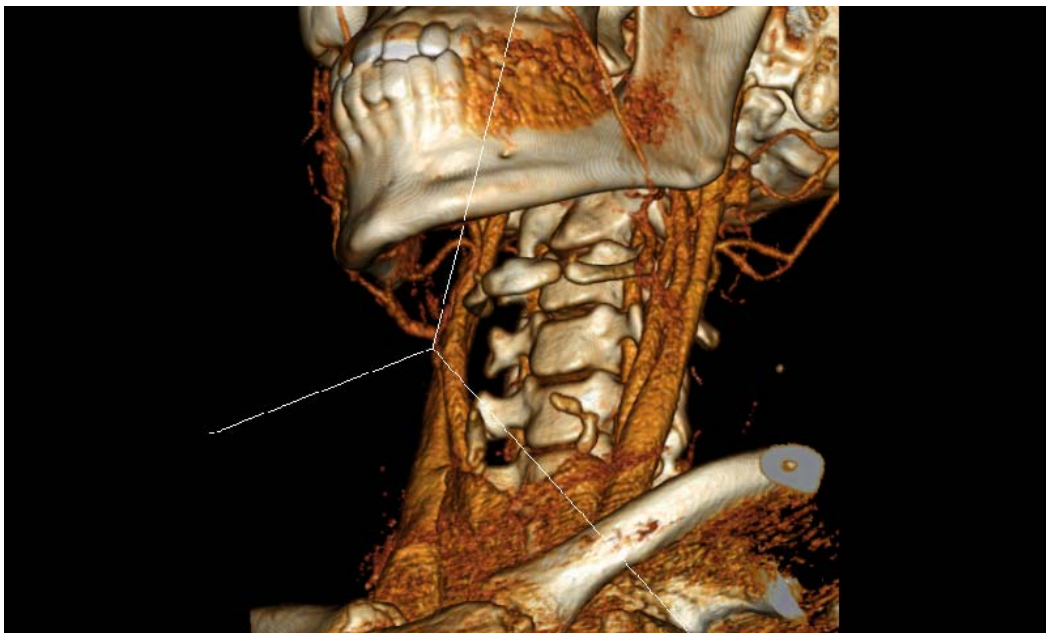




UK Audit of Vascular Surgical Services & Carotid Endarterectomy



July 2010 Public Report

Prepared on behalf of the Steering Group by
The Clinical Standards Department
Royal College of Physicians of London

UK Audit of Vascular Surgical Services & Carotid Endarterectomy

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Chapter 1: Overview

1.1 Executive Summary

This document reports findings from the UK Organisational Audit of Vascular Surgical Services 2009 and the results of the second round of the clinical UK Carotid Endarterectomy Audit. It was undertaken by the Clinical Standards Department of the Royal College of Physicians of London and the Vascular Society of Great Britain and Ireland.

Summary of the UK Organisational Audit of Vascular Surgical Services 2009

Aims

1. To evaluate the current structure of vascular services within the UK.
2. To enable benchmarking of the provision of vascular services regionally and nationally.
3. To provide those involved in the organisation of vascular services with a national benchmark.
4. To identify areas of vascular service which would benefit from further evaluation and guidance.
5. To provide baseline data for a quality improvement programme in vascular surgery.
6. To stimulate improvement in the provision of vascular services.

Data was collected by paper questionnaire sent to all 125 eligible trusts. An 87% response rate was achieved.

Key findings

- At trust level, there were discrepancies between data self-reported to the audit and HES.
- A significant number of trusts undertook fewer than the recommended minimum number of complex cases each year.
- Over 80% of trusts had the recommended products for managing abdominal aortic aneurysm.
- 82% of trusts reported they perform endovascular aneurysm repair in a sterile environment.
- 78% of trusts reported that they were part of a vascular network, but there was a lack of clarity about what this involved. 53% reported the network had some audit or governance function.

Training provided	National %
Trust provides training in vascular surgery	92
- Training in vascular interventional radiology for their surgical trainees	55
- Vascular surgical training for radiology trainees	8

- 98% of trusts have multi-disciplinary team meetings to discuss the appropriateness of surgical intervention but only 8% involve an anaesthetist regularly.
- 87% of trusts reported cancellation of elective vascular surgery within the last 12 months due to a lack of critical care beds. An estimated median of 6 cases per trust were cancelled.
- 86% of trusts admit patients to wards with experienced vascular nurses providing care

On-call rota	National %
24/7 vascular surgical on-call rota	81%
24/7 interventional radiology on-call rota	23%

Recommendations

Remuneration

- Where there was a large difference between the number of cases self-reported to the audit, than within national agency records (HES), trusts should examine their coding systems to assess the accuracy of their coding of these procedures.
- Trusts undertaking fewer than the minimum number of recommended cases per annum should link with adjacent trusts to increase workload to a safe level by centralising complex surgical procedures.
- Vascular services should form networks with adjacent units for local/regional governance and audit.

Facilities

- Vascular teams should not undertake open Abdominal Aortic Aneurysm repair without rapid access to cell salvage, infusers for fluid including blood and available blood products and haemostatic agents within one hour. Trusts without these facilities should seek to provide them or develop protocols for the transfer of patients to adjacent units with such facilities.
- Access to an emergency theatre should be considered essential for all vascular units.

Risk management

- Trusts should perform Endovascular Aneurysm Repair in a sterile environment.
- To minimise the risk of cross-infection, patients who have undergone arterial surgery should not be nursed adjacent to those with open, infected wounds or stomas.

Networks

- The requirements for 24 hour vascular cover, provision of surgical and endovascular training and sufficient throughput of major cases should stimulate low volume centres to join other vascular centres, either by formal network arrangements or centralisation.

Training

- All vascular trainees should undergo at least one year of formal endovascular training.
- Vascular trainees should be provided with better access to training in endovascular techniques in order to meet future patient demand.

Specialist Staffing

- As vascular surgery develops into a separate speciality, services should be re-configured to provide 24 hour access to both surgical and endovascular interventions.
- Vascular units should include assessment by an anaesthetist with experience in elective vascular anaesthesia as a formal part of pre-operative assessment and be staffed with anaesthetists with specialist vascular skills for emergency cases.
- Vascular patients should be nursed by teams with expertise in providing vascular care.

Patient feedback

- All vascular units should regularly seek patient views on the range of vascular services.

