



NATIONAL CARDIAC AUDIT PROGRAMME

# ANNUAL REPORT 2020

THE ACID TEST

IMPROVING CARDIOVASCULAR CARE  
THROUGH AGGREGATION, COLLABORATION,  
INFORMATION AND DELEGATION

**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 the Welsh Government and, for four of the domains, from the Scottish Government. Funding has been sought to aid the participation of hospitals in Northern Ireland, the Republic of Ireland and the private sector.

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## BARTS HEALTH NHS TRUST



With a turnover of £1.5 billion and 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, 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/national-programmes](http://www.hqip.org.uk/national-programmes)

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# EXECUTIVE SUMMARY

The NHS England Long Term Plan calls for improvements in:

- Early detection of cardiovascular disease (CVD)
- Preventative treatment
- Early and effective treatment out of hospital for emergencies
- Hospital treatments
- Referral to cardiac rehabilitation

As services recover from the COVID-19 pandemic first wave, national audit data can feed quality improvement programmes and service redesign through four main processes:

## Aggregation: clinical pathways should be reviewed



-2.4%  
↓

- In 2018/19 (compared with the previous financial year), prior to COVID-19, there was a 2.4% reduction in heart attack admissions (to 87,091), a 2.5% reduction in PCIs (to 100,294) and 7.8% reduction in first time CABG (to 14,098, partly explained by non-participation of two Scottish hospitals).



NHS

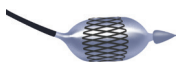
- More PCI and pacemaker implant centres conform to national minimum numbers of procedures (but 16 NHS PCI centres and 28 NHS pacing services still do not; 38 NHS centres do not conform to standards for complex device implantation).



3 to 32

- There are challenges to delivering cardiac surgical procedures for acute aortic dissection (hospitals perform between 3 and 32 procedures per year).

## Collaboration: working together to achieve better results



- Primary PCI is now the default treatment for patients with STEMI across the participating nations (it is now offered throughout Wales); more patients with STEMI now receive reperfusion therapy (from 74% in 2010/11 to 82% in 2018/19).



110min  
↓  
123min

- However, Call-To-Door times are worsening (median 110 minutes in 2010/11 to 123 minutes in 2018/19).

- An increased number of patients with NSTEMI receive in-house angiography (from 64% in 2010/11 to 85% in 2018/19), but still only 57% receive it within the recommended 72 hours from admission.



- The previous fall in referral to cardiac rehabilitation after a heart attack has been reversed – now 80% overall (target 85%) but in-patient referral after admission with heart failure remains low (13%).



1  
in  
10

- Double scrubbing in congenital procedures is now performed in 1 in 10 surgical procedures (1 in 5 neonatal operations) and 1 in 5 interventional procedures (1 in 3 neonatal procedures).

## Information: enables decision-making



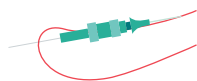
- There is considerable age-specific variation between centres in the proportion of patients receiving tissue (vs

mechanical) aortic valve replacements (63-94% overall).



+22%  
↑

- More patients are now offered intervention for aortic valve disease (2,333 [22%] increase from 10,694 in 2014/15 to 13,027 in 2018/19); the proportion receiving TAVI has increased from 17.5% to 40%.
- The 1-year repeat intervention rate after AF/AT ablation varies between centres (0-24%, median 9.1%).
- Radial access rates for PCI have improved further – now 89% of all procedures.



## Delegation: Nurse Specialists and Physician Associates can improve services



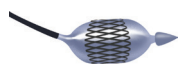
96.7%

- Only 61% of patients with a heart attack are admitted to a cardiac ward, but 96.7% are seen by a member of a specialist cardiac team; 45% of patients with heart failure are admitted to a cardiac ward, but 82% are seen by a member of a specialist team.



90%+

- Over 90% of patients with a heart attack were discharged on all the secondary preventive drugs they were eligible to receive but only 67% with left ventricular dysfunction receive an MRA. Only 48% of patients admitted with heart failure with reduced ejection fraction are discharged on all three disease-modifying drugs, mainly because of a low prescription rate of MRAs (55%).



- Day-case services for elective PCI remains at 64% (variance <10-100%); implementation of this service requires specialist nurse input.

Future plans include the roll-out of on-line data tools to all hospitals for all specialty domains to allow:

- data quality checks
- immediate views of how a hospital fares against the national average and the best centres for the designated QI metrics
- local queries from the live database.

These tools are already available for the NAPCI and NACSA domains. The utility of these tools is dependent on rapid data submission from all participating hospitals.

### Legend:

AF = atrial fibrillation; AT = atrial tachycardia; CABG = coronary artery bypass grafting; CVD = cardiovascular disease; HFrEF = heart failure with reduced ejection fraction; MRA = mineralocorticoid receptor antagonist; NACSA = National Adult Cardiac Surgery Audit; NAPCI = National Audit of Percutaneous Coronary Intervention; NSTEMI = non-ST-elevation myocardial infarction; PCI = percutaneous coronary intervention; QI = quality improvement; STEMI = ST-elevation myocardial infarction; TAVI = transcatheter aortic valve implantation.

# HOW TO USE THIS REPORT

Access all supporting documents mentioned below at  
[www.nicor.org.uk/national-cardiac-audit-programme/](http://www.nicor.org.uk/national-cardiac-audit-programme/)

## Main report

Carry on reading for the Annual NCAP Report

## Key messages

Key messages can be found [here](#)

## Audit specific reports

Choose audit specific reports from the NCAP page [here](#)

## Local reports

Find the full list of audits [here](#)

## Patient report

Find the patient report online [here](#)

## for QUALITY IMPROVEMENT



### Hospitals want to:

improve practice by comparing local results and benchmarking against the national picture and also by learning best practice from other hospitals.

### WHAT TO READ

Main report

Key messages

Audit specific reports

Local reports

## for COMMISSIONERS



### Commissioners want to:

know how local services are performing and find out what the national picture is to compare.

### WHAT TO READ

Main report

Key messages

Local reports

## for PATIENTS & THE PUBLIC



### Patients want to:

understand their condition and what level of care they are likely to receive, and find support.

### WHAT TO READ

Main report

Patient report

Local reports

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# 1. FOREWORD

The National Cardiac Audit Programme (NCAP) reports on the performance of hospitals treating patients with cardiovascular disease (CVD). Because of a redesign needed to one of our six domains, our first combined report in [2018](#) provided a [supplement](#) for the report on the National Audit of Cardiac Rhythm Management (NACRM). This year, our report presents the findings for all six CV domains together, from 2018/19 audit data (or 2016/19 data depending on metric), and makes clear recommendations which support key national policies or developments, in particular the [NHS Long Term Plan](#). This aggregate report highlights important themes to help hospitals and commissioners with plans to redesign or improve services but does not summarise all of the findings of the six specialty domains. It does however summarise the [key recommendations](#).

We have been working with colleagues at [UCL Partners](#), one of the Academic Health Science Networks, to help hospitals identify where quality improvement (QI) is needed and to provide them with the tools to make changes at local level. We are making good progress with these important aims.

Rapid output of information needs rapid input of data. During the COVID pandemic, NICOR has been able to work with NHS Digital and our Data Controllers (NHS England, the Healthcare Quality Improvement Partnership (HQIP) and Barts Health NHS Trust) to allow our data to be linked to NHS Digital Data (Hospital Episode Statistics and Office for National Statistics data). This has enabled rapid analysis to help the national data science efforts during this international crisis. Working with our partner Professional Societies, great efforts were made to maintain data flows into NICOR. A number of outputs were provided in our report '[Rapid cardiovascular data: we need it now \(and in the future\)](#)' presented earlier in the year.<sup>1</sup> This highlighted the need for continual download of data, ideally on a weekly basis, and this has become our new 'standard of care'.

The pandemic has had a significant impact on cardiovascular services. In the acute phase in the spring, there was a major drop in the admission of patients with a heart attack or heart failure, and a major disruption to the usual provision of cardiac investigations and treatments. There is now considerable energy being applied to restoration of services, dealing with a backlog and a review of staffing and capacity.

Changes are being driven at a local level. Integrated Care Services (ICSs) and Sustainability and Transformation Partnerships (STPs) (and their counterparts in the devolved nations) will lead on all aspects of service delivery and

enable collaboration between service providers, clinicians, Clinical Commissioning Groups (CCGs) as well as with local authorities, patient groups and the voluntary sector. Support from informatics and evidence to ensure that clinical standards are maintained or improved will be needed. Our 2020 report provides a framework of principles to aid with this process and builds on the progress that has been made with the NCAP over the last few years.

While an annual report can provide 'state of the nation' highlights and key messages, hospitals and commissioners need more detailed information and more timely feedback from the audits. We have therefore developed online tools that allow our participating hospitals continuous access to the latest information across the audits. These went live in July 2020 for the National Adult Cardiac Surgery Audit (NACSA) and the National Audit of Percutaneous Coronary Intervention (NAPCI). Work is on-going to develop these tools for the other four domains. Further discussions are needed to promote the transparency agenda and how we might develop our reports on the quality of hospital services.

Previously, the bare minimum requirement was for all hospitals to provide data to the NCAP within a stipulated period (three months from the completion of a hospital episode) but many hospitals failed to do this consistently. One reason for delay has been the time taken by hospitals to validate their data. To remove this delay, the validation process will now be integrated into the online reporting system so that hospitals can continually review the information that is being entered using a new tool to check data completeness. It is more effective to download the unvalidated data and to correct them over time than not to report until the last minute. In future, if data are not provided within the three-month window, a hospital's data will not be reported on and compliance with data standards will be more accurately monitored.

The one exception to this new approach will be in reporting on mortality outcomes. The previous annual validation cycle will remain in place, and only validated data will be incorporated into the annual report. However, to be useful, the annual report should ideally be available to all within a matter of months following the end of the financial year. This can only be achieved if hospitals provide data according to the set timetable. There is a current debate about how the COVID-19 pandemic has influenced the audit and especially the Clinical Outcomes Programme (COP). The pandemic did not make a significant impact on services until the current financial year



and so the COP programmes relating to the 2016/19 and 2017/20 three-year audit cycles will be reported as usual.

We have also designed some QI packs for hospitals, starting with the NACSA and NAPCI, and delivered two QI-focused roadshows this year, one in London and one in Leeds. These were well attended and we were delighted that our colleagues from UCL Partners could focus attendees on how best to use the data from the national audits to help with local improvement programmes. Our planned roadshows to Bristol and Scotland were postponed due to the pandemic, but we hope to hold these in 2021.

We are proud of our role in improving the provision of care for patients with CVD in the UK. We acknowledge the often

unrecognised work of busy clinical teams and hospital audit staff to input the data, and will do what we can to provide useful information back. Hospitals and other partners cannot be expected to know where changes are needed if they are not aware of how they perform against the set standards or in comparison with their peers. Our metrics also reassure hospitals and patients when it is clear that high standards are maintained and we believe that this quality assurance (QA) remains an important role for the NCAP. We are committed to enhancing the speed, quality and usability of the information and will work with the key national data agencies to make this possible.

**Professor John Deanfield, Director of NICOR**





## 2. SETTING THE SCENE: LARGE-SCALE IMPROVEMENT IN OUTCOMES AS SET OUT IN THE NHS LONG TERM PLAN REQUIRES SYSTEM-LEVEL LEADERSHIP

### 2.1 THE NHS LONG TERM PLAN SETS AMBITIOUS IMPROVEMENT GOALS FOR THE PREVENTION AND TREATMENT OF CVD

Patients and commissioners of healthcare want safe, effective treatments that improve care and outcomes, are cost-effective and enhance the patient experience. Delivering health services requires an understanding of the 'size of the problem' and understanding how well centres are delivering care.

The publication of the NHS England Long Term Plan (January 2019)<sup>2</sup> is a major milestone in advancing the prevention and treatment of CVD. It sets an agenda for ways that the whole of the health system, with patients and carers involved at the heart, can work together to make improvements in:

- early detection (for example, regular community-based health checks, the use of multi-disciplinary teams as part of primary care networks, access to genetic testing and proactive identification of people with risks of heart rhythm irregularities and high blood pressure)
- preventative treatment (including measures to help with weight loss, reducing blood pressure and appropriate prescription of anticoagulation medication)
- rapid treatment out of hospital (for example, a national network of community first responders and defibrillators, new technology to rapidly locate life-saving equipment and apps to enable ambulance trusts and members of the public to provide fast basic life support)
- treatment in hospital (including rapid access to heart failure care for those not on a cardiology ward and personalised care planning)
- rehabilitation (to reduce the risk of early death, improve quality of life and reduce hospital readmissions).

It demands further progress on care quality and improved outcomes. This builds on the work stimulated by the previous

[NHS Five Year Forward View](#),<sup>3</sup> with efforts being focused on narrowing the gaps between best and worst whilst raising the bar for all, together with comprehensive transparency of performance data, allowing everybody to access information regardless of their internet skills.

It emphasises the role of innovation in the NHS, leading to new drugs, new technologies, new treatments and new ways of delivering services. This will be supported by research and the active collection and use of health outcomes data, with a call for different approaches to performing randomised clinical trials (RCTs) and using the examination of real-world data in the absence of definitive trial results. In short, a push towards:

- better prevention
- faster diagnosis
- better treatment
- better care for all
- more integrated care.

### 2.2 BEYOND THESE SPECIFIC IMPROVEMENT IDEAS, THE LONG TERM PLAN DESCRIBES SOME FUNDAMENTAL SHIFTS IN HOW HEALTHCARE IS PROVIDED

#### 2.2.1 A MOVE TO INTEGRATED CARE SYSTEMS

Regional coordination of care is essential to provide the best services for patients, especially when patients require transfer from one part of the healthcare system to another, whether electively or urgently.

- In England, Integrated Care Systems (ICSs) and Sustainability and Transformation Partnerships (STPs) are responsible for driving collaboration between primary and secondary care, between smaller and larger hospitals and the development of integrated care plans across a region.

A greater focus on prevention may lead to a reduction in the need for more expensive hospital treatments, although longer survival of patients might lead to the need for additional treatments some years later. Collaborative approaches can better understand and attempt to reduce health inequalities. A similar approach is undertaken in the devolved nations. For example, the Rhwydwaith Cardiaidd Cymru/Welsh Cardiac Network has its own Heart Conditions Implementation Plan 2016/20, led by the Heart Conditions Implementation Group (HCIG).

