NATIONAL CARDIAC AUDIT PROGRAMME

NATIONAL ADULT CARDIAC SURGERY AUDIT (NACSA)

2022 Summary Report

(2018/19–2020/21 data)

NICOR

National Institute of Cardiovascular Outcomes Research (NICOR)

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

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Society of Cardiothoracic Surgeons in Great Britain & Ireland

The SCTS is an affiliated group of the Royal College of Surgeons of England and has charitable status. The Charity's objects are to enable surgeons to achieve and maintain the highest standards of surgical practice and patient care.

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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/

This report was published on 16 June 2022

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NACSA AT A GLANCE

Data from the three-year period April 2018 to March 2021

The number of operations fell 34% in 2020/21 with only 19,333 adult heart operations performed. Adult surgery activity reduced by 80% and 60% during the two peaks of coronavirus disease (COVID-19) admissions. Around 10,000 patients across the UK did not have the heart surgery they should have done.

Case volumes are important factors both in maintaining good consultant performance and in the training of new surgeons.

- **The average consultant performed only 75 operations in 2020/21, down from 140 in 2013/14.**
- **Surgeons in training performed 28% fewer operations than in the previous year.**

Coronary Artery Bypass Grafts (CABG)

Coronary artery bypass graft surgery is the most common type of cardiac surgery.

- **Reoperation for bleeding rates remained low at 1.78%.**
- **Stroke rates fell to 0.6%.**
- **The rate of the most serious type of sternal wound infection was very low at 0.14%.**
- **There was a 21% increase in waiting times for elective CABG in England (to 125 days), a 61% increase in Northern Ireland (to 197 days), and a 94% increase in Wales (to 252 days). Only 5 NHS hospitals met the 84-day target.**
- **Average waiting time for urgent CABG across the UK decreased from 11 to 10 days (though only 3 hospitals met the 7-day target).**

Changes in case mix

65.1 **the mean age (years) of patients undergoing surgery was down from 66.6 in 2019/20.**

25.3% **the proportion of females undergoing surgery was down from 27.4% in 2013/14.**

Aortic valve interventions

Aortic Valve Replacement (AVR) surgery can be carried out in isolation or as part of a combined procedure (usually with coronary artery bypass graft (CABG) surgery). Transcatheter Aortic Valve Implantation (TAVI) is increasing year on year and is preferred in older patients.

- **Total transcatheter aortic valve implantation (TAVI) and aortic valve replacement (AVR) procedures fell by 17%. There was an overall drop of more than 2,000 aortic valve procedures in 2020/21.**
- **There was an 11% increase in TAVI which partly made up for the fall in surgical procedures.**
- **The ratio of TAVI to AVR rose from 1.2:1 to 2.3:1.**

Executive summary

This report summarises the outputs of the National Adult Cardiac Surgery Audit (NASCA), which is a part of the National Cardiac Audit Programme (NCAP). It includes every adult patient undergoing heart surgery in England, Wales and Northern Ireland over the three years between 2018/19 to 2020/21. The report focuses on a number of specific quality improvement (QI) metrics derived from national and/or international standards and guidelines.

The effects of the coronavirus disease (COVID-19) pandemic on heart surgery started to be felt in late March 2020. The pandemic has challenged the capacity of healthcare systems around the world, including substantial disruptions to cardiovascular care across key areas of healthcare delivery. This report largely focusses on the changes within adult cardiac surgery that were seen during this period.

WHERE THINGS WORSENED / CAUSES FOR CONCERN	
A big fall in adult heart surgery operations	Number of operations performed down 34% in 2020/21 with only 19,333 adult heart operations. Around 10,000 patients across the UK did not have the heart surgery they should have done. Adult surgery activity reduced by 80% and 60% during the two peaks of COVID-19 admissions. Reduction in activity varied hugely between cardiac centres with drops ranging between 7% and 53%.
Increasing waiting times for elective coronary artery bypass grafting (CABG)	A 21% increase in waiting times in England (to 125 days), 61% increase in Northern Ireland (to 197 days), and 94% increase in Wales (to 252 days). Only 5 NHS hospitals met the 84-day target.
Day-of-Surgery Admission (DOSA) rates fell	DOSA rates down by over 50% in 2020/21 to only just over 8% of elective admissions. No hospital achieved the target in 2020/21.
Volume of coronary artery interventions reduced	Total percutaneous coronary intervention (PCI) and CABG procedures fell by 13%. The ratio of PCI to CABG rose from 7:1 to 10:1.
Number of aortic valve interventions down	Total transcatheter aortic valve implantation (TAVI) and aortic valve replacement (AVR) procedures fell by 17%. There was an overall drop of more than 2,000 aortic valve procedures. There was an 11% increase in TAVI which partly made up for the fall in surgical procedures. The ratio of TAVI to AVR rose from 1.2:1 to 2.3:1.
Significant reduction in consultant case volumes	The average consultant performed only 75 operations in 2020/21, down from 140 in 2013/14.
Surgical training substantially reduced	Surgeons in training performed 28% fewer operations than in the previous year.

WHERE LEVELS OF CARE WERE MAINTAINED OR REMAINED BROADLY STABLE	
Complications following CABG surgery still low	Reoperation for bleeding rates remained low at 1.78%. Stroke rates fell to 0.6%. The rate of the most serious type of sternal wound infection was very low at 0.14%.
Crude mortality rates rose slightly	Overall crude mortality rate (after all adult cardiac operations combined) slightly higher at 3.28%, reflecting changes in case mix.
WHERE THINGS IMPROVED / PRACTICES CHANGED	
Waiting times for urgent CABG down slightly	Average waiting time across the UK decreased from 11 to 10 days (though only 3 hospitals met the 7-day target).

Summary of recommendations

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

   Units not achieving the target should consider ring-fencing level 3 intensive therapy unit (ITU) facilities, and seek to make greater use of day-of-surgery admissions (DOSA) and enhanced recovery after surgery (ERAS) to improve patient flows and outcomes.

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

2 Hospitals not reaching the target of urgent CABG performed within 7 days after coronary angiography should undertake a review of their processes to identify where delays occur and how these can be avoided. If necessary, advice should be sought from centres with evidence of the best performance. A quality improvement (QI) plan should be instigated to reduce delays.

   Units not achieving the target should consider ring-fencing level 3 ITU facilities, and seek to make greater use of enhanced recovery after surgery (ERAS) to improve.

3. Hospitals not reaching the 75% target of urgent CABG performed within 7 days of coronary angiography should undertake a review of their processes to identify where delays occur and how these can be avoided. If necessary, advice should be sought from centres with evidence of the best performance. A QI action plan should be instigated to reduce delays.

   Units not achieving the target should consider ring-fencing level 3 ITU facilities, and seek to make greater use of enhanced recovery after surgery (ERAS) to improve patient flows and outcomes.

4. Hospitals not reaching the DOSA target should undertake a review of their processes to identify the barriers to achieving this target (such as introducing pre-assessment clinics). If necessary, advice should be sought from centres with evidence of the best performance. A QI action plan should be instigated to achieve this target.

1 Introduction

Last year was a year like no other for patients undergoing cardiac surgery. The National Adult Cardiac Surgery Audit (NACSA) in the UK has been collecting data and reporting in one format or another since 1977, but never has one event had such a huge impact. We have been reporting steadily improving hospital and surgeon-specific outcomes since 2005. However, the COVID-19 pandemic has caused a major disruption to the provision of cardiac surgery.

This audit covers all adult patients that underwent heart surgery between April 2018 and March 2021 in the UK. The effects of the pandemic first began to be felt in cardiac surgical units in the last week or so of March 2020. It also includes some data in the years preceding 2018 to allow comparisons and demonstrate the longer term trends.

Sadly this is the first time in the history of the audit that Scottish hospitals have chosen to not directly take part and have not submitted data from April 2020. The data presented here for the UK as a whole is therefore purely for the other 3 UK nations. To allow yearly comparisons, all UK data prior to April 2020 has been recalculated with Scotland removed from the totals. The numbers seen in this report for earlier years will therefore be slightly different from those previously published.

We have chosen to concentrate largely on the effects of the COVID-19 pandemic within this main report, rather than just publishing all the usual outcome and quality improvement metrics. However, all these data and many other supplementary tables and graphs are published separately in an Appendix to this report giving a much larger picture of UK cardiac surgery than can be summarised here.

The rest of this report is structured as follows:

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

2 Principal impacts of the COVID-19 pandemic

2.1 A big fall in cardiac surgical operations

Across the UK, 2020/21 saw a 34% reduction in cardiac surgical operations compared to the previous year. The numbers of heart operations have been gradually falling for a while [Figure 2.1], but the total reduction from 2013 to 2020 was only 12%, from just over 33,000 to under 30,000. In stark contrast, only 19,333 operations were performed last year. Based on previous levels, just under 10,000 patients did not have heart surgery that should have been done across the UK.

The reduction in heart surgery due to COVID-19 has therefore been far more marked than for PCI. This is likely to reflect the larger proportion of emergency and urgent cases undergoing PCI, as these procedures have little requirement for ITU beds, which are essential for cardiac surgical patients. At the beginning of the pandemic intensive care facilities were in danger of being overwhelmed by the needs of COVID-19 patients and in some hospitals heart surgery stopped completely.

There was considerable uncertainty in the early weeks as to whether it was even safe to operate if patients had been exposed to COVID prior to an operation, or for how long surgery should be postponed. It is probable, too, that many patients usually treated by surgery, underwent interventional procedures instead. This would have reduced the pressure on ITU and cardiac surgical services, even if these treatments in the longer-term may be less effective.

Figure 2.1: Total cardiac operations each year in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]

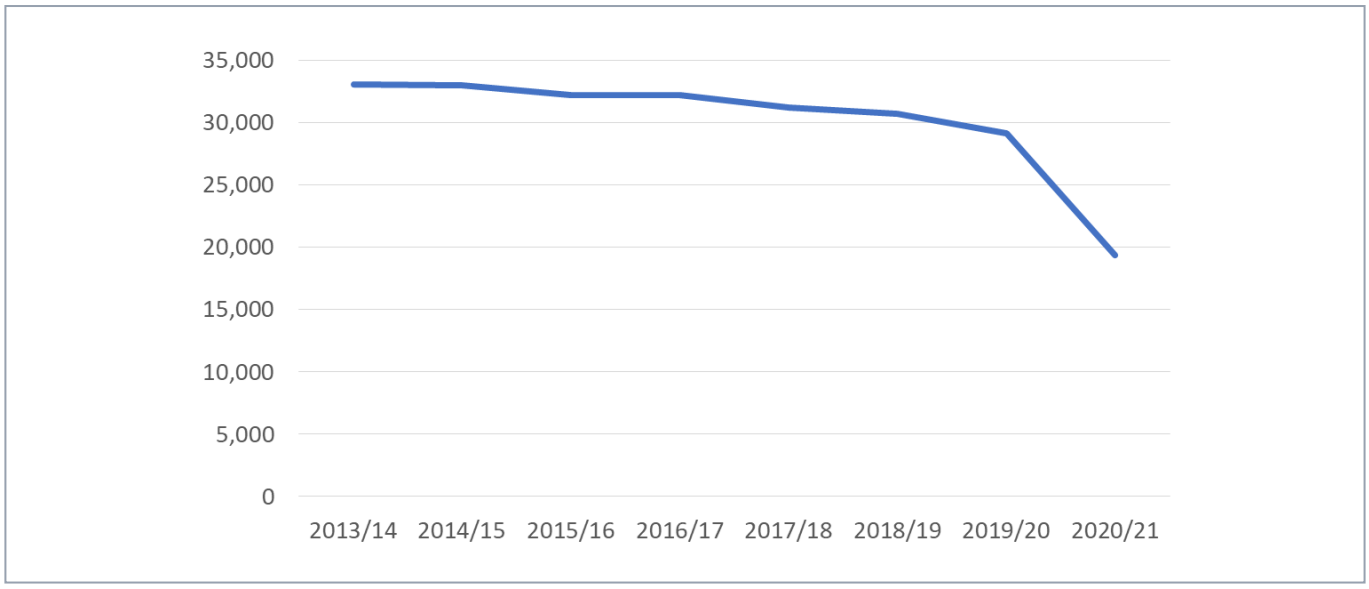
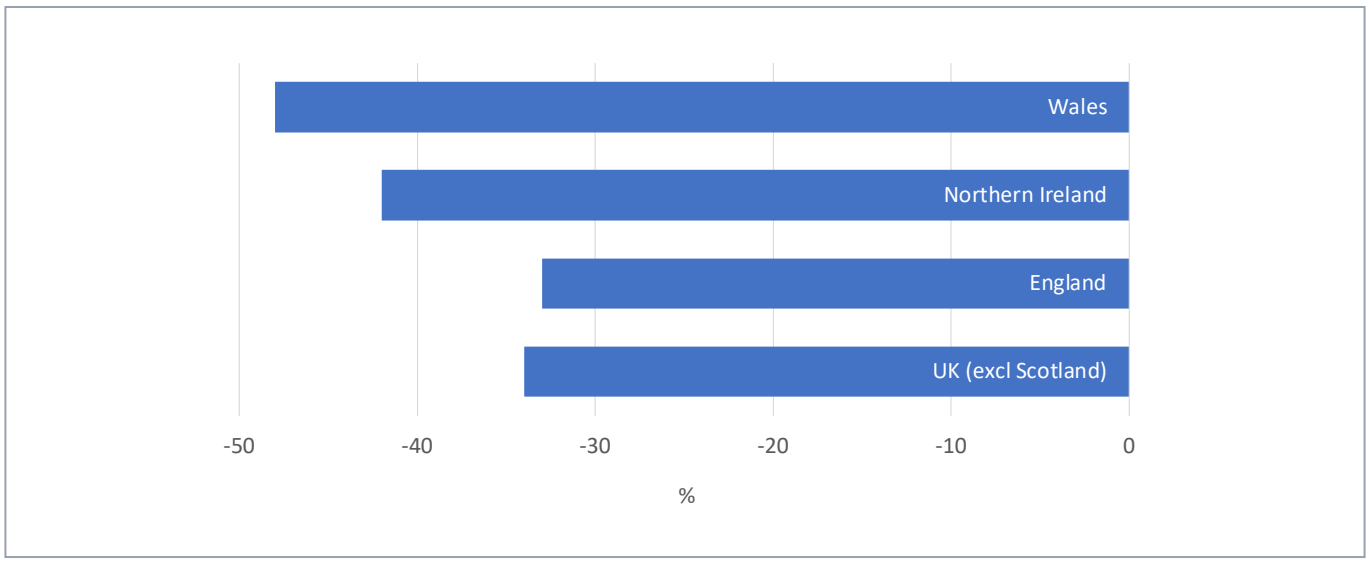


Figure 2.2: Percentage reduction in cardiac operations performed in 2020/21 (compared to 2019/20), UK and by country (excluding Scotland), [NACSA data]



At 48%, Wales had the biggest drop in the number of heart operations [Figure 2.2]. This compares to a 42% reduction in Northern Ireland and 33% in England. For comparison, PCI procedures in 2020/21 fell by 9.8% in the UK (see the NAPCI report). The largest fall in PCIs performed was in Northern Ireland (19.7%), followed by England (10.3%), with the least reduction in Wales (1.2%).

