



NATIONAL VASCULAR REGISTRY

2021 Annual Report

November 2021



Royal College
of Surgeons
of England
ADVANCING SURGICAL CARE



VASCULAR
SOCIETY

OF GREAT BRITAIN AND IRELAND



British Society of
Interventional
Radiology

Registered Charity No: 1084852



HQIP

Healthcare Quality
Improvement Partnership

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The Royal College of Surgeons of England is an independent professional body committed to enabling surgeons to achieve and maintain the highest standards of surgical practice and patient care. As part of this, it supports Audit and the evaluation of clinical effectiveness for surgery. Registered charity no: 212808

The RCSEng managed the publication of the 2021 Annual report.



The Vascular Society of Great Britain and Ireland is the specialist society that represents vascular surgeons. It is one of the key partners leading the audit. Registered charity no: 1102769



The British Society of Interventional Radiology is the specialist society that represents interventional radiologists. It is again, one of the key partners leading the audit. Registered charity no: 1084852

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The Healthcare Quality Improvement Partnership (HQIP) aims 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 is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices.

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Foreword

It is a pleasure to recommend to you the 2021 National Vascular Registry report, which summarises the data staff have worked hard to enter over the last year. Surgical outcome data is an increasingly important aspect of practice, but as interventions change, different measures need to be prioritised. Datasets therefore evolve over time as differing aspects of care are addressed. The future challenge will be to capture the most relevant data in order to shape good practice going forward.

As the COVID-19 pandemic continues to impact on practice, it is useful to consider the lessons we have learned over the last year. Team working and interaction with other specialties was a very important aspect of care during the first wave of the pandemic. In fact, most vascular surgeons had already been working within a team, often with a weekly responsibility for managing emergency admissions and ward patients. Collaboration with interventional radiologists (often with hybrid approaches), elderly care physicians, anaesthetic and critical care doctors is now crucial to get the best outcomes for our often frail and elderly patient cohort. Outcomes should be openly discussed at regular Morbidity and Mortality meetings and shared responsibility for decision making is now the norm with weekly MDT meetings.

This year's report predictably reflects the COVID-19 influence on the elective workload with numbers reduced for most elective and indeed emergency procedures (following guidance from the VSGBI, BSIR, NHS England Vascular CRG and GIRFT). The disease process itself has caused new presentations with novel thrombotic occlusions and has clearly

caused increased mortality after major surgery. As such, we felt publication of individual surgical mortality for this year was unhelpful and we are grateful to HQIP for supporting this stance. Going forward, with the already noted move towards team working and often multi-consultant involvement in complex procedures, it may be time to reconsider the role of individual outcome results in the public domain.

Looking at the data in more detail, there was a 35% reduction in aortic procedures, 32% reduction in lower limb bypass and angioplasty and 28% reduction in carotid endarterectomy numbers compared with last year. Amputation numbers remain similar year on year, but mortality was greater in 2020 with an increase in respiratory complications. This is entirely consistent with periods of interruption for planned care and the pressure on both hospital and critical care bed bases. Even after the crux of maximum COVID-19 patient admission rates had passed, the impact of re-deployed staff, reduced diagnostic capacity and protracted critical care patient recovery times, meant that many hospitals did not return to a full service for many months.

Although it may be difficult to predict the number of patients "yet to present", this may not be as significant in vascular services compared with other specialties with large waiting lists. The majority of index cases measured by NVR are emergent or urgent and we are fortunate that NAAASP data allows an accurate estimate of screen-detected aortic aneurysm case numbers. Nevertheless, there is a backlog in most large units and there is a continued need for patients with aneurysms

to be prioritised for admission in addition to those with cancer.

There are a number of success stories from this year's report. Firstly, it is clear that there was an improvement in times to lower limb revascularisation at the height of the first wave of the pandemic. Some of the measures put in place during this time (hot clinics, tele-medicine, prioritised diagnostics and emergency-only operating) have clearly had a positive impact and need to remain a part of everyday practice. Day case interventional radiology services played a large part in this and collaboration between vascular surgeons and interventional radiology colleagues was instrumental in achieving these results. It is also a pleasure to report that the NVR team won the HQIP 'Audit team of the year award' in November 2020, which is an excellent accolade to reward their amazing performance over many years.

Looking to the future, it is crucial that the dataset incorporates measures that will allow us to better manage patients. New for this year, is the introduction of revision aortic datasets and device data for aneurysm patients and although the latter is not mandatory at the moment, just under 60% has been completed, even in such a difficult year. This will provide a valuable insight into durability in future years and potentially allow us to identify failing devices at an earlier stage. Accurate data will remain crucially important and it is vital we continue to achieve this.

Mr Mike Jenkins
President of the Vascular Society of Great Britain and Ireland

Dr Ian McCafferty
President of the British Society of Interventional Radiology

Executive Summary

This year's NVR Annual Report has a different feel to the reports from previous years to take into account the impact of the COVID-19 pandemic on NHS vascular services. In particular, in each chapter on the various procedures (in the main report), results are reported for 2020 and are presented alongside those for 2019 to show the extent of the changes in practice and outcomes during 2020. The largest changes were in the number of procedures being performed; for patients having a procedure, vascular units were able to meet many recommended standards. We have reported some results using data from multiple years when there was insufficient data from a single year to

produce robust results. This is the executive summary document, and the full report can be found on our website at:

<https://www.vsgip.org.uk/reports/2021-annual-report/>

This webpage also contains the trust/health board level appendices and organisational data viewer. The key metrics, especially those linked to the recommendations in the report can be produced in the organisational data viewer. The spreadsheet allows individual trusts to be compared to the national averages and national standards of these metrics, allowing it to be used for quality improvement purposes.