Summary of Clinical UK Carotid Endarterectomy Audit (Round 2)

Data were returned by 93% of eligible surgeons, reporting 70% (6970/10,022) of cases reported in HES in the same time period (1st January 2008 to 30th September 2009).

Aims

1. To assess the current speed of delivery of CEA in the UK.
2. To assess variations in access and quality of care for patients needing CEA.
3. To assess 30-day mortality and complications rates following CEA.
4. To stimulate improvements over time in the quality of care provided to patients of CEA.

Key Findings

Denominator	Number of cases
All patients	6983
All symptomatic patients	5828
All patients with 30 day survival data	6151
All cases where a follow up appointment was conducted	5503

Symptom	National %
Amaurosis fugax or TIA	65
Stroke	33
None of the above	4

- The median number of days from symptom to surgery 28 (IQR 12-64)
- The median number of days from symptom to referral was 8 (IQR 3-26)
- The median number of days from referral to operation was 19 (IQR 7-47)

When delay between symptom and surgery was more than 14 days, the main causes of delay included delay in referral (40%), lack of staff or operating time (18.2%), delay in patient presentation (18%) and operation cancellation as unfit or patient choice (15%), amongst others.

The rate of complication at 3 days was	National %
Stroke and death	1.8
Myocardial infarct	0.7
Bleeding post-operatively	2.7
Cranial nerve injury	2.5

Clinical key indicators are presented for individual trusts and regionally in tabular form within the report.

Recommendations

- While data reporting has improved, rates of data capture to national audits needs to improve further. Commissioners should require this from all vascular units.
- While there has been a reduction in delay from symptoms to treatment, there is significant room for improvement. Many patients are not being treated within the timeframe set by NICE or the National Stroke Strategy.
- Significant delay occurs between symptom and presentation. Better public awareness of TIA and stroke is needed.
- Delays in referral or due to lack of operating staff and facilities need to be addressed by trusts.
- The reported complication rates are much lower than those reported from clinical trials, it is recommended that all patients undergoing Carotid Endarterectomy should have both surgical and stroke physician/neurologist follow up.

1.2 History

Carotid Endarterectomy (CEA) is an operation performed in order to prevent stroke. It is carried out on people with narrowing of the neck arteries to remove a diseased area of the main blood vessel supplying the brain. Removing this diseased area helps to prevent small particles breaking off and passing up into the brain, one of the major causes of stroke. To maximise benefit, CEA should be performed as soon as possible after the patient experiences relevant symptoms, for example facial or arm weakness, speech problems, or loss or blurring of vision.

In 2008, the first CEA clinical audit report was published. It outlined unacceptable delays between patients experiencing their symptom and undergoing surgery. These delays were

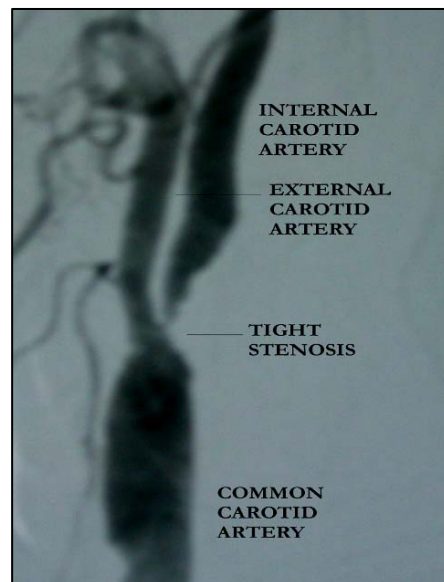
attributed to the organisation of the services involved and also a lack of public awareness. It was therefore anticipated that the 2008 report would help to improve the national provision of CEA.

In the UK, CEAs are almost exclusively carried out by vascular surgeons. Vascular surgery is currently undergoing a period of major change. It has historically formed a subspecialty of general surgery, with vascular surgeons undertaking both general surgery and vascular work. Recent rapid advances in technology have driven changes in the treatment of vascular disease and it is now possible to treat conditions which have previously been considered too high risk for intervention.

As a result, it has been necessary for vascular surgeons to become more specialised and to form partnerships with different specialties to provide the best treatment for patients.

An independent vascular specialty has emerged but regions are at very different stages of development. The organisational audit was planned to assess the organisation of services related to CEA for patients at risk of stroke or Transient Ischaemic Attack (TIA). At the same time, however, the Vascular Society was planning a quality improvement programme that required information about other organisational aspects of vascular services, and some vascular services were reorganising to fulfil the requirements for participation in the NHS Abdominal Aortic Aneurysm Screening Programme.

The remit of the audit was therefore expanded to examine all aspects of the organisation of vascular surgical services, not just those confined to carotid intervention.



DIGITAL SUBTRACTION ANGIOGRAPHY

Many of the issues which affect the delivery of a timely carotid service are common to other vascular interventions.

This report therefore presents the results of two audits:

1. The **organisational audit** entitled UK Organisational Audit of Vascular Surgical Services 2009. This questionnaire collected data on the volume of procedures, facilities, networks and staffing to provide a snapshot of vascular surgical services.
2. The **clinical audit** entitled the UK Carotid Endarterectomy Audit (Round 2). This is based on the reports by surgeons of the process of care for a sample of patients in the relevant timeframe who have surgery. It includes details of how long it takes to receive CEA once a patient has experienced a symptom and it reports on any complications after surgery or at follow up. This section includes a key indicator table which may be used to compare trust level provision of CEA.

1.3 Evidence Base

The evidence used for setting audit questions is derived from six main documents:

1. Stroke: The diagnosis and acute management of stroke and transient ischaemic attacks by the National Institute for Health and Clinical Excellence (NICE) <http://www.nice.org.uk/Guidance/CG68>
2. National Stroke Strategy http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_081062
3. Quality Improvement Framework (QIF) http://www.vascularsociety.org.uk/library/quality-improvement/doc_download/52-summary-document-framework-for-improving-the-results-of-elective-aaa-repair.html
4. Vascular Society of Great Britain and Ireland (VSGBI) Quality Improvement Program (QIP) – The VSBGI, through the Health Foundation Closing the Gap Scheme, are hosting a programme of audit and change with the aim of quality improvement and reducing mortality associated with aortic aneurysm surgery <http://www.aaqip.com>
5. Provision of Vascular Services (POVS) http://www.vascularsociety.org.uk/library/vascular-society-publications/doc_download/65-revised-
6. National Confidential Enquiry into Patient Outcome and Death (NCEPOD) <http://www.ncepod.org.uk/>

1.4 Funding

We would like to thank the Healthcare Quality Improvement Partnership (HQIP) for central funding for this project and the Vascular Society of Great Britain and Ireland (VSGBI) who contributed to the funding of the Clinical Audit web-based data collection tool. We would like to thank the Stroke Association and the Northern Ireland Chest Heart and Stroke Association who funded the preliminary work.