The effect on individual hospitals has varied markedly in terms of the amount of surgery that they were able to perform [Figure 2.3]. No NHS hospital managed to maintain its pre-pandemic throughput in 2020/21. Three hospitals managed to achieve 90% or more (all 3 of which do not have an A&E on site), whereas fifteen hospitals achieved less than 60% of their 2019/20 caseloads.

Figure 2.3: Reduction in cardiac operations (%) in 2020/21 (compared to 2019/20), by hospital [NACSA data]

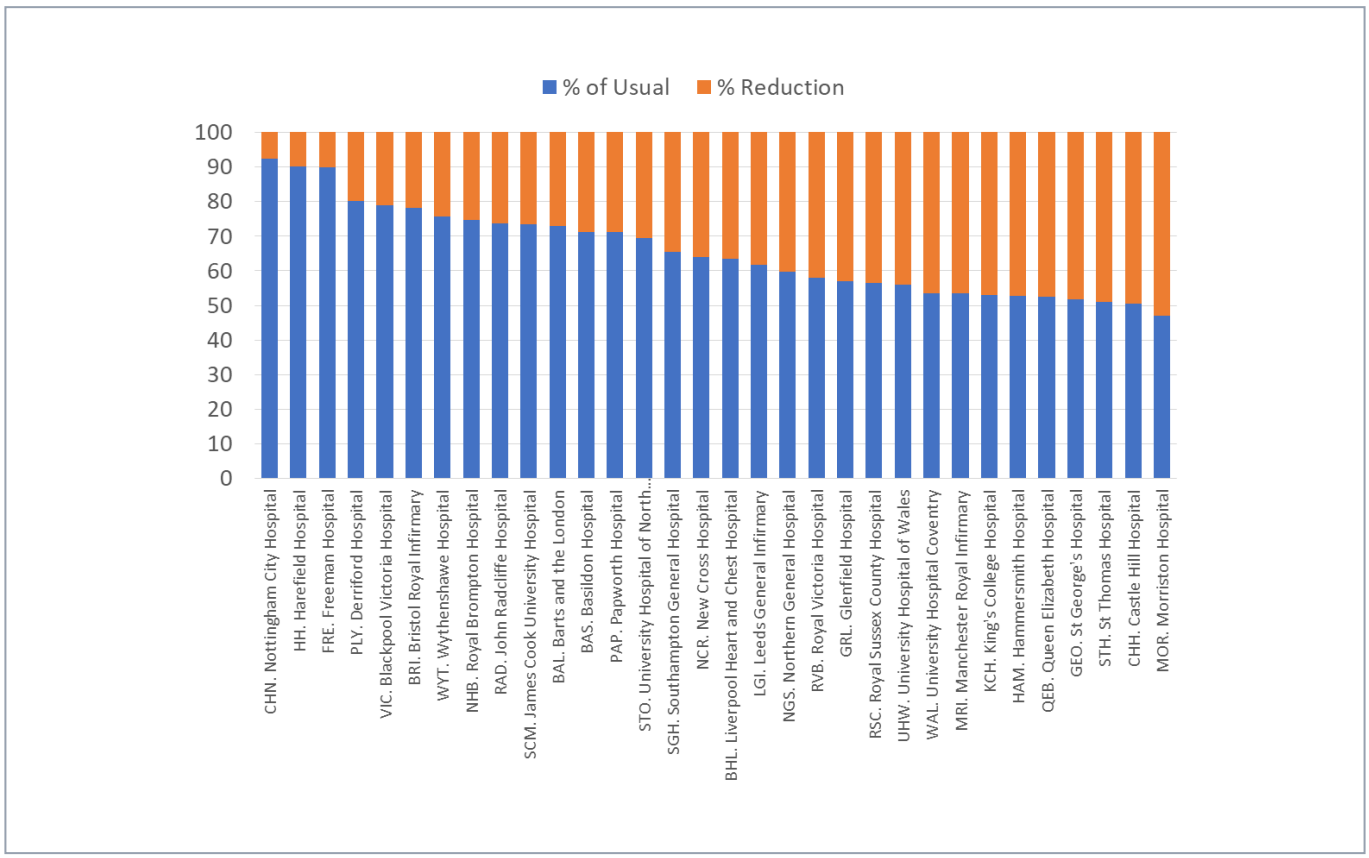
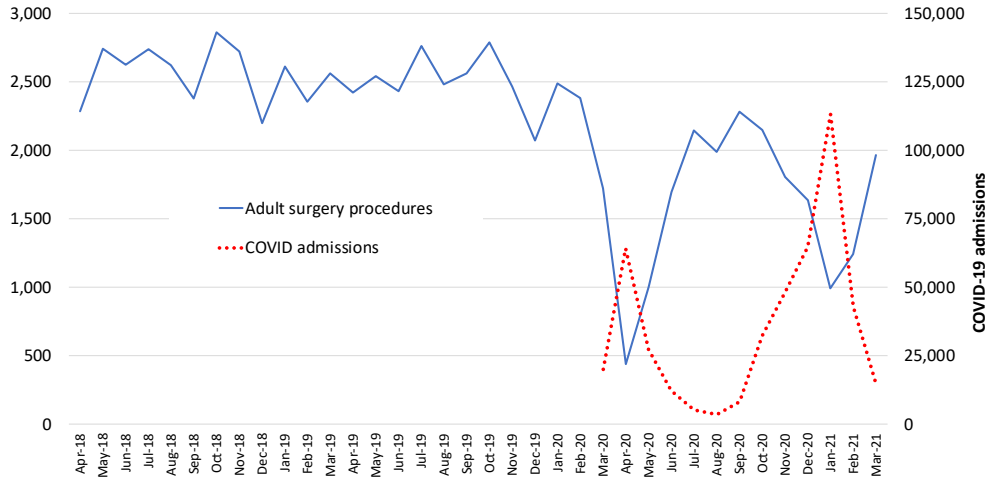


Figure 2.4: Total cardiac operations (excluding Scotland) by month against UK admission rates for COVID-19, 2018/19 – 2020/21 [NACSA data]



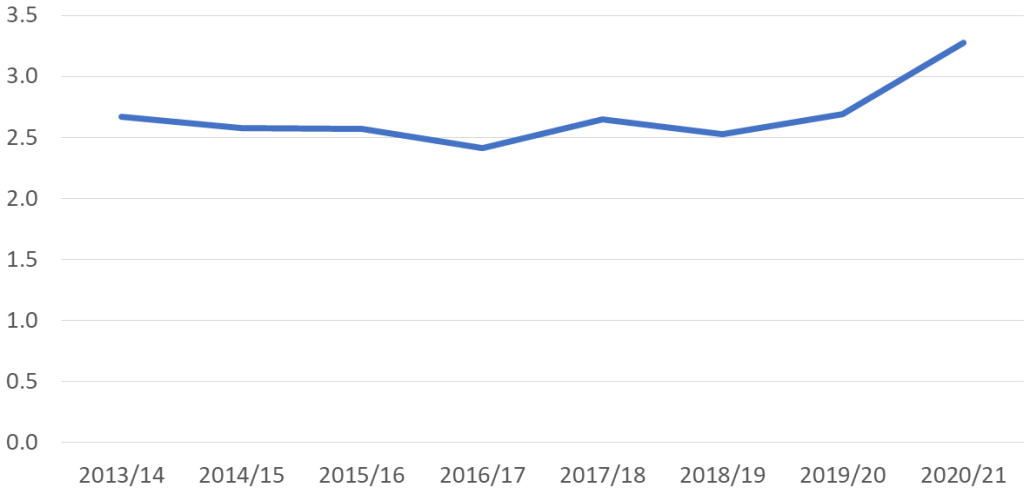
The impact of the rate of admissions of patients to hospital with COVID-19 on the numbers of heart operations performed is shown in Figure 2.4. Usually the rates of surgery per month fluctuate, often with a small drop in winter each year. However, as hospital admissions with COVID-19 spiked during the first and second waves of the pandemic, the numbers of heart operations declined.

Only 438 heart operations were performed across the UK in the month of April 2020, compared with a monthly average of around 2,500. The need for ITU beds almost exactly mirrored the rate of hospital admissions with COVID-19 during the year. The lack of ITU facilities for cardiac surgery during these times largely explains these dramatic drops at each peak.

2.2 Crude mortality increased

The crude mortality rate (unadjusted for risk) following heart surgery rose last year in the UK to 3.28% [Figure 2.5]. The mortality rate following heart surgery had been falling over the past 2 decades, although it had plateaued in recent years at just over 2.5%.

Figure 2.5: Crude mortality rate (%) following cardiac surgery (all procedures including emergencies) in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]

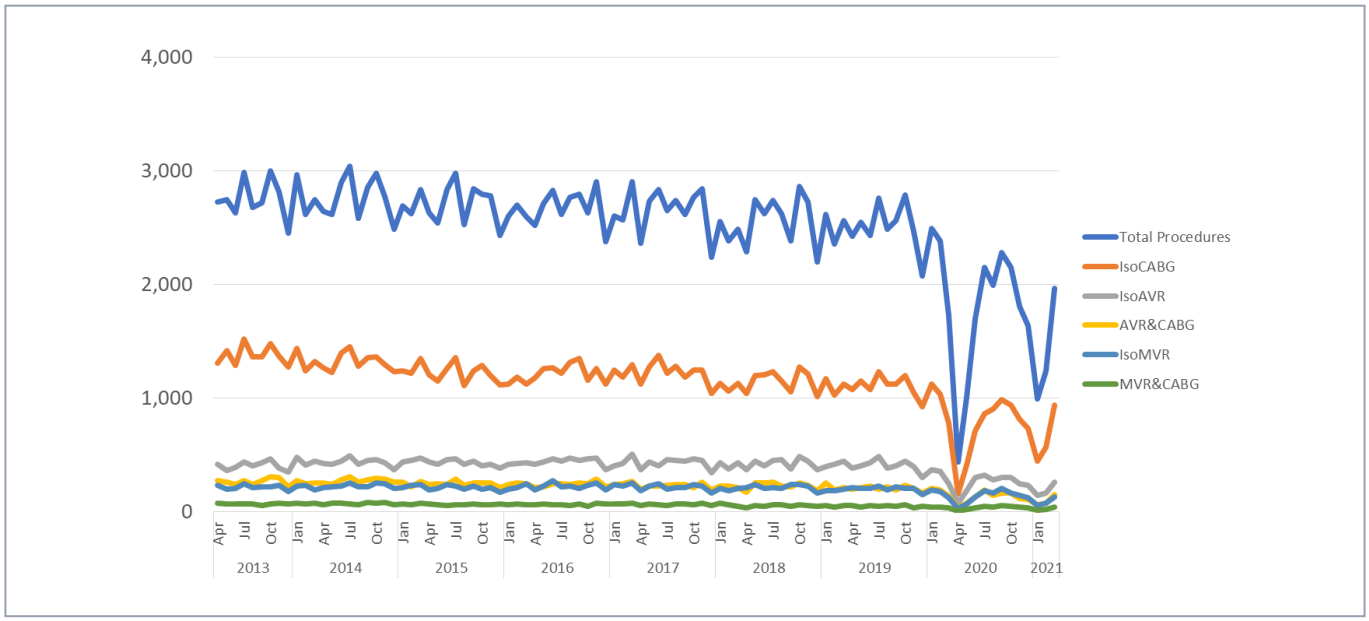


Some of these deaths in 2020/21 have been due to COVID, certainly in the early weeks of the pandemic, although it is not possible to quantify this from the data collected. Many cardiac units have reported patients dying with COVID-19 on ITU following their heart surgery.

However, the main reason for the increase seen is most likely due to the changing proportion of the types of operations performed with a reduction in elective surgery and the changing demographics of the patients being operated on. As the pandemic has continued, delays in treatment will also have resulted in patients being operated on later in their disease process, which also results in poorer outcomes. Future audits will need to monitor this.

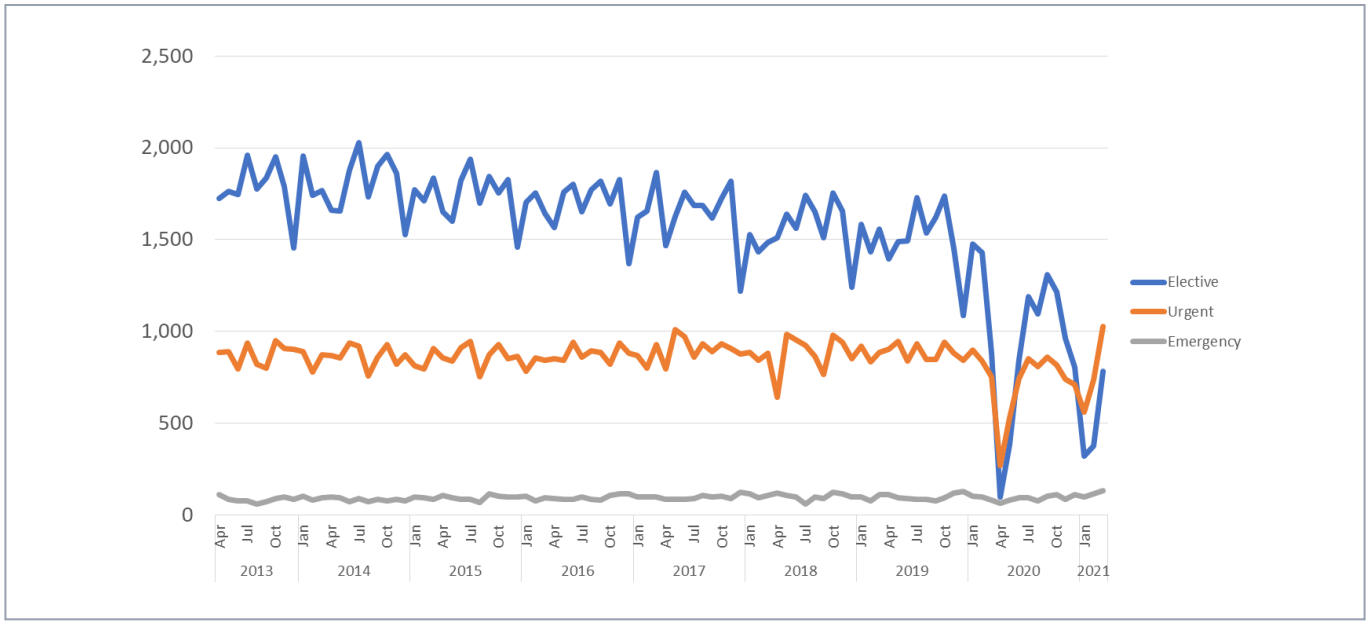
The changes in the types and urgency of heart operations performed are shown in Figure 2.6 and Figure 2.7.

