



# NATIONAL VASCULAR REGISTRY

## 2022 Annual Report



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

## This report was prepared by

*Clinical Effectiveness Unit, The Royal College of Surgeons of England*

Mr Sam Waton, NVR Project Manager

Dr Amundeeep Johal, Senior Statistician

Ms Panagiota Birmipili, NVR Clinical Research Fellow

Dr Qiuju Li, Research Fellow in Medical Statistics

Ms Eleanor Atkins, NVR Clinical Research Fellow

Prof David Cromwell, CEU Director

*Vascular Society of Great Britain and Ireland (VSGBI)*

Mr Arun Pherwani, Consultant Vascular Surgeon

*British Society of Interventional Radiology (BSIR)*

Dr Robin Williams, Consultant Interventional Radiologist



**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 2022 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

## Commissioned by



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.

Registered charity no: 1127049

## **Please cite this report as:**

Waton S, Johal A, Birmipili P, Li Q, Atkins E, Cromwell DA, Williams R, Pherwani AD. *National Vascular Registry: 2022 Annual Report*. London: The Royal College of Surgeons of England, November 2022.

# Foreword

The 2022 National Vascular Registry Annual Report highlights the important outcome data for vascular procedures performed in the period between 2019 and 2021. For the majority of this period, vascular clinician's practice came under unprecedented pressure from the Covid-19 pandemic. It is of great credit to the vascular community that despite these pressures, case ascertainment rates in the NVR remain extremely high. Furthermore vascular surgeons and interventional radiologists have embraced the innovative changes introduced to the datasets aimed at gaining a greater understanding of variations in practice and patient outcomes and ultimately aimed at improving patient care.

The addition of Covid-19 variables to the datasets in early 2020 has enabled the NVR team to get a good understanding of the impact of the pandemic on patient pathways and outcomes. There is no doubt that the numbers of elective interventions for aortic aneurysms, intermittent claudication and symptomatic carotid disease have fallen in both 2020 and 2021, albeit with small rebound over the last year. It remains to be seen whether we will see any lasting change in practice.

The report has a focus on lower-limb interventions for peripheral arterial disease (PAD) and in particular the 5-day target for re-vascularisation for emergency admissions with critical lower limb threatening (CLTI). Overall 55% of these patients underwent lower limb bypass or angioplasty within 5-days of admission. However most encouragingly the "5-day revascularisation target" has been adopted into clinical practice in many centres, in response to both the PAD Quality Improvement Framework (PAD-QIF)

and the successful CQUIN application in England for 2022-2023. The NVR team has worked extremely hard on both these projects and I am sure they will lead to demonstrable patient benefits in the coming years.

The report also includes results from the recent organisational survey and of particular interest is the wide variation in support for data-entry onto the NVR in many Trusts and limited access to barcode scanning. The fact that 60% of aortic devices are being captured for a non-mandatory field reflects the fact that clinicians recognise the importance of collecting this data to drive improvements in the management of aortic aneurysms. I hope that those units with limited support for data collection may be able to use the report to drive local change.

The NVR team is working on a second Aortic devices report, which will provide important insights into re-interventions after both EVAR and open surgical repair. The NVR Team is also working closely with NHSEI/GIRFT on the Medical Device Safety Programme to share the expertise that has been developed over the last 5-years.

The NVR is recognised as one of the "Jewels in the Crown" of the NCAPOP programme, which reflects the excellent engagement and data collection of vascular clinicians across the UK and the fantastic team based at the Royal College of Surgeons. I have no doubt the team will continue to look beyond audit and innovate to benefit vascular patients in the years ahead.

**Mr Jon Boyle**  
***President of the Vascular Society of Great Britain and Ireland***

This is the summary report, and the supplementary document can be found on our website at:

<https://www.vsgip.org.uk/reports/2022-annual-report/>

This webpage also contains the NHS trust / health board level appendices and

organisational data viewer. The key metrics, especially those linked to recommendations in the report, can be explored 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.

## Organisational Audit

In 2022, an organisational audit of NHS vascular services was performed. A questionnaire was based on the NVR organisational audit undertaken in 2018 as well as recommendations in the Vascular Society of Great Britain and Ireland (VSGBI) "Provision of Vascular Services" document. Full responses were received from 67 of 68 UK arterial centres, and one response was not fully complete.

48 of the 68 responders (70.6%) report that they have the role of hub within a vascular network. Twelve vascular units (17.7%) stated that configuration is planned within the next two years, or are in the process of reconfiguration.

In terms of recommended levels of staffing and facilities:

- 56 units (83.6%) had 6 or more FTE consultant vascular surgeons,
- 27 (39.7%) had 6 or more FTE consultant interventional radiologists who do vascular work,
- 57 (83.8%) had  $\geq 2$  FTE vascular specialist nurses,
- 29 (39.7%) had access to a named healthcare of the elderly physician for review of vascular inpatients,

- 47 (69.1%) have  $\geq 3$  FTE vascular scientists.
- 44 units (64.7%) had data support staff for vascular surgeons, and 18 of 65 units (27.7%) for interventional radiologists for the NVR.