Abdominal aortic aneurysms (AAA)

1) *Elective infra-renal AAA*

Aneurysms frequently develop in the aorta below the arteries to the kidneys, and are known as infra-renal AAA. The NVR received information on 2,258 patients with an elective infra-renal AAA repair in 2020, of which 60% were endovascular repair (EVAR) and 40% were open repair. This was 1,198 fewer procedures than performed in 2019, a reduction of 35% reduction.

VSGBI AAA Quality Improvement Framework

All elective procedures should be reviewed preoperatively in an MDT that includes surgeon(s) and interventional radiologist(s) as a minimum.

All patients should undergo comprehensive preoperative assessment and risk scoring, as well as CT angiography to determine their suitability for EVAR.

All patients should be seen in pre-assessment by an anaesthetist with experience in elective vascular anaesthesia.

The Vascular Society AAA Quality Improvement Framework established a number of standards for preoperative assessment of patients undergoing AAA repair. In 2020, most patients treated in NHS vascular units received care consistent with the standards:

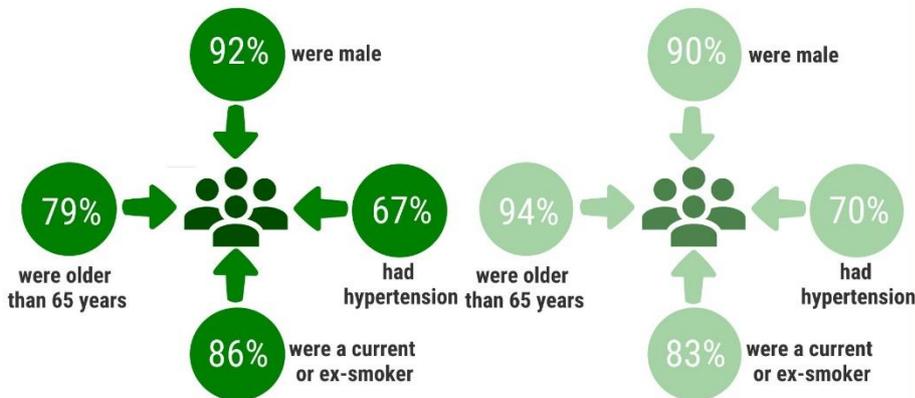
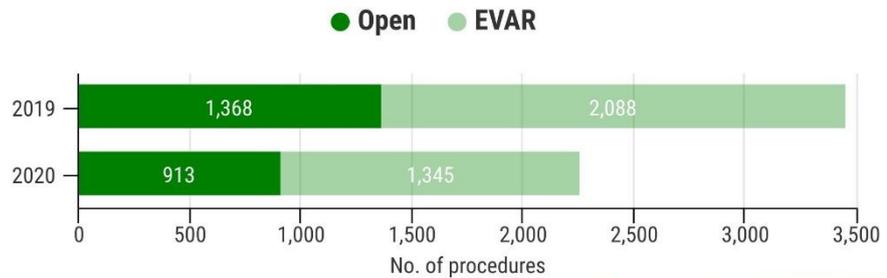
- 85.5% were discussed at MDT meetings
- 91.4% had preoperative CT/MR angiography
- 97.2% underwent a formal anaesthetic review
- 80.0% had documented formal fitness assessment tests.

Repair of abdominal aortic aneurysm (AAA) to prevent rupture

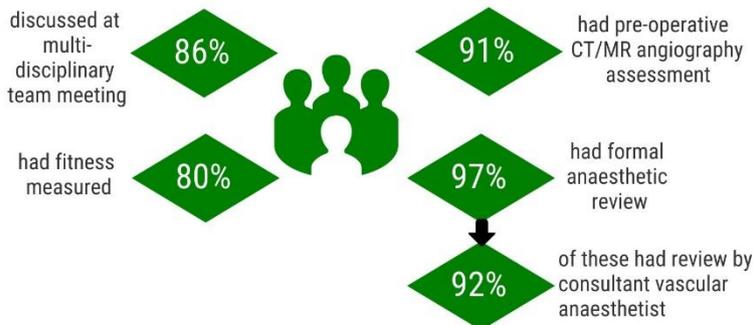
AAA is an abnormal expansion of the aorta (the largest vessel taking blood away from the heart). If left untreated, it may enlarge and rupture causing fatal internal bleeding. An infra-renal aneurysm occurs below the level of the renal (kidney) arteries within the aorta.

Impact of COVID-19

There were 2,258 elective infra-renal AAA repairs submitted to the NVR in 2020, which is a decrease of 35% on the 3,456 procedures in 2019.



How were patients assessed?



Glossary

The average is the median; "typical range" is the interquartile range.

Patient outcomes after surgery in 2020



During the first wave of the COVID-19 pandemic, it was recommended (collaboratively by the VSGBI, BSIR, NHS England Vascular CRG and GIRFT) that only patients with infra-renal AAAs with an aortic diameter greater than 7cm should be offered elective surgery. During April 2020, over 50% of patients who had an AAA repair had these large aneurysms; as activity increased after the first COVID-19 wave, the proportion of patients who had a diameter greater than 7cm returned to typical levels, making up around 15% of the monthly activity.

NHS vascular units achieved good patient outcomes after elective infra-renal AAA repair in 2020. The in-hospital postoperative mortality was 3.3% after open repair and 0.4% after EVAR. Over the 3-year period from January 2018 to December 2020, the risk-adjusted in-hospital mortality rates for all NHS vascular units were within the expected range of the national average (1.4% for 2018-20).