Figure 2.6: Trends in monthly cardiac surgical activity by procedure type in the UK (excluding Scotland), 2013/14 – 2020/2 [NACSA data]



Legend: IsoCABG = isolated coronary artery bypass grafting (CABG); IsoAVR = isolated aortic valve replacement (AVR); AVR&CABG = combined AVR with CABG; IsoMVR = isolated mitral valve operation (replacement or repair) (MVR); MVR&CABG = combined MV operation with CABG

Figure 2.7: Trends in monthly cardiac surgical activity by operative urgency in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]



The drop in the total numbers of procedures during the first and second waves was seen across all the procedure types. The commonest procedure is usually CABG, but only 156 were performed across the UK in April 2020. A similar reduction was seen in valve surgery and in combined valve and CABG operations.

Elective cardiac surgery almost totally ceased in the first wave. Overall elective procedures fell from over 1500 per month pre-COVID to 780 per month in 2020/21.

Urgent surgery continued, but was greatly reduced. Urgent procedures fell from 875 per month to 720 per month in 2020/21.

Emergency procedures continued at the same rate before and during COVID (at around 96 procedures per month).

2.3 The volume of coronary revascularisation procedures was reduced

The total numbers of patients undergoing coronary revascularisation procedures by either CABG or PCI fell in 2020/21 by approximately 13% compared to the previous year [Figure 2.8]. However, there was a marked difference between CABG procedures that fell by 34%, compared to PCI procedures that fell by only 10%.

The ratio of patients having PCI compared to CABG has been gradually increasing since 2013/14, from around 5:1 up to 7:1 in 2019/20. However, due to COVID-19 this ratio jumped to nearly 10:1 in 2020/21.

The greater use of PCI relative to CABG will have greatly facilitated more rapid treatment of patients with coronary disease and will have avoided the need for patients to stay on ITU following their procedure. Whilst beneficial short-term during the crisis of the early waves of the pandemic, the long-term outcomes for patients that would normally have had CABG, but received PCI instead, may be less good.

Figure 2.8: CABG and PCI volumes in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]

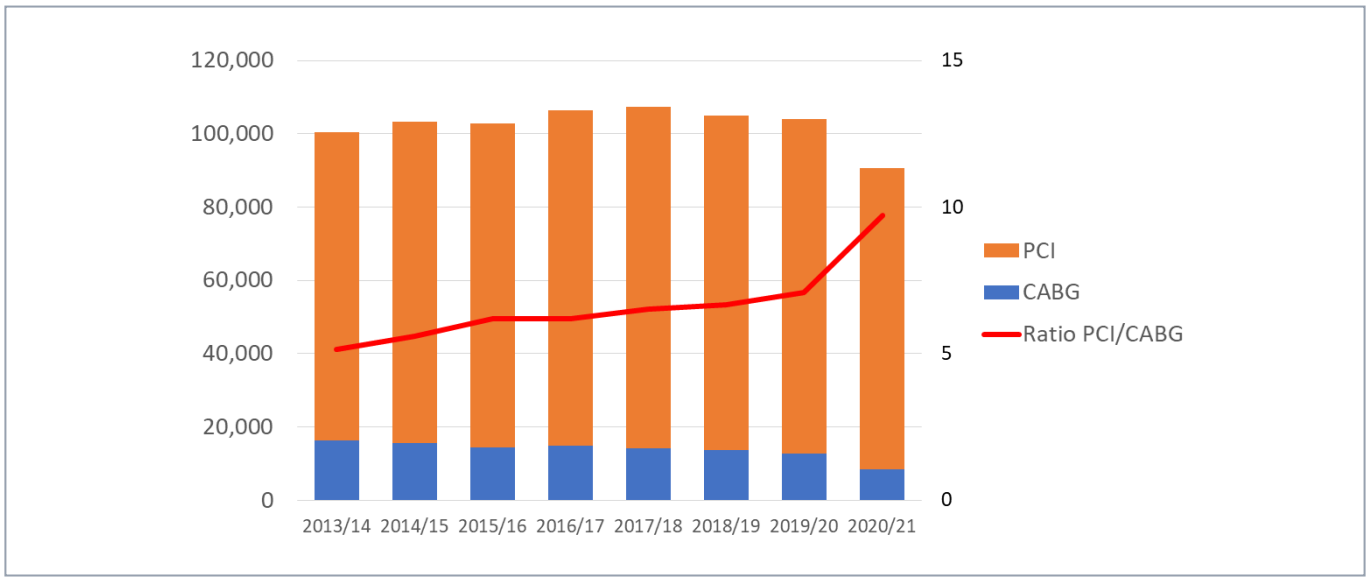
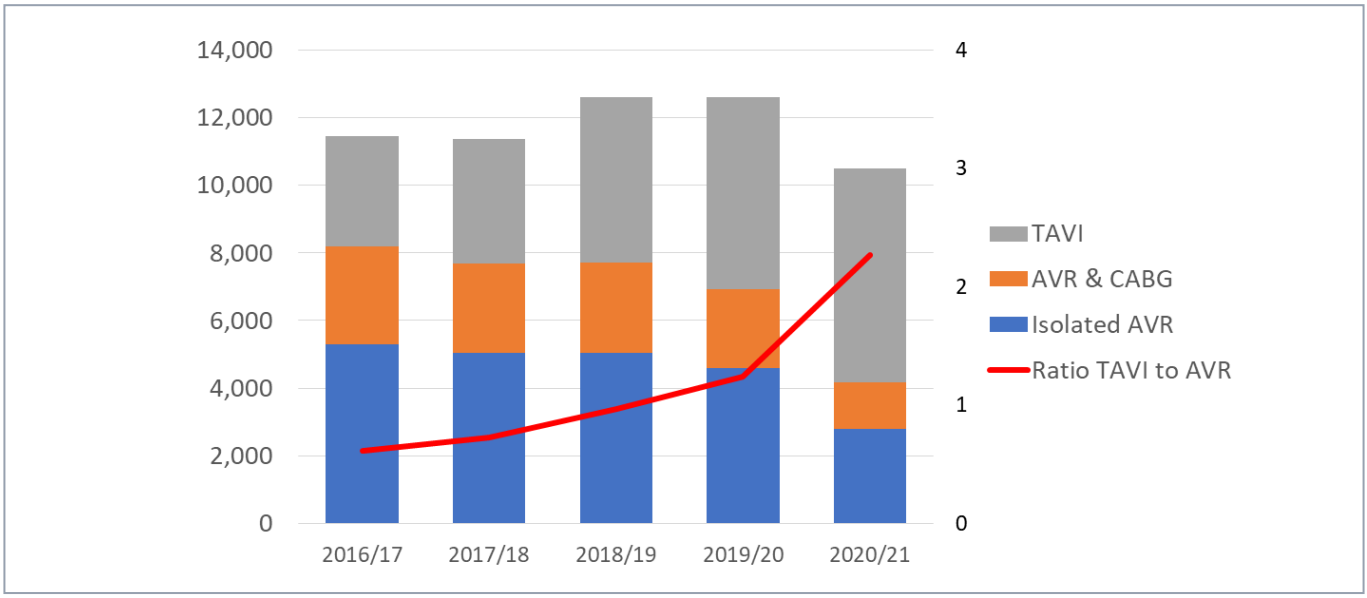


Figure 2.9: AVR and TAVI activity in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]



The total number of patients undergoing aortic valve procedures by either surgical AVR or TAVI in 2020/21 fell by nearly 17% compared to the previous year [Figure 2.9].

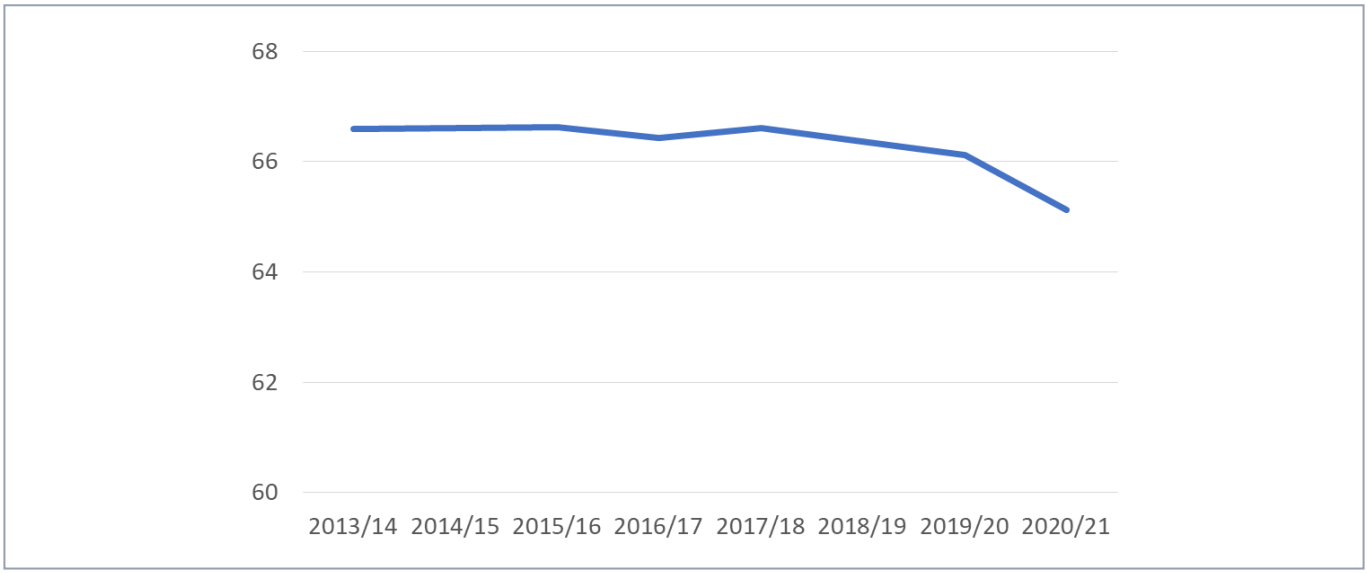
Most of these patients have aortic stenosis which once it becomes symptomatic usually has a poor prognosis without intervention. Surgical procedures (either isolated AVR or combined AVR&CABG) both fell by around 40%.

However, TAVI increased by 11% during this time. As the indications for TAVI have broadened in recent years the numbers performed have rapidly increased, to the point where in 2019/20 they overtook isolated AVR numbers for the first time. This trend has dramatically accelerated during the pandemic, with the ratio of TAVI to AVR last year rising to nearly 2.3:1.

2.4 Average age of patients lowered slightly

The age of patients having heart surgery had been slowly increasing over the last 2 decades, but plateaued since 2013/14 and dropped 1.5 years to just over 61 in 2020/21 [Figure 2.10]. In Wales patients have been 2 years older compared to England or Northern Ireland, but last year Welsh patients had the same average age as the rest of the UK.

Figure 2.10: Age (mean, years) of patients undergoing cardiac surgery (all procedures) in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]



2.5 Proportionately fewer females are having cardiac surgery

The NACSA report in 2021 identified a drop in the proportion of older women having heart surgery over the last 5 years.[1] This trend has continued with the proportion of women having surgery falling from 28.1% in 2015/16 to 25.3% in 2020/21 [Figure 2.11 and Figure 2.12].

Figure 2.11: Proportion (%) of male patients undergoing cardiac surgery (all procedures) in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]

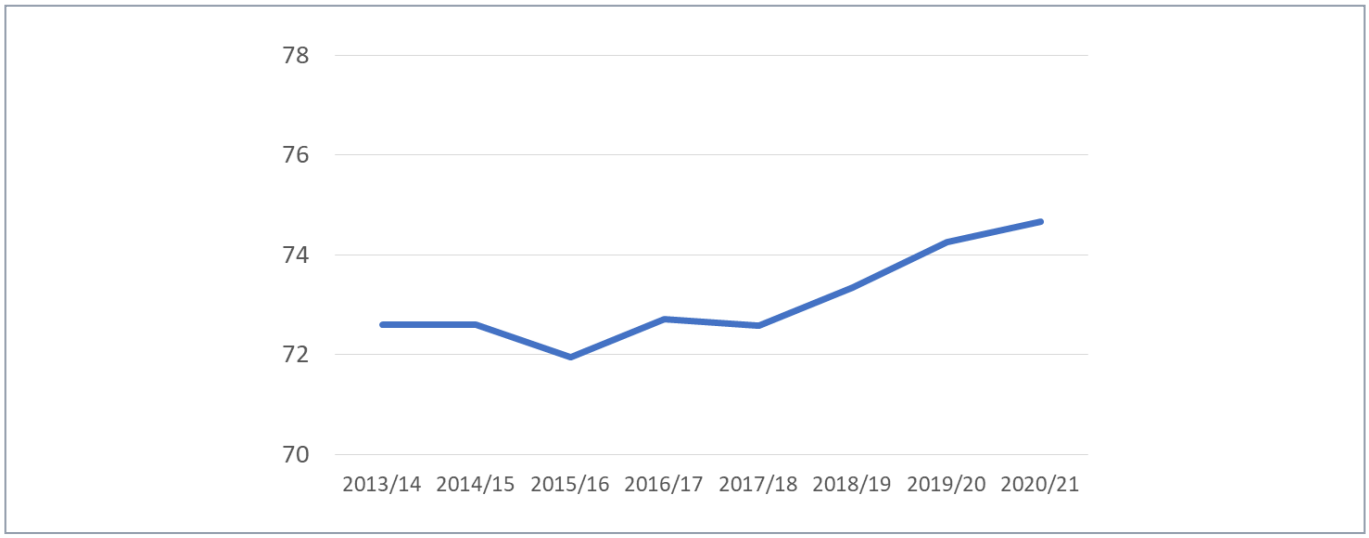
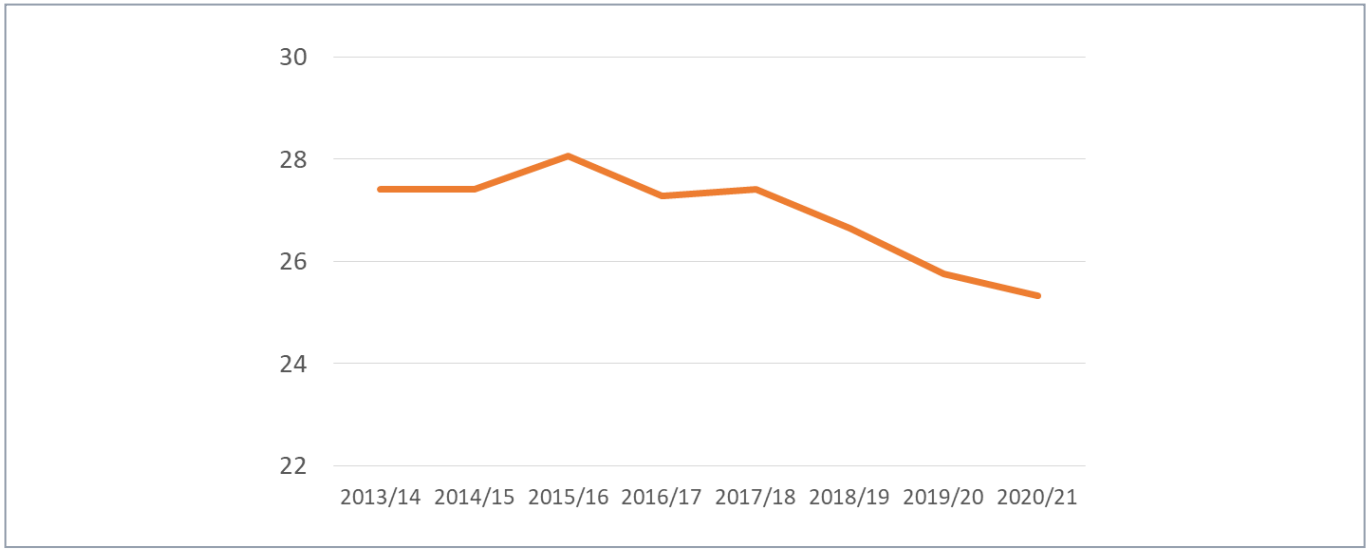


Figure 2.12: Proportion (%) of female patients undergoing cardiac surgery (all procedures) in the UK (excluding Scotland), 2013-14 – 2020/21 [NACSA data]



The numbers of male and female patients of each age having surgery is shown in Figure 2.13 and Figure 2.14. COVID-19 has caused a drop in operation numbers in both sexes across all age groups. Prior to last year, for both sexes the rates of heart surgery have stayed largely the same for the youngest patients (under 60) since 2013/14. Likewise, for both sexes the rates have been falling in the oldest patients (over 80), as more TAVI procedures rather than surgical AVR are being performed in this group.