1.5 Project Team

The audit is supported by a multidisciplinary Steering Group comprising professional organisations and patients, as outlined below:

- Mrs Sara Baker, Associate Director of the National Vascular Database, Royal Bournemouth Hospital
- Mr Peter Barker, Patient Representative, Weymouth
- Professor Alison Halliday, Professor of Vascular Surgery, St George's University of London
- Mr Tim Hartshorne, Chief Vascular Technician, Leicester Royal Infirmary
- Professor Mike Horrocks, Professor of Vascular Surgery, Royal United Hospital
- Ms Helen Laing, Healthcare Quality Improvement Partnership Contracts & Commissioning Manager
- Dr Sumaira Macdonald, Consultant Vascular Radiologist, Freeman Hospital
- Professor Ross Naylor, Professor of Vascular Surgery, Leicester Royal Infirmary
- Mr William Nicklin, Patient Representative, Nuneaton
- Professor John Potter, Professor of Ageing & Stroke Medicine, University of East Anglia
- Dr Iain Robertson, Consultant Interventional Radiologist, North Glasgow Interventional Unit
- Professor Peter Rothwell, Professor of Neurology, Radcliffe Infirmary
- Dr Mark Stoneham, Consultant Anaesthetist, John Radcliffe Hospital

Day to day management of the audits (including running the helpdesk, analysis and reporting of results) takes place within the Clinical Standards Department of the Royal College of Physicians of London (RCP). The RCP vision is to improve patient care by the setting, monitoring and implementation of clinical standards.



The organisational audit is a collaborative piece of work which also has the support of the Department of Health and the NHS Abdominal Aortic Aneurysm Screening Programme. The clinical audit data submission (web-based) is via the Vascular Society of Great Britain and Ireland's National Vascular Database.

Chapter 2: UK ORGANISATIONAL AUDIT OF VASCULAR SURGICAL SERVICES 2009

2.1 Organisational Introduction

2.1.2 Overview

The organisational audit was designed to build a picture of vascular surgical services within the UK during a period of major change. There was a specific emphasis on the availability of procedures, facilities and staff. This allowed calculation of the number of key facilities for vascular services within each trust and health board. It is hoped that these data provide a snapshot of vascular surgical services which trusts can build and improve upon.

2.1.2 Aims

The aims of this organisational audit were:

1. To evaluate the current structure of vascular services within the UK
2. To enable trusts and health boards to benchmark the provision of vascular services regionally and nationally
3. To provide those involved in the organisation of vascular services with a national benchmark
4. To identify areas of vascular service which would benefit from further evaluation and guidance
5. To provide baseline data for a quality improvement programme in vascular surgery
6. To stimulate improvement in the provision of vascular services

2.2 Organisational Methods

2.2.1 Data Collection

- The organisational audit questionnaire was designed by the Steering Group and piloted prior to national data collection.
- The final questionnaire is shown in **Appendix 1** and covers key aspects of vascular service provision.
- Topics comprise volume of vascular procedures, surgical and hospital facilities, networks, staffing and patient involvement.
- A paper copy of the questionnaire was sent to an identified lead at every trust and health board undertaking vascular surgery within the UK.
- This was then completed and returned by post or fax to the Royal College of Physicians where the data were entered into an SPSS database.
- Data were submitted between 21st December 2009 and 1st February 2010.
- Great care was taken to ensure accuracy. This includes returning the data electronically to the trusts and health boards for validation prior to the preparation of this report.

2.2.2 Presentation of results

- Results are presented in this report as the percentage of trusts answering in a given way.
- Numerical data are presented as the median, because this is the middle point of the data set with 50% of the values above and below, and inter-quartile range (IQR).
- Missing data are reflected by variation in the denominators.
- For clarity of presentation, the terms trust or trusts is used generically to describe trusts and health boards.
- A full glossary is presented in **Appendix 2**.

2.3 Organisational Results

2.3.1 Participation

The Organisational Audit was sent to all 125 eligible trusts across England, Wales, Scotland and Northern Ireland and 109 (87%) of these were completed and returned by the deadline.

2.3.2 Index procedures

This audit collected data on five vascular procedures. These were:

1. **Infrainguinal Bypass Surgery:** The surgical bypass of a blocked or narrowed artery in the leg.
2. **Leg Amputation:** The surgical removal of the leg at/above/below the knee.
3. **Carotid Endarterectomy (CEA):** The surgical removal of material from the inside of the neck artery in order to prevent a stroke.
4. **Carotid Stent:** The non-surgical unblocking of the neck artery in order to prevent stroke.
5. **Abdominal Aortic Aneurysm (AAA) Repair:** The surgical repair of a ballooned or ruptured section of the artery near the kidneys.



CAROTID ARTERY IN THE NECK

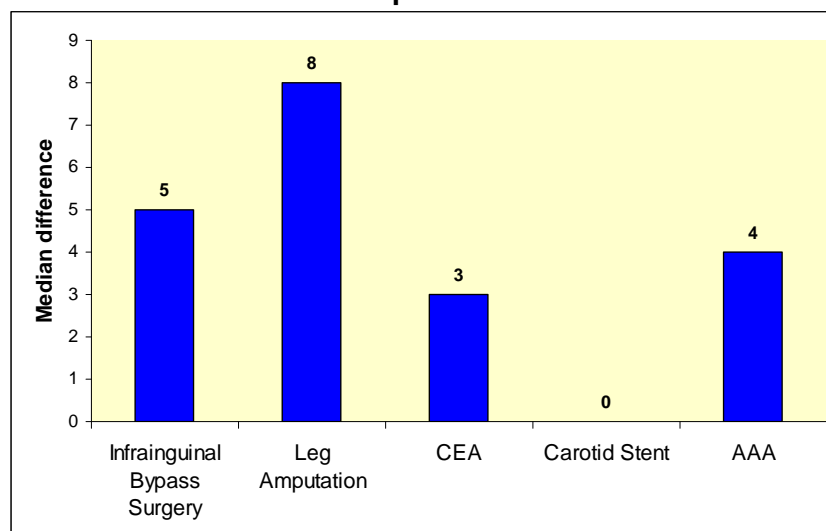
All trusts submit basic details on admissions and procedures to a national agency which is known as Hospital Episode Statistics (HES) in England.