Multiple reasons for not being able to offer a 24/7 EVAR service for ruptured aortic aneurysms were provided by 17 units. They included:

- Lack of interventional radiology cover (15 units, 88.2%).
- Lack of radiology support staff, e.g. radiographer, IR nurse (9 units, 52.9%).
- Lack of facilities, e.g. hybrid theatre, IR suite (7 units, 41.2%).
- Lack of on shelf devices for EVAR (4 units, 23.5%).
- Lack of experience in the procedure from vascular surgery (3 units, 17.6%).
- Lack of experience in the procedure from interventional radiology (3 units, 17.6%).

Of the 67 vascular units who responded regarding thoracic endovascular aortic repair (TEVAR) procedures:

- 46 (68.7%) admit and manage uncomplicated Type B aortic dissection.
- 34 (50.7%) perform TEVAR for Type B aortic dissection.

## 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).

In 2021, vascular specialists were still responding to the challenges posed by the COVID-19 pandemic. A major contribution to helping vascular services deliver safe and effective care was the roll-out of the NHS COVID-19 vaccination programme. The ongoing recovery of elective and non-elective interventions for lower-limb peripheral arterial disease, as well as other major arterial conditions, will continue to depend upon ensuring the necessary precautions against COVID-19 are offered to staff and patients.

### 1) Lower limb bypass surgery

In 2021, NHS Trusts submitted 5,817 (3,149 elective and 2,668 non-elective) bypass procedures to the NVR. Among these patients, 82% 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 2021, 54% of patients with CLTI who were admitted non-electively had their bypass within five days.

Surgical outcomes for bypass procedures were good in 2021. The in-hospital

postoperative mortality rates were 1.3% for elective admissions and 4.8% for non-elective admissions. Over 75% of patients had no reported complications. A subsequent procedure after the initial operation was required in 9.0% of elective admissions and 20.1% 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 6,509 endovascular procedures (4,297 elective and 2,212 non-elective) performed in 2021.

#### 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 2021, there were 1,820 patients with chronic limb-threatening ischaemia admitted non-electively. Overall, 55% had their revascularisation within five days.

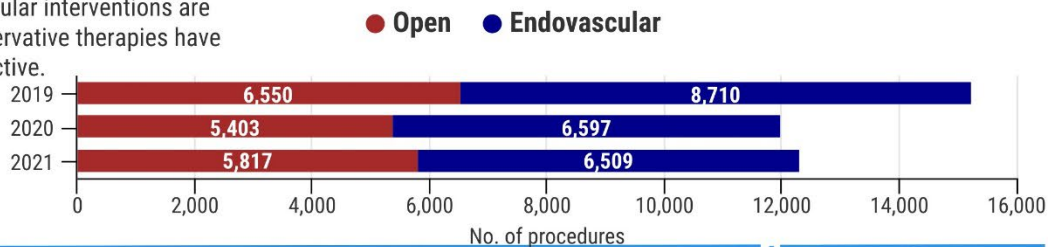
Outcomes after lower limb angioplasty / stents were good. In 2021, the in-hospital postoperative mortality rate was 0.6% for elective admissions and 4.1% for non-elective admissions. All NHS Trusts had an adjusted rate of postoperative in-hospital death that fell within the expected range of the national average (1.8% for 3 years from 2019 to 2021).



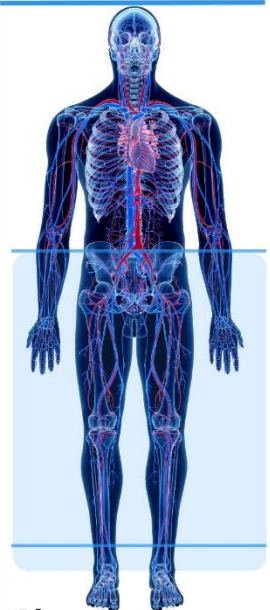
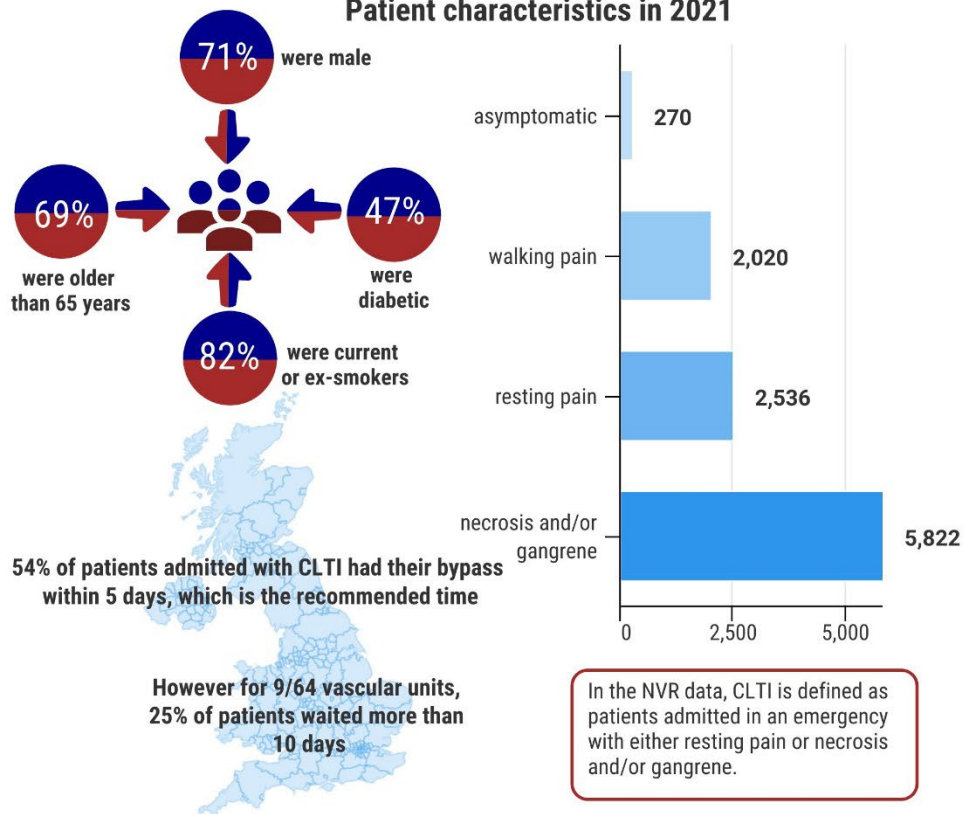
# Lower limb revascularisation for peripheral arterial disease to prevent limb loss

