NCAP

NATIONAL CARDIAC AUDIT PROGRAMME

NICOR

National Adult Cardiac Surgery Audit (NACSA)

2025 Annual Report

2023/24 and 2021/24 data

Report at a glance

All data are for 2023/24 unless otherwise stated.

10% fall in adult cardiac surgery procedures since 2019/20 **(>3000 fewer operations a year)**

25 out of 32 NHS hospitals performed fewer cases than in 2019/20

Mortality rates were 'as expected' for all hospitals in England, Wales and Northern Ireland during the last 3 years **(2021/22 to 2023/24)**

The median number of operations per consultant per year **(96)** is much lower than is expected (≥ 150)

130 days waiting time (from coronary angiography to operation) for elective coronary artery bypass grafting (CABG) surgery was up

Only 5 NHS hospitals had an average waiting time for elective CABG under the target of 84 days

13 days average waiting time in England for urgent CABG (NHS target is 7 days), **13** days in Wales and **27** days in Northern Ireland

Only **2 NHS hospitals** reached the target of **50%** of patients with Day Of Surgery Admission (DOSA) for elective cardiac surgery

20 NHS hospitals had Day Of Surgery Admissions (DOSA) rates of **<5%**

The use of a tissue valve prosthesis in patients <60 years old undergoing isolated aortic valve replacement (AVR) ranged from **7%-82%** in NHS hospitals

Recommendations

Number of procedures

1. Hospitals should aim for consultants to undertake at least 150 cardiac surgical operations a year and should identify and resolve any issues that are preventing this.

Care pathways

2. More patients should be offered day of surgery admission (DOSA) and hospitals should review their systems to enable compliance with the Getting It Right First Time (GIRFT) recommendations to enable this.

3. Hospitals with longer post-operative length of stay (PLOS) should investigate the reasons for this and implement changes to improve performance.

Complications

4. Hospitals with higher bleeding rates should review their practice and implement changes to reduce these.

5. Hospitals with higher deep sternal wound infection (DSWI) rates should review their practice and implement changes to reduce these.

Data completion

6. All hospitals should ensure complete and accurate data are submitted to the audit, especially with respect to:
- complications following surgery
- transfusion rates
- use of multi-disciplinary team meetings.

Introduction

The National Adult Cardiac Surgery Audit (NACSA) is part of the National Cardiac Audit Programme (NCAP) which is run by the National Institute for Cardiovascular Outcomes Research (NICOR). The audit aims to drive quality improvement in adult cardiac surgery by tracking trends in activity and outcomes, and benchmarking hospital performance against peers and guidelines/standards.

This report principally focuses on data from the last three years (2021/22 to 2023/24). Earlier years are also included where helpful in illustrating longer-term trends. Previous reports highlighted the impact of the COVID-19 pandemic on the provision of cardiac surgery. The current report demonstrates that service delivery remains lower than pre-pandemic levels but also highlights a downward trend in case numbers over several years.

The audit has operated in one format or another since 1977, including reporting outcomes at both hospital and surgeon levels since 2005. Scottish hospitals no longer participate in the audit (instead submitting data to the Scottish Cardiac Audit Programme). Consequently, any data labelled as ‘UK’ in this report represents England, Northern Ireland and Wales.

This report is of value to a wide range of stakeholders but importantly it allows patients and their relatives to better understand adult cardiac surgical care and its outcomes in the UK. The slides in the report are interactive so you can select and explore the data that interest you. The regularly reported outcome and quality improvement metrics are described here. Together with this report, these give a comprehensive picture of the current state of UK cardiac surgery.

All participating hospitals have contributed data for 100% of their NHS patients undergoing cardiac surgery. We are indebted to the local clinical and audit teams for their dedication and engagement with the data collection, without which this report would not have been possible. We will continue to work closely with hospitals, patients and other stakeholders to improve the quality of audit data and how these are used to improve the delivery of high quality cardiac surgery in the UK.

The NICOR NACSA audit team

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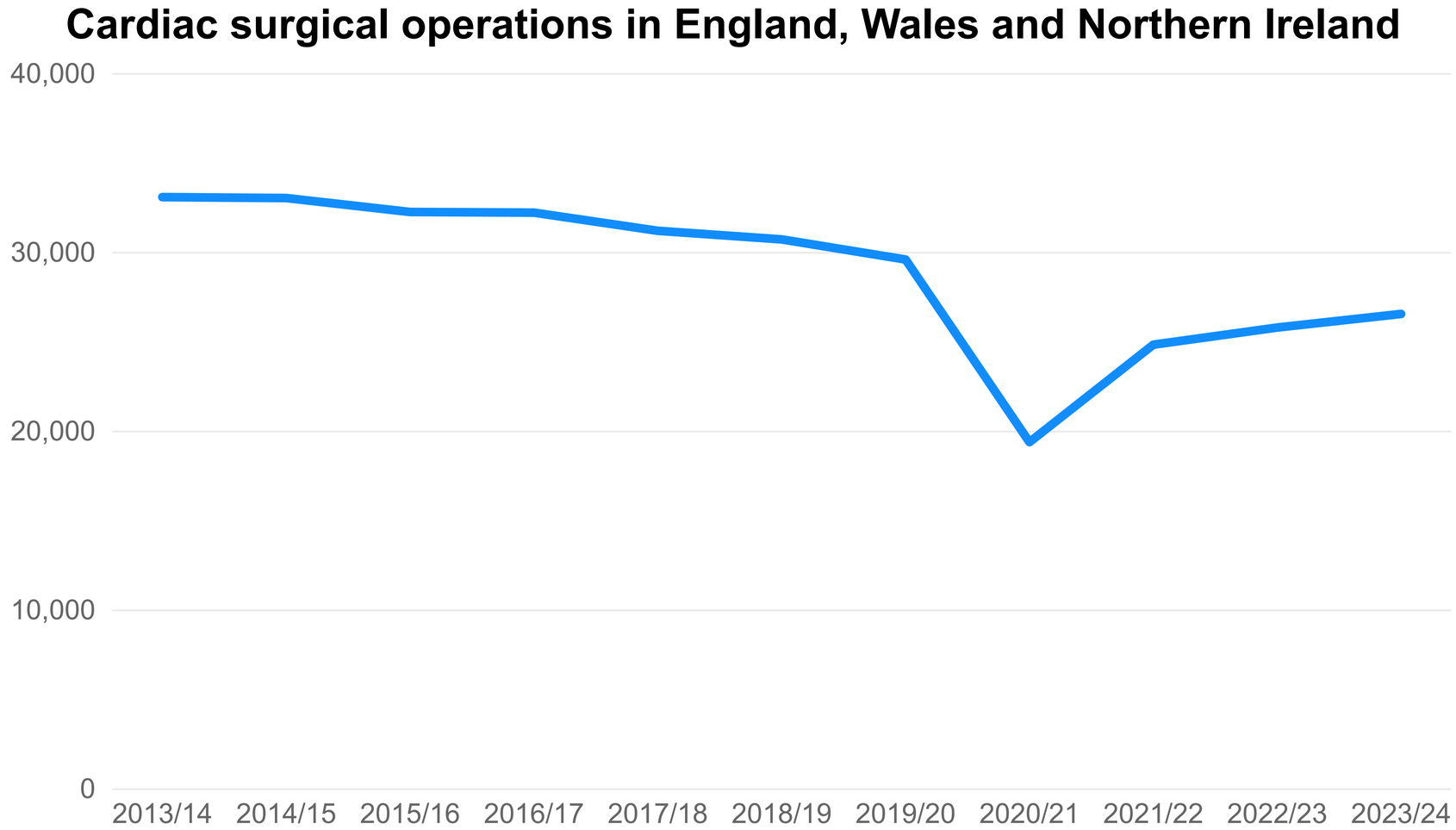
The number of cardiac surgical cases is on a long-term downward trend

The annual number of cardiac surgical operations in the UK has gradually declined over the last decade, with a big dip in activity during the COVID-19 pandemic.

Activity has not returned to pre-pandemic levels.

In 2023/24, the total of 26,529 operations was 10% lower (3,044 fewer cases) than in 2019/20 and down by around a fifth (6,533 fewer cases) from ten years earlier.

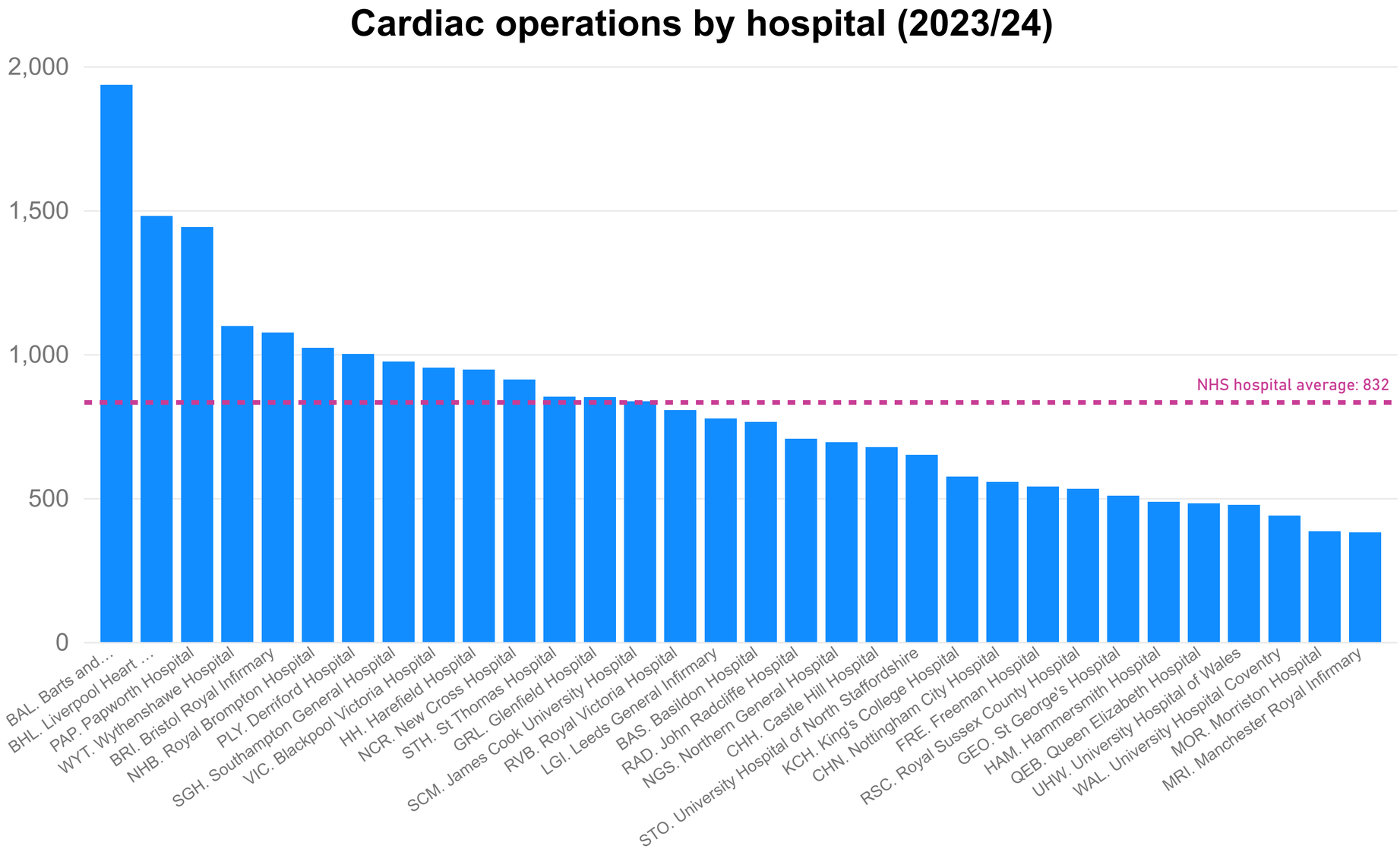


Cardiac surgical centres within NHS hospitals performed between 380 and 1,935 operations in 2023/24

On average, each NHS hospital performed 832 adult cardiac operations in 2023/24.

The highest number of operations was 1,935, while the fewest operations performed by an NHS hospital was 380.

Six NHS hospitals performed fewer than 500 operations.

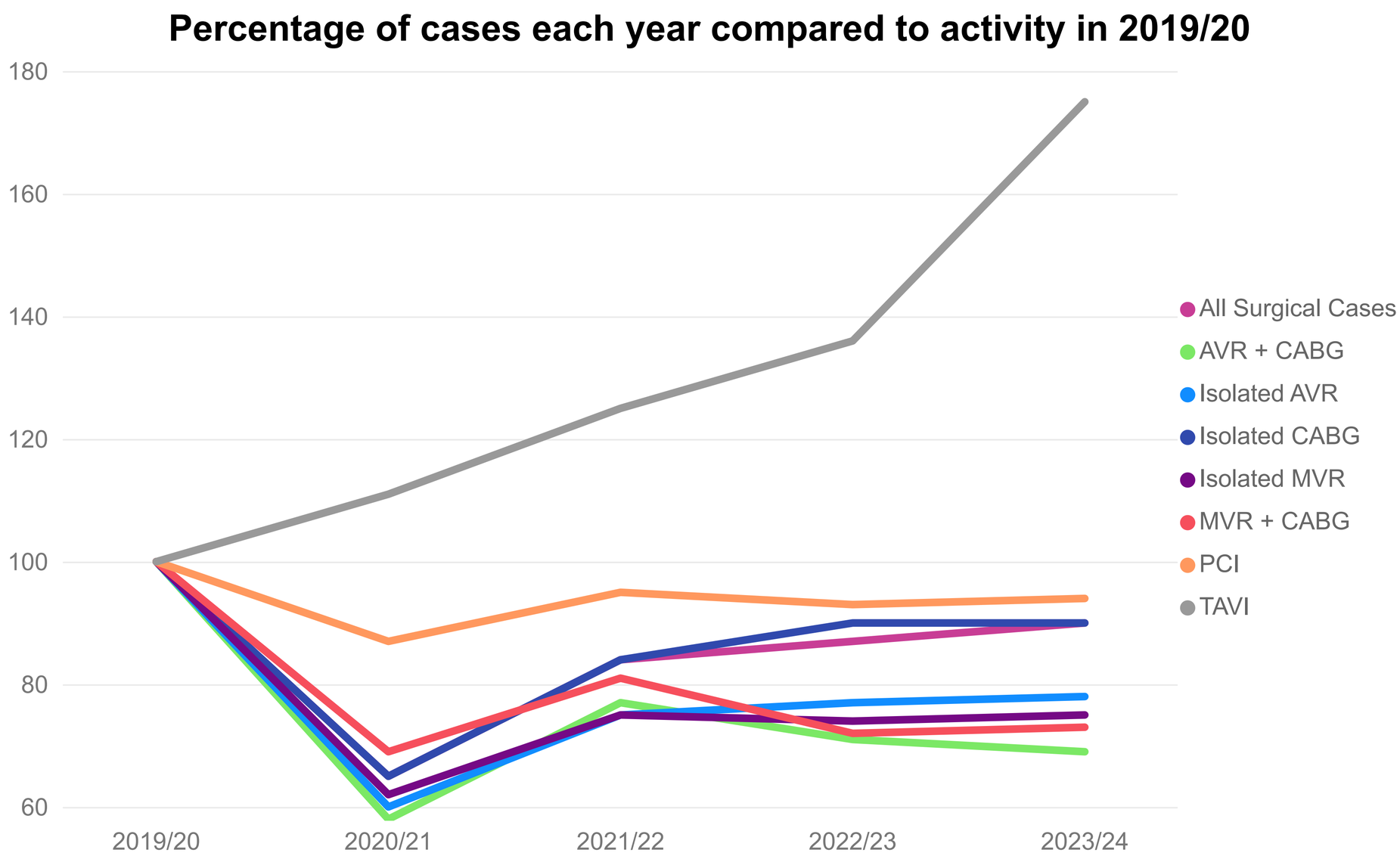


The reduction in cardiac surgical activity since the COVID-19 pandemic can still be seen across all types of procedure

The fall in cardiac surgical activity since the COVID-19 pandemic is still evident for all types of operation, whether involving isolated or a combination of procedures:

- coronary artery bypass grafting (CABG)
- aortic valve replacement (AVR)
- mitral valve (MV) operations.

This compares with transcatheter aortic valve implantation (TAVI) cases, which were considerably higher (175%) in 2023/24 compared with 2019/20.



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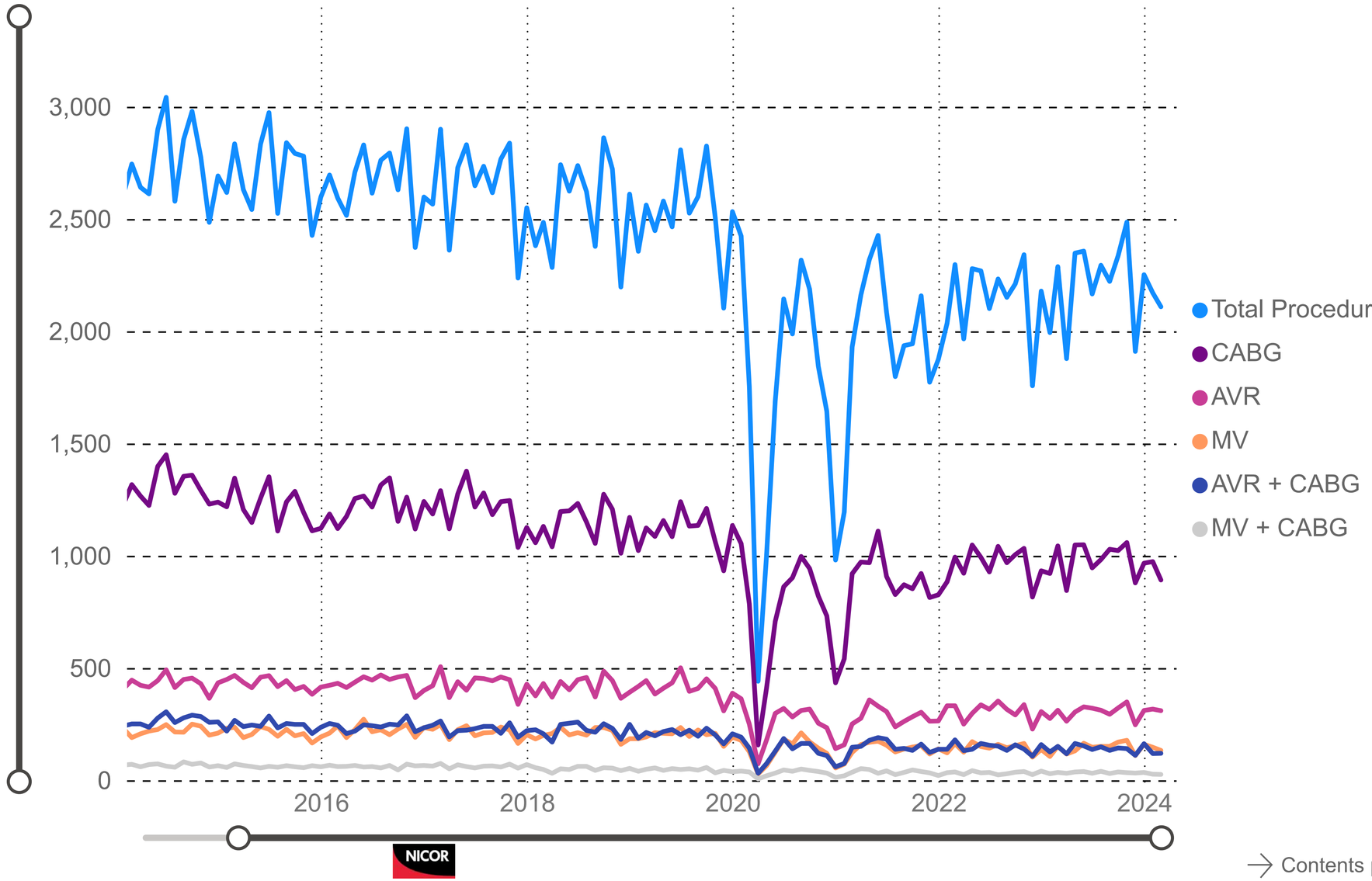
Monthly activity data highlights the impact of the COVID-19 pandemic and the partial recovery thereafter, especially for coronary artery bypass graft procedures

On a monthly basis, operation volumes in 2023/24 remained largely below pre-pandemic levels for coronary artery bypass grafting (CABG), aortic valve replacement (AVR) and mitral valve (MV) operations.

The monthly data also highlight the dramatic impact of the pandemic during the first two waves in March 2020 and the winter of 2020/21.

Monthly number of cardiac surgical operations by procedure type



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On average, hospitals performed 88% of the procedures undertaken in 2019/20, prior to the COVID-19 pandemic

During 2023/24, individual NHS hospitals performed between 56% and 126% of the procedures they did in 2019/20.

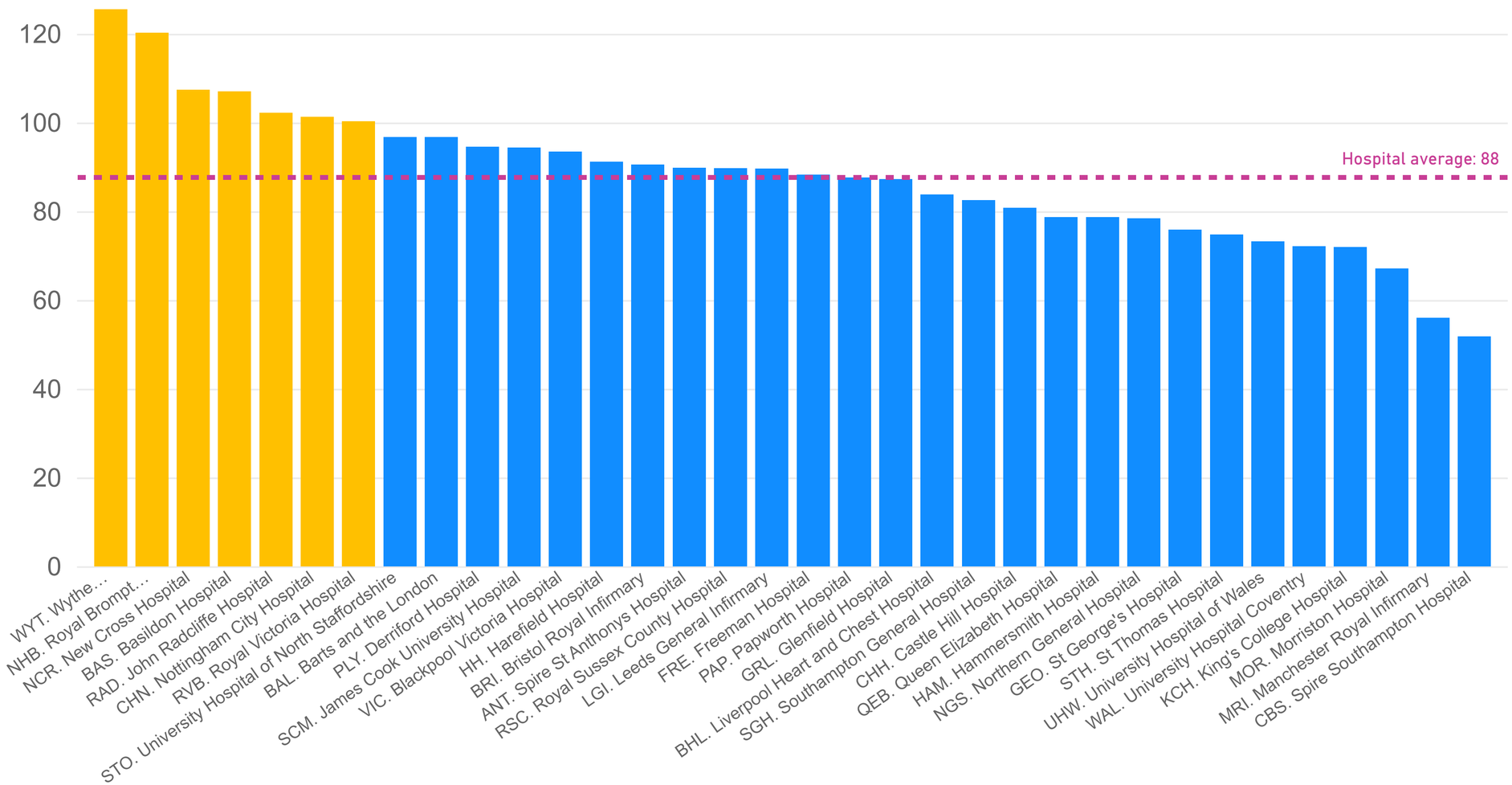
The average across all hospitals was 88%.

Only 7 cardiac centres (within NHS hospitals) carried out more cases than they did prior to the pandemic.

Twenty seven hospitals (25 of them NHS) had lower activity, with seven hospitals performing fewer than 75% of their pre-COVID-19 levels.

Note: Two private centres have only submitted data for two years. Reported activity at the Cromwell Hospital increased from 15 cases in 2019/20 to 90 in 2023/24 (not included in chart).

Percentage of cases performed by individual hospitals in 2023/24 compared to 2019/20



The number of cases per consultant cardiac surgeon has fallen by almost a third over the last decade

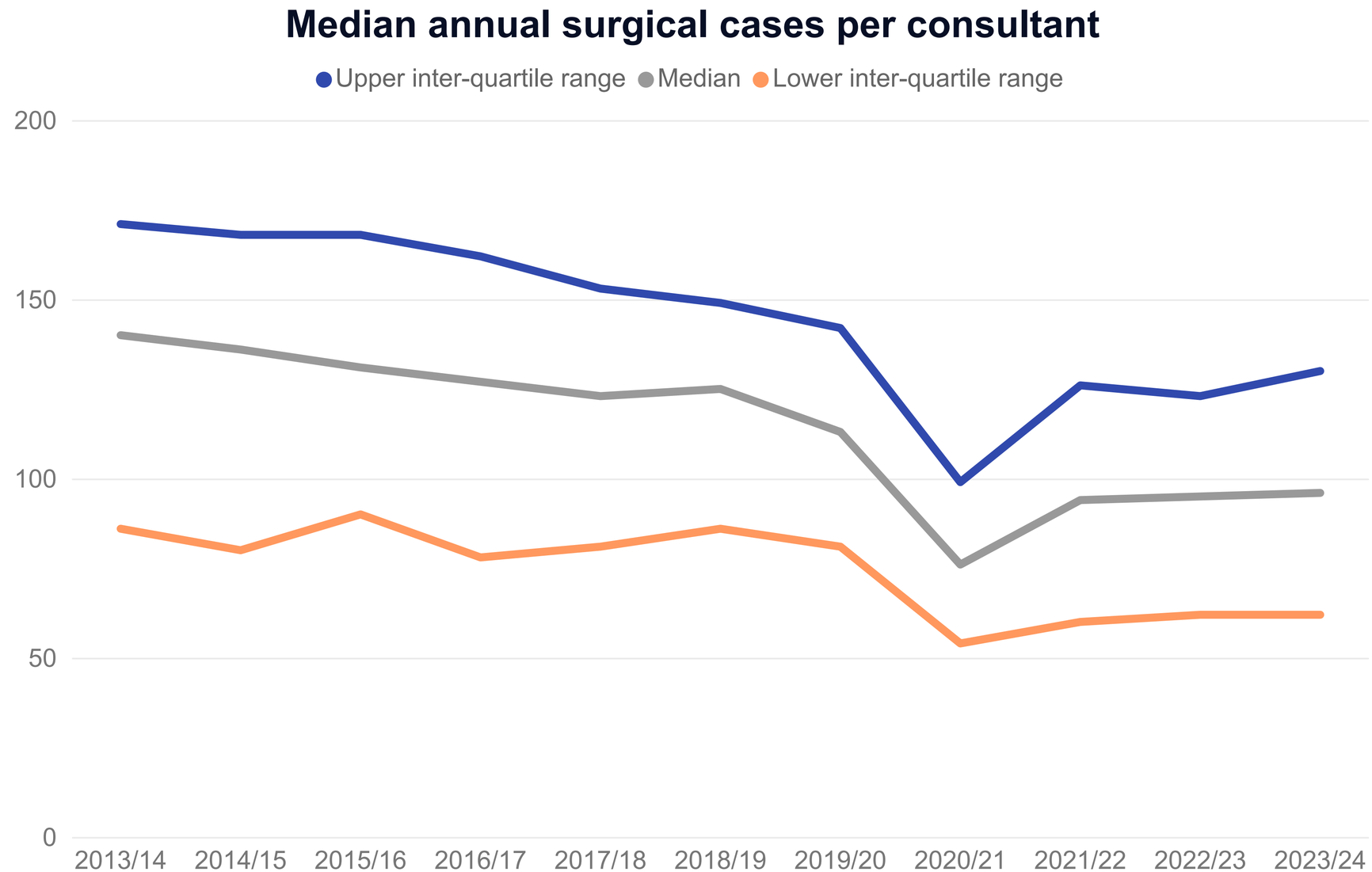
A typical consultant would be expected to perform 168 cases per year (assuming they undertake two lists per week, two cases per list and no cancellations). Surgeons performing very complex surgery might perform only one case on any given day.

However, consultant surgical activity is falling well below these levels. In 2023/24 the median caseload was only 96 operations compared with 140 in 2013/14.

Consultants in the top quartile performed at least 130 cases a year in 2023/24, down from 171 or more cases in 2013/14.

There are many reasons for not achieving expected throughput, most commonly a lack of ITU beds.

Note: Only consultants performing over 100 cases per 3-year audit cycle are used in these figures (including emergencies but excluding dual consultant cases).



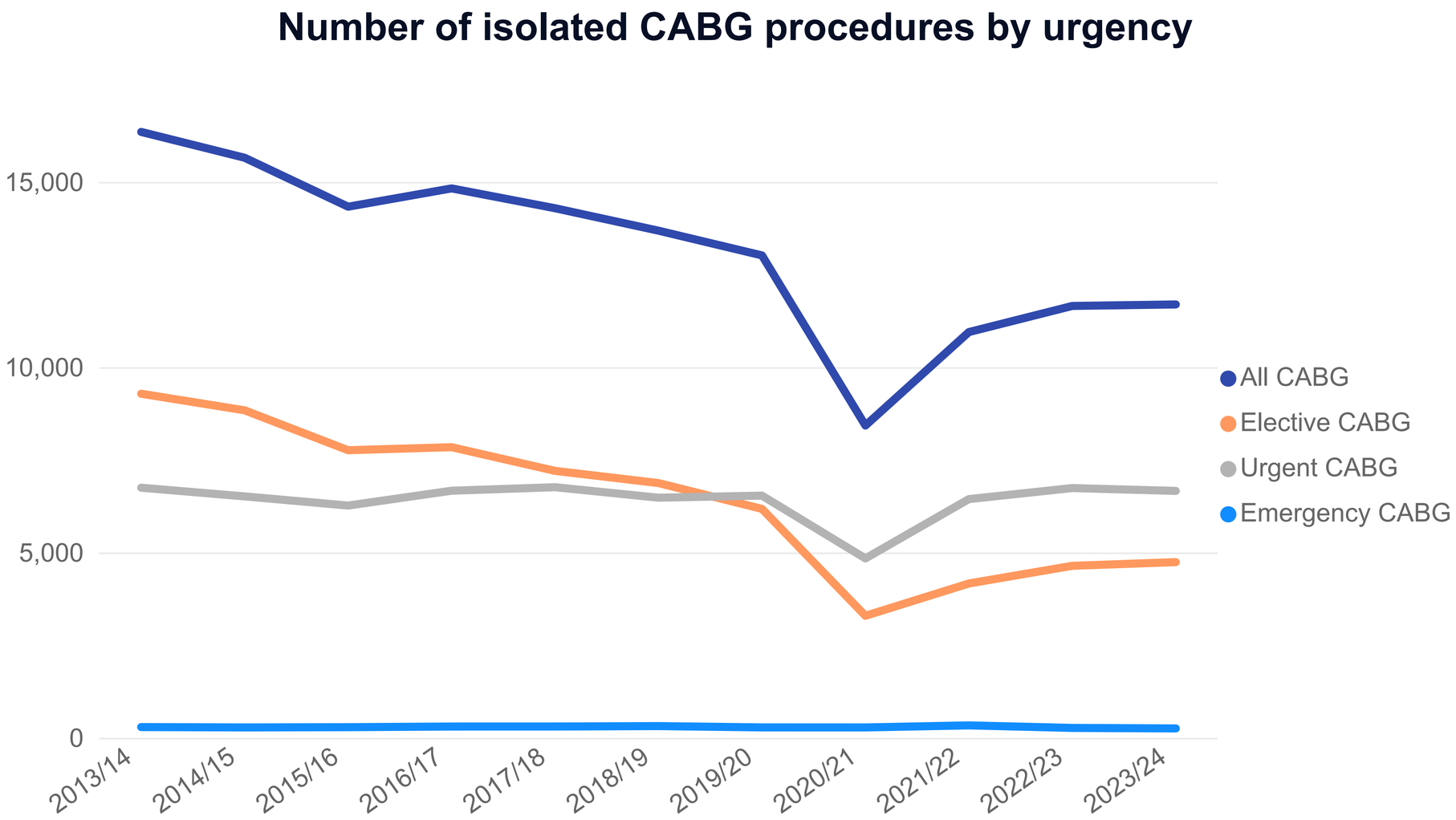
The drop in isolated CABG operations is a result of fewer elective cases

The 11,694 coronary artery bypass graft (CABG) operations in 2023/24, while rising since 2020/21, still appear to be part of a continuing fall seen over the last decade.