- Quality improvement (QI) messages increasingly need to be targeted at a systems level. For example, efforts to improve times to treatment for patients with a large heart attack (ST-elevation myocardial infarction, STEMI) requires coordination between the ambulance services, hospitals without percutaneous coronary intervention PCI services and those providing 24/7 primary PCI services. The management of out-of-hospital cardiac arrest requires coordination across many specialties. Optimisation of treatment for heart failure patients requires collaboration and good communication between hospital and community services.

## 2.2.2 GREATER EMPHASIS ON SHARED DECISION MAKING WITH PATIENTS

Patients cannot make clear decisions about their treatment unless they know what their options are, and the likely risks and outcomes with each possible option. Evidence from trials can provide some of this information but often trials are based on restricted subsets of patients. Additional information is needed from larger 'real-world' datasets, especially if these can then align results to the risk profile of the individual patient.

## 2.2.3 INVESTMENT IN DIGITAL TECHNOLOGY AND DATA

Policy decision-makers (whether at national, regional, local or hospital level) require contemporary data provided in a way that is useful. They need to identify where things are going well and where improvements are needed. Providers should have the appropriate technology and staff and clinical audit teams must be fully supported. This is fundamental to maintain rapid data flows. At the same time, data collection systems across the NHS should be integrated to allow efficiencies in data collection whilst enhancing the opportunities for useful outputs:

- New informatics systems allow for a more rapid distillation of information that can impact on clinical care.
- Harmonisation and aggregation of coding, mortality and national audit and registry data provide a better means of

serving commissioners, providers and researchers than each data source on its own.

## 2.3 DEVELOPMENTS IN EPIDEMIOLOGY, SCIENCE AND STANDARDS ALSO DRIVE THE NEED TO REFORM SERVICES

As well as the ideas contained within the Long Term Plan, there is a wider set of imperatives that are driving the constant need to review and reform cardiovascular services. It is recognised that CVD is one of the leading areas where the NHS can save lives over the coming years, with early detection of risk factors and prompt management of high-risk conditions. Multidisciplinary teams can improve clinical pathways and outcomes, whether in sub-specialties or combining primary and secondary care expertise.

- The epidemiology of CVD changes over time and novel diagnostic methods and treatments offer new opportunities to redesign clinical pathways and to replace existing ways of treating cardiovascular conditions. This leads to a growing need for some treatments and a reduced need for others (taking into account the science of uptake rates).
- Even when services are good already, they can be improved (and changes are definitely needed when performance is seen to deteriorate over time). There is an acknowledgement in the Long Term Plan that outcomes are improving but there is still too much variation in care. The importance of reducing this variation in the cardiovascular specialties is a priority.
- Reaching an acceptable standard is a clear aim, but striving to reach the standards set by leading centres drives a further improvement in outcomes. When new evidence points to new standards and these standards are delivered with less variance, patient expectations then become higher and there is more chance of being able to deliver equitable care.

## 2.4 | A FOCUS IS NEEDED TO TACKLE INEQUALITIES AND ENSURE PARITY OF ESTEEM

CVD is a huge challenge for the whole population as it is the greatest cause of premature mortality. However, this can mask the stark inequalities between patients. Particularly for those with high-risk factors, perhaps linked to socio-economic deprivation, genetic pre-disposition or barriers to accessing healthcare, there needs to be increased effort to securing more equitable outcomes and experience.

Nowhere is this more pressing than for those with severe mental illness. Ensuring parity of esteem will require an evolution of prevention and care as the impacts of mental health conditions continue to grow, compounded by rising levels of dementia, frailty and extended end-of-life.

## 2.5 | THE RECOVERY FROM COVID-19 IS ACCELERATING THE REDESIGN OF SERVICES

NICOR has reported separately on the [impact of the COVID-19 pandemic on cardiovascular services](#).<sup>1</sup> Since early 2020, these have seen major disruptions. This is the result of the reassignment of staff and resources to help with the early part of the pandemic and also from the reluctance of patients to

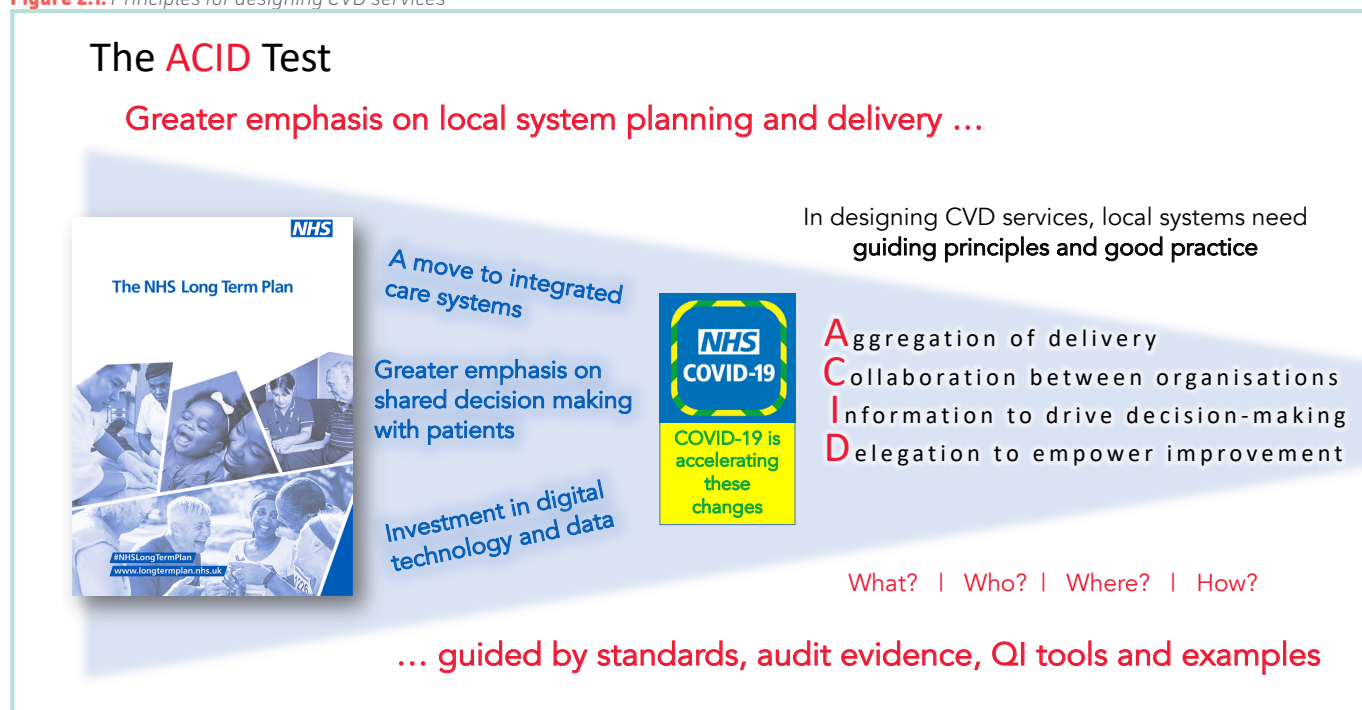
attend hospital, either from fear of the disease or a desire to avoid adding pressure on already stretched clinical teams.

As the NHS adapts to the later stages of the pandemic and moves through the recovery phase, local health systems (primary care networks [PCNs], STPs/ICSs, and others) are taking the opportunity to reassess how they will deliver services in the future and embed or accelerate some of the positive changes that have emerged over the last few months (for example, the use of digital technology in outpatient appointments and closer working between primary and secondary care for referral optimisation).

## 2.6 | THIS REPORT SETS OUT WAYS THAT SYSTEM LEADERS CAN DELIVER MORE CONSISTENT HIGH-QUALITY CARDIOVASCULAR CARE

At this crucial time of planning for the future, system leaders will need support and guidance to arrive at the optimum design for cardiovascular services and how to implement these. This report offers a series of principles to help with this process [Figure 2.1].

**Figure 2.1:** Principles for designing CVD services



## 2.6.1 THE AGGREGATION OF DELIVERY

There has been a gradual move to bring together the delivery of certain services in one place for safety and quality reasons. Specific services might be best provided in fewer specialist centres whilst others should be available at all local hospitals.

Such changes do not happen overnight. Once evidence is distilled, there is a need to identify champions for change and to bring together the relevant stakeholders. Clinical pathways have to be redesigned and implemented. Roles and responsibilities need to be accepted. Training and educational requirements must be addressed and the relevant infrastructural and administrative requirements put in place.

We have already seen:

- reorganisation of services to enable combined skills to be concentrated in larger centres so that both children and adults with congenital heart defects can access optimal care
- replacement of thrombolysis with primary percutaneous coronary intervention (PPCI) ('primary angioplasty') for patients with ST-elevation myocardial (STEMI), leading to the development of 'Heart Attack Centres'.

## 2.6.2 THE INCREASED NEED FOR COLLABORATION BETWEEN ORGANISATIONS

Care for patients is delivered by community and hospital-based teams but, for each clinical pathway, these teams cannot work in isolation. Close collaboration between services is necessary.

We have already seen:

- greater integration between primary, secondary and tertiary care for the optimal delivery of care to patients with heart failure. This links community and hospital services and allows appropriate selection of patients for expensive treatments for severe heart failure, as well as better provision of palliative care for patients with the most severe disease.
- development of new complex pacemaker devices to treat patients with heart failure. This leads to tighter alignment between sub-specialties and regional discussions on how best to deliver care.
- development of multidisciplinary teams (MDTs) to discuss individual complex cases where more than one strategy might be considered. Associated with this has been the

need for greater communication between local and regional centres.

## 2.6.3 THE USE OF INFORMATION TO DRIVE DECISION-MAKING

With growing treatment options and changes in service delivery, the need for information becomes more important. Information is required by patients, individual clinicians, their clinical teams, hospital management and commissioners. The need for integrated care means that information is required at regional as well as national level.

In general terms, all stakeholders should understand the scale of the programmes to deliver care and the skill sets needed to implement them. Information is needed on processes of care, appropriateness of treatment, methods of treatment and the outcomes associated with these. Both hospitals and commissioners have to understand how services are performing and whether changes are needed.

Patients want to have a say and want to know more than just the probability of surviving a procedure. They have a right to know their treatment options, what to expect with each, delays to treatment, how long they will have to be in hospital and how long their recovery will take, potential complications and the likely impact of the treatment or complications on their short- and longer-term quality of life. Where possible, information should be provided on local services and their outcomes. It is only with such information that clinical services can truly offer a complete and equitable shared decision-making process.

We have already seen:

- an increase in the range of quality metrics provided by the NCAP. Apart from the feedback to hospitals, the NCAP also aligns to other levers to improve care. Measures incorporated into the Best Practice Tariff are recorded in the Myocardial Ischaemia National Audit Project (MINAP) and the National Heart Failure Audit (NHFA). Data are provided to the Get It Right First Time (GIRFT) team and to the Care Quality Commission (CQC) to assist in local discussions about facilities and performance.
- an increase in the local development of patient information leaflets.
- the development of feedback organisations such as HealthWatch to enhance patient awareness and promote patient feedback into local health services.

## 2.6.4 THE BENEFITS OF DELEGATION TO EMPOWER IMPROVEMENT

The variety of cardiovascular conditions treated and the range of treatments requires specialist teams. Within those teams, different individuals can take the lead on specific ways of improving services.

We have already seen:

- an increased use of specialist nurse teams in the management of patients. Specialist Nurses and Physician's Associates have now been trained to lead on pre-assessment and consent processes for procedures and to manage the post-operative or post-procedural care and follow-up of patients. They can sometimes initiate treatments and are very involved in the up-titration of secondary prevention treatments for patients with a heart
- the establishment of specialist teams within interventional cardiology services, using new skills and technology to allow greater effectiveness of PCI for patients with chronic total occlusions (CTOs) of vessels
- the establishment of highly-skilled 'Structural Heart Teams' combining cardiac surgical and interventional cardiology expertise and applying developments in surgical and percutaneous techniques to deal with structural heart abnormalities.

attack or heart failure. They are highly effective in providing a bridge between primary and secondary care. Nurse-led secondary prevention, arrhythmia and heart failure clinics are being adopted by more regions. This improves access to care, enables more patients to receive optimal medical therapy (OMT) and improves efficiency and value of services. Patients with potentially high-risk conditions can be identified and be triaged to specialist services.





# 3. APPLYING THESE CORE PRINCIPLES TO COVID RECOVERY PLANS AND POSSIBLE REDESIGN OF CLINICAL SERVICES – CAN WE LEARN FROM EXPERIENCE?

## 3.1 | AGGREGATION OF SERVICES

The science of volume-outcome relationships in healthcare is complex. At the heart of this is the basic premise that the more one does, the better one becomes. The minimum number required to provide optimal performance may be difficult to assess, and centres that become too large may not be able to provide optimal care. Key skills have to be integrated into an effective infrastructure. It also relates to the complexity and risks of cases undertaken. Apart from the outcomes themselves, accessibility and the efficiency of service delivery have also to be considered and these impact considerably on the patient experience.

In scenarios where a patient has to be transferred from one hospital to another, and then might return to the original hospital for recuperation and rehabilitation, there are challenges to tracking performance at each part of the clinical pathway and to attribute that to the appropriate teams. However, these pathways and services need to be integrated and teams at different provider units need to work together. High-level information can be useful to such integrated services, which can examine steps in the pathways to ensure that patients receive the best care.

### 3.1.1 MORE PCI CENTRES ARE MEETING VOLUME STANDARDS AS LEVELS OF HEART ATTACK AND REVASCULARISATION DROP

At a time when we are seeing changes in epidemiology, these issues become magnified. For the first time, the Myocardial Ischaemia National Audit Programme ([MINAP](#)), the National Audit of Percutaneous Coronary Intervention ([NAPCI](#)) and the National Adult Cardiac Surgery Audit ([NACSA](#)) have all reported a fall in the number of admissions with a heart attack and a fall overall in the number of patients undergoing elective PCI and coronary artery bypass graft (CABG) surgery. The reasons for these changes are unclear but possible influences include:

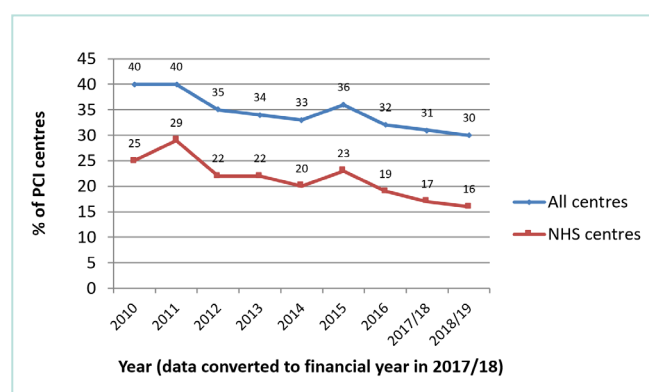
- an impact of primary and secondary prevention therapies
- a gradual swing to a more conservative approach for stable coronary disease using optimal medical therapy – this follows trials such as the Clinical Outcomes Utilizing Revascularization And Aggressive Drug Evaluation (COURAGE)<sup>4</sup> and the International Study of Comparative Health Effectiveness with Medical and Invasive Approaches ISCHEMIA<sup>5</sup> trials (although timing of the results of the latter suggest this might have greater impact in future years)
- better case selection for revascularisation – this takes advantage of physiological assessment of coronary disease

in the catheter laboratory, using fractional flow reserve (FFR) and instant flow reserve (iFR) technology.