Trusts were asked to self-report the number of these five vascular procedures performed at their trust in 2008 according to their own records. These figures were then compared to the number of cases submitted to the national agencies for the same period.

Discrepancy between the number of vascular procedures reportedly performed and the number submitted to the national agency could indicate that trusts were not receiving appropriate remuneration on these vascular procedures. For example, if a trusts own records stated they operated on 25 cases but HES report 30, the discrepancy is 5 cases overpaid to the trust.

The median size of the difference between number of cases recorded by the national agencies and self-reported from the trusts own records is shown in the figure below.

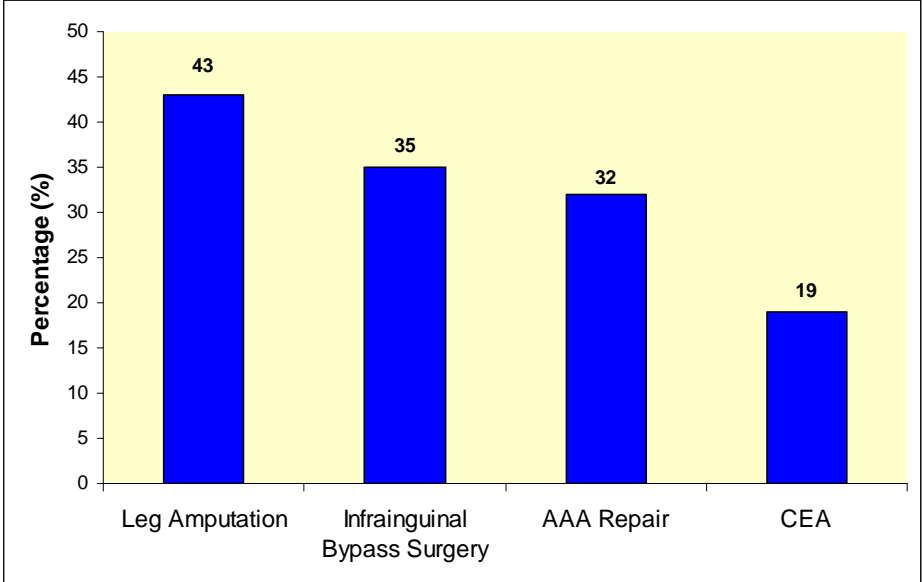
Figure 1: Median size of the difference between the number of cases recorded by the national agencies and the number self-reported to the audit



The median number was used to report the size of the difference because it presents a general picture of the data. Whilst there are many trusts where the two sources were very close, there were others where the size of the difference for just one procedure was as large as 128.

It is felt that a difference of 10 or more cases may represent a significant discrepancy and thus Figure 2 lays out the percentage of trusts falling within this category for each procedure.

Figure 2: Percentage of trusts with a discrepancy of 10 of more cases between the number self-reported to the audit and submitted to HES, by procedure type



It is important to prevent risk of inappropriate allocation of resources by accurately recording and reporting each type of vascular procedure which is performed.



PRE-CAROTID STENT
POST CAROTID STENT
VISIBLE BY DIGITAL SUBSTRACTION ANGIOGRAM

Far less carotid stents are performed than the other procedures listed thus discrepancies are necessarily smaller, however:

- 23/97 trusts had some difference in the number of carotid stenting cases between the number self-reported to the audit and submitted to the national agencies (HES).

There is variation in the agreement between the national agencies (HES) and self-reported data throughout the UK, with CEA generally demonstrating the closest agreement at trust level. For Infrainguinal Bypass Operations, there is a trend towards higher rates reported to the audit whilst the reverse is true for leg amputation and aortic aneurysm repair. These discrepancies are important; if self-reported data is inaccurate, the audit data will not reflect a true picture of vascular practice; if HES data is inaccurate, trusts may not be receiving appropriate remuneration. It is also important that trusts know accurately how many of each type of vascular procedure is routinely performed in order to plan and allocate the facilities and resources that these require.

Endovascular aneurysm repair for infrarenal Abdominal Aortic Aneurysm

Endovascular Aneurysm Repair (EVAR) is a surgical operation commonly used to treat Abdominal Aortic Aneurysm (AAA).

AAA is a ballooned or ruptured section of the artery near the kidneys.

79% (85/108) of trusts reported they were able to provide Endovascular Aneurysm Repair (EVAR) for infrarenal Abdominal Aortic Aneurysm (AAA).

The VSGBI in conjunction with several other allied Societies produced a Quality Improvement Framework (QIF) for improving the results of AAA repair in May 2009. This recommended that open AAA repair should be undertaken with access to cell salvage, rapid infuser for infusion of fluid including blood, rapid access to blood products and access to haemostatic agents.



ABDOMINAL AORTIC ANEURYSM

For the purposes of this report, these are defined as:

Cell salvage: A method for collecting blood lost during/after an operation to be given back to the patient.

Rapid infuser: A machine required for the safe and rapid delivery of intravenous (IV) fluids to patients.

Rapid access to blood products: When surgeons have access to blood and blood products within one hour whilst in theatre.

Haemostatic agents: A substance used to stop bleeding.

Table 1: Percentage of trusts who reported recommended products were available in theatre for Abdominal Aortic Aneurysm repair

Which of the following do you have available in theatre for Abdominal Aortic Aneurysm repair?	
Cell salvage	88%
Rapid infuser	81%
Rapid access to blood products (within 1hr)	97%
Haemostatic agents incl. glue	89%

Table 1 lists the percentage of trusts which reported they had the facilities recommended by the QIF. Vascular teams without these facilities should engage actively with their service managers to provide them or develop clear protocols for transfer of patients to adjacent trusts who do have these facilities.

The QIF recommends that EVAR should only be undertaken in a sterile environment. It is good that 82% of trusts report that they perform EVAR in a sterile environment. Patient safety is compromised, however, in the 18% of trusts who report they are routinely performing EVAR in a non-sterile environment. These trusts should review their implementation of this policy.