This is driven by a decline in the number of elective CABG cases, with a 23% reduction since 2019/20.

It is not clear whether this reflects a delay in post-pandemic recovery or reflects a new level of required elective procedures.

Conversely, the number of urgent CABG procedures, usually recommended during the same admission after a heart attack, was 2% higher than pre-pandemic levels.



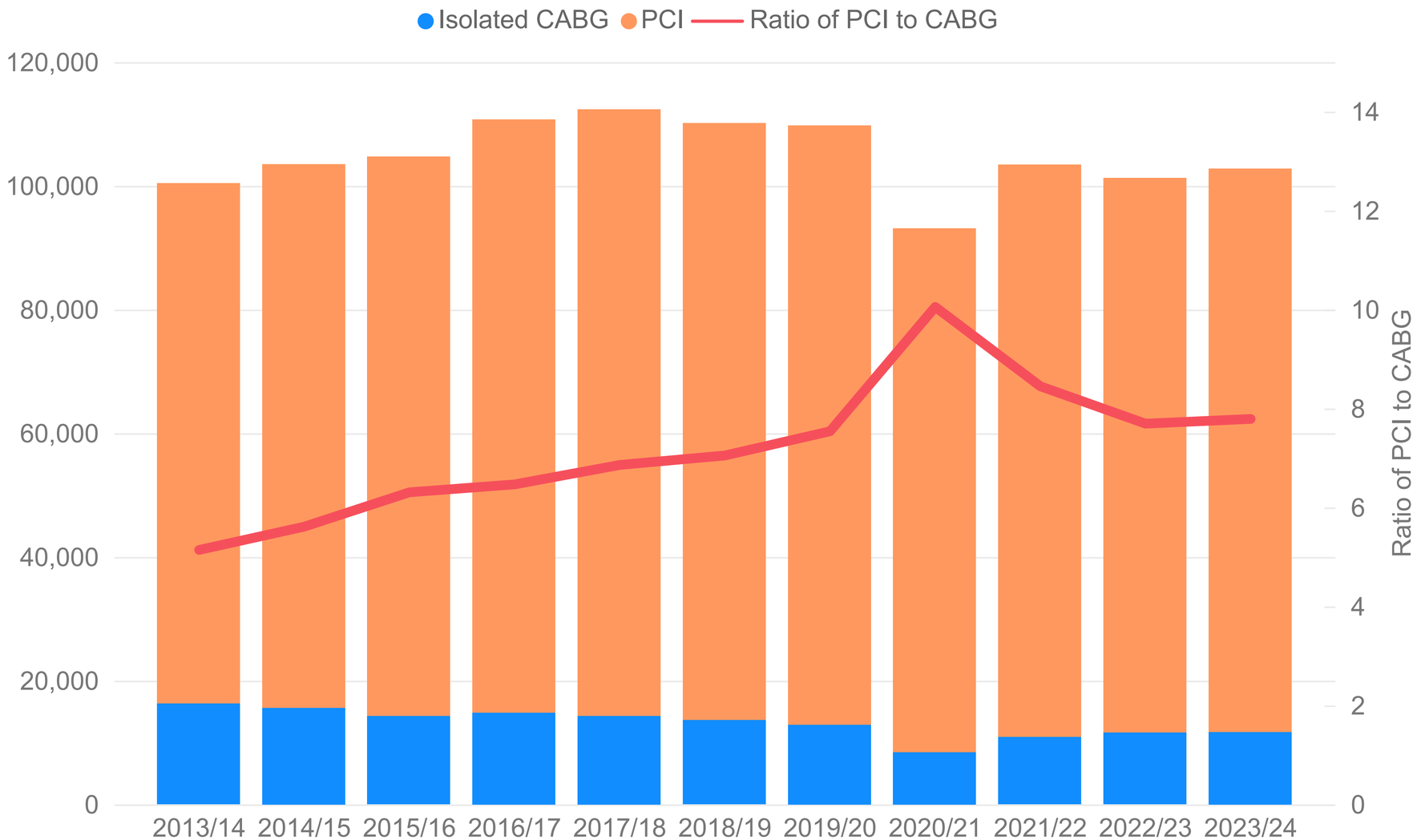
The rise in PCI relative to CABG has fallen back since the COVID-19 pandemic

The total number of patients undergoing some form of revascularisation procedure, including either percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG), had been falling in the UK for several years, but last year rose slightly compared to 2022/23.

The ratio of PCI relative to CABG was on an upward trend prior to the pandemic, peaking in 2020/21 (at almost 10:1) when surgical throughput was most affected by the COVID-19 pandemic.

Over the last two years, the PCI:CABG ratio has fallen back to nearly 8:1.

Numbers of PCI and CABG procedures and ratio of PCI to CABG

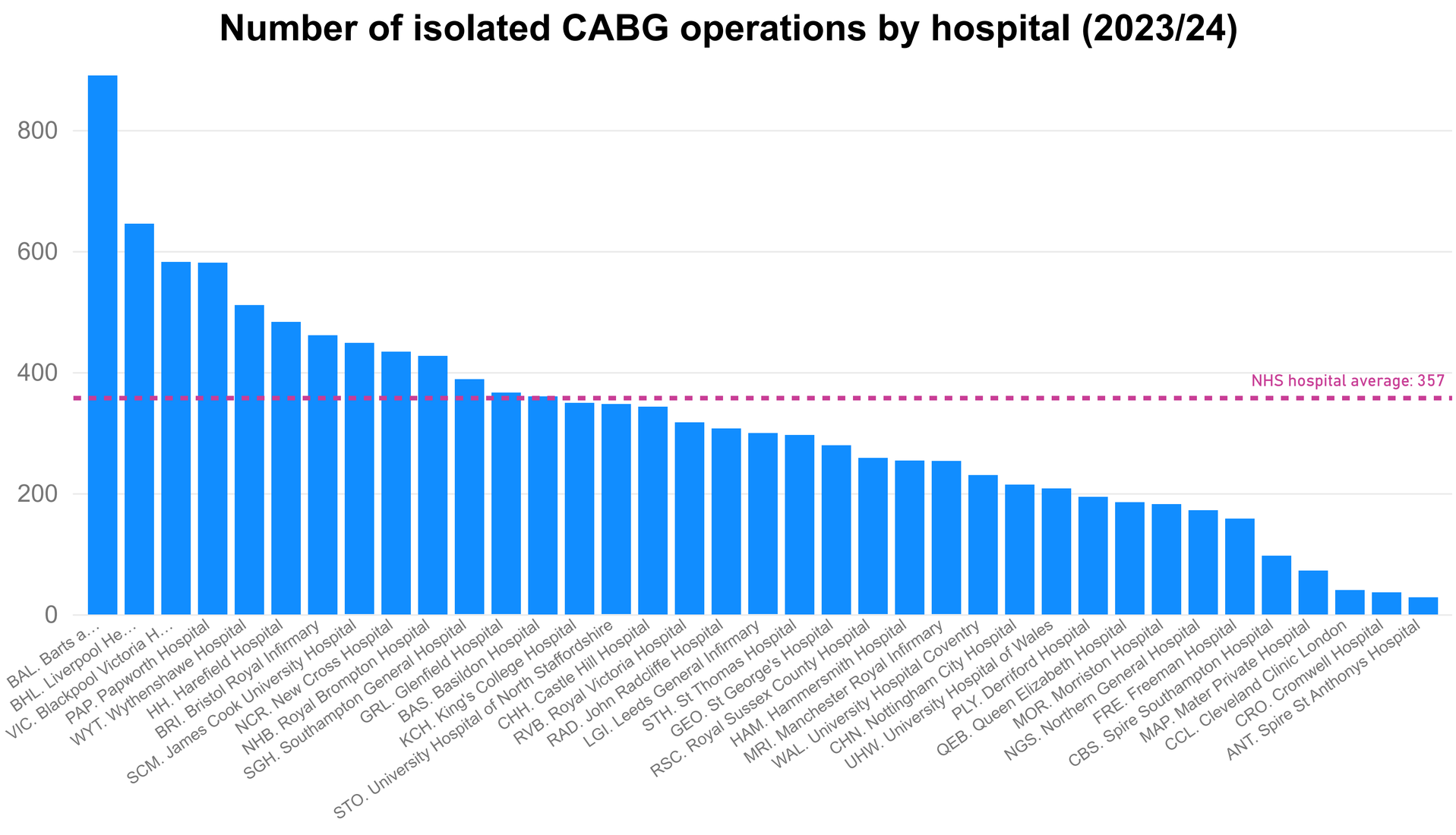


The number of isolated coronary artery bypass operations in NHS hospitals in 2023/24 ranged from 158 to 890

In 2023/24, 11,694 isolated coronary artery bypass grafting (CABG) operations were performed in England, Wales and Northern Ireland.

NHS hospitals undertook 357 CABG cases on average, with 890 being the highest number and 158 the lowest.

Five hospitals performed more than 500 cases, while 10 (5 NHS) carried out fewer than 200 operations.



AVR operations for low-risk cases are particularly reduced from pre-pandemic levels, with evidence that TAVI is being considered more for these patients

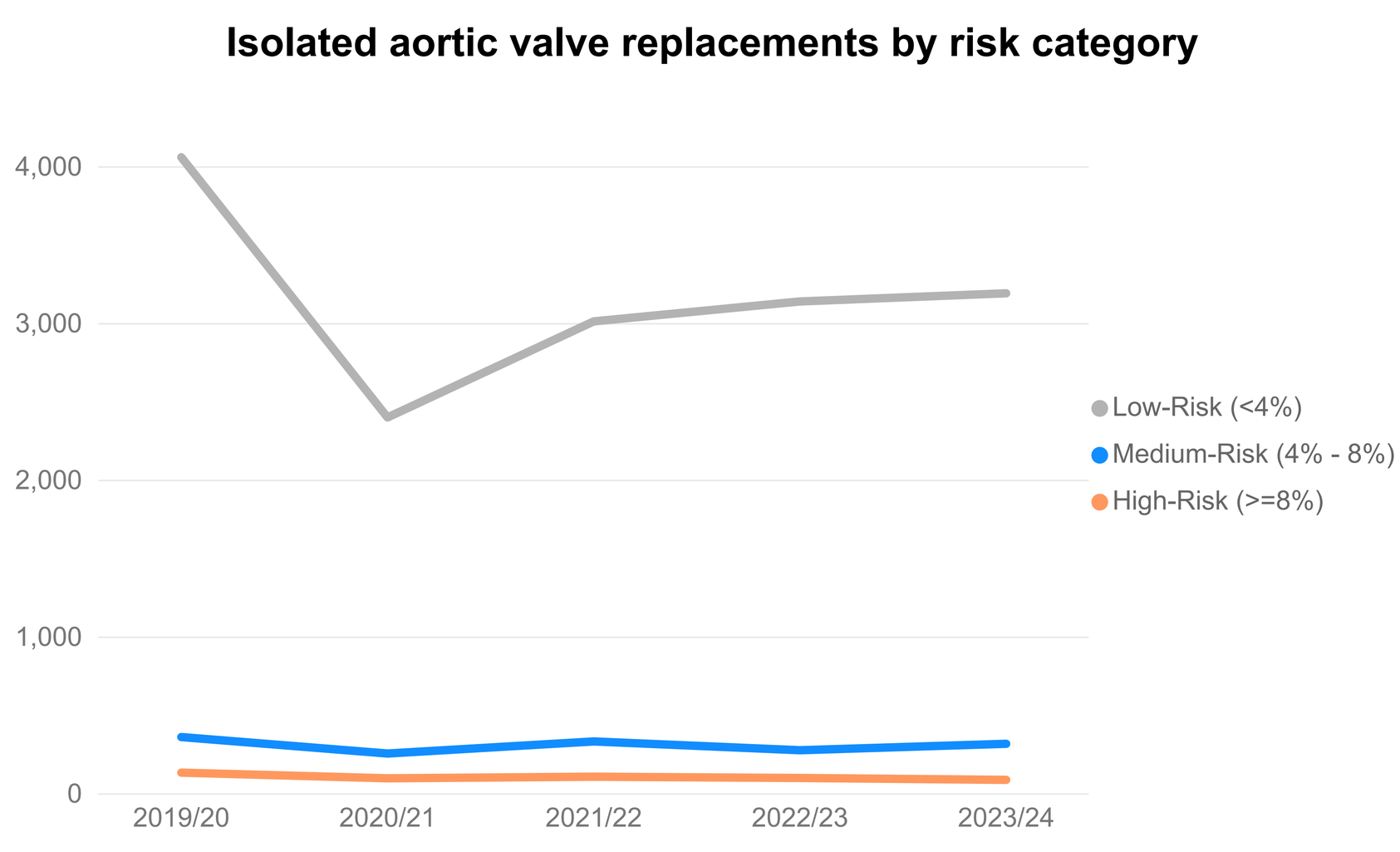
A total of 3,589 isolated aortic valve replacements (AVRs) were performed in 2023/24.

NICE guidance from 2021 recommends that patients with low or medium-risk for surgery should undergo aortic valve replacement (AVR) in preference to transcatheter aortic valve implantation (TAVI).

The proportion of patients deemed at low-risk (EuroSCORE2 <4%) has stayed roughly the same at 87 to 89% over the last four years. Despite this, overall surgical AVR numbers are falling.

Results from recent publications studying TAVI in low-risk cohorts is challenging the NICE guidance and there is evidence that TAVI is now being considered more commonly for this patient group.

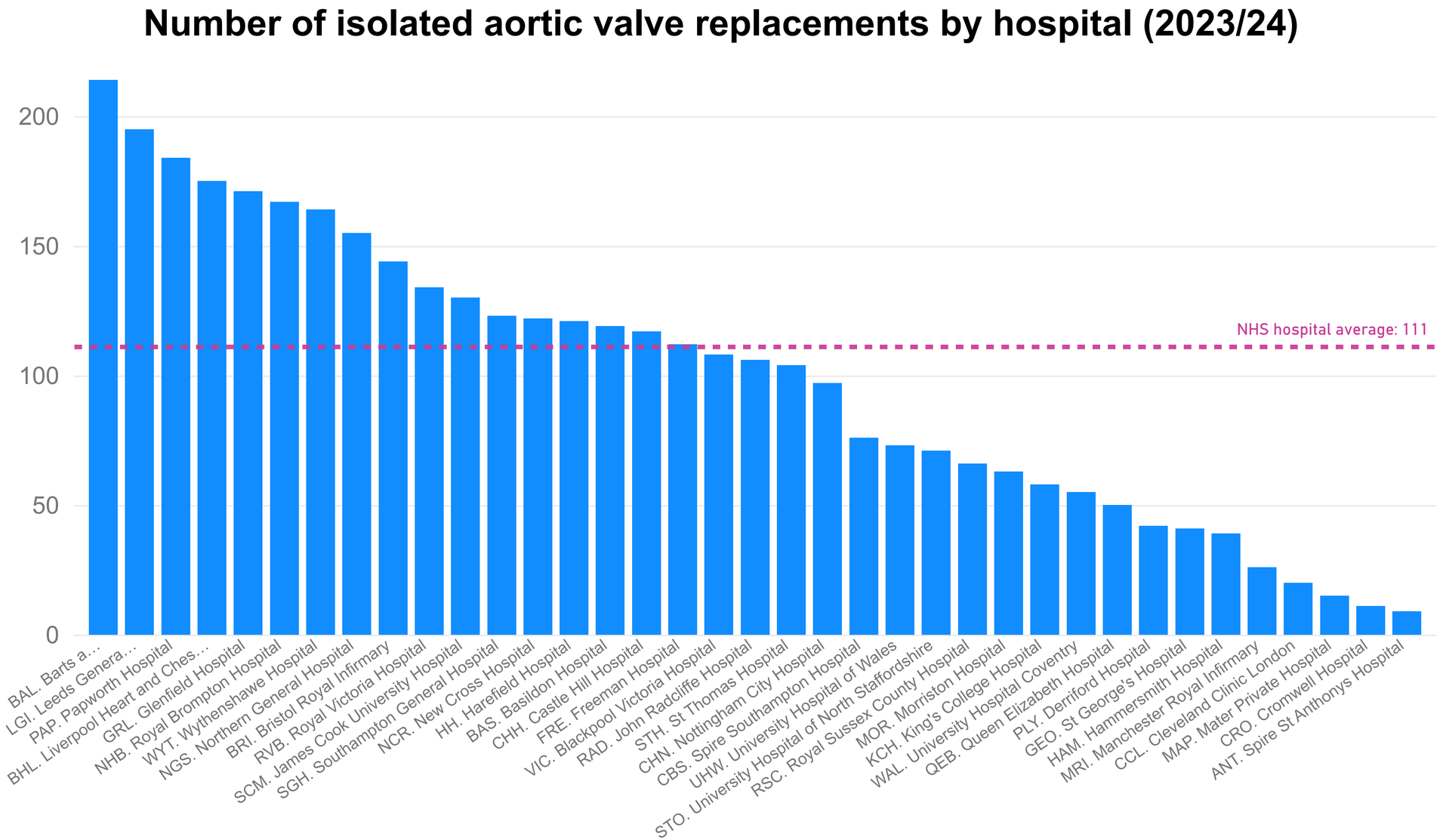
In 2023/24, only 2.7% of AVR cases were in the high-risk category (EuroSCORE2 >=8%). These patients are likely to have had factors making TAVI unsuitable (e.g. endocarditis or vascular access problems).



There is a wide variation in the number of isolated aortic valve replacements performed by individual NHS hospitals

The number of isolated AVR procedures in NHS hospitals ranged from 26 to 214 in 2023/24.

The average per hospital was 111.



The highest ever number of patients with aortic valve disease were treated in 2023/24, with TAVI procedures nearly triple isolated AVR operations

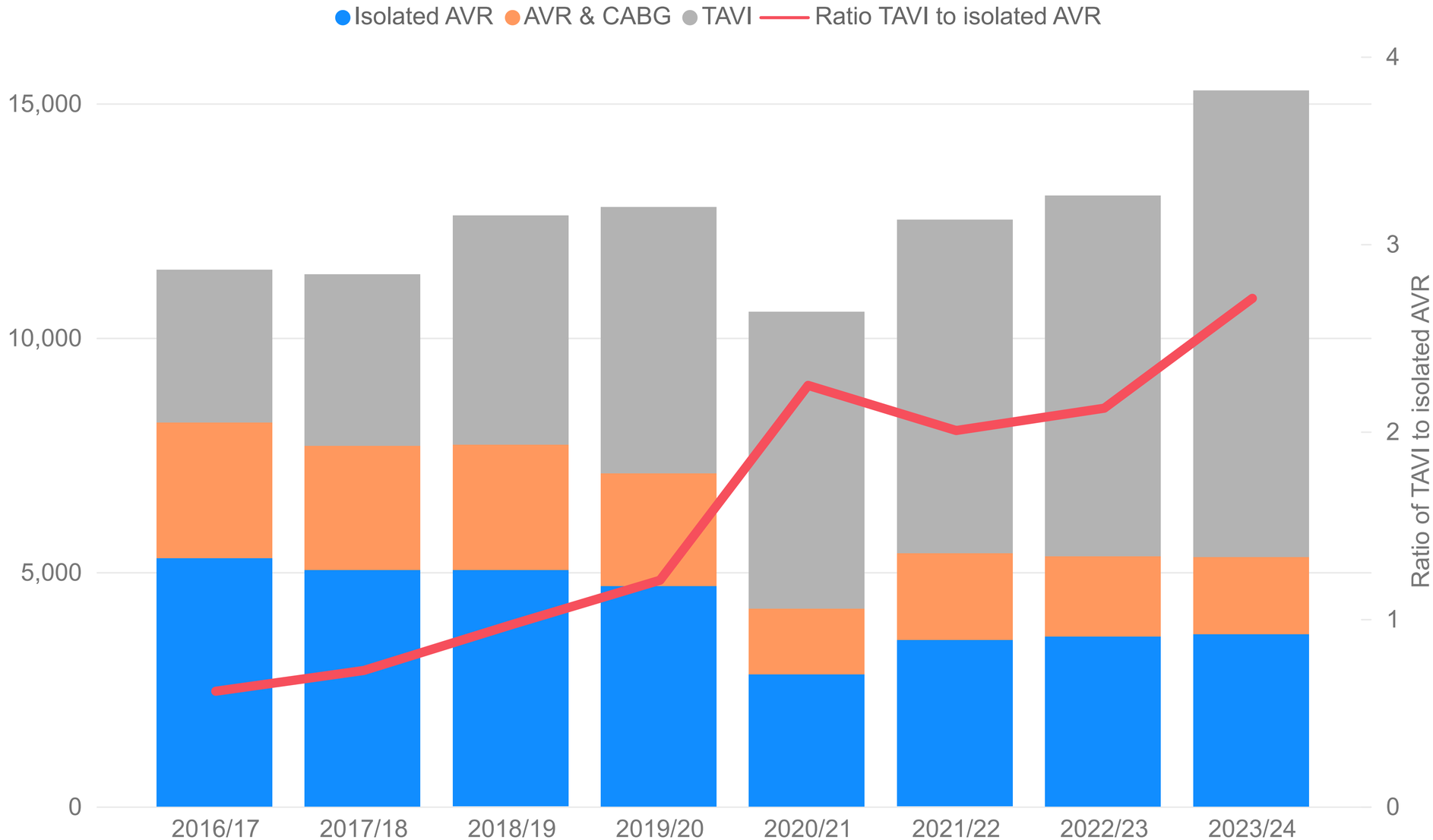
While isolated surgical AVR procedures have fallen since COVID, the total number of patients receiving aortic valve intervention of any type (surgery and TAVI combined) was at its highest ever level in 2023/24.

More than 15,000 aortic valve (AVR + TAVI) procedures were performed last year, an increase of nearly 20% since 2019/20.

The use of TAVI has been increasing and, compared to cardiac surgery, the capacity to deliver this treatment was not as affected by the COVID-19 pandemic.

In 2023/24, TAVI procedures were nearly triple the number of isolated AVR operations performed.

Types of aortic valve procedure and ratio of TAVI to isolated AVR



Nearly a third of younger patients undergoing aortic valve replacement receive a biological valve, contrary to current recommendations

Once implanted, biological ('tissue') valves are more prone to long term-structural failure than mechanical valves. This may result in the need for either repeat aortic valve replacement (AVR) surgery or transcatheter aortic valve implantation (TAVI).

On the other hand, while there is evidence that mechanical valves give younger patients better life expectancy when compared to tissue valves, there is a need for lifelong anticoagulation, meaning patients are more prone to bleeding-related complications.

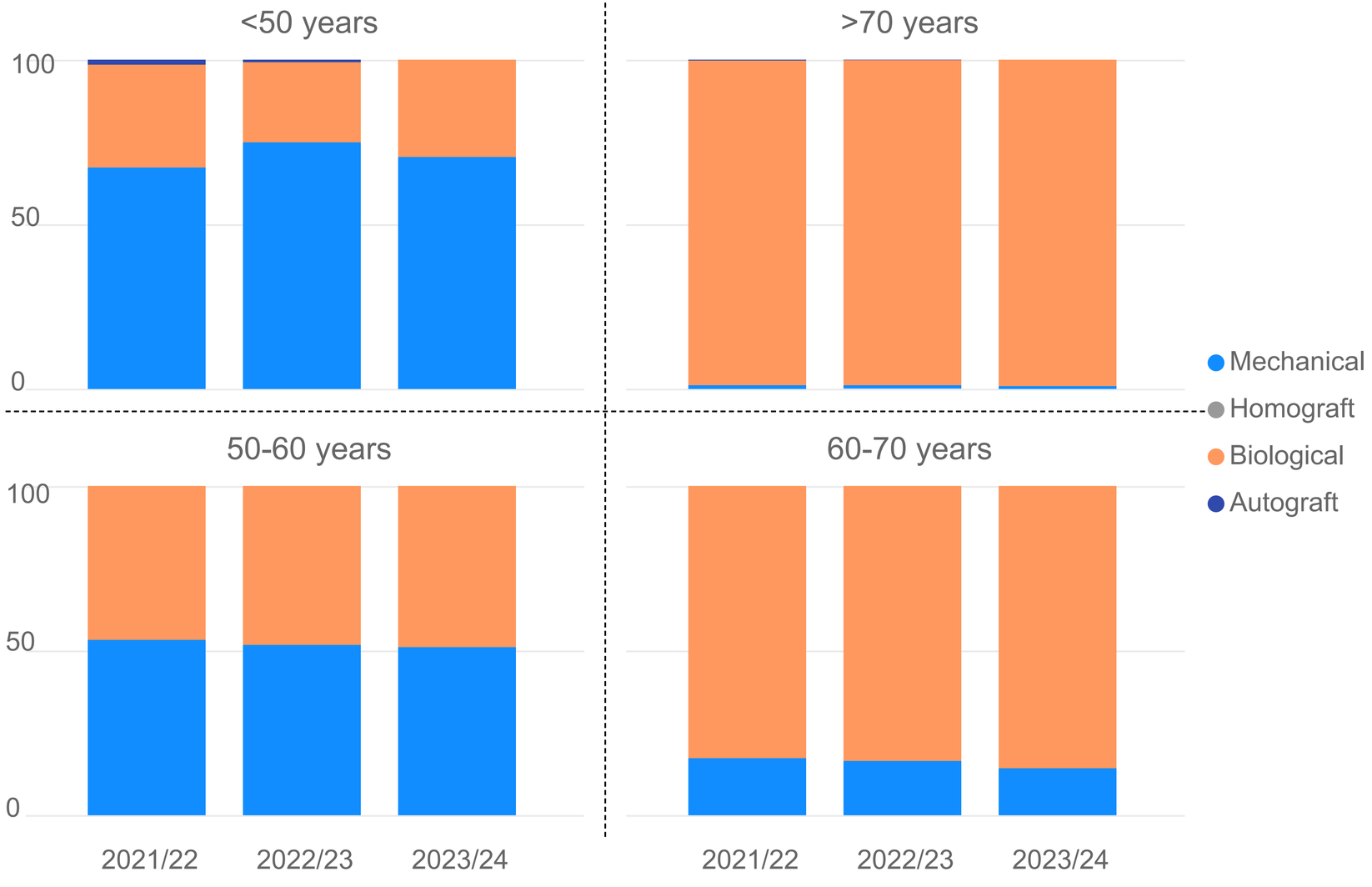
Guidelines therefore recommend mechanical valves in younger patients (<50 years) and biological valves in older patients (>70 years). For patients between 50-70 years, there is debate as to which is better, especially since the advent of TAVI, which provides an option for a 'redo' procedure over time.

In 2023/24, almost all of AVR procedures in patients over 70 years old used biological valves.

However, nearly 30% of AVR procedures in patients under 50 were performed using biological valves, against the current guidance (accepting some small sub-groups where this might be appropriate).

Note: 60-70 years means >60-70 years.

Percentage of different valve types used in isolated AVR by age group



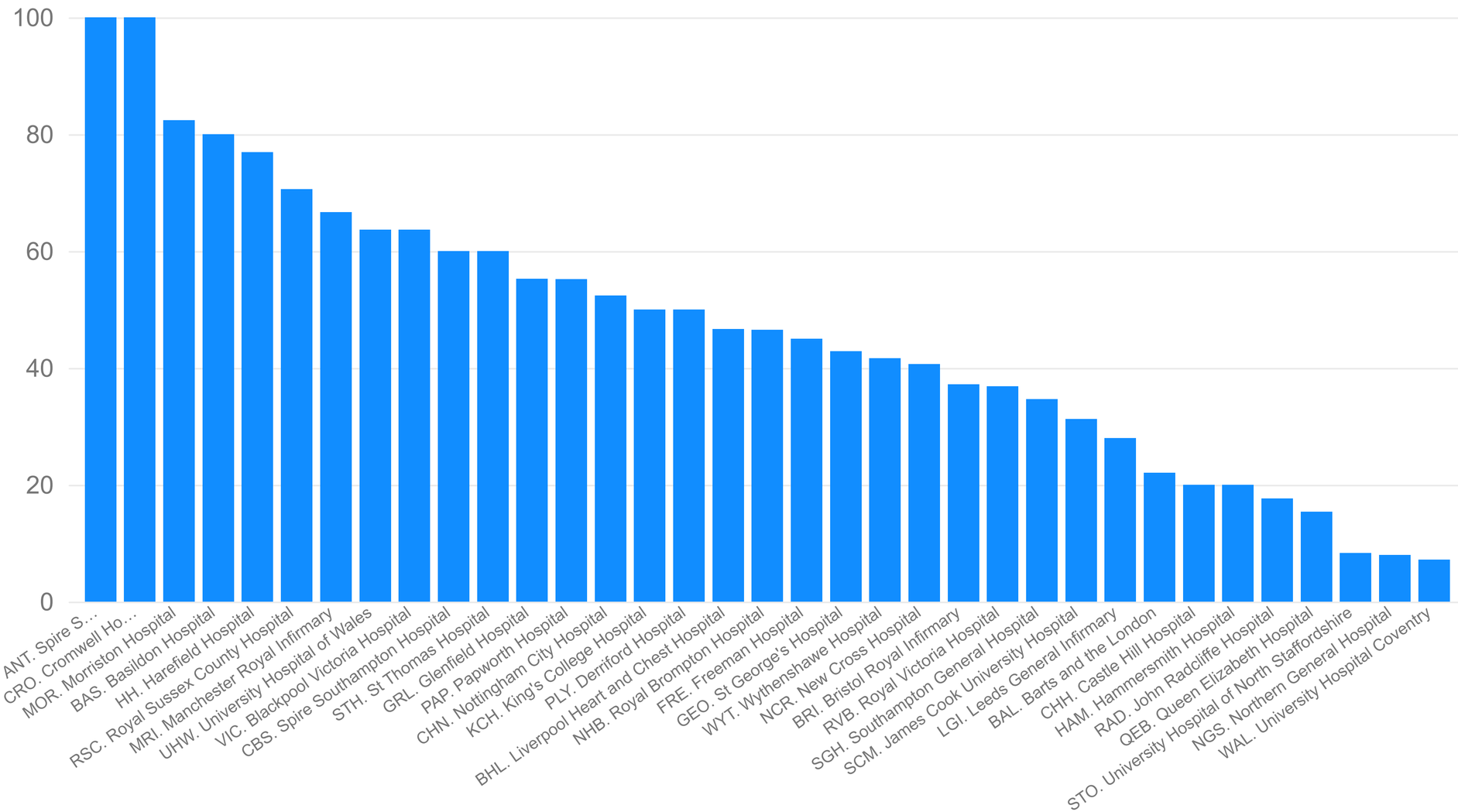
The proportion of patients under 60 years old receiving a biological valve during isolated AVR operations varies hugely across hospitals

Most patients aged less than 60 years undergoing isolated aortic valve replacement (AVR) would be expected to receive a mechanical valve according to current guidelines.

There is huge variation in practice across the UK in the proportion of this group who instead receive a biological valve against these guidelines.

The range for this in NHS hospitals in 2023/24 was from 7% to 82%.

Percentage of patients under 60 years receiving a biological valve during an isolated AVR operation in 2023/24



The number of mitral valve operations remains well below pre-pandemic levels

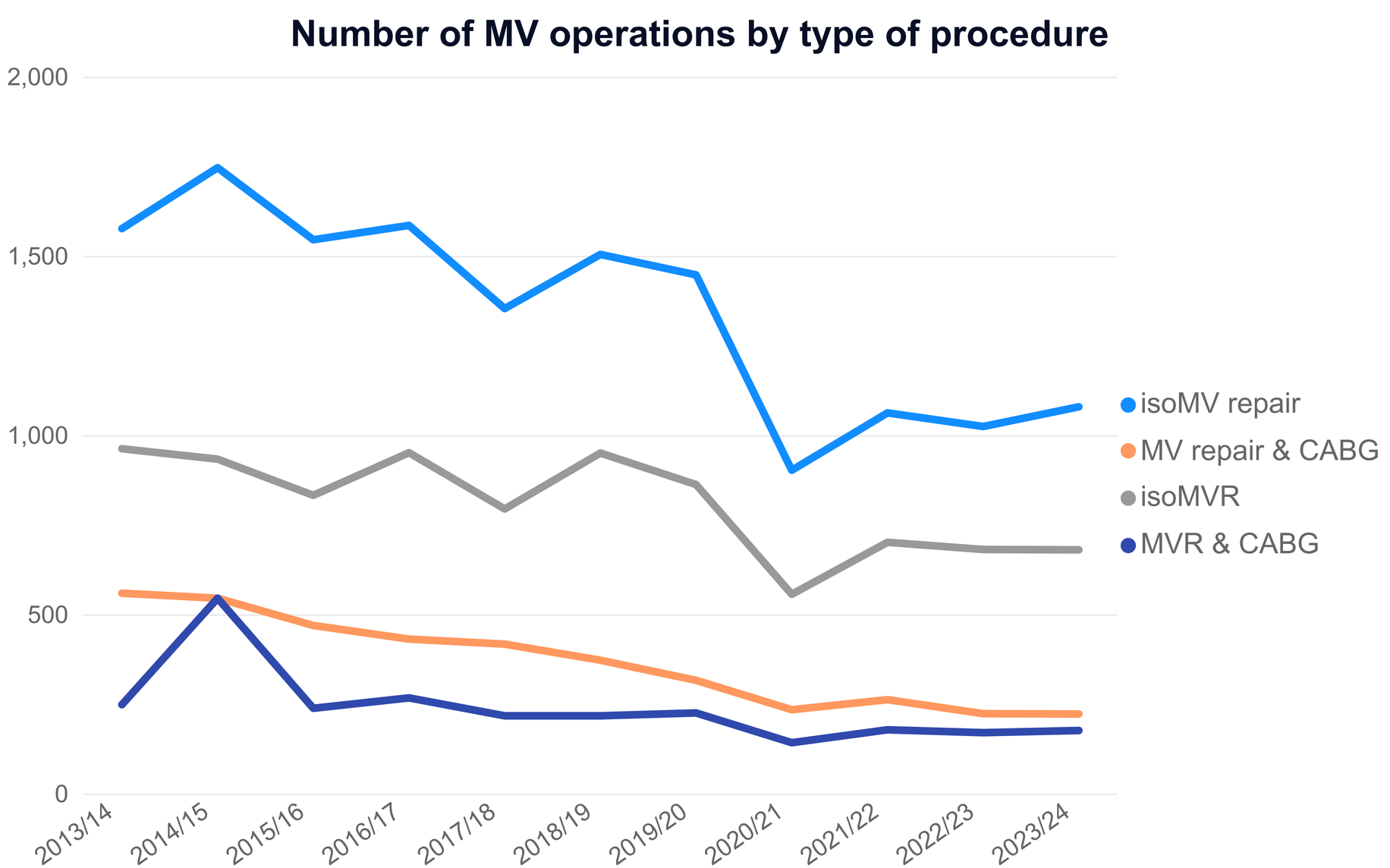
Mitral valve replacement (MVR) and mitral valve repair (MV repair) can be undertaken either as isolated procedures or in conjunction with coronary artery bypass grafting (CABG).