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 and endovascular interventions are options when conservative therapies have proved to be ineffective.



## Patient characteristics in 2021

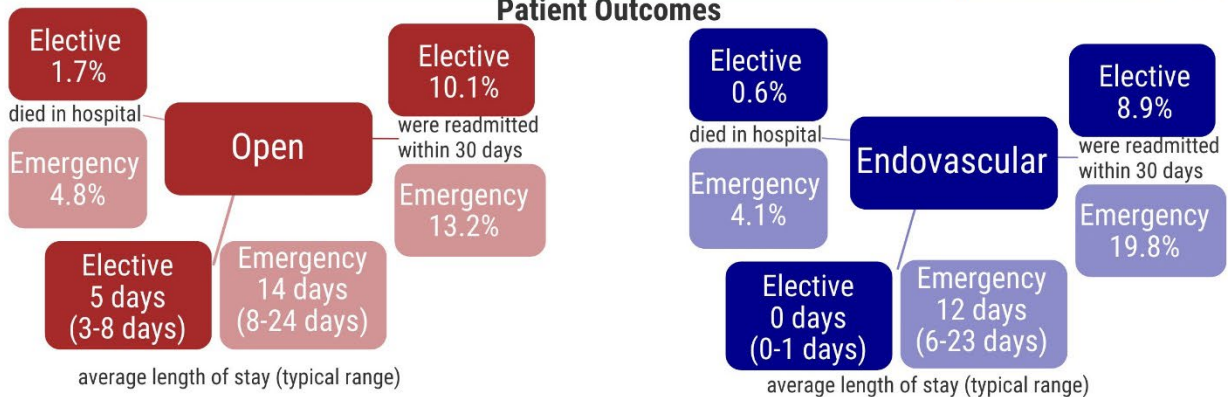


## Glossary

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



### 3) Major lower limb amputation

During 2021, the NVR received details of 3,068 major lower limb amputations. The majority of patients who had a major amputation were admitted non-electively (83% non-elective vs 17% elective).

#### **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 9 days (IQR: 3 to 26 days). The time differed for patients who had amputations as elective procedures (median=36 days; IQR: 13 to 111) compared with patients who had the procedure following a non-elective admission (median=7 days; IQR: 3 to 19). Among patients admitted non-electively, there were 8 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 2021, there were 1,536 above knee and 1,532 below knee amputations, giving an overall AKA:BKA ratio of 1.00. Just over half of the NHS Trusts had a ratio of less than one, but five organisations had a ratio above two.

#### **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.

These VSQBI Amputation QIF process measures reflect recommendations from the National Confidential Enquiry into Patient Outcome and Death (NCEPOD). NHS Trusts performance against the process measures was reasonable overall, but requires improvement in several areas in which there was variation in performance across NHS vascular units. Overall, in 2021:

- 87% of major amputations occurred during daytime hours (8am-6pm)
- a consultant surgeon was present in 72% of the procedures
- 83% of patients were reported to receive prophylactic antibiotics and 72% on DVT medication.

The overall rate of 30-day in-hospital death for major lower limb amputations in 2021 was 6.6%, which was lower than in 2020 (7.1%). As expected, it was higher for AKA (8.7%) than BKA (4.1%). 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 (6.6% for 3 years from 2019 to 2021).

The levels of post-operative respiratory complications and mortality in 2021 following a major amputation were lower than in 2020. They were back down to the pre-COVID-19 levels, indicating that the increases in 2020 could have been temporary.