2.3.3 Vascular Networks

There is benefit to working jointly across a wider geographical area than a trust to produce a critical mass, disseminate good practice and share expertise. The audit asked about the presence and nature of these 'networks' which are relatively recent for vascular services.

78% of trusts indicated that they were part of a Vascular Network. These were defined by category as in Table 2.

Table 2: Network type for those trusts which had a network

Type of network	Trusts %
Formal Network*	59%
Informal Network	34%
Both Formal and Informal	7%

* Definition of a formal network: Has a formally appointed Lead/Chair and holds regular formal meetings, with clear geographical boundaries.

There are a few established networks of trusts working together with appointed chairs, regular formal meetings and clear geographical boundaries.

These are in a minority, however, and although 78% (85/109) of trusts reported they were part of a network the nature of these networks and their function was very varied. Network meetings varied both in respect of the staff who attend them and their frequency. There was also overlap in the boundaries between some networks and in some instances there was confusion surrounding which network a particular trust belonged to.

It appears that currently most networks exist for the purpose of providing a satisfactory on-call arrangement for vascular surgery between hospitals. There is evidence that the networks have started to provide other functions as 53% (43/81) of trusts reported that their function included audit and governance for elective surgery and 21% (17/80) reported dealing with organisational aspects of the provision of vascular services.

It is unlikely that there can be a “one size fits all” solution to vascular networks but, in light of the wide variation of configurations in place currently, it may be helpful to produce some basic guidance for the development of a vascular network which trusts could use to adapt to their own needs. This will be examined further as part of the Quality Improvement Programme of the VSGBI.

2.3.4 Vascular Staffing

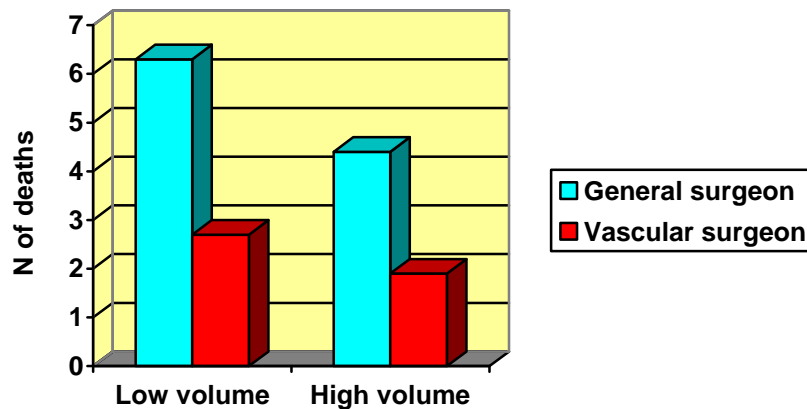
It was reported that:

- 3% (3/108) of trusts have only one vascular surgeon.
- 22% (24/108) have only two vascular surgeons.
- 47% (51/108) have three or less vascular surgeons.

Whilst these trusts may have network arrangements with other trusts there may be benefits to be gained by the amalgamation of smaller units (Hill et al., 2008).

There is evidence emerging that high centre volume is related to positive outcomes for a wide variety of surgical procedures (Killeen et al., 2007; Nazaria et al., 2008). Reducing the number of centres undertaking complex surgical procedures is associated with better outcomes (Young et al., 2007). This effect is almost certainly related to having a team with high skill levels developed through frequent repetition of complex tasks.

Figure 3: In-hospital mortality following AAA repair in high and low volume hospitals
(adapted from Dimick et al., 2003)



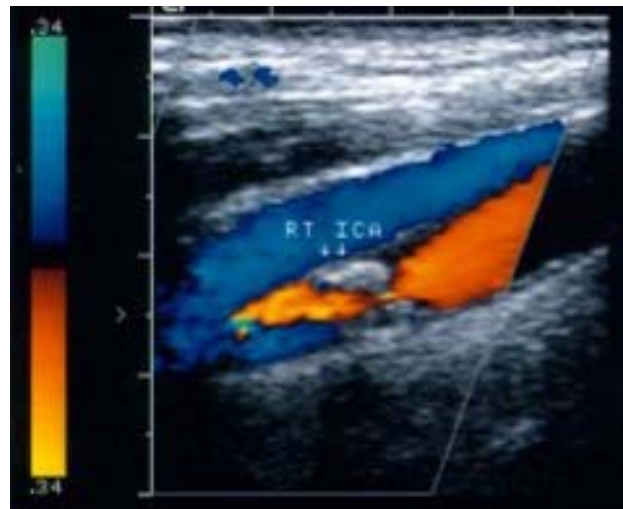
A formal rota ensures continuous availability of vascular surgical specialists able to undertake complex vascular procedures. Formal rotas are one method of ensuring that these specialists are readily available as necessary for patients.

The audit demonstrated that:

- A small number of trusts with surgeons who spent less than 50% of their time doing vascular surgery were doing very small numbers of complex operations such as CEA.
- 39% of Vascular Specialist Registrars (SpRs) spent 75% or more and 17% spent less than half of their time in vascular service related work.

Interventional Radiology

Radiology uses scans and images to diagnose and treat disease. Interventional Radiology is a subspecialty which utilises imaging to guide an instrument through the body to treat disease. This is known as endovascular intervention. As it is minimally invasive, interventional radiology and endovascular intervention is more and more frequently being used in the management of vascular disease.



The audit found that 23% of trusts had a formal interventional radiology on call rota. These rotas are required due to the increasing use of endovascular intervention for the management of vascular disease.

Either interventionalists were providing 24 hour cover without being on a formal rota or there was no cover being provided in the other trusts.

Consideration should be given as to how a 24 hour formal endovascular intervention service can be developed in the future.

Vascular Anaesthetist

The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) provides critical examination, by senior specialists, of what has actually happened to patients in the event of death. It covers everything from individual clinical practice to national healthcare organisation, always with the aim of improving patient care and safety.

The NCEPOD report of 2005 identified that 61% of emergency patients were cared for by anaesthetists who performed five or fewer emergency aneurysm repairs and it is perhaps surprising therefore that there are not more vascular anaesthetist rotas.

The audit found that only 3/106 (3%) trusts had a formal vascular anaesthetist on-call rota. This may reflect the fact that some anaesthetists were able to manage high-risk patients within multiple different surgical specialties.

Trusts should ensure that anaesthetists treating emergency vascular patients are experienced in anaesthesia for elective vascular surgery.

