NATIONAL CARDIAC AUDIT PROGRAMME

NATIONAL ADULT CARDIAC SURGERY AUDIT (NACSA)

2021 Summary Report

NICOR

The National Institute for Cardiovascular Outcomes Research (NICOR)

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

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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.

www.scts.org

Barts Health NHS Trust

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

The Healthcare Quality Improvement Partnership (HQIP)

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

www.hqip.org.uk/

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NACSA AT A GLANCE

Data from the three-year period April 2017 to March 2020

31,046 cardiac operations were performed in 2019/20 (a 13% fall over 5 years, almost all in elective procedures, falls greatest in women >70yrs)

Valve interventions

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

Mitral valve repair is the preferred method of surgery for patients with mitral disease, but mitral valve replacement (MVR) is usual in patients with unfavourable valve characteristics (such as rheumatic mitral disease).

25% increase in all aortic valve interventions over 5 years (now 5056 AVRs, 2596 AVR&CABG, 6076 TAVIs)

26% fall in isolated mitral valve repairs and 15.7% fall in isolated mitral valve replacements over 5 years

61% rate of mitral valve repairs (rate varies between hospitals from 22-90%)

Coronary Artery Bypass Graft (CABG) surgery in numbers

Coronary artery bypass graft surgery is the most common type of cardiac surgery. The number of CABG performed has been falling steadily year on year. The number of elective CABGs performed has been falling steadily year on year, whilst the number of urgent and emergency procedures is stable.

104 days	↑	wait for elective CABG (up from 97 days in 2017/18)
11 days	↑	wait for urgent CABG (up from 10 days in 2017/18)
18.5%	↑	admitted on day of surgery (up from 10.8% in 2017/18)
50.7%	↑	percentage of CABG cases performed as urgent cases (up from 47.4% over 3 years)
0		no hospital operates on >75% of urgent cases within 7 days of the angiogram
1.8%	↓	reoperation for bleeding after CABG (down from 2.6% in 2017/18); low rates of other complications

Executive summary

This report summarises the outputs of the National Adult Cardiac Surgery Audit (NACSA) for 3 years of data collected between 1st April 2017 and 31st March 2020. All data within this report are from this 3 year period unless stated otherwise.

It includes data collected in March 2020 when the first few cases of the COVID-19 pandemic were being identified in cardiothoracic units. Analysis of the data suggests little effect of COVID-19 on the metrics being presented due to the small number of cases reported in the UK prior to April 2020.

KEY MESSAGES

	FOCUS OF ATTENTION	AUDIT FINDING
	**Number of procedures**	Fall of 13% in cardiac surgical procedures over 5 years to 31,046. Almost all the fall was in elective procedures. Surgery in women greater than 70 years of age has fallen more than in other groups.
	**Waiting times for elective coronary artery bypass grafting (CABG)**	Increased to 104 days, up from 97 days in 2017/18. Only 8 NHS hospitals have a mean wait <84 days.
	**Urgent CABG cases to be operated on during the index admission**	50.7% CABGs are now performed as urgent cases (up from 47.4% in 3 years)
	**Waiting times for urgent CABG**	Now 11 days, up from 10 days in 2017/18. No hospital achieves >75% cases operated on within 7 days of the angiogram
	**Increase day of surgery admissions**	Now 18.5%, up from 10.8% in 2017/18
	**Number of mitral valve (MV) repairs and replacements**	Fall of 26% in isolated MV repairs and a 15.7% fall in MV replacements over 5 years
	**Review rates of MV repairs vs replacements**	61.6% rate of repairs but high variation (between 22% and 91%) across different hospitals
	**Aortic valve (AV) interventions**	Increase of 25% in AV interventions over 5 years. In 2019/20, there were 5,056 isolated AV replacements, 2,596 AVR&CABGs and 6,076 TAVIs

	**Complications following cardiac operations**	Complications remain at a low level. Re-operations for bleeding have fallen from 2.6% to 1.8% since 2017/18
	**Audit dataset**	73% implementation of the new dataset over 3 years. Some hospitals need to provide a complete dataset.

1 Introduction

This report summarises the outputs of the National Adult Cardiac Surgery Audit (NACSA) for 3 years of data collected between 1st April 2017 and 31st March 2020. All data within this report are from this 3 year period unless stated otherwise. It includes data collected in March 2020 when the first few cases of the COVID-19 pandemic were being identified in cardiothoracic units. Analysis of the data suggests little effect of COVID-19 on the metrics being presented due to the small number of cases reported in the UK prior to April 2020.

However, for the overall mortality rates of individual hospitals and cardiac surgeons within the Clinical Outcomes Publication (COP), following discussions between SCTS, NICOR and HQIP, we elected to report on the period from March 1st 2017 until 29th February 2020 (shifting the analysis back by a month compared to usual) as prior to the analysis there was uncertainty whether the results of surgery in March 2020 might have an undue impact from COVID-19 related mortality for individual surgeons. (Subsequent analysis has shown this to not be the case, but we have stuck to publishing the pre-agreed timeframe.) These results are reported separately here and here.

Unlike last year, when two Scottish hospitals were missing, the data for 2019/20 comes from every single NHS hospital performing cardiac surgery in the UK, so a true UK-wide picture is possible. It also includes the missing Scottish data from the 2018/19 report. Three private hospitals performing cardiac surgery in 2019/20 have contributed, however three private hospitals (all in England) have chosen not to. Future reports will not contain Scottish data, following the establishment of the Scottish Cardiac Audit Programme.

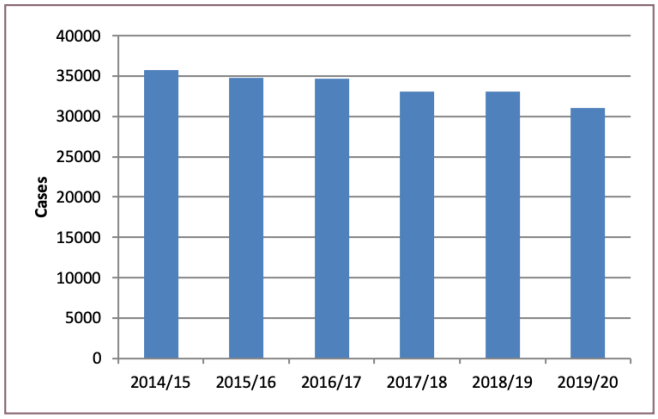
In order to prevent this report being too long, much of the supplementary data to the figures and tables are contained within an appendix (available here). In particular, more data are presented on hospitals for several of the metrics with the trends over each of the last 3 (or in some cases 6) years.

1.1 Activity levels and trends

In 2019/20 there were 31,046 adult cardiac operations performed in the UK [Figure 1]. This represents a 13% fall in procedures over the last 5 years (4,645 fewer in 2019/20 compared to 2014/15). There have been falls in all of the four nations during this time (13.8% for England, 6.5% for Scotland, 11.8% for Wales and 8.3% for Northern Ireland) [Table 1].

During the last year (2018/19 to 2019/20) there were 1,977 fewer procedures in the UK (a fall by 6%), with a 5-7% reduction in England and Wales, no change in Scotland and an increase of 5.3% in Northern Ireland. These changes have been seen in both NHS and private centres, with a fall in activity in 26 out of 35 NHS hospitals. There was an increase in activity associated with the developments at the Bart's Heart Centre (combining two former individual hospitals) and a slight increase over the previous year in four other English, two Scottish, one Welsh and the one Northern Irish centre.

Figure 1: Number of cardiac operations performed each year in the UK for the past 6 years



Includes emergency operations.

Table 1: Number of cardiac operations performed each year by country for the past 6 years

Region	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
UK total	35,691	34,752	34,670	33,040	33,023	31,046
England	30,782	29,949	29,991	28,499	28,493	26,545
Northern Ireland	864	917	907	860	752	792
Scotland	2,680	2,521	2,475	2,432	2,506	2,505
Wales	1,365	1,365	1,297	1,249	1,272	1,204

The mortality rates following cardiac surgery overall (including emergencies) have been falling over the decades since the first data were collected, and in particular over the past 10 years [Figure 2 and Table 2]. It appears that this improvement may have plateaued over the last 5 years and, for the first time, the mortality rate has risen in 2019/20 compared to the previous year (from 2.23% to 2.44%). It is to be noted, however, that these crude mortality rates are not risk-adjusted for case mix.

Figure 2: Crude annual mortality rates (%) following all cardiac surgery (including emergencies) in the UK since 2010

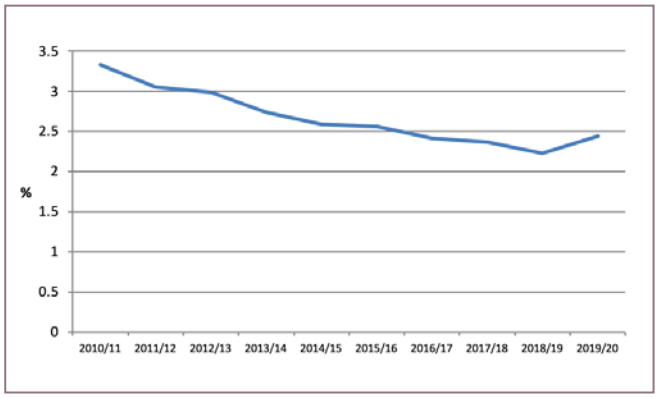


Table 2: Crude annual mortality rates (%) following all cardiac surgery (including emergencies) in the UK, since 2010

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
UK	3.33	3.05	2.99	2.74	2.59	2.56	2.41	2.37	2.23	2.44

In 2019/20 there were 13,932 isolated coronary artery bypass grafting (CABG) procedures performed in the UK [Figure 3 and Table 3]. The numbers of patients undergoing CABG procedures have been steadily falling over the last 5 years. Total numbers decreased by 3,007 operations (17.7%) between 2014/15 and 2019/20 across the UK. This is almost entirely due to a reduction in elective CABG cases (patients admitted from home for surgery) during this time (by 3,090 cases, 31.5%).

Urgent CABG cases (performed during same hospital admission as the angiogram) have stayed roughly the same over the 5 years and for the first time overtook elective cases in 2019/20. Emergency CABG cases (performed the same day as the angiogram) have also been stable.

Figure 3: Number of isolated CABG operations in UK (total and divided into operative urgency), 2014/15 – 2019/20

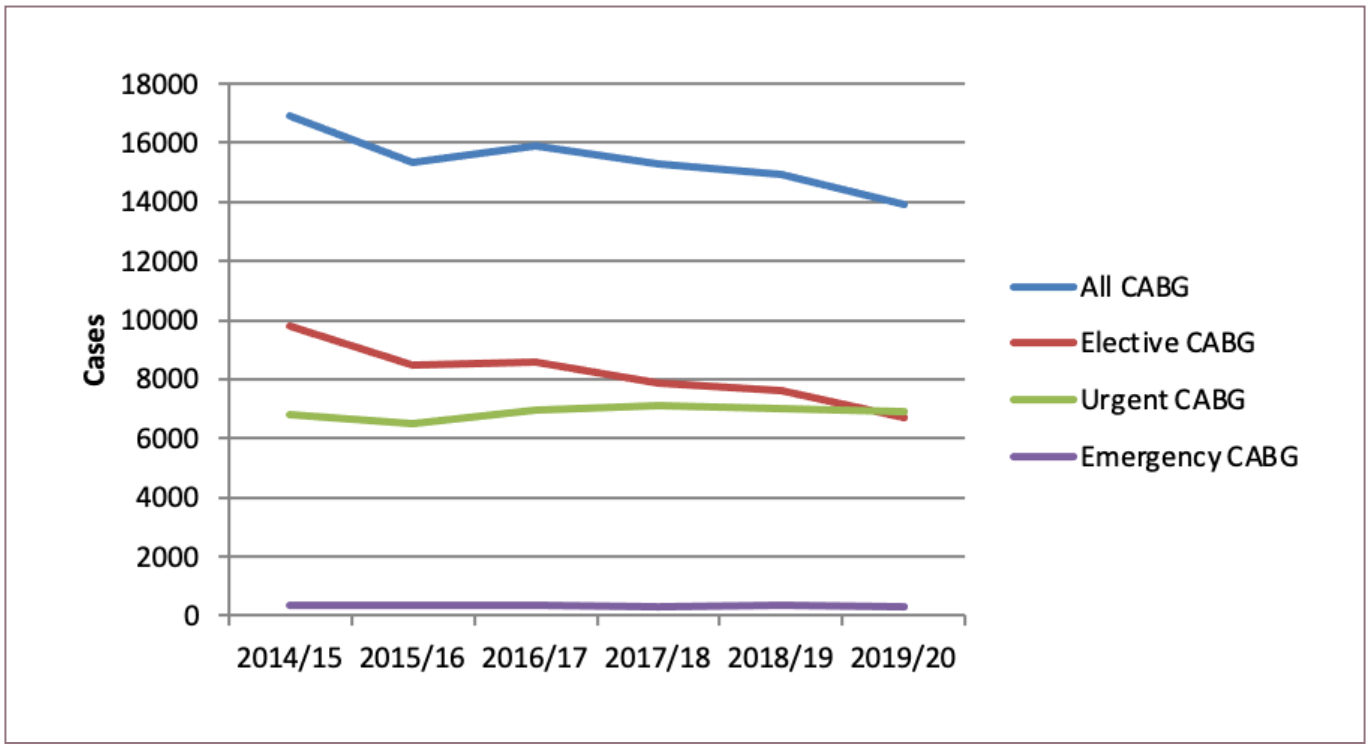


Table 3: Number of isolated CABG operations in UK, 2014/15 – 2019/20

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
All CABG	16,939	15,345	15,897	15,305	14,930	13,932
Elective CABG	9,804	8,500	8,592	7,884	7,613	6,714
Urgent CABG	6,782	6,512	6,951	7,106	6,987	6,914
Emergency CABG	353	333	354	315	330	304

Emergency CABG includes both emergency and salvage cases.