For women there has been a reduction in operations for both the middle groups (60–69 and 70–79), whereas for men the reduction has only been for the 60–69 year old group, with little change in rates for the 70–79 year olds.

Figure 2.13: Age distribution of male patients having cardiac surgery (all procedures) in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]

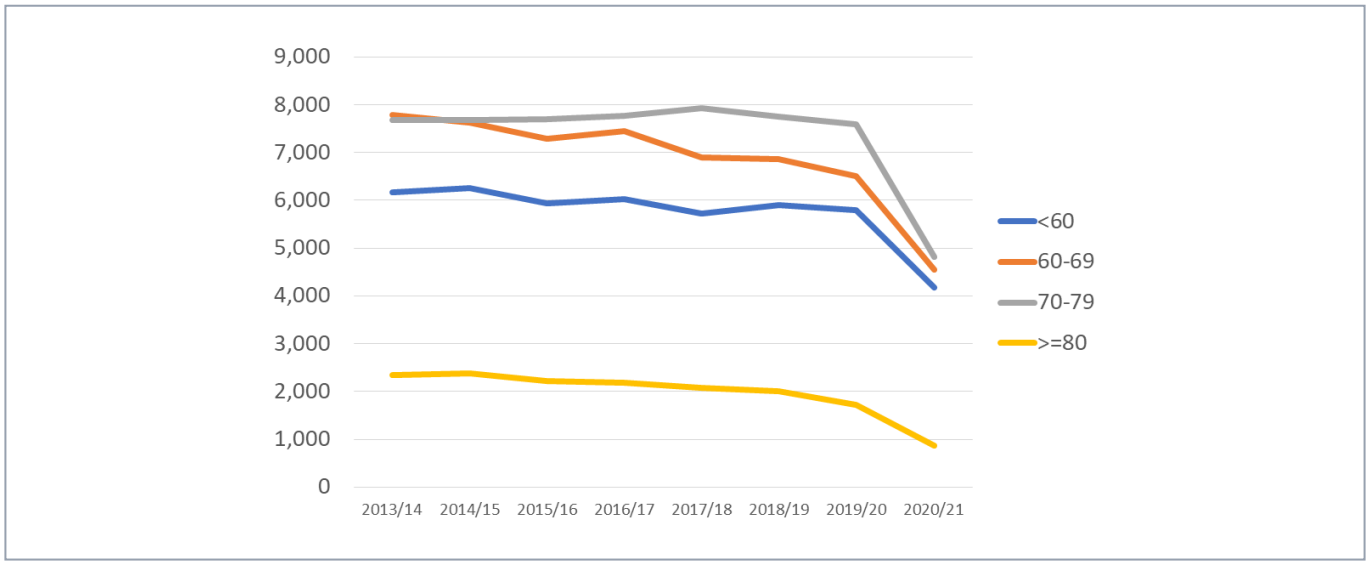
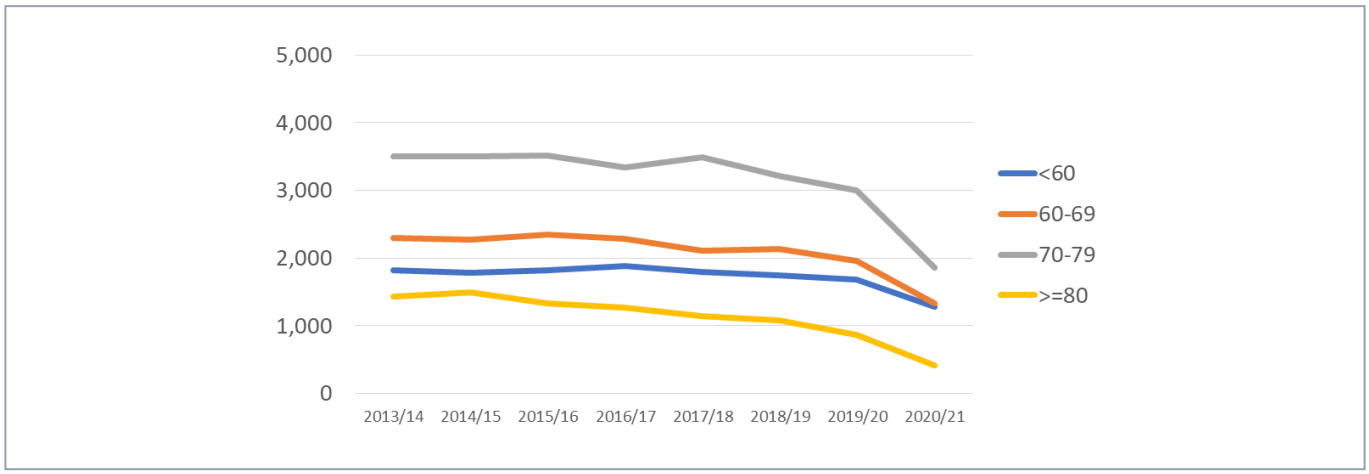


Figure 2.14: Age distribution of female patients having cardiac surgery (all procedures) in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]

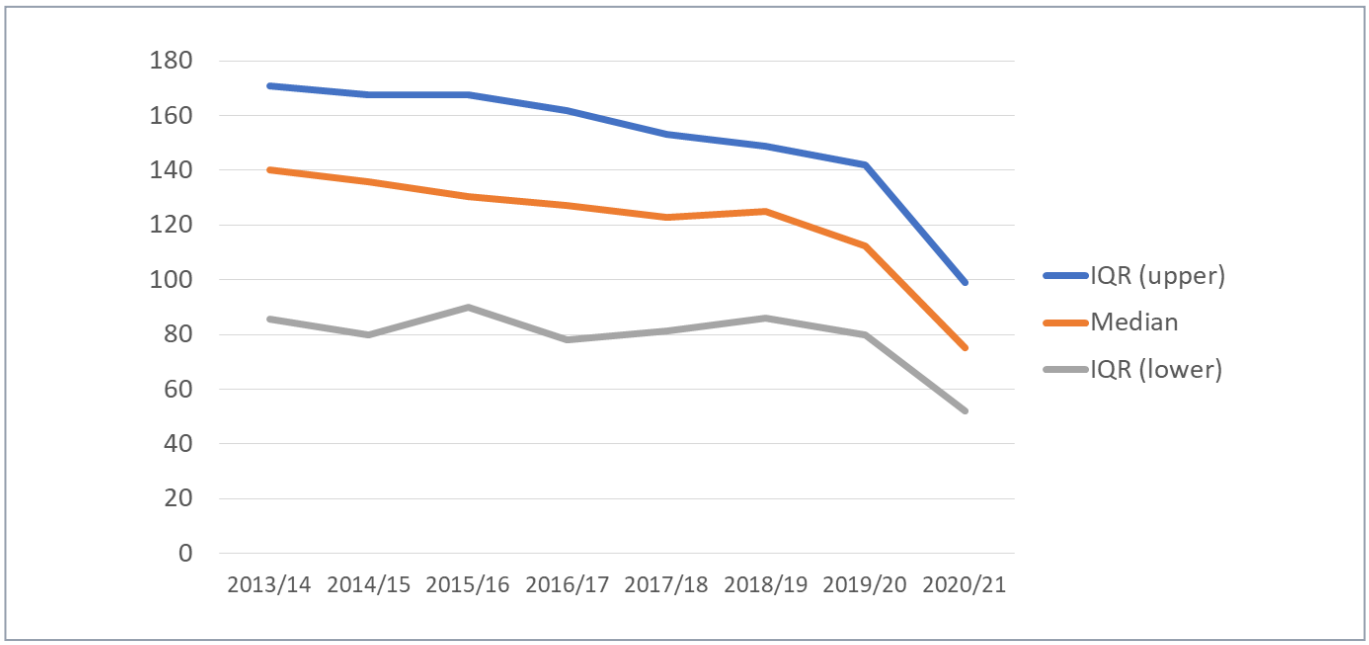


2.6 Consultant Surgeons are performing fewer heart operations each year

The numbers of operations performed by an individual consultant each year has been falling steadily since 2013 [Figure 2.15]. Not surprisingly there was a big drop in 2020/21, with the average UK consultant only being able to perform 75 operations during the year of the pandemic.

More worryingly perhaps, there has been a gradual decline in the numbers of operations performed on average by each surgeon over many years. In 2013/14 the average (median) was 140 cases per year, with the busiest quartile of surgeons performing more than 171 per year. In the year prior to COVID-19, this had

Figure 2.15: Numbers of cardiac operations performed each year per consultant in the UK (excluding Scotland), 2013/14 – 2020/21 [NACSA data]



These counts include all cases for which an individual consultant is responsible – as per the Clinical Outcomes Publication (COP). However, these counts also include emergencies (which are excluded from the COP analysis). Publication of a surgeon's outcomes in COP requires >99 cases in 3 years.

fallen to an average of only 112 cases (with more than 142 cases by the top 25%).

Most cardiac surgeons in the UK are no longer performing any thoracic surgery. The numbers are rapidly falling with only 33 cardiothoracic consultants recorded in the UK (including Scotland) in the SCTS Workforce Report of 2019.[2] There have not been any mixed practice cardiothoracic surgeons appointed as consultants for around a decade. This change would be expected to increase the numbers of cardiac operations performed per surgeon, as less time is spent on thoracic operations. So it does not explain the reductions in throughput seen.

A small part could be explained by the fall in cases in March 2020 in the very early days prior to the UK lockdown, although the trends seen for 2019/20 are very much in keeping with the trends from previous years. Notably in recent years there has been an increase in consultant job-plans requiring more time for attendance at multi-disciplinary team meetings and for providing ward cover during the week and at weekends. However, even allowing for this, most current job-plans allow for 2 days per week of operating.

The expectation would therefore be for a purely cardiac surgeon to perform just over 160 cases per year (assuming the most common scenario when 2 operations are scheduled per list and allowing for annual leave). Some surgeons will be performing complex cases that take too long for 2 operations to be performed in a day. However, the reason for the discrepancy is almost certainly largely (but not exclusively) due to cancellations of operations due to the unavailability of ITU beds. Assuming this is the main reason would give an estimated 20 lost potential operations per year in 2013/14; 47 operations lost in 2019/20; and 85 operations lost per surgeon on average during the COVID year of 2020/21.

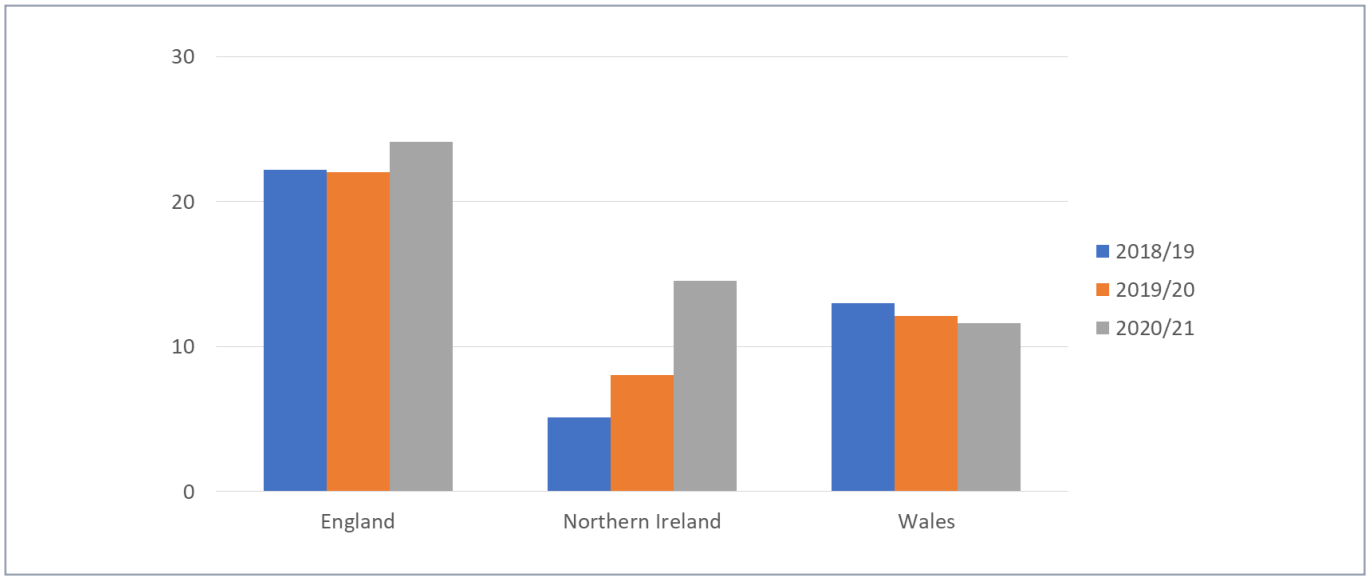
An emphasis should be placed on protecting cardiothoracic ITU facilities if the decline in operations performed by each surgeon is to be reversed. This is likely to be the most vital step to help reverse the backlog of patients waiting longer for their surgery last year.