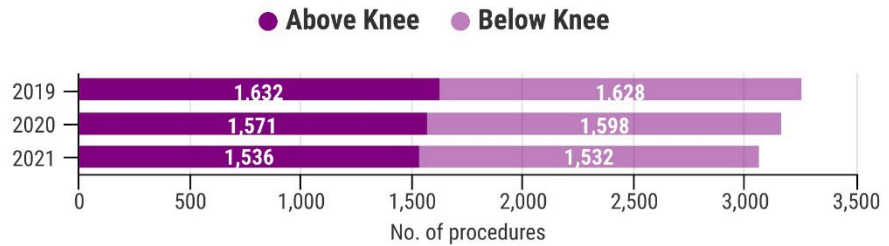
# Lower limb major amputation for peripheral arterial disease

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.

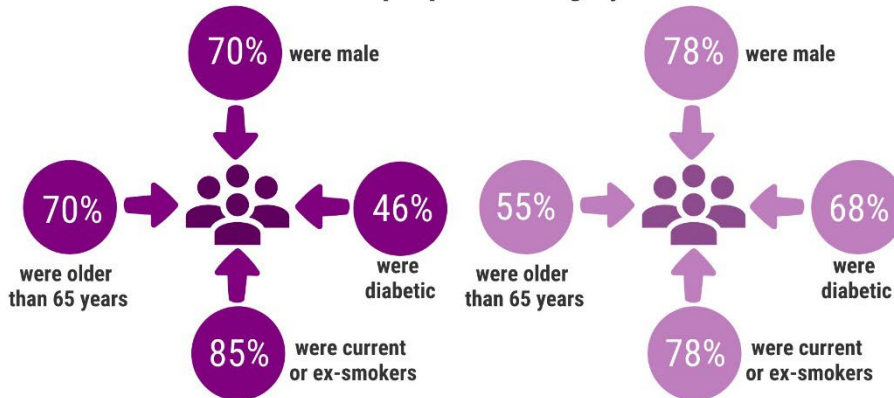
PAD can gradually progress in some patients and an operation to improve blood flow may no longer be possible. In these situations, people will require amputation of the lower limb. Additionally, patients without PAD but with a complication of diabetes may require a major amputation.

## Impact of COVID-19

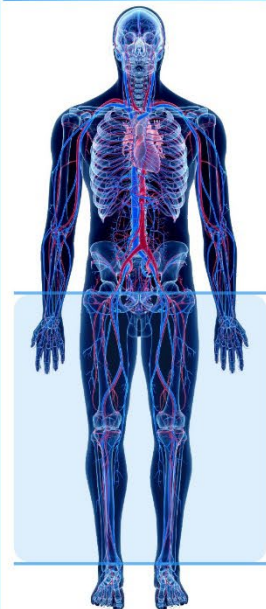
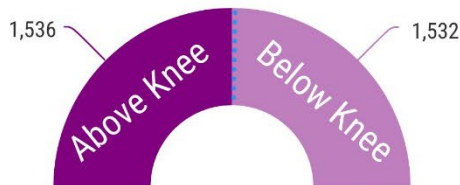
There has only been a slight reduction in the number of procedures submitted on the NVR from 2019 to 2021.



## Which people had surgery?



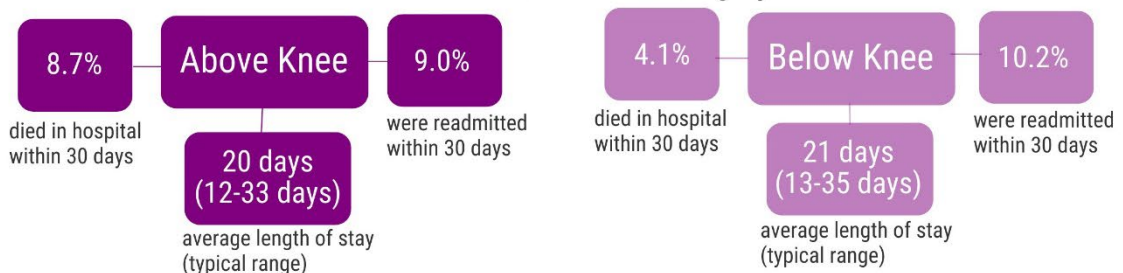
Hospitals should aim to have an above knee amputation to below knee amputation ratio below 1. In 2021, the national ratio was 1.00, but it varied greatly across the country. 29 hospitals had a ratio above 1, and of these, 5 were above 2.



## Glossary

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

## Patient outcomes after surgery





## 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 2,744 patients with an elective infra-renal AAA repair in 2021, of which 59% were endovascular repair (EVAR) and 41% were open repair. The number of elective infra-renal AAA repairs being performed decreased from 3,480 in 2019 to 2,328 in 2020 but increased again to 2,744 procedures recorded in 2021.

#### **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 2021, most patients treated in NHS vascular units received care consistent with the standards:

- 87% were discussed at MDT meetings
- 92% had preoperative CT/MR angiography
- 97% had a formal anaesthetic review
- 83% had documented formal fitness assessment tests.

The National AAA Screening Programme (NAAASP) recommends a target of 8 weeks from the date of referral from the NAAASP to the date of repair. The Screening Programme states that NHS trusts should meet this standard for 80% of patients.