The number of mitral valve (MV) operations has been decreasing over the last decade with a major dip during the COVID-19 pandemic.

Compared to 2019/20, overall MV procedures fell by 24% in 2023/24 (693 fewer cases). Isolated MV repair case also reduced by 25% (368 fewer) and isolated MVR by 21% (182 fewer).

It is unclear whether this reflects an issue related to post-pandemic recovery or represents a new level of requirement.

Other options are also now available to treat MV disease (such as MitraClip™), but their recent introduction is unlikely to explain the longer-term reduction in surgical activity.

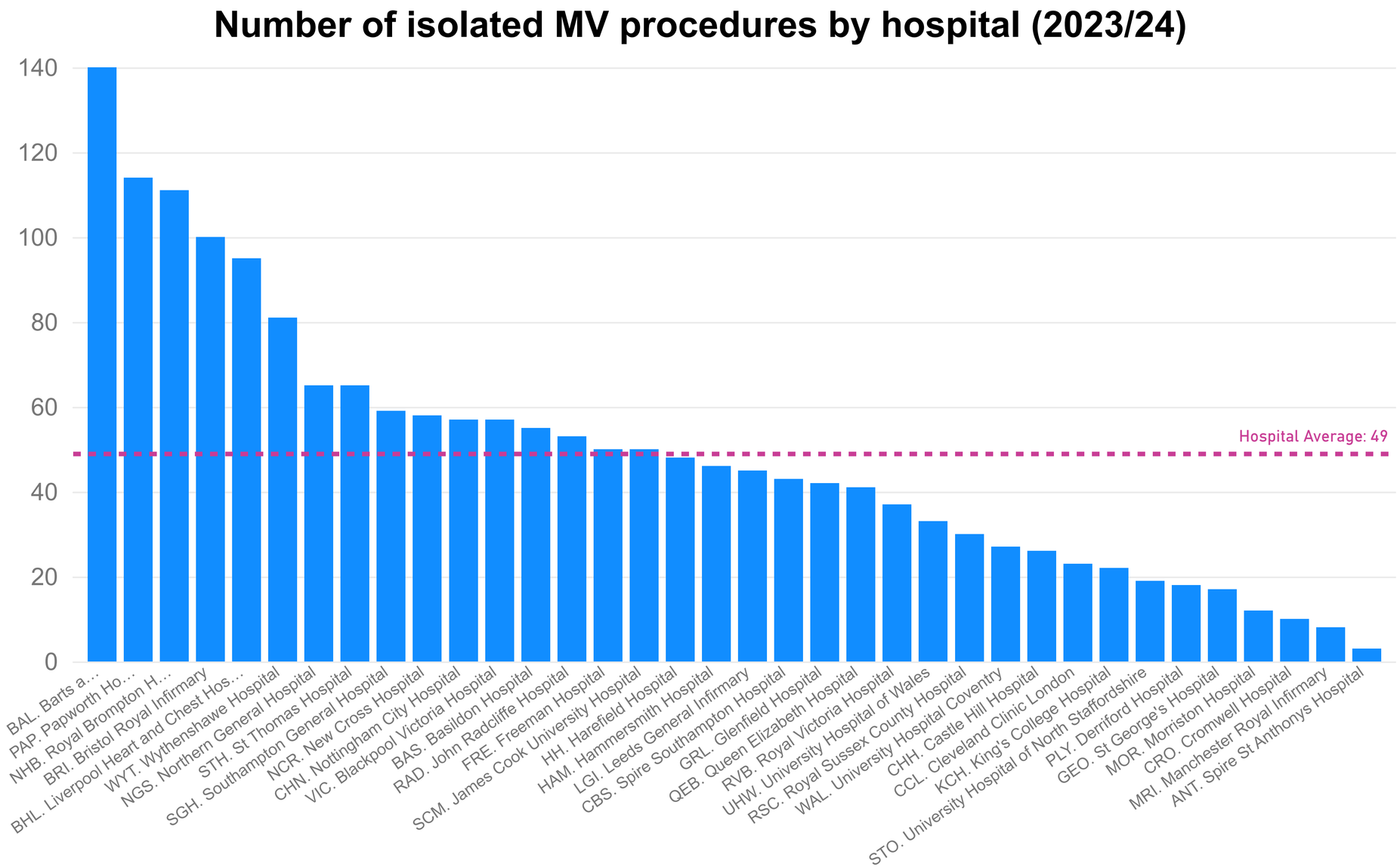


There was a 17-fold difference in the number of mitral valve procedures performed by individual NHS hospitals in 2023/24

A total of 1,759 isolated mitral valve (MV) procedures (including both replacements and repairs) were performed in 2023/24.

The average MV procedures per hospital was 49.

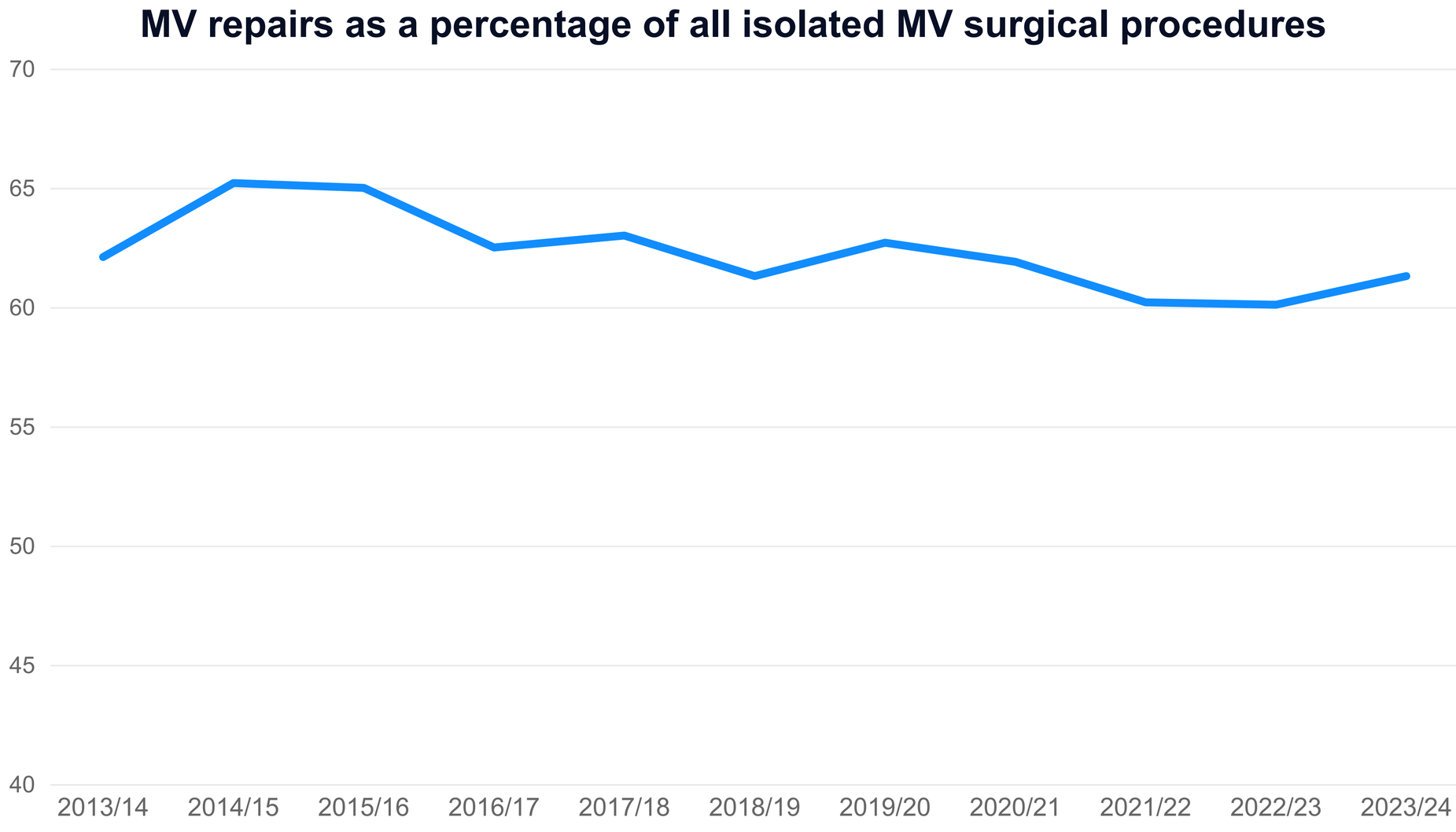
The most active NHS hospital performed 140 MV procedures, while the least active centre undertook only 8 cases.



Mitral valve repairs have reduced as a percentage of all isolated mitral valve surgery

The best treatment for suitable patients with degenerative mitral valve (MV) disease is mitral valve repair rather than replacement of the valve (MVR).

Not only has the total number of MV repair procedures been falling, but the rate of these procedures as a proportion of all patients having an isolated MV procedure is also declining slowly (to 61% in 2023/24).

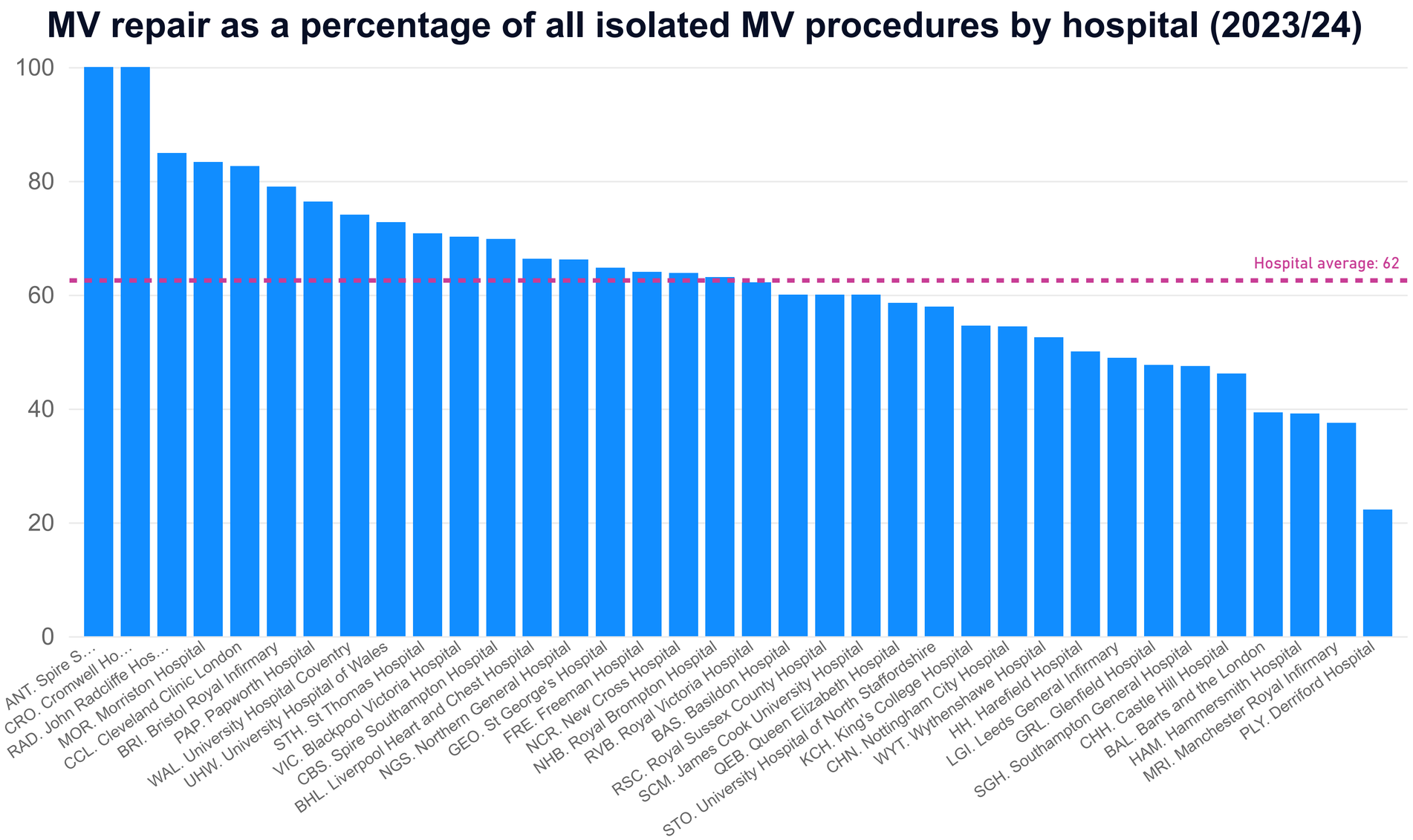


Mitral valve repair rates differ hugely by hospital

There is very considerable variation between hospitals in the number of mitral valve (MV) repairs performed as a proportion of all isolated MV surgical procedures.

In 2023/24, this ranged from 22% to 85% in NHS hospitals.

The average across all hospitals, (including private centres) was 62%.

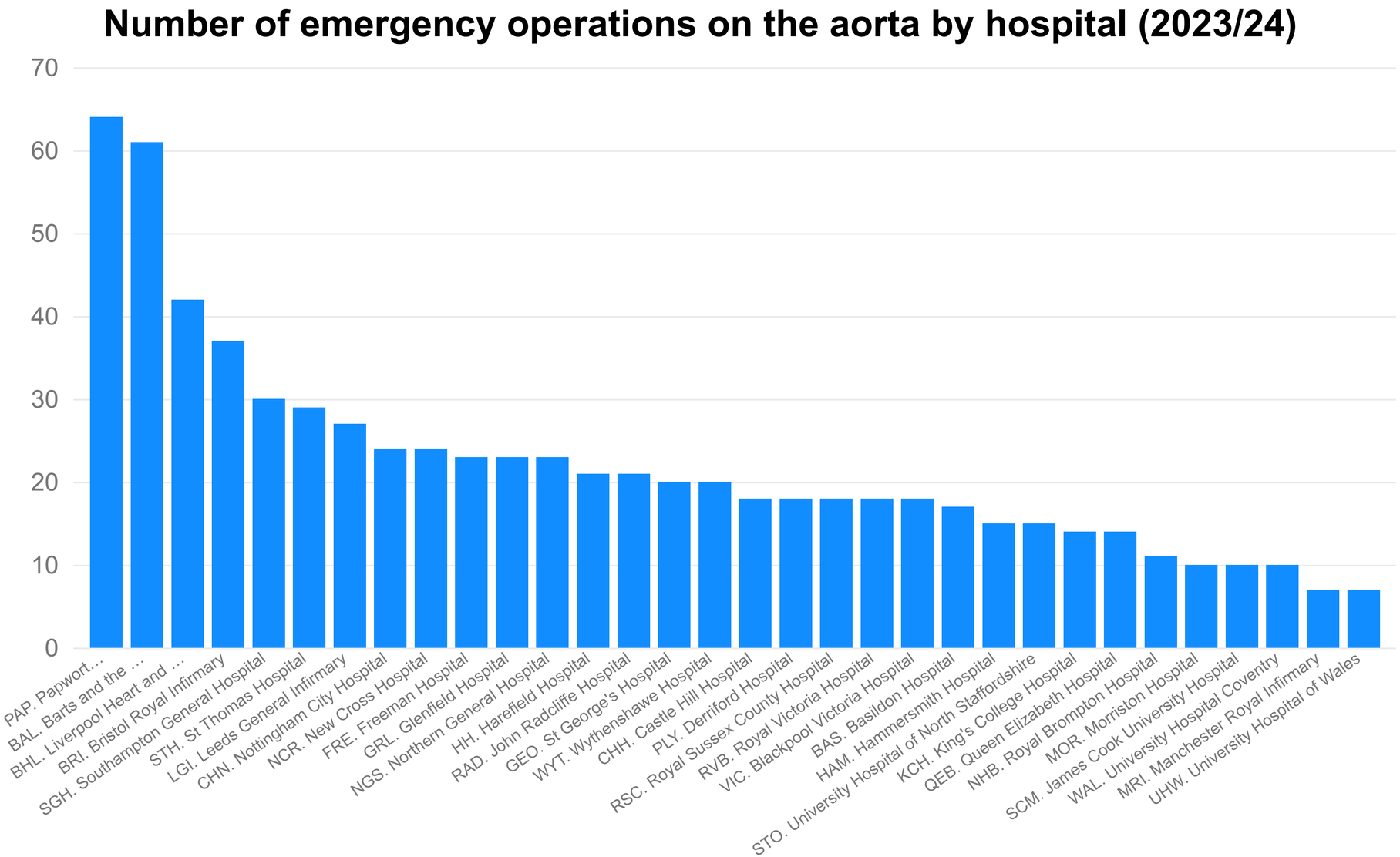


In 2023/24, the majority of hospitals performing emergency operations on the aorta carried out fewer than 24 operations

A total of 707 emergency operations were performed on the thoracic aorta in 2023/24. Most (but not all) of these were for acute aortic dissection.

The 2023 NACSA audit report suggested that mortality outcomes are possibly improved if centres undertake 24 or more operations per year (based on UK results from the last decade).

In 2023/24, only 9 hospitals performed 24 or more cases. The remaining 23 hospitals did not reach the minimum recommended number of procedures, with the lowest carrying out just 7 cases.



Left atrial appendage occlusion (LAAO) procedures at the time of cardiac surgery have risen significantly

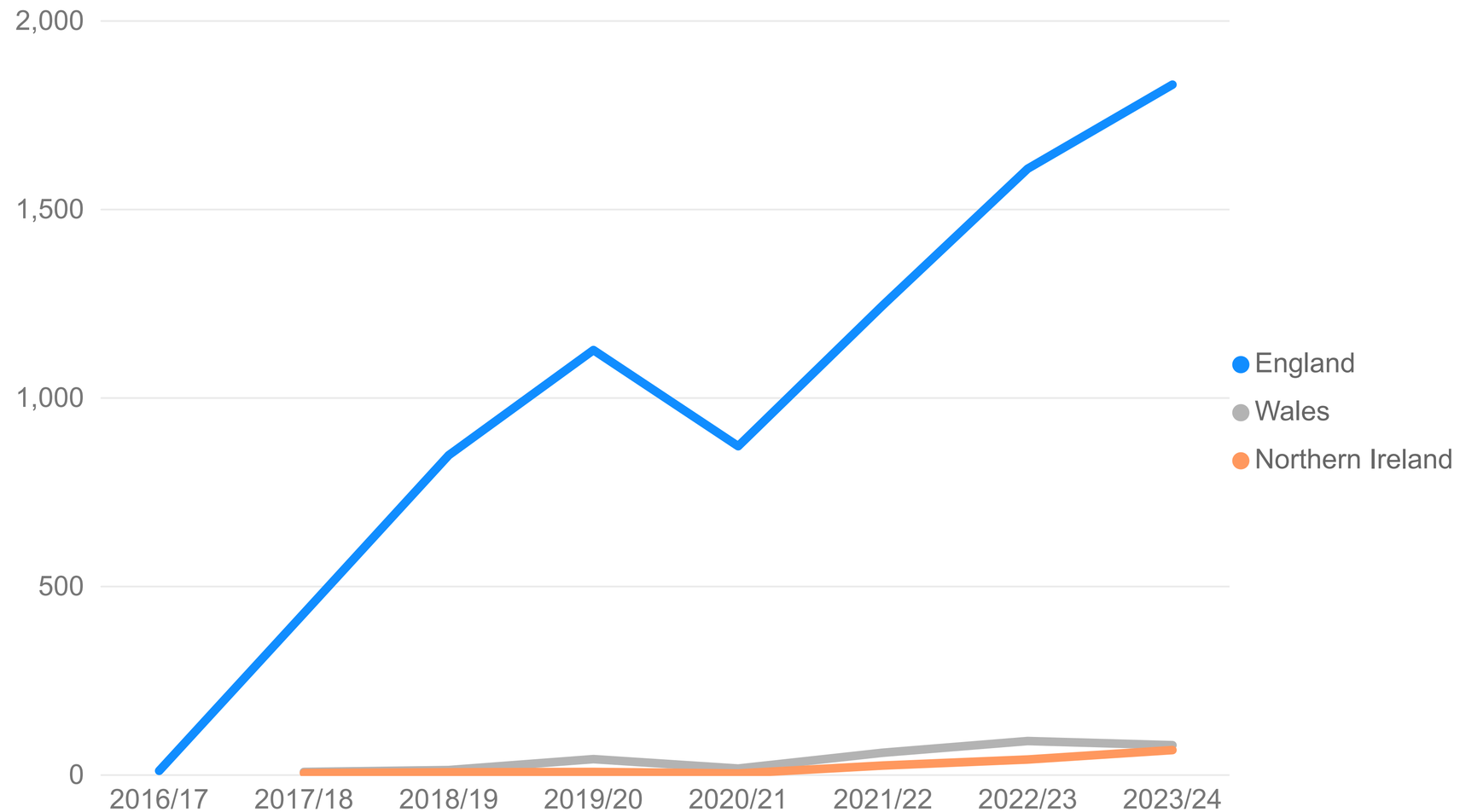
Left atrial appendage occlusion (LAAO) is very straightforward and quick to perform as a concomitant procedure at the time of undergoing surgery, and usually involves simply placing a clip across the atrial appendage.

The 2021 LAAOS III trial suggested that all patients with atrial fibrillation (AF) should undergo LAAO in order to reduce their future risk of stroke.

UK practice has clearly changed as a result of this evidence. There has been yearly growth in the procedures performed every year since 2016/17 (with the exception of the pandemic year of 2020/21).

In 2023/24, a total of 1,971 LAAO procedures were carried out.

Number of left atrial appendage occlusion procedures at the time of cardiac surgery



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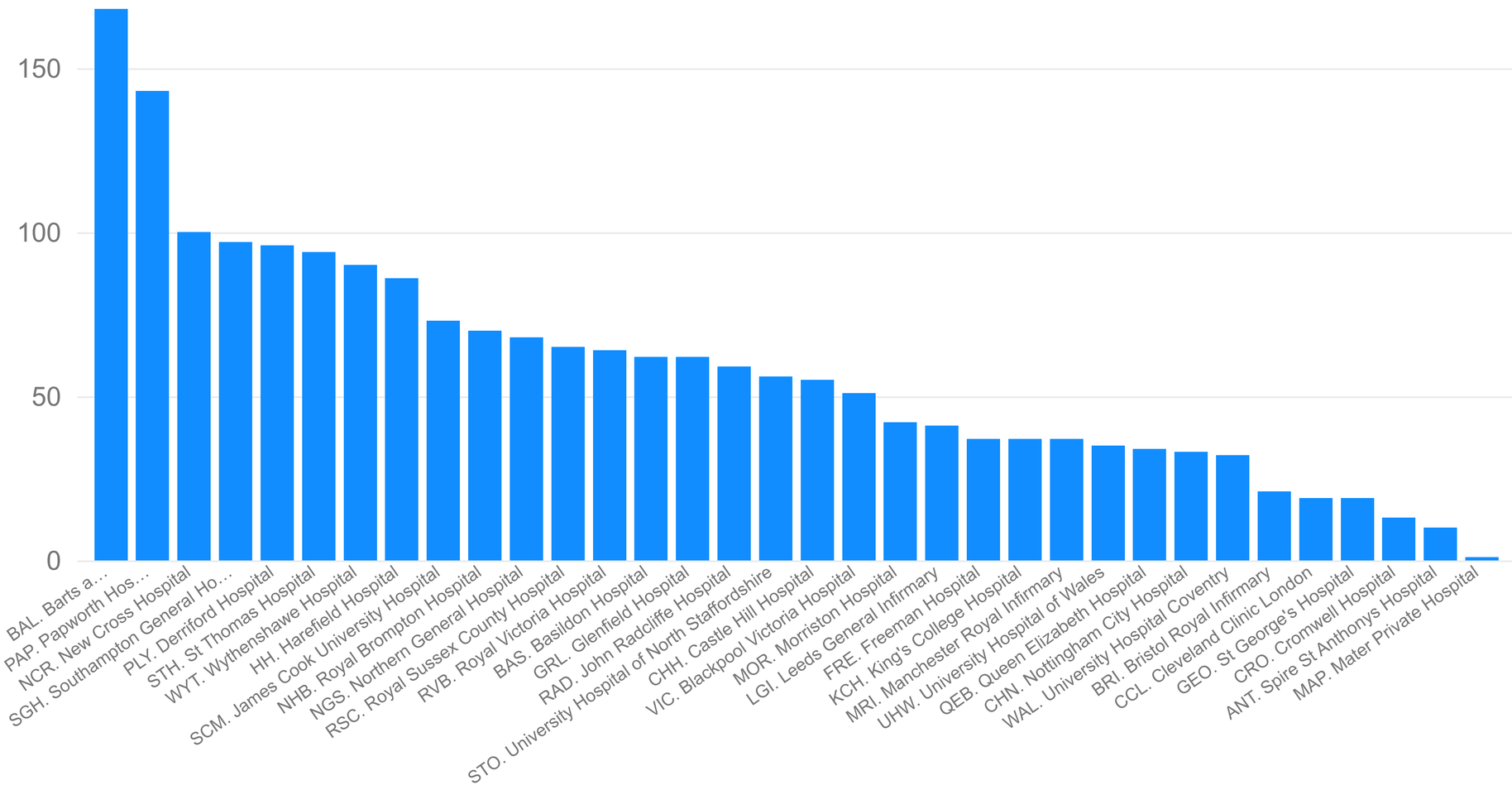
The number of left atrial appendage occlusion (LAAO) procedures varied from 19 to 168 in NHS hospitals

The most active NHS hospital performed 168 LAAO procedures in 2023/24.

11 hospitals carried out fewer than 50 procedures, with the lowest performing just 19.

Reliable data on pre-operative rates of AF are not available, although NHS units undertaking higher numbers of LAAO procedures are performing it in around 10-12% of all their cases (see next page).

Number of left atrial appendage occlusion procedures during cardiac surgery by hospital (2023/24)

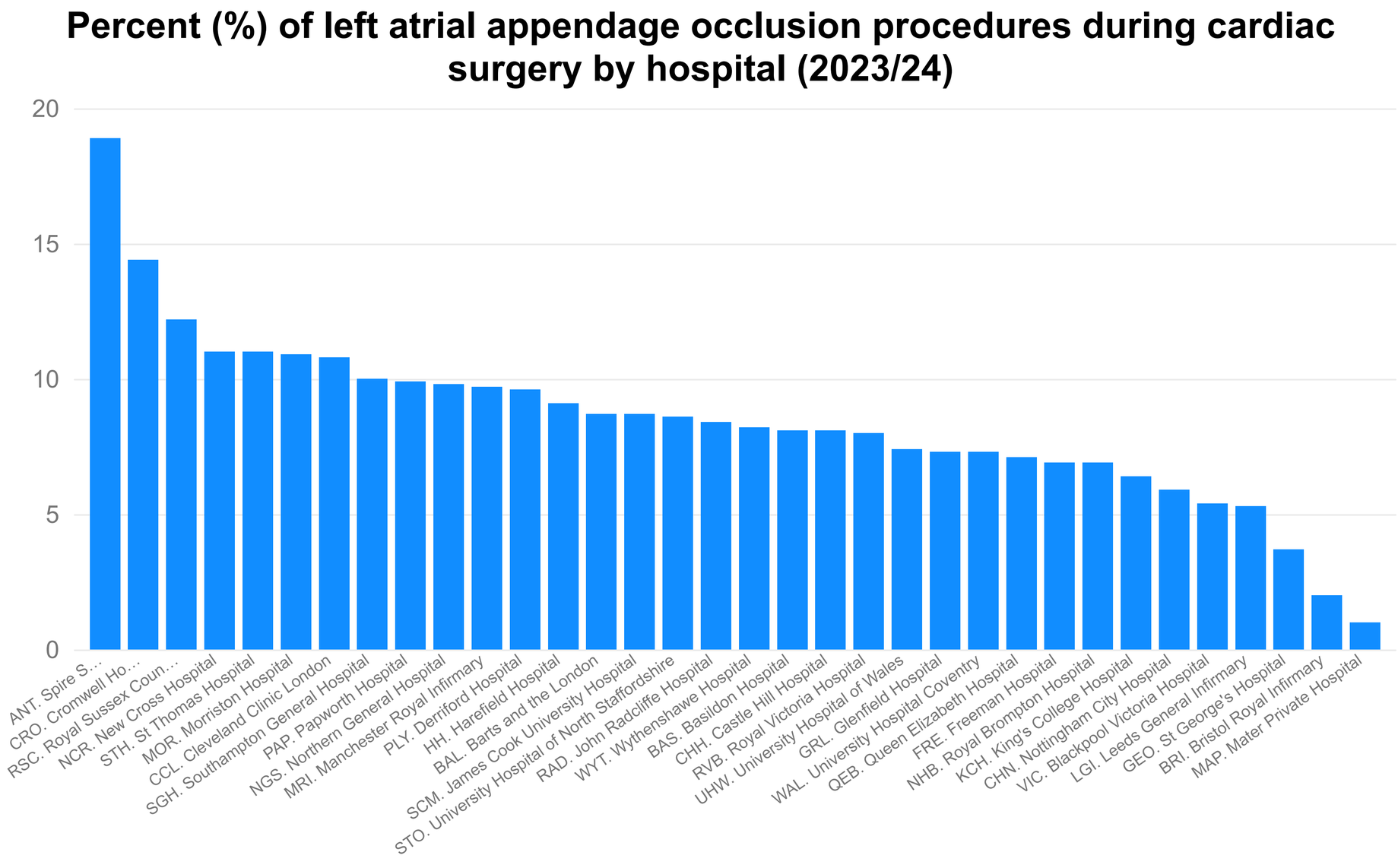


The percentage of cardiac operations involving a left atrial appendage occlusion (LAAO) procedure varies from 12% to just 2% in NHS hospitals

All patients with AF are recommended to undergo LAAO at the time of cardiac surgery if feasible.

In 2023/24, the rates of LAAO in NHS hospitals varied 6 fold, from 12% in the best centres to only 2% in the worst.

Note - reliable rates of preoperative AF are not available within the data collected.