The UK mortality rates for non-emergency isolated CABG continue to be low with rates no more than 1% in each of the last 6 years and 0.87% in 2019/20 [Figure 4 and Table 4]. In 2019/20 UK mortality rates after urgent CABG were 1.13% and 0.61% after elective CABG.

Figure 4: Mortality (%) following isolated CABG in the UK (all cases, and divided into operative urgency), 2014/15 – 2019/20

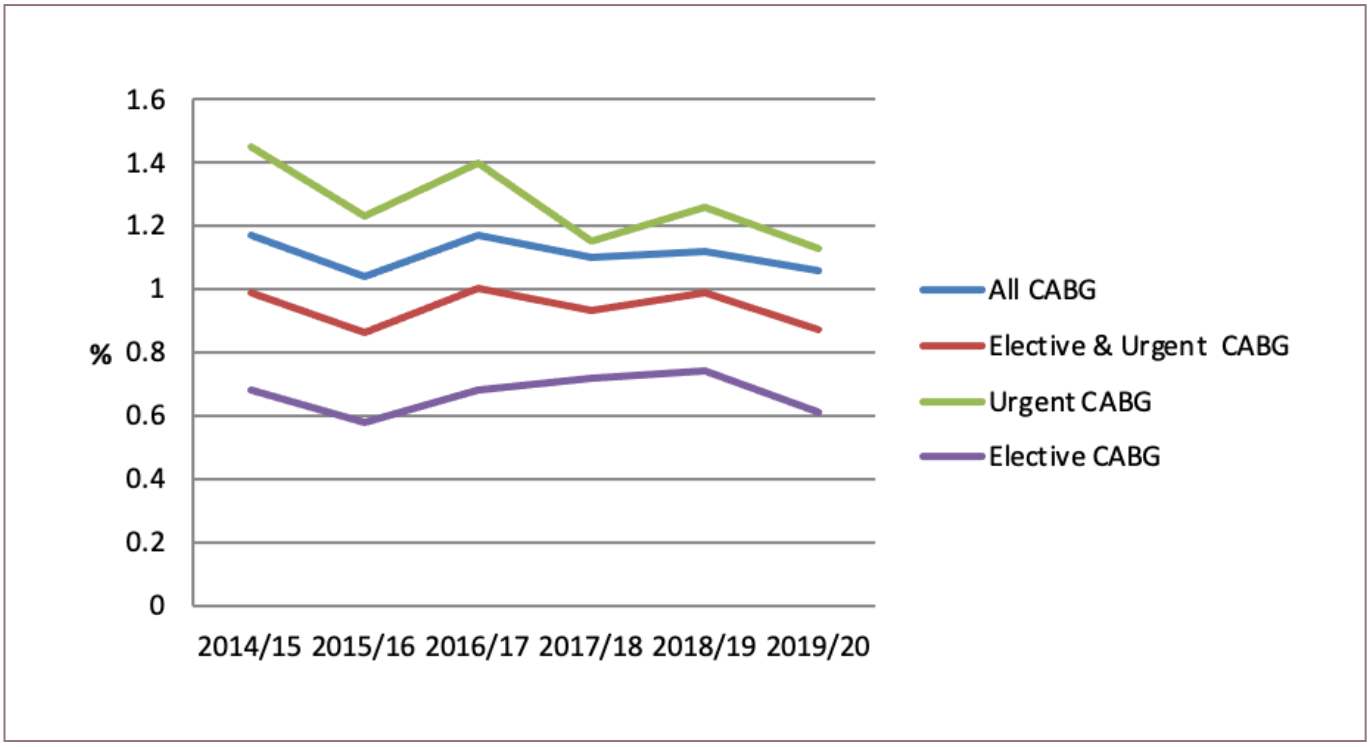


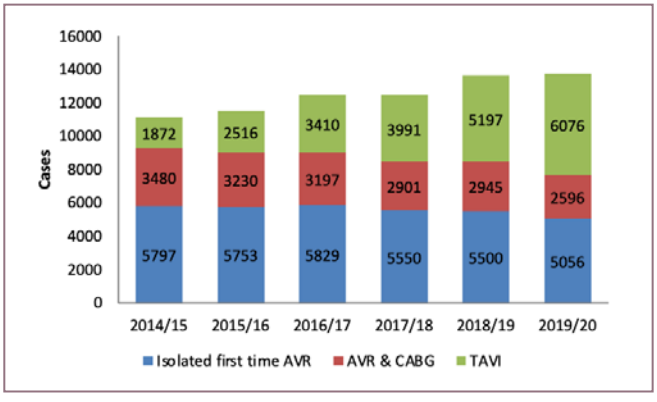
Table 4: Mortality (%) following isolated CABG in the UK (all cases, and divided into operative urgency), 2014/15 – 2019/20

UK	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
All CABG	1.17	1.04	1.17	1.1	1.12	1.06
Elective & Urgent CABG	0.99	0.86	1.00	0.93	0.99	0.87
Urgent CABG	1.45	1.23	1.40	1.15	1.26	1.13
Elective CABG	0.68	0.58	0.68	0.72	0.74	0.61

All CABG includes emergencies and salvage. In hospital mortality rate.

Numbers of patients undergoing either surgical aortic valve replacement (AVR) or combined AVR & CABG have fallen between 2014/15 and 2019/20. However, there has been a year-on-year increase in the number of TAVI procedures, such that the overall number of patients undergoing interventions for aortic valve disease has continued to rise. Over the last 5 years, nearly 25% more patients with aortic valve disease have been treated per year in the UK [Figure 5 and Table 5].

Figure 5: Number of Aortic Valve Replacements (AVR), combined AVR&CABG, and Transcatheter Aortic Valve Implantations (TAVI) in UK, by year, 2014/15 – 2019/20



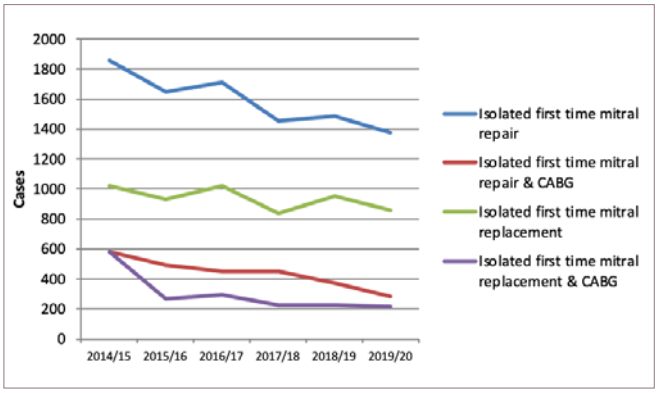
AVR (Aortic Valve Replacement); TAVI (Transcatheter Aortic Valve Implantation).

Table 5: Number of Aortic Valve Replacements (AVR), combined AVR&CABG, and Transcatheter Aortic Valve Implantations (TAVI) in UK, by year, 2014/15 – 2019/20

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Isolated first time AVR	5,797	5,753	5,829	5,550	5,500	5,056
AVR & CABG	3,480	3,230	3,197	2,901	2,945	2,596
TAVI	1,872	2,516	3,410	3,991	5,197	6,076

Operations on the mitral valve can either be to repair or to replace the valve. Rates for all types of mitral surgery have fallen over the past 5 years [Figure 6 and Table 6]. Isolated mitral repair operations have fallen by 484 (26%), and isolated mitral repair & CABG have fallen by 299 (51%). Isolated mitral valve replacement (MVR) has fallen by 161 (15.7%), and isolated MVR & CABG has fallen by 366 (63%).

Figure 6: Number of mitral valve operations with and **without CABG,** UK by year, 2014/15 – 2019/20



Includes emergencies.

Table 6: Number of mitral valve operations with and without CABG, UK by year, 2014/15 – 2019/20

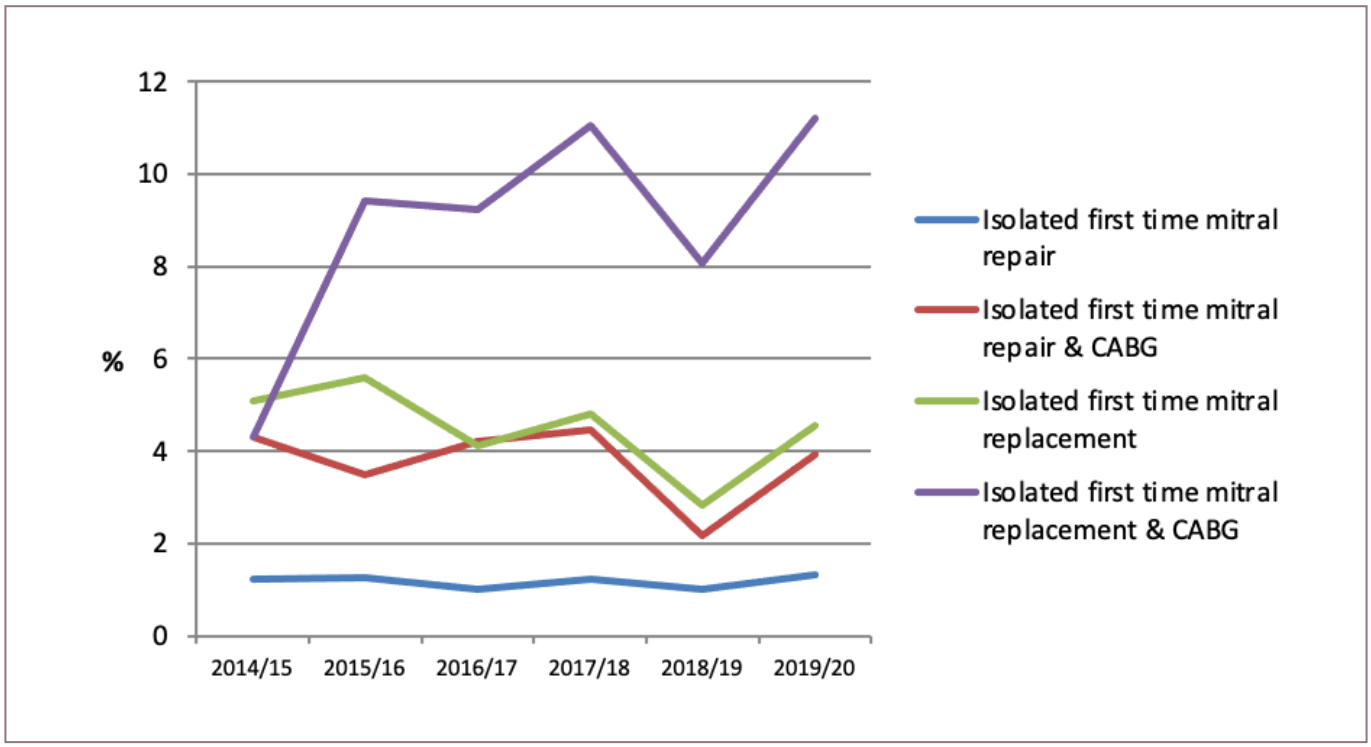
UK	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Isolated first time mitral repair	1,859	1,649	1,709	1,454	1,487	1,375
Isolated first time mitral repair & CABG	580	490	450	448	370	281
Isolated first time mitral replacement	1,019	930	1,019	835	951	858
Isolated first time mitral replacement & CABG	580	265	293	226	223	214

Includes emergencies.

Mortality rates following the different types of mitral surgery are shown in Figure 7 and Table 7. Mortality after isolated mitral repair is low and has been stable for the past 5 years at just over 1%.

The highest risk is for patients undergoing MVR & CABG combined with rates around 8% to 11% over the 5 years. Clearly, isolated mitral repair is a safer option for patients compared to isolated MVR. However, patients suitable for MV repair can often be very different to those in whom an MVR might be more appropriate, for example in cases of mitral stenosis.

Figure 7: Crude mortality rates (%) following mitral valve operations with and without CABG, UK by year, 2014/15 – 2019/20



Includes emergencies.

Table 7: Crude mortality rates (%) following mitral valve operations with and without CABG, UK by year, 2014/15 – 2019/20

UK	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Isolated first time mitral repair	1.24	1.27	0.99	1.24	1.01	1.31
Isolated first time mitral repair	4.31	3.47	4.22	4.46	2.16	3.91
Isolated first time mitral replacement & CABG	5.10	5.60	4.12	4.79	2.84	4.55
Isolated first time mitral replacement & CABG	4.31	9.43	9.22	11.06	8.07	11.21

Includes emergencies.

1.2 Changes in age and sex of patients undergoing cardiac surgery over time

The age of patients undergoing cardiac surgery is falling. Across the UK the mean age fell from 66.7 years (2017/18) to 66.2 years (2019/20). This trend was seen across all four of the nations, although the mean age was higher in Wales (68.0 years) than in the other three countries [Figure 8]. For two or more decades the age of patients undergoing surgery was increasing in the UK, but this has plateaued and is now beginning to fall. The variation in the mean age of patients between NHS hospitals was from 63.0 to 70.0 years (2019/20).