Whether these trends will continue is not known and data show that the requirement for urgent cases is unchanged. With the rise in the prevalence of obesity and diabetes, there are concerns that reduction in the number of events will be short-lived. Following the initial part of the COVID pandemic, there is a risk of a medium-term increase in the number of heart attacks triggered by the inflammatory phase<sup>6</sup> but this remains to be seen, and may not even be recognised should patients not present to hospital because of fears about the risk of infection.

The NAPCI demonstrates that two-thirds of all PCI is now for patients with acute coronary syndromes, so organisation of services to allow for timely treatment is essential. Many centres have now grown their activity to accommodate demands [Figure 3.1]. However, problems remain in terms of times to investigation and treatment. This suggests issues with either prioritisation, capacity or both (see section 3.2.4).

**Figure 3.1:** Proportion of PCI centres performing <400 cases a year (from NAPCI report)



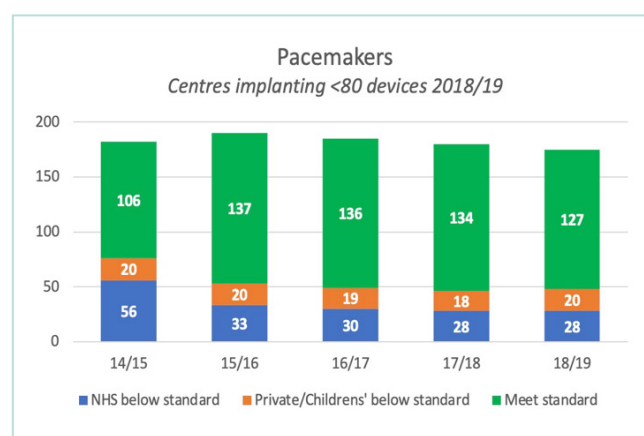
Of 20 centres performing <200 cases a year, there is only one NHS centre, all the others being private. Operators in the latter work in both NHS and private centres, and so this does not reflect whether individual operators are meeting minimum numbers set by the [British Cardiovascular Intervention Society](#).

Given that these hospitals work at a level of activity well below the national guidelines it is extremely important that they demonstrate the quality of their services and risk-adjusted outcomes. In the past however, many have been poor at providing data to the NCAP, although this has improved over recent years. Should private hospitals be commissioned by the NHS to provide additional capacity to address the backlog of investigations and treatments that has built up during the pandemic, such audit reporting will become even more important.

### 3.1.2 THE NUMBER OF HOSPITALS FAILING TO REACH THE MINIMUM EXPECTED PROCEDURE NUMBERS OF PACEMAKERS REMAINS STUBBORNLY UNCHANGED

The National Audit of Cardiac Rhythm Management (NACRM) has shown that, compared with five years ago, more hospitals have reached the standards for minimum number of implants of pacemakers and complex devices [Figure 3.2]. There remains, though, a stubbornly consistent number of NHS hospitals implanting pacemakers (28 in 2018/19) that do not meet the minimum implantation rate.

**Figure 3.2:** Proportion of hospitals meeting national standards for pacemaker implantation rates 2018/19 (from NACRM report)



Similarly, for complex devices, although the proportions are improving, 38 NHS adult hospitals still fail to reach the designated standards. There also remains a substantial minority of individual operators that do not meet the minimum number of annual implants or revision procedures.

A small number of hospitals do not reach the designated standards for ablation techniques for arrhythmias. This may be satisfactory as long as this is an agreed commissioning position and outcomes are good.

Ensuring adherence to minimum volume standards is an area for ICSs/STPs or their equivalents to address, using their local data to understand where they need to act. Options include:

- a review of clinical pathways to identify the most appropriate patients for procedures
- re-allocation of procedures from larger centres to smaller centres
- transfer of all activity from very small centres to larger centres
- operators working on more than one site within a combined programme
- a review of the numbers of operators and trainees required.

### 3.1.3 HOW BEST TO DELIVER SERVICES FOR ACUTE AORTIC DISSECTION?

Attention has recently been focused on how best to deliver surgical services for the management of acute aortic dissection. This is an extremely serious condition with a very



high early mortality. The [NACSA](#) has reported for the first time on those patients who undergo emergency surgery. The numbers operated on by country over the last few years are shown in Table 3.1.

**Table 3.1:** Number of emergency aortic dissection cases by nation and by year (from NACSA report)

Nation	2016/17	2017/18	2018/19
England	371	368	381
Northern Ireland	12	11	7
Scotland	27	23	5
Wales	12	17	7
Total	422	419	400

(NB data not submitted from two Scottish hospitals in 2018/19)

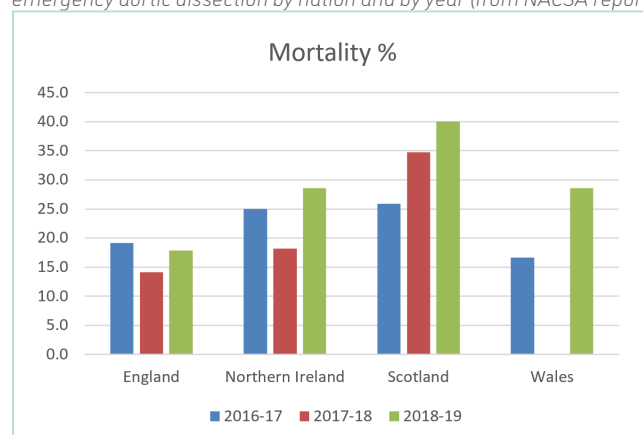
It is important to note that these data:

- do not include all patients with this condition as many are either too sick to undergo surgery, or die before they reach the operating theatre, and some types of aortic dissection can be managed conservatively with outcomes that are not improved by surgical intervention. Some patients managed medically may subsequently require elective surgery because of further complications, but these are not part of the data reported here.
- are not the same as those in the Getting It Right First Time ([GIRFT](#)) report,<sup>2</sup> which included all urgent and emergency aortic surgery (and reported lower mortality rates), not just these higher risk operations for acute dissection.

Each surgical centre on average performs only around 11 cases, although some completed over 30 per year while others carried out fewer than three. The data then show substantial variation in the unadjusted mortality [Figure 3.3].

The UK mean mortality for the three years 2016-2019 combined was 17.7% which is consistent with figures reported from other countries.<sup>8-10</sup> Although there appears to be a difference between the nations, data were not submitted by two Scottish hospitals in 2018/19 and there is no adjustment for severity of clinical features, so the figures may only reflect different thresholds for intervention. Nevertheless, the data suggest that further study of this important condition should be considered and recommendations developed for how services could optimally be delivered.

**Figure 3.3:** In-hospital mortality rates (%) following operations for emergency aortic dissection by nation and by year (from NACSA report)



Although there may be some strength in delivering these services at a select number of centres, this has to be considered against the potential early mortality of long transfer times (not captured by these operative mortality figures) and the time taken by hospitals where the patients first present to make the diagnosis and refer through to the surgical teams. A greater understanding of the problem is required in deciding on the potential benefits of aggregation of services; other indications for aortic surgery should be considered in these discussions. Whatever decisions are made, a collaborative approach between commissioners and all clinical stakeholders is required and decisions should be made on the best available evidence.

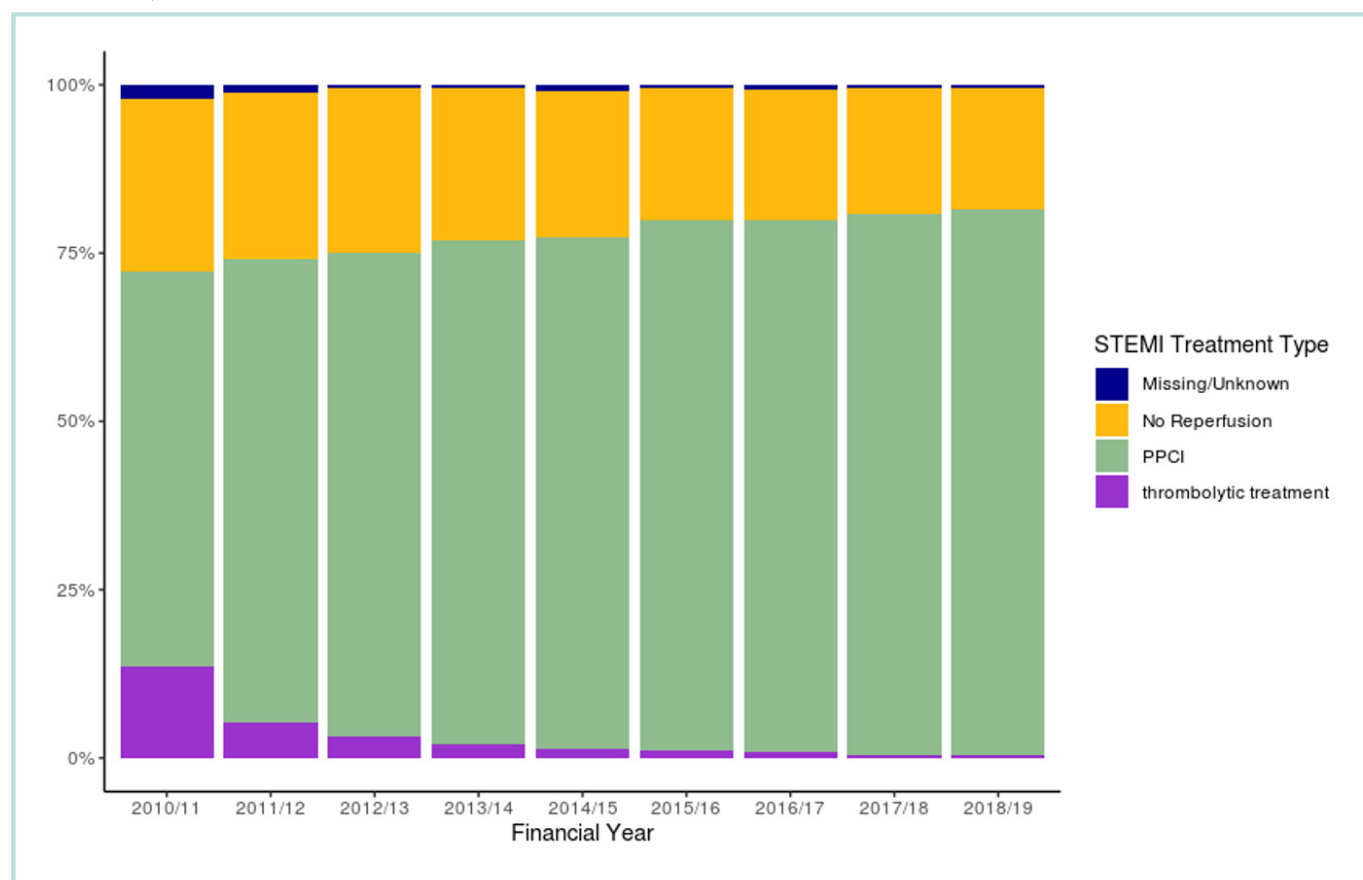
## 3.2 | COLLABORATION BETWEEN PARTNERS TO DELIVER SERVICES

There are many examples where multiple stakeholders have come together to provide significant improvements in services.

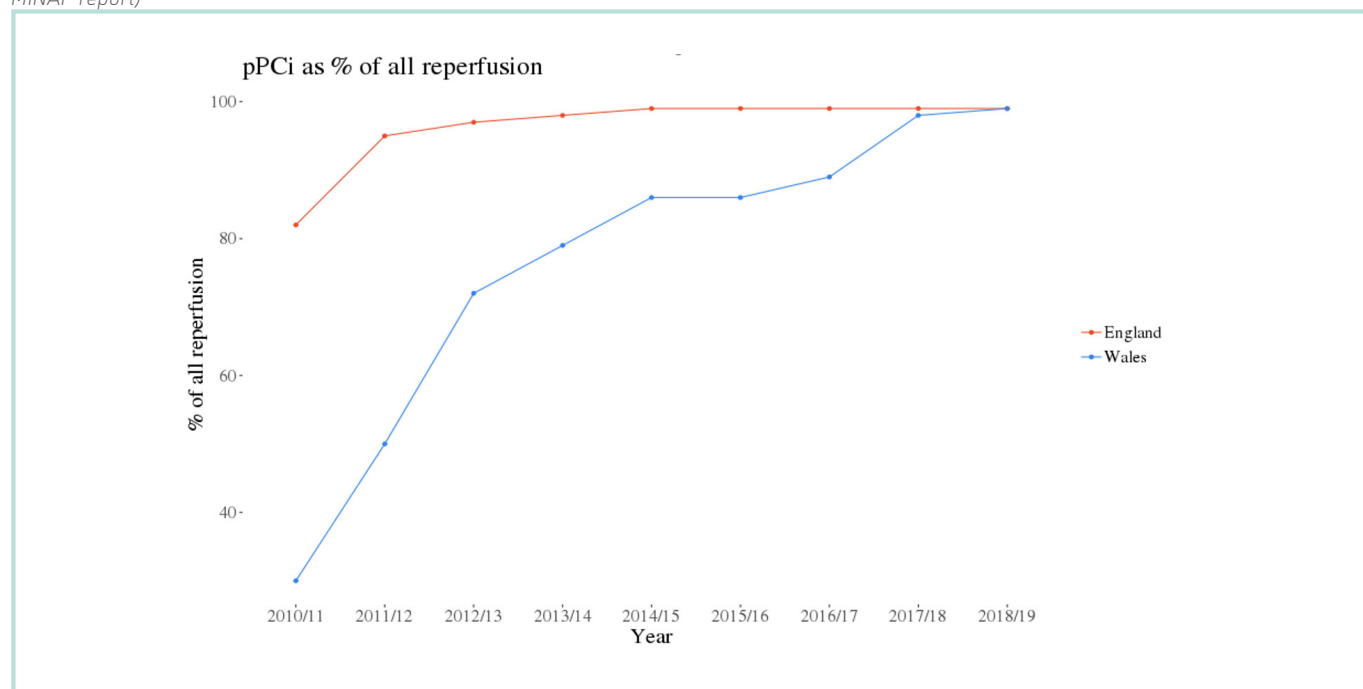
### 3.2.1 PRIMARY PCI IS NOW AVAILABLE TO ALL PATIENTS ACROSS THE UK

Perhaps the most striking of these has been the transformation of reperfusion services for patients with acute ST-elevation myocardial infarction (STEMI) [Figure 3.4]. Although there have been some geographical challenges in certain regions, the development of PCI services in Inverness and also in Ysbyty Glan Clwyd, North Wales has meant that primary PCI is now delivered to all parts of the UK [Figure 3.5].