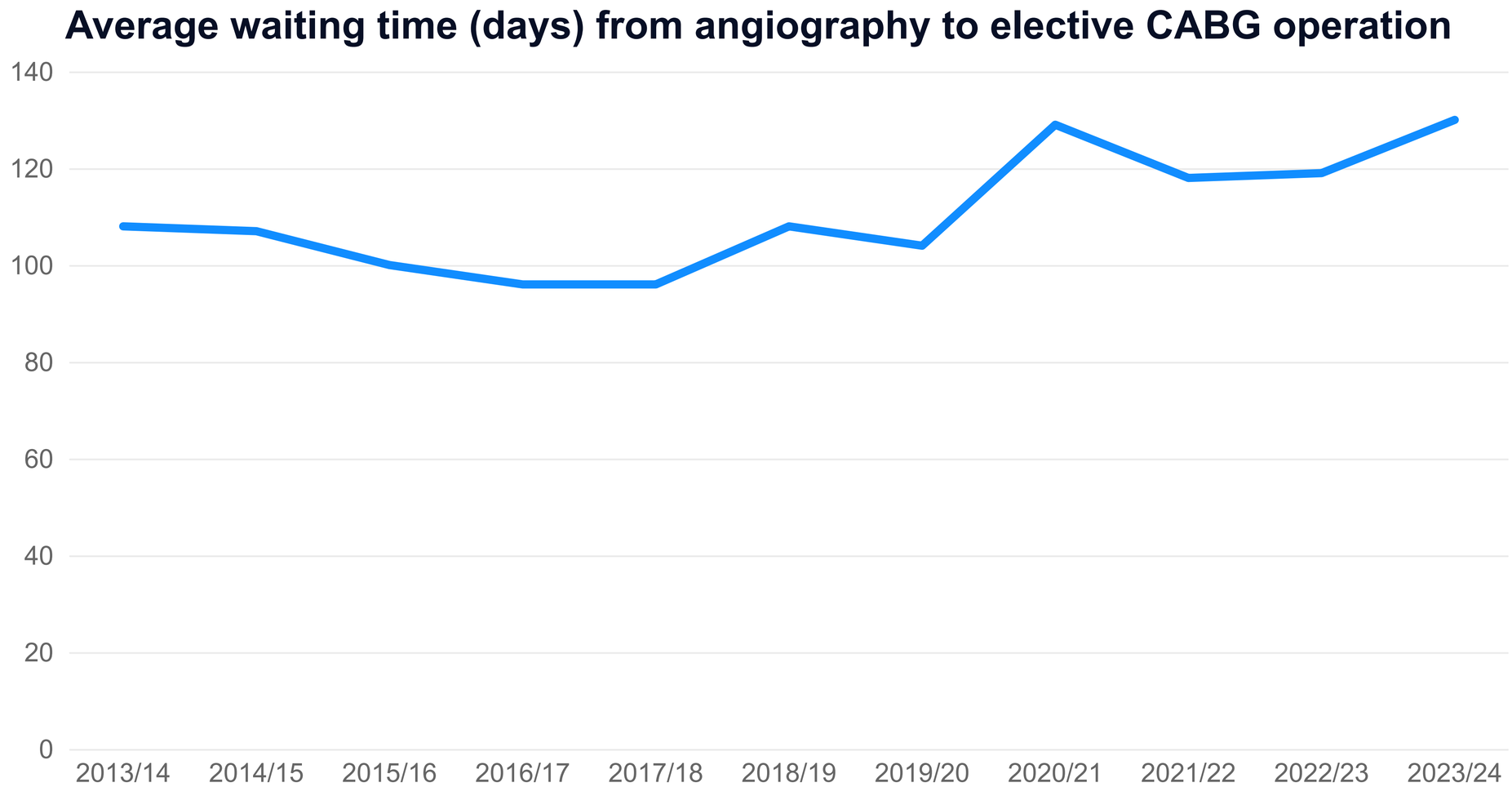
Average waiting times for elective CABG remain significantly above the target and are increasing

NHS hospitals have a 12-week target waiting time (under 84 days) for patients requiring elective coronary artery bypass grafting (CABG).

The time starts from the date the patient has undergone coronary angiography.

Waiting times had fallen to 96 days in 2017/18 but then started rising, with a sharp increase during the COVID-19 pandemic when they reached an average of 129 days.

After some improvement in 2021/22, elective CABG waiting times increased again, reaching 130 days on average in 2023/24.



In 2023/24, only 5 NHS hospitals hit the target waiting time for elective CABG

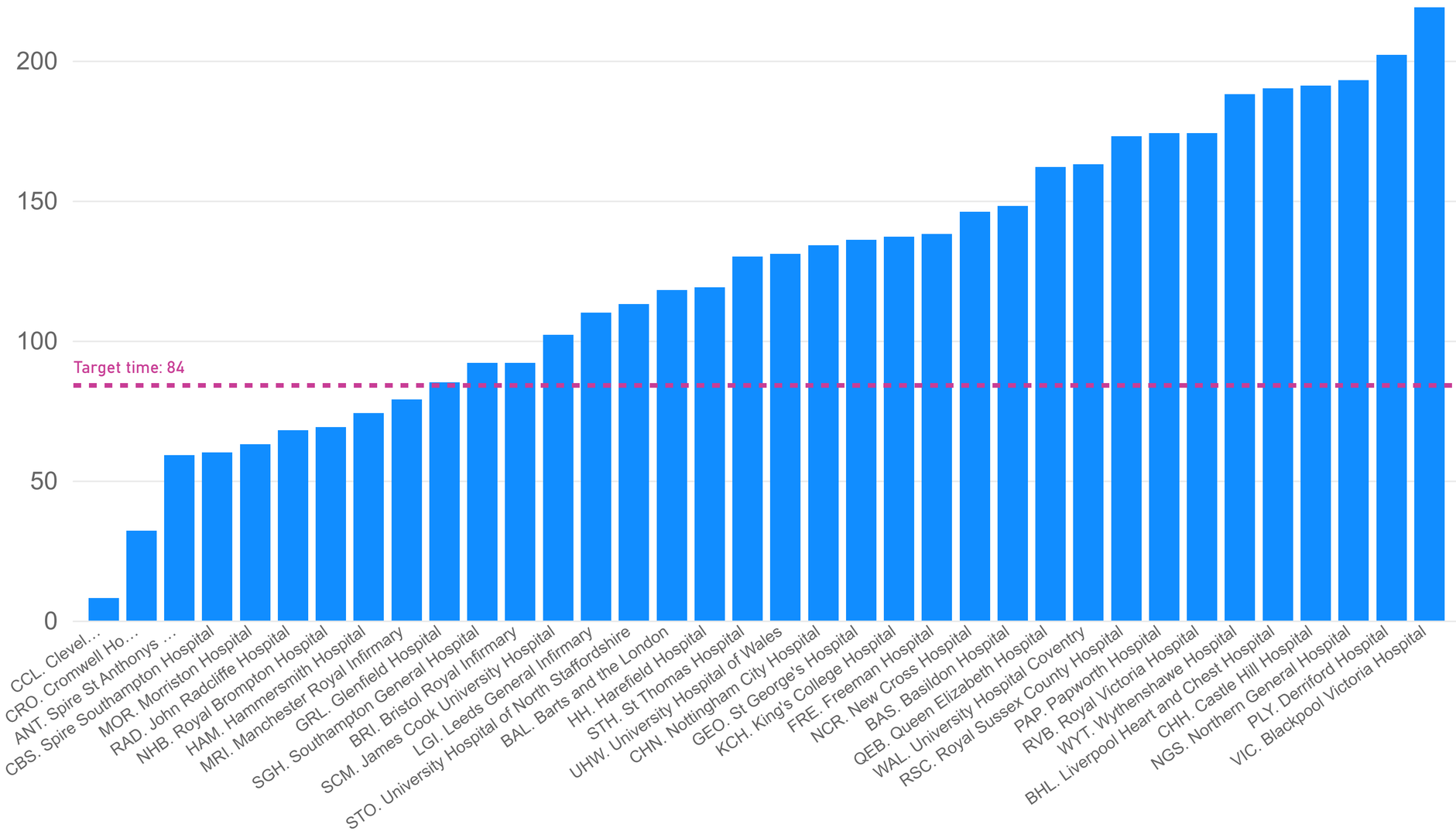
In 2023/24, the average waiting time (from angiography) for elective coronary artery bypass grafting (CABG) was 130 days.

5 NHS hospitals met the 12-week target (84 days) with a shortest waiting time of 63 days.

Eleven hospitals had waiting times of more than 150 days.

The longest waiting times (by hospital) were 219 days in England, 174 days in Northern Ireland and 131 days in Wales.

Waiting times (days) from angiography to elective CABG by hospital (2023/24)

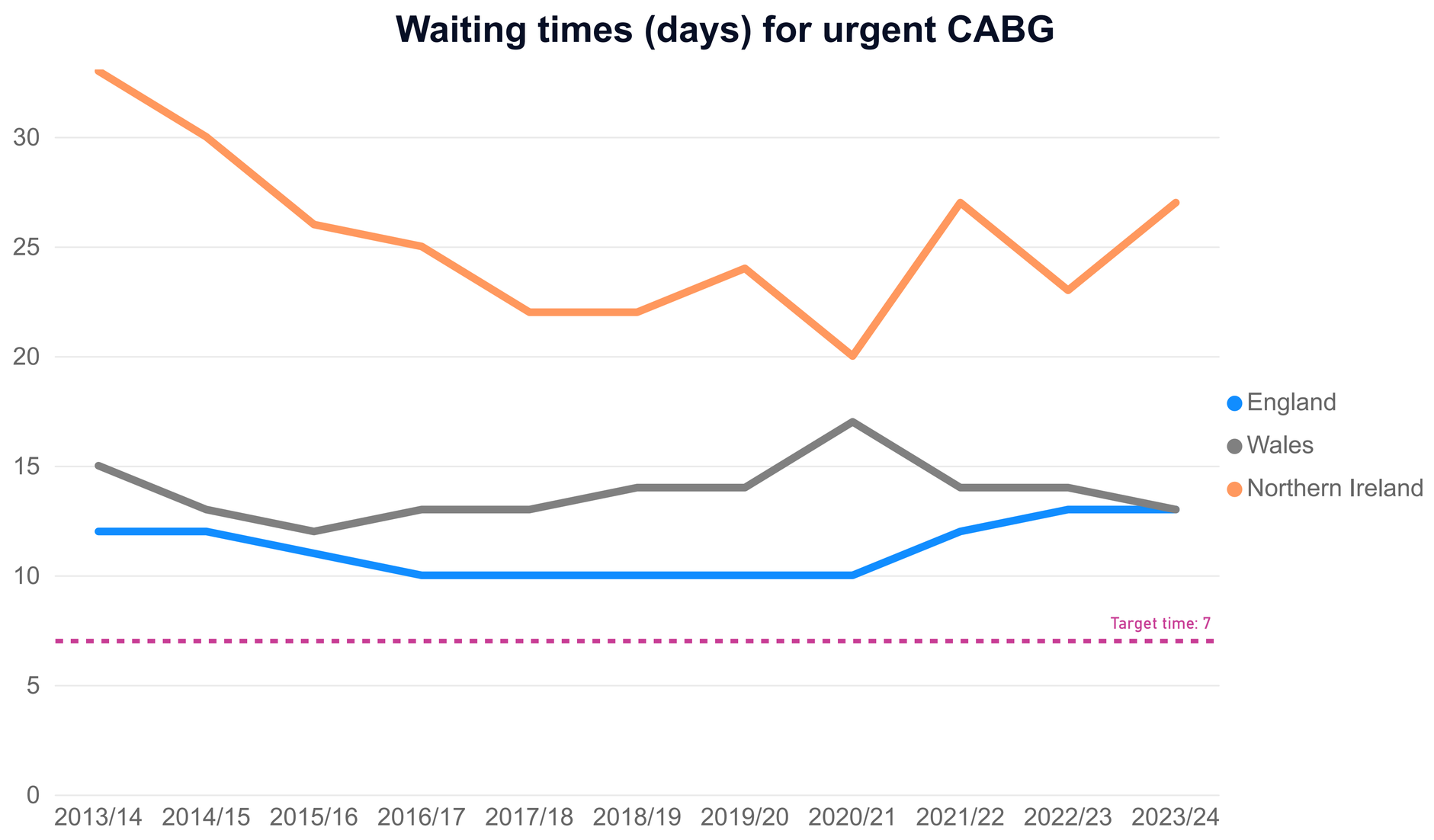


Urgent CABG surgery waiting times are significantly longer than the NHS target

Current NHS targets specify that patients requiring urgent coronary artery bypass graft (CABG) surgery should receive this **within seven days** of diagnostic angiography.

In England the average wait for urgent CABG had averaged 10 days prior to the COVID-19 pandemic but rose to 13 days in 2023/24.

Waiting times in Northern Ireland were much the longest (27 days) while the average wait was reduced by 1 day in Wales.



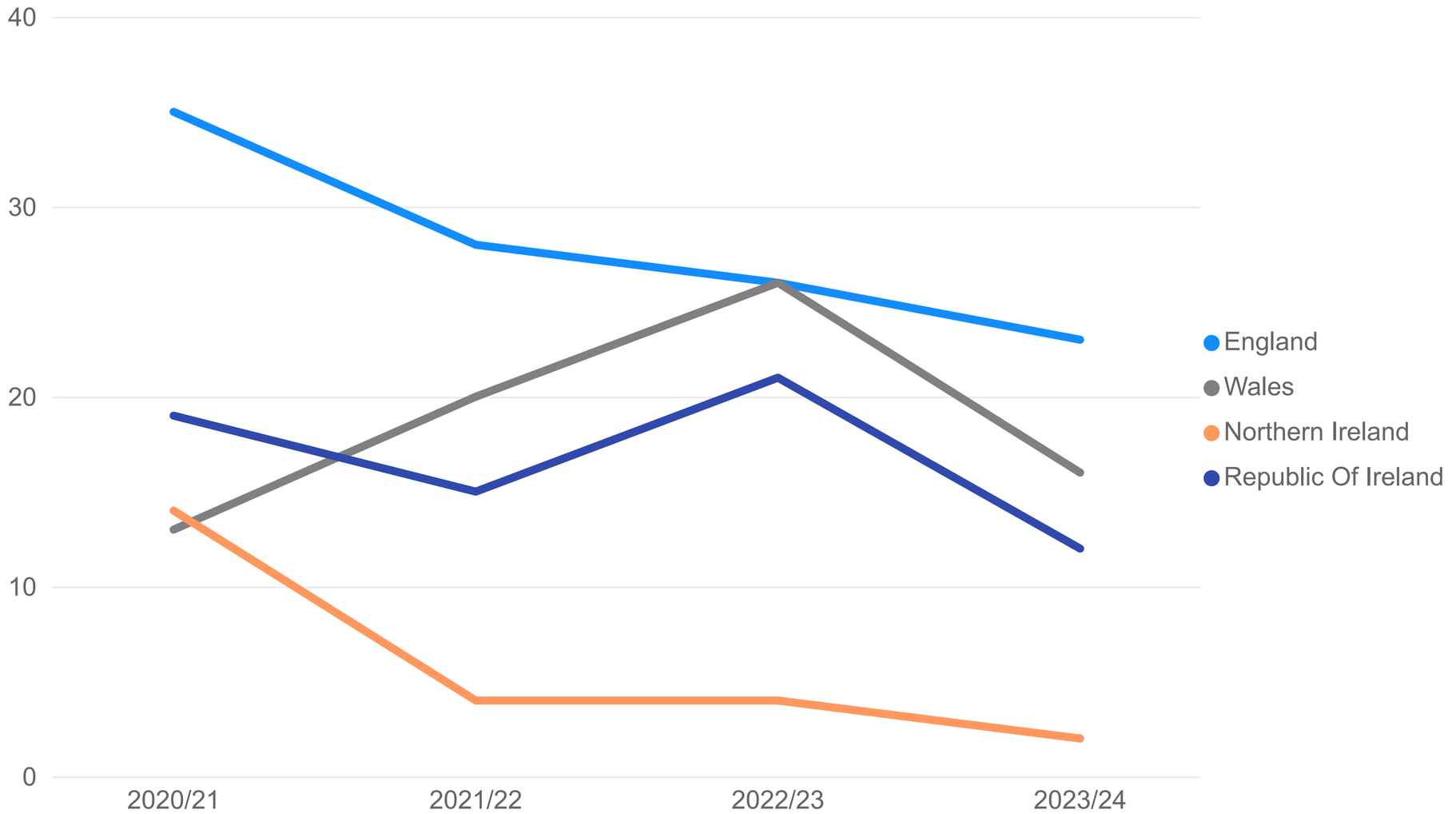
Only 1 in 4 patients requiring urgent CABG are operated on within 7 days in England, 1 in 6 in Wales and only 1 in 50 in Northern Ireland

The overall proportion of patients requiring urgent coronary artery bypass graft (CABG) surgery being treated within the 7-day target continues to fall.

In England only 23% met the 7-day target in 2023/24 (down from 35% in 2020/21).

The performance in Wales has worsened with only 16% meeting the target last year.

Only 2% of patients in Northern Ireland are operated on within seven days of angiography.



No hospitals met the 7-day target for performing urgent CABG operations in 2023/24

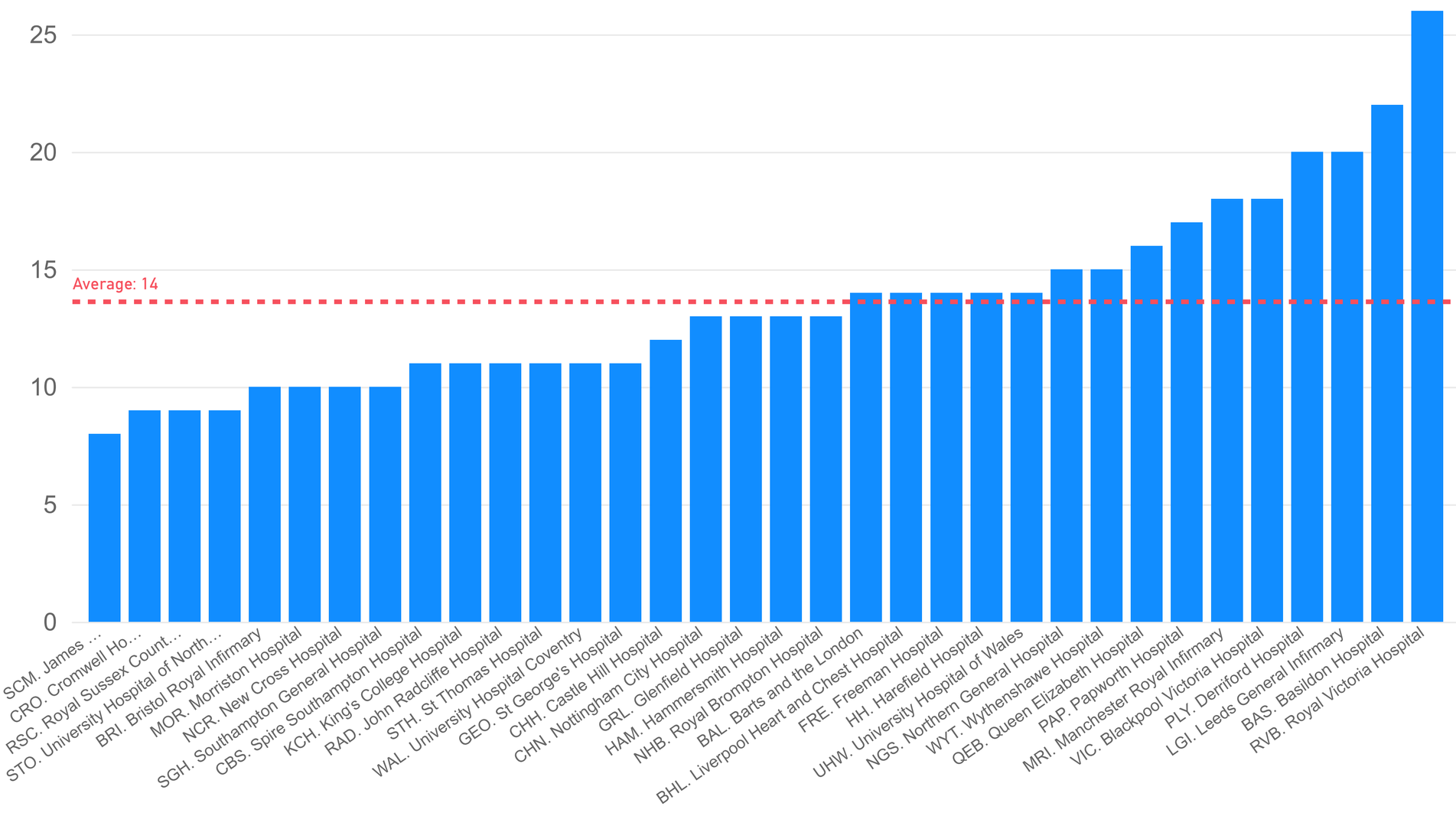
In 2023/24, no NHS hospitals achieved the target of performing coronary artery bypass grafting (CABG) for urgent patients within seven days on average (from time of angiography to surgery).

The best hospital achieved an average wait of 8 days.

The average UK hospital waiting time was 14 days.

There is considerable variation in waiting times between hospitals, with 15 NHS hospitals having average waiting times of 14 days or more for urgent CABG surgery (up from 7 last year).

Average waiting times (days) for urgent CABG by hospital (2023/24)



In 2023/24, no hospital achieved the target of operating on 75% of patients requiring urgent CABG within seven days of angiography

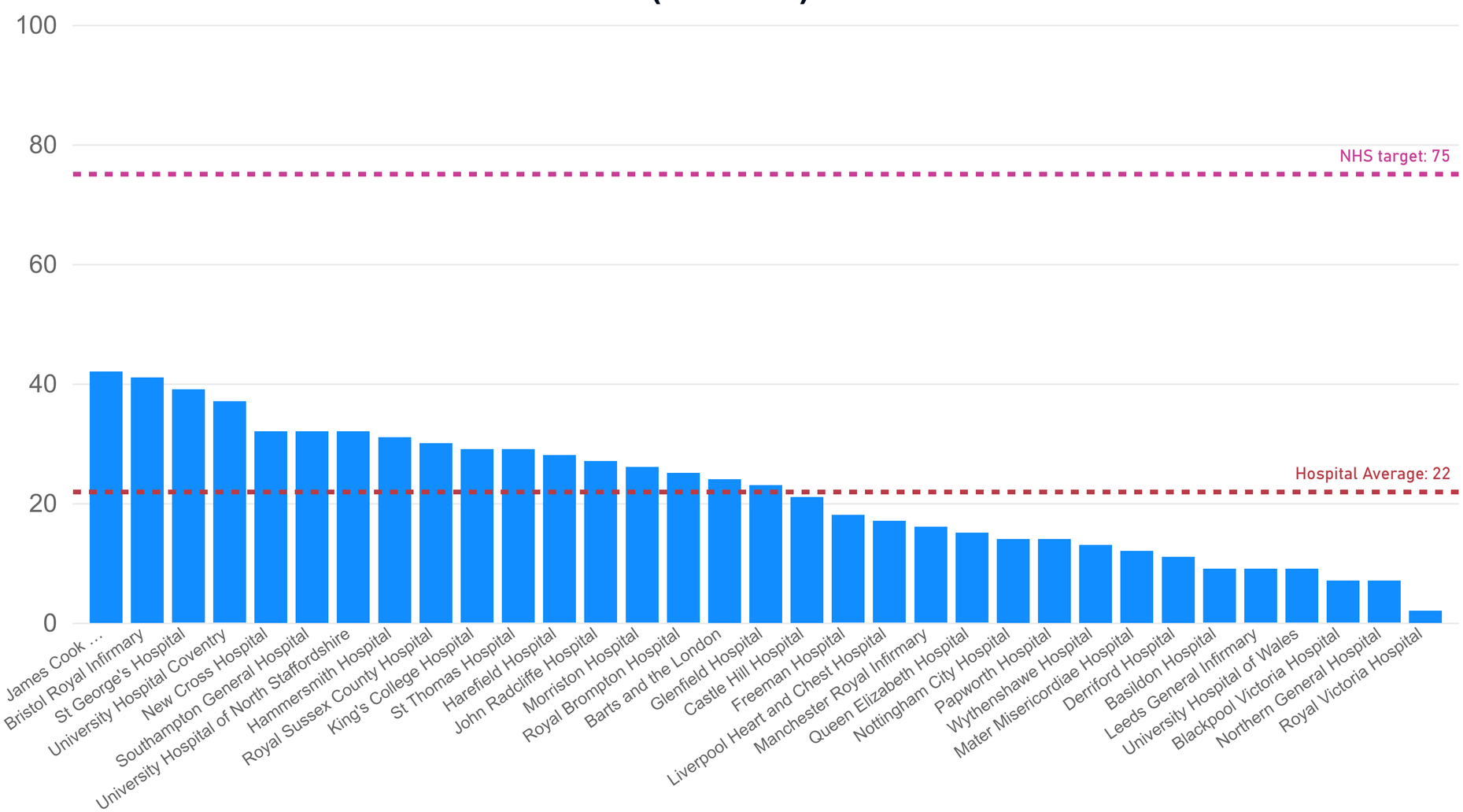
A target has been set for 75% of patients requiring urgent coronary artery bypass grafting (CABG) to have this performed within 7 days of angiography.

In 2023/24, no hospital achieved this waiting time target.

The best performing hospital achieved this for 42% of patients while the average across all hospitals was 22%.

15 hospitals performed 20% or less of their urgent operations within 7 days last year (up from 12 in 2022/23).

Percentage of patients undergoing urgent CABG within 7-day target by hospital (2023/24)



Following the pandemic, there has been a slow rise in the proportion of patients with 'day of surgery admission' (DOSA) for elective cardiac surgery

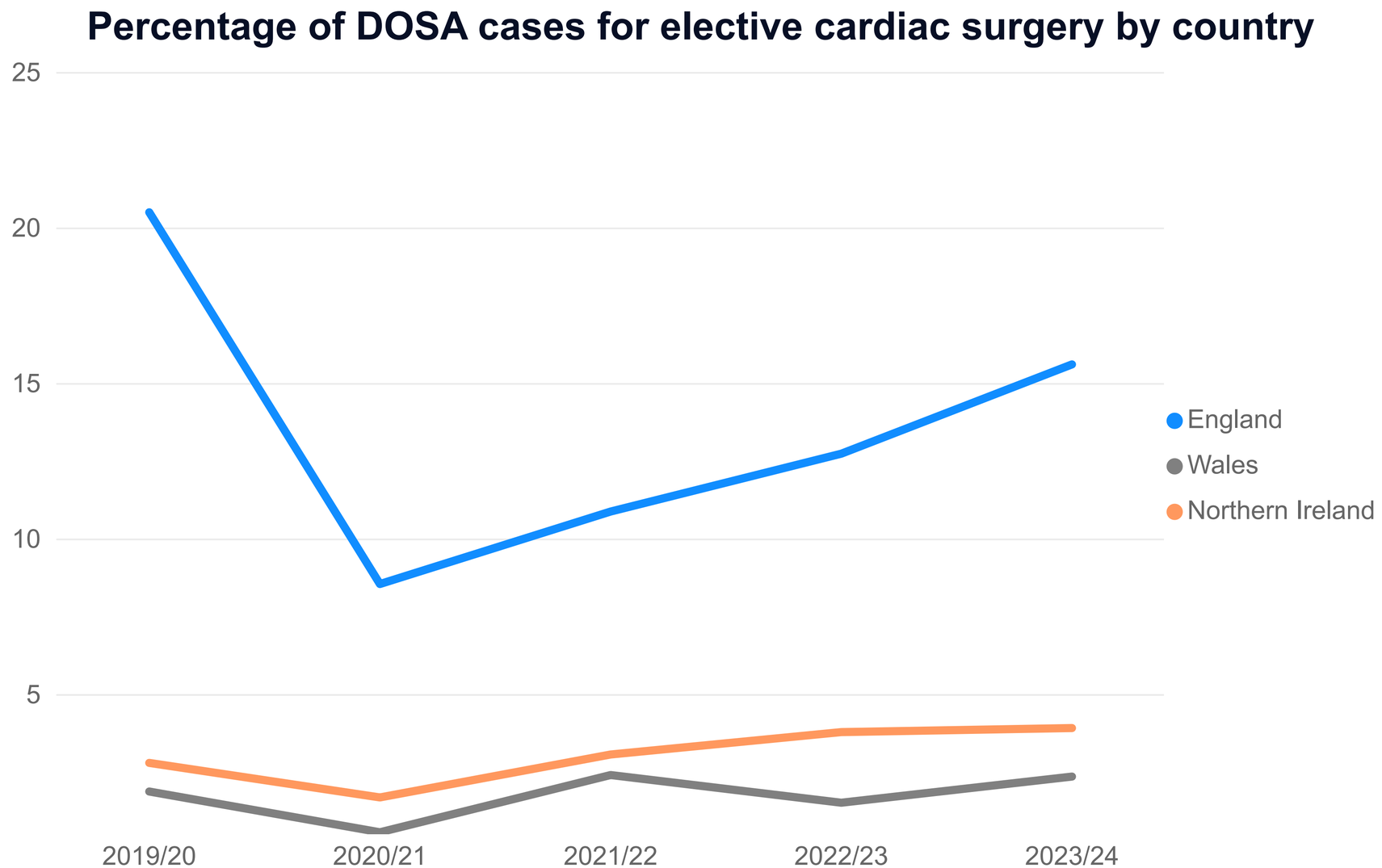
The 2018 Getting It Right First Time (GIRFT) report recommended that all patients undergoing elective cardiac surgery should have day of surgery admission (DOSA).

This requires effective pre-operative assessment clinics which reduce the likelihood of operations being cancelled for medical reasons. It also allows greater efficiency in ward bed usage and reduces hospital costs.

The audit target is that 50% of elective patients should be DOSA cases.

In 2023/24, just over 15% of elective operations involved DOSA in England. Evidence from prior to the pandemic suggests that this could easily be improved.

Little or no progress has been made in implementing DOSA in Wales or Northern Ireland.



In 2023/24, only 2 NHS hospitals achieved the audit target for 50% of elective cardiac surgery cases to have day of surgery admission

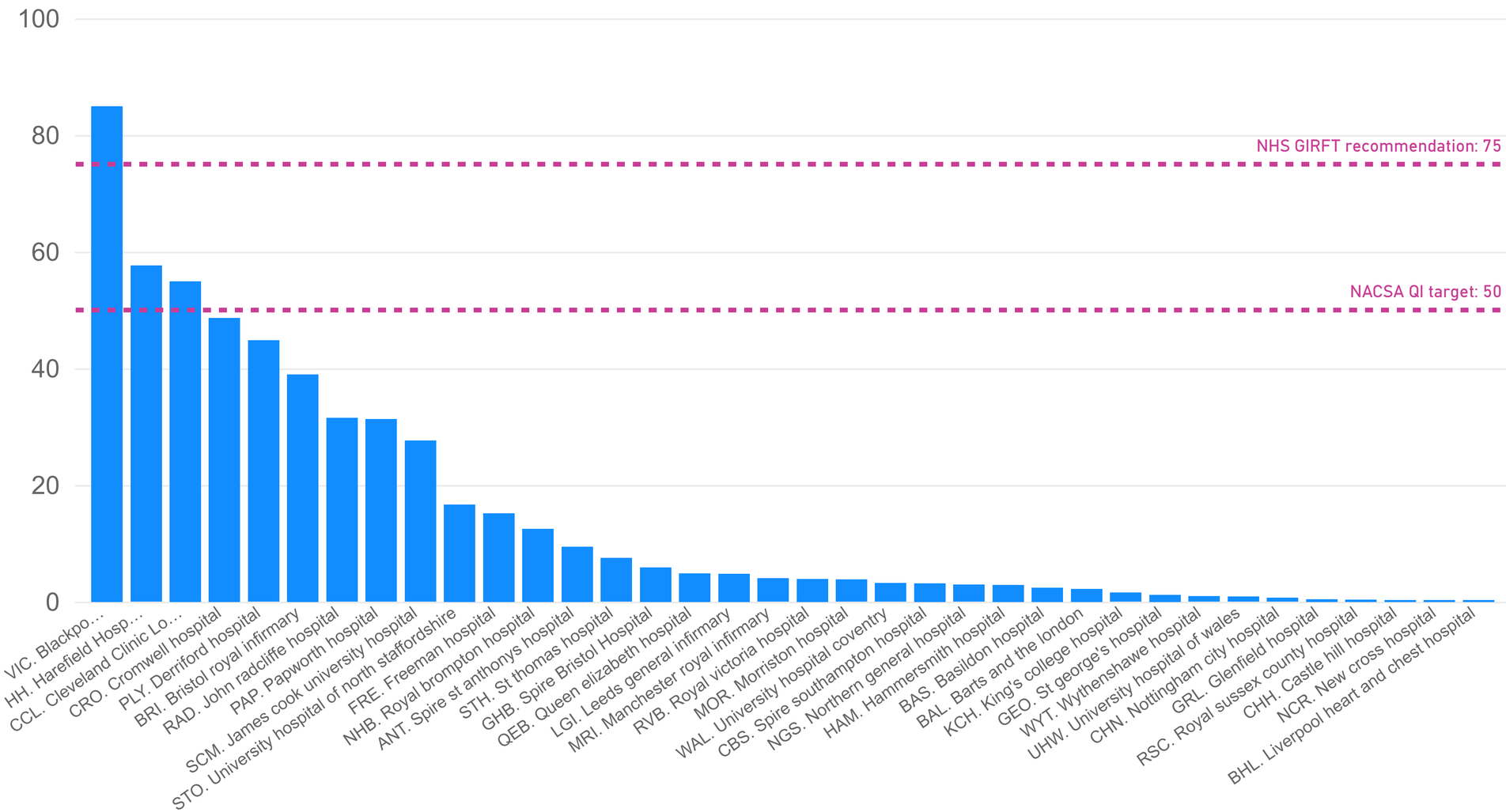
The audit promotes a target of 50% of elective patients to have day of surgery admission (DOSA).

This is a quality improvement (QI) 'stepping stone' on the way to achieving the ambition of 75% recommended by the NHS Getting It Right First Time (GIRFT) recommendations.

In 2023/24, two NHS hospitals met the 50% target, with 1 of those also delivering the GIRFT ambition for DOSA.

