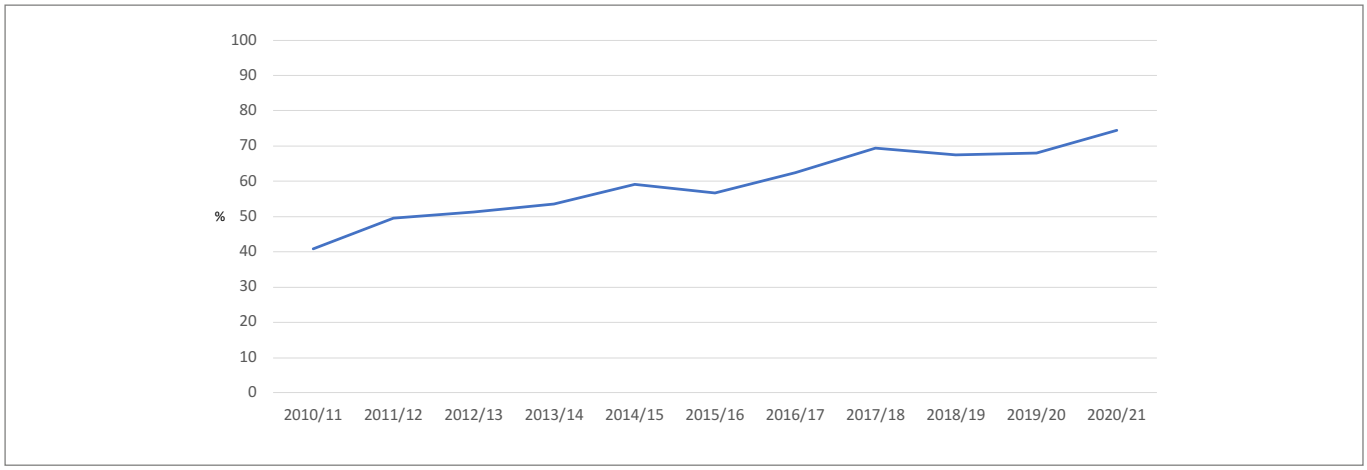
3.10 Two-thirds of eligible patients received aldosterone antagonists

3.10.1 Overview of QI metric

QI Metric Description/Name	Aldosterone antagonists (also known as mineralocorticoid receptor antagonists – MRA) following STEMI
Why is this important?	Improved outcomes when aldosterone antagonists are given to patients with impaired LV systolic function soon after STEM.
QI theme	Effectiveness.
What is the standard to be met?	No specified standard – so suggest 90% of eligible patients should receive an MRA at time of discharge from hospital following STEMI.
Key references to support the metric	ESC Guideline: 'MRAs are recommended in patients with left ventricular ejection fraction (LVEF) ≤40% and heart failure or diabetes, who are already receiving an ACE inhibitor and a beta-blocker, provided there is no renal failure or hyperkalaemia.[2]
Numerator	All patients who are prescribed an aldosterone antagonist at the time of discharge from hospital to home.
Denominator	Patients with a final diagnosis of STEMI, who are discharged home (i.e. do not die during index admission and are not transferred to another hospital), who undergo an echocardiogram during admission, which reveals LVEF is 'poor' (presently defined as LVEF <30% in MINAP).
Trend	The proportion receiving MRAs have increased substantially over the past decade – now 74% [Figure 3.20].
Variance	In the top five hospitals every eligible patient received an MRA at discharge. In the lowest five hospitals MRAs were received by 70% or fewer eligible patients [Figure 3.21].