**Figure 3.4:** Proportion of patients receiving intravenous thrombolytic therapy, primary PCI or no-reperfusion treatment for STEMI, 2010/11 to 2018/19 (from MINAP report)



**Figure 3.5:** Proportion of patients who underwent primary PCI as reperfusion therapy for STEMI, in England and in Wales, 2010/11 to 2018/19 (from MINAP report)



## 3.2.2 MORE HEART ATTACK PATIENTS ARE RECEIVING REPERFUSION THERAPY

Proportionately fewer patients with STEMI are not receiving reperfusion therapy [Figure 3.6].

There are a number of valid reasons why patients do not receive this, including arriving in hospital too late to benefit from treatment or because of a decision not to treat because of severe frailty or multiple comorbidities. However, other reasons include logistic problems that are amenable to improvement.

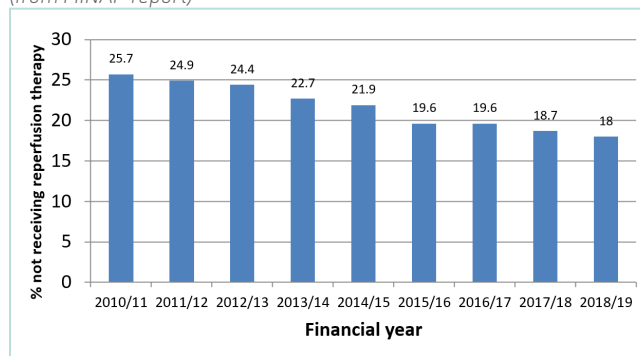
The significant change in proportion of cases not receiving care suggests that all those involved along the clinical pathway, including the ambulance, accident and emergency and cardiology services, are working well together to improve services and this should continue to be encouraged by local system leaders to ensure the gains made over recent years are not lost.

## 3.2.3 CALL-TO-DOOR TIMES ARE INCREASING

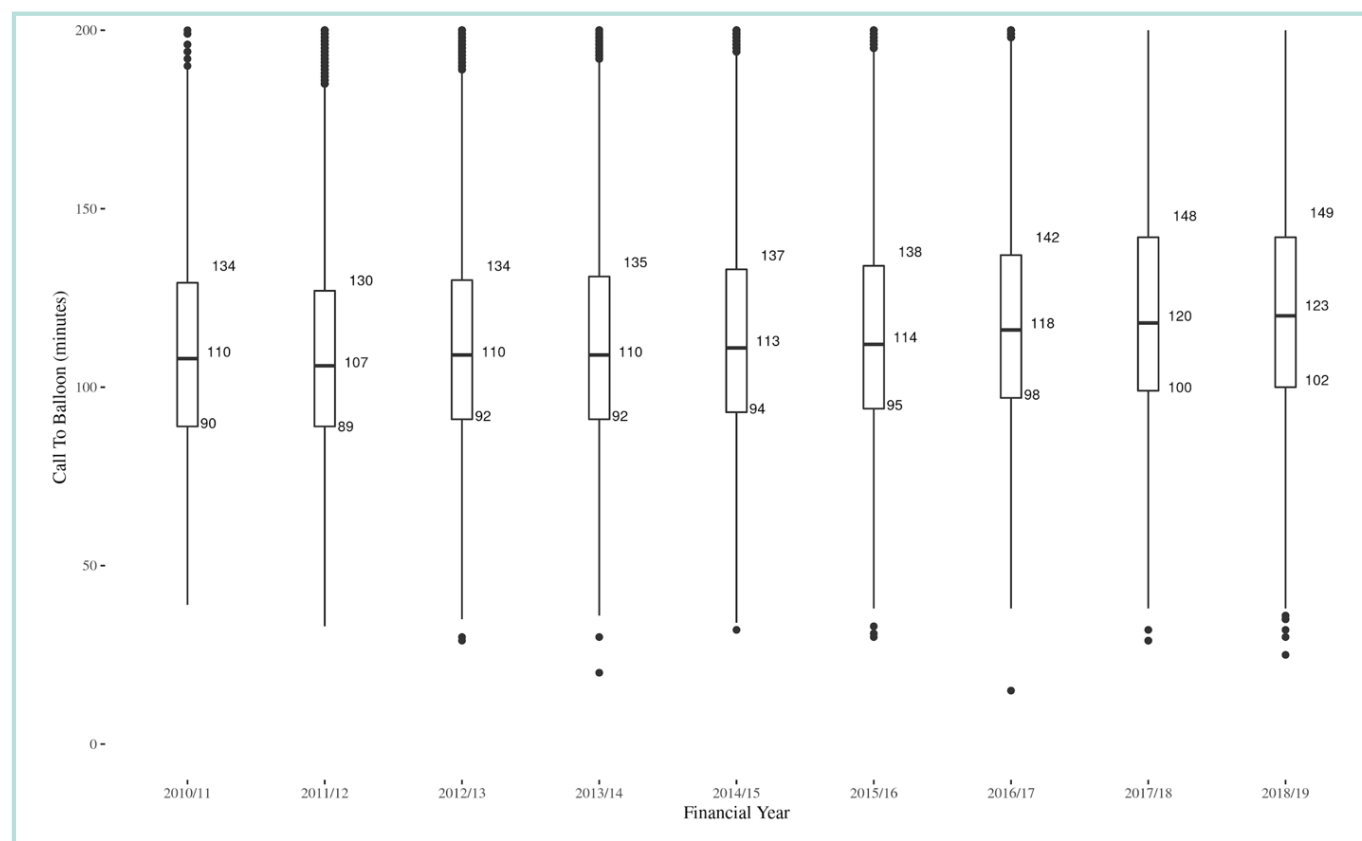
Although progress is being made in many aspects of care, there are areas of concern. For a few years, the NCAP has been reporting that Call-To-Balloon (CTB) times for patients with

STEMI have been increasing. Door-To-Balloon (DTB) times have remained relatively constant (although the [MINAP](#) and [NAPCI](#) audits reveal there is scope to reduce DTB times further), and so the problem appears to be with increasing Call-To-Door (CTD) times. In spite of our highlighting the issue of CTD times, we have not yet seen a reversal of this trend and, indeed, it continues to worsen [Figure 3.7].

**Figure 3.6:** Proportion of patients receiving neither intravenous thrombolytic therapy nor primary PCI for STEMI, 2010/11 to 2018/19 (from MINAP report)



**Figure 3.7:** Trend in Call-To-Balloon (CTB) times – median and interquartile ranges, 2010/11 to 2018/19 (from MINAP report)



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

The time to reperfusion is critical in terms of lives saved and future health gains. This has recently been taken up by the Healthcare Safety Investigation Branch ([HSIB](#)) in an effort to identify how this essential service can be reliably improved. A whole-system approach will be needed to make the changes needed.

### 3.2.4 TIMES TO ANGIOGRAPHY AND PCI FOR PATIENTS WITH NSTEMI ARE ONLY MARGINALLY IMPROVING

Although there is not the same clinical imperative for immediate angiography and PCI (or CABG, when indicated) for patients admitted with a non-ST-elevation myocardial infarction (NSTEMI), there is no disadvantage of an earlier approach and there are still considerable delays before investigation or treatment for some patients.

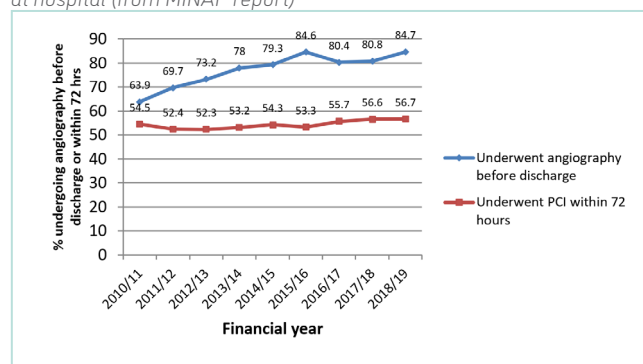
After an initial fall in performance in recent years, the latest data show improvement in overall levels of angiography for NSTEMI patients but only marginal improvements in investigations within 72 hours of hospital admission [Figure 3.8]. Similarly, there has only been a very small rise in the proportion of patients undergoing PCI within 72 hours.

Interestingly, during the start of the COVID-19 pandemic, there was a major reduction in elective activity and a significant reduction in the numbers of patients who presented with an NSTEMI. Times to angiography and PCI were shortened considerably from the pre-COVID period from a median of 64 hours to 26 hours from hospital admission.<sup>11</sup> This reveals

that under normal circumstances there are issues to do with either capacity or prioritisation that would have to be tackled to maintain this improvement as clinical pathways are restored.

The NAPCI report shows that patients who require an inter-hospital transfer have to wait for at least 24 hours longer than those who are admitted direct to a PCI hospital. Delays related to inter-hospital transfers can only be tackled by a higher proportion of appropriate patients being taken direct to a PCI centre and an acceleration of the steps required for rapid patient transfer. To achieve any significant changes for this aspect of care, an integrated approach should be made in every local area to identify the key steps needed for sustainable gains in performance.

**Figure 3.8:** Trends for proportion of eligible patients with NSTEMI undergoing angiography before discharge or within 72 hours of arrival at hospital (from MINAP report)



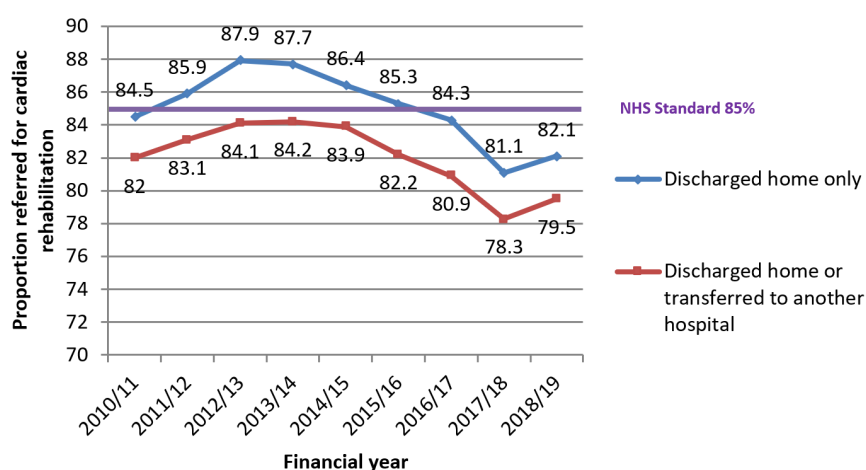
### 3.2.5 REFERRAL TO CARDIAC REHABILITATION: HAVE WE TURNED THE CORNER?

In last year's report we highlighted the fact that fewer patients were being referred as an in-patient for cardiac rehabilitation, both for patients admitted with a heart attack or those admitted with heart failure. Although some hospitals defended their performance by pointing to the fact that referral to rehabilitation was arranged following discharge, our specialist advisors highlight that national and international guidelines recommend that both referral to cardiac rehabilitation and the first phase of this should be done prior to discharge.

It is therefore encouraging to see that the previous marked downward trend looks to have been reversed [Figure 3.9].

However, further effort is needed to achieve the NHS Standard of 85%. This requires coordinated action between the medical and nursing elements of clinical teams and community services. To support this, commissioners should ensure that these programmes are adequately resourced. This is especially important as referral as an in-patient to cardiac rehabilitation services for patients admitted with heart failure remains very low at 13% ([NHFA report](#)).

**Figure 3.9:** Rates of referral for cardiac rehabilitation programmes following either STEMI or NSTEMI (from MINAP report)

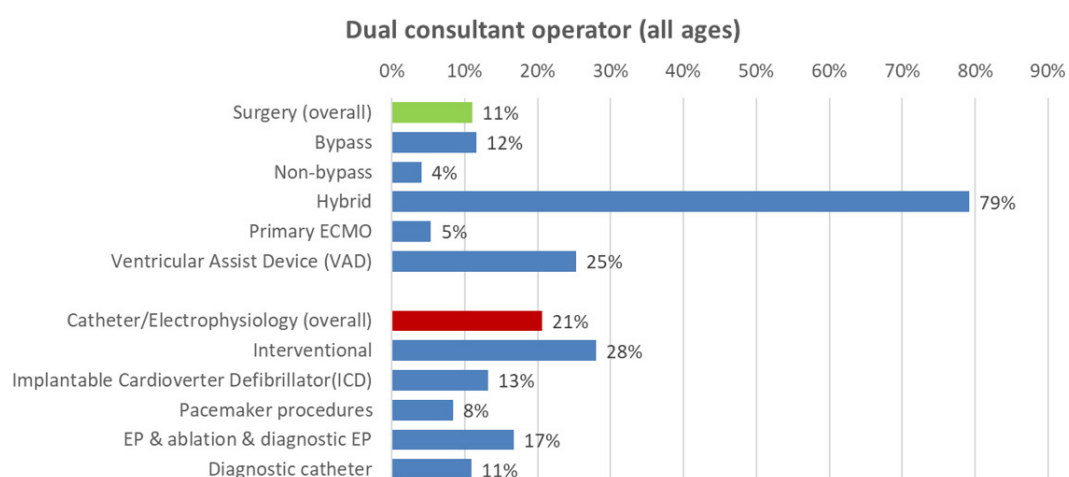


### 3.2.6 WORKING TOGETHER IN COMPLEX CASES: DOUBLE-SCRUBBING

Many cardiovascular procedures require a mix of skills within a team to provide better care for patients. In cardiac surgery, transcatheter aortic valve implantation (TAVI) procedures and ablation procedures, two (or even more) consultants working together can deliver outcomes that could not be achieved by each working alone. This is highlighted in Figure 3.10 for the National Congenital Heart Disease Audit (NCHDA), where procedures are performed jointly by two or more consultants in:

- one in ten surgical operations
- one in five neonatal surgical procedures
- more than one in five interventional/electrophysiological procedures
- one in three neonatal interventional/electrophysiological procedures.