Corresponding to the drop in overall cases performed in the UK, there is a fall in the numbers of male patients having surgery across all age groups. However, there is little difference between the age groups with the rate of decline [Figure 9].

For women there is also a drop in numbers of operations performed across all age groups [Figure 10]. Unlike for men, the drop is particularly marked for women aged over 70 [Figure 11]. For women aged over 70, the drop in case numbers has been by 1,253 over 5 years (23.1% between 2014/15 and 2019/20). The proportion of patients over 70 having cardiac surgery that are female has dropped from 33.5% to 29.6% over 5 years (2014/15 to 2019/20). It is hard to explain why the drop in patients over 70 having surgery has affected women more than men.

There is certainly a drop in older patients having surgical AVR, as TAVI has increased, but this does not equate to the differences seen. It also would not explain why the drop is larger for women in this age group compared to men, as the current guidance for TAVI does not have differing age limits between men and women. The variation in the proportion of female patients undergoing surgery in NHS hospitals is from 20.5% to 31.2% in 2019/20 (compared to the UK mean of 25.8%).

The number of patients undergoing isolated CABG has been falling for the last 6 years. The proportionate fall in patients undergoing isolated CABG has been roughly uniform across the age groups (between 17.2% to 19.8%) [Figure 12]. This is likely to represent changes in practice in treating coronary disease, either with PCI or with medical treatment, that is currently equally applied across the age groups.

The numbers of patients undergoing surgical AVR has stayed roughly stable in the age group of patients less than 70 years old. However, for the over 70 age group there has been a drop in patients having isolated AVR (by 756 patients (17.1%) per year, between 2014/15 and 2019/20) [Figure 13]. This change is almost certainly entirely due to the increased use of TAVI to treat this population of patients with severe aortic stenosis over the age of 70.

Figure 8: Age (mean) of patients undergoing cardiac surgery, by country by year, 2017/18 – 2019/20

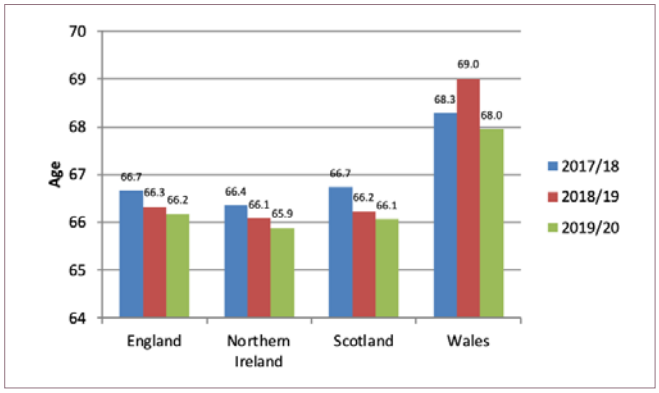


Figure 9: Number of male patients having cardiac surgery by age group, UK by year, 2014/15 – 2019/20

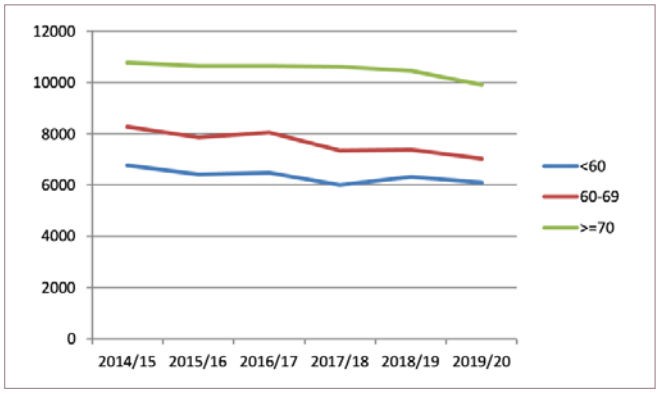


Figure 10: Number of female patients having cardiac surgery by age group, UK by year, 2014/15 – 2019/20

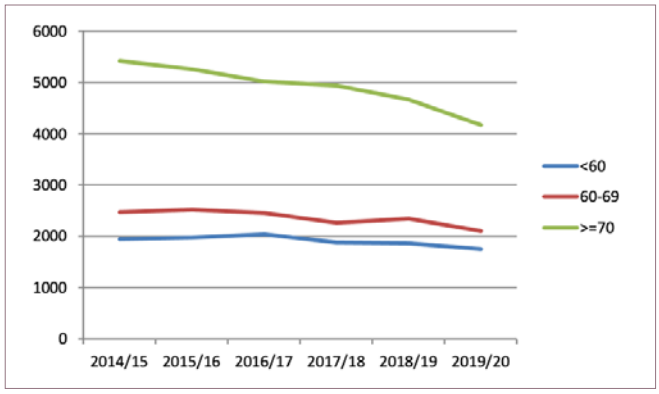
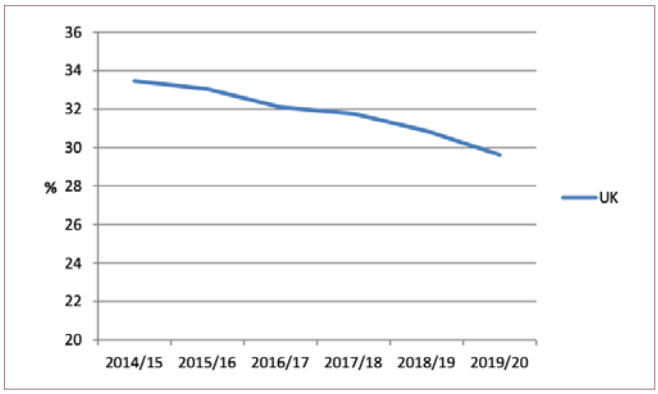


Figure 11: Proportion (%) of patients >70 years old having cardiac surgery that are female, UK by year, 2014/15 – 2019/20



The proportion of female patients (all age groups) in 2019/20 was 25.8%.

Figure 12: Number of patients undergoing isolated CABG by age group, UK by year, 2014/15 – 2019/20

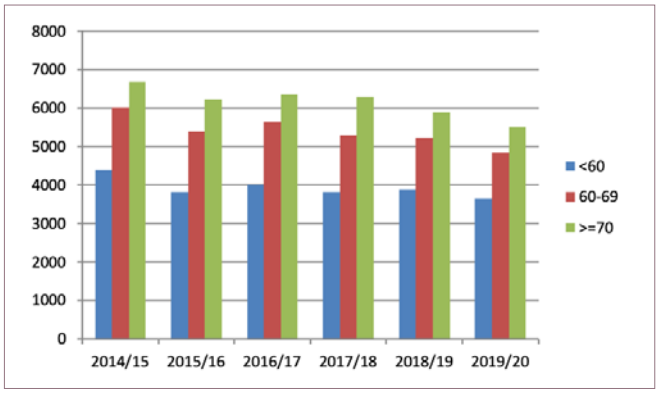
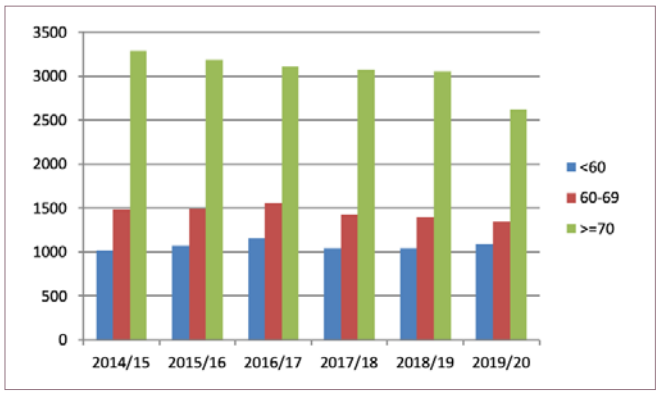


Figure 13: Number of patients undergoing isolated AVR by age group, UK by year, 2014/15 – 2019/20



2 | Quality improvement metrics

2.1 Times waiting for elective CABG have worsened

2.1.1 Overview of QI metric

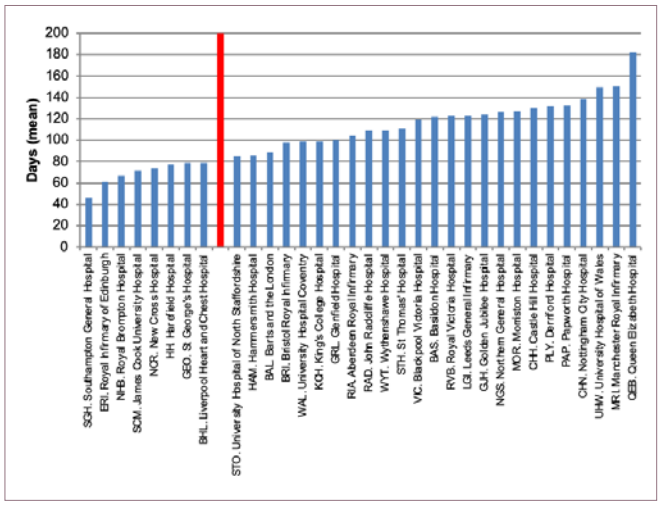
QI Metric Description/Name	Elective CABG waiting time – from angiography to operation date
Why is this important?	Patients should not wait any longer than necessary for elective coronary artery surgery that is expected to improve both symptoms and/or life expectancy.
QI theme	Safety and Effectiveness
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	An increase from 97 days (mean) in 2017/18 to 104 days in 2019/20 across UK.
Variance	See Figure 14. Best performance is in England compared to the other 3 nations, but still had an increase from 95 to 103 days over the 3 years. Worst was in Wales increasing from 113 to 140 days. Eight NHS hospitals achieved target of <12 weeks. In 8 hospitals it was worse than 18 weeks [Figure 15].

2.1.2 Audit results

Over three years, the mean waiting time to elective CABG following angiography in NHS hospitals worsened by 7 days, from 97 to 104 days [Figure 14]. There were increases in times for all of the UK nations (+8 days in England, +5 days in Scotland, +27 days in Wales and +4 days in Northern Ireland) but with considerable variation amongst NHS centres (range 46-150 days) [Figure 15].

Figure 14: Mean times (days) from diagnostic angiography to elective CABG, by country 2017/18 to 2019/20.

Figure 15: Waiting time (mean days) for elective CABG by NHS hospital, 2019/20.



Target <84 days. (Hospitals to the left of the red bar achieve the target.)

2.1.3 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.

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

2.2 More patients undergoing first time elective CABG were admitted on the same day as surgery (DOSA).

2.2.1 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[1]
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	Increase from 10.8% in 2017/18 to 18.5% in 2019/20 across UK [Figure 16].
Variance	There was very considerable variation amongst NHS centres (from 0.3% to 71.4%). Four centres achieved the target of better than 50% [Figure 17].

2.2.2 Audit results

Following the GIRFT report in 2018, SCTS has promoted the use of day-of-surgery admissions (DOSA) for elective cardiac surgery.[1] 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.

Although well short of the 50% target that has been set, the proportion having DOSA for elective surgery increased from 10.8% to 18.5% over two years, but this was entirely down to improvements seen in England (from 11.4% to 20.8%) [Figure 16]. Rates were lower in the other nations: Scotland 7.4%; Northern Ireland 2.8%; Wales 1.9%. There was very considerable variation amongst centres (0.3% to 71.4% in NHS centres, Figure 17) and many surgical units could learn from the steps taken by those who have championed this change in practice.

Figure 16: Proportion (%) of patients undergoing elective CABG with day-of-surgery admission (DOSA), by country, 2017/18 to 2019/20