2) Complex aneurysm repair

Aortic aneurysms that occur above or around the arteries to the kidneys are more complex than infra-renal aneurysms to repair, with a higher risk of complications or death. There were 70 active vascular units that reported complex AAA repairs to the NVR between 2019 and 2020. Thirty-eight units submitted fewer than 20 procedures over the two years.

In 2019, there were 799 procedures, of which 73 were open repairs. Activity was lower in 2020, with units performing 625 complex repairs, of which just 51 were open repairs. Among the 574 endovascular procedures, there were: 349 fenestrated repairs (FEVAR), 34 branched repairs (BEVAR) and 115 thoracic repairs (TEVAR).

Rates of postoperative mortality after complex endovascular repairs were lower

than after complex open repairs. In 2020, in-hospital postoperative mortality rates were:

- 2.4% for endovascular procedures, being 1.7% for FEVAR and 4.3% for TEVAR.
- 7.8% for open repairs.

3) Repair of ruptured AAA

Emergency repair of a ruptured abdominal aneurysm remains a high-risk procedure, with only about two-thirds of patients being discharged home. The NVR recorded 1,155 cases from January 2019 to December 2020.

There were 477 procedures recorded on the NVR in 2020, compared to 678 in 2019, which represents a reduction of 30%.

In the 2015 NVR Annual Report, open repairs constituted 78% of all procedures. Since then, the use of EVAR has increased over time; in 2020, 41.3% of patients with ruptured AAA underwent EVAR.

The in-hospital postoperative mortality rates for EVAR and open repair were 20.3% and 50.0%, respectively, in 2020. We caution against comparing the figures for EVAR and open repair because patients who have open procedures may represent the more complex cases that are unsuitable for endovascular repair. We are also unable to comment on out-of-hospital care, such as transfers of patients from non-arterial hospitals to arterial hospitals.

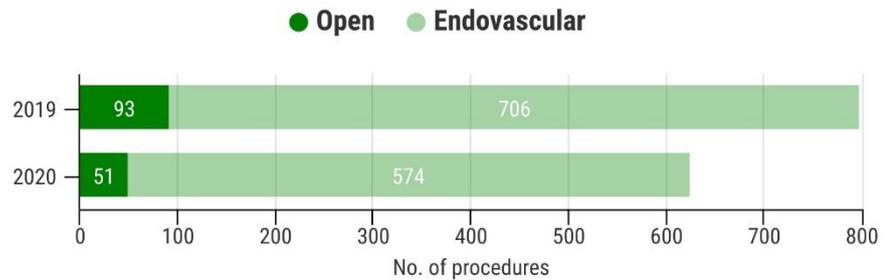
During the three-year period 2018-2020, all NHS Trusts had in-hospital postoperative mortality rates within the expected range after repair for ruptured AAA, given the number of procedures performed at the vascular units. The overall national average for this period was 34.5%.

Repair of elective complex aortic aneurysms to prevent rupture

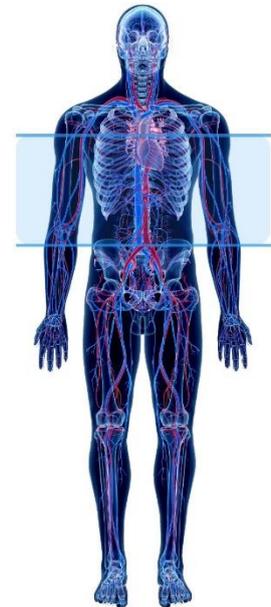
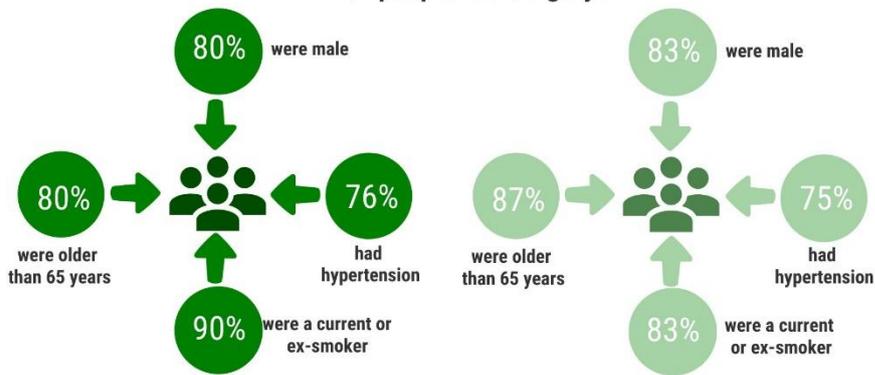
The term **complex** is used to describe those aneurysms that occur above the level of the renal (kidney) arteries. These are more complicated than the standard infra-renal repairs and require specialist teams, often within a specialist hospital.

Impact of COVID-19

There were 625 repairs of elective complex AAAs carried out in 2020, which is a 22% reduction on the 799 procedures in 2019.



Which people had surgery?



Glossary

The average is the median; "typical range" is the interquartile range.

The most common complex endovascular procedures were:

Fenestrated EVARs (FEVAR), which involves a graft containing holes (fenestrations) to allow the passage of blood vessels from the aorta.

Branched EVAR (BEVAR), which involves separate grafts being deployed on each blood vessel from the aorta after the main graft has been fitted.

Thoracic endovascular aortic/aneurysm repair (TEVAR), which involves a repair of the aorta within the chest region of the body.

Patient outcomes after surgery in 2020



Lower Limb Interventions for Peripheral Arterial Disease

Peripheral arterial disease of the lower limbs causes a range of symptoms extending from lifestyle restrictions due to intermittent claudication, to potential limb loss because of limited blood flow in the lower limb arteries (acute or chronic limb-threatening ischaemia).