**Figure 3.10:** Percentage of congenital heart disease patients of any age who had their procedure undertaken by two consultant operators, broken down by procedure type in 2016/17 to 2018/19 (financial years) (from NCHDA report)



ECMO = extracorporeal membrane oxygenation; VAD = ventricular assist device; ICD = implantable cardioverter defibrillator; EP = electrophysiology

## 3.3 | THE IMPORTANCE OF INFORMATION IN DECISION-MAKING

Clinicians cannot decide on which treatment to offer patients without the information from trials and registries and they must be able to communicate the relevant issues when a patient is making a choice. Hospitals cannot determine whether they need to improve performance in areas of practice unless they understand the desired standards and can benchmark themselves against others. Information must constantly be available and contemporary.

### 3.3.1 CHOOSING BETWEEN TISSUE OR MECHANICAL VALVES FOR AORTIC STENOSIS

Until recent years, surgical aortic valve replacement (SAVR) has been the gold standard treatment for patients with symptomatic severe aortic stenosis. The choice of valve depends on a range of factors, but in general younger patients are usually offered mechanical valves (which do not wear out but require life-long anticoagulation with Warfarin) whilst elderly patients are usually offered a tissue valve (as anticoagulation is associated with greater bleeding risk in this group, but these valves can deteriorate over the years).

The use of tissue valves varies from 63% to 94% by surgical centre, a variation that does not seem to be explained by demographic differences [Table 3.2]. There is also a variation between regions that needs greater exploration. Information to support consistent practice is available in making these choices. National recommendations have been suggested and patients need a full explanation of the pros and cons of each approach before proceeding to surgery.

**Table 3.2:** Prosthesis types (number, %) used for isolated AVR in the UK over the last three years categorised by age of patient (<60; 60-69; ≥70 years) (from NACSA report)

	Valve type by age group (%), 2016/19 (aggregate data)					
	<60		60-69		≥70	
Nation	Mechanical	Biological	Mechanical	Biological	Mechanical	Biological
UK	1626 (60.1%)	1080 (39.9%)	679 (18.3%)	3037 (81.7%)	139 (1.8%)	7546 (98.2%)
England	1029 (59.3%)	707 (40.7%)	439 (18.6%)	1921 (81.4%)	84 (1.8%)	4657 (98.2%)
Northern Ireland	82 (71.3%)	33 (28.7%)	17 (12.1%)	124 (87.9%)	1 (0.3%)	294 (99.7%)
Scotland	25 (78.1%)	7 (21.9%)	12 (13.6%)	76 (86.4%)	2 (1%)	206 (99%)
Wales	490 (59.5%)	333 (40.5%)	211 (18.7%)	916 (81.3%)	52 (2.1%)	2389 (97.9%)

### 3.3.2 THE CHOICE BETWEEN ADULT SURGERY AND TAVI

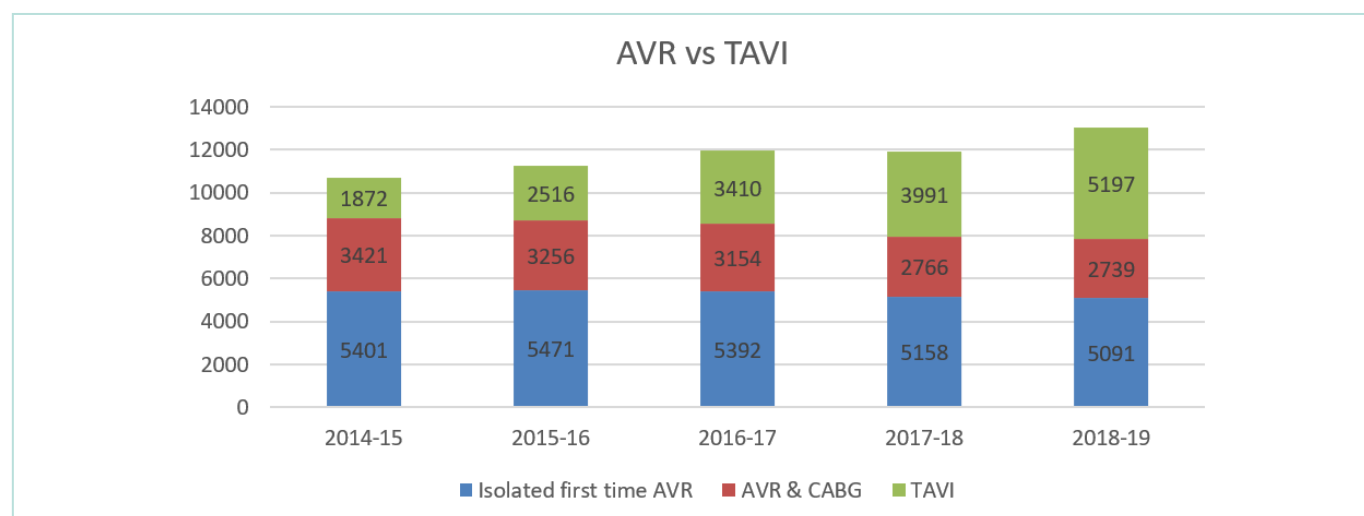
Over the last decade, a number of trials have demonstrated that transcatheter aortic valve implantation (TAVI) is an appropriate alternative for different subsets of patients. In general, those at low risk for open heart surgery will still be considered for SAVR, but TAVI is often the preferred treatment for older patients and those with significant comorbidities that put them at higher risk for surgery.

It is recommended that hospitals coordinate these approaches

using a multidisciplinary team and that patients are fully informed of the advantages and disadvantages of each approach before making the final choice of treatment.

Overall, the introduction of TAVI has offered a greater number of patients with aortic stenosis the opportunity of treatment. The number of procedures has been increasing year on year with a slight reduction in the numbers of patients undergoing isolated SAVR [Figure 3.11].

**Figure 3.11:** Patient numbers of isolated AVR, combined AVR&CABG and TAVI in the UK for the past 5 years (from NACSA report)  
[Data provided with permission from the British Cardiovascular Intervention Society and the Society for Cardiothoracic Surgery in Great Britain and Ireland]



AVR = aortic valve replacement; CABG = coronary artery bypass grafting; TAVI = Transcatheter aortic valve implantation

### 3.3.3 INFORMATION AIDS CLINICAL DECISION MAKING

When faced with a decision about treatment options, patients need more information than just the likelihood of survival of a procedure. Time has to be given to provide information on the likely natural history of their condition with medical therapy alone, and then the advantages and disadvantages of an intervention or, more frequently nowadays, the various treatment options.

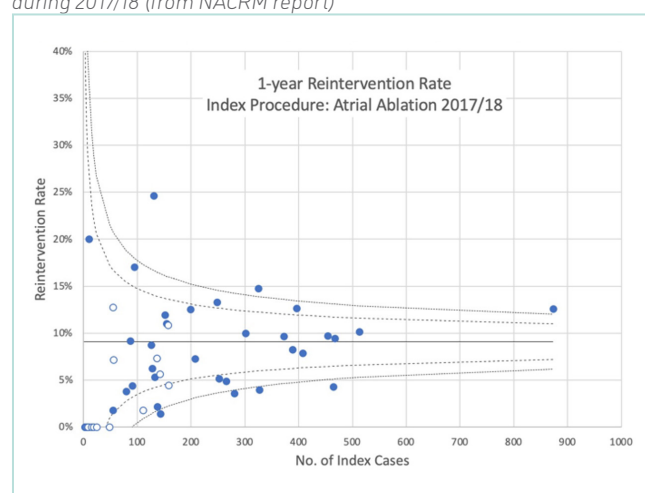
In the past, the NCAP has provided information on surgical and interventional mortality, but over the last few years more granular information on complication rates has been added. This is evident in the full outputs from the NCHDA, NAPCI and NACSA reports. The NACRM also now reports on the need for repeat procedures following device implants, including one- and two-year re-intervention rates for ablation procedures [Figure 3.12].

The national average figures seen are encouraging, though there is a significant variance that does not seem to be fully explained by differences in case mix. As a complex issue that has many potential influencing factors, this needs further work to be understood in more depth.

Apart from the national switch to primary angioplasty highlighted earlier [section 3.2.1], perhaps the biggest shift in practice driven by information has been the use of the radial artery as the access point for PCI. There has been a further improvement in 2018/19 but this may now be reaching a ceiling as there are only a few centres now that do not reach the standards set, and some procedures need to be performed from the femoral artery [Figure 3.13]. The various

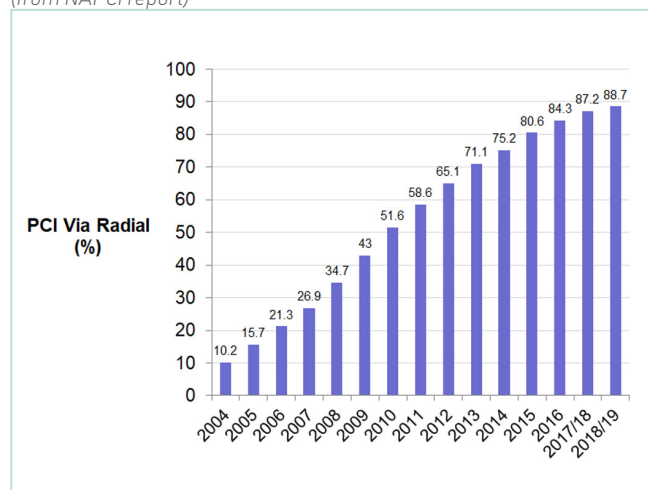
improvements being achieved can be seen throughout the six domain reports.

**Figure 3.12:** Funnel plot of one-year re-intervention rates for patients undergoing ablation procedures for atrial fibrillation in UK hospitals during 2017/18 (from NACRM report)





**Figure 3.13:** Growth in the use of radial access for PCI, 2004 to 2018/19 (from NAPCI report)



### 3.3.4 USING HOSPITAL-LEVEL INFORMATION TO DRIVE QI

In July 2020, the NCAP launched new data tools for hospitals performing PCI and adult cardiac surgery. These included:

- a data completion tool: hospitals can drill down to the data for individual patients and identify missing or incorrect data, which itself will enhance the validation process
- a QI metric tool: hospitals can see how they perform in the selected national QI metric panel, not only against the national average but against the top performing centres
- a local query tool: hospitals can set up a separate query and see how they compare against the national average.

We are making progress to deliver these tools to all our sub-specialty domains and to enlarge the suite of analyses available. These tools mean that hospitals can constantly see how they are faring with the current data in the database. The functionality is significantly improved if all centres download data frequently and regularly, preferably on a weekly basis. The information that can be provided back then becomes far more useful.

We will develop these tools according to requirements and feedback, but they are seen as a major step forward for the NCAP. Previous delays stemming from a protracted validation process can be reduced significantly should providers use the data completeness tools. It is better to send the unvalidated data regularly and then use the data completeness tool to modify the data as necessary rather than not sending any data to the NCAP until the last minute. The NCAP is exploring different ways of providing information at hospital level, over and above our new data tools. These will take time to

implement as new software will have to be developed and statistical analysis plans developed.

### 3.3.5 PROVIDING INFORMATION AT NATIONAL AND REGIONAL AS WELL AS LOCAL LEVEL

The NCAP receives data from hospitals and delivers back information to those hospitals to show how they fare against set standards and their peers. The NCAP will also explore methods of reporting back at a regional level. As a first step, in our 2020 specialty reports, we separate out hospitals from the devolved nations to facilitate evaluation of the hospitals in each country as well as those private hospitals that participate in the NCAP. It will be desirable to provide an overview of how each nation fares against the UK average but to use techniques to drive quality up towards that achieved by the best centres. This desire is entirely dependent on full compliance with the NCAP by all participating nations.

In the past we have shown national differences in the care of patients but significant improvements have been taking place. With the development of a new PCI centre in the north of the country, Wales has been able to increase its PCI activity against a backdrop of a fall elsewhere in the UK. It now delivers primary PCI equivalently to the rest of the UK. However, the drift in the wrong direction for Call-To-Door times has been seen across the UK and although Call-To-Balloon times are longest for Wales (median 140 minutes versus 125 in England and 116 in Northern Ireland), it has shown significant improvement. Times to angiography for patients with non-ST-elevation MI are similar in the devolved nations (and so a national effort is needed to improve these).

Wales has also increased the availability of pacing and ablation services. However, the lack of data submission from some large centres, especially in Scotland, limits the ability to provide reliable comparisons in some domains, especially for the NACRM and the NACSA.

For cardiac surgery, there are national differences in the ability to conform to the nationally agreed standard for the timely delivery of urgent CABG. The target is met in 35% of cases in England, 29% in Scotland (from the limited data received), but only 15% in Wales and 1.5% in Northern Ireland (NACSA data). The proportion of patients with day-of-surgery admission for elective CABG is 14% for England, 5.5% for Scotland, but less than 2% for Wales and Northern Ireland. There are also meaningful differences in post-operative lengths of stay between the countries (median 6 days for England, 7 days for Wales and Northern Ireland and 9 days for Scotland). On the other hand, the use of mechanical valves for aortic valve replacements in patients <60 years of age is higher in Scotland and Northern Ireland (>70%) than is the case in England and Wales (about 60%).

The NCHDA has reported year-on-year improvements on the antenatal diagnosis of conditions requiring intervention within the first year of life and, although there are marginal differences, these improvements are occurring in all four nations. The NCHDA is currently working on delivering information at commissioner level.

### 3.4 THE IMPORTANCE OF DELEGATION: IMPROVING THE PATIENT EXPERIENCE AND PROMOTING EFFICIENCY

Clinical services can be significantly enhanced by the extended roles of non-medical healthcare professionals. The development of Specialist Nurses, Physicians' Associates and extending the roles of Physiologists and Pharmacists has made a big impact in a number of areas of healthcare delivery.