2.3.5 Emergency Theatre

The recommendation of NCEPOD is that there should be a designated emergency vascular theatre. 97% (104/107) of trusts indicated that they have some access to a designated emergency theatre, for example in working hours.

Conversely, 3% of vascular units in this study still do not have any access to an emergency theatre and 6% have no access during the day. Given the urgent nature of vascular surgery, with up to 40% of vascular patients presenting as emergency or urgent cases (POVS), access to an emergency theatre should be considered essential for all vascular units.

2.3.6 Vascular Training

92% of trusts reported that they provided vascular training. The audit looked into the provision of vascular training and the results are outlined in Table 3.

Table 3: Which of the following training is provided by your trust?

Type of training	Trusts %
Surgical trainees in vascular interventional radiology	55%
Radiological trainees in vascular surgery	8%
Radiological trainees in vascular interventional radiology	75%

Only just over half of the 98 trusts which provided training were able to offer surgical trainees training in vascular interventional radiology (Table 3).

Most appointments to the level of consultant vascular surgeon are currently being advertised with a requirement to undertake endovascular treatments. Unless these (55%) trusts are providing all the endovascular training, which seems unlikely, there is currently a gap in the training requirements of vascular surgical trainees which needs to be addressed.

It has been noted that many trainees are going abroad towards the end of their formal training in order to obtain the necessary endovascular training.

Similarly, as the specialities of vascular surgery and vascular interventional radiology merge interventional radiology trainees will increasingly need skills in at least basic vascular surgery. At the current time, only 18% of trusts are providing this training.

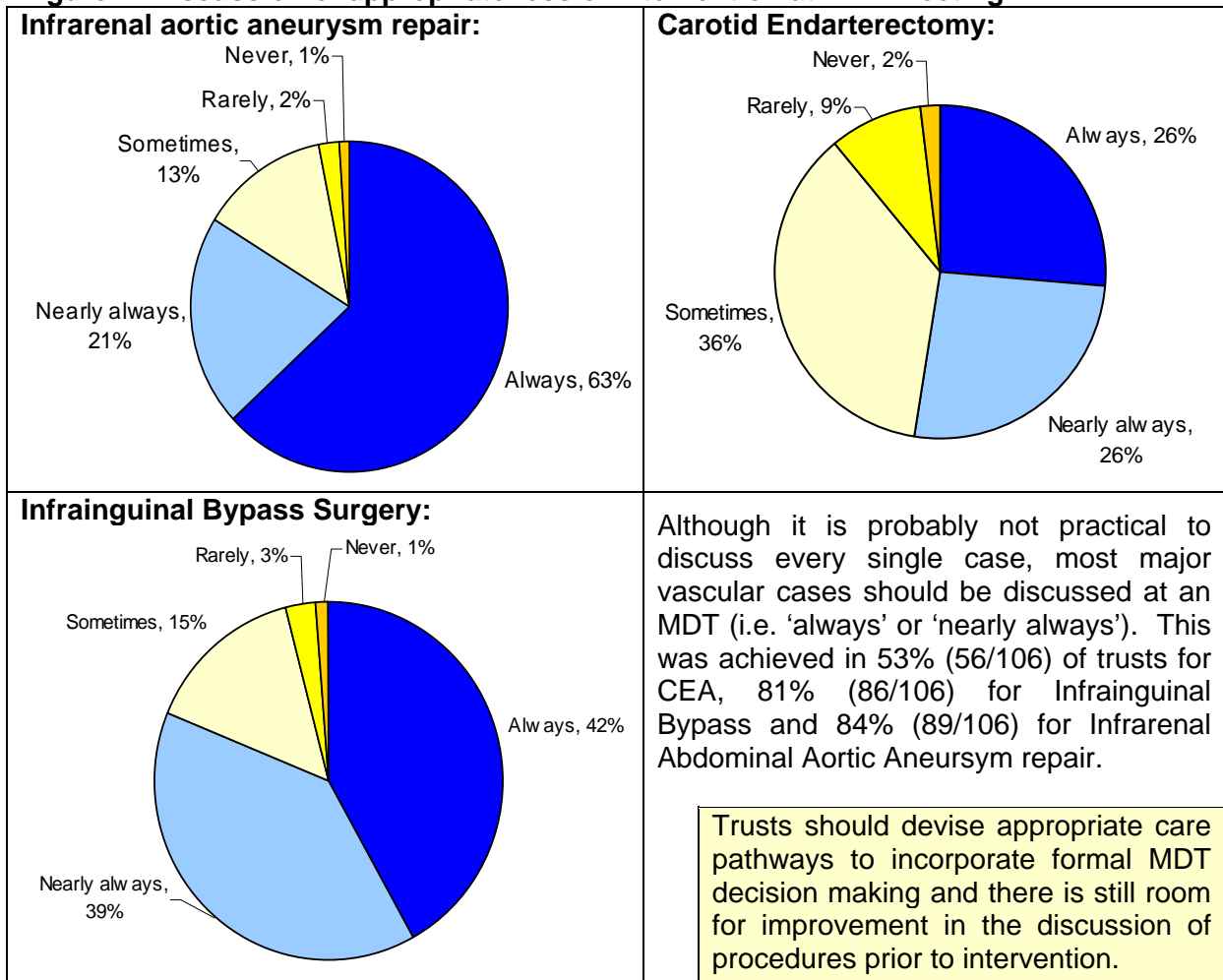
2.3.7 Multidisciplinary Team Meetings

Multidisciplinary Team (MDT) meetings are important to trusts as they facilitate discussion of appropriateness of intervention for elective operations and allow anaesthetists to be involved in the decisions to treat patients and in their pre-operative care.

The audit found that 98% of trusts reported that they have dedicated vascular MDT meetings but only 8% of these trusts reported that an anaesthetist regularly attends these meetings.