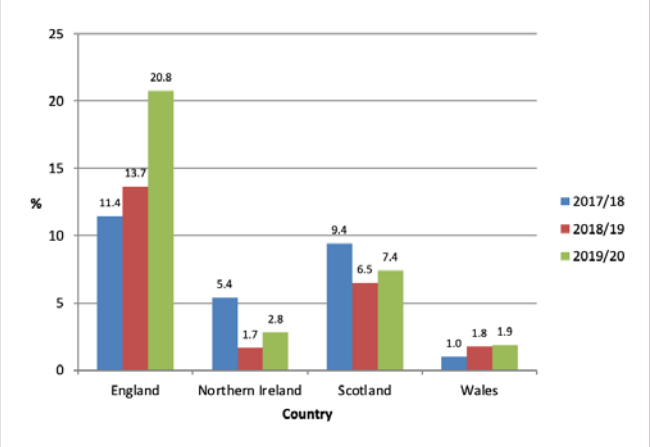
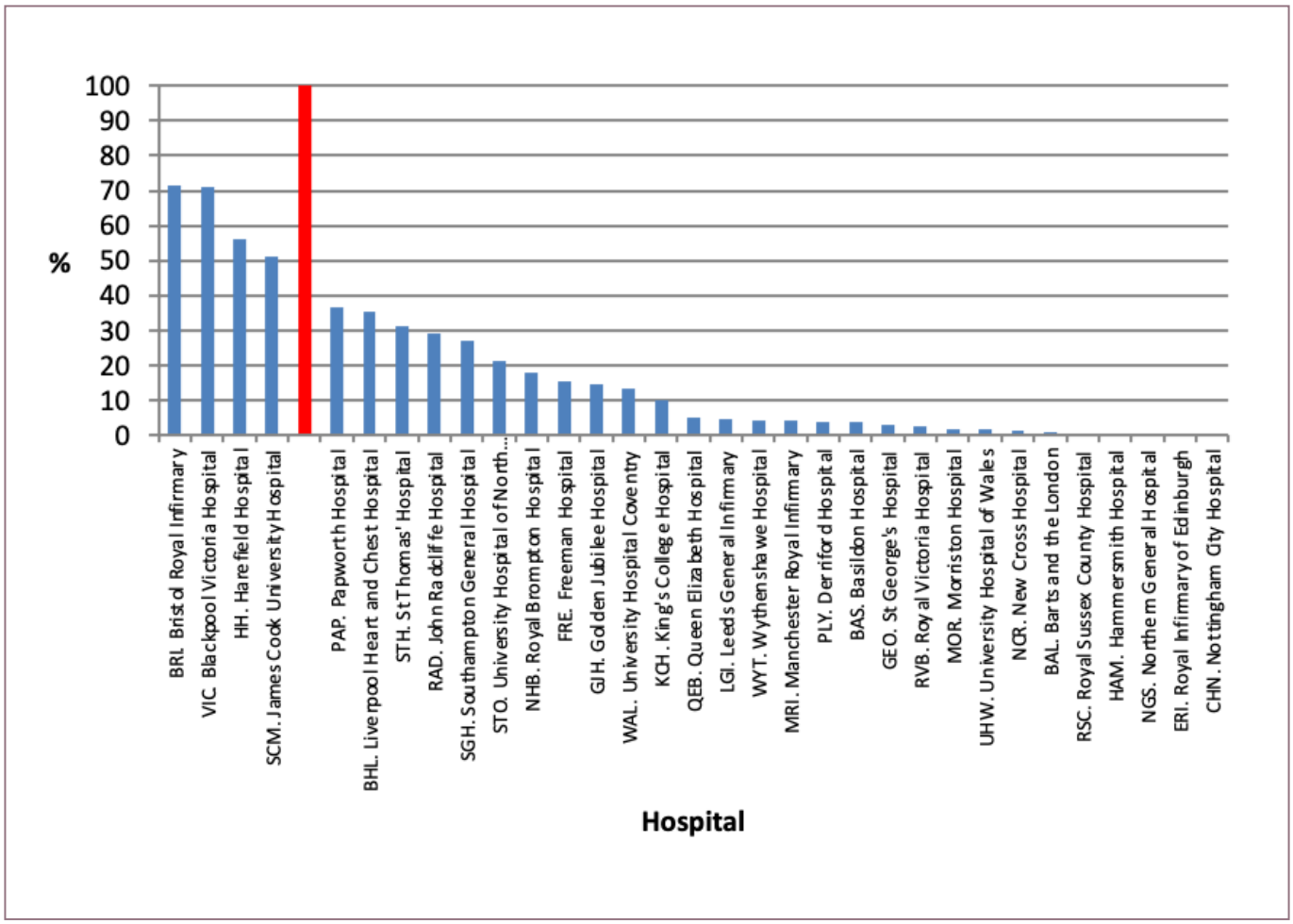


Figure 17: Proportion (%) of patients with day-of-surgery admission (DOSA) for elective CABG, by NHS hospital, 2019/20.



Target >50%. (Hospitals to the left of the red bar achieve the target.)

2.2.3 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.

2.3 Greater proportion of patients are undergoing urgent CABG

2.3.1 Overview of QI metric

QI Metric Description/Name	Proportion of first time CABG operated on urgently
Why is this important?	Timely CABG surgery during the same hospital admission as a NSTEMI is recommended. Patients should not be routinely sent home without an operation (often called 'home and date' for surgery). Patients with NSTEMI requiring revascularisation are the commonest reason for referral for CABG. There should be an emphasis on providing CABG surgery urgently, rather than electively, before the patient has further cardiac events (death or another myocardial infarction, MI).
QI theme	Safety and Effectiveness
What is the standard to be met?	There are no existing audit standards for this metric. This audit outlines the current UK performance and allows identification of poorer performance by units. Based on current UK data there is an expectation that at least 50% of CABG operations in each hospital should be performed urgently
Key references to support the metric	NACSA recommendation.
Numerator	All patients undergoing first time CABG as an urgent case.
Denominator	All patients undergoing first time CABG.
Trend	Gradual improvement in the UK over the last three years, from 47.4% to 50.7% [Figure 18].
Variance	The best unit achieves 70% of CABG cases performed urgently, compared with 29% in the worst. 21 (out of 35 NHS) units achieve greater than 50% of cases [Figure 19].

2.3.2 Audit results

Following admission with an acute coronary syndrome, patients may require percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG) or a decision may be made for patients to continue with optimal medical therapy (tablets) without undergoing a revascularisation procedure.

For those in whom CABG is the preferred option, there has been a push towards offering urgent CABG surgery to patients, provided during the same hospital admission, as the highest risk of a further heart attack is during the first 30 days following the first acute event. This is rather than the previous policy of discharging the patient home to be readmitted later for elective surgery.

Some progress has been made, either because of this focus on urgent cases, maybe aided by a reduction overall in the number of patients undergoing elective CABG (although this is partly cause and effect). Overall, urgent cases represented 50.7% of all CABG cases in the UK in 2019/20 (a 3.3% increase over 3 years) [Figure 18]. The highest proportion of urgent cases was seen in Wales (63.7%, +5.8%), then Northern Ireland (51.5%, +4.1%) and England (51.3%, +3.3%); the lowest proportion of urgent cases was seen in Scotland (39.6%, but this represented a 5% improvement over 3 years).

There was considerable variation amongst centres (from 29% to 70% in NHS centres) suggesting considerable room for improvement is possible [Figure 19].

Figure 18: Proportion (%) of first-time CABG patients operated on urgently, by country, 2017/18 to 2019/20

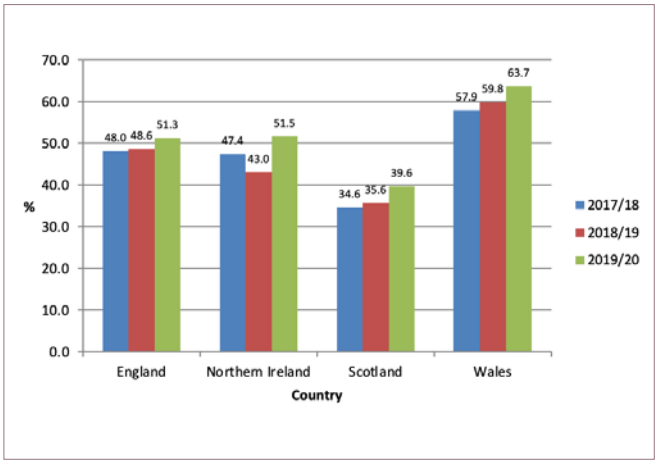
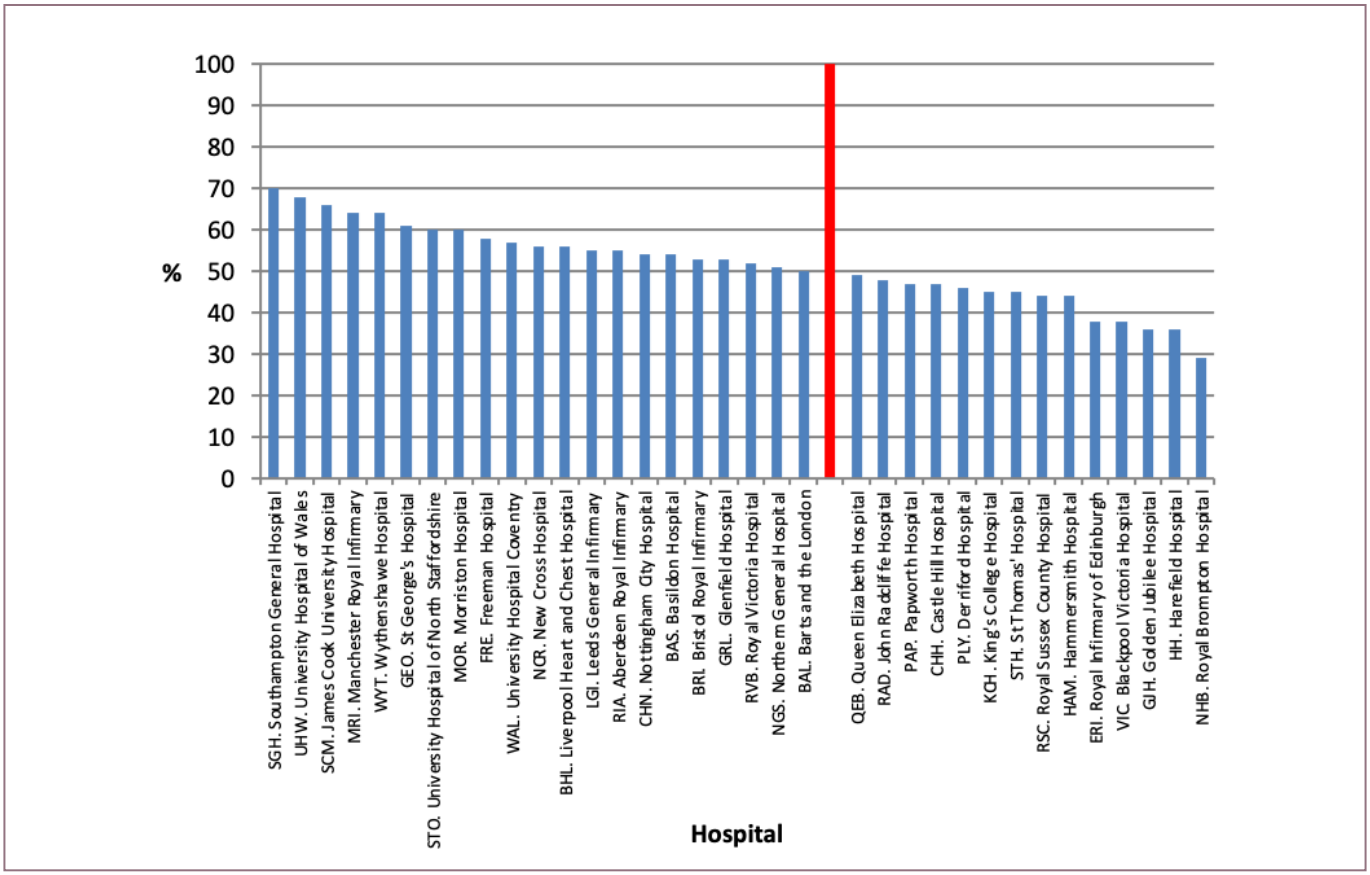


Figure 19: Proportion (%) of first-time CABG patients operated on urgently, by NHS hospital, 2019/20.



Target >50%. (Hospitals to the left of the red bar achieve the target.)

2.3.3 Recommendations for those not achieving the standard

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.

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

2.4.1 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 (European Society of Cardiology [ESC])/European Association for Cardio-Thoracic Surgery [EACTS] Revascularisation Guidelines 2018).[2] 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. In the 2020 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[2] CQUIN target[3]
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 34% of patients achieving the target in 2019/20, but this has worsened from 37% in 2017/18. Scotland achieved 28% in 2019/20 (no change). Wales was worse at 17% (compared to 26% in 2017/18). Northern Ireland only achieved 6% [Figure 20].
Variance	Only 6 NHS hospitals achieved >50%. There is a very large variance from best to worst hospitals – from 60% to 6% [Figure 21]

2.4.2 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 34% of patients achieved the target in 2019/20. No UK hospital achieved the target of performing 75% of urgent CABG within 7 days. There is a considerable variance in performance between the best and worst hospitals, suggesting that major improvements can be made by those that are poorly performing.

Figure 20: Proportion (%) of urgent CABG performed within 7 days of coronary angiography, by country, 2017/18 to 2019/20

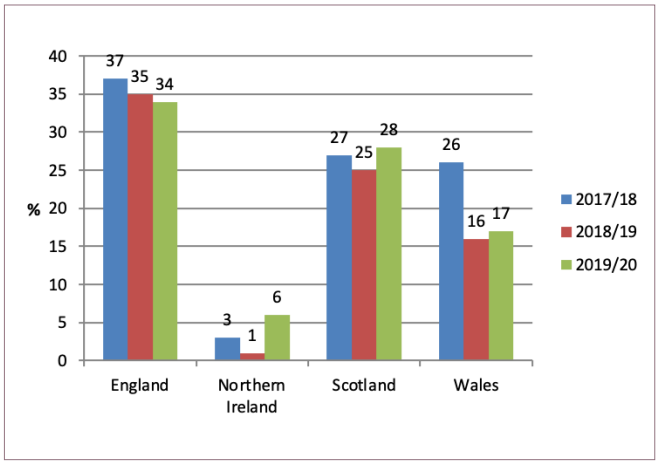
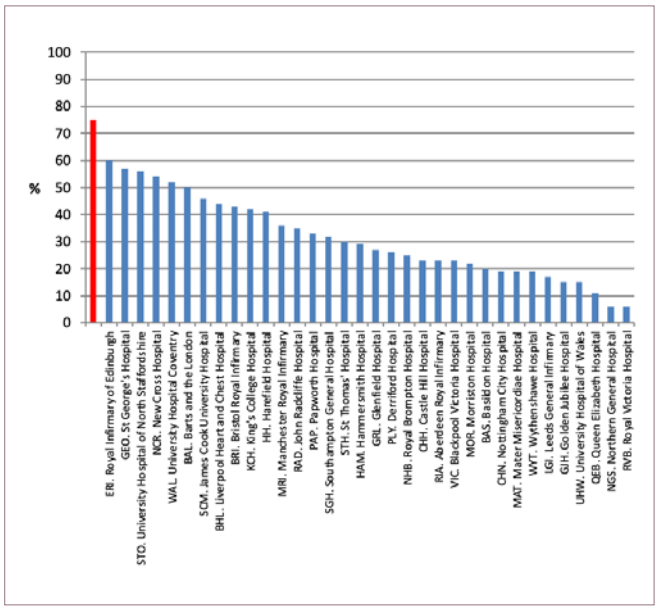


Figure 21: Proportion (%) of urgent CABG performed within 7 days of coronary angiography, by NHS hospital, 2019/20.