Across the 62 NHS vascular units performing infra-renal AAA repair, the median delay from vascular assessment to AAA repair was typically between 50 and 160 days. However, at eight vascular units, a quarter of patients waited more than 220 days for their procedure in 2021.

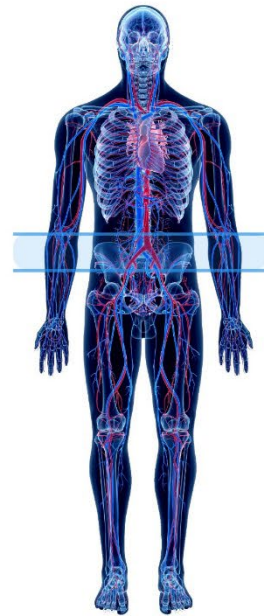
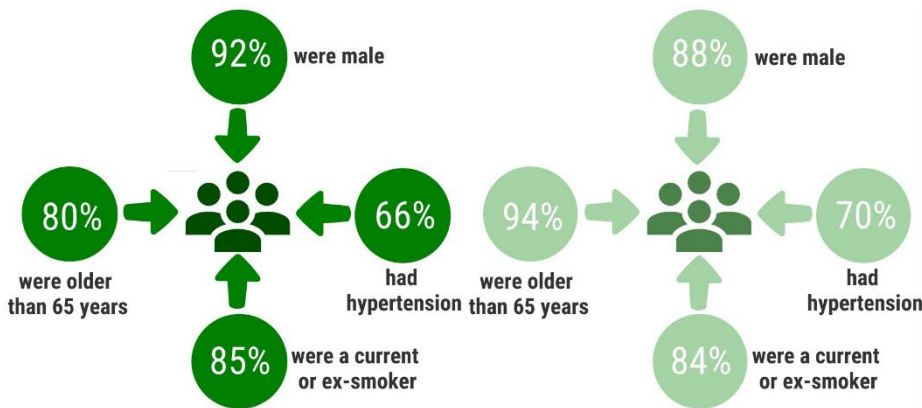
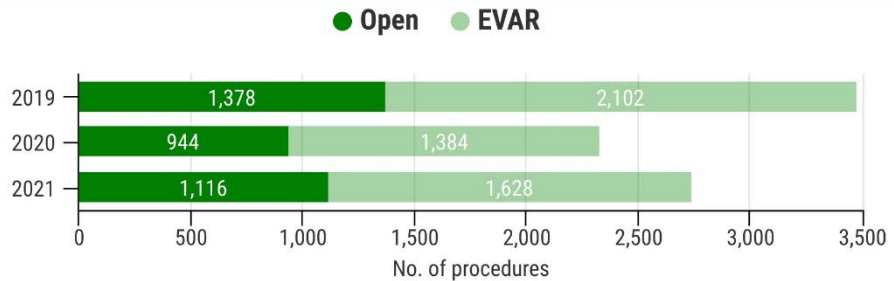
NHS vascular units achieved good patient outcomes after elective infra-renal AAA repair in 2021. The in-hospital postoperative mortality was 3.1% after open repair and 0.5% after EVAR. Over the 3-year period from January 2019 to December 2021, the risk-adjusted in-hospital mortality rates for all NHS vascular units were within the expected range of the national average (1.4% for 2019-21).

# Repair of abdominal aortic aneurysm (AAA) to prevent rupture

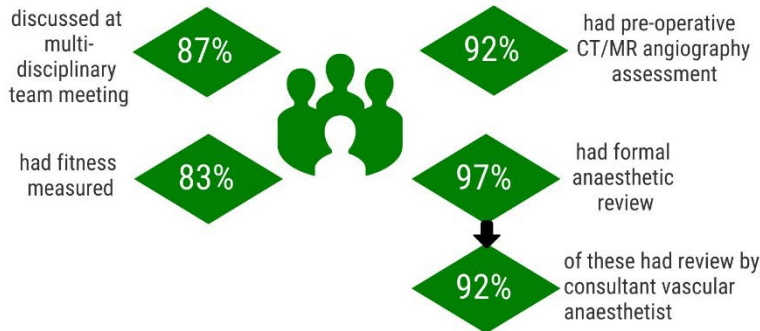
AAA is an abnormal expansion of the aorta (the largest vessel taking blood away from the heart). If left untreated, it may enlarge and rupture causing fatal internal bleeding. An infra-renal aneurysm occurs below the level of the renal (kidney) arteries within the aorta.

## Impact of COVID-19

There was an increase in procedures in 2021, but the numbers were still not back up to the pre-COVID-19 levels in 2019.



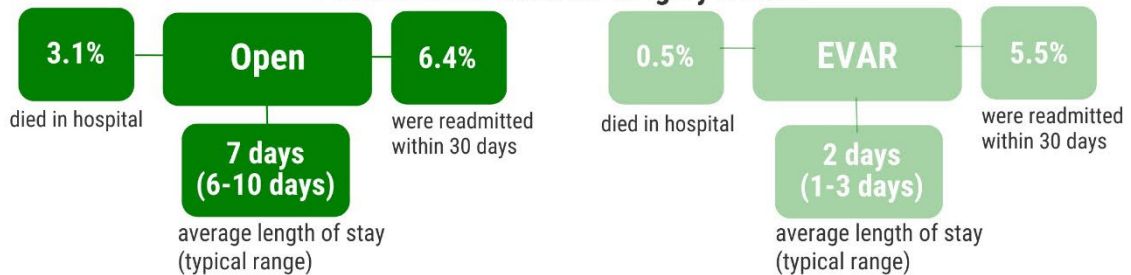
## How were patients assessed?