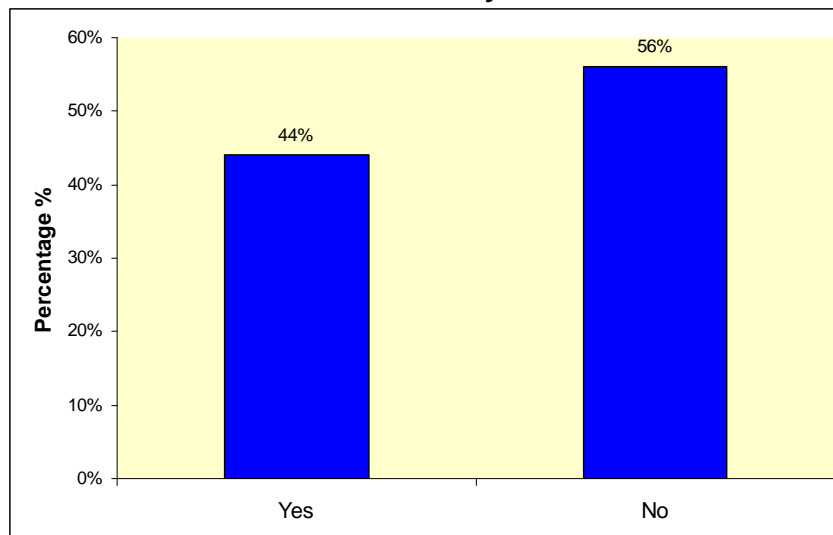
Anaesthetists have a central role within the team and should be involved in decisions to treat and in pre-operative patient care. Increased involvement of anaesthetists in vascular MDT meetings should be encouraged within trusts.

Figure 4: Discussion of appropriateness of intervention at MDT meeting



2.3.8 In-patient Stay

Figure 5: Are there dedicated vascular beds at your trust?

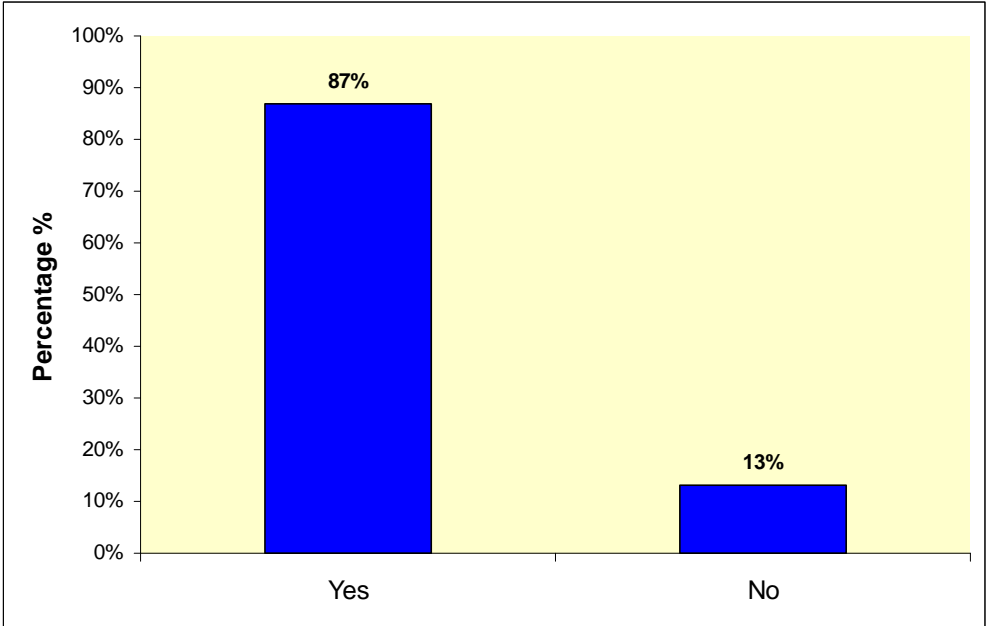


Fewer than half the trusts had dedicated vascular beds and most of those who did not, shared the beds in particular with general surgery patients. Given the serious nature of prosthetic graft infection in vascular patients (Zetrenne et al., 2007) and the current concern regarding MRSA infection (Murphy et al., 2001) patients should receive their care in an environment dedicated to vascular surgical patients.



MRSA BACTERIA

Figure 6: Were any elective vascular cases cancelled in the last 12 months due to lack of a critical care bed at your trust?



Trusts should consider providing dedicated space for the care of vascular surgery patients.

87% of trusts reported that they had cancelled some elective vascular surgery cases in the last 12 months due to lack of a critical care bed. A median of 6 cases per trust were cancelled amongst this 87% (IQR 4-12), however, the majority of these figures were reported to be estimates rather than exact numbers. Although an estimate, this equates to more than 800 cases per year nationally. This significant waste of resource may represent a cost to the NHS of several million pounds.



Vascular operations in patients requiring critical care are usually long and complex, taking up at least a half a day if not longer. Cancelling these patients not only causes significant stress for the patient but wastes an operating list.

Cancellation of vascular surgery cases in almost all trusts is concerning and a closer examination of delays and the consequences of postponement should be encouraged in each trust.

2.3.9 Patient Feedback

Trusts were asked whether they sought patient views on vascular services. 64% (68/107) of trusts reported that they did and these trusts were then asked about which aspects of the service they sought views on.

Table 4: Which of the following aspects of the service are patient views sought on?

Aspects of service	Trusts %
Varicose veins (PROMs*)	80% 52/65
Varicose veins (not PROMs*)	25% 16/65
Other vascular procedures	31% 20/65

*Definition of PROMs: Patient Reported Outcome Measures

Sixty-four percent of trusts sought patient views on vascular services but it is clear that the majority specifically asked about Patient Reported Outcome Measures (PROMs) which are compulsory. 36% did not collect patient views on vascular services and 20% of those that did, did not collate PROMs. 31% of trusts who sought patient views, did so only for patients undergoing non-venous vascular surgery.

There is room for considerable improvement in this area and the VSGBI Quality Improvement Program (QIP) will examine this area further. Further work needs to be done to develop validated questionnaires on assess patient views of arterial surgery.

It is recommended that all vascular units should regularly seek patient views on the range of vascular services.

2.3.10 Characteristics of Specialist Vascular Units

The Provision Of Vascular Service (POVS) sets out the principles for high quality vascular services.

Looking at some of the elements in the POVS, in conjunction with key aspects identified in this audit, five key characteristics of a specialist vascular unit were identified as in Table 5.