20 NHS hospitals had DOSA rates below 5%.

Percentage of DOSA cases for elective cardiac surgery by hospital (2023/24)



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The average post-operative length of stay after CABG is eight days

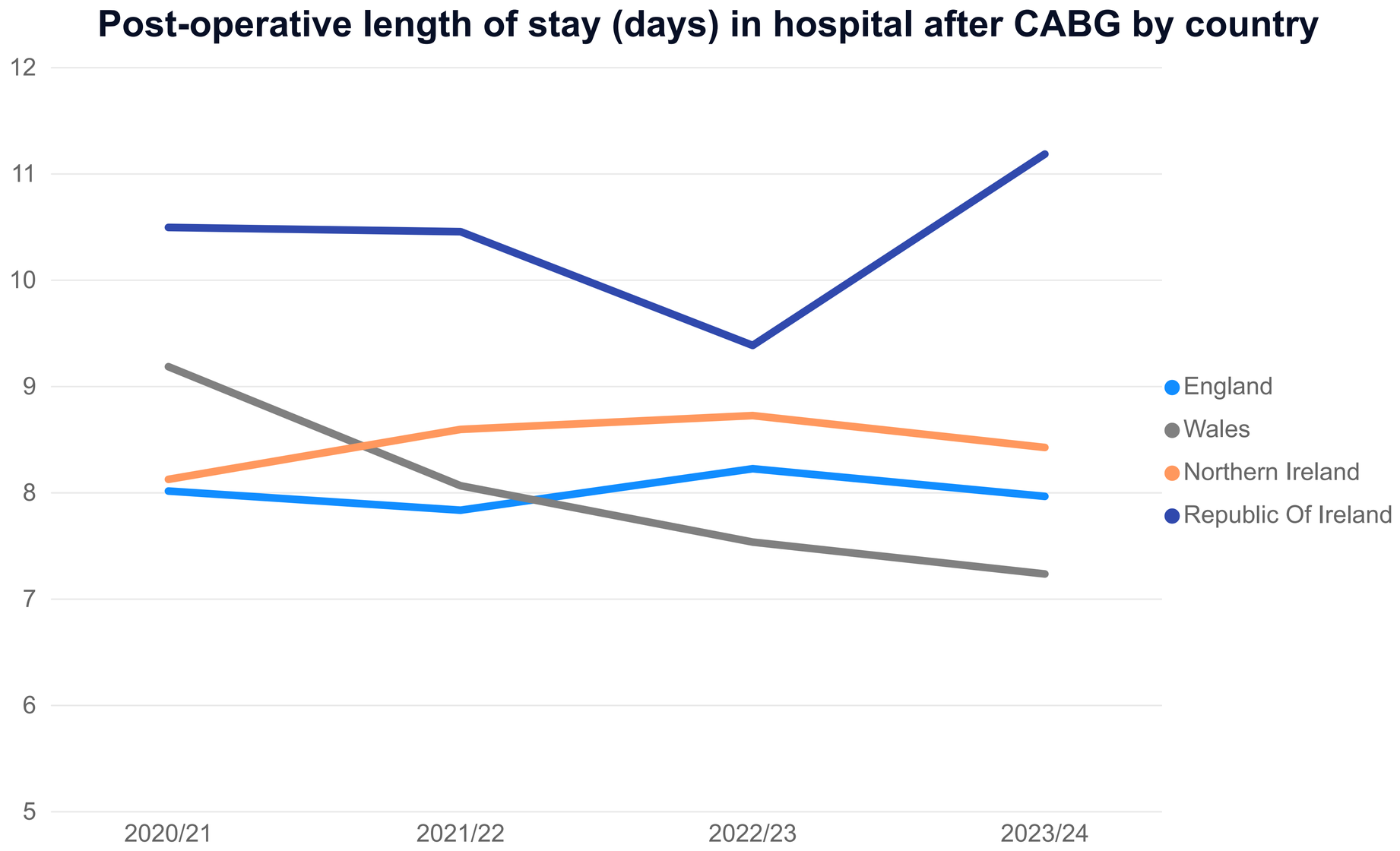
Post-operative length of stay (PLOS) following CABG surgery depends on a variety of factors including patient age and co-morbidity.

It also reflects rates of post-operative complications that may delay discharge (such as heart rhythm disturbances, stroke or wound infections).

A shorter PLOS is likely to reflect efficient bed usage and lower complication rates following surgery.

The PLOS figures in Wales have fallen from 9.2 to 7.2 days over the last 4 years.

PLOS in Northern Ireland and England were 8.4 and 8.0 days respectively in 2023/24, little changed in 4 years.

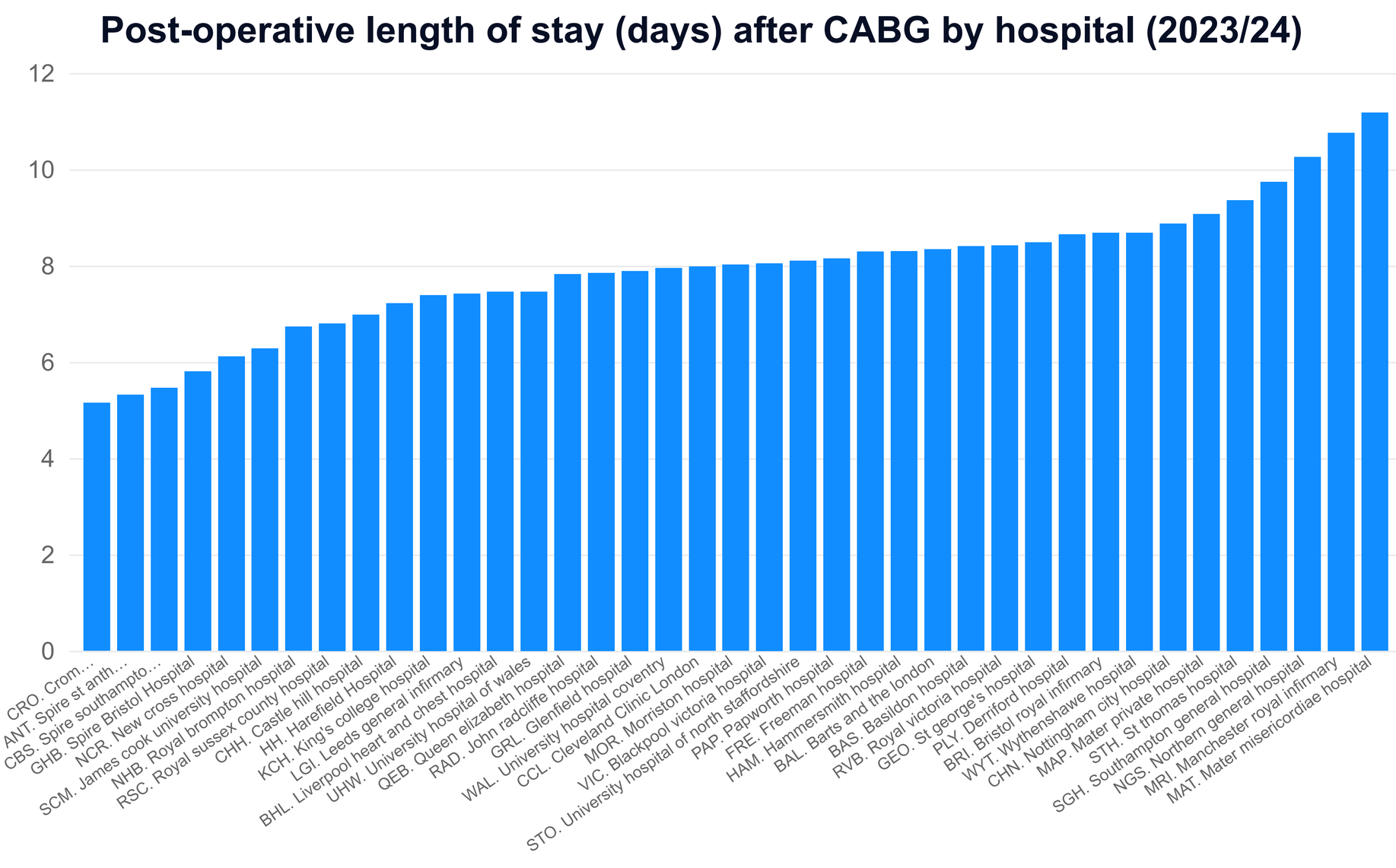


The post-operative length of stay (PLOS) for the best performing NHS hospitals is more than 40% lower than those with the longest stays

The average PLOS across all hospitals was eight days.

The shortest average PLOS following CABG in an NHS hospital was 6.1 days while the longest was 10.7 days.

There is considerable variation in PLOS with the best hospitals achieving 42% shorter post-operative stays than the poorest performers.



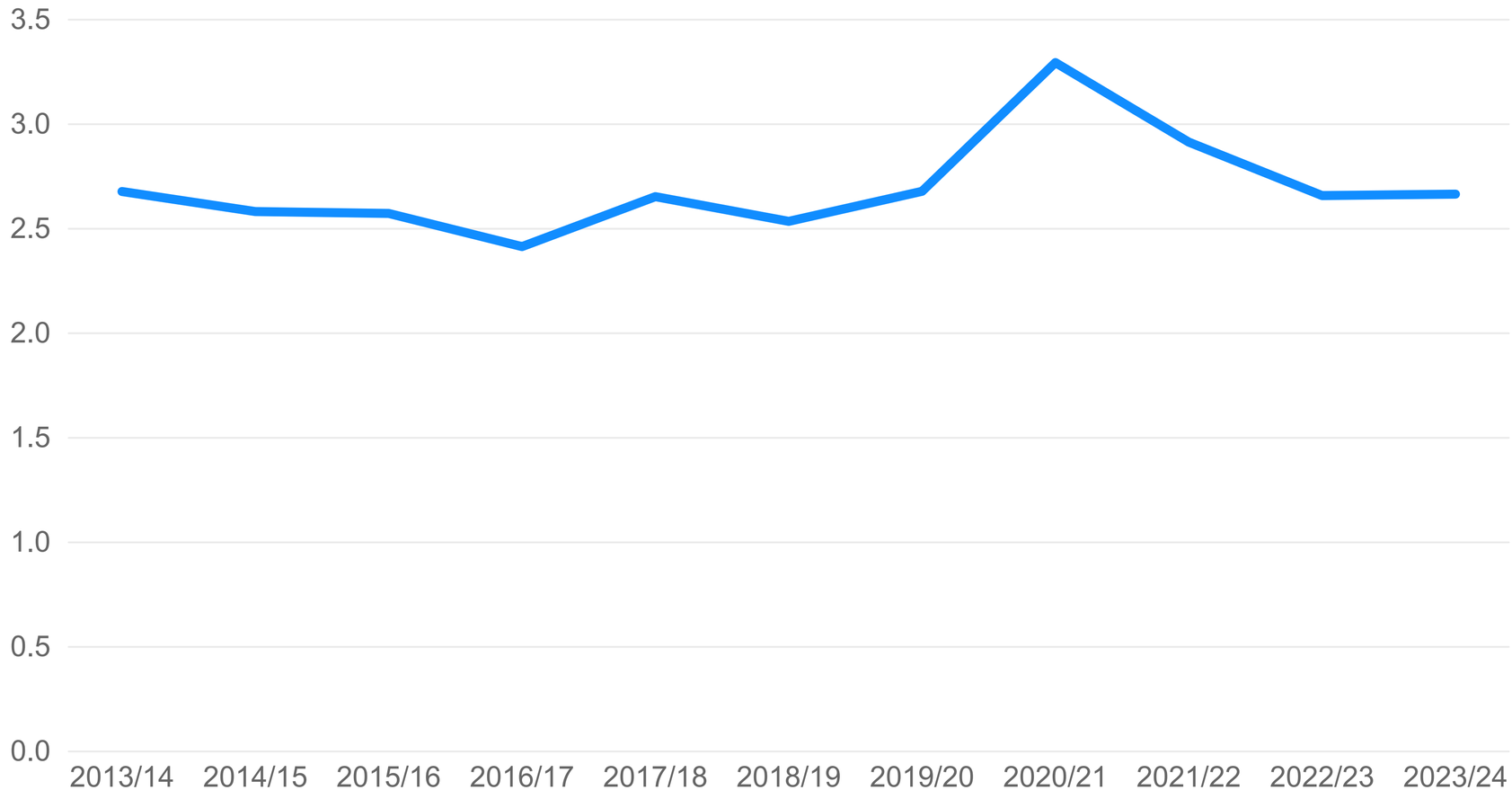
The overall in-hospital mortality rate for all cardiac surgery cases (including emergencies) was 2.6% in 2023/24 returning to pre-pandemic levels

Unadjusted (crude) mortality rates following all heart surgery, including emergencies, had somewhat plateaued up to 2019/20 at around 2.5%.

During the COVID-19 pandemic, crude mortality rose to 3.3%, a result of fewer elective cases and relatively more urgent and emergency cases being operated on.

In 2023/24, the crude mortality rate was 2.6% and has returned to pre-pandemic levels.

Unadjusted in-hospital mortality rate (%) for all procedures (including emergencies)



All cardiac surgical centres are performing 'as expected' in relation to mortality rates

All UK hospitals in the UK have survival / in-hospital mortality rates after cardiac surgery that are 'as expected' during the last three years (2021/22 to 2023/24).

The UK average survival rate during this three year period was 98.2%.

Key:
Black dot: Survival rate using random effects model is as expected
Open square: Actual survival rate
Black X: Predicted survival rate
Numbers in brackets after hospital code: Number of operations over three years and % data completeness

This visual does not support exporting.

List of hospital names

Risk-adjusted mortality methods

The overall logistic EuroSCORE (raw predicted mortality rate) varies by hospital, suggesting case mix variation

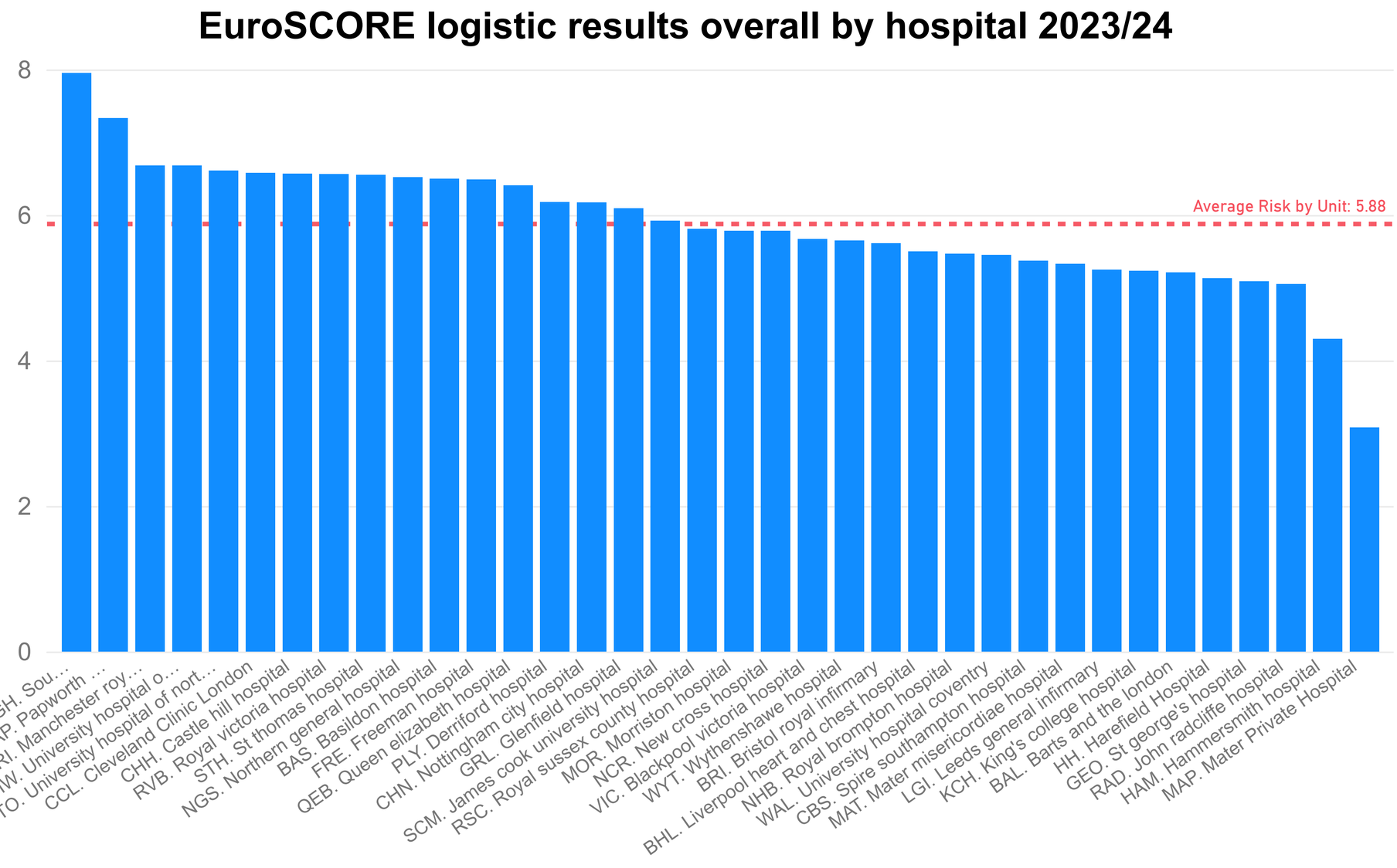
In order to compare surgical outcomes NACSA collects many risk factors that allow cardiac surgical operations to be risk stratified.

This chart shows the average calculated predicted risk (of death) for the operations at each hospital (using EuroSCORE logistic - without correction for modern surgical outcomes in the UK).

Actual mortality rates in the UK are very approximately a third of the calculated risk using this model. (The NACSA methodology takes this into account when performing outlier analyses).

There is considerable variation in the predicted risks of surgery at NHS hospitals of between 4.3% and 7.9%.

Note - excludes emergency cases



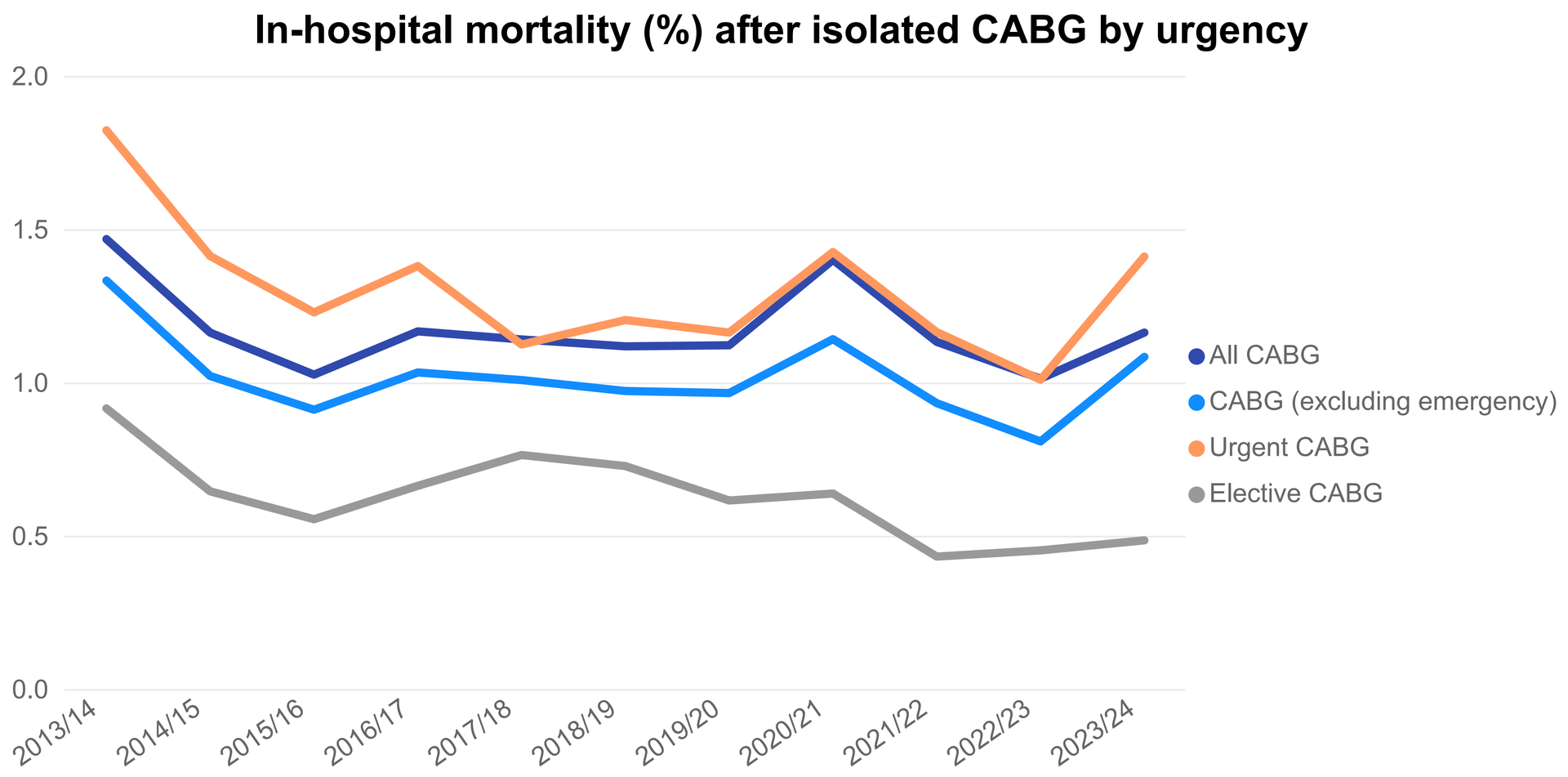
Unadjusted mortality rates following urgent isolated CABG are 1.4% and rates for elective surgery are less than 0.5%

In-hospital unadjusted mortality rates after isolated CABG have been declining over the last decade.

Despite a trend towards more operations being performed on an urgent basis, the overall CABG mortality rate fell from 1.5% in 2013/14 to 1.2% in 2023/24.

Mortality after elective CABG was 0.49% last year.

Mortality after urgent CABG last year has risen to 1.4% compared to rates in the previous 2 years .



In-hospital mortality rates after isolated aortic valve replacement are low, even when combined with coronary artery bypass grafting

In-hospital mortality after aortic valve replacement (AVR) has also been falling over the last ten years.

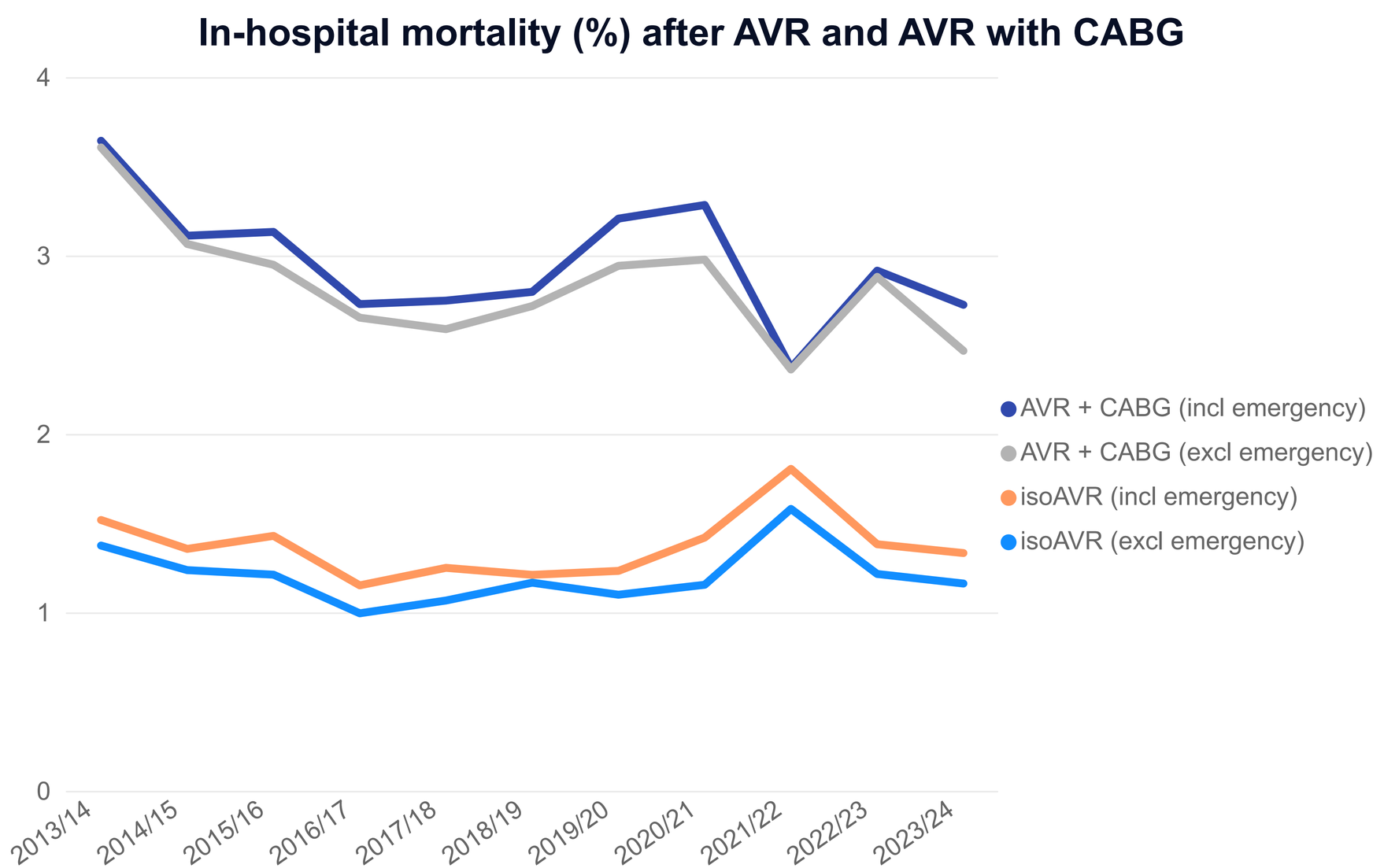
In 2023/24, the mortality rate for non-emergency cases was 1.2% for isolated AVR and 2.5% for combined AVR and coronary artery bypass graft (CABG) surgery.

The increasing mortality during the COVID-19 pandemic was probably because of changes to case mix.

The fall in mortality following AVR predates the rapid increase in transcatheter aortic valve implantation (TAVI) in recent years.

Recent changes in patient profiles, as more patients have TAVI (especially the elderly and higher-risk cases), will probably have contributed to improvements as well.

Greater use of pre-operative multi-disciplinary teams (MDTs) for deciding on the best treatment options for aortic valve disease may also explain better outcomes.



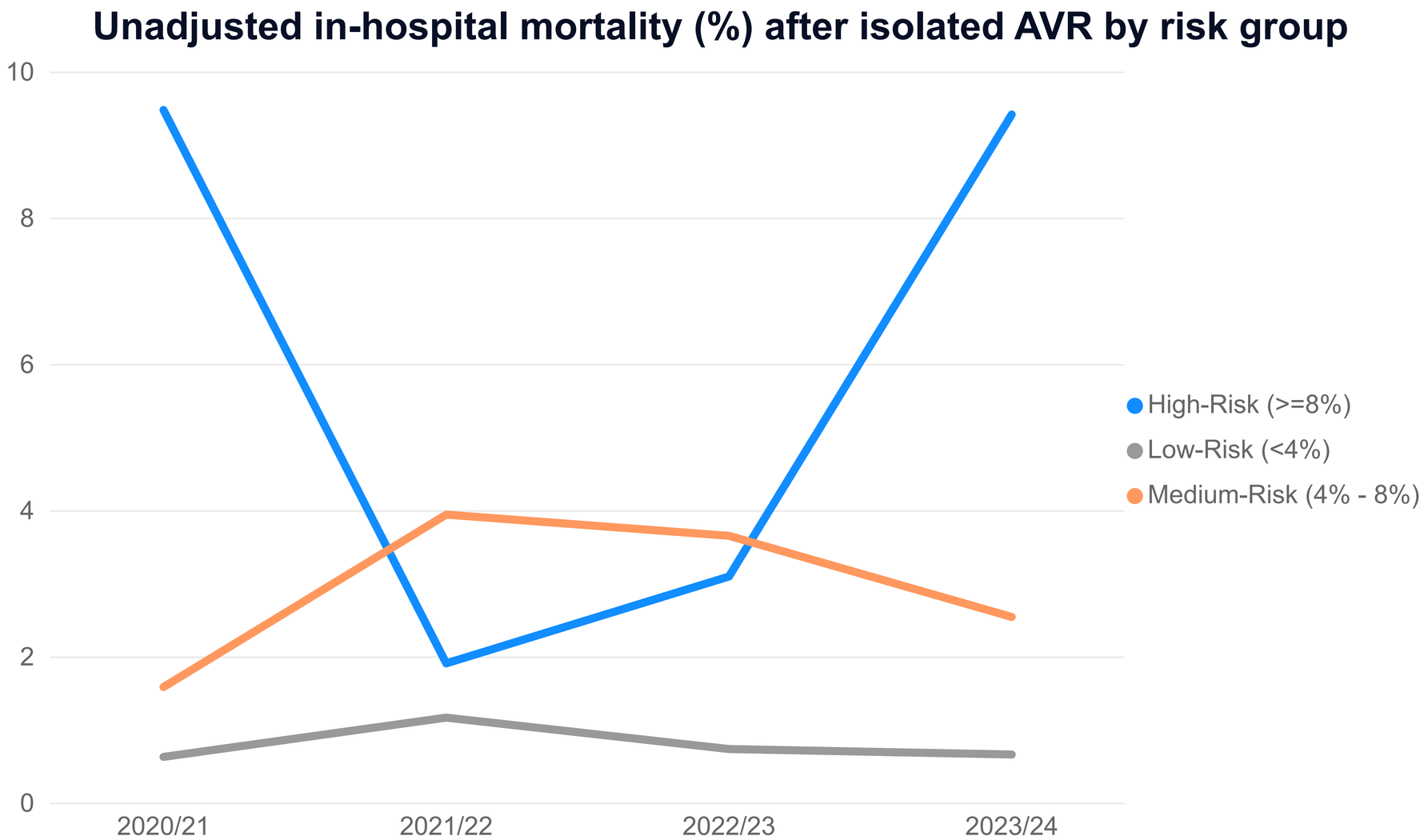
Mortality after isolated aortic valve replacement operations is lower than predicted across all risk groups

The results for the surgical treatment of aortic valve disease are excellent.

In 2023/24, the mortality for aortic valve replacement (AVR) cases for low-risk patients (EuroSCORE2 <4%) was 0.7%.

This group makes up the vast majority (89%) of all cases performed.

Mortality for medium-risk AVR cases (EuroSCORE2 4-8%) was 2.5% and 9.4% for high-risk (EuroSCORE2 >=8%).



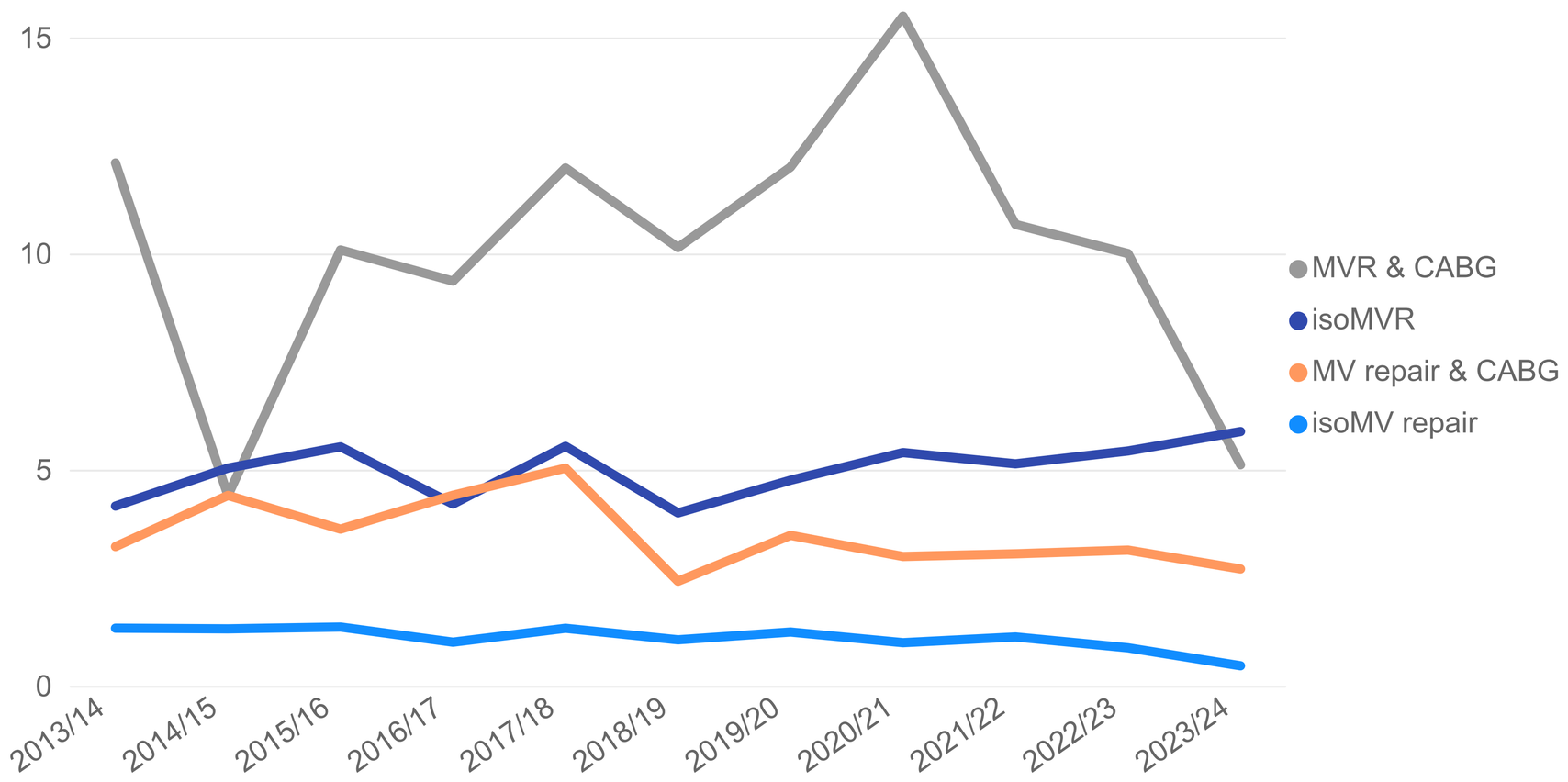
The unadjusted in-hospital mortality rates after mitral valve repairs is lower than for mitral valve replacements

In-hospital mortality after mitral valve (MV) repair is low and has been gradually falling over the last decade (from 1.3% in 2013/14 to 0.5% in 2023/24).