1) Lower limb bypass surgery

In 2020, NHS Trusts submitted 5,071 (2,542 elective and 2,429 non-elective) bypass procedures to the NVR. There were 6,300 procedures submitted in 2019, which consisted of a similar number of non-elective procedures (2,438) but a higher level of elective activity (3,862 procedures). Elective activity was 32% lower in 2020.

Among these patients, 77% were admitted with chronic limb-threatening ischaemia (CLTI).

VSGBI: PAD QIF

Patients admitted non-electively with chronic limb-threatening ischaemia should have a revascularisation procedure within five days.

During 2019-2020, 47% of patients with CLTI who were admitted non-electively had their bypass within five days.

Surgical outcomes for bypass procedures were good in 2020. The in-hospital postoperative mortality rates were 1.6% for elective admissions and 4.9% for non-elective admissions. Over 75% of patients had no reported complications. A subsequent procedure after the initial operation was

required in 8.1% of elective admissions and 18.5% of non-elective admissions. All NHS Trusts had an adjusted postoperative in-hospital mortality rate that fell within the expected range given the volume of cases.

2) Lower limb endovascular procedures

NHS Trusts submitted data on 6,390 endovascular procedures (4,221 elective and 2,169 non-elective) performed in 2020. Overall activity was again lower than levels observed in 2019, with the reduction again being concentrated in the elective pathway (6,188 elective procedures and 2,548 non-elective).

VSGBI: PAD QIF

Patients admitted non-electively with chronic limb-threatening ischaemia should have a revascularisation procedure within five days.

Among the patients who had endovascular interventions during the 2019-20 audit period, there were 3,798 patients with chronic limb-threatening ischaemia admitted non-electively. Overall, 52% had their revascularisation within five days.

Outcomes after lower limb angioplasty / stents were good. In 2020, the in-hospital postoperative mortality rate was 0.8% for elective admissions and 4.9% for non-elective admissions. All but one NHS Trust had an adjusted rate of postoperative in-hospital death that fell within the expected range of the national average (1.8% for 3 years from 2018 to 2020).

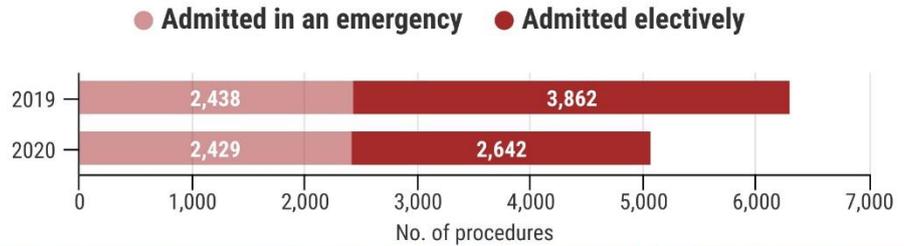
Lower limb bypass for peripheral arterial disease to prevent limb loss

Peripheral arterial disease (PAD) is a restriction of the blood flow in the lower limb arteries that can severely affect a patient's quality of life, and risk their limb.

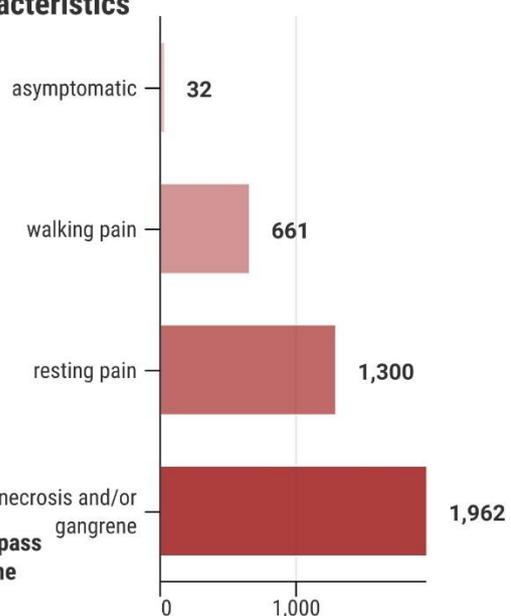
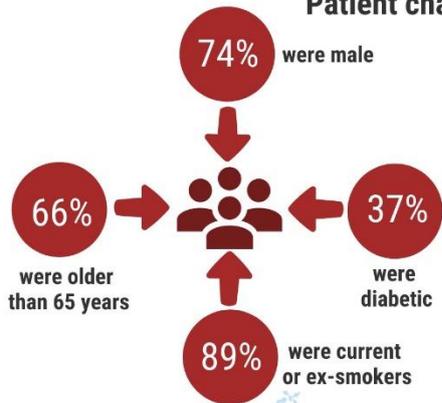
Open surgical (bypass) interventions become options when conservative therapies have proved to be ineffective.

Impact of COVID-19

There were 5,071 lower limb bypass procedures carried out in 2020, which is a 20% reduction on the 6,300 procedures in 2019.



Patient characteristics



53% of patients admitted with CLTI had their bypass within 5 days, which is the recommended time

However for 29/61 vascular units, 25% of patients waited more than 10 days

In the NVR data, CLTI is defined as patients admitted in an emergency with either resting pain or necrosis and/or gangrene.

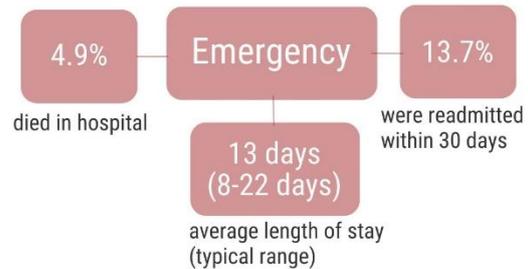
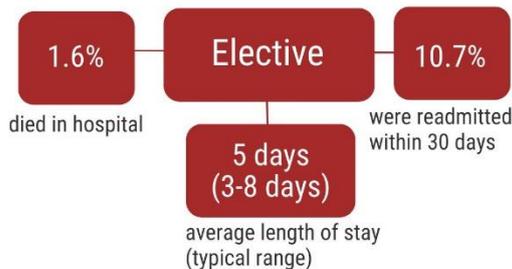


Glossary

The average is the median; "typical range" is the interquartile range.