Table 5: Key characteristics of a specialist vascular unit

Characteristic	Audit questions that identify characteristics of a specialist vascular unit	National number and percentage of trusts with this facility % (N)
1	Nursing staff experienced in looking after vascular surgery patients or dedicated beds (Q7.3 and Q7.3c)	86% (92/107)
2	Access to at least one Intensive Therapy Unit and one High Dependency Unit bed (Q7.6)	94% (102/109)
3	24/7 vascular on-call rota to deal with emergency procedures (Q3.9)	81% (87/107)
4	24/7 vascular radiology on-call rota to deal with urgent vascular interventional procedures (Q3.14)	23% (25/107)
5	The opportunity to obtain training in vascular interventional radiology (Q3.16 and Q3.16a)	68% (73/107)

It is concerning that 14% (15/107) of trusts report that their vascular surgery patients were not admitted onto a ward with nursing staff that had vascular expertise. Vascular patients can be very sick with multiple comorbidities and frequently require critical care. Although most trusts can provide this care, it is concerning that a small number of trusts performing vascular surgery cannot provide this level of care.

DIGITAL SUBTRACTION ANGIOGRAPHY



As endovascular treatments become the preferred treatment for many vascular conditions it is of concern that there is an apparent unmet requirement for endovascular training and a lack of 24 hour cover for vascular interventional radiology with a formal rota in only 23% of trusts.

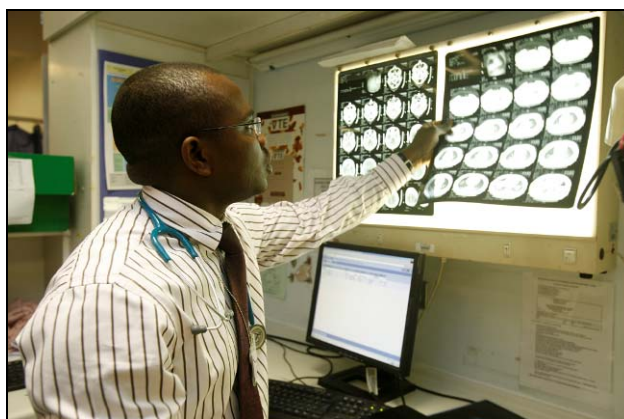
Table 6 outlines how many of the key characteristics each trust reported that they had across the UK.

Table 6: How many of the key characteristics of a specialist vascular unit are present within the trusts in the UK

How many key characteristics are present?	National % (N)
0/5	0.01% (1/109)
1/5	0.03% (3/109)
2/5	17% (18/109)
3/5	27% (29/109)
4/5	34% (37/109)
5/5	19% (21/109)

Most of the participating trusts performing vascular procedures have at least four of these five key characteristics of a specialist vascular unit, however, a surprising amount are limited to two or less.

Networking, centralisation and the development of a new vascular speciality may address many of these issues (Lees, 2008).



2.4 Organisational Recommendations

Remuneration

- Where there was a large difference between the number of cases recorded locally and self-reported to the audit, than within national agency records (HES), trusts should examine their coding systems to assess the accuracy of their coding of these procedures.
- Vascular services should form networks with adjacent units for local/regional governance and audit.

Facilities

- Vascular teams should not undertake open Abdominal Aortic Aneurysm repair without rapid access to cell salvage, infusers for fluid including blood and available blood products and haemostatic agents within one hour. Trusts without these facilities should seek to provide them or develop protocols for the transfer of patients to adjacent units with such facilities.
- Access to an emergency theatre should be considered essential for all vascular units.

Risk management

- Trusts should perform Endovascular Aneurysm Repair in a sterile environment.
- To minimise the risk of cross-infection, patients who have undergone arterial surgery should not be nursed adjacent to those with open infected wounds or stomas.

Networks

- The requirements for 24 hour vascular cover, provision of surgical and endovascular training, and sufficient throughput of major cases should stimulate low volume centres to join other vascular centres either by formal network arrangements or centralisation.

Training

- All vascular trainees should undergo at least one year of formal endovascular training.
- Vascular trainees should be provided with better access to training in endovascular techniques in order to meet future patient demand.

Specialist Staffing

- As vascular surgery develops into a separate speciality, services should be re-configured to provide 24 hour access to both surgical and endovascular interventions.
- Vascular units should include assessment by an anaesthetist with experience in elective vascular anaesthesia as a formal part of pre-operative assessment and be staffed with anaesthetists with specialist vascular skills for emergency cases.
- Vascular patients should be nursed by teams with expertise in providing vascular care.

Patient Feedback

- All vascular units should regularly seek patient views on the range of vascular services.

2.5 Organisational Summary

This audit provides a timely review of the current organisation of vascular surgical services to inform a recent initiative for quality improvement in vascular surgery and the development of a new vascular specialty.

It is hoped that the value of this report will be to help trusts to focus on aspects of their service which are not yet in keeping with standards.

Findings:

1. Differences in data collected by surgical teams and national agencies (HES) have been highlighted by this audit, and further work is required to improve these data collection systems and to ensure data completeness.
2. Standards outlined in the VSGBI Quality Improvement Framework are not being met by all trusts, and vascular teams and trusts should work to meet these standards or to provide treatment in other centres where these standards can be provided.
3. Some trusts are undertaking small volumes of vascular surgery. The requirements for 24 hour vascular cover, provision of surgical and endovascular training, and sufficient throughput of major cases should stimulate low volume centres to join other vascular centres either by formal network arrangements or centralisation.

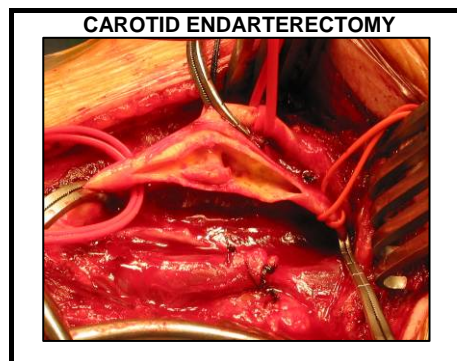
Chapter 3: CLINICAL UK CAROTID ENDARTERECTOMY AUDIT (ROUND 2)

3.1 Clinical Introduction

3.1.1 Overview

There have been major initiatives to improve the organisation of Transient Ischaemic Attack (TIA) and stroke services with the production of the National Stroke Strategy 2007 and NICE guidance 2008. There has also been a national awareness campaign for the public and professionals including triaging of 'high' risk TIA patients (Rothwell et al., 2005).

Carotid endarterectomy (CEA) can prevent stroke in patients with narrowing of the carotid artery (stenosis) who have had a TIA or previous stroke.



There is evidence that greater benefit from CEA is achieved when surgery is performed as soon as possible, ideally within two weeks of the initial symptom (Rothwell et al., 2004).

3.1.2 Aims

The aims of this clinical audit into CEA provision were to:

1. Assess the current speed of