In the cardiovascular world, specialist nurses run secondary prevention clinics, community arrhythmia and heart failure services, chest pain assessment services, pre-admission and follow-up clinics, and they help to provide information to patients, aiding the consent process. Appropriate training is

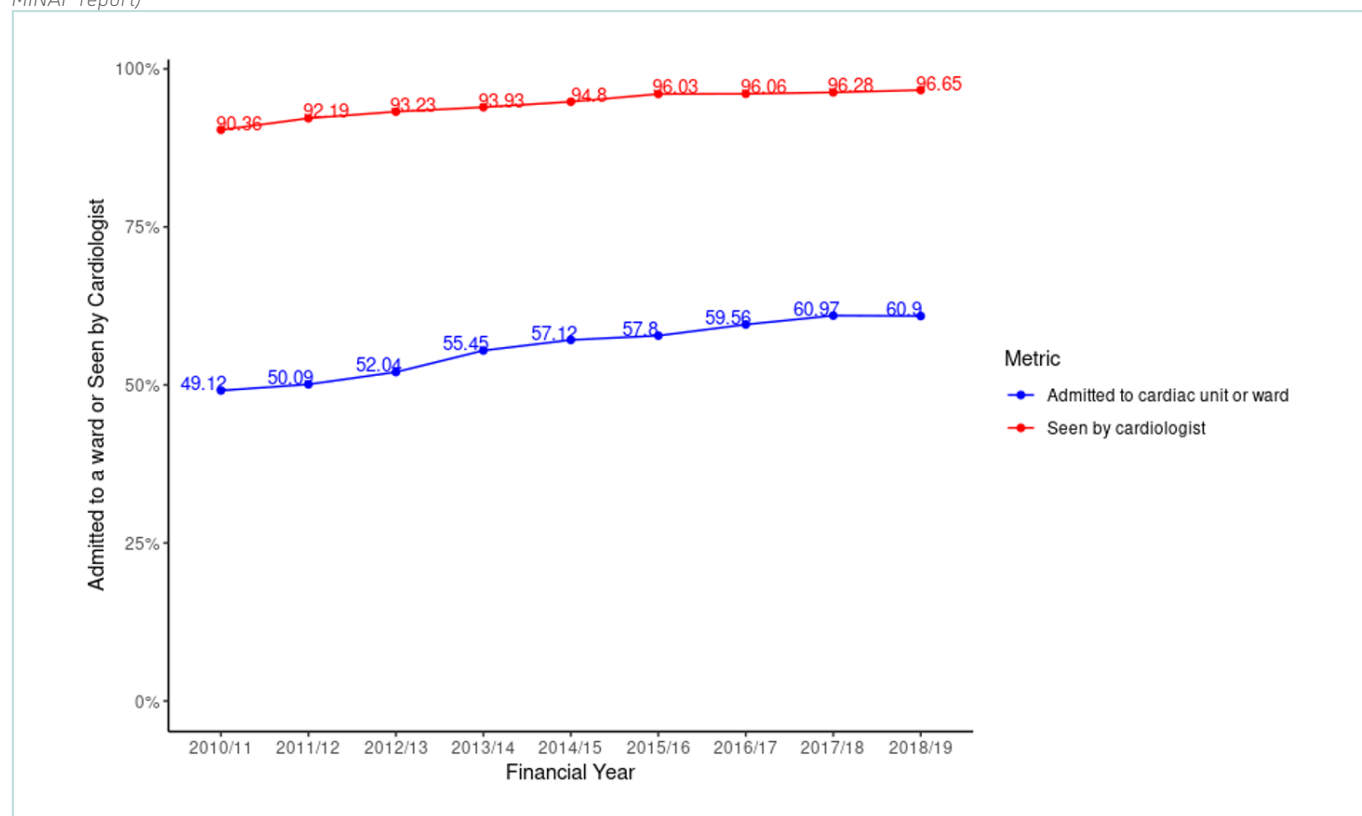
required and well-documented medical oversight is essential. Such services work best when there is a medical lead who champions the extended role, acting as the first port of call to deal with problems that arise. Above all, a multidisciplinary approach with full team buy-in is required. There are a number of examples where this has influenced access to treatment and promoted efficient services.

#### 3.4.1 IMPROVED ACCESS TO CARDIOLOGY CARE FOR PATIENTS WITH A HEART ATTACK OR HEART FAILURE

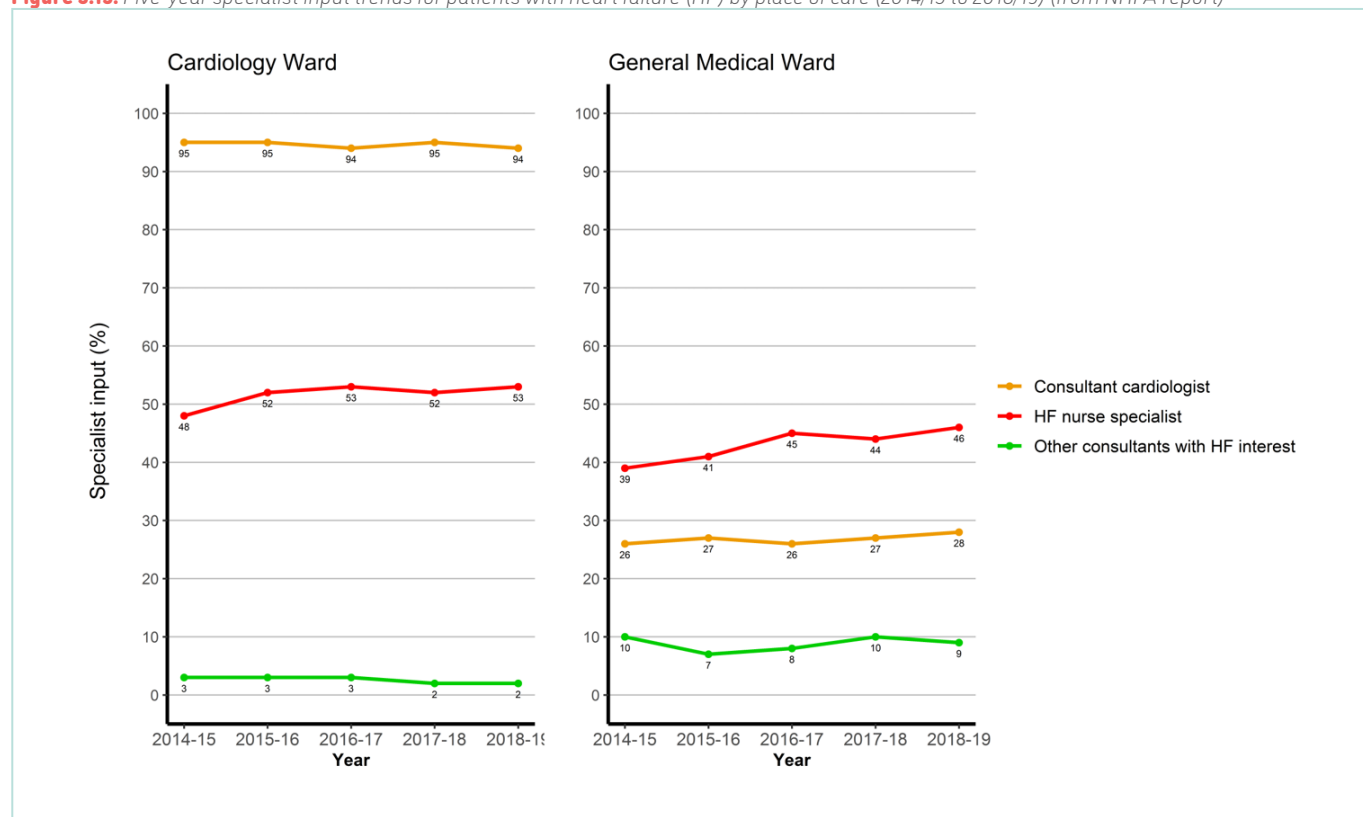
Over the last few years, there has been a gradual increase in the number of patients with a heart attack who are nursed on a cardiac ward, but there is still a large minority who are not [Figure 3.14].

The development of Nurse Specialist outreach teams has meant that a growing number of patients have access to specialist care. Such outreach services are especially important for heart failure patients as access to specialist care is associated with better outcomes. However, there is scope for improvement as there is currently too much variance [Figures 3.15 and 3.16].

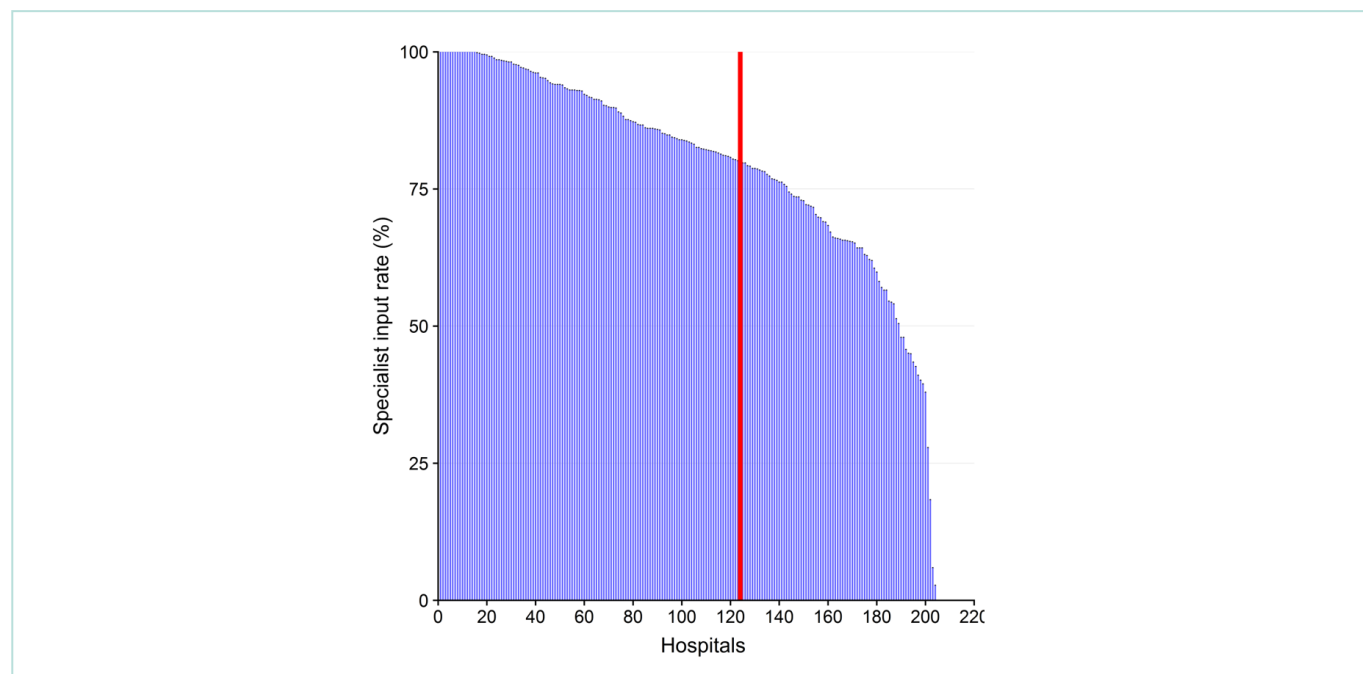
**Figure 3.14:** Trend in proportion of patients with NSTEMI who are admitted to a cardiac unit or ward and seen by a cardiologist during admission (from MINAP report)



**Figure 3.15:** Five-year specialist input trends for patients with heart failure (HF) by place of care (2014/15 to 2018/19) (from NHFA report)



**Figure 3.16:** Inter-hospital variation in percentage of HF patients seen by a specialist (2018/19) (from NHFA report)



[Note: Hospitals to the right of the red line are not achieving the 80% of heart failure patients seen by a specialist. Data from 204 hospitals, 1 hospital reporting <20 cases was excluded].

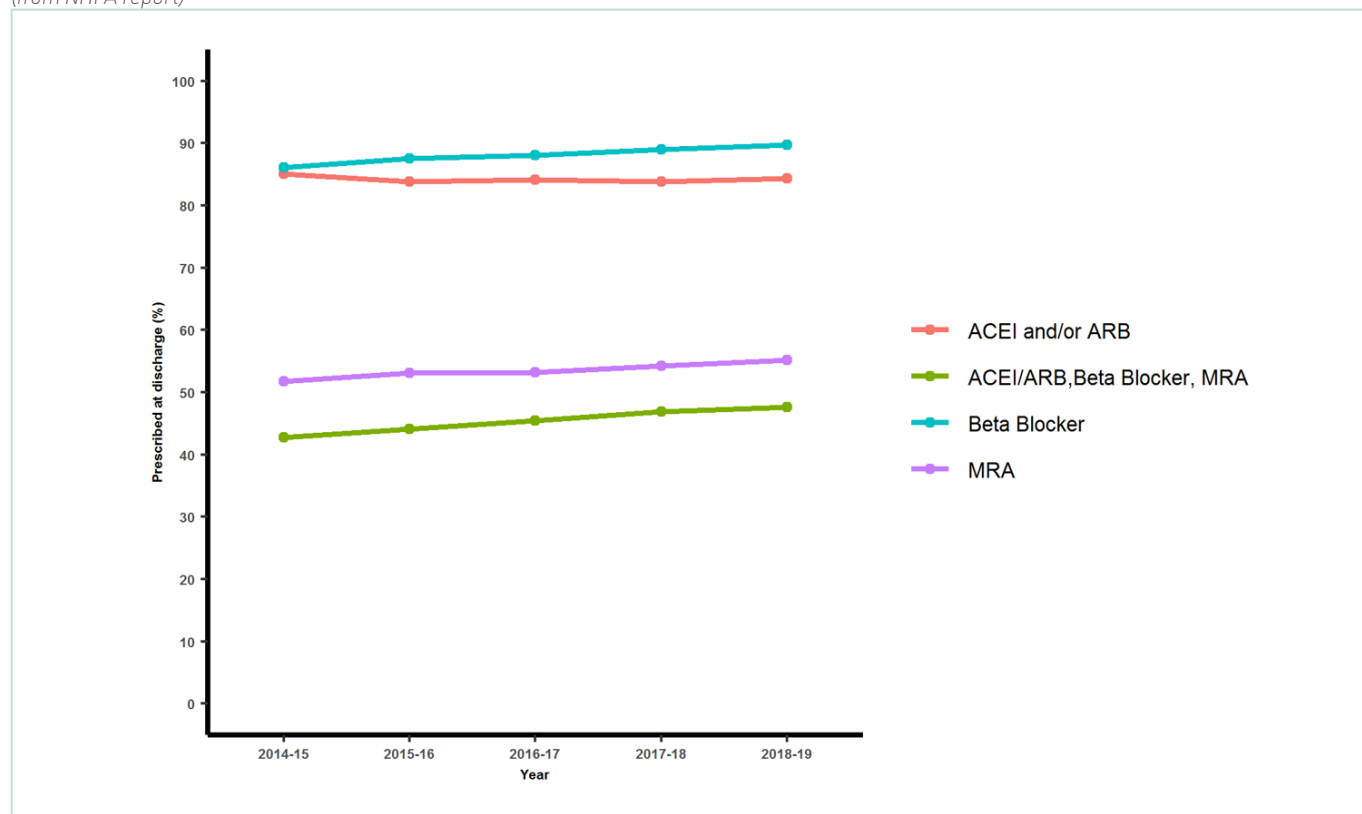
### 3.4.2 GETTING THE RIGHT DRUG TO THE RIGHT PATIENT AT THE RIGHT DOSE

There is now very strong evidence for a number of medications that improve the prognosis of patients who have suffered a heart attack or who have heart failure. A minority of patients do not tolerate these medications or have contra-indications to them. The audits allow for these 'exclusions' and report on the prescription of these drugs to patients. The prescription of most drugs is at a high or very high level across the country, but there is considerable drop-off in the rates of heart failure disease-