2.7 The number of training procedures was substantially reduced

One particular aspect of the pandemic has been the effect on the training of surgeons in training. The effect of the first wave is eloquently described later in this report by a group of trainees. In the early weeks, most operating was largely for emergencies and very urgent cases only and these were performed largely by consultants. Training almost totally stopped as trainees were redeployed to help where needed most within their hospitals.

As operating returned, trainees have been allowed to operate in roughly the same proportion of cases as prior to COVID, at around 23% of operations performed [Figure 2.16]. However, this hides the fact that overall operation numbers were reduced, meaning that the total number of training procedures performed were reduced by around 28% across the UK in 2020/21. This has coincided with a planned reduction in specialist training time, from 8 years to 7 in the UK by the GMC (General Medical Council). The ability to achieve the requirements for training within the time allowed has therefore caused a lot of stress for trainees in the past year.

Figure 2.16: Percentage of heart operations performed by a surgeon other than the responsible consultant, by country, 2013/14 – 2020/21 [NACSA data]



Defined as First Operator GMC number not the same as Responsible Consultant GMC number within the dataset. This will include both registrars with a national training number (NTN) and Trust Fellows etc. Cases where no GMC number has been recorded for the First Operator are excluded from these counts. (Hospital level data are available in the Appendix to the report).

CASE STUDY:
COVID-19, the first wave through the eyes of a cardiothoracic trainee

Chris Bayliss, Charlotte Holmes, Nick Chilvers – cardiothoracic trainees (West Midlands and Northern deaneries)

January 2020, enter COVID-19, an unknown threat from a distant land. Is this the next SARS, Ebola or just a bad cold? As a cardiothoracic trainee, the expectation was of A&E's and respiratory wards under pressure. But this is winter in the modern NHS, nothing new, each year worse than the last. Hospitals creak, but cope and cardiothoracic surgery continues. COVID-19 was going to be someone else's problem.

Fast-forward to March 2020 and the world has changed. We are in lockdown and the streets are empty. Hospital corridors become eerily quiet. The carpark is empty. There are no elective patients and no visitors. Staff are shielding, sick or isolating. No more corridor conversations, operating stops, training stops.

Walls are built to slice hospitals in two: COVID-free "Green zones" versus "Red zones" or COVID-Land. We train in the use of PPE, although no one really knows when to use what; FFP1, 2 or 3? Eye protection and full gown, or just an apron? What exactly is an aerosol-generating procedure? Emergency operating in full PPE is hot, uncomfortable and tiring. As PCR tests take a long time to give a result at this point, more often than not full PPE is required for most operations. I am unenvious and full of admiration for our ITU nurse colleagues, redeployed to the COVID-ITU, having to wear full PPE all shift.

The cardiothoracic ITU is cleared of patients in preparation of an impending tsunami. We train in the use of ventilators for the terrifying prospect of ITU becoming overrun, necessitating ventilating patients in theatres or recovery areas. Shift patterns change; we are drafted into looking after patients on what was once the cardiothoracic HDU, now a melting pot of vascular, upper GI, colorectal and medical patients. We join the "proning team".

For the first time in our careers we see colleagues becoming sick, in some cases very sick, with the same disease as our patients. Is it really safe for our anaesthetic colleagues to be intubating a patient? Does viral load matter? Is PPE effective? Am I safe?

MDTs, teaching and all other face to face meetings cease to exist. Zoom, Microsoft Teams and the now universal phrase "you're on mute!" come into existence. Outpatient clinics become telephone conversations only.

After two weeks of almost no operations, surgery gingerly restarts. Initially one case a day, consultant performed, no training. Gradually we return to "the new normal". Activity remains reduced. A combination of isolating staff and general ITU patients on the cardiothoracic ITU mean beds are hard to come by. But we are operating again and training resumes, albeit at a reduced rate.

In spite of the challenges, there are positives. We rediscovered our ability to be doctors, generalists as well as specialists. Unable to see our own, our work colleagues became our family. Small acts of kindness, and some free food and drinks, made a huge difference to morale. We stood and clapped with our neighbours, a little embarrassed but proud for the work we were doing amidst the uncertainties. The NHS embraced new technology and new ways of working. Staff wellbeing rightfully became relevant. With summer came a reduction in COVID cases and relief of restrictions. On the horizon a rainbow after the storm, a vaccine, hope.

3 | Selected quality improvement metrics

3.1 Times waiting for elective CABG have worsened

3.1.1 Overview of QI metric

QI Metric Description/Name	Elective CABG waiting time – from angio to operation date
Why is this important?	Patients should not wait any longer than necessary for elective coronary artery surgery that is expected to improve both symptoms and/or life expectancy.
QI theme	Safety and Effectiveness.
What is the standard to be met?	NHS England target of 18 weeks (126 days) from GP referral to treatment (but this includes several other steps in the pathway prior to final referral for surgery), meaning that the portion from the performance of diagnostic investigations to the treatment should be considerably less than 18 weeks. The finding of an abnormality on the coronary angiogram is usually the point that triggers the consideration of a referral for cardiac surgery. This time (from angiogram to operation) is the portion of the patient pathway that surgical teams can influence. A target of 84 days means that the surgical team has taken 67% (12 weeks) of the referral-to-treatment time.
Key references to support the metric	NHS England Commissioning target.
Numerator	All patients undergoing elective first time CABG.
Denominator	N/A
Trend	Elective waiting times have worsened in all 3 UK nations between 2019/20 and 2020/21. Overall in the UK there was an increase of 22% from 104 to 127 days.
Variance	In England there was a 21% increase, in Northern Ireland a 61% increase, and in Wales a 94% increase in waiting times in 2020/21 [Figure 3.1]. Only 5 NHS hospitals met the 84 day target. Eight hospitals had shorter times than 2019/20, but the remaining 27 had worse performance [Figure 3.2]. There is a huge variation amongst NHS centres (range 37-271 days).

3.1.2 Audit results

The mean waiting time for elective CABG following angiography in NHS hospitals worsened by 23 days (from 104 to 127 days) in the last year [Figure 3.1]. This was an overall increase of 22%. Waiting times increased in England by 22 days, by 75 days in Northern Ireland and by 122 days in Wales.

Only 5 NHS hospitals achieved the 12 weeks target [Figure 3.2]. The considerable differences amongst NHS centres, ranging between 37 and 271 days, shows that COVID-19 has impacted cardiothoracic units to a very varying degree. It also suggests, though, that improvements can be made by hospitals with longer waiting times.

Figure 3.1: Waiting time for elective CABG (days from angio to operation date) by country, 2013/14 – 2020/21 [NACSA data]

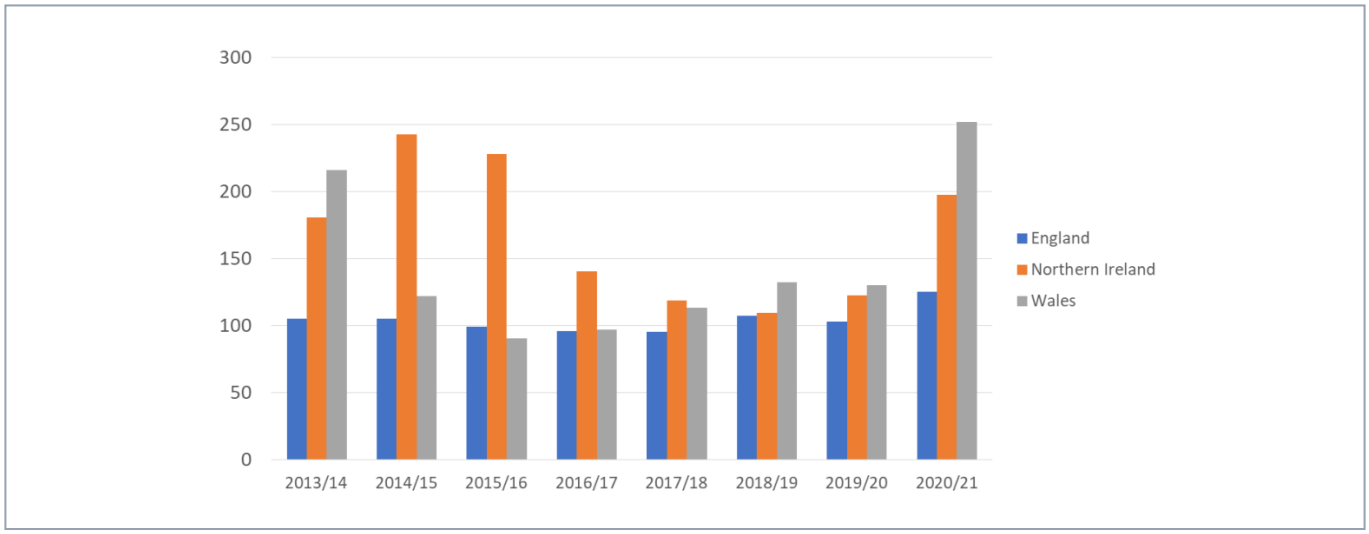
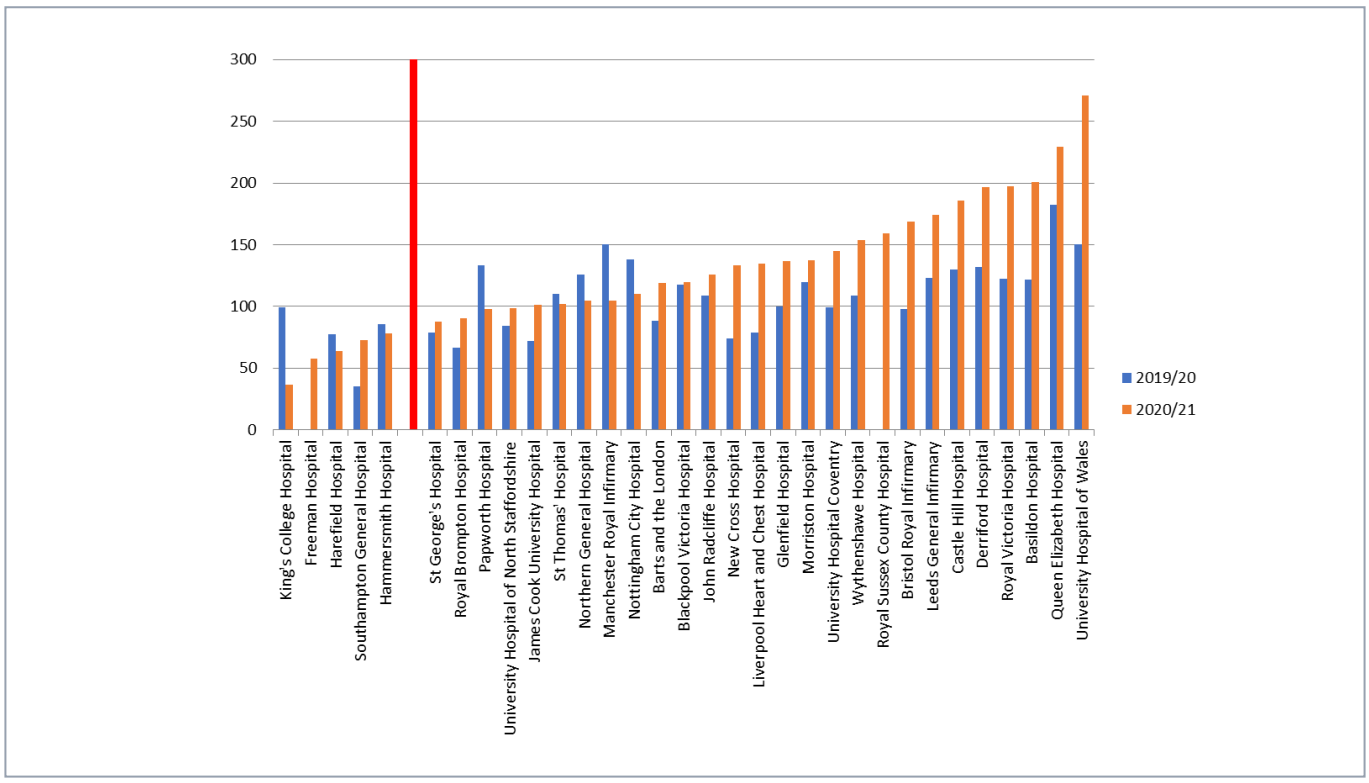


Figure 3.2: Waiting time (mean days) for elective CABG by NHS hospital, 2019/20 – 2020/21 [NACSA data]



Target <84 days. (Hospitals to the left of the red bar achieved the target in 2020/21). Ranked by waiting time in 2020/21.

3.1.3 Recommendations for those not achieving the standard

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.

Units not achieving the target should consider ring-fencing level 3 ITU facilities, and seek to make greater use of day-of-surgery admissions (DOSA) and enhanced recovery after surgery (ERAS) to improve patient flows and outcomes.

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

CASE STUDY:
Linda's Story. (A patient's perspective of undergoing heart surgery during the first wave of COVID pandemic)

"My name is Linda. I am 69 years old and live in the Northeast of England.

I had never been ill a day in my life when in March 2019 I felt unwell with palpitations and called 111, where the responder sent me to A&E. Following my admission and a scan of my heart it was discovered that I needed a replacement aortic valve. This process took some time, and I eventually saw a cardiologist in November 2019. Further delays meant that the promised date in December or January did not materialise and I called the cardiologist's secretary in January 2020, who said they had experienced a lot of emergencies but would get me in as soon as they could. At that time I was number 14 on the list so was not expecting this to happen quickly.

As I waited for a date, the COVID pandemic was starting to be an issue in hospitals and elsewhere. But I spoke to my husband, who was himself vulnerable with progressive heart failure and Alzheimer's, and he was supportive of me having my replacement valve surgery during COVID. My husband unfortunately developed pneumonia then an infection on his pacemaker and was taken into hospital. He was stable but they expected to keep him in for six weeks, so when I was offered a surgery date on 1 May I accepted, as it would mean that my husband would not need to go into respite care. I felt that the safety in hospital would be high and people would be taking extra care. I was advised that the surgery might possibly be cancelled but my surgeon's secretary made it very clear to people that it was important for it to go ahead on that day if at all possible, as it was the best time for me to have the surgery, as I knew my husband was being cared for in hospital.

My husband was on the ground floor next to a window, and as I couldn't see him due to COVID regulations, I used to phone him and stand outside the window so he could see me while we spoke. A friend's daughter worked on the ward so she took things in for him. Unfortunately I got a call from the ward sister one day to say that he was deteriorating. At 7pm in the evening I got a phone call to ask if I wanted to come in and see him. It was difficult as I was vulnerable too as I was waiting for my surgery. I felt I needed to leave. I could see he was tired and I said my goodbyes to him. One of the volunteers said to me that she understood I needed to go and he would not be alone if he passed. I went home and he died about half past 11. I was alone, and I had no one with me. It felt difficult to tell my story over the phone to everyone who needed to be told, and I couldn't see people because of the restrictions, so there are people I've never really talked about it with.