Chronic limb-threatening ischaemia (CLTI) is the most severe form of PAD, where the blood flow to the legs becomes severely restricted.

Patient outcomes post bypass in 2020



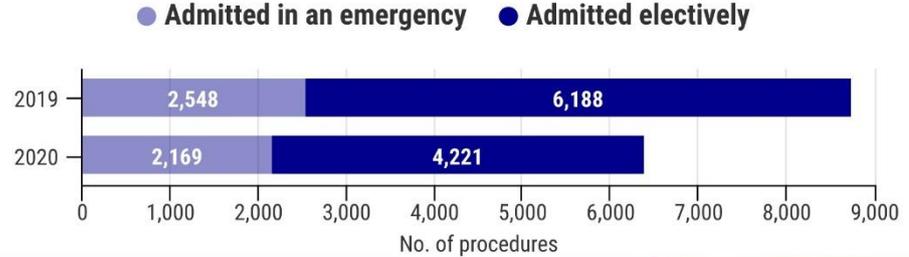
Lower limb angioplasty/stenting for peripheral arterial disease

Peripheral arterial disease (PAD) is a restriction of the blood flow in the lower limb arteries that can severely affect a patient's quality of life, and risk their limb.

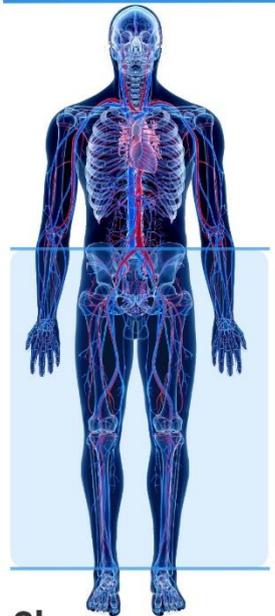
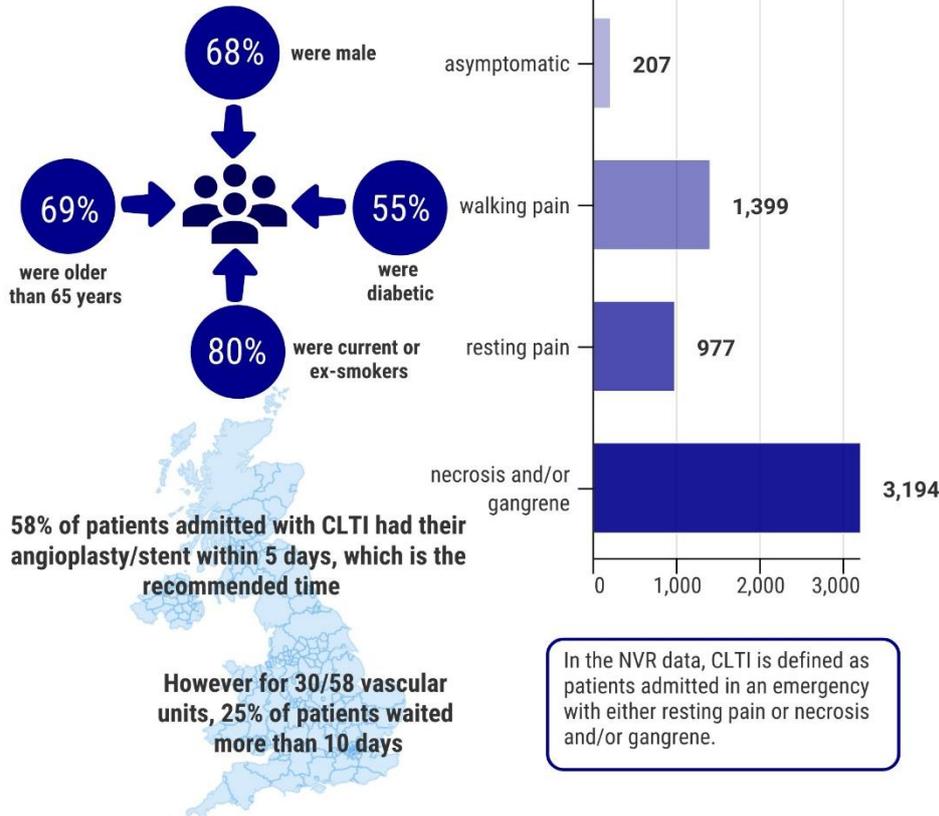
Endovascular interventions become options when conservative therapies have proved to be ineffective.

Impact of COVID-19

There were 6,390 lower limb angioplasty/stent procedures carried out in 2020, which is a 27% reduction on the 8,736 procedures in 2019.



Patient characteristics



Glossary

The average is the median; "typical range" is the interquartile range.

Chronic limb-threatening ischaemia (CLTI) is the most severe form of PAD, where the blood flow to the legs becomes severely restricted.

Patient outcomes post procedure in 2020



3) Major lower limb amputation

During 2020, the NVR received details of 3,169 major lower limb amputations. The majority of patients who had a major amputation were admitted non-electively (80% non-elective vs 20% elective).

The number of major amputations performed in 2020 were not significantly lower than 2019.

VSGBI: Amputation QIF

All patients undergoing elective major lower limb amputation should be admitted in a timely fashion.