Target 75%. (No hospital achieves this target.)

2.4.3 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.

2.5 No improvement in time to urgent CABG following coronary angiography

2.5.1 Overview of QI metric

QI Metric Description/Name	Time to urgent CABG following 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).[2] 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.[3]
Key references to support the metric	ESC/EACTS Revascularisation Guidelines[2] CQUIN target[3]
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 increased from 10 to 11 days between 2017/18 and 2019/20 [Figure 22]. There was no change in England (10 days), a worsening in Northern Ireland (22 to 24 days) and in Wales (12.5 to 14 days), with an improvement in Scotland (14 to 13 days).
Variance	There is considerable variation between hospitals (between 7 days and 24 days). Five NHS hospitals achieved the 7 day target [Figure 23].

2.5.2 Audit results

The waiting time to urgent CABG has worsened with an increase across the UK of one day overall. Across the four nations the changes were 0, -1, +1.5, +2 days for England, Scotland, Wales and Northern Ireland respectively [Figure 22]. Times were worst for Northern Ireland (24 days), with Wales (14 days), Scotland (13 days) and England (10 days) having better performance. There was considerable variation between NHS centres from 7 to 24 days. Five hospitals achieved the 7 day target [Figure 23]. 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 22: Time (mean days) to urgent CABG after diagnostic angiography, by country, 2017/18 to 2019/20

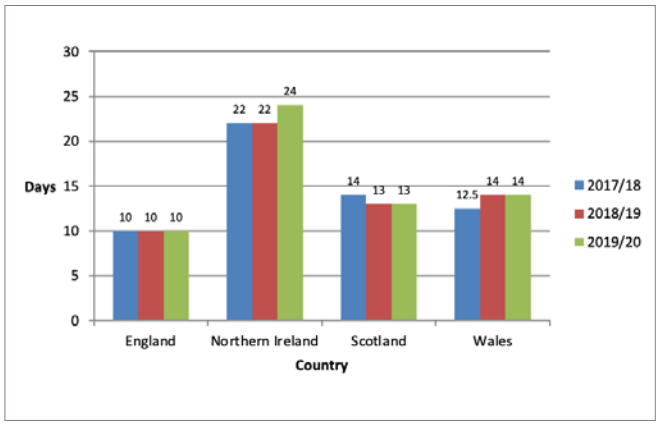
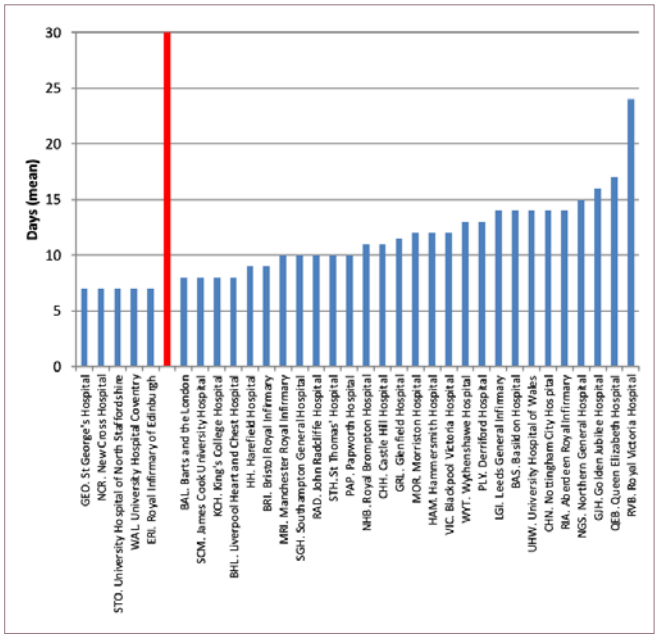


Figure 23: Time (mean days) to urgent CABG after diagnostic angiography, by NHS hospital, 2019/20.



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

2.5.3 Recommendations for those not achieving the standard

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

A QI action plan should be instigated to reduce delays.

2.6 No change in post-op length of stay (PLOS) following first time CABG

2.6.1 Overview of QI metric

QI Metric Description/Name	Post-op length of stay (PLOS) following first time CABG
Why is this important?	Length of stay in hospital is prolonged in patients with complications following surgery. Prolonged PLOS increases costs of care. Evidence from the GIRFT report in 2018 suggested that improvements in 7 day working practices within surgical units may possibly help to reduce PLOS.
QI theme	Effectiveness
What is the standard to be met?	There are no clear audit standards for PLOS. The audit seeks to show the current practice around the UK, and to give a benchmark for units with below average performance. From NACSA report 2020 the mean in the UK was 7.8 days in 2018/19.
Key references to support the metric	Get it Right First Time (GIRFT) report 2018[1]
Numerator	All patients requiring first time CABG
Denominator	n/a
Trend	Across the UK as a whole there has been little change in PLOS from 8.0 days in 2017/18 to 7.9 days in 2019/20. England has the best performance at 7.8 days, but no change from 2017/18 to 2019/20. Northern Ireland (from 9.5 to 8.5 days), Scotland (8.5 to 8.3 days) and Wales (9.5 to 9.2 days) have all improved from 2017/8 to 2019/20 [Figure 24].
Variance	There is considerable variance between from 6.5 to 10.7 days from the best to worst NHS hospitals in 2019/20 [Figure 25].

2.6.2 Audit results

Post-op length of stay (PLOS) following first time CABG has not shortened over the last 3 years in the UK. In 2019/20 the best performance was in England (7.8 days), followed by Scotland (8.3 days), Northern Ireland (8.5 days), with the worst in Wales (9.2 days). However, there is evidence that the performance has improved over the last 3 years in the 3 countries other than England.

Longer PLOS may be due to postoperative complications. Based on the GIRFT report it is also associated with poorer practices surrounding discharging patients from hospital at the weekend. This may be due to less senior clinician input. There was considerable variance from 6.5 to 10.7 days from the best to worst NHS hospitals in 2019/20. This suggests that the poorer performing hospitals have scope to improve.

Figure 24: Post-op length of stay (PLOS) (mean days) following first time CABG, by country, 2017/18 to 2019/20

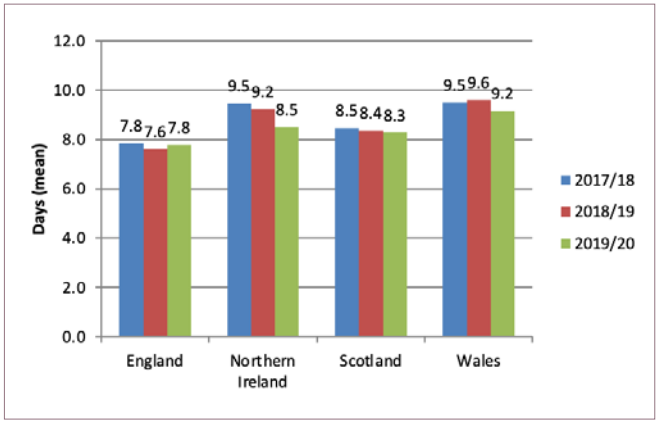
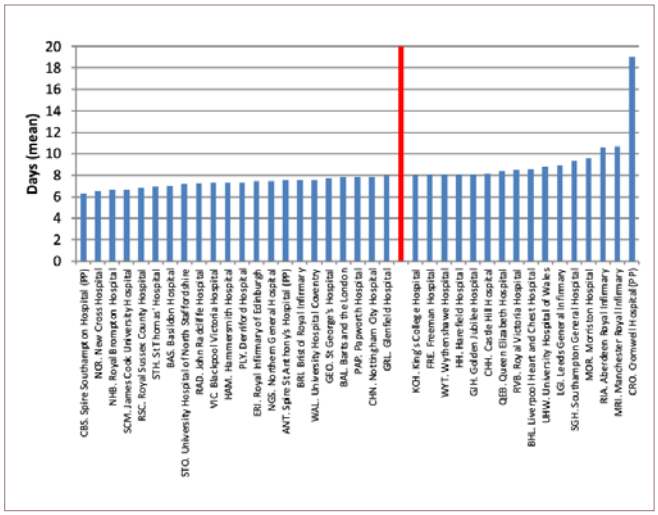


Figure 25: Post-op length of stay (PLOS) (mean days) following first time CABG, by hospital, 2019/20.



Target: Hospitals to the left of the red bar were better than the UK mean of 7.9 days in 2019/20.

2.6.3 Recommendations for those not achieving the standard

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.

2.7 Rates of post-op bleeding (following CABG) are improving

2.7.1 Overview of QI metric

QI Metric Description/Name	Post-op bleeding (following CABG)
Why is this important?	Bleeding is a major complication following all cardiac surgery and can be a serious risk for patients. Major bleeding usually necessitates a return to theatre, may require blood transfusion and infusion of blood clotting products. It usually prolongs stays both in ITU and in hospital overall. These are all costly to the NHS.
QI theme	Safety
What is the standard to be met?	The GIRFT report (2018) reported reopening for bleeding rates of 3.75% (but this includes cases other than CABG). Based on the aggregate data for 2017/20 (3 years combined) the units in top quartile (UK) have a reopening rate of <1.65%
Key references to support the metric	Get it Right First Time (GIRFT) report 2018[1]
Numerator	All patients requiring first time CABG
Denominator	n/a
Trend	Rates of reoperation for bleeding have fallen in the UK from 2.59% to 1.83% between 2017/8 and 2019/20. The trend has worsened in Scotland (1.83% to 2.24%), but improved in England (2.57% to 1.83%), Wales (2.43% to 1.1%) and Northern Ireland (6.08% to 1.37%).
Variance	15 hospitals performed better than the target (<1.65%). 7 NHS hospitals had rates worse than 3%.

2.7.2 Audit results

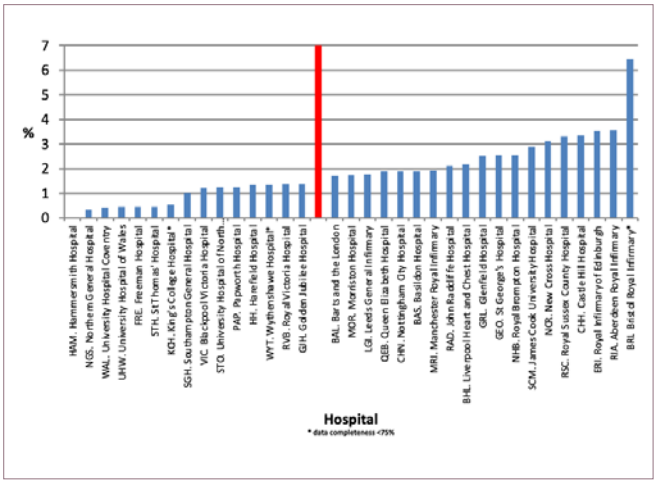
Two years ago, the NACSA report focussed on complications following CABG. Across the UK, rates of complications are gratifyingly low, but that initial review demonstrated a worrying variance in some aspects of care. Since then, there has been a reduction in re-operation rates for bleeding from 2.59% to 1.83% over the last two years [Figure 26].

These reductions were seen in England, Wales and Northern Ireland although rates increased slightly in Scotland (from 1.83% to 2.24%).

The variance seen in NHS centres (range 0% to 3.57% in centres providing adequate data, Figure 27) suggests that further improvements are possible.

Figure 26: Proportion (%) of patients requiring re-operation for bleeding after CABG, by country, 2017/18 to 2019/20

Figure 27: Proportion (%) of patients undergoing re-operation for bleeding following CABG, by NHS hospital, 2019/20.



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

2.7.3 Recommendations for those not achieving the standard

Hospitals with high rates of reopening following CABG should review their processes before, during and after surgery. Systemic causes of the need for reoperation should be identified.

Data on bleeding rates should be regularly presented at team audit meetings. If necessary, advice should be sought from centres with evidence of the best performance.

A QI action plan should be instigated to reduce reopening and bleeding rates.

2.7.4 Case study – Reopening for bleeding

Mark Jones

Consultant Cardiac Surgeon, Royal Victoria Hospital, Belfast, shares the Belfast experience of reopening for Bleeding:

Northern Ireland has only one cardiac centre, located in Belfast, which performs all the cardiac surgery within the region. As a result of the limited case numbers compared to the rest of the UK small variations will result in large percentage changes in rates of reopening for bleeding. However, we noted a reopening rate for bleeding which appeared to be higher than we would have liked following publication of the NACSA report in 2017/18.

As a group of cardiac surgeons we began to review complication rates on a frequent basis. Reopening rates for bleeding were presented regularly to the team. Greater awareness of this initial high rate has been associated with a progressive reduction in the rate of reopening through 2018 and indeed further into 2019/20 to a level substantially below the UK average. Staff at all levels deserve credit for this, particularly our Data Manager.