Unadjusted mortality rates are higher after MV replacements (MVRs) compared to repairs.

Relatively few operations are performed where MVR is combined with coronary artery bypass grafting (CABG). The unadjusted mortality rates for this are usually higher than for isolated MV operations (but were similar at around 5.1% to 5.9% last year).

Unadjusted in-hospital mortality rates (%) after mitral valve operations (with and without CABG)



In 2023/24, the re-operation rate for bleeding following CABG ranged from zero to 7.5%

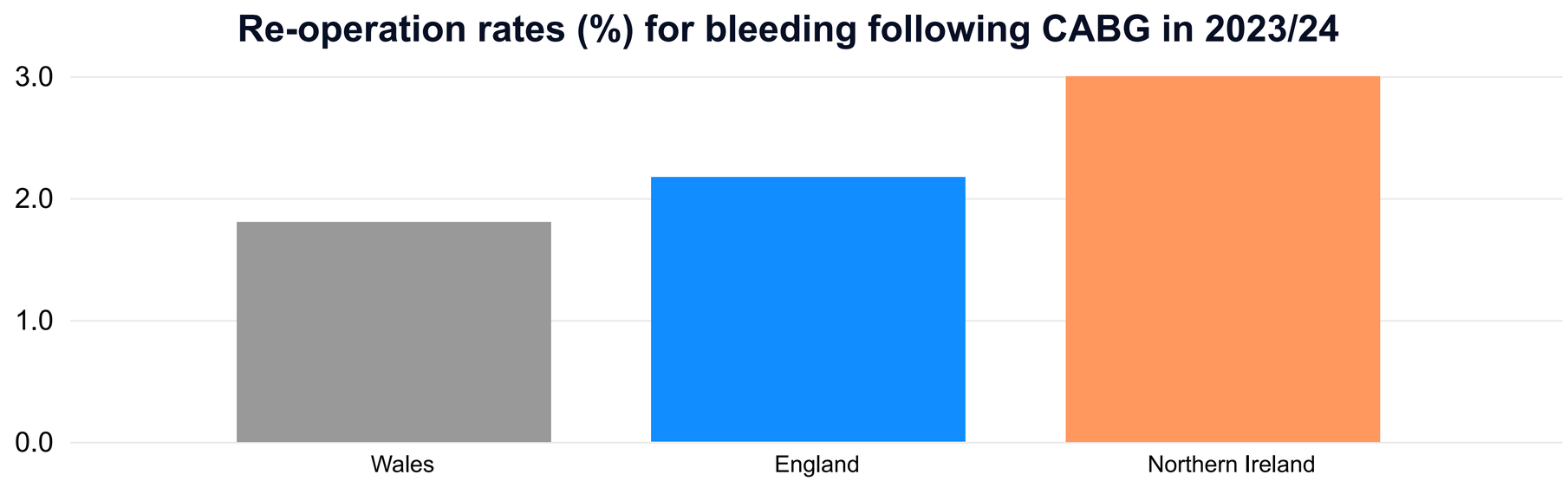
On average, 2.2% of patients undergoing coronary artery bypass grafting (CABG) in England required re-operation for bleeding following their surgery (2023/24) compared with 1.8% in Wales and 3.8% in Northern Ireland.

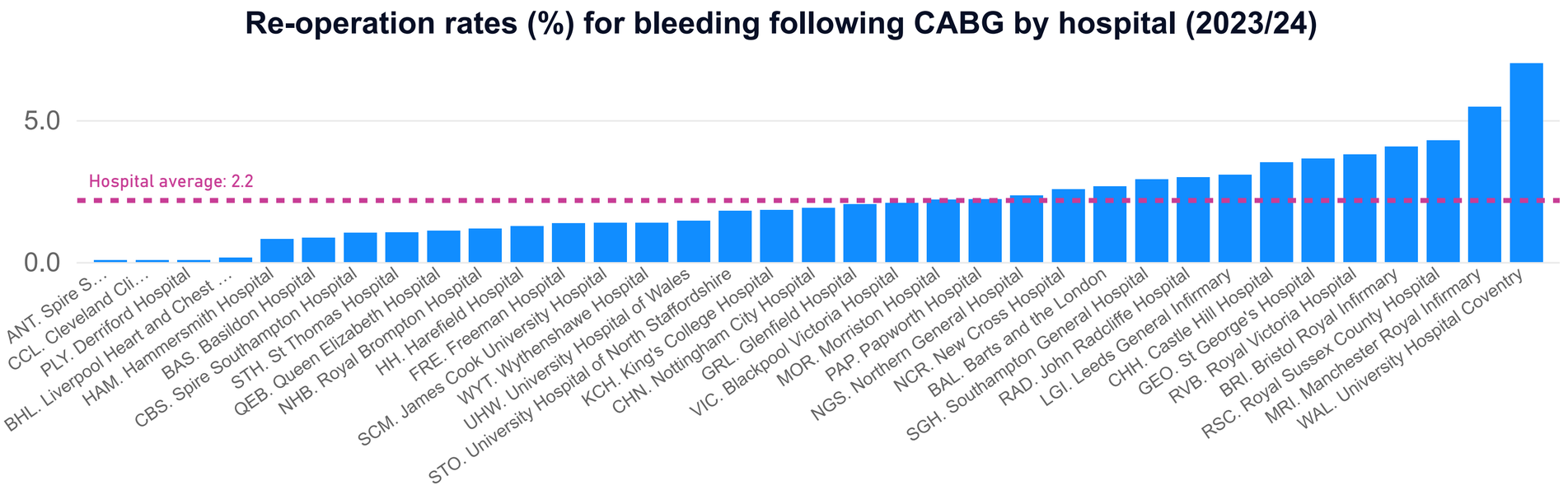
Many factors influence bleeding rates, including patient comorbidity and frailty, pre-operative drugs (especially anticoagulant and antiplatelet therapies), urgency of operation, as well as operative technique.

A single NHS hospital reported zero re-operations for bleeding in 2023/24.

The highest rate in an NHS hospital was 7.5%.

Note: Cromwell Hospital and Mater Private Hospital have provided 'no or incomplete bleeding data' in 2023/24, so are not displayed.





Year

2023/24

The rate of deep sternal wound infection following CABG is low

Deep sternal wound infection (DSWI) following coronary artery bypass grafting (CABG) that requires further surgery or debridement is a very-serious complication of cardiac surgery. It often leads to long-term after-effects or further complications for the patient.

Fortunately, rates of DSWI in the UK were low in 2023/24 at 0.3%.

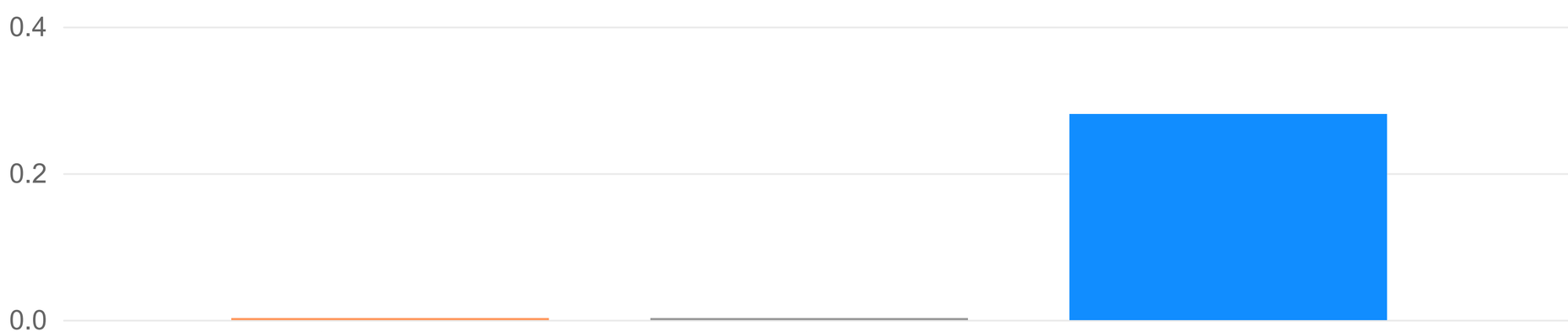
The overall rate across England was 0.3%, and zero in Wales and Northern Ireland.

Note: There were 10 hospitals reporting 0% deep sternal wound infection rates in 2023/24 (displayed) and 9 hospitals have provided 'no or incomplete deep sternal wound infection data' in 2023/24 (not displayed).

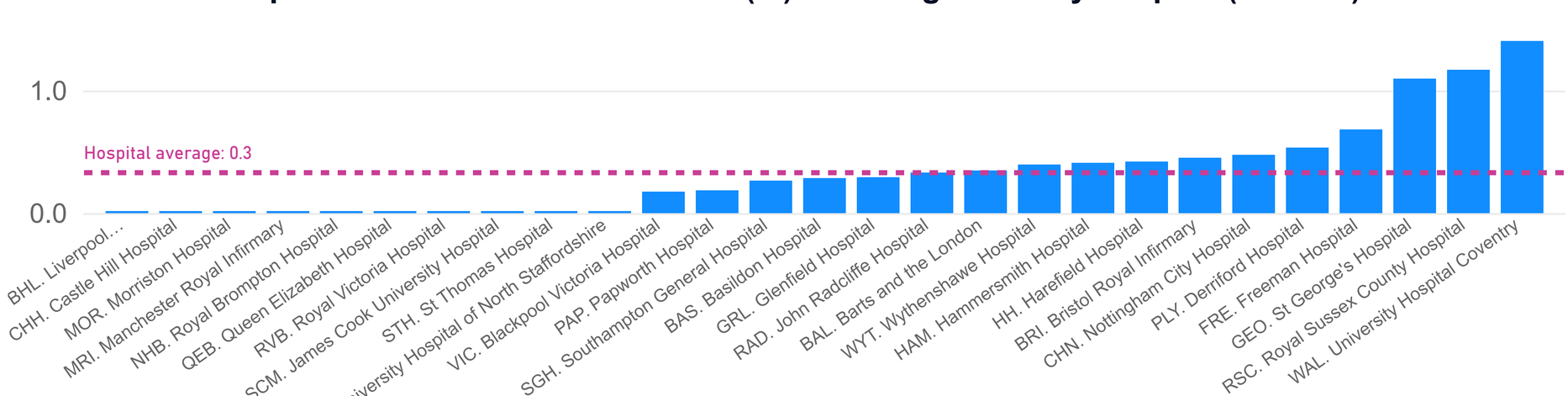
Year

2023/24

Deep sternal wound infection rates (%) following CABG (2023/24)



Deep sternal wound infection rates (%) following CABG by hospital (2023/24)



Serious post-operative neurological events following CABG occur in less than 1% of cases

Serious post-operative neurological events following coronary artery bypass grafting (CABG) include a cerebro-vascular accident (CVA, or stroke) and a transient ischaemic event (TIA).

The rate of serious post-operative neurological events has ranged from 0.53% to 0.8% in England over the last three years.

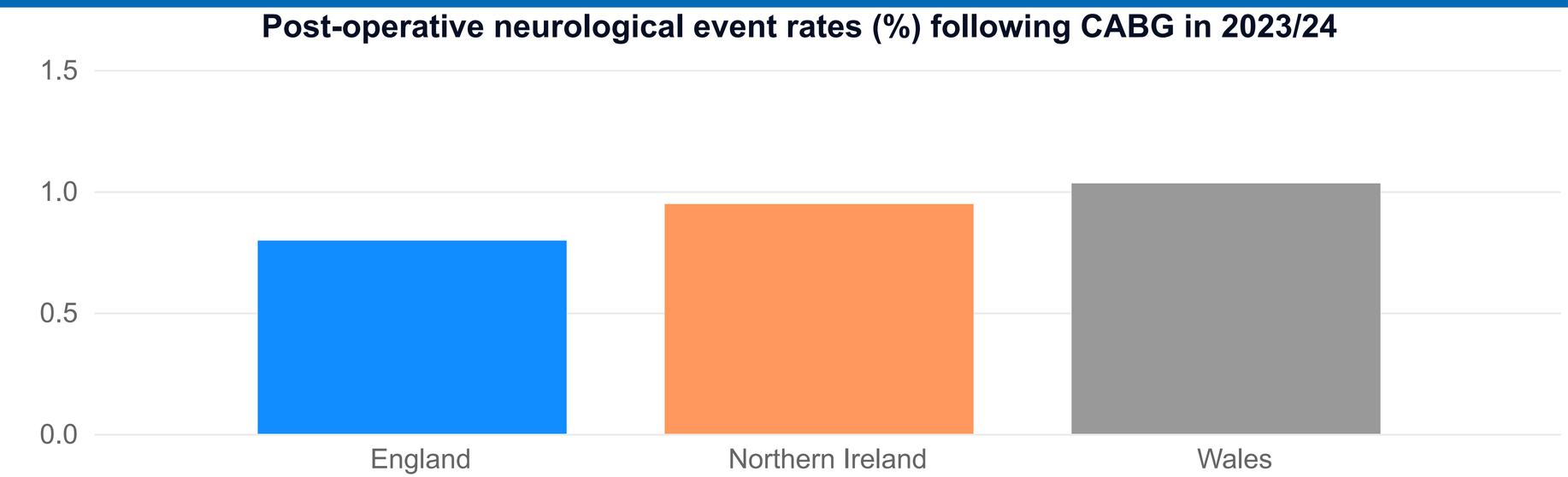
In 2023/24, two NHS hospitals recorded no post-operative events. The highest rate was 2.7%.

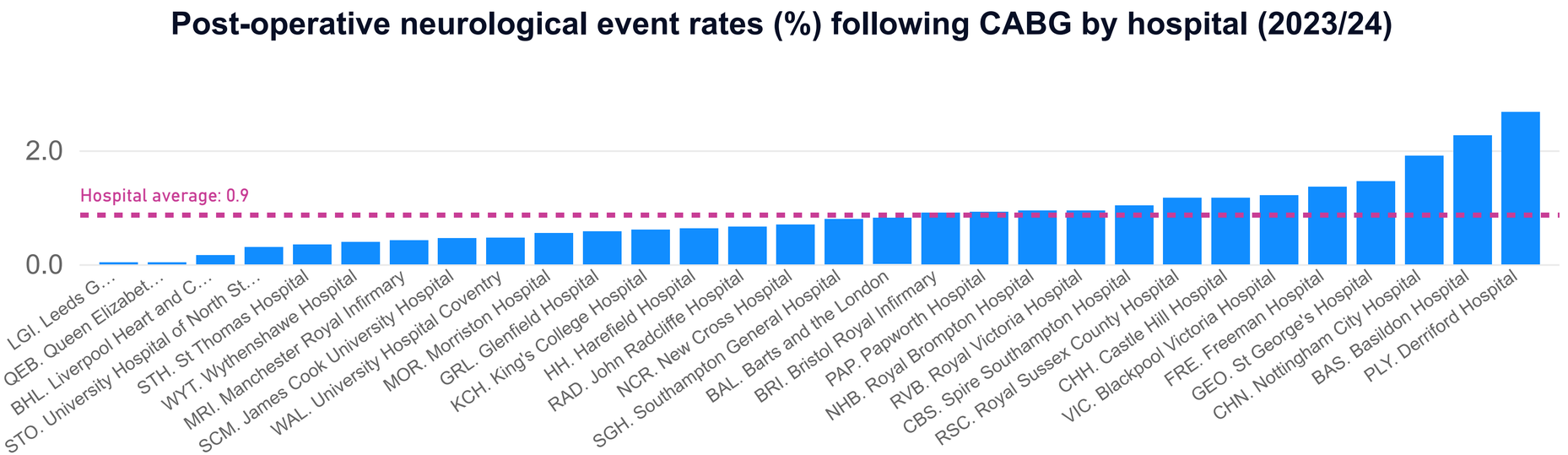
Caution is needed in the interpretation of these data. Higher rates may reflect better detection and reporting of cases. Increased used of peri-operative CT scanning and Stroke Team input may identify cases that are less clinically obvious.

Note: 6 hospitals have provided "no or incomplete" neurological data in 2023/24 (not displayed).

Year

2023/24





The need for renal support therapy following CABG is low

Kidney failure following cardiac surgery usually resolves, but not always. However, it is associated with worse outcomes, including a higher mortality rate, following surgery.

The rate of serious kidney failure (requiring renal dialysis or support therapy) following coronary artery bypass grafting (CABG) in England over the last three years has ranged from 0.98% to 1.45%.

Rates in Northern Ireland and Wales have been slightly higher than this.

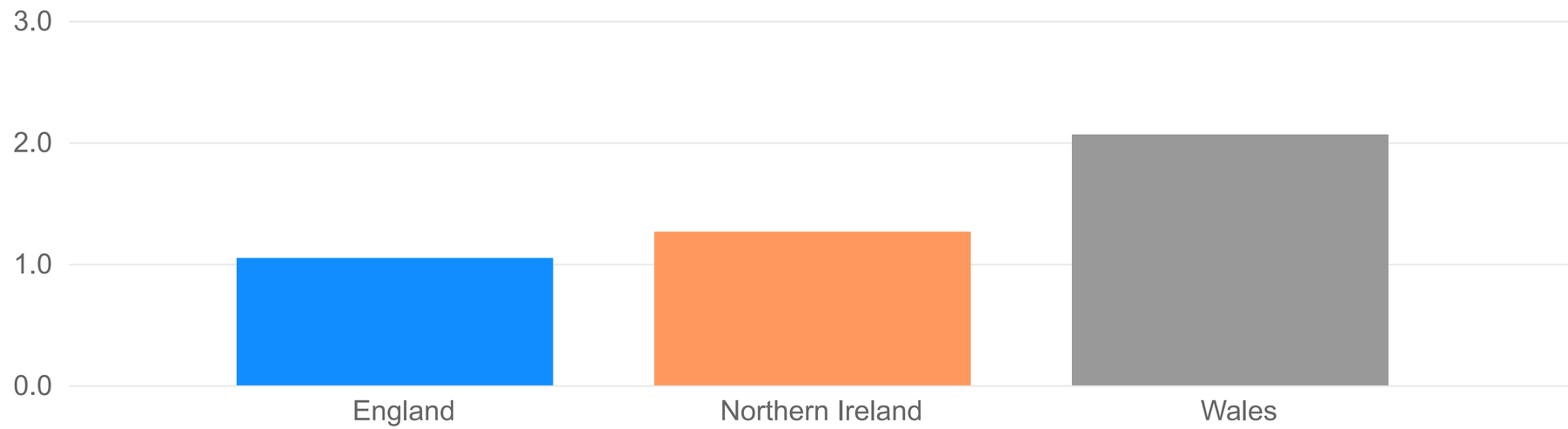
In 2023/24, 1 NHS hospital reported no requirement for renal support therapy. The highest reported rate was 3.3%.

Note: 6 hospitals provided "no or incomplete" data in 2023/24 (not displayed).

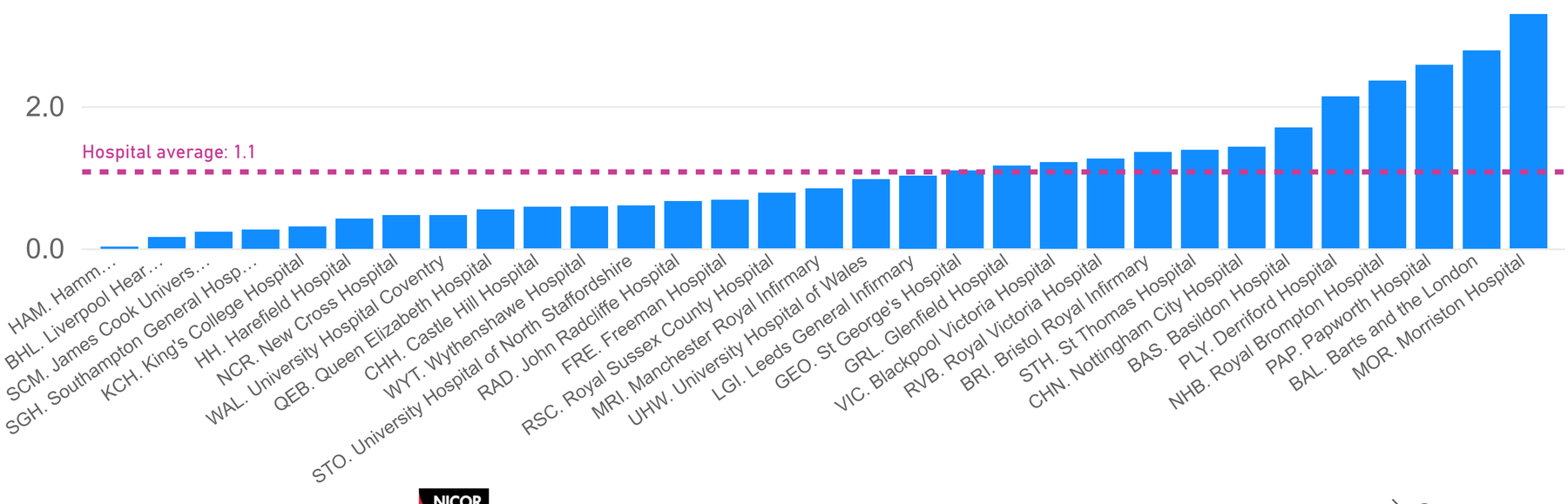
Year

2023/24

Post-operative requirement for renal support therapy (%) following CABG in 2023/24



Post-operative requirement for renal support therapy (%) following CABG by hospital (2023/24)



A blood transfusion was used in 45% of patients undergoing isolated CABG

The 2018 GIRFT report recommended that all hospitals collect data on blood transfusion rates during or following cardiac surgery.

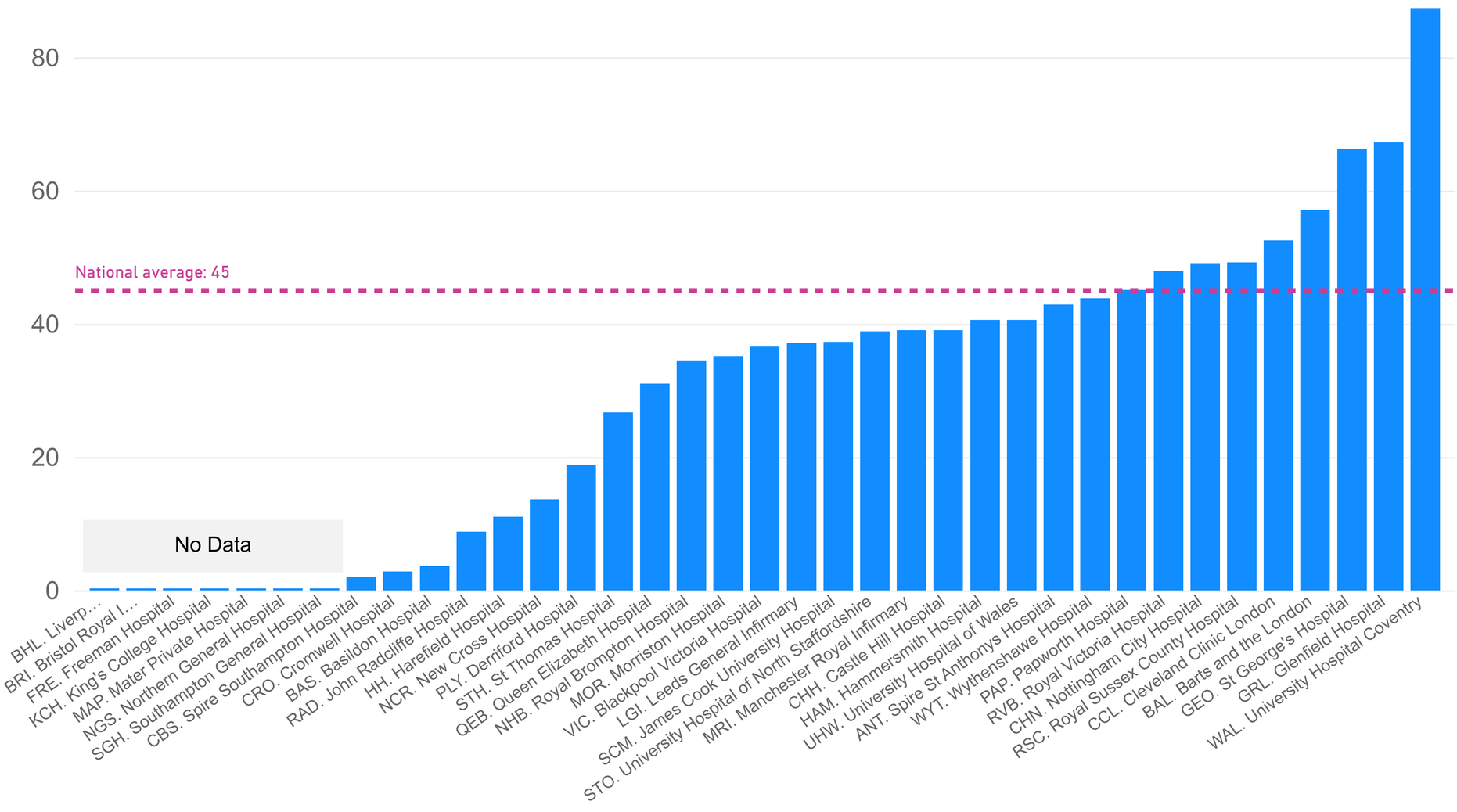
In 2023/24, 3,615 patients undergoing isolated coronary artery bypass grafting (CABG) had a blood transfusion, 45% of the total.

There is very considerable variation in performance between hospitals:

- 2 NHS hospitals reported rates of less than 10%
- 5 hospitals (4 NHS) reported transfusion rates of more than 50%.

Note: This is a new metric and only 3 years of data are available (7 hospitals did not provide data).

Percentage of patients undergoing isolated CABG who received a blood transfusion by hospital (2023/24)



43% of patients undergoing isolated aortic valve replacement received a blood transfusion in 2023/24

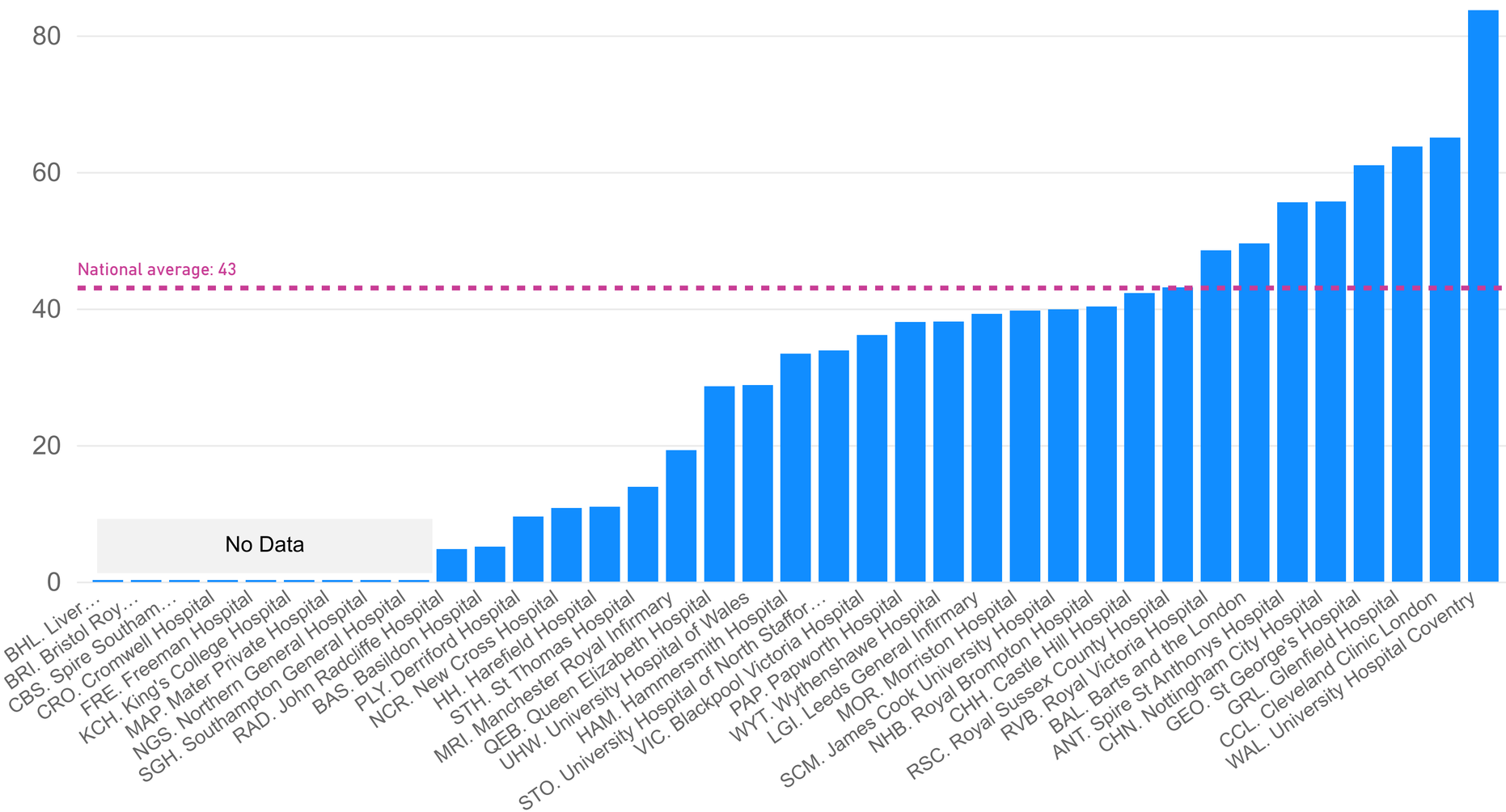
The 2018 GIRFT report recommended all hospitals collect data on blood transfusion rates during or following cardiac surgery.

In 2023/24, the average blood transfusion rate for patients undergoing isolated aortic valve replacement (AVR) was 43%.

3 NHS hospitals reported a transfusion rate of under 10% while 6 (4 NHS) hospitals had transfusion rates of more than 50%.

Note: This is a new metric and only three years of data are available (9 hospitals did not provide data).

Percentage of patients undergoing isolated AVR requiring a blood transfusion by hospital (2023/24)



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Just over a third of patients undergoing isolated mitral valve replacement received a blood transfusion in 2023/24

The 2018 GIRFT report recommended all hospitals collect data on blood transfusion rates during or following cardiac surgery.