The hospital offered to put the surgery back two weeks but I thought about it and wanted to go ahead, push through it and have it done. I'm a Christian, and I told the surgeon's secretary that I believed God would carry me through. My husband's funeral was 30 April, and I had to prepare for my surgery on Friday 1 May, so following the small ceremony I needed to have a COVID test that afternoon and then the following day I went into hospital. The hospital was separated into two halves, a COVID side and a non-COVID side. A friend dropped me off at the door, which was strange as normally at the hospital you can't get near the door. There

was no one around when I entered and took the lift, not like the usual busy place it is. Ward staff and nurses were in masks, but not full PPE.

My surgery went well. The surgical team had pre-warned me not to be alarmed at what they were wearing when I came round as they looked like people from a space craft, in forensic style overalls with plastic foot covers. A person leaned over my bed and she had a mask on and then all the PPE on top of that. There were disembodied voices around me. Even so, they were able to convey their compassion and concern for me. I later saw one of the nurses out of PPE and I didn't recognise her, but she told me they had tried (and failed) to stop me being sick when I woke up. But the personal touch was appreciated by me.

I went from ICU to high dependency and then a normal ward. I was in hospital for five days. I wasn't able to have visitors. I agreed with one friend that she would be the contact point with the hospital, so the hospital kept her informed and she spoke to everyone else. I had my phone during the whole time but I could hardly hold a phone. Later on I did video calls. Everyone was very understanding about people calling their friends and families who couldn't visit. Part of me was quite relieved at the lack of visitors, as I don't know when I would have fitted in all the people who would have wanted to visit! I think limited visiting is quite a good thing.

I had to consider what I would do when I was discharged. I had an arrangement with a friend to come to stay with me but this fell through as her family were worried about her being exposed to COVID from the hospital, as she was vulnerable as a diabetic. I was facing the prospect of carers coming into my house at first, as I couldn't manage alone. Three different people, seven days a week, who had potentially been with ten people already. It was at this point that I thought, "Really, God?". Not long after that, I got a phone call from a girl at my church, and she told me she could stay with me for a week, and it was all arranged. She ended up staying for two, doing her work from home job from my house.

I asked if there was any physiotherapy and the hospital sent me exercise sheets through the post, so I made myself do these, but it was difficult to understand the tiny pictures! I had done leg exercises to strengthen my legs before I went into hospital to prepare for lack of mobility, as I knew I would have to be careful with my arms having just had my chest cut open. I knew getting up from standing or sitting would be difficult. I had to do all my own post-op monitoring, I haven't seen any doctor face to face since the surgery apart from a scan a year after, and I knew I was at risk if I were to go into a doctor's surgery, so I stayed at home.

The worse part of everything was a condition I developed after taking codeine in hospital for post-surgery pain relief. The drug slowed down my digestive system which caused painful complications which I found even worse than the surgery. I couldn't walk, lie down, sit or stand without being in pain. It brought me to my knees more than anything. I was asked if it was hindering my cardiac recovery and I said yes, because I couldn't be active. At that point I was put under general anaesthetic to have a camera examination, and something they did during that resolved the problem, which was such a relief. I wish I had been able to have a discussion about pain relief, and been informed of what I was being given. In general though I found their care compassionate, and I felt listened to.

One of the first nights after my surgery a nurse came over to ask me if I was okay, because I was still awake in the dark. I asked her if I could tell her something and she took my hand. I told her that my husband had died. She said she was very sorry and asked when. "Two weeks ago" I replied. And she hooked her foot around a chair and asked me to tell her about it. Whatever else was going on, she stayed with me until I fell asleep. These are the things I will remember. The kindness she showed me. Everyone may have been rushed off their feet, and there was COVID, but I never ever felt that they didn't have time for me. And I also reflect that I believed God would carry me through, and He did. "

Linda would like to express her gratitude to the entire heart team at the James Cook University Hospital, Middlesbrough.

3.2 Improvement in time to urgent CABG following coronary angiography across the UK, but only 3 hospitals hit the target

3.2.1 Overview of QI metric

QI Metric Description/Name	Waiting time for urgent CABG within 7 days of referral
Why is this important?	Most patients with NSTEMI requiring revascularisation with CABG should be operated on during the same hospital admission (ESC/EACTS Revascularisation Guidelines 2018).[3] Patients usually require 5 days antiplatelet therapy cessation prior to surgery in order to reduce the risks of bleeding at surgery. The optimal window for surgery is between 5 to 7 days following diagnosis (and referral). Longer waits for surgery as an inpatient uses considerable hospital resources and blocks ward beds from allowing other admissions.
QI theme	Safety and Effectiveness.
What is the standard to be met?	The Commissioning for Quality and Innovation framework (CQUIN) target in 2016 recommended that 100% of patients should meet the target of undergoing urgent CABG within 7 days of angiography.[4]
Key references to support the metric	ESC/EACTS Revascularisation Guidelines.[3] CQUIN target.[4]
Numerator	All patients requiring urgent first time CABG.
Denominator	n/a
Trend	Across the UK as a whole the mean waiting time for urgent CABG has decreased from 11 to 10 days between 2019/20 and 2020/21 [Figure 3.3]. There was no change in England (10 days), an improvement in Northern Ireland (24 to 20 days) and a worsening in Wales (13.5 to 18.5 days).
Variance	There is considerable variation between hospitals (between 6 days and 21 days). Three NHS hospitals achieved the 7 day target [Figure 3.4].

3.2.2 Audit results

The waiting time to urgent CABG has improved in the last year, with a reduction across the UK of one day overall (from 11 to 10 days). Times were worst for Northern Ireland (20 days, down 4 days from 2019/20) and Wales (18.5 days, up 5 days). England saw no change at 10 days [Figure 3.3].

Again, there was considerable variation between NHS centres, with a spread of waiting times from 6 to 21 days. Three hospitals achieved the 7-day target [Figure 3.4]. The large variance in performance between the best and worst hospitals suggests that major improvements can be made by those that are poorly performing.

Figure 3.3: Time (mean days) to urgent CABG after diagnostic angiography, by UK country (excluding Scotland), 2013/14 – 2020/21 [NACSA data]

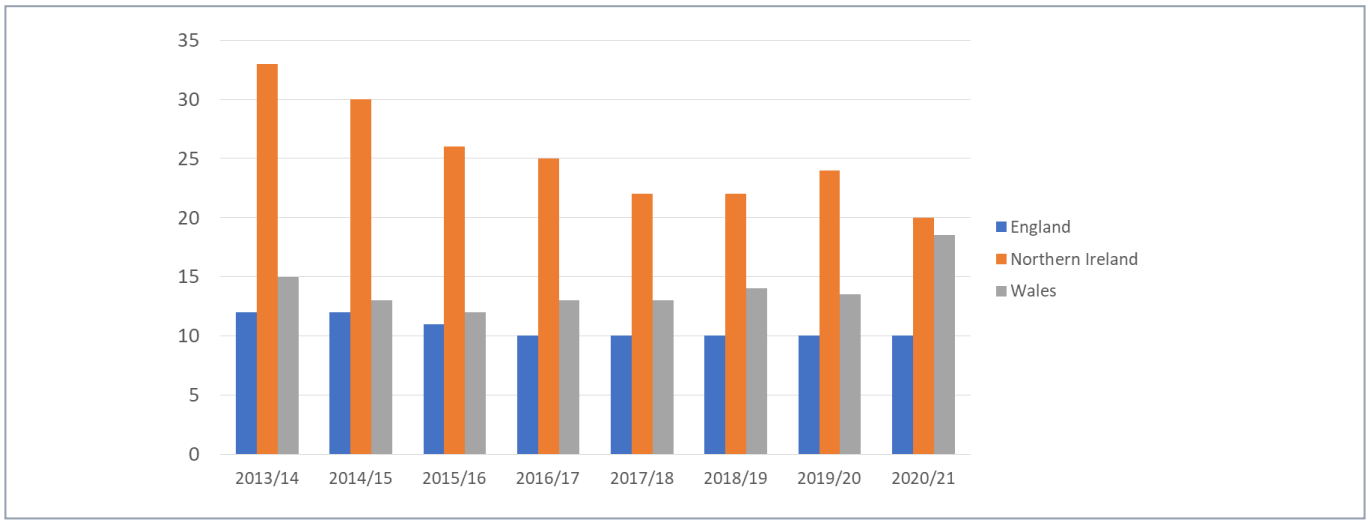
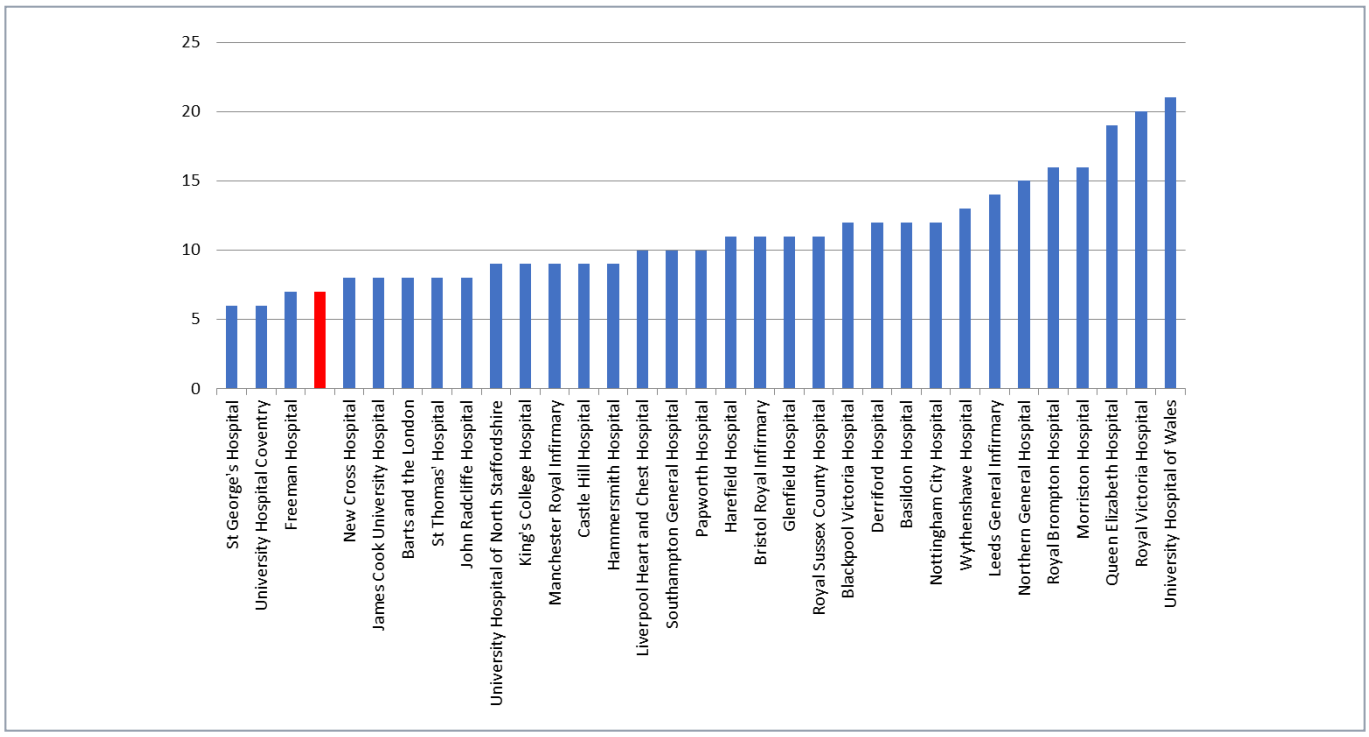


Figure 3.4: Time (mean days) to urgent CABG after diagnostic angiography, by NHS hospital, 2013/14 – 2020/21 [NACSA data]



Target 7 days. (Hospitals to the left of the red bar achieve the target)

3.2.3 Recommendations for those not achieving the standard

Hospitals not reaching the target of urgent CABG performed within 7 days after coronary angiography should undertake a review of their processes to identify where delays occur and how these can be avoided. If necessary, advice should be sought from centres with evidence of the best performance. A QI action plan should be instigated to reduce delays.

Units not achieving the target should consider ring-fencing level 3 ITU facilities, and seek to make greater use of enhanced recovery after surgery (ERAS) to improve patient flows and outcomes.

3.3 No improvement in proportion of urgent CABG performed within 7 days of coronary angiography

3.3.1 Overview of QI metric

QI Metric Description/Name	Urgent CABG performed within 7 days of coronary angiography
Why is this important?	Most patients with NSTEMI requiring revascularisation with CABG should be operated on during the same hospital admission (ESC/EACTS Revascularisation Guidelines 2018).[3] This is because the highest risk of a further MI or death is in the first month following the initial presentation. Timely surgery is therefore associated with better patient outcomes. Patients usually require 5 days antiplatelet therapy cessation prior to surgery in order to reduce the risks of bleeding at surgery. The optimal window for surgery is between 5 to 7 days following diagnosis (and referral). Longer waits for surgery as an inpatient uses considerable hospital resources and blocks ward beds from allowing other admissions.
QI theme	Safety and Effectiveness.
What is the standard to be met?	The Commissioning for Quality and Innovation framework (CQUIN) target (2016) recommended that 100% of patients should meet the target of undergoing urgent CABG within 7 days of angiography.[4] In the 2021 NACSA report no NHS centre met this target. A revised target of 75% was set for this audit cycle.
Key references to support the metric	ESC/EACTS Revascularisation Guidelines.[3] CQUIN target.[4]
Numerator	All patients requiring urgent first time CABG receiving this within 7 days of the diagnostic angiogram.
Denominator	All patients requiring urgent first time CABG.
Trend	England had the best results with 35% of patients achieving the target in 2020/21 (compared to 34% in 2019/20); Wales got worse at 13% (compared to 19% in 2019/20). Northern Ireland improved, but still only achieved 14% (compared to 6%). [Figure 3.5].
Variance	No NHS hospital achieved the target of >75% and only 3 achieved >50%. There is a very large variance from best to worst hospitals – from 58% to 9% [Figure 3.6].

3.3.2 Audit results

Following admission to hospital with a NSTEMI (heart attack), patients requiring CABG should have their operation within 7 days of the diagnostic coronary angiogram. Prolonged inpatient waiting times are very costly to the NHS and are associated with poorer outcomes for patients.

In England, only 35% of patients achieved the target in 2020/21 [Figure 3.5]. No UK hospital achieved the target of performing 75% of urgent CABG within 7 days [Figure 3.6]. There is a huge variance in performance between the best and worst hospitals, again suggesting that major improvements can be made by those that are poorly performing.