The overall median time from vascular assessment to major lower limb amputation was 8 days (IQR: 3 to 25 days). The time differed for patients who had amputations as elective procedures (median=26 days; IQR: 8 to 73) compared with patients who had the procedure following a non-elective admission (median=8 days; IQR: 3 to 18). Among patients admitted non-electively, there were 9 NHS Trusts where a quarter of patients had a wait longer than 30 days.

VSGBI: Amputation QIF

Vascular units should aim to have an above knee amputation (AKA) to below knee amputation (BKA) ratio below one.

In 2020, there were 1,571 above knee and 1,598 below knee amputations, giving an overall AKA:BKA ratio of 0.98. Half of the NHS

Trusts had a ratio of less than one, but 12 organisations had a ratio above 1.5.

VSGBI Amputation QIF and NCEPOD Report

Major amputations should be undertaken on a planned operating list during normal working hours.

A consultant surgeon should operate or at least be present in the theatre to supervise a senior trainee (ST4 or above) undertaking the amputation.

NHS Trusts performance against the VSQBI Amputation QIF / NCEPOD process measures was reasonable overall, but requires improvement in several areas in which there was variation in performance across NHS vascular units. Overall, in 2020:

- over 85% of major amputations were performed during daytime hours (8am-6pm)
- a consultant surgeon was present in 75% of the procedures
- just over 65% of patients were reported to receive have prophylactic antibiotics and DVT medication, but this is likely to be an under-estimate.

The overall rate of 30-day in-hospital death for major lower limb amputations in 2020 was 7.0%, which was higher than in 2019 (6.4%). As expected, it was higher for AKA (9.3%) than BKA (4.8%). All NHS Trusts had an adjusted 30-day mortality rate that fell within the expected range of the overall 30-day in hospital mortality rate (6.1% for 3 years from 2018 to 2020).

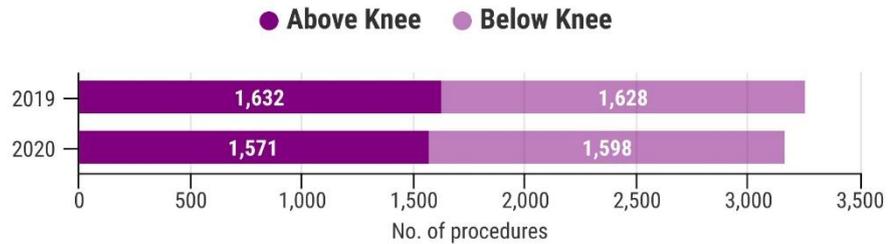
Lower limb major amputation for peripheral arterial disease

Peripheral arterial disease (PAD) is a restriction of the blood flow in the lower limb arteries that can severely affect a patient's quality of life, and risk their limb.

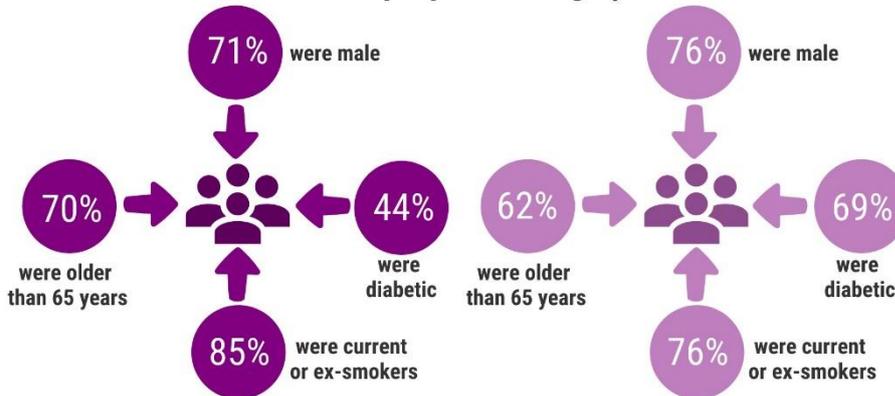
PAD can gradually progress in some patients and an operation to improve blood flow may no longer be possible. In these situations, people will require amputation of the lower limb. Additionally, patients without PAD but with a complication of diabetes may require a major amputation.

Impact of COVID-19

In 2020 there were 3,169 major lower limb amputations submitted to the NVR. This was only a slight reduction on the 3,260 procedures in 2019.



Which people had surgery?



Hospitals should aim to have an above knee amputation to below knee amputation ratio below 1. In 2020, the national ratio was 0.98, but it varied greatly across the country. 29 hospitals had a ratio above 1, and of these, 12 were above 1.5.



Glossary

The average is the median; "typical range" is the interquartile range.

Patient outcomes after surgery



Carotid endarterectomy

In 2020, a total of 2,991 carotid endarterectomies (CEAs) were entered onto the NVR.

The number of CEA has decreased markedly since 2011 when nearly 6,000 procedures were performed; there were 4,156 CEAs performed in 2019. The decrease in activity during 2020 was mainly due to the COVID-19 pandemic and the guidance published at the height of the first wave by the VSGBI which recommended best medical management for most symptomatic patients.

NICE guideline NG128

The delay from symptom to carotid surgery is recommended to be within 14 days to reduce the risk of patients developing a stroke.

Carotid endarterectomy aims to reduce the risk of stroke, and can be performed in patients who have recently experienced symptoms. It can also be performed in patients with no symptoms but whose carotid arteries are partially blocked, although this has become less common in the UK over recent years. Symptomatic patients made up 95.7% of the CEAs performed in 2020.

The median time from symptom to surgery for patients who had CEA in 2020 was 12 days and 62% were treated within 14 days. This is similar to the level of performance observed each year since 2017. There is still variation in the waiting time for CEA between NHS Trusts. The median delay exceeded 20 days at five NHS Trusts, although this is less than a quarter of the number in 2016. This is despite the pressures on activity during the COVID-19 pandemic.