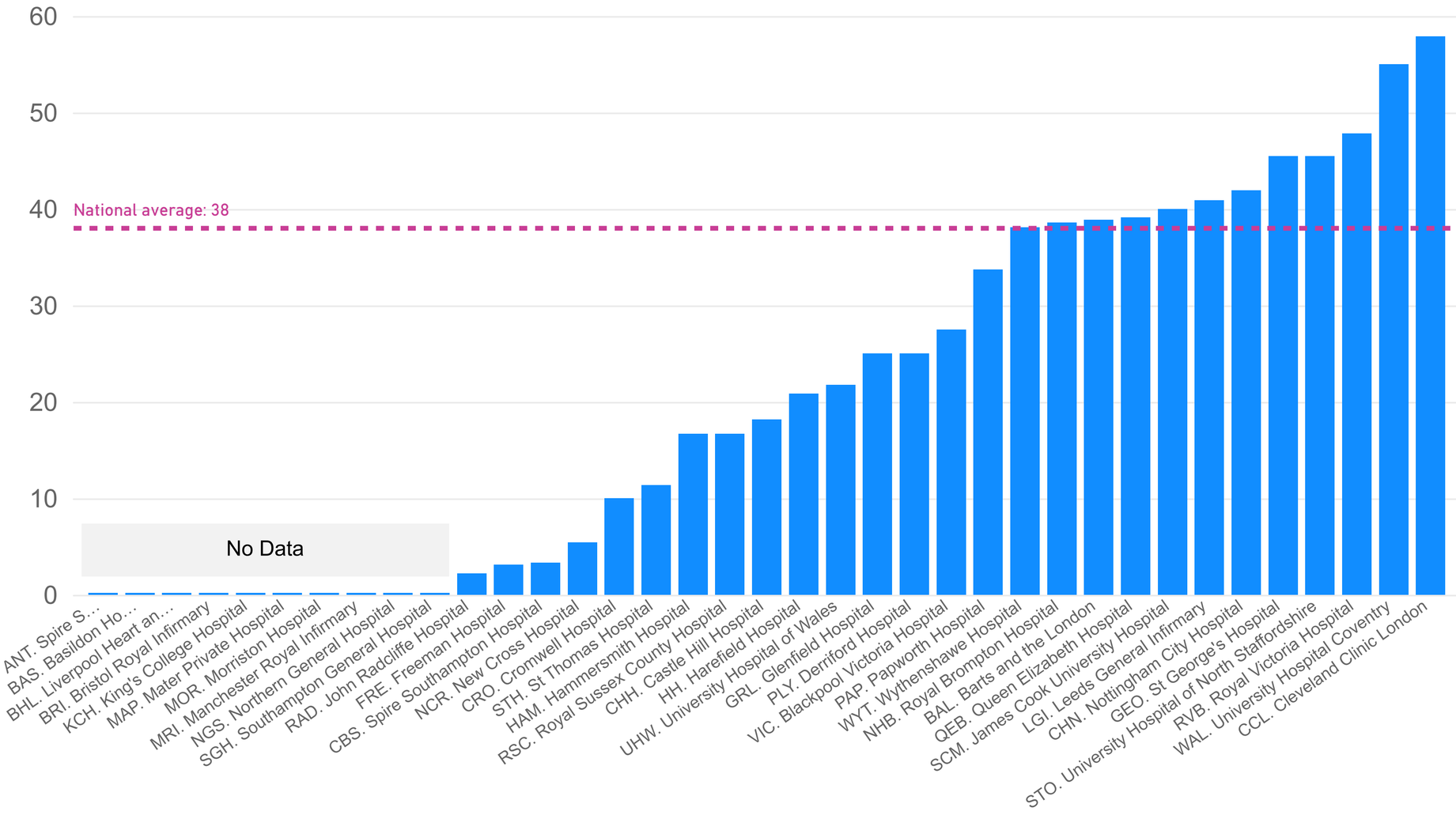
In 2023/24, the average UK blood transfusion rate was 38% for isolated mitral valve replacement (MVR).

This represented 225 patients who had a blood transfusion out of 627 cases for which data were reported.

5 hospitals (3 NHS) reported a transfusion rate of under 10% while 2 hospitals (1 NHS) had transfusion rates above 50%.

Note: This is a new metric and only three years of data are available. Ten hospitals did not provide data.

Percentage of patients undergoing isolated MVR who received a blood transfusion by hospital (2023/24)



There is considerable variation between hospitals in the use of MDT discussions for patients undergoing isolated coronary artery bypass grafting

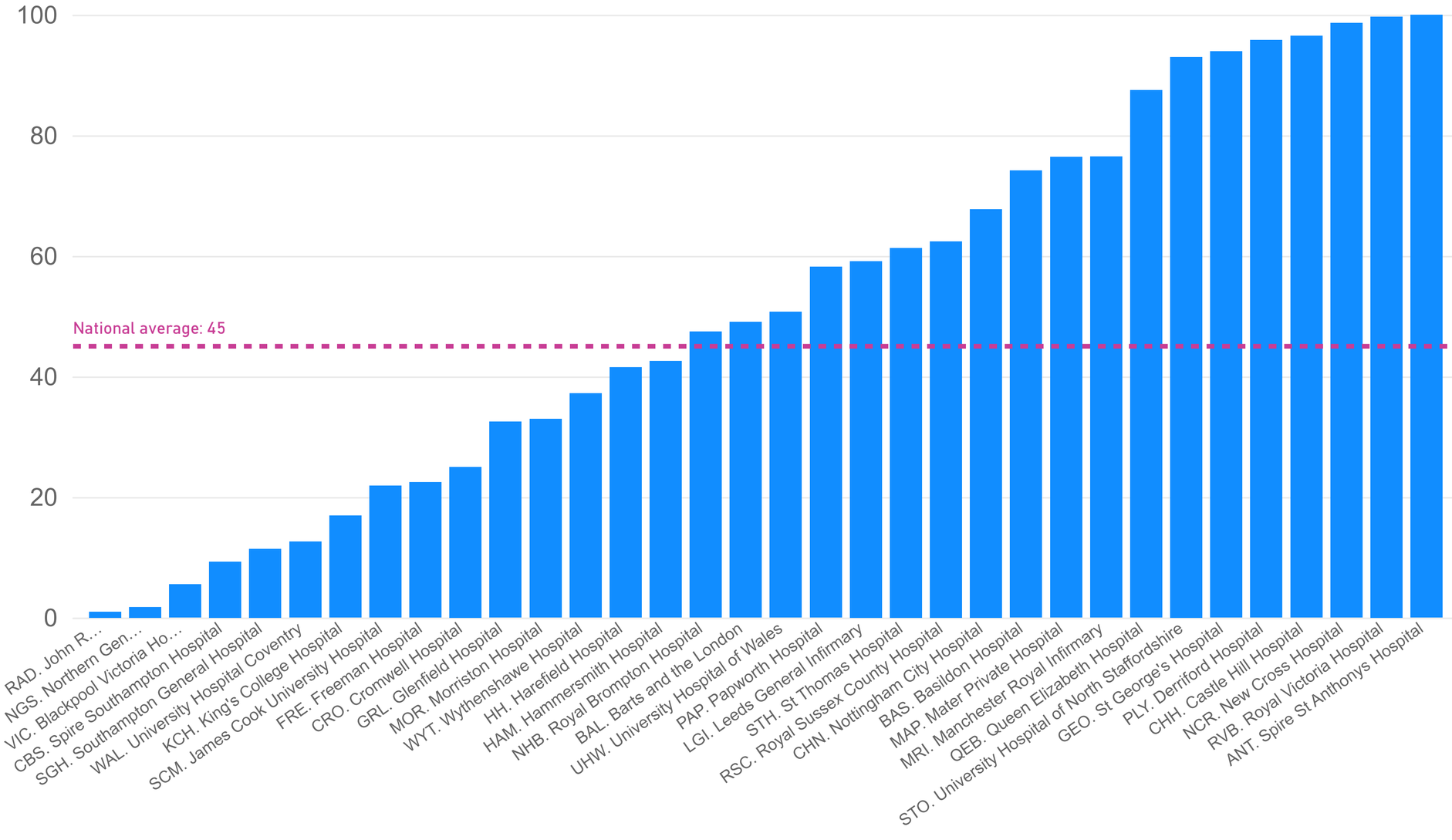
The 2021 GIRFT report recommended that all non-emergency cardiac surgery should be discussed by a disease-specific multi-disciplinary team (MDT).

In 2023/24, 45% patients receiving a coronary artery bypass graft (CABG) operation were recorded as being discussed at an MDT.

There is very considerable variation in performance between hospitals. Amongst NHS hospitals, 6 undertook MDTs in more than 90% of cases. The worst-performing did so for only 4% of patients.

Note: This is a new metric and only three years of data are available. Data were not provided by seven hospitals.

Percentage of isolated CABG cases discussed at an MDT by hospital (2023/24)



Just under half of patients undergoing isolated aortic valve replacement are discussed at an MDT

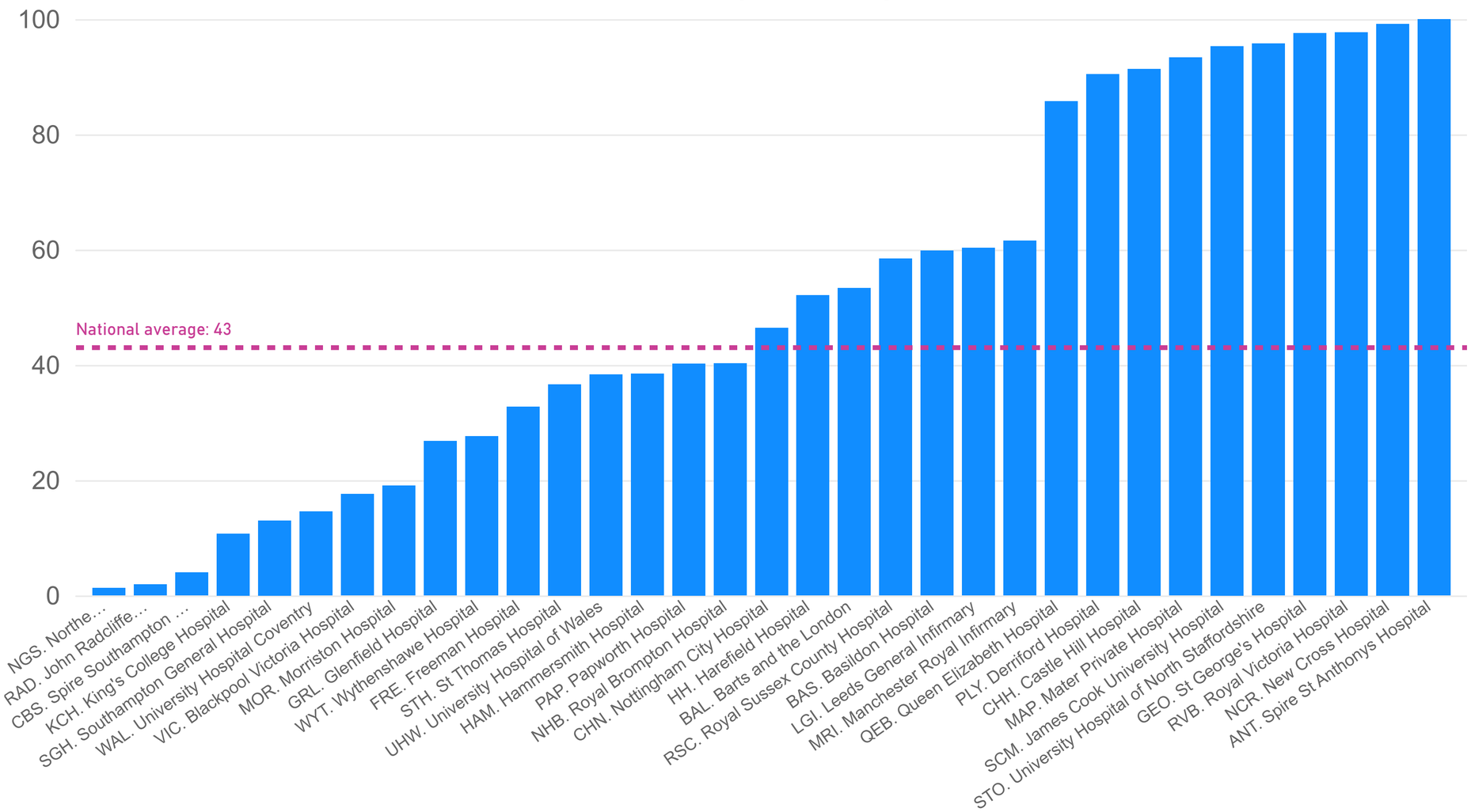
The 2021 GIRFT report recommended that all non-emergency cardiac surgery should be discussed by a disease-specific multi-disciplinary team (MDT).

In 2023/24, only 43% of patients undergoing isolated aortic valve replacement (AVR) were recorded as being discussed at an MDT.

There is a huge variation between units, with 7 NHS hospitals achieving the target in more than 90% of operations, compared to only 1% in the worst-performing.

Note: This is a new metric and only three years of data are available. Four hospitals did not provide data.

Percentage of patients undergoing isolated AVR discussed at an MDT by hospital (2023/24)



Under 37% of patients undergoing isolated mitral valve replacement are discussed at an MDT

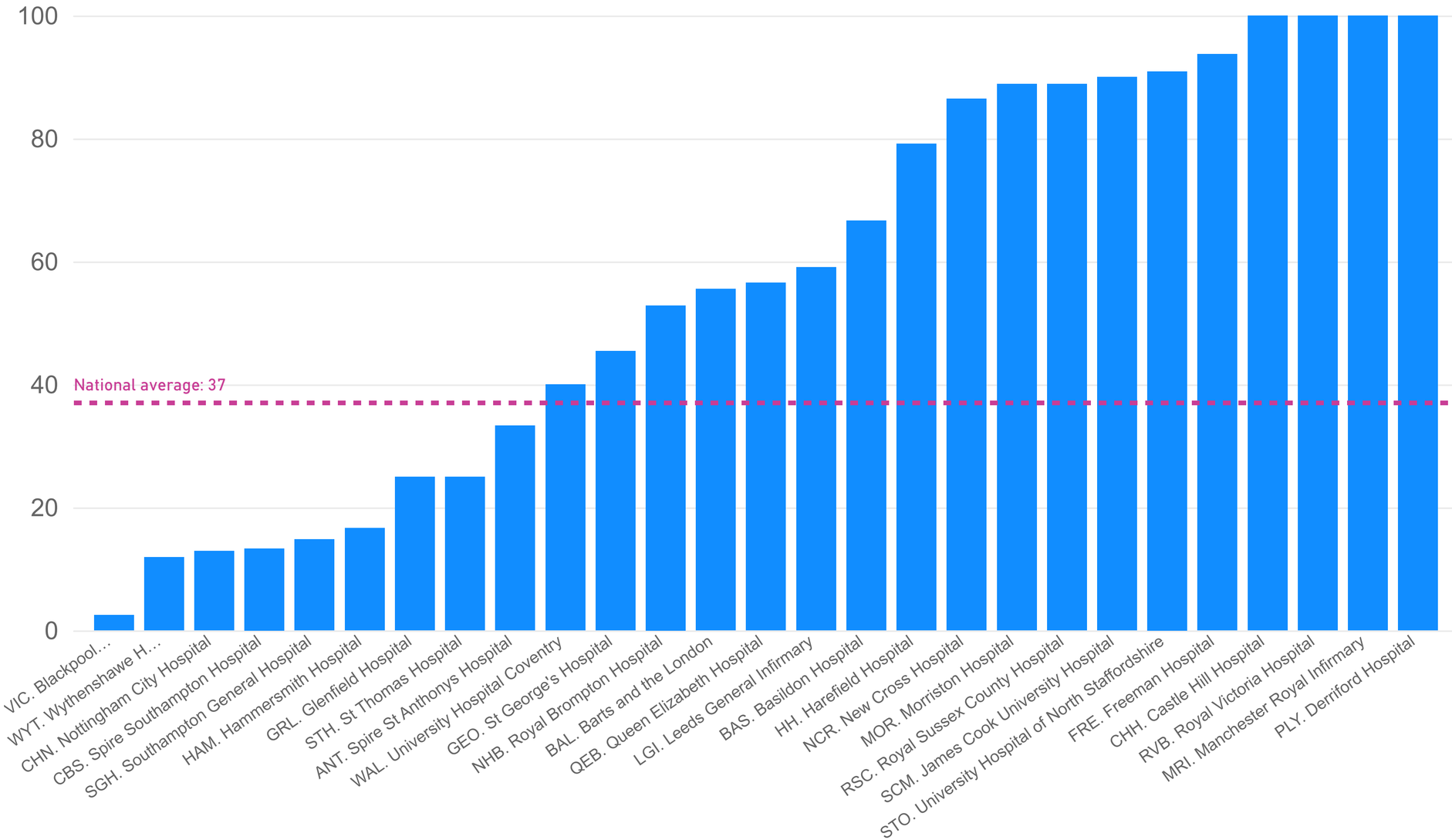
The 2021 GIRFT report recommended that all non-emergency cardiac surgery should be discussed by a disease-specific multi-disciplinary team (MDT).

Of patients undergoing isolated mitral valve replacement (MVR), only 37% were recorded as being discussed at an MDT.

There is very considerable variation in performance between hospitals with 7 NHS hospitals achieving the target in >90% of operations, compared with the worst where only 3% of cases were discussed by an MDT.

Note: This is a new metric and only three years of data are available (10 hospitals did not provide data).

Percentage of patients undergoing isolated MVR discussed at an MDT by hospital (2023/24)



Number of isolated CABG cases per million population by Integrated Care Board / University Health Board

The map shows the rates of isolated CABG operations per million population (pmp) according to postcode of the patient's residence for the 42 Integrated Care Boards (ICBs) in England and 7 Welsh University Health Boards (HBs) (commissioning organisations).

In 2023/24 the highest rate was 477 operations per million (North West London Health and Care Partnership).

The lowest rate was only 91 operations per million (Gloucestershire ICB).

There is a more than 5 fold variation in CABG rates between ICBs in England and Wales.

Select a time period and type of procedure below to see the relevant data.

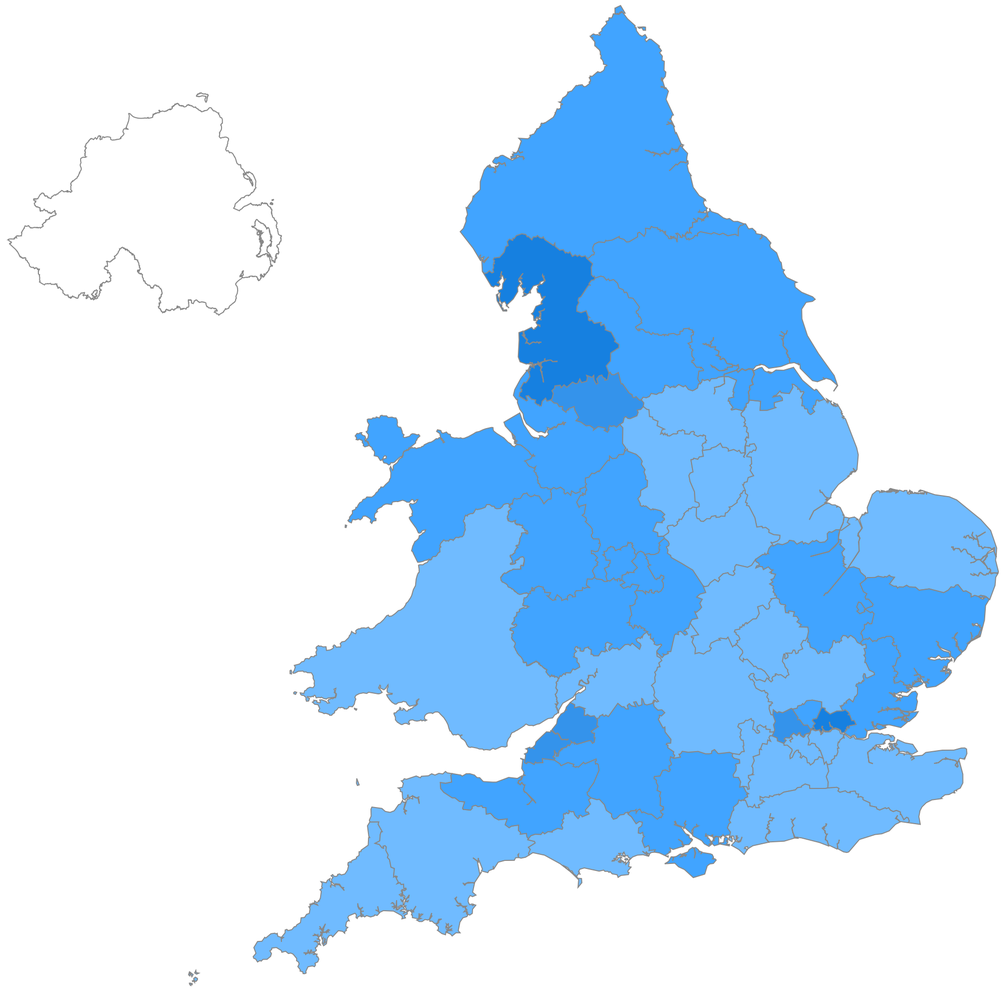
Year

2023/24

Type

Urgent

Total isolated CABG cases per million population by ICB/HB (by financial year selected)



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Number of isolated AVR cases per million population by Integrated Care Board / University Health Board

The map shows the rates of isolated AVR operations per million population (pmp) according to the postcode of the patient's residence for the 42 Integrated Care Boards (ICBs) in England and 7 Welsh University Health Boards (HBs) (commissioning organisations).

In 2023/24, there was a 4-fold variation in surgical AVR rates between ICBs in England and Wales.

The highest rate was 114 operations per million (West Yorkshire and Harrogate Health and Care Partnership). The lowest rate was only 31 operations per million (Devon ICB).

Select a time period and type of procedure below to see the relevant data.

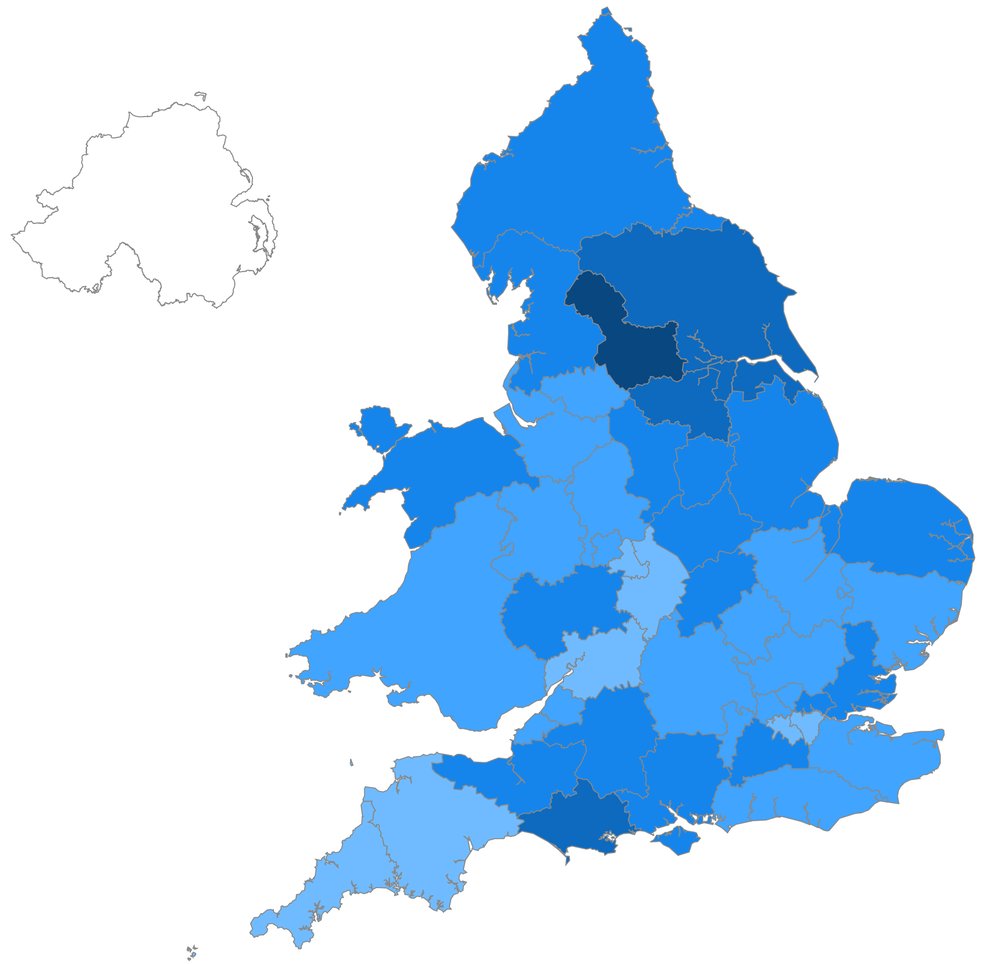
Year

2023/24

Type

Total

Total isolated AVR cases per million population by ICB/HB (by financial year selected)



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Number of Emergency Major Aortic cases per million population by ICB

The map shows the rates of emergency major aortic cases per million population (pmp) according to the postcode of the patient's residence for the 42 Integrated Care Boards (ICBs) in England and seven Welsh University Health Boards (HBs) (commissioning organisations).

The vast majority of these operations are for Type A Aortic Dissection.

In 2023/24, there was nearly a 6-fold difference in rates of emergency surgery on the thoracic aorta per year between ICBs in England and Wales.

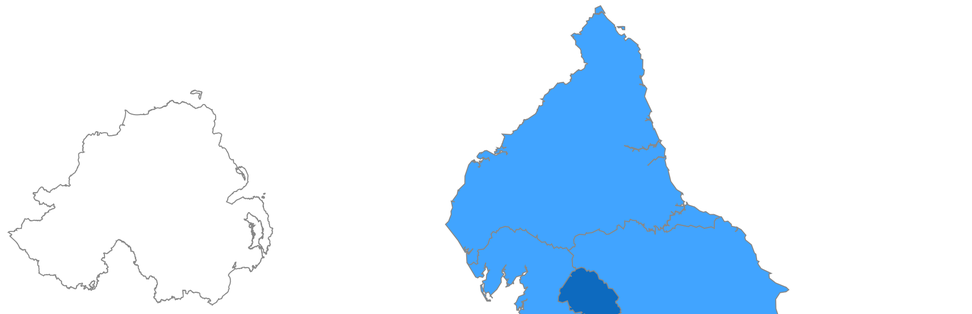
The highest rate of operations was 22 per million (Cambridgeshire and Peterborough ICB and East London Health and Care Partnership). The lowest rate was 3.9 per million (Shropshire and Telford and Wrekin ICB).

Select a time period below to see the relevant data.

Year

2023/24

Total Emergency Major Aortic cases per million population by ICB (by financial year selected)



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Off Pump (OPCAB) Coronary Artery Bypass rates are falling

Isolated CABG surgery can be performed without the use of a cardiopulmonary bypass machine, otherwise called Off Pump (OPCAB) coronary artery bypass.

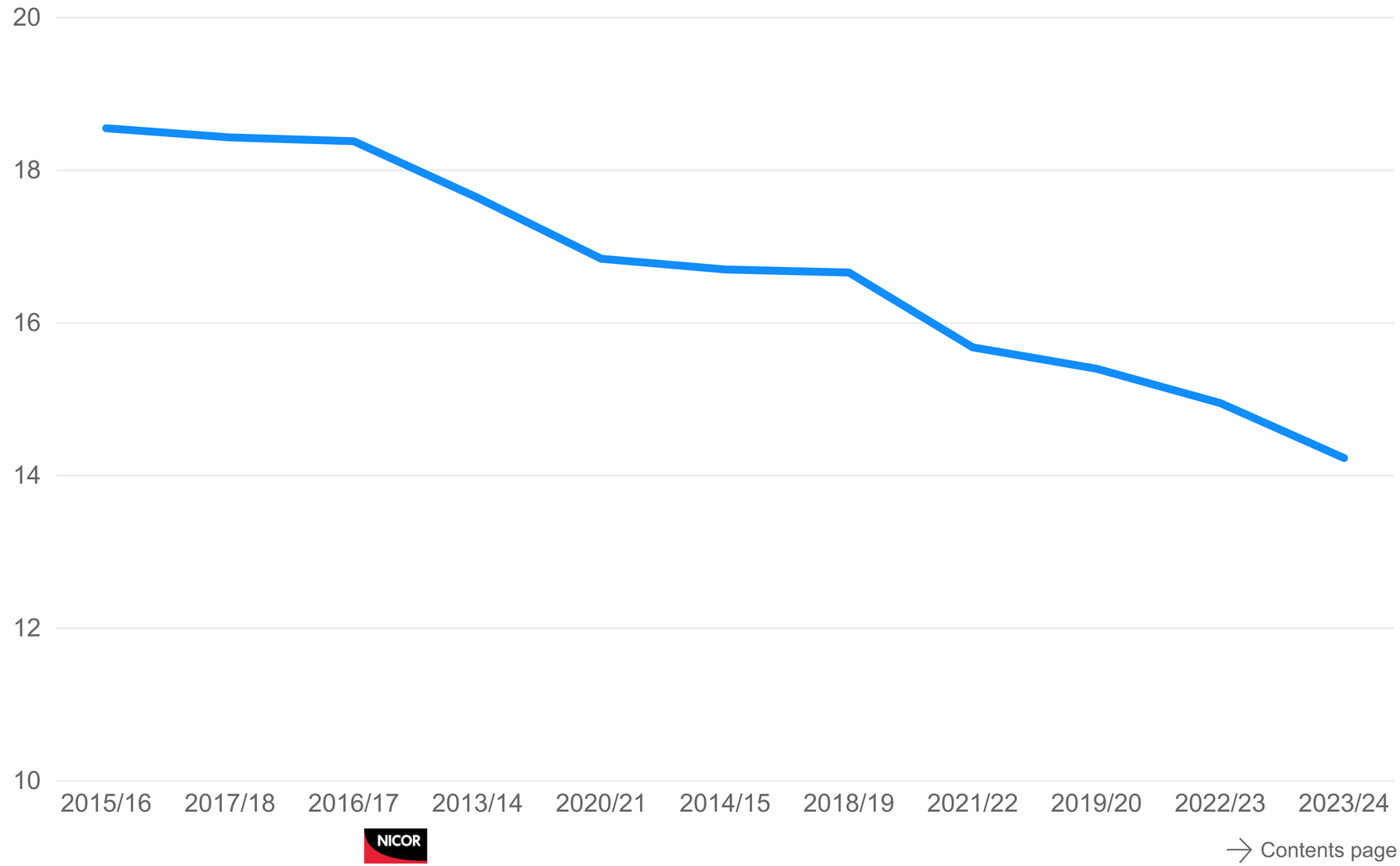
Rates of OPCAB have been falling in the UK since a peak in around 2008.

Although contentious, there is probably no difference in outcomes between OPCAB and conventional on bypass CABG.

Last year (2023/24) the rate of OPCAB in the UK was 14.2% of all isolated CABG operations.

Note: These rates also include all cases where no bypass time recorded, so may be an overestimate.

Percentage use of Off Pump Coronary Artery Bypass for isolated CABG cases



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There is considerable variation in the use of Off Pump (OPCAB) Coronary Artery Bypass rates by hospital

OPCAB rates vary hugely between different hospitals across the UK (from <0.5% to 56% in the NHS).

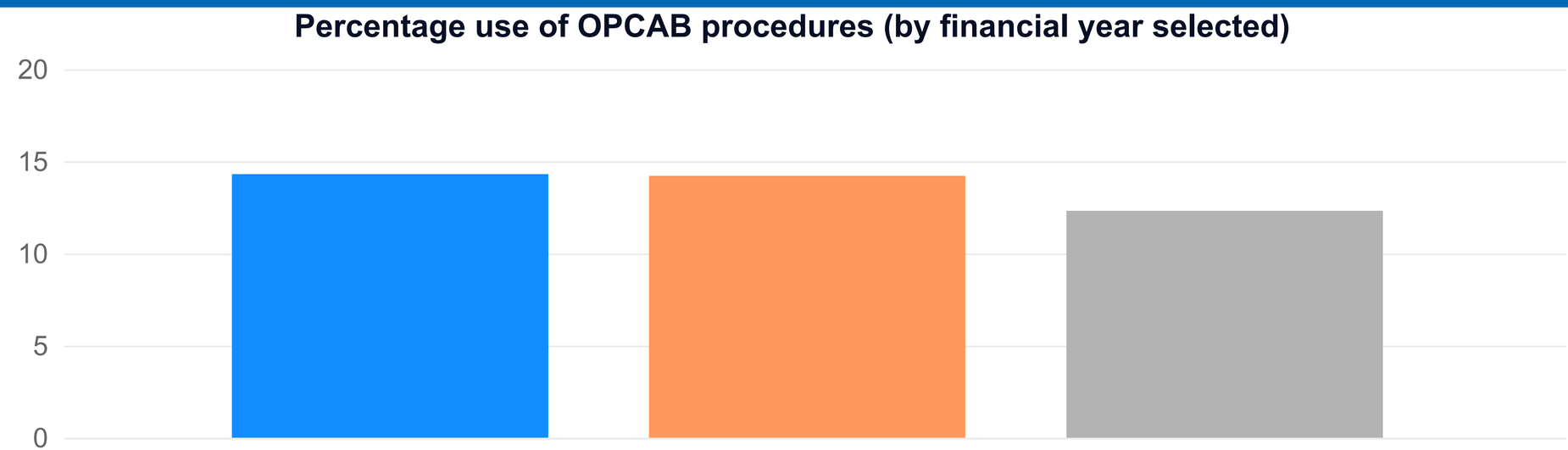
Last year (2023/24) there were 5 hospitals (3 NHS) where it was used in more than 40% of CABG operations.