## Glossary

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

## Patient outcomes after surgery in 2021



## **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 63 active vascular units that reported complex AAA repairs to the NVR between 2019 and 2021. One unit performed 250 complex repairs between 2019 and 2021 but 34 units performed fewer than 20 procedures in the same period.

In 2019-2021, there were 2,123 procedures, of which 248 were open repairs. Among the 1,875 endovascular procedures, there were: 1,073 fenestrated repairs (FEVAR), 152 branched repairs (BEVAR) 393 thoracic repairs (TEVAR) and 211 iliac branched grafts.

Rates of postoperative mortality after complex endovascular repairs were lower than after complex open repairs. In 2019-2021, in-hospital postoperative mortality rates were:

- 2.6% for endovascular procedures, being 2.6% for FEVAR and 3.1% for TEVAR.
- 10.9% for open repairs.

There were a total of 274 repairs for aortic dissection in 2019-2021. The overall mortality rate was 9.5% (7.3% for elective admissions and 11.0% for non-elective admissions). These were submitted by 31 NHS trusts, with only four trusts submitting more than 20 procedures. An interactive map showing all UK hospitals performing TEVAR for type B aortic dissection can be found here:

<https://batchgeo.com/map/2fbd4c083be28e9885bbac91917bc1b>

## **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 1,690 cases from January 2019 to December 2021.

In the 2015 NVR Annual Report, open repairs constituted 78% of all procedures. Since then, the use of EVAR has increased over time; in 2021, about 40% of patients with ruptured AAA underwent EVAR.

The in-hospital postoperative mortality rates for EVAR and open repair were 20.7% and 44.2%, respectively, in 2019-2021. 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.

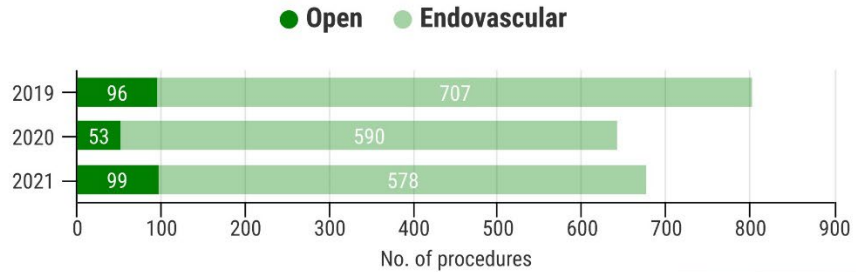
During the three-year period 2019-21, all NHS Trusts had in-hospital postoperative mortality rates within the expected range after repair for ruptured AAA, given the number of procedures performed at the vascular units. The overall national average for this period was 35.3%.

# Repair of elective complex aortic aneurysms to prevent rupture

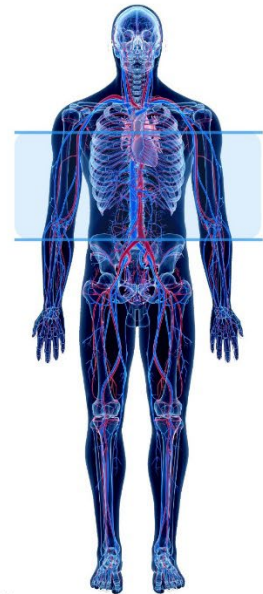
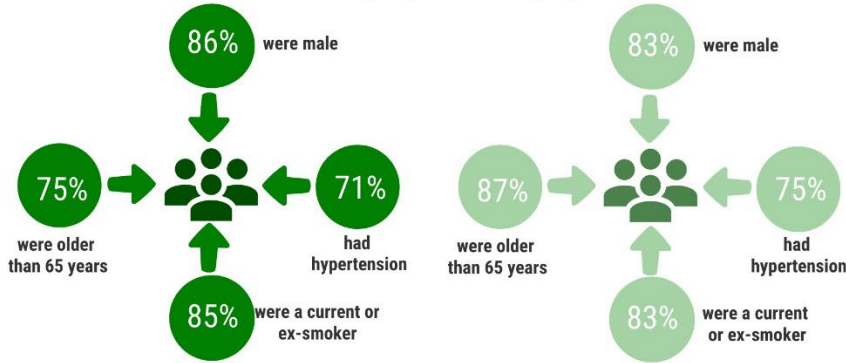
The term complex is used to describe those aneurysms that occur above the level of the renal (kidney) arteries. These are more complicated than the standard infra-renal repairs and require specialist teams, often within a specialist hospital.

## Impact of COVID-19

The numbers have fluctuated over recent years with 803 procedures in 2019, 643 in 2020 and 677 in 2021. This represented a reduction of around 16% between 2019 and 2021.