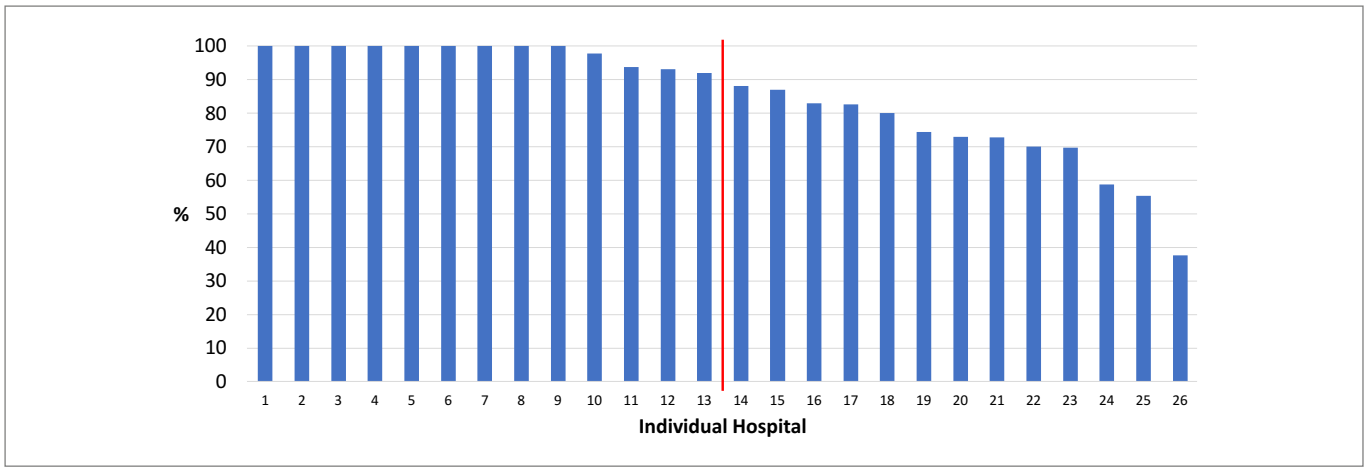
3.10.2 Audit results

Figure 3.20: Use of aldosterone antagonists in those with STEMI and significant left ventricular systolic impairment, 2010/11 – 2020/21 [MINAP data]



Because patients with severely impaired left ventricular systolic function form the minority of people with STEMI, and hospitals reporting fewer than 20 such cases are excluded from analysis, relatively few hospitals are included in Figure 3.21.

Figure 3.21: Distribution of hospitals based on the percentage of patients with STEMI and significantly impaired left ventricular systolic function discharged home on an aldosterone antagonist, 2020/21 [MINAP data]



Hospitals to the right of the red line have not achieved ≥ 90% of patients being discharged on aldosterone antagonist despite being eligible by virtue of significant left ventricular impairment. Data from 26 hospitals; hospitals reporting fewer than 20 cases excluded.

3.10.3 Recommendations for those not achieving the standard

Staff in 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.

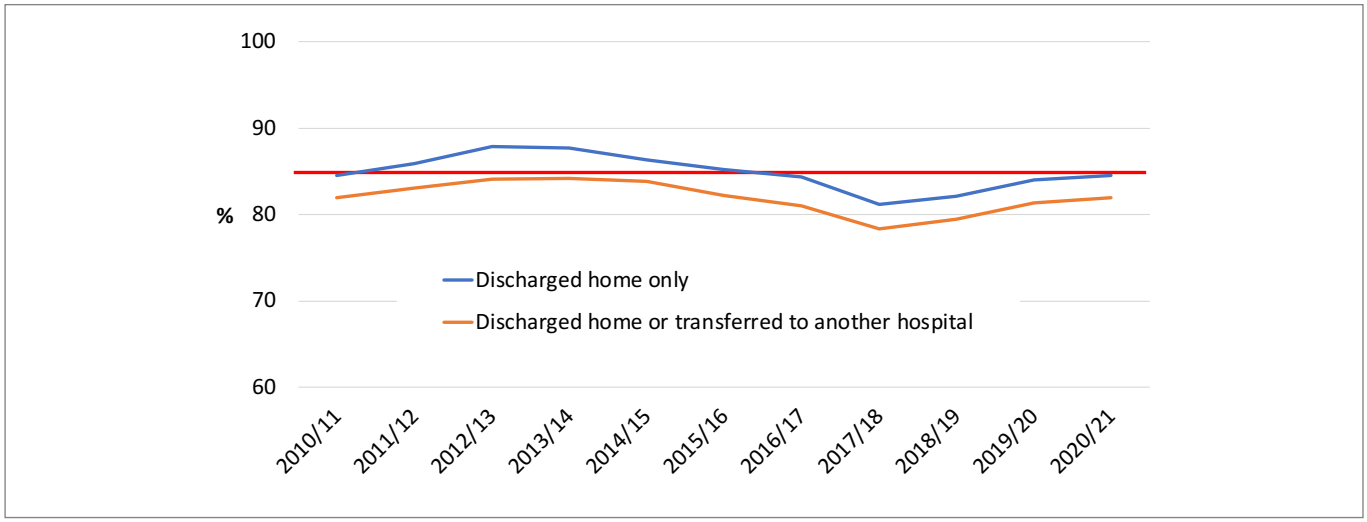
3.11 Referral to cardiac rehabilitation

3.11.1 Overview of QI metric

QI Metric Description/Name	Referral to cardiac rehabilitation
Why is this important?	Exercise-based cardiac rehabilitation programmes are associated with fewer cardiac deaths in patients with coronary artery disease.
QI theme	Effectiveness.
What is the standard to be met?	NHS Long Term Plan aspires to '85% of those eligible accessing cardiac rehabilitation'.
Key references to support the metric	NICE quality standard (QS 99) 'Adults admitted to hospital with a myocardial infarction are referred for cardiac rehabilitation before discharge.'[11]
Numerator	All patients who are referred to cardiac rehabilitation programme at the time of discharge from hospital to home.
Denominator	All STEMI and NSTEMI patients who survived to discharge home (i.e. did not die during index admission, and were not transferred to another hospital) who neither refused referral nor had reasons that would make cardiac rehabilitation 'not indicated'.
Trend	A continued increase in the proportion referred for cardiac rehabilitation over the last four years reaching between 82% and 85% [Figure 3.22].
Variance	114 hospitals referred at least 85% of patients to cardiac rehabilitation. The lowest ten hospitals referred 40% of patients or fewer [Figure 3.23].