Among the 2,991 patients undergoing carotid endarterectomy in 2020, complication rates during the hospital admission remained low:

- 2.6% of patients died and/or had a stroke within 30 days (95% CI 2.1-3.3)
- 1.7% of patients had a cranial nerve injury during their admission (95% CI 1.3-2.3).

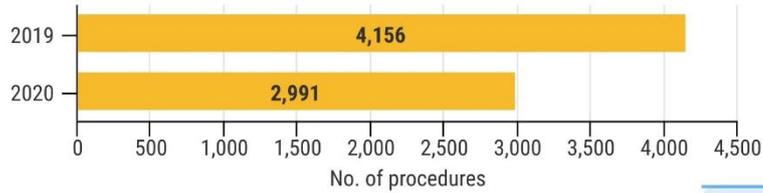
For procedures performed between 2018 and 2020, all but one NHS Trust had an adjusted 30-day mortality / stroke rate after surgery within the expected range of the national average (2.2%), given the number of procedures performed at that organisation.

Carotid artery surgery to prevent stroke

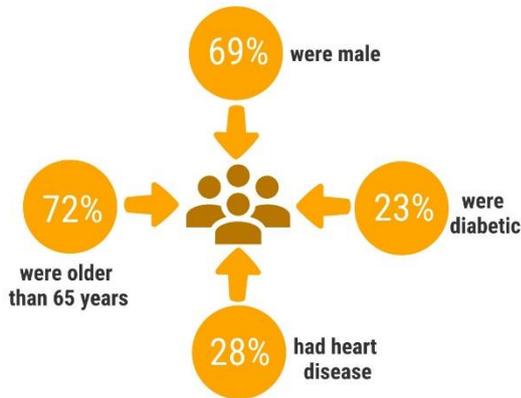
A procedure in which build-up of plaque is removed from the carotid artery in the neck is called a carotid endarterectomy (CEA).

Impact of COVID-19

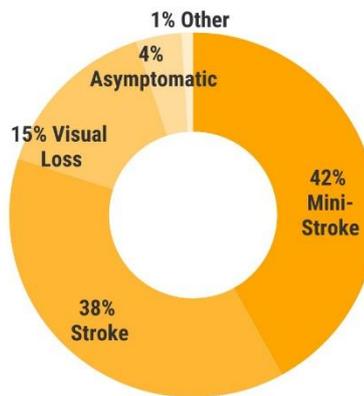
There were 2,991 CEAs submitted to the NVR in 2020, which is a 28% reduction of the 4,156 in 2019.



Which people had surgery?

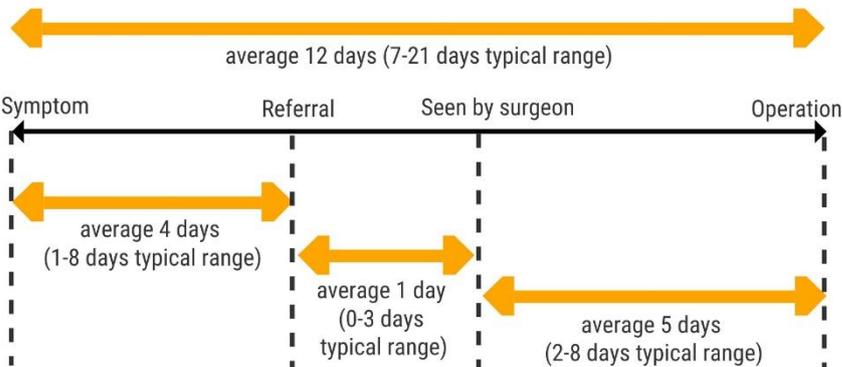


Reasons for surgery



Treatment times for symptomatic patients

Recommended time from symptom to surgery is within 14 days



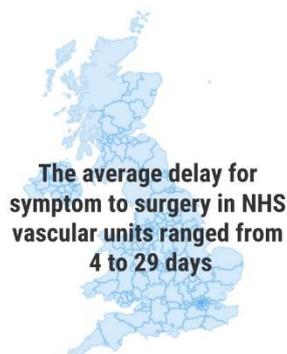
Glossary

A mini stroke, also known as a transient ischaemic attack (TIA), resolves completely within 24 hours.

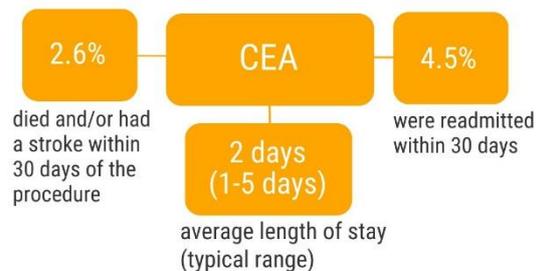
Visual loss (amaurosis fugax) is the loss of vision in one eye due to an interruption of blood flow to the retina.

The average is the median; "typical range" is the interquartile range.

A patient showing symptoms is known to be symptomatic.