Figure 3.5: Proportion (%) of urgent CABG performed within 7 days of coronary angiography, by country (excluding Scotland), 2018/19 – 2020/21 [NACSA data]

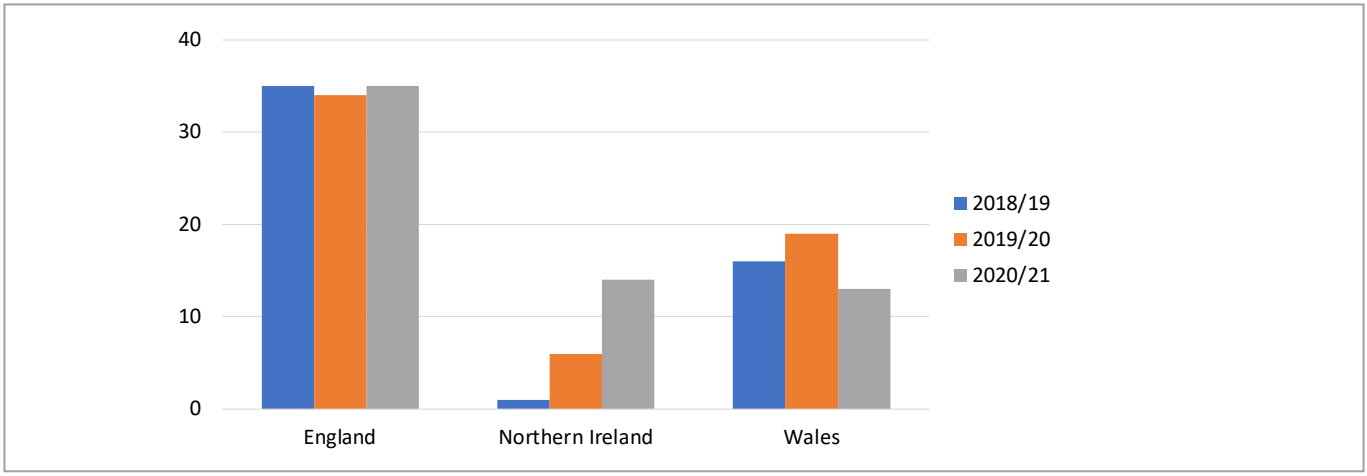
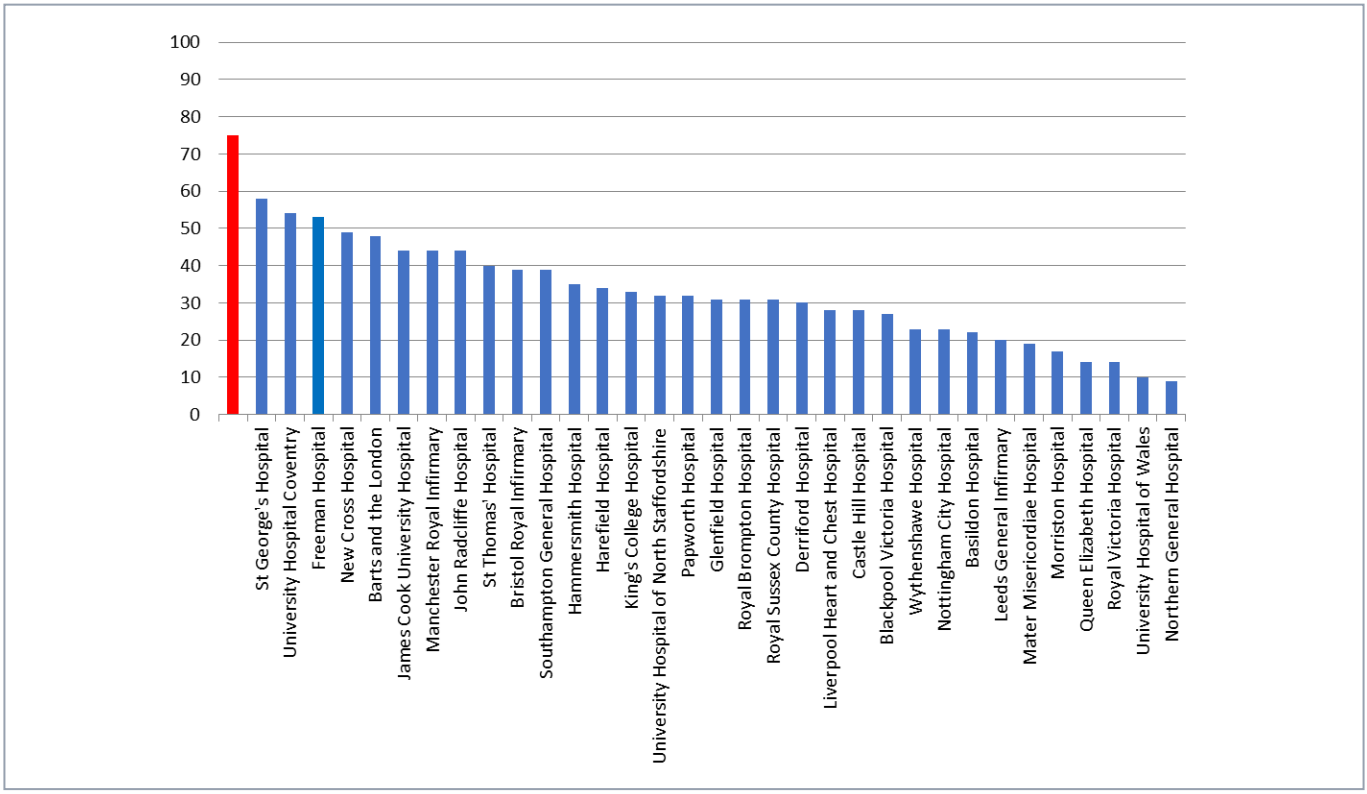


Figure 3.6: Proportion (%) of urgent CABG performed within 7 days of coronary angiography, by NHS hospital, 2020/21 [NACSA data]



Target 75%. (No hospital achieves this target)

3.3.3 Recommendations for those not achieving the standard

Hospitals not reaching the 75% target of urgent CABG performed within 7 days of coronary angiography should undertake a review of their processes to identify where delays occur and how these can be avoided. If necessary, advice should be sought from centres with evidence of the best performance. A QI action plan should be instigated to reduce delays.

Units not achieving the target should consider ring-fencing level 3 ITU facilities, and seek to make greater use of enhanced recovery after surgery (ERAS) to improve patient flows and outcomes.

3.4 Day-of-Surgery Admission (DOSA) for elective CABG less than 50% of pre-pandemic levels

3.4.1 Overview of QI metric

QI Metric Description/Name	Proportion of patients with DOSA (day-of-surgery admission) for elective CABG
Why is this important?	Admission to hospital 24 hours prior to elective surgery is inefficient and an unnecessary and expensive use of ward beds. Units should have processes and protocols in place to allow thorough preoperative assessment (including for anaesthesia) without the need for admission the day before an operation. These processes may also reduce the need for last minute theatre cancellations (due to more timely pick up of other comorbidities).
QI theme	Effectiveness.
What is the standard to be met?	At least 50% of elective patients should be admitted on the day of surgery.
Key references to support the metric	Get it Right First Time (GIRFT) report 2018.[5]
Numerator	All patients undergoing elective CABG who were admitted on the same day as the day of surgery.
Denominator	All patients undergoing elective first time CABG.
Trend	After 3 years of improvements particularly in England following the GIRFT report, the rate fell to the worst ever in 2020/21 with only 8.3% of UK patients admitted as DOSA in 2020/21 (from 19.6% in 2019/20). [Figure 3.7].
Variance	There was very considerable variation amongst NHS centres in 2020/21 (from 0% to 38.2%). No centre achieved the target of better than 50% last year [Figure 3.8], whereas 4 achieved it in 2019/20. In Wales and Northern Ireland hospitals do not yet appear to have developed DOSA programs, even before the pandemic.

3.4.2 Audit results

Following the GIRFT report in 2018, SCTS has promoted the use of day-of-surgery admissions (DOSA) for elective cardiac surgery.[5] This provides a better patient experience and also aids efficiency. It is also a marker of well-functioning preoperative assessment clinics which are required for it to run smoothly.

A 50% target was set for the audit and in the first 3 years the proportion having DOSA for elective surgery gradually increased from 11.4% to 20.8% across England [Figure 3.7]. However, rates fell in 2020/21 in England to only 8.8%, and are much lower in Northern Ireland (1.7%) and Wales (0.6%).

The COVID-19 pandemic made running face-to-face pre-assessment clinics very challenging and so, unsurprisingly, the rate of DOSA has fallen last year. There was very considerable variation amongst NHS centres, with DOSA rates between 0% and 38% [Figure 3.8].

As the UK recovers from the pandemic it is likely that the greater use of DOSA will aid the recovery and throughput of the elective cardiac surgical programs in many hospitals. Hospitals should therefore seek to re-establish DOSA programs in line with the GIRFT recommendations.

Figure 3.7: Proportion of patients (%) undergoing elective CABG with day-of-surgery admission (DOSA), by country (excluding Scotland), 2017/18 – 2020/21 [NACSA data]

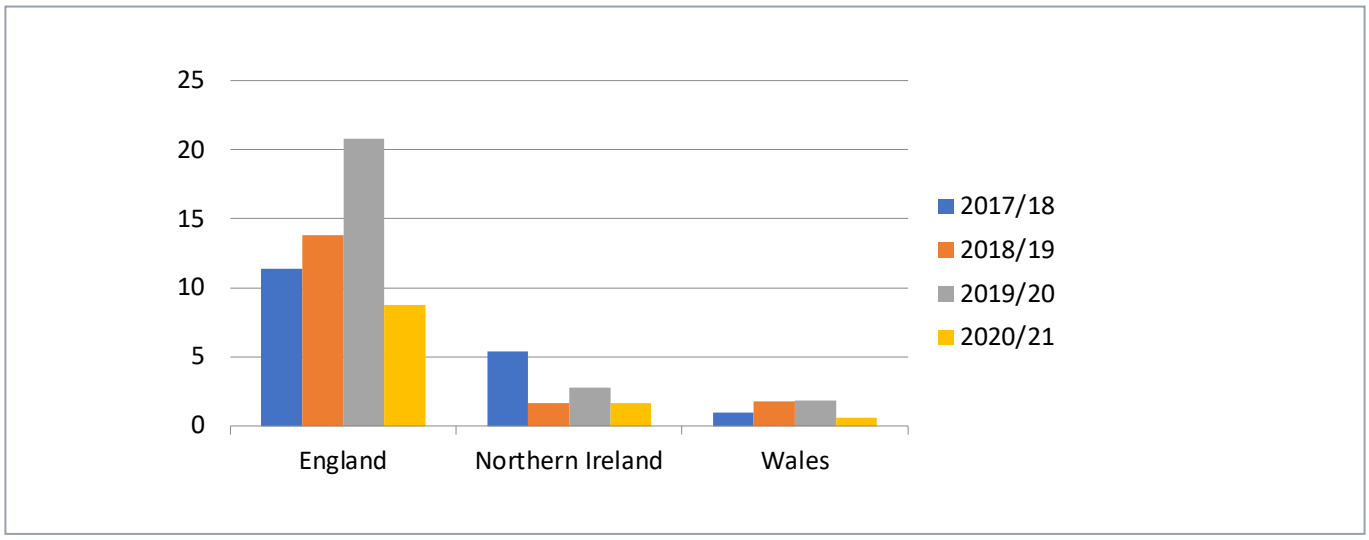
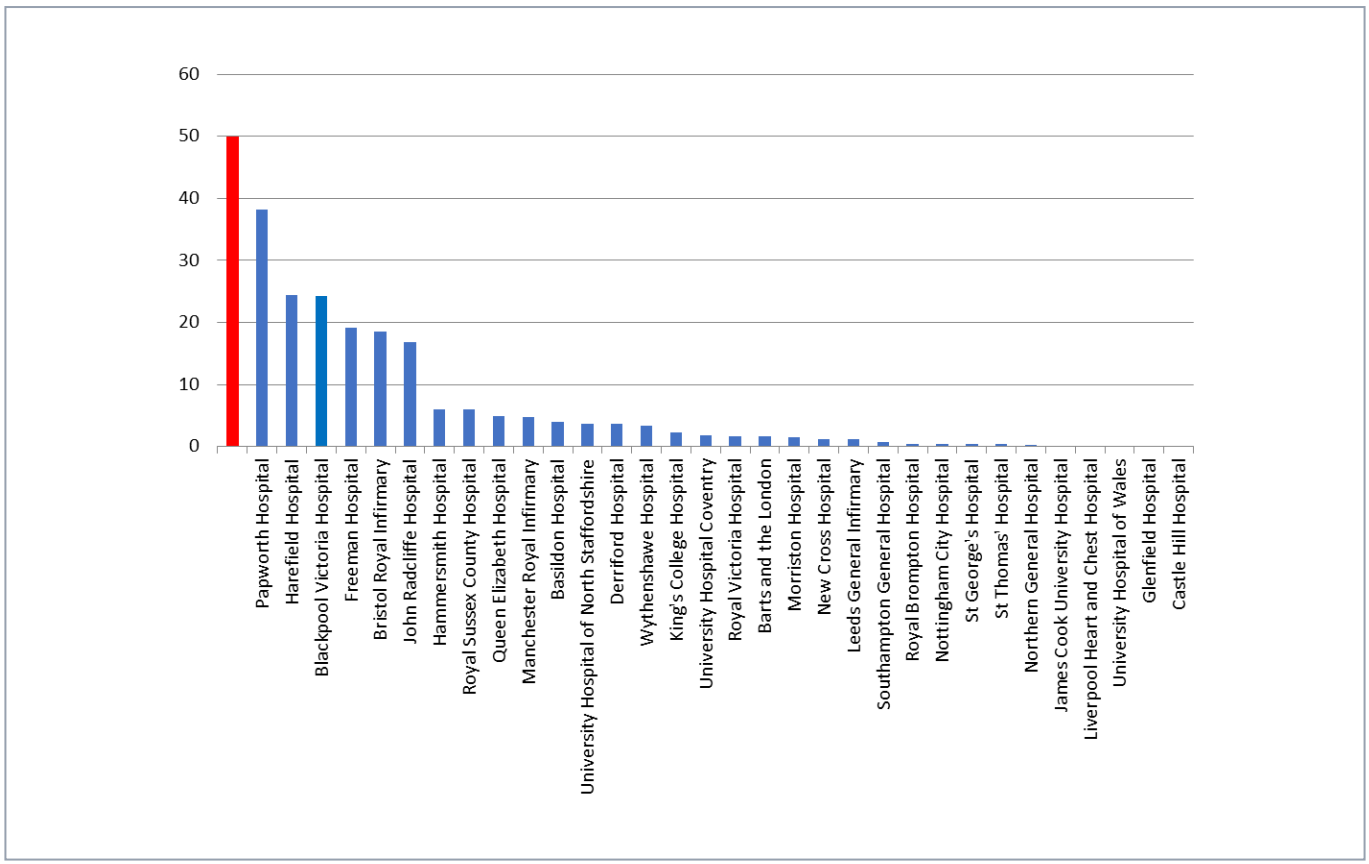


Figure 3.8: Proportion of patients with day-of-surgery admission (DOSA) for elective CABG, by NHS hospital, 2020/21 [NACSA data]



Target >50% (red bar). No hospitals achieved the target in 2020/21 (compared to 4 in 2019/20).