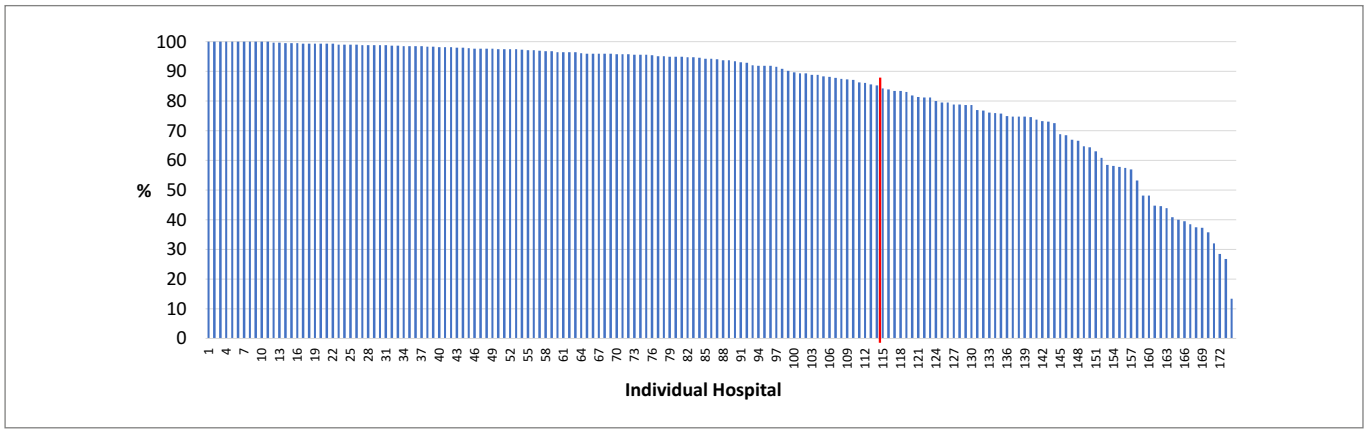
3.11.2 Audit results

Figure 3.22: Percentage of patients (STEMI and NSTEMI combined) referred for cardiac rehabilitation programmes, 2010/11 to 2020/21 [MINAP data]



The red horizontal line represents the NHS aspiration for 85% referral.

Figure 3.23: Distribution of hospitals based on the percentage of patients with STEMI and NSTEMI referred for cardiac rehabilitation at the time of discharge home or transfer to another hospital, 2020/21 [MINAP data]



Hospitals to the right of the red line have not achieved ≥ 85% of patients being referred for cardiac rehabilitation. Hospitals reporting fewer than 20 cases excluded.

3.11.3 Ethnicity and sex

Considering only those cases in which both ethnicity and sex was recorded, only 76% of those of non-white ethnicities were referred for cardiac rehabilitation at the time of discharge home or transfer to another hospital, while 85% of white patients were referred. The figure for females was 80% and 83% of males.

3.11.4 Recommendations for those not achieving the standard

Hospitals not meeting the standards for referral of patients to cardiac rehabilitation following either STEMI or NSTEMI should review the provision of services and identify early patients who might benefit.

This could include routine distribution of cardiac rehabilitation information/invitation leaflets to all patients admitted to cardiac facilities, and the inclusion of such information in discharge checklists.

All hospitals should ensure equitable access to cardiac rehabilitation. Rehabilitation staff who were redeployed to ward-based duties during the pandemic should return to their original practices.

4 | Future direction

In the future we intend to:

- Provide timely data to assist hospital staff and commissioners to plan the restoration of services following the COVID-19 pandemic.
- Express existing metrics with respect to geographic regions and networks.
- Promote web-based 'user tools' that enable participating hospitals to analyse their performance 'in real time' and at a 'case-by-case' level.
- Supply participating hospitals with 'quality reports' to encourage and facilitate local quality improvement initiatives.
- Express survival/mortality rates following admission to hospital using a risk adjustment model derived from existing validated models and developed at University College London.
- Work with other domains within NCAP to produce linked metrics – for example the rate of implantation of complex cardiac devices following heart attack.
- Revise the MINAP dataset to more closely reflect contemporary options for investigations and treatments, harmonising where possible with other national audits and international clinical disease registries.
- Explore the utility of existing routinely collected datasets and electronic health records in performing some or all present audit functions.

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