Outcomes of surgery



Recommendations

Recommendation	Page(s)	Audience
1) Ensure that patients waiting for elective AAA repair who had their procedure postponed during the COVID-19 pandemic are prioritised with other time critical and life threatening conditions on NHS waiting lists.	Page 13 of main report	NHS Trusts and vascular specialists
2) Evaluate measures to increase access to endovascular repair of ruptured aneurysms in suitable patients (anatomically and physiologically). This may require: <ul style="list-style-type: none"> Improving network pathways for vascular surgery, working in collaboration with interventional radiology and anaesthesia 24/7 access to hybrid operating theatres developing teams with the required expertise to deliver in and out of hours care including nursing staff and radiographers addressing workforce for both vascular surgery and interventional radiology. 	Page 31 of main report	NHS Trusts, vascular specialists and commissioners
3) Ensure that patients with CLTI receive care as recommended in the VSGBI Quality Improvement Frameworks (QIF) for peripheral arterial disease and amputation , namely: <ul style="list-style-type: none"> patients admitted non-electively with CLTI have their revascularisation procedure within 5 days patients undergoing major amputation are admitted in a timely fashion to a recognised arterial centre with agreed protocols and timeframes for transfer from networked hospitals patients should have routine DVT and antibiotic prophylaxis according to local policy. 	Pages 36-41 of main report; Pages 50-54 of main report	NHS Trusts and vascular specialists
4) Ensure that data on implanted medical devices for all aortic repairs are entered on the NVR.	Page 21 of main report	NHS Trusts and vascular specialists
5) Commissioning of Vascular units to perform complex AAA repair should be conditional on the unit submitting data on all cases to the NVR so that the safety of the service can be monitored.	Page 22 of main report	NHS Trusts
6) Vascular units within a region should collaborate to ensure that the provision of complex AAA care meets recommended standards on access and safety.	Page 27 of main report	NHS Trusts
7) Improve completeness of data entry into the NVR on all lower limb revascularisation and major amputation procedures. This should include: <ol style="list-style-type: none"> provision of administrative support, with a network data manager, supporting vascular specialists to enter their data better recording of 'hybrid' procedures involving both open and endovascular techniques. 	Pages 32-33 of main report	NHS Trusts and vascular specialists
8) Consider studies to look at the management of patients with symptomatic carotid disease with appropriate consideration given to modern and aggressive medical management.	Pages 59-60 of main report	VSGBI and vascular specialists
9) Review whether the minimum recommended number of carotid procedures should be revised.	Page 59 of main report	VSGBI

Glossary

Abdominal Aortic Aneurysm (AAA)	This is an abnormal expansion of the aorta. If left untreated, it may enlarge and rupture causing fatal internal bleeding.
Angiography	Angiography is a type of imaging technique used to examine blood vessels. It may be carried out non-invasively using computerised tomography (CT) and magnetic resonance imaging (MRI).
Asymptomatic Patient	A patient who does not yet show any outward signs or symptoms of plaque.
Cardiopulmonary Exercise Testing (CPET)	Cardiopulmonary Exercise Testing is a non-invasive method of assessing the function of the heart and lungs at rest and during exercise.
Carotid Stenosis	Abnormal narrowing of the neck artery to the brain.
Complex AAA	A term used to describe aortic aneurysms that are not located below the arteries that branch off to the kidneys. These are categorised into three types: juxta-renal (that occur near the kidney arteries), supra-renal (that occur above the renal arteries) and thoraco-abdominal (more extensive aneurysms involving the thoracic and abdominal aorta).
Cranial Nerve Injury (CNI)	Damage to one of the 12 nerves supplying the head and neck.
Chronic Limb-Threatening Ischaemia (CLTI)	The most severe form of peripheral arterial disease, where the blood flow to the legs becomes severely restricted, to such an extent that these parts of the limb are at risk of developing gangrene. CLTI is associated with severe pain at rest, which is often worse at night, and there may also be ulcers on the leg and foot.
Confidence Interval (CI)	A statistical term used to describe the range of values that we are confident the metric lies within.
Endovascular Aneurysm Repair (EVAR)	A method of repairing an abdominal aortic aneurysm by placing a graft within the aneurysm from a small cut in the groin.
Index case	The first procedure a patient underwent in their hospital admission.
Infra-renal AAA	An abdominal aneurysm that is located below the point where the arteries branch off the aorta to the kidneys.
Interquartile range (IQR)	Once the data are arranged in ascending order, this is the central 50% of all values and is otherwise known as the 'middle fifty' or IQR.

Hybrid operating theatre	An operating theatre with built-in radiological imaging capabilities. The imaging equipment is able to move and rotate around a patient and multiple monitors provide good visibility around the operating table.
Median	The median is the middle value in the data set; 50% of the values are below this point and 50% are above this point.
National Abdominal Aortic Aneurysm Screening Programme (NAAASP)	A programme funded by the Department of Health to screen men over the age of 65 years for AAA.
Peripheral arterial disease (PAD)	Peripheral arterial disease (PAD) is a restriction of the blood flow in the lower-limb arteries. The disease can affect various sites in the legs, and produces symptoms that vary in their severity from pain in the legs during exercise to persistent ulcers or gangrene.
Plaque	Scale in an artery made of fat, cholesterol and other substances. This hard material builds up on the artery wall and can cause narrowing or blockage of an artery or a piece may break off causing a blockage in another part of the arterial circulation.
Revascularisation	The restoration of blood flow to a part of the body after the arteries have become clogged with cholesterol plaque. In context of the NVR, this will involve an open or endovascular procedure.
Stroke	A brain injury caused by a sudden interruption of blood flow with symptoms that last for more than 24 hours.
Symptomatic	A patient showing symptoms is known to be symptomatic.
Thrombotic occlusion	A formation of blood clot(s) inside a patient's blood vessels, resulting in an obstruction to the blood flow.
Trust or Health Board	A public sector corporation that contains a number of hospitals, clinics and health provisions. For example, there were 4 hospitals in the trust and 3 trusts in the region.
Vascular Society of Great Britain and Ireland (VSGBI)	The VSGBI is a registered charity founded to relieve sickness and to preserve, promote and protect the health of the public by advancing excellence and innovation in vascular health, through education, audit and research. The VSGBI represents and provides professional support for over 600 members and focuses on non-cardiac vascular disease.

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