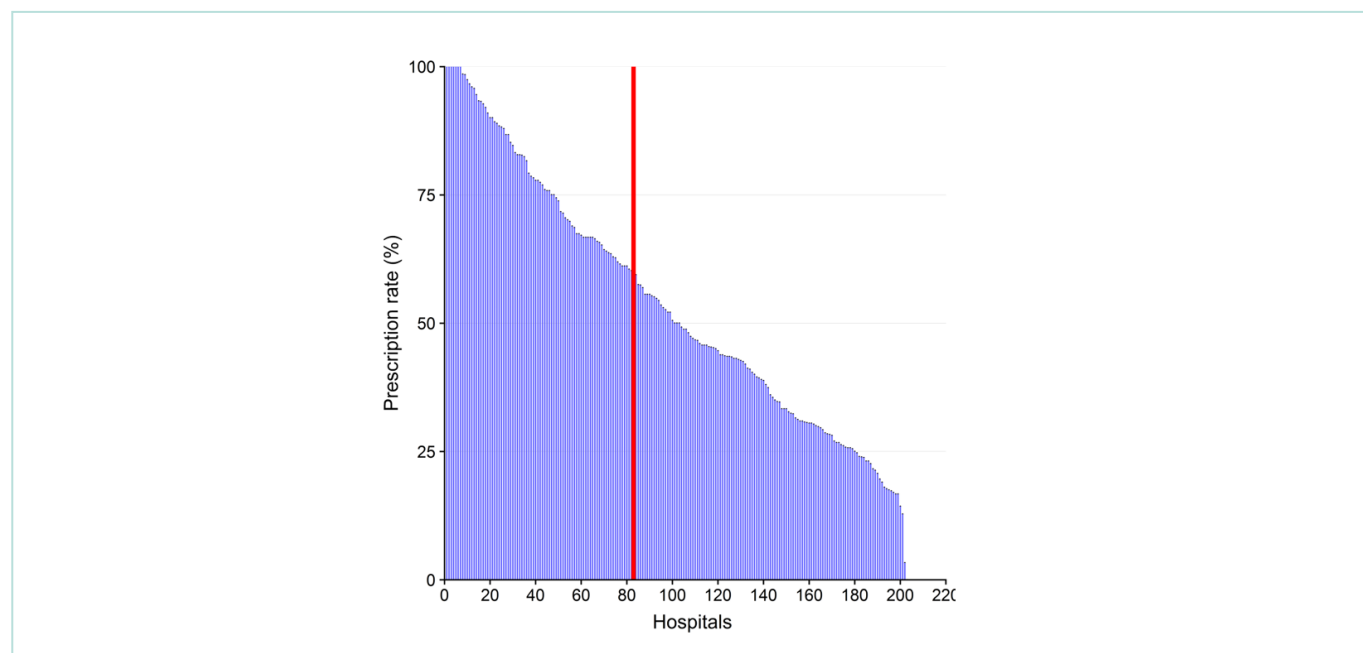
modifying drugs in the elderly. In some cases, this may relate to frailty or other factors not collected in the audit datasets.

A tighter target is to look at whether patients receive all the drugs that they are eligible for. This approach to 'bundles of care' demonstrates that there is room for significant improvement, especially as there is considerable variance between hospitals [Figures 3.17 and 3.18]. Local system leaders should look to delegate responsibility to hospital and community teams for putting in place the necessary protocols and working arrangements to ensure that drugs are up-titrated to optimal doses.

**Figure 3.17:** Five-year trends in prescription of disease-modifying therapies for heart failure with reduced ejection fraction (HFrEF), 2014/15 to 2018/19 (from NHFA report)



**Figure 3.18:** Proportion of Patients with HFrEF receiving all three drugs per hospital (2018/19) (from NHFA report)



[Note: Hospitals to the right of the red line are not achieving the 60% of eligible HFrEF patients receiving all three disease-modifying drugs. Data from 204 hospitals, 1 hospital reporting <20 cases was excluded.]

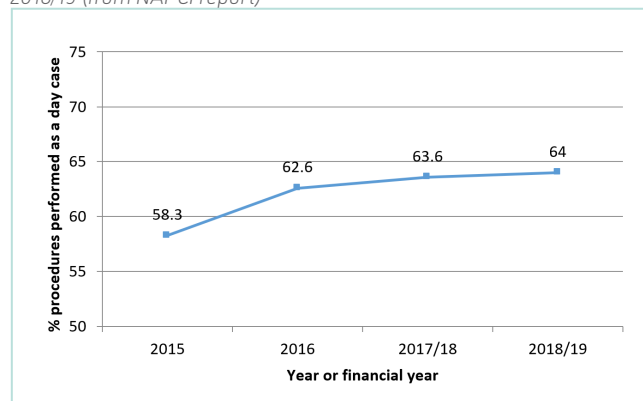
### 3.4.3 DAY-CASE TREATMENT FOR PATIENTS UNDERGOING ELECTIVE PCI

Last year's report identified day-case PCI for elective patients with stable disease as an important new means of service delivery. Although it is not appropriate for all patients, current PCI technology and adjunctive pharmacology makes this safe for the majority of patients. It increases efficiency and is preferred by patients. The British Cardiovascular Intervention Society has suggested a reasonable standard should be  $\geq 75\%$  of all elective cases. Although there was a slight increase in previous years, there has been no further improvement in rates of day-case PCI over the 2018/19 financial year [Figure 3.19].

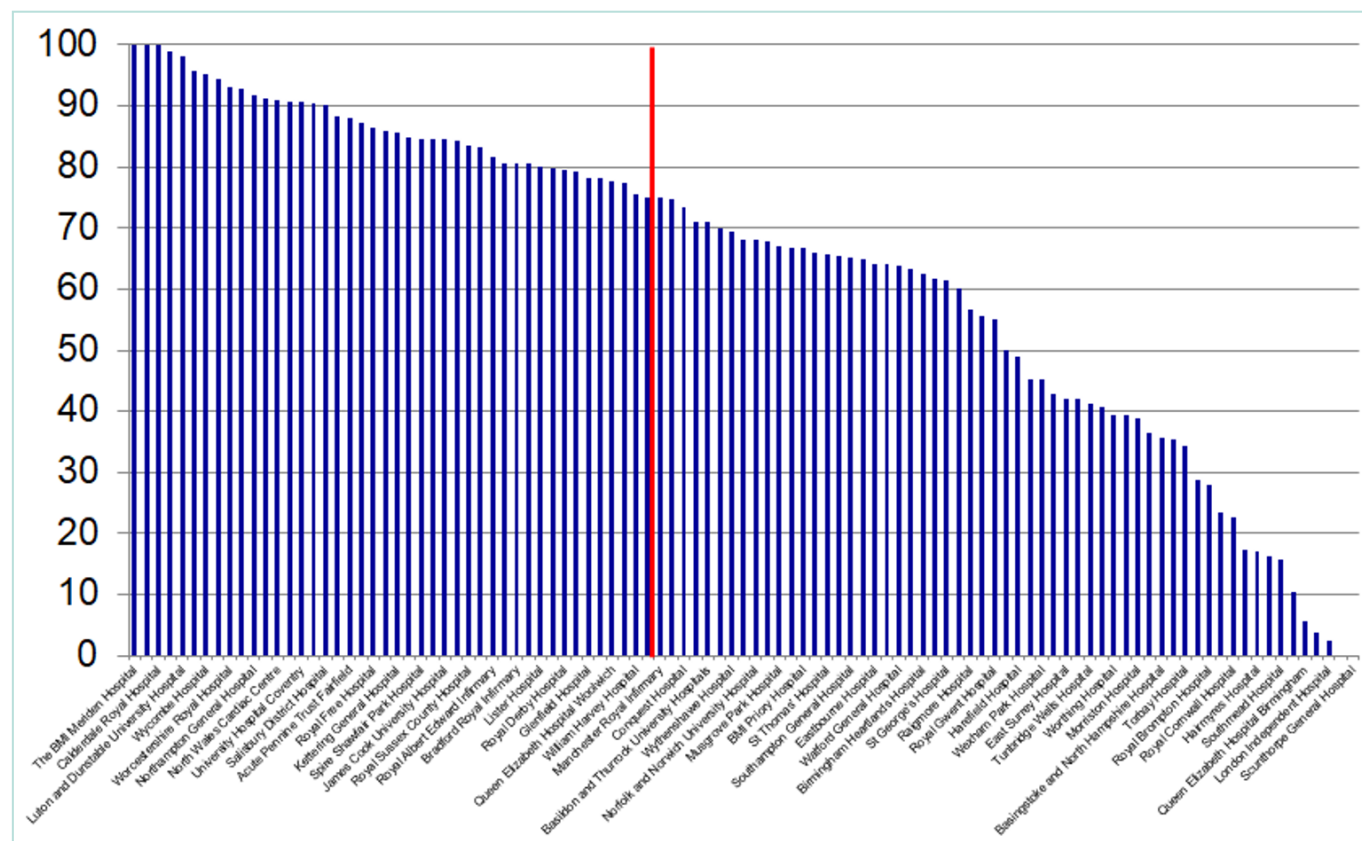
This approach requires a lot of planning and also delegation of the pre-assessment and some of the consent processes to specialist nurses who can also perform much of the post-assessment and follow-up of patients. There is considerable variance between hospitals, with some doing this routinely and

others not offering this service at all [Figure 3.20]. Those not meeting the standard can learn from the hospitals that have pioneered this method of service delivery in the UK.

**Figure 3.19:** Proportion of elective PCI performed as a day case, 2015 to 2018/19 (from NAPCI report)



**Figure 3.20:** Proportion of elective PCI performed as a day case by hospital, 2018/19 (from NAPCI report)



[Hospitals to the right of the red line have not achieved the target of ≥75% of all elective cases.]

# CONCLUSIONS

Before the COVID-19 pandemic, we had seen progressive improvements in a range of audit measures and this year's reports demonstrate many of these. For some (for example, use of radial access, use of drug-eluting stents during primary PCI) a ceiling has almost been reached. For other metrics, there is still room for considerable progress. For some of these, a sticking point appears to have been reached – as with the desire to offer early angiography to patients with NSTEMI, or the need to refer to cardiac rehabilitation. For one or two (for example, Call-To-Door times for patients with ST-elevation myocardial infarction), the trends are in the wrong direction.

Above all, we continue to see too much variance between individual hospitals in many of the things we measure through the NCAP audit. Whilst this is very concerning, as it is not equitable for patients and will inevitably serve to worsen inequalities, it does offer the immediate potential for improvement. Those hospitals whose performance is below the set standards can and must learn from those who perform best in delivering some of the best cardiovascular care in the world.

In redesigning cardiovascular services post-COVID-19, it is a priority for system leadership at local levels to take a systematic approach in understanding where the problems are in their area and then working together as an integrated system to reach the set standards. The NCAP data enable them to do this and provides the guiding principles and QI tools and resources to plan and make the necessary changes.

In each of the six NCAP Domain Reports, we provide background data on what is happening nationally in terms of numbers of urgent admissions (for patients with a heart attack or heart failure) or specific procedures being done, whether on an elective, urgent or emergency basis. Then, for each domain, there is a focus on a number of key metrics with details of trends over time and variances between hospitals. Recommendations are provided so that improvements in delivery can be made. These are also summarised in our key messages and our line-of-sight tables.

Each year, the six NCAP sub-specialty domains within the NCAP review current standards and the latest best practice to ensure that we capture relevant data through the audit. QI metrics are proposed where we see room for improvement and new audit measures are introduced accordingly. Significant changes to datasets can take time to implement, not least because hospitals use different IT solutions for the collection of data and in many cases these changes have to be implemented

by third-party vendors of such systems. We continue to explore options to speed this process.

We have reported here on clinical care delivered between 2016 and 2019. Since then, the NHS has had to meet the challenge of the COVID-19 pandemic, the impacts of which will be far-reaching. NICOR's special report<sup>1</sup> highlights the huge effects on admissions and numbers of procedures offered and spells out the level of disruption to our specialty. Work will be needed to understand better the impacts of case mix so as to prioritise the most urgent cases. There will also be a need for collaboration to deal with issues of staffing, capacity and job plans. It will take time to get teams fully back together after staff were asked to perform other duties during the acute phase.

For the NCAP, as well as all the other national clinical audits, the COVID-19 crisis underscores the importance of the contemporaneous collection, analysis and reporting of data on a nationwide basis to inform timely decision-making in healthcare. National longitudinal and integrated datasets are enormously valuable in responding effectively to an immediate public emergency as well as supporting every-day decision-making in the NHS.

This value has been hugely amplified by strengthened collaboration between data partners, with work to transform analytical processes and streamline information governance, all of which is better enabled by the rapid availability of contemporary data. These gains from the COVID-19 response should not be lost and our aim is to embed them in the future ways of working for cardiovascular audit and QI.

Of course, there are trade-offs to be made between the speed at which data can be made available and the value of data to building understanding, shaping policy and QI and taking decisions. Contemporary data are improved by ensuring they are complete, validated, combined with other datasets and interpreted correctly while some value is lost because of the time lag to report it. 'Rapid data', as we would term it, maximises the overall value by using continuous data collection and optimising the effort around completeness, validation, integration and interpretation based on the type of metric [Figure 4.1].