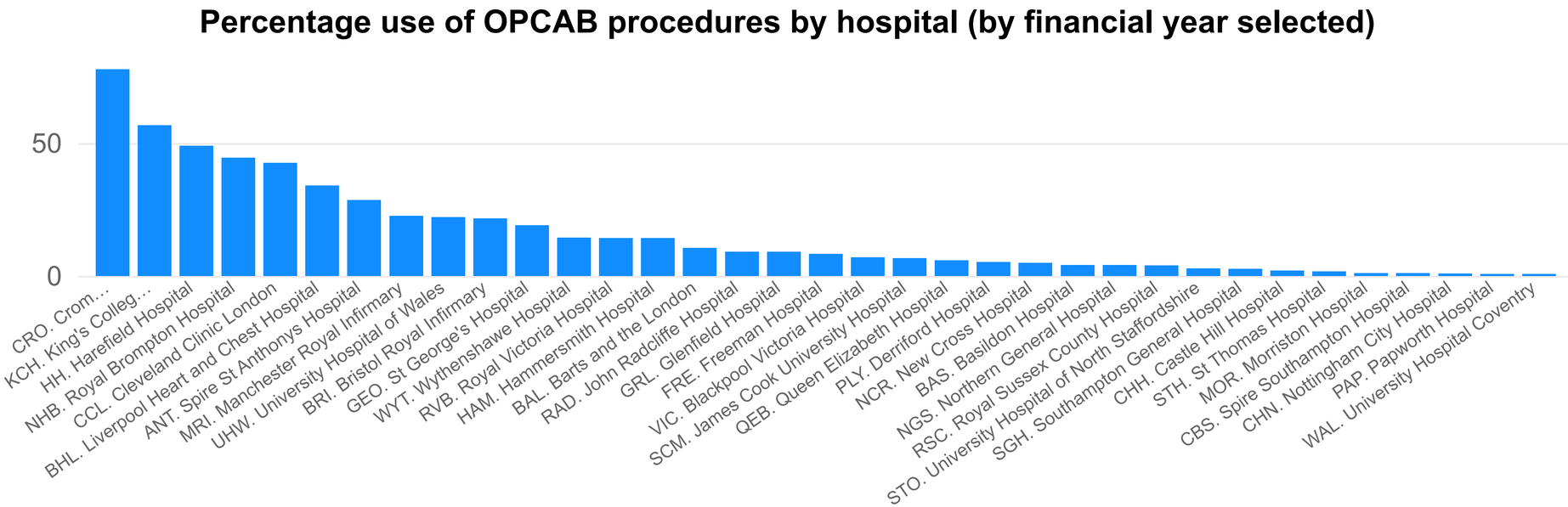
In 20 hospitals the OPCAB rates were <10% of isolated CABG cases.

Select year below to see specific data.

Year

2023/24





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The average number of bypass grafts performed during isolated CABG varies between hospitals

3 bypass grafts is the commonest number performed during isolated CABG (48% of patients in 2023/24).

The range is usually from 1 to 5 per patient (5.4% had one graft, 2.4% received 5 or more).

The mean number of grafts has remained consistent at 2.9 in England over the last decade.

Slightly more grafts per operation are performed in Wales (3.2 per patient) and in Northern Ireland (3.2) in 2023/24.

Select mean/mode and year below to see specific data.

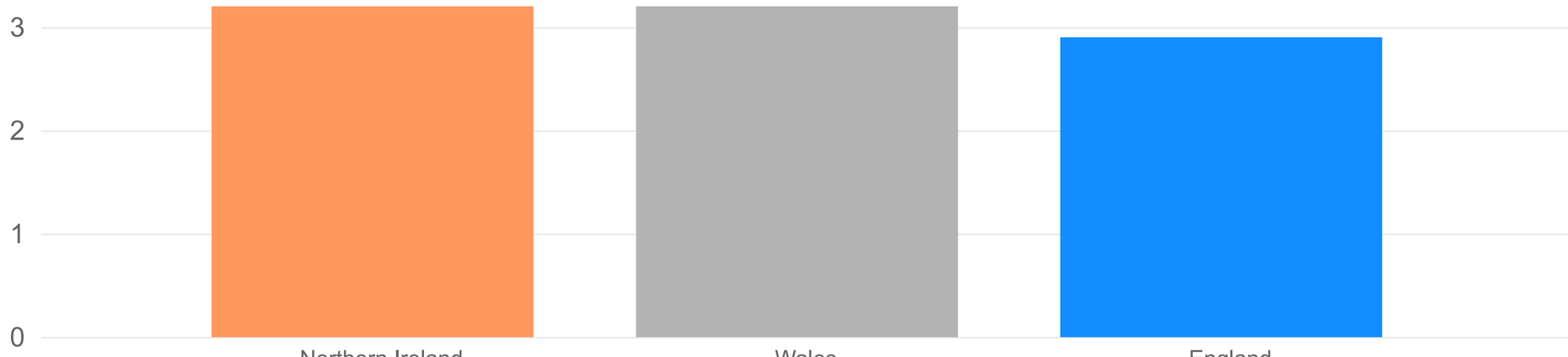
Mean/Mode

Mean

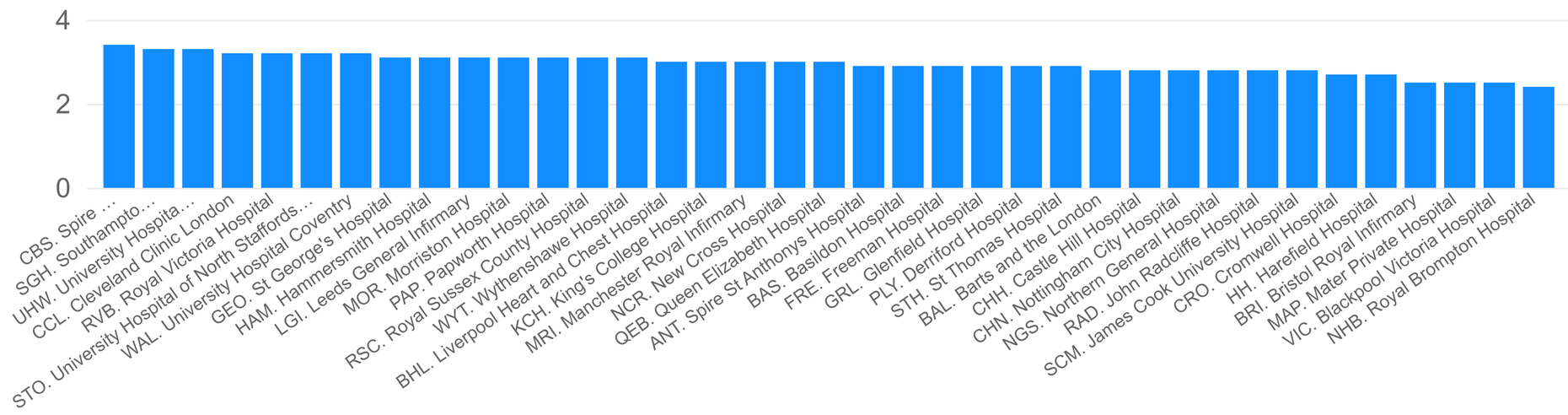
Year

2023/24

Mean or median number of bypass grafts during isolated CABG (by financial year selected)



Mean or median number of bypass grafts during isolated CABG by hospital (by financial year selected)



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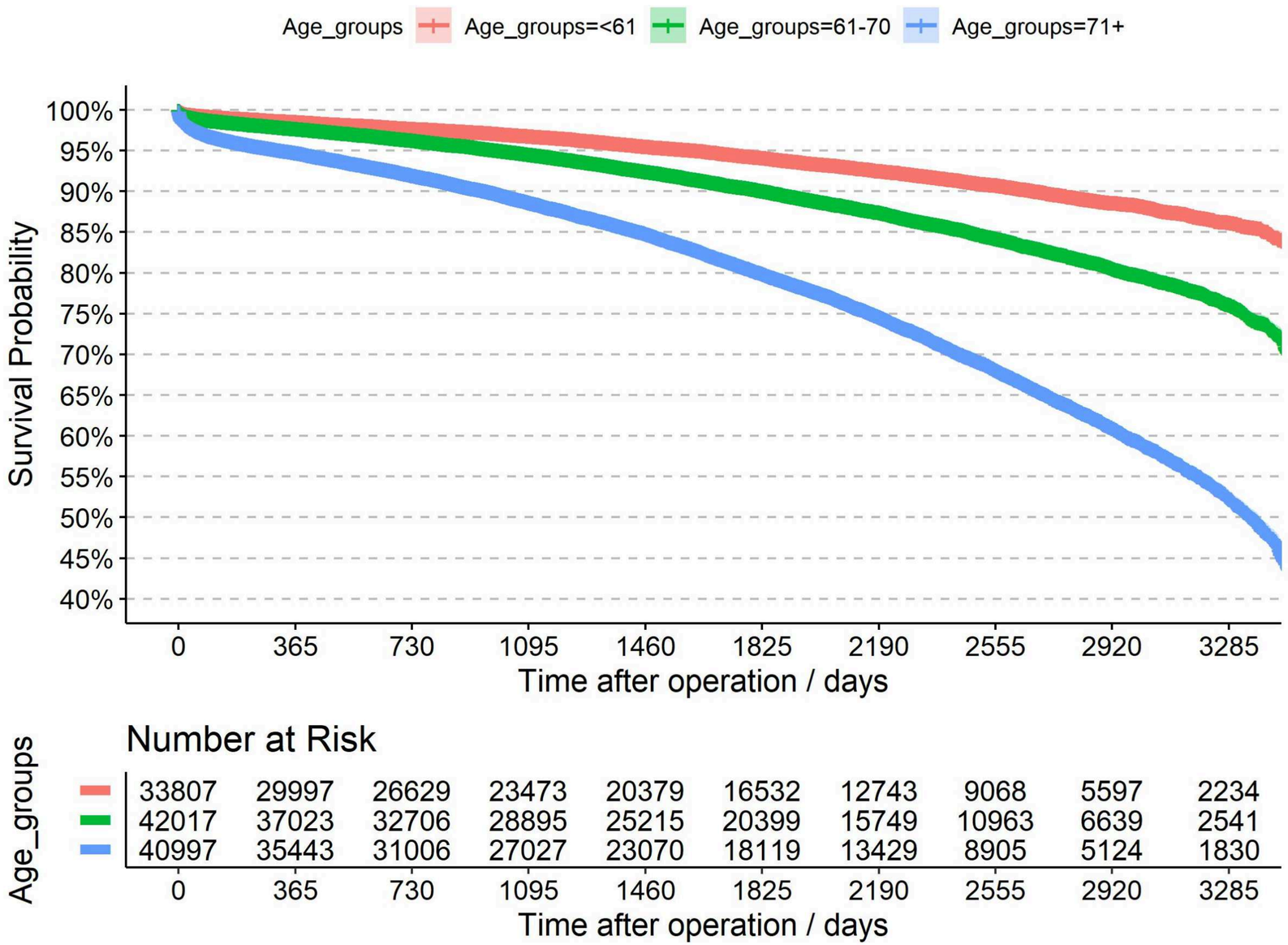
Long-term survival probability following isolated CABG - by age group

Kaplan-Meier curve showing chance of survival up to 9 years following isolated CABG according to age at the time of surgery.

(Operations performed in UK since 2013)



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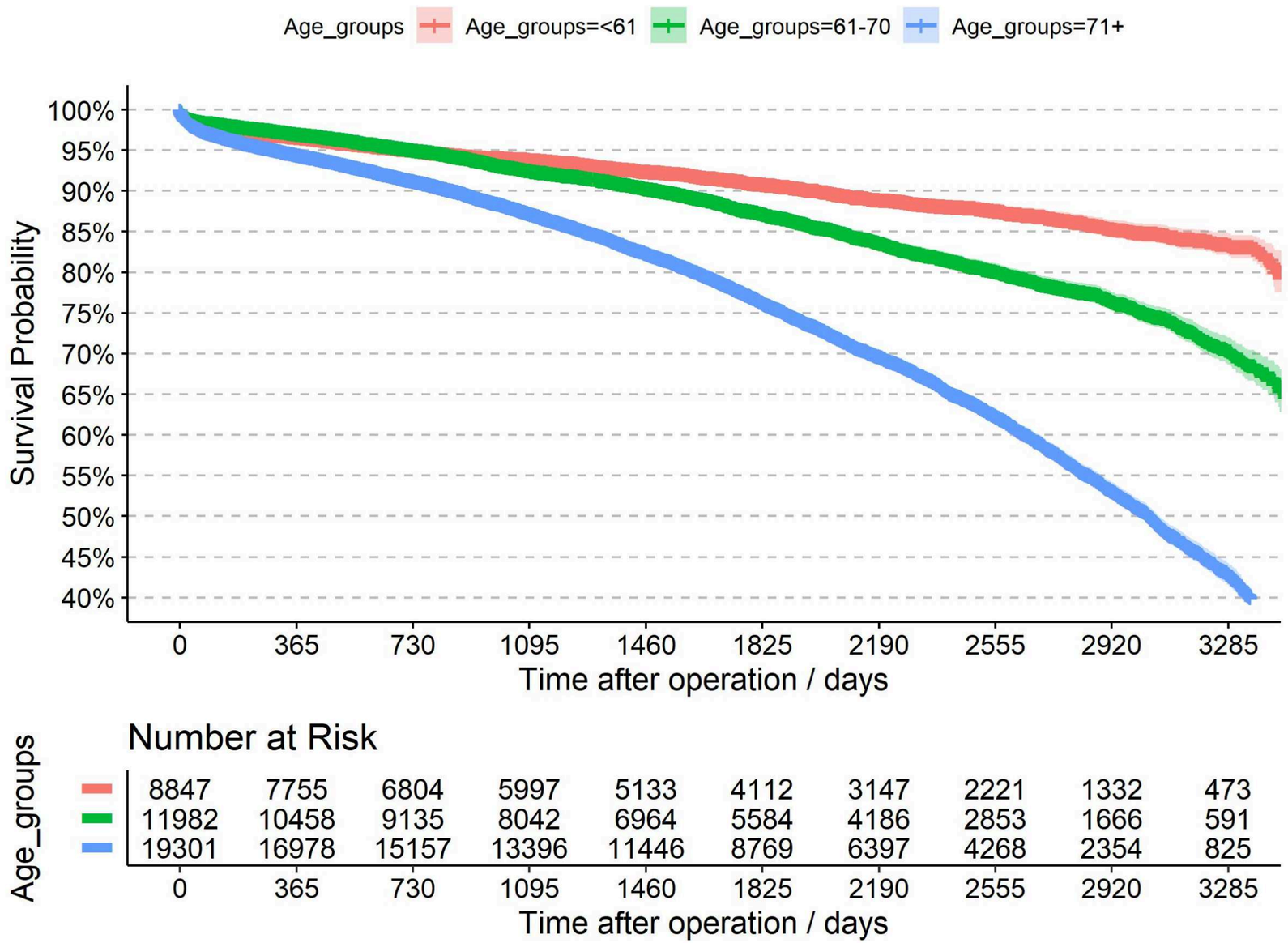
Long-term survival probability following isolated AVR - by age group

Kaplan-Meier curve showing chance of survival up to 9 years following isolated AVR according to age at time of surgery.

(Operations performed in UK since 2013).



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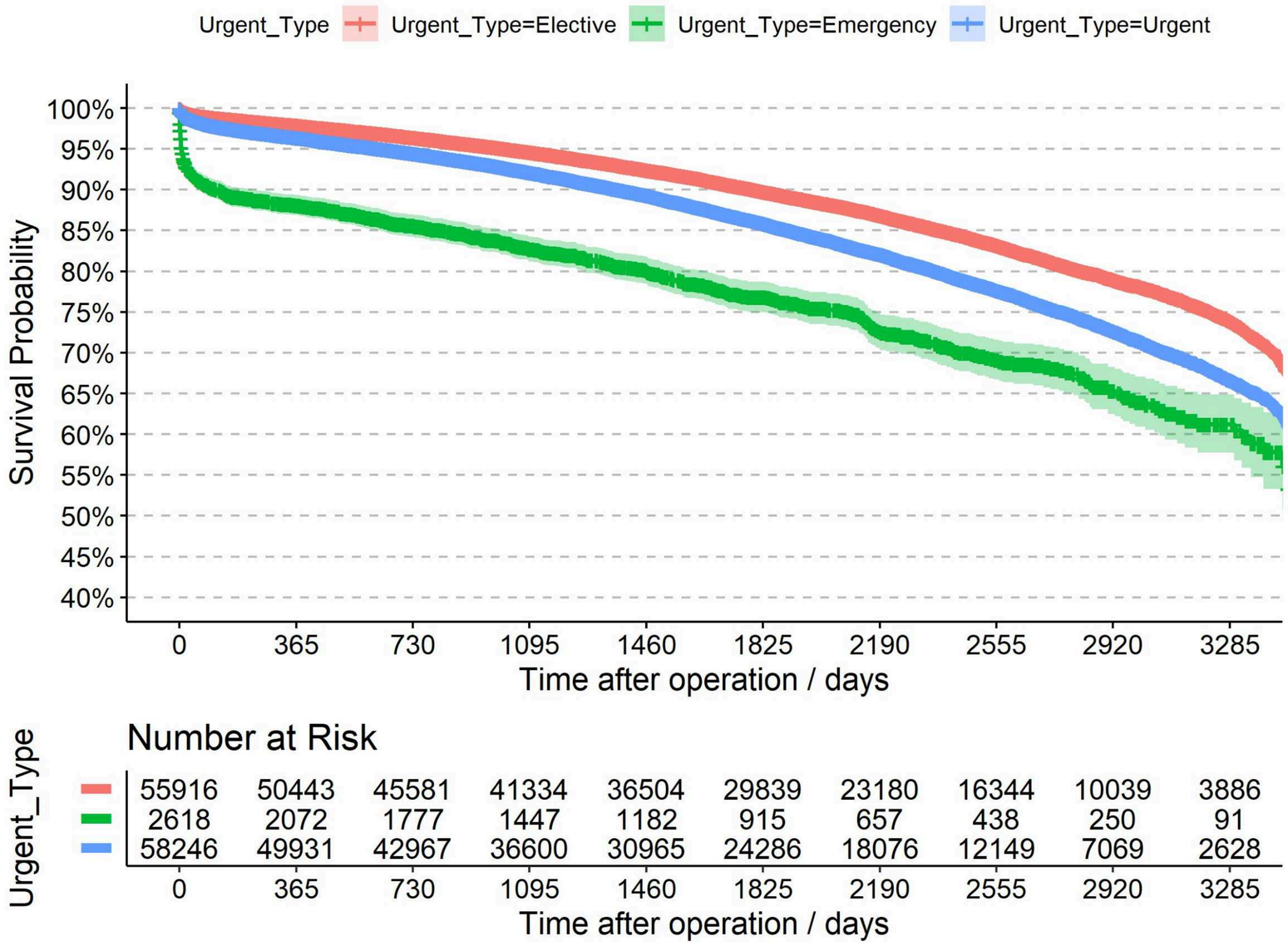
Long-term survival probability following isolated CABG - by operative urgency

Kaplan-Meier curve showing chance of survival up to 9 years following isolated CABG according to the operative urgency of the procedure.

(Operations performed since 2013).



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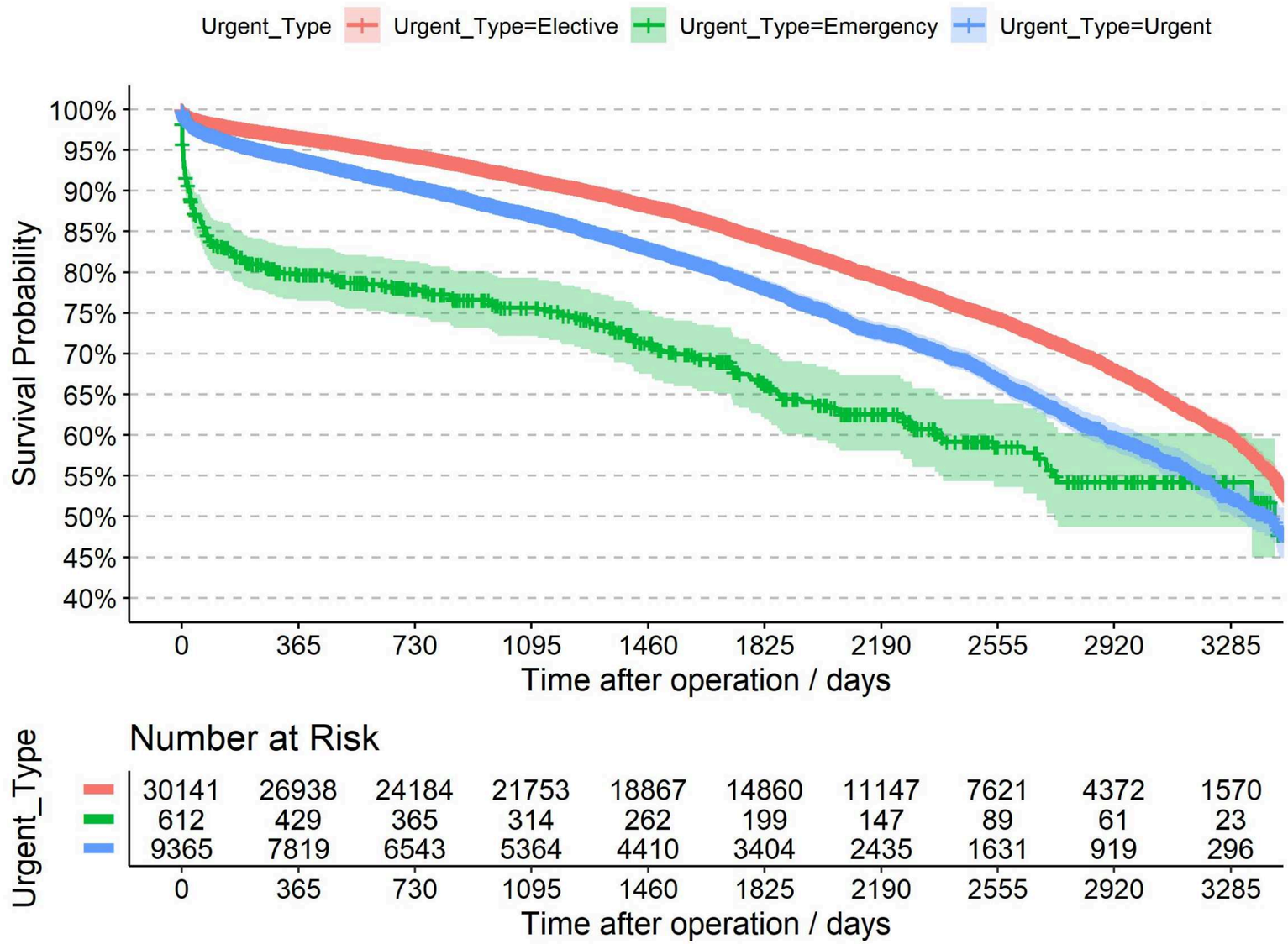
Long-term survival probability following isolated AVR - by operative urgency

Kaplan-Meier curve showing chance of survival up to 9 years following isolated AVR according to the operative urgency of the procedure.

(Operations performed since 2013)

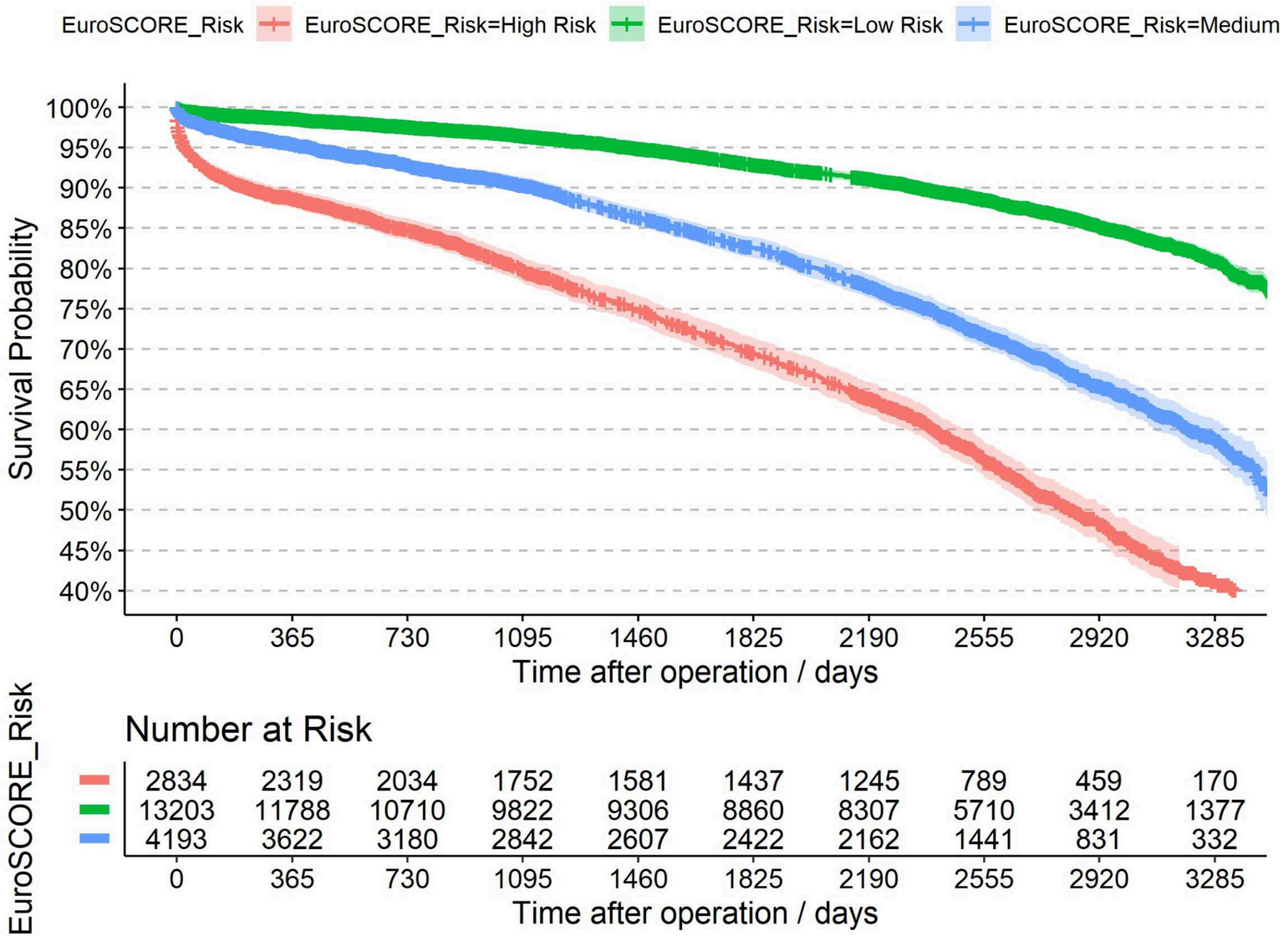


Long-term survival probability following isolated CABG - by EuroSCORE predicted operative risk

Kaplan-Meier curve showing chance of survival up to 9 years following isolated CABG according to the pre-operatively predicted risk of surgery (using EuroSCORE logistic).

Low risk (EuroSCORE logistic predicted risk 0-4%), medium risk (4-8%), high risk (>8%).

Operations performed since 2013.

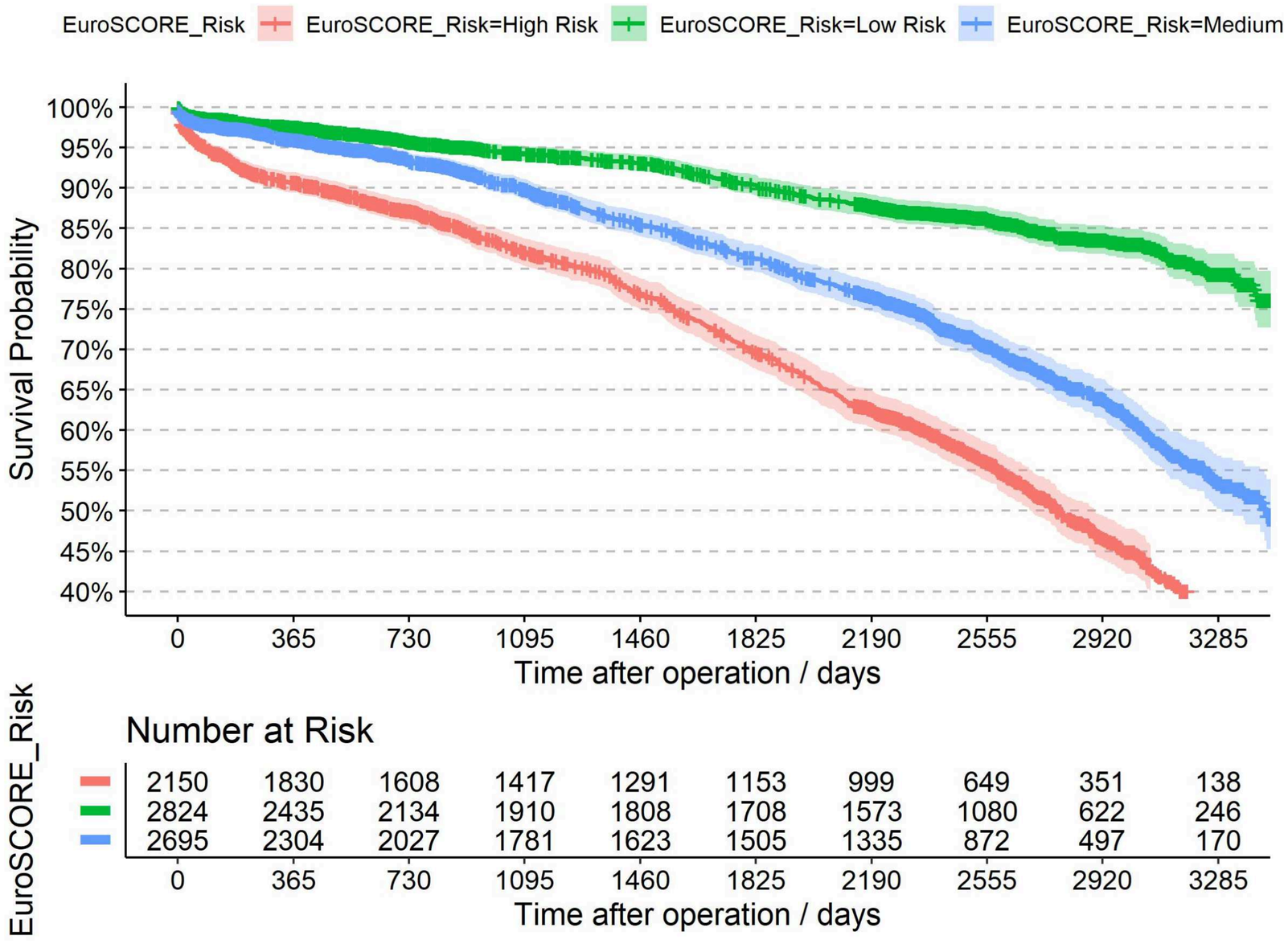


Long-term survival probability following isolated AVR - by EuroSCORE predicted operative risk

Kaplan-Meier curve showing chance of survival up to 9 years following isolated AVR according to the pre-operatively calculated risk of surgery (using EuroSCORE logistic).

Low risk (EuroSCORE logistic predicted risk 0-4%), medium risk (4-8%), high risk (>8%).

Operations performed since 2013.



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ANT	St Anthony's Hospital, London
BAL	Barts Heart Centre, London
BAS	Basildon Hospital, Essex
BHL	Liverpool Heart and Chest Hospital
BRI	Bristol Royal Infirmary
CBS	Spire Hospital, Southampton
CHH	Castle Hill Hospital, Hull
CHN	Nottingham City Hospital
CCL	Cleveland Clinic, London
CRO	Cromwell Hospital, London
FRE	Freeman Hospital, Newcastle
GEO	St George's Hospital, London
GRL	Glenfield Hospital, Leicester
HAM	Hammersmith Hospital, London
HH	Harefield Hospital, London
HHW	Wellington Hospital, London
HSC	Harley Street Clinic, London
KCH	Kings College Hospital, London
LBH	London Bridge Hospital, London
LGI	Yorkshire Heart Centre, Leeds
MAT	Mater Misericordiae Hospital, Dublin
MOR	Morriston Hospital, Swansea
MRI	Manchester Royal Infirmary
NCR	New Cross Hospital, Wolverhampton
NGS	Northern General Hospital, Sheffield
NHB	Royal Brompton Hospital, London
PAP	Royal Papworth Hospital, Cambridge
PLY	Derriford Hospital, Plymouth
QEB	Queen Elizabeth Hospital, Birmingham
RAD	John Radcliffe Hospital, Oxford
RSC	Royal Sussex County Hospital, Brighton
RVB	Royal Victoria Hospital, Belfast
SCM	James Cook University Hospital, Middlesbrough
SGH	Southampton General Hospital
STH	St Thomas' Hospital, London
STO	University Hospital of NorthStaffordshire, Stoke
UHW	University Hospital of Wales, Cardiff
VIC	Blackpool Victoria Hospital
WAL	University Hospital, Coventry
WYT	Wythenshawe Hospital, Manchester

The NACSA audit uses risk-adjusted methods to compare outcomes at different hospitals performing cardiac surgical procedures

The NACSA audit has worked with University College London Department of Statistical Science to develop a risk adjustment model to allow the outcomes of different hospitals to be compared.

A random effects model is used to infer outlier status for each hospital (details of the methodology can be found here).

The results of the latest analysis are displayed on the next slide using a forest plot (note these shows survival rates, the inverse of the mortality rates):

- Performance that is within expected limits (black dot) based on the survival probability using a random effects model.
- The observed survival (square) is the actual survival rate for each hospital. Certain high-risk procedures are excluded (details are available here).
- Predicted survival rate (X) is calculated using an annually recalibrated version of EuroSCORE logistic.

The y-axis has the abbreviated code for each hospital. Clicking on the button 'List of hospital names' shows the code for each hospital.

The numbers of operations performed in the last three years and the percentage data completeness are also shown.