We have continued to reopen patients for bleeding where indicated and do not support a policy of excessive blood transfusion or continued observation of bleeding in inappropriate circumstances in order to avoid reopening. There were no specific systems changes relating to perioperative care and bleeding per se during this time, but in conjunction with our cardiac anaesthetists we have aimed for earlier extubation times, earlier mobilisation and shortened intensive care stay. These goals appear to have had a positive interaction with reduced postoperative bleeding and the greater awareness of the issue has been associated with better outcomes.

On-going audit is important and continually reinforces the message of ensuring the best care for all patients. We continue to be aware that because of the relatively small numbers any change in absolute numbers could reflect a large percentage change for better or worse in subsequent years. However, with the support of NICOR and SCTS we strive to maintain high standards as we move forward.

2.8 Low rates of Deep Sternal Wound Infection (DSWI) following CABG surgery

2.8.1 Overview of QI metric

QI Metric Description/Name	Deep Sternal Wound Infection (DSWI) following CABG surgery
Why is this important?	Wound infection following cardiac surgery has been identified in surveys as a complication that patients are particularly concerned about. Failure of the sternum (breastbone) to heal due to a serious infection within the mediastinum (tissues around the heart) may require surgery to remove the infected tissue and to repair the wound. This is usually a major procedure and often involves input from plastic surgeons. The consequences to the patient are large, with pain, prolonged recovery and even death in the most serious cases. The cost to the NHS due to extra treatments and long inpatient stays is usually high.
QI theme	Safety
What is the standard to be met?	The GIRFT report reported DSWI rates of 0.69% (but this includes cases other than CABG). Based on the aggregate data for 2017/20 (3 years combined) the units in the top quartile (UK) have a DSWI rate of <0.21%
Key references to support the metric	Get it Right First Time (GIRFT) report 2018[1]
Numerator	All patients requiring first time CABG
Denominator	n/a
Trend	Rates of DSWI are low in the UK and are possibly improving – from 0.33% to 0.3% between 2017/18 and 2019/20.
Variance	Eleven hospitals had 0% DSWI in 2019/20 (and achieved target of <0.21%). Five hospitals had rates of >0.5% with one unit openly acknowledging a rate of 2.15%.

These data only include patients with the most serious type of wound infection, in particular those with an infection serious enough to require a return to theatre for debridement or surgical reconstruction. Data on more superficial infections (treated with antibiotics alone) are not available.

2.8.2 Audit results

Deep sternal wound infections after CABG were at a low level (0.3% in 2019/20) across all nations (range 0.22% to 0.34% across countries) [Figure 28]. There is some variation between centres (0% to 1.36% in NHS centres with good data) [Figure 29] with 5 hospitals reporting rates >0.5%. Several centres submitted incomplete data and in 7 centres no data were submitted.

Figure 28: Proportion (%) of patients with a deep sternal wound infection following CABG, by country, 2017/18 to 2019/20

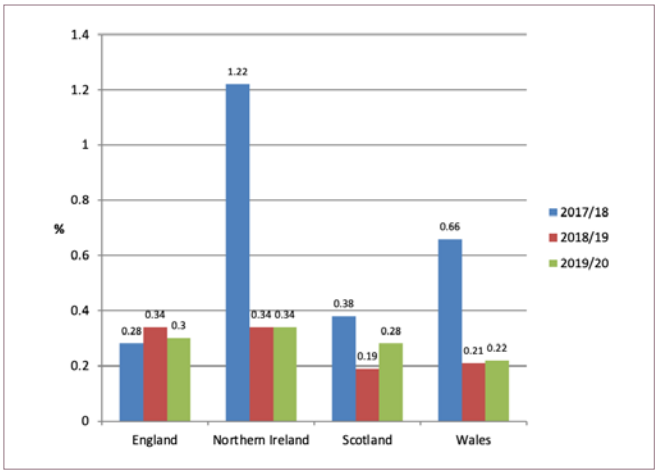
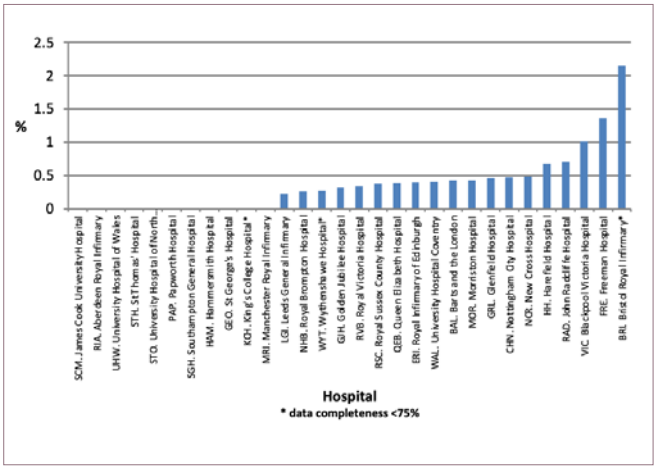


Figure 29: Proportion (%) of patients with a deep sternal wound infection following CABG, by hospital, 2019/20



2.8.3 Recommendations for those not achieving the standard

Hospitals with poor data compliance should collect and submit data for DSWI.

Hospitals with high rates of DSWI following CABG should review their processes before, during and after surgery. A root cause analysis should be performed for every patient with DSWI so that lessons are learnt. Systemic causes should be identified. Data on DSWI should be regularly presented at team audit meetings. If necessary, advice should be sought from centres with evidence of the best performance.

A QI action plan should be instigated to reduce DSWI.

2.9 Neurological events (CVA or TIA) following CABG

2.9.1 Overview of QI metric

QI Metric Description/Name	New post-op CVA (cerebrovascular accident) or TIA (transient ischaemic attack) following CABG
Why is this important?	Stroke (CVA or TIA) following cardiac surgery is relatively common, but fortunately in most cases fully resolves over time. However, permanent neurological damage can be a catastrophic complication.
Risks of stroke should be discussed with patients prior to all cardiac operations.	
QI theme	Safety
What is the standard to be met?	Based on aggregate data from 3 years (2017/20) the top quartile units have a rate <0.59%
Key references to support the metric	Get it Right First Time (GIRFT) report 2018[1]
Numerator	All patients requiring first time CABG
Denominator	n/a
Trend	Rates of CVA/TIA combined are low in the UK as a whole, but quite variable over the last 3 years (from 0.6% to 0.95%). In 2019/20 the UK rate was 0.8%.
Variance	Four hospitals had rates of 0% in 2019/20. Thirteen achieved rates of <0.59%, with three having rates >2%. Two NHS hospitals provided no data. Six NHS hospitals submitted <80% complete data.

2.9.2 Audit results

Rates of neurological complications (a combined rate of either a cerebrovascular accident [CVA] or transient ischaemic attack [TIA]) were at a low level following CABG at 0.8% in the UK during 2019/20. Between the four UK nations the range was from 0.79% to 1.02% [Figure 30]. The variability between centres was 0% to 2.94% in 2019/20 with three units having rates >2% [Figure 31].

Several centres submitted incomplete data and in 7 centres no data were submitted. Due to variance in data quality it is hard to compare performance between units, as units with good data collection systems may be likely to identify and report higher rates of CVA and TIA and will therefore look worse within the audit comparatively to units that have poor data collection. Unlike mortality statistics (via ONS death certificate data) it is hard for NICOR to independently verify stroke rates. It is important for future audits that data improve from poorly compliant units.

Figure 30: Proportion (%) of patients with a neurological event (CVA and TIA combined) following CABG, by country, 2017/18 to 2019/20

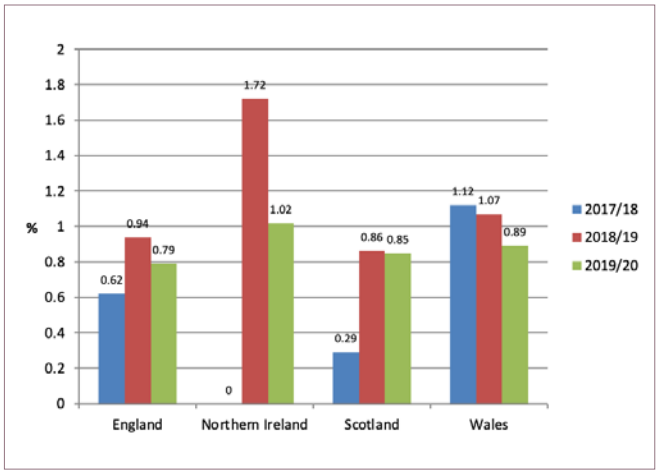
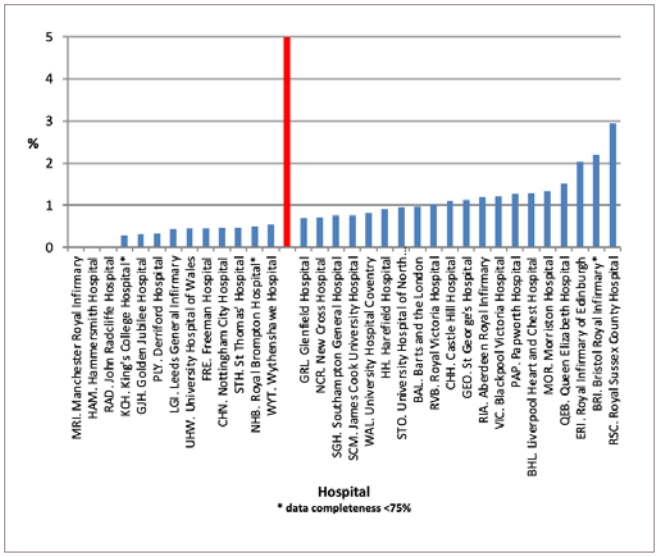


Figure 31: Proportion (%) of patients with a neurological event (CVA and TIA combined) following CABG, by hospital, 2019/20.



Target <0.59% (based on top quartile for 3 years 2017/20 aggregate data). Hospitals to the left of the red bar achieve this.

2.9.3 Recommendations for those not achieving the standard

All hospitals should submit accurate stroke data for 100% of patients.

Hospitals with poor data compliance should investigate the reason for this. They should put in place systems to collect and submit accurate data for post-operative neurological complications.

2.10 Post-op renal failure (need for renal support) following CABG

2.10.1 Overview of QI metric

QI Metric Description/Name	Need for dialysis or haemofiltration following CABG
Why is this important?	Kidney failure is a major complication after heart surgery and may result from pre-existing reduced kidney function, or reduced cardiac output in the perioperative period. Treatment with dialysis or haemofiltration usually requires prolongation of ITU stay and is costly.
QI theme	Safety
What is the standard to be met?	The GIRFT report (2018) reported need for renal support rates of 2.35% (but this includes cases other than CABG). Based on aggregate data from 3 years (2017/20) the top quartile units have a rate <0.84%
Key references to support the metric	Get it Right First Time (GIRFT) report 2018[1]
Numerator	All patients requiring first time CABG
Denominator	n/a
Trend	In the UK the rates were 1.59% (2017/18), 1.26% (2018/19) and 1.46% (2019/20).
Variance	One NHS hospital had a rate of 0% with eleven achieving rates of <0.84%. Nine hospitals had rates >2%. Three hospitals provided no data.

2.10.2 Audit results

The requirement for renal support therapy following CABG was low in the UK at 1.46% in 2019/20. The range of the four nations was from 0.68% to 2.27% [Figure 32]. Northern Ireland went from the worst to the best country between 2017/18 and 2019/20, but this may be due to low case volumes (in a single hospital). There was considerable variability between NHS centres from 0% to 4.03% (2019/20) [Figure 33]. Eleven units achieved rates of <0.84%, with 3 NHS units providing no data.

Figure 32: Proportion (%) of patients with post-operative renal failure following CABG, by country, 2017/18 to 2019/20

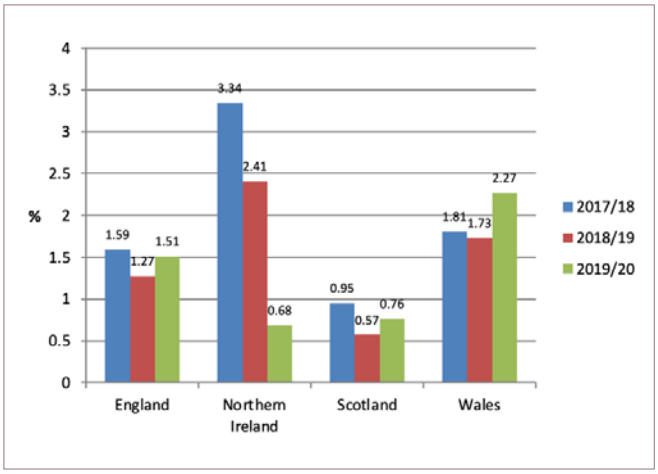
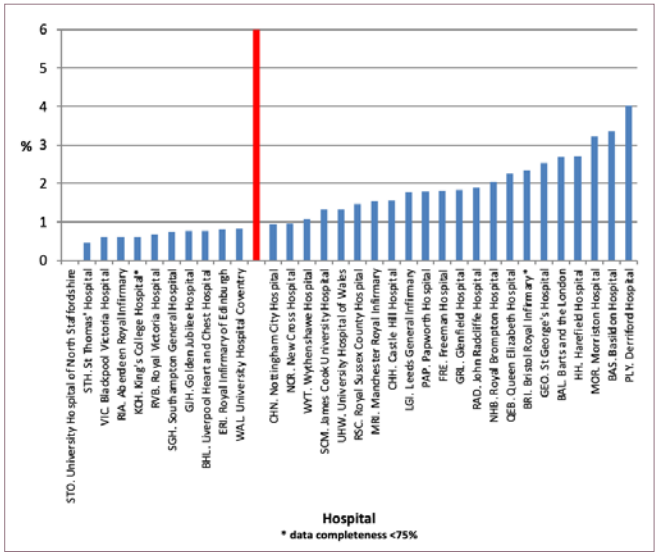


Figure 33: Proportion (%) of patients with post-operative renal failure following CABG, by NHS Hospital, 2019/20.