**Figure 4.1:** Using continuous national data collection to deliver 'rapid data' of maximum value



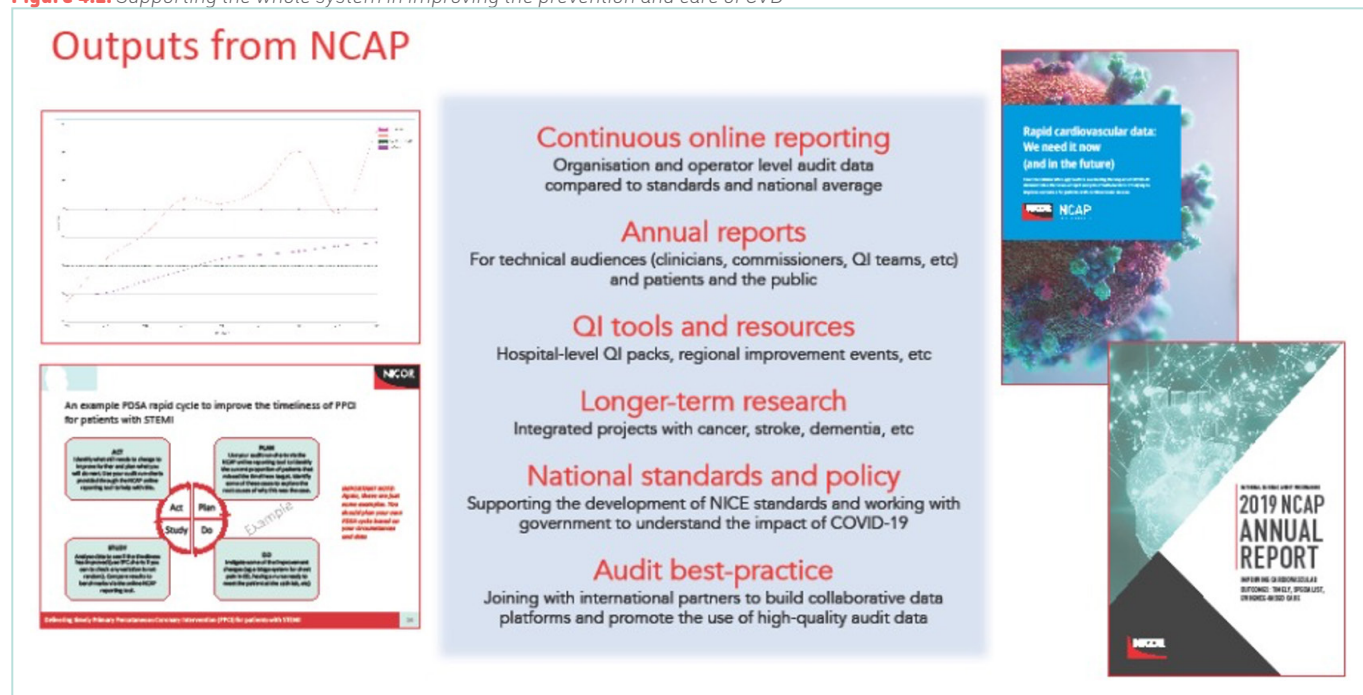
So, for certain key outputs of the national audit programme, in particular outcome measures, it is essential to have professional engagement in a validation process that ensures both data completeness and accuracy and, where appropriate, provides enough time to make case mix adjustments. For many other data metrics, such as the type of treatment a patient received or its indication, a time-consuming validation process may add only limited value.

Consequently, NICOR's aim is to allow hospitals the ability to track continuously their own performance on these process

metrics and to see how they perform against accepted standards, national averages and benchmark centres. This function can only work if data are entered and submitted to NICOR rapidly, using contemporaneous direct data entry, or with data uploads ideally on a weekly basis.

By investing in our ability to turn rapid data into useful information for all our stakeholders, NICOR is committed to developing further the range of outputs that will help improve the prevention and care for CVD across the UK and internationally [Figure 4.2].

**Figure 4.2:** Supporting the whole system in improving the prevention and care of CVD



# REFERENCES

1. Rapid cardiovascular data: we need it now (and in the future). <https://www.nicor.org.uk/covid-19-and-nicor/nicor-covid-19-report/>
2. NHS Long Term Plan. <https://www.longtermplan.nhs.uk/>
3. NHS Five Year Forward View. <https://www.england.nhs.uk/five-year-forward-view/>
4. Sedlis SP, Hartigan PM, Teo KK, Maron DJ, Spertus JA, Mancini GBJ, Kostuk W, Chaitman BR, Berman D, Lorin JD, Dada M, Weintraub WS, Boden WE for the COURAGE Trial Investigators. Effect of PCI on Long-Term Survival in Patients with Stable Ischemic Heart Disease. NEJM 2015; 373:1937-46 DOI: 10.1056/NEJMoa1505532
5. Maron DJ, Hochman JS, Reynolds HR, Bangalore S, O'Brien SM, Boden WE, Chaitman BR, Senior R, López-Sendón J, Alexander KP, Lopes RD, Shaw LJ, Berger JS, Newman JD, Sidhu MS, Goodman SG, Ruzylo W, Gosselin G, Maggioni AP, White HD, Bhargava B, Min JK, Mancini GBJ, Berman DS, Picard MH, Kwong RY, Ali ZA, Mark DB, Spertus JA, Krishnan MN, Elghamazy A, Moorthy N, Hueb WA, Demkow M, Mavromatis K, Bockeria O, Peteiro J, Miller TD, Szwed H, Doerr R, Keltai M, Selvanayagam JB, Steg PG, Held C, Kohsaka S, Mavromichalis S, Kirby R, Jeffries NO, Harrell FE, Rockhold FW, Broderick S, Ferguson TB, Williams DO, Harrington RA, Stone GW, Rosenberg Y for the ISCHEMIA Research Group. Initial Invasive or Conservative Strategy for Stable Coronary Disease. NEJM 2020; 382:1395-1407. DOI: 10.1056/NEJMoa1915922
6. Smeeth L, Thomas SL, Hall AJ, Hubbard R, Farrington P, Vallance P. Risk of Myocardial Infarction and Stroke after Acute Infection or Vaccination. NEJM 2004;351: 2611-18
7. Cardiothoracic surgery. GIRFT Programme National Specialty Report 2018. <https://gettingitrightfirsttime.co.uk/cardiothoracic-surgery-report/>
8. Ghoreishi M, Sundt TM, Cameron DE, et al. Factors associated with acute stroke after type A aortic dissection repair: An analysis of the Society of Thoracic Surgeons National Adult Cardiac Surgery Database. J Thorac Cardiovasc Surg. 2020;159(6):2143-2154.e3. doi:10.1016/j.jtcvs.2019.06.016
9. Bottle A, Mariscalco G, Shaw MA, et al. Unwarranted Variation in the Quality of Care for Patients With Diseases of the Thoracic Aorta. J Am Heart Assoc. 2017;6(3):e004913. Published 2017 Mar 14. doi:10.1161/JAHA.116.004913
10. Conzelmann LO, Weigang E, Mehlhorn U, et al. Mortality in patients with acute aortic dissection type A: analysis of pre- and intraoperative risk factors from the German Registry for Acute Aortic Dissection Type A (GERAADA). Eur J Cardiothorac Surg. 2016 Feb;49(2):e44-52. doi: 10.1093/ejcts/ezv356.
11. Wu J, Mamas M, Rashid M, Weston C, Hains J, Luescher T, de Belder MA, Deanfield JE, Gale CP. Patient response, treatments and mortality for acute myocardial infarction during the COVID-19 pandemic. Eur Heart J: Qual Care Clin Outcomes 2020 Jul30;qcaa062. <https://doi.org/10.1093/ehjqcco/qcaa062>

THE NCAP AUDIT HAS A NUMBER OF DEVELOPMENT OBJECTIVES FOR THE COMING 12 MONTHS.

We  
will work with our  
Patient Representative  
Group to ensure the  
programme is focussed on  
the needs of patients and  
carers and works towards  
reducing inequalities

Our  
new data tools will  
be rolled out to all  
domains of the NCAP –  
helping hospitals to see their  
own data, improve the  
validation process, and to  
allow them to develop  
their own data  
queries

We  
will develop  
additional tools to  
help regional quality  
improvement  
teams

We will work on  
new ways of  
providing hospitals their  
own data summary  
statistics over agreed  
time periods

We  
will work with  
our stakeholders  
to provide reports  
at regional level

We  
will work with our  
Data Controllers to  
stream line linkage to other  
datasets (especially for HES  
and ONS data and to assist  
researchers with their  
applications for national  
data)

The NCAP will  
continue to work with  
academic partners and other  
stakeholders to ensure the  
programme helps answer  
questions of public concern and  
to develop novel methods of  
running clinical trials.

# SUMMARY OF RECOMMENDATIONS FROM THE NCAP

## National Congenital Heart Disease Audit (NCHDA)

1. Hospitals not achieving the desired data quality standard should improve data completeness and quality. This may require a review of staffing, IT infrastructure and level of engagement between local clinical leads and audit teams.
2. Hospitals should aim to increase the rate of antenatal diagnosis of conditions requiring intervention in the first year. Individual congenital heart disease networks should take responsibility for improving outcomes and play a pivotal role in reviewing staffing, infrastructure, education and training.

## Myocardial Ischaemia National Audit Project (MINAP)

3. 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 to provision of primary PCI. Individual case reviews may play a part in quality improvement. Ambulance Trusts should review their local trends and consider methods to improve Call-To-Door times.
4. In the management of heart attack (both STEMI and NSTEMI), concerning the performance of pre-discharge echocardiography, staff in those hospitals with lower rates of provision 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; where patients are discharged early to another hospital, there must be a clear request to provide this service at the receiving hospital.
5. Concerning admission to a cardiac ward, where possible, patients with a heart attack (both STEMI and NSTEMI) should be treated on a cardiac ward, but outreach services should be provided for those nursed elsewhere. Those hospitals not reaching recommended levels should review their systems and bed allocations to allow patients the benefits of access to cardiac care.
6. Those hospitals with low rates of cardiology involvement for patients with a heart attack should undertake a review of their data collection processes - to ensure that the data submitted reflect practice. If they do, then 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.
7. In the management of NSTEMI, concerning performance of a coronary angiogram, staff in those hospitals with low rates of angiography in eligible patients should review their systems of managing NSTEMI.

Commissioning Groups in those areas where hospitals do not meet the standards for the use of pre-discharge angiography within 72 hours of admission to hospital should set up a process review and quality improvement programme involving all stakeholders to change performance. There should be tight performance management of the entire process, with consideration of streamlining the identification of appropriate patients and their referral for angiography and possible intervention. Commissioning Groups should consider all options to improve performance including that of decommissioning services in centres with consistently poor performance and redirecting patients to more responsive centres.

8. In the management of heart attack (both STEMI and NSTEMI), staff in hospitals not meeting the standard for the prescription of all secondary prevention medications prior to discharge should first explore data completeness and ensure that their data are a valid representation of practice. If the reported performance is confirmed they should design and implement a quality improvement programme. This might include the introduction of a discharge pro forma or checklist, the involvement of a specialist hospital pharmacist or 'ACS Nurse Specialists'. Regions, networks and commissioning

groups should facilitate peer-support activities through a local collaborative whereby highly-performing hospitals or Trusts support those hospitals consistently returning poor performance in this metric.

9. As part of the review of prescription of secondary prevention medications prior to discharge, specific attention should be made to the prescription of aldosterone antagonists for patients with impaired left ventricular function.
10. Staff in hospitals not meeting the standards for referral of patients to cardiac rehabilitation following a heart attack (both STEMI and NSTEMI) should review the provision of services (including structural/staffing issues) and the effective and early identification of patients who might benefit.

## National Audit of Percutaneous Coronary Intervention (NAPCI)

11. A letter is sent from BCIS clinical standards group to any centre whose total PCI numbers fall below 200 for 3 successive years. Regional commissioners may need to discuss with local providers.
12. A focus is needed to reverse the deterioration in ambulance response times for patients with ST-elevation myocardial infarction. 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 hospitals that perform well to see what lessons can be learned.
13. It is important that many centres improve the rapidity of NSTEMI patient access to invasive cardiology investigation and treatment for patients.
14. There has been a substantial shift in practice to the use of radial 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.
15. To help introduce day case procedures for patients undergoing elective PCI, hospitals should seek to modify their pathways and ward structures to reduce unnecessary overnight stays for patients.
16. 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.

## National Adult Cardiac Surgery Audit (NACSA)

17. Hospitals not reaching the target for patients undergoing urgent CABG within 7 days of 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.
18. Hospitals not reaching the target for day-of-surgery admission for elective CABG 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.
19. 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.
20. Patients should be offered surgery in neighbouring hospitals with shorter waiting times if reductions in waiting times cannot be demonstrated.

21. 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.
22. Hospitals with prolonged post-operative length of stays 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.
23. Commissioning bodies and the professional societies (SCTS and BCIS) should produce guidance on types of AVR implantation in young (<60) patients.
24. In patients <60 years old undergoing surgical AVR the benefit of avoiding anticoagulation has to be carefully weighed against the high likelihood of needing further intervention in the future (either by redo surgery or TAVI) and the cost to the NHS and risk to the patient that is involved in the longer term. Bioprosthetic aortic valve implantation is not recommended in patients <60 years old who are likely to need anticoagulation for a reason other than for their prosthetic valve.
25. Regions and units need to collect and audit data on all patients presenting with aortic dissection, not just those undergoing emergency surgery.
26. In regions or units where there are concerns about outcomes or case numbers, a system-level review should be undertaken for patients requiring surgery for aortic dissection, taking into account the need to optimise the entire pathway of care.

## National Heart Failure Audit (NHFA)

27. 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.
28. Hospitals should ensure that high-risk cardiac patients have access to cardiology wards.
29. 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.
30. Hospitals that do not have a Clinical Lead for Heart Failure should appoint one: ideally a Consultant Cardiologist.
31. 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.
32. Further research is required into the association between length of stay, severity of disease and outcomes, especially around the value of short periods of hospitalisation for initiation of care supported by community services.
33. 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.
34. 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 great access and uptake for heart failure patients.



## National Audit of Cardiac Rhythm Management (NACRM)

35. Regions with low volume centres should ensure that these centres comply fully with the data entry requirements of the audit. Reasons for the low level of activity should be understood and decisions made about how centres can reach the desired standards. In some cases, it may be appropriate to decommission a low volume centre.
36. Hospitals with low volume operators should ensure accurate documentation of who performs procedures and ensure job plans and decisions about sub-specialisation are reviewed.
37. Hospitals with poor data compliance should ensure all members of the local CRM team comply with the requirements of the national audit dataset. Local training on the importance of each data field may be required.
38. Hospitals with high re-intervention rates following device implants should review their cases to examine the factors involved and to determine means by which these can be lowered.
39. Hospitals with high re-intervention rates following ablation procedures should review their cases to examine the factors that are involved and to determine whether these can be reduced.

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This report is available online at <https://www.nicor.org.uk/national-cardiac-audit-programme/>