3.4.3 Recommendations for those not achieving the standard

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

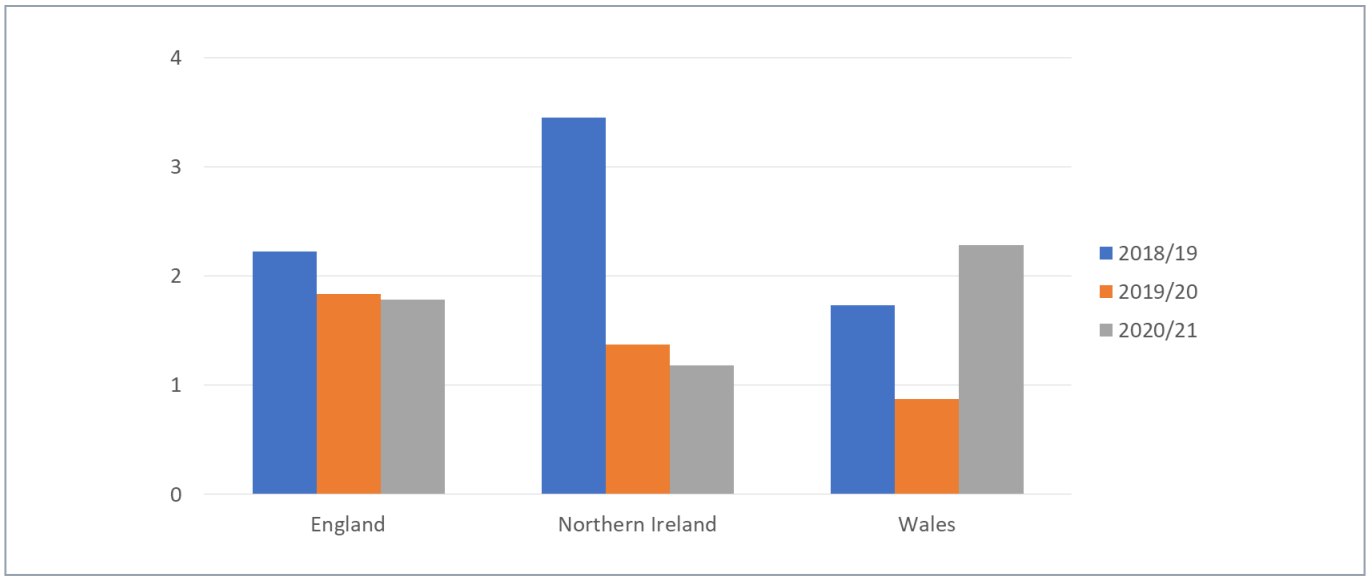
3.5 Summary of other QI metrics usually reported

More details on all of these metrics (including hospital level data) are reported with the Appendix to this report.

3.5.1 No change in reoperation for bleeding rates following CABG

The need for reoperation for post-operative bleeding following CABG remained the same in the UK last year (1.78% in both 2019/20 and 2020/21). The rates have fallen in England and Northern Ireland, but risen in Wales [Figure 3.9]. Maintaining these low rates of complications is a notable achievement, as the proportion of higher risk and urgent patients being operated on increased last year.

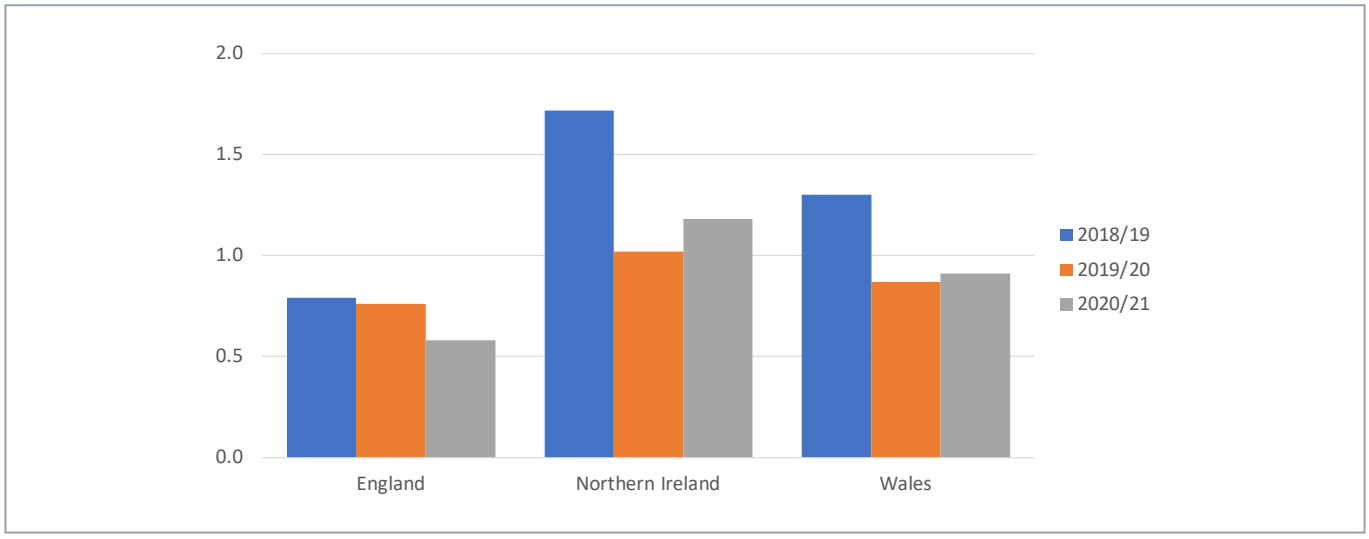
Figure 3.9: Re-operation rates (%) for bleeding, by country, 2018/19 to 2020/21



3.5.2 Reduction in new post-operative neurological events (CVA or TIA) following CABG

The rate of neurological events, of either stroke (CVA) or transient ischaemic attack (TIA), following CABG has continued to fall in each of the last 3 years across the UK (from 0.83% in 2018/19 to 0.6% in 2020/21). In each of the 3 nations the rates were lower in 2020/21 compared to 2018/19 [Figure 3.10].

Figure 3.10: Neurological events rate (%) following CABG, by country (excluding Scotland), 2018/19 – 2020/21 [NACSA data]

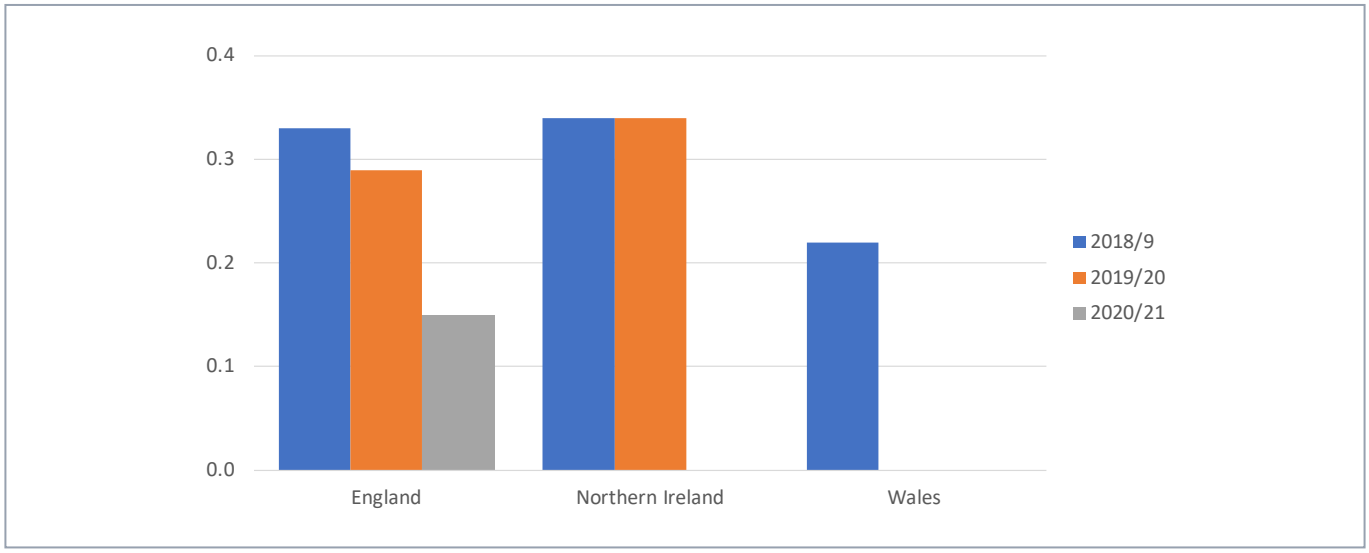


3.5.3 Very low rates of Deep Sternal Wound Infection (DSWI) following CABG

The rates of Deep Sternal Wound Infection (DSWI) serious enough to require surgical debridement, or a return to theatre for chest wall reconstruction, remain very low and are falling over the last 3 years. The rate across the UK was 0.14% in 2020/21 (equivalent to less than 2 patients per 1,000 CABG operations performed).

In Wales and Northern Ireland there were no cases of DSWI reported in 2020/21 [Figure 3.11]. It is possible that every effort has been made to avoid further surgery during the pandemic by utilisation of non-surgical treatments. However, in the most serious cases of DSWI it is unlikely that surgical treatment would have been avoided or delayed.

Figure 3.11: Operations (%) for deep sternal wound infections following CABG, by country (excluding Scotland), 2018/19 – 2020/21 [NACSA data]



CASE STUDY:
A consultant experience of the COVID pandemic in Wales

Dheeraj Mehta – consultant cardiac surgeon, Cardiff

I had just taken on the Lead Surgeon role for our Department in February of 2020. The first wave of the COVID pandemic arrived at a time when cardiac surgery at UHW (University Hospital Wales, Cardiff) was already under great pressure from long elective waiting lists. Well-developed plans for outsourcing elective patients to other hospitals outside of Wales were cancelled by the impact of the pandemic on all UK centres.

In early March, as we heard of the wave of COVID spreading across Europe towards the UK, we had our first encounters with the disease. Three cardiac and one thoracic patient succumbed in the early post-operative period. Two were complex patients whose rapid demise post-op underlined to us all the devastating nature of this infection, motivating us to make dramatic changes.

On the 6th of April 2020, we sadly lost a very dear member of our surgical team, Mr Jitendra Rathod to COVID. As a longstanding and greatly respected member of the department, his loss was deeply felt by all who knew him within the Health Board and the wider cardiothoracic community. His funeral was broadcast to staff in the department, affording all an opportunity to remember and say farewell.

Like most centres, cardiac surgical activity was greatly curtailed while rapid reconfiguration of hospital services took place, leading to loss of our ITU and ward capacity. The challenge to develop a 'safe pathway' for urgent and emergency cardiothoracic surgery during the first wave was met admirably by members of our department. From the rapid roll out of PPE, establishing patient testing and isolation pathways, maintaining an ever changing physical 'footprint' for the service. This included creation of a theatre 'bubble', comprising an operative theatre, with two adjacent theatres converted into ITU 'pods'. Witnessing our ability to maintain a critical service while chaos reigned around us was truly remarkable, and testimony to the professionalism, collaboration, and resourcefulness of all the teams involved.

The urgent need to develop a medium to long term strategy for resumption of cardiothoracic activity required broad engagement from the Directorate team, other specialty teams (e.g. anaesthesia, critical care, theatres) and the Senior Health Board Executive, to devise and appraise several options. All carried major risks, with the unpredictability of the pandemic being a key confounding factor. Ultimately, with Executive support, in May 2020 we began planning for a move of the Cardiothoracic Surgical Unit to a proposed 'Green zone' located within the University Hospital Llandough, 9 miles away. This required extensive modification of the existing local infrastructure to accommodate a 14 bedded ITU/HDU, 3 cardiothoracic theatres and a postoperative ward with appropriate cubicles and telemetry facilities for cardiac patients. Never had I expected that as Lead Surgeon, one of my tasks would be to lead on a project of such magnitude, and under such challenging circumstances.

The move took place over a weekend at the end of June 2020, with a phased completion of the footprint requiring again the use of temporary ITU 'pods' and two further relocations of our ward space. The resumption of operative activity was similarly phased, and by October 2020, we were back to pre-pandemic volumes of cardiac surgical activity. Inevitably, the disruption over the year had resulted, by November of 2020, in an elective waiting list of over 200 patients, of which 122 were waiting >36 weeks. However, with the resumption of operative capacity, these figures had improved by March 2021, to a total of 141 on the elective list and 46 patients >36 weeks. This was greatly facilitated by diminished elective referrals (as was the experience nationally), allowing us to focus on clearing the elective backlog and maintaining urgent/ emergency activity.

By the summer of 2021, the list of patients waiting >36 weeks had been cleared, with the service remaining resilient through subsequent COVID waves. Now in 2022, as COVID enters the endemic phase, we look forward to planning our return to UHW.

In the face of such adversity it is undeniably the resourcefulness, collaboration, and skilled determination of individuals and teams that can overcome traditional barriers and organisational inertia that would otherwise make such a rapid reconfiguration nigh impossible. It has therefore been a truly humbling experience for me as Lead Surgeon to have worked alongside such an inspiring team within the Cardiothoracic Directorate and other specialist teams at both UHW and UHL.

4 | Future direction

The main issue for the future of the NACSA audit will be to see how cardiac surgery bounces back from the dramatic drop in cases performed last year. It will be important to see how this impacts on the time patients wait for surgery and whether these delays result in poorer outcomes following their operation.

Over the coming years we need to see how the shift from surgery to interventional procedures during the pandemic impacts (as might be expected) on long-term outcomes for these patients, although it might be many years before any signal emerges. The reason many patients are referred for surgery in preference to cardiological interventions (from which there is a much quicker recovery usually) is the long-term prognostic benefit.

It would be valuable for future planning to know what happened (or happens) to patients that do not receive any surgical treatment (or intervention) as a result of a pandemic situation, and how many deaths might have occurred as a result. Unfortunately, the structure of the NACSA audit only collects data on those who have had their procedure, not those who don't, or those who die whilst waiting for surgery.

This year's report has concentrated on the changes in surgical practice brought about by COVID-19. For future reports, as surgical provision returns to some state of normality, it will be important to again concentrate on measures of quality of surgical provision, such as Day-of-Surgery Admissions (DOSA) and reductions in rates of complications. The dataset has recently added fields to allow collection of data on multi-disciplinary team working and on dual consultant operating.

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6 | Thanks and acknowledgements

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This report is available online here.