Target <0.84% (based on top quartile for 3 years 2017/20 aggregate data). Hospitals to the left of the red bar achieve this.

2.10.3 Recommendations for those not achieving the standard

Hospitals with poor data completeness should collect and submit complete and accurate data for post-operative renal complications.

2.11 Proportion of hospitals entering data on surgical incision for mitral surgery (speed of NACSA dataset upgrade)

2.11.1 Overview of QI metric

QI Metric Description/Name	Speed of implementation of a new variable within NACSA dataset by hospitals
Why is this important?	Data on surgical incision was added to the NACSA dataset from April 2017 in order to allow measurement of rates of minimally invasive cardiac surgery. Units were given 6 months prior notice of the change. Dataset upgrades within NACSA are infrequent, but it is important that units have both the IT and audit infrastructure, as well as funding, to allow timely change and updates of the dataset being collected.
QI theme	Safety and Effectiveness
What is the standard to be met?	No standard, although it is reasonable to expect 100% by 3 years following implementation.
Key references to support the metric	n/a
Numerator	Patients where type of surgical incision has been recorded
Denominator	All patients undergoing mitral valve surgery
Trend	Across the UK as a whole 38% of patients had incision data recorded in the first year (2017/18), 63% in 2nd, and 73% by the 3rd/final year (2019/20). Across the four nations the rate in the final year ranged from 0% (Northern Ireland) to 80% in England [Figure 34].
Variance	In 2019/20 (after 3 years) 25 units (out of 41) had 100% compliance with data entry. Nine hospitals had <3% compliance (0% in eight) [Table 8].

2.11.2 Audit results

This variable was introduced to allow audit of minimally invasive surgical operations within NACSA. Mitral operations were chosen as the denominator for this metric as it is one of the commonest minimally invasive procedures being performed. Implementation of collecting the data was slow in the first year (42%), but has achieved 73% of all mitral operations across the UK for the final (3rd) year in 2019/20. Data collection is still not happening in 9 hospitals, several of which are known to perform minimally invasive procedures, making it all the more important that the data is submitted to NACSA.

Collection of this variable has allowed an assessment of the rates of minimally invasive mitral valve surgery being performed in the UK [Figure 35]. In 2019/20 in England 15.7% of isolated mitral operations were through an incision other than a conventional sternotomy. In Scotland the rate was 3.2% and in Wales 0%. There are no data available for Northern Ireland.

Table 8: Proportion (%) of isolated mitral valve operations where incision has been recorded, by hospital, for 3 consecutive years after variable introduced to dataset

Hospital	2017/18	2018/19	2019/20
ANT. Spire St Anthony's Hospital (PP)	100	100	100
CHN. Nottingham City Hospital	100	100	100
CRO. Cromwell Hospital (PP)	100	100	100
GEO. St George's Hospital	100	100	100
GRL. Glenfield Hospital	100	100	100
HHW. Wellington Hospital North (PP)	100	100	100
HSC. Harley Street Clinic (PP)	100	100	100
LBH. London Bridge Hospital (PP)	100	100	100
MRI. Manchester Royal Infirmary	100	100	100
QEB. Queen Elizabeth Hospital	100	100	100
SCM. James Cook University Hospital	100	100	100
SGH. Southampton General Hospital	100	100	100
NCR. New Cross Hospital	98	100	100
MOR. Morriston Hospital	94	100	100
HAM. Hammersmith Hospital	73	100	100
BAL. Barts and the London	64	100	100
RAD. John Radcliffe Hospital	14	100	100
HH. Harefield Hospital	0	100	100
NHB. Royal Brompton Hospital	0	100	100
BHL. Liverpool Heart and Chest Hospital	99	99	100
FRE. Freeman Hospital	100	98	100
RIA. Aberdeen Royal Infirmary	0	87	100
WAL. University Hospital Coventry	3	76	100
BAS. Basildon Hospital	0	63	100
STH. St Thomas' Hospital	0	29	100
GJH. Golden Jubilee National Hospital	1	99	97
PAP. Royal Papworth Hospital	30	100	97
STO. Royal Stoke University Hospital	7	92	97
VIC. Blackpool Victoria Hospital	8	97	95
NGS. Northern General Hospital	0	1	90
WYT. Wythenshawe Hospital	0	3	81
KCH. King's College Hospital	50	66	65
CHH. Castle Hill Hospital	0	3	3
BRI. Bristol Royal Infirmary	0	0	0
CBS. Spire Southampton Hospital (PP)	0	0	0
ERI. Royal Infirmary of Edinburgh	0	0	0
LGI. Leeds General Infirmary	0	0	0
PLY. Derriford Hospital	0	0	0
RSC. Royal Sussex County Hospital	0	0	0
RVB. Royal Victoria Hospital	0	0	0
UHW. University Hospital of Wales	0	0	0

Ranked by data completeness for 2019/20. Data completeness yellow if <90%, red if <80% in 2019/20.

Figure 34: Proportion (%) of isolated mitral valve operations where incision has been recorded, by country

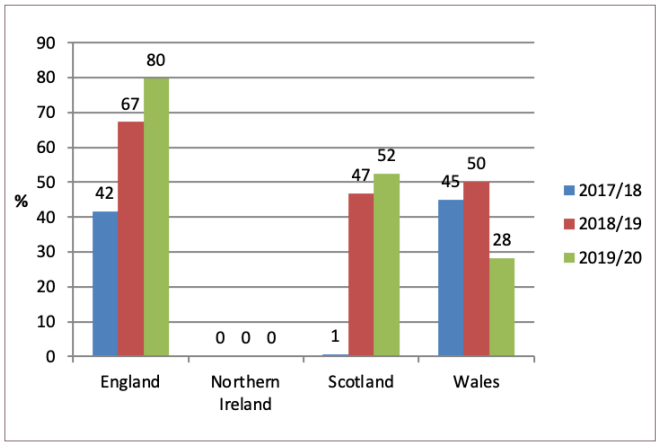
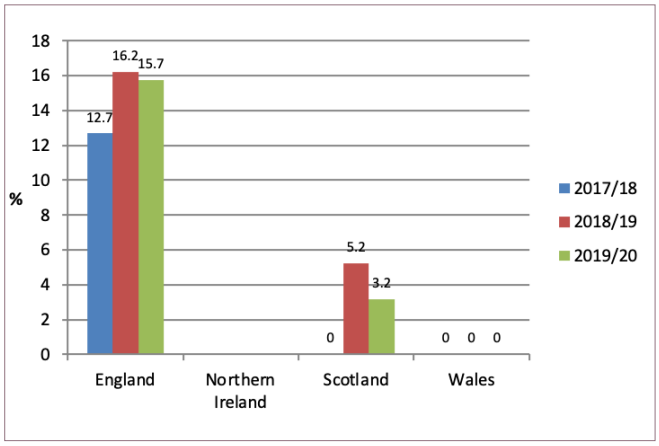


Figure 35: Proportion (%) of minimally invasive isolated mitral valve operations (procedure performed through an incision other than a conventional sternotomy), by country



No data for Northern Ireland.

2.11.3 Recommendations for those not achieving the standard

Hospitals not collecting new variables within the NACSA dataset need to identify the reasons for this.

Hospitals need to ensure that there is adequate funding for IT infrastructure, timely database software upgrades and to support audit teams.

2.12 Mitral valve repair rates

2.12.1 Overview of QI metric

QI Metric Description/Name	Mitral valve repair rate as a proportion of all isolated mitral procedures
Why is this important?	Despite the lack of randomised trials, mitral repair is accepted as the standard of care for patients with degenerative mitral regurgitation. Repair of the valve avoids the need for implantation of a prosthetic valve and is associated with better long-term outcomes.
QI theme	Effectiveness
What is the standard to be met?	Based on 2017/20 aggregate the top quartile units have repair rates >70.6%
Key references to support the metric	European Valvular Heart Disease Guidelines[4]
Numerator	Patients undergoing isolated mitral valve repair
Denominator	All patients undergoing isolated mitral valve surgery
Trend	Rates of mitral repair appear to be declining in the UK, from 64.6% (2014/15) to 61.6% (2019/20) [Figure 36]. In England and Scotland the rates have decreased during this period, whereas in Wales and Northern Ireland they have improved [Table 9].
Variance	There is considerable unexplained variation in mitral repair rates between hospitals, between 22% and 91%. No data were available from 2 NHS hospitals [Table 10].

2.12.2 Audit results

Mitral valve repair rates are falling in the UK and are currently 61.6% of all isolated mitral procedures (2019/20). The highest repair rate is now in Northern Ireland at 68.3%, who notably had the worst rate 5 years ago. The rates in England (62.2%) and Scotland (51.4%) are falling compared to 5 years ago, but are rising in Wales (61.5%). Mitral valve repair is the preferred method of surgery for patients with mitral disease, but mitral valve replacement is usual in patients with unfavourable valve characteristics (such as rheumatic mitral disease).

Mitral repair rates are often quoted as being >95% in expert centres, but these are quoting purely repair rates in patients selected as suitable for repair, so are not comparable. Incomplete data from several hospitals on valve pathology have made reliably analysing repair rates for purely degenerative mitral regurgitation not feasible for this audit.

There is considerable unexplained variation in mitral repair rates between hospitals from 22% in the worst to 91% in the best. Based on this UK data the top quartile units achieve repair rates >70.6% for all isolated mitral operations combined. Some care needs to be taken when interpreting surgeon level data, especially if there are low case numbers, if disproportionate numbers of rheumatic valves are being operated on by a surgeon or team. However, both the European guidelines and the 2018 GIRFT report recommend that mitral surgery should be performed by surgeons with a special interest in mitral surgery, so low volume practices should be discouraged.[1,4]

Rheumatic mitral disease is also relatively rare in the UK and so is highly unlikely to explain low rates of mitral repair in the hospital level data reported here, and particularly not for the hospitals in the bottom quartile (repair rates <53.5%).

Figure 36: Mitral valve repair rate (%) as proportion of all isolated mitral procedures, for UK

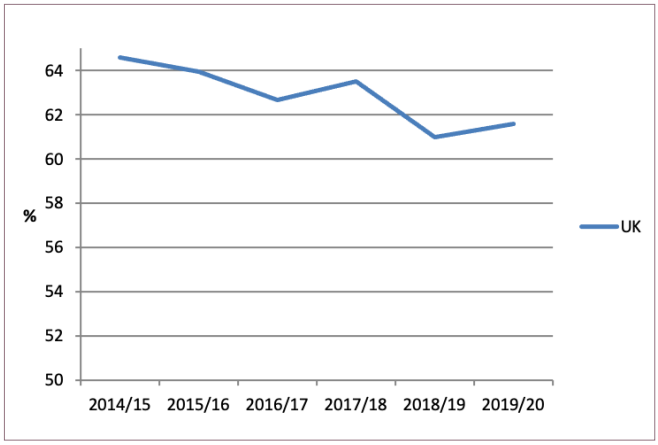


Table 9: Mitral valve repair rate (%) as proportion of all isolated mitral procedures, by country

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
UK	64.6	63.9	62.6	63.5	61.0	61.6
England	66.2	65.8	62.8	64.3	61.5	62.2
Northern Ireland	38.5	51.9	50.0	52.9	55.9	68.3
Scotland	56.8	51.5	64.6	59.7	57.1	51.4
Wales	52.1	52.3	68.8	60.4	61.5	61.5

Excludes cases with concomitant procedures (CABG etc).

2.12.3 Recommendations for those not achieving the standard

All hospitals performing mitral surgery should regularly audit their mitral valve repair rate within their team. Repair rates in each hospital should be used to inform multidisciplinary team meetings and patient consent processes.

Hospitals with low mitral repair rates should identify the causes for this. Hospitals with low rates of repair should consider referring patients with mitral regurgitation to centres with expertise in mitral surgery and with high rates of repair.