## Which people had surgery?



## Glossary

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

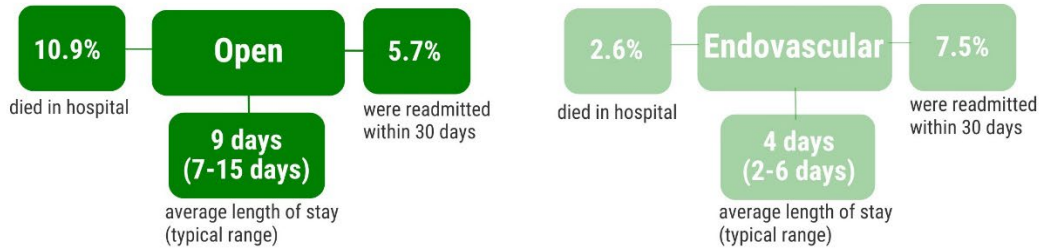
The most common complex endovascular procedures were:

**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 2019-21



## Carotid endarterectomy

In 2020, a total of 3,171 carotid endarterectomies (CEAs) were entered onto the NVR.

The number of CEAs has decreased markedly since 2011 when nearly 6,000 procedures were performed. Overall, there was around a 25% reduction in the number of CEAs carried out in 2020 and 2021 compared to 2019.

### **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 96% of the CEAs performed in 2021.

The median time from symptom to surgery for patients who had CEA in 2021 was 13 days and 58% were treated within 14 days. This is slightly worse than in 2020, when the median time was 12 days and 62% of patients were treated within 14 days. There is still variation in the waiting time for CEA between NHS Trusts. The median delay exceeded 20 days at four NHS Trusts, although this is a quarter of the number in 2016.

Among the 3,171 patients undergoing carotid endarterectomy in 2021, complication rates during the hospital admission remained low:

- 2.3% of patients died and/or had a stroke within 30 days (95% CI 1.8-2.9)
- 2.1% of patients had a cranial nerve injury during their admission (95% CI 1.7-2.7).

For procedures performed between 2019 and 2021, all NHS Trusts 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.

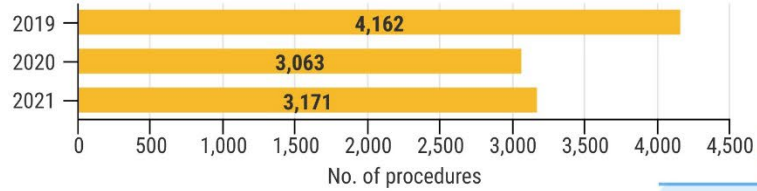


# Carotid artery surgery to prevent stroke

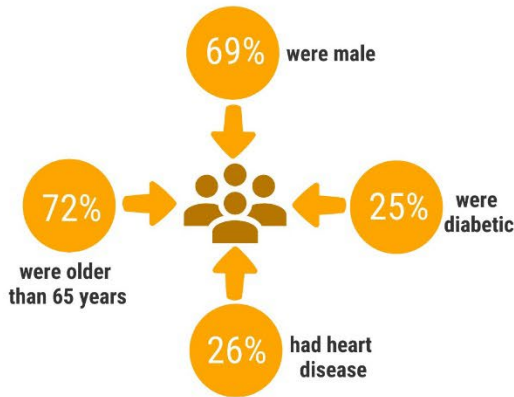
A procedure in which build-up of plaque is removed from the carotid artery in the neck is called a carotid endarterectomy (CEA).

## Impact of COVID-19

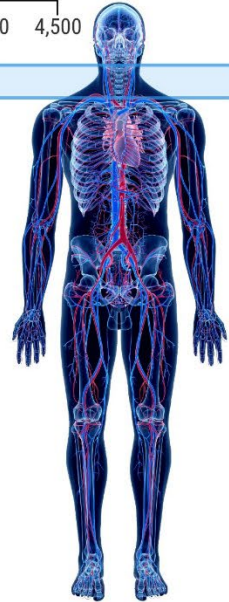
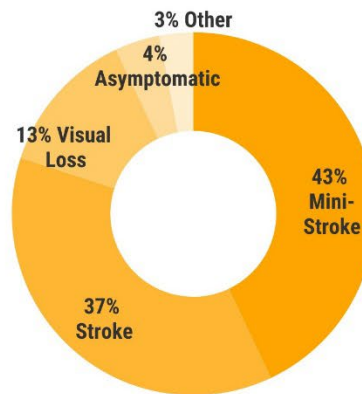
There was a large decrease in the number of CEAs carried out in 2020, compared to 2019. This number only slightly increased in 2021.