Table 10: Mitral valve repair rate (%) as proportion of all isolated mitral procedures, by Hospital (3 year aggregate data for 2017/20)

Hospital	2017/20 MVR (n)	2017/20 MV repair (n)	Repair rate (%)
WAL. University Hospital Coventry	23	236	91
RAD. John Radcliffe Hospital	48	150	76
HHW. Wellington Hospital North (PP)	2	6	75
NHB. Royal Brompton Hospital	58	162	74
BAS. Basildon Hospital	62	170	73
ERI. Royal Infirmary of Edinburgh	80	204	72
SCM. James Cook University Hospital	49	124	72
QEB. Queen Elizabeth Hospital	37	92	71
RSC. Royal Sussex County Hospital	27	66	71
ANT. Spire St Anthony's Hospital (PP)	5	12	71
VIC. Blackpool Victoria Hospital	73	174	70
PLY. Derriford Hospital	75	177	70
PAP. Papworth Hospital	165	379	70
STH. St Thomas Hospital	85	182	68
WYT. Wythenshawe Hospital	45	92	67
SGH. Southampton General Hospital	53	108	67
KCH. King's College Hospital	59	118	67
NGS. Northern General Hospital	94	181	66
NCR. New Cross Hospital	64	116	64
HSC. Harley Street Clinic (PP)	5	9	64
HH. Harefield Hospital	83	143	63
FRE. Freeman Hospital	57	94	62
GEO. St George's Hospital	37	61	62
MOR. Morriston Hospital	44	69	61
GRL. Glenfield Hospital	89	131	60
RVB. Royal Victoria Hospital	89	131	60
BHL. Liverpool Heart and Chest Hospital	172	242	58
STO. University Hospital of North Staffordshire	53	61	54
CHH. Castle Hill Hospital	36	38	51
GJH. Golden Jubilee Hospital	122	106	46
HAM. Hammersmith Hospital	120	103	46
CHN. Nottingham City Hospital	72	54	43
BAL. Barts and the London	298	201	40
LGI. Leeds General Infirmary	113	69	38
LBH. London Bridge Hospital (PP)	5	3	38
MRI. Manchester Royal Infirmary	94	38	29
RIA. Aberdeen Royal Infirmary	51	14	22
BRI. Bristol Royal Infirmary	NA	NA	NA
CBS. Spire Southampton Hospital (PP)	NA	NA	NA
CRO. Cromwell Hospital (PP)	NA	NA	NA
UHW. University Hospital of Wales	NA	NA	NA

MVR (mitral valve replacement); MV (mitral valve) repair. Excludes cases with concomitant procedures (CABG etc). Ranked by highest repair rate, aggregate 2017/20. (Top quartile >70.6% Green; Bottom quartile <53.5% Red.)

2.13 Dual Consultant operating (DCO) for high risk cases

2.13.1 Overview of QI metric

QI Metric Description/Name	Dual Consultant Operating (DCO)
Why is this important?	Dual Consultant Operating (DCO) is a new concept within adult cardiac surgery and was introduced to the NACSA following the GIRFT report (2018) and discussion between SCTS, NICOR and HQIP in April 2019. Data are therefore only for the 2019/20 year. DCO was introduced so as to optimise patient care for those undergoing very high risk procedures by having two experts involved in performing the procedure. Since the advent of surgeon-specific mortality outcome reporting there had been concerns that some surgeons may be less willing to operate on patients perceived to be at high risk of dying following cardiac surgery. In order to try to reduce 'risk averse' behaviour, surgeons with the prior documented agreement of a multidisciplinary team, can remove these cases from their own reported figures. However, the cases (and any deaths) are still audited as occurring within that hospital, and so will still continue, as before, to contribute to the outcomes reported for each individual hospital. In this way the onus for the outcomes lies with the unit and the team treating the patient, rather than with an individual surgeon.
QI theme	Safety
What is the standard to be met?	n/a
Key references to support the metric	Get it Right First Time (GIRFT) report 2018[1]
Numerator	All cases attributed as DCO within each hospital
Denominator	n/a
Trend	110 cases were performed in the UK in 2019/20 (0.34% of all adult cardiac operations) [Table 11].
Variance	No cases were documented in Northern Ireland or Wales, and only 1 in Scotland. Sixteen hospitals reported cases, with between 1 to 16 operations. The rate (as % of total cases) within these hospitals was from 0.16% to 1.69% [Table 12].

For a case to be attributed as DCO there needs to be preoperative MDT documentation that this has been agreed by a quorate team. It is only suitable, therefore, for elective and urgent cases (emergencies are already excluded from surgeon specific outcome reporting). NICOR insists on the GMC number of both consultants present at the surgery being collected with dataset, but does not attribute the death to either surgeon.

Estimates of operative risk are presented here using the EuroSCORE logistic, so that an indication of the risks of patients operated on can be determined. However, it is recognised that this scoring method performs less well for patients with very high risk profiles.

2.13.2 Audit results

This was the first year of data collection for this new means of operating on particularly complex or high risk cases. It necessitates careful preoperative planning and team work, followed by surgery being performed by two consultants operating together. Overall 110 cases were performed in the UK in 2019/20 (0.34% of all adult cardiac operations).

Nearly all the cases were performed in England. So far 16 hospitals (all of which were NHS) out of 41 hospitals (35 NHS) recorded cases.

The mortality seen for DCO cases was 32.7% overall, compared to a predicted mortality of 27.3%. It has to be noted that EuroSCORE logistic is not reliable for very high risk cases such as these, and is no longer used by NICOR for risk stratifying routine low risk cases (as it tends to over-predict operative risk overall).

However, it appears from the risk scores that it is high risk cases (as would be expected) that are being allocated to this type of working.

Some units have been far more willing to embrace the new ways of team working, with up to 1.69% of all adult operations allocated to DCO by the highest user. In the longer term it is not expected that cases per hospital will be that much higher, as this is only suitable for very high risk/complex cases.

It is not clear why more than half the units in the UK have not used DCO on any cases since it has been available. There may be infrastructural issues and units should ensure that their databases are up to date to capture the DCO fields for upload to NACSA. There may also be professional reasons why individuals do not wish to take up this operating method, which should be respected.

Table 11: Dual Consultant Operations (DCO), at national level, 2019/20

Nations	Number of DCO cases	% total cases	Deaths (n)	Mortality (%)	Predicted mortality (%)
UK	110	0.34	36	32.7	27.3
England	109	0.40	35	32.1	26.6
Northern Ireland	0				
Scotland	1	0.04	1	100.0	98.2
Wales	0				

Predicted mortality calculated by EuroSCORE logistic %.

Table 12: Dual Consultant Operations (DCO), at hospital level, 2019/20

Units	Number of DCO cases	% total cases	Deaths (n)	Mortality (%)	Predicted mortality (%)
ANT. Spire St Anthony's Hospital					
BAL. Barts and the London					
BAS. Basildon Hospital					
BHL. Liverpool Heart and Chest Hospital	6	0.34	2	33.3	33.6
BRI. Bristol Royal Infirmary					
CBS. Spire Southampton Hospital					
CHH. Castle Hill Hospital	10	1.17	3	30	40.2
CHN. Nottingham City Hospital					
CRO. Cromwell Hospital					
ERI. Royal Infirmary of Edinburgh					
FRE. Freeman Hospital					
GEO. St George's Hospital					
GJH. Golden Jubilee Hospital					
GRL. Glenfield Hospital	16	1.61	1	6.3	20.1
HAM. Hammersmith Hospital	9	1.40	0	0.0	19.1
HH. Harefield Hospital	10	0.97	4	40.0	27.3
HHW. Wellington Hospital North					
HSC. Harley Street Clinic					
KCH. King's College Hospital	7	0.86	4	57.1	32.6
LBH. London Bridge Hospital					
LGI. Leeds General Infirmary					
MOR. Morriston Hospital					
MRI. Manchester Royal Infirmary	4	0.59	2	50.0	40.3
NCR. New Cross Hospital	2	0.23	1	50.0	26.4
NGS. Northern General Hospital	15	1.69	4	26.7	23.3
NHB. Royal Brompton Hospital	8	0.93	5	62.5	24.6
PAP. Papworth Hospital	5	0.30	5	100.0	25.6
PLY. Derriford Hospital					
QEB. Queen Elizabeth Hospital	1	0.16	1	100.0	37.8
RAD. John Radcliffe Hospital	4	0.62	1	25.0	24.4
RIA. Aberdeen Royal Infirmary	1	0.30	1	100.0	98.2
RSC. Royal Sussex County Hospital					
RVB. Royal Victoria Hospital					
SCM. James Cook University Hospital	5	0.56	1	20.0	17.7
SGH. Southampton General Hospital					
STH. St Thomas' Hospital					
STO. University Hospital of North Staffordshire					
UHW. University Hospital of Wales					
VIC. Blackpool Victoria Hospital					
WAL. University Hospital Coventry					
WYT. Wythenshawe Hospital	7	0.82	1	14.3	27.9

Predicted mortality calculated by EuroSCORE logistic %.

2.13.3 Recommendation

Units wishing to attribute cases to Dual Consultant Operating (DCO) should ensure that their IT/ databases are up to date with the data-fields required.

2.13.4 Case study – Two consultant operating

Peter Braidley

Consultant Cardiac Surgeon, Northern General Hospital, Sheffield, shares their experience of two consultant operating:

In common with many in our specialty, in Sheffield we were pleased when a mechanism was introduced to recognise particularly high risk cases that could be removed from individual surgeon-specific outcomes monitoring beyond the previous exclusions (such as emergencies). This was one of the recommendations in the cardiac surgery GIRFT report (2018).

In Sheffield we have reported 15 Dual Consultant Operating (DCO) cases (1.69% of our overall caseload) in this year to NACSA. These particularly high risk cases, however, only represent part of our experience with two consultants operating. We have reviewed our activity over the past two years and can report that 8.7% of our cases have had (at some point) two consultants scrubbed in for the procedure. We see this as a very positive observation with much to commend it as a normal and routine part of consultant practice in the 21st century.

By way of explanation for this observation, we would cite what we consider a few important factors. Firstly the culture within the consultant body has always been one of mutual support and encouragement. We have had a long tradition of operating together as consultant colleagues. We recognise that we all have things we can learn from each other and that in difficult situations “two heads are better than one”. Asking for help is seen as a strength and not a weakness.

The mainstay of decision making has to be a functional Complex Patient multi-disciplinary meeting (MDM) – again a recommendation from GIRFT – and one that we have had for several years now and has matured with broad representation. With these foundations in place two consultant operating has been seamless and straightforward.

Over the past couple of years we have made three new consultant appointments (2 locums) and each has been mentored. This has included operating with more experienced colleagues for more complex cases so they get experience and support easing the transition into independent consultant practice. It also embeds and reinforces the collegiate supportive culture mentioned above. Colleagues returning from prolonged periods of absence can also be quickly and effectively reintroduced to clinical and operative practice with two consultant operating.

As we have evolved our surgical practice with the introduction of new techniques we have used two consultant operating as a way of accelerating this learning across our team. Finally, in low volume, complex cases (e.g. major aortic surgery) two consultant operating broadens the overall experience of the surgical team and it is these cases that represent the majority where we have two consultants scrubbed.

As a final comment, the value in this approach should be recognised in the job planning process. We have pressed over the years for this and now have a reasonable allocation of time specifically to recognise two consultant operating. It is the same for all of us and there is an expectation that we all participate equally.

We would like to commend greater collegiate consultant surgeon working as being both better for our patients and better for us as surgeons. More support translates into a less stressed environment and better team working.

3 Future direction

The NACSA audit is increasingly moving away from purely reporting surgeon level mortality statistics, and to concentrate far more on unit level outcomes.

The aim of the NACSA audit for the future will be more focus on QI measures and morbidity measures, rather than on what are already very low mortality statistics for most routine adult cardiac operations.

In partnership with the SCTS, we are seeking more timely data upload from hospitals to NICOR. This will allow units to monitor outcomes more frequently and in real time. The aim is for all data to be uploaded within 1 month of an operation, with an absolute deadline of 3 months (to allow corrections and prolonged hospital stays to be entered).

NICOR has provided new online data tools for units, and audit leads within those units, to measure several QI measures from 'live' UK-wide data. This will feed into the quarterly unit level audit meetings that SCTS and NACSA have promoted that will be an important part of the accreditation and quality assurance process for every hospital. During the coming year these measures will be improved and expanded. There is also the facility for units to perform their own bespoke data queries, with comparison data generated at the UK level.

As a quid pro quo of moving away from surgeon level reporting, evidence of greater team working within cardiac surgical units, through multidisciplinary team meetings, or through the use of Dual Consultant Operating (DCO) will be audited.

COVID-19, the 'elephant in the room', has not featured in this report, as it almost entirely predates the first wave of infections seen in the UK (barring the last few days of March 2020). However, the effects of COVID-19 on outcomes and the metrics measured will form an important part of monitoring how the NHS recovers from the effects of the pandemic and returns to providing timely, high quality care for cardiac patients.

4 | NACSA Centre codes

Hospital Code	Hospital Name
BAL	St Bartholomew's Hospital, London
BAS	Basildon Hospital
BHL	Liverpool Heart & Chest Hospital
BRI	Bristol Royal Infirmary
CHH	Castle Hill Hospital, Hull
CHN	Nottingham City Hospital
ERI	Edinburgh Royal Infirmary
FRE	Freeman Hospital, Newcastle
GEO	St George's Hospital, London
GJH	Golden Jubilee Hospital, Glasgow
GRL	Glenfield Hospital, Leicester
HAM	Hammersmith Hospital
HH	Harefield Hospital
KCH	King's College Hospital, London
LGI	Leeds General Infirmary
MOR	Morriston Hospital, Swansea
MRI	Manchester Royal Infirmary
NCR	New Cross Hospital, Wolverhampton

Hospital Code	Hospital Name
NGS	Northern General Hospital, Sheffield
NHB	Royal Brompton Hospital, London
PAP	Papworth Hospital
PLY	Derriford Hospital, Plymouth
QEB	Queen Elizabeth Hospital, Birmingham
RAD	John Radcliffe Hospital, Oxford
RIA	Aberdeen Royal Infirmary
RSC	Royal Sussex Hospital
RVB	Royal Victoria Hospital, Belfast
SCM	James Cook University Hospital, Middlesbrough
SGH	Southampton General Hospital
STH	St Thomas' Hospital, London
STO	University Hospital of North Staffordshire
UHW	University Hospital of Wales, Cardiff
VIC	Victoria Hospital, Blackpool
WAL	University Hospital Coventry
WYT	Wythenshawe Hospital

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6 | Thanks and acknowledgements

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Please go to www.hqip.org.uk for more information.

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