## Which people had surgery?

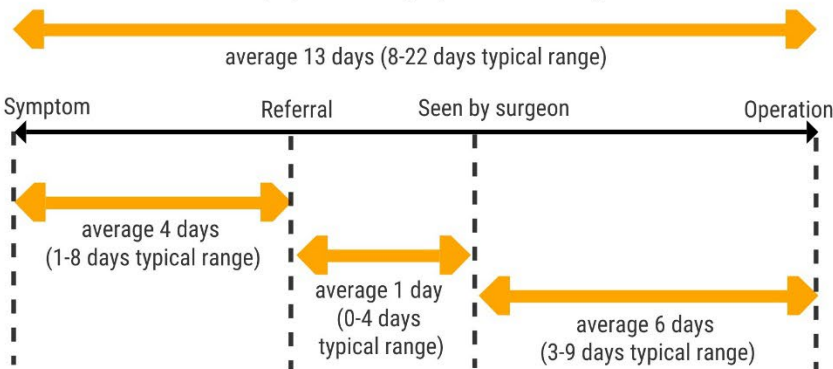


## Reasons for surgery



## Treatment times for symptomatic patients

Recommended time from symptom to surgery is within 14 days



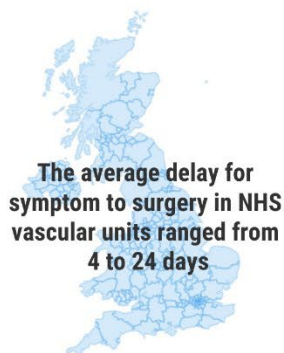
## Glossary

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

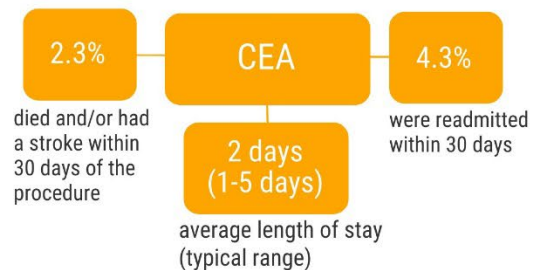
Visual loss (amaurosis fugax) is the loss of vision in one eye due to an interruption of blood flow to the retina.

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 pathways for patients with aortic aneurysms avoid undue delays for both standard and complex repair. Units should regularly aim to meet the recommended 8 week standard pathway for elective AAA repair	Page 9	NHS Trusts and vascular specialists
2) Evaluate whether the organisation of vascular services is consistent with the VSGBI 2022 “Provision of Vascular Services” document and the GIRFT 2018 Vascular Services report, with particular attention to: <ul style="list-style-type: none"> <li>• Improving network pathways for vascular surgery</li> <li>• Providing 24/7 access to hybrid operating theatres</li> <li>• Developing teams with the expertise to deliver in and out of hours care including nursing staff and radiographers</li> <li>• Levels of staffing in vascular surgery and interventional radiology.</li> </ul>	Page 4 (organisational audit)	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. Vascular units should: <ul style="list-style-type: none"> <li>• aim for 60% of patients to have a revascularisation procedure within 5 days, in keeping with the 2022-23 CQUIN</li> <li>• have access to (ring-fenced) urgent interventional radiology slots, potentially within a day case unit</li> <li>• provide access to a supervised exercise programme</li> <li>• have sufficient capacity on diabetic foot MDT ward rounds for inpatients and a diabetic foot MDT clinics for outpatients</li> </ul>	Page 5	NHS Trusts and vascular specialists
4) Ensure that patients who have major lower limb amputation receive care as recommended in the VSGBI Quality Improvement Framework (QIF). Vascular units should: <ol style="list-style-type: none"> <li>a. investigate the causes of long delays to surgery</li> <li>b. review levels of consultant presence in theatre</li> <li>c. ensure access to a specialist amputee rehabilitation team including psychological support and rehabilitation medical or AHP consultant.</li> </ol>	Page 7	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	Pages 11-12	Specialist commissioning
6) Ensure timely referral and expedited surgery for patients with symptomatic carotid disease with measures to reduce waiting times to carotid endarterectomy	Pages 13-14	NHS Trusts and vascular specialists
7) Continue to review the COVID-19 vaccine status of patients requiring vascular procedures and ensure the necessary precautions are offered	Page 3	Vascular specialists
8) Improve the completeness of data entered into the NVR by ensuring the provision of administrative support for vascular surgeons and interventional radiologists. NHS trusts should review levels of completeness in relation to: <ol style="list-style-type: none"> <li>a. Details of implanted medical devices</li> <li>b. ‘Hybrid’ lower limb revascularisation procedures</li> <li>c. Complex repair of aortic aneurysms and aortic dissection</li> <li>d. Frailty among patients aged 70 years or over undergoing AAA repair.</li> </ol>	Throughout	NHS Trusts and vascular specialists

# 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.

## **Copyright**

All rights reserved. Applications for the copyright owner's written permission to reproduce significant parts of this publication (including photocopying or storing it in any medium by electronic means and whether or not transiently or incidentally to some other use of this publication) should be addressed to the publisher. Brief extracts from this publication may be reproduced without the written permission of the copyright owner, provided that the source is fully acknowledged.

Copyright © Healthcare Quality Improvement Partnership, November 2022

The Royal College of Surgeons of England is dedicated to enabling surgeons achieve and maintain the highest standards of surgical practice and patient care. To achieve this, the College is committed to making information on surgical care accessible to the public, patients, health professionals, regulators and policy makers.

Registered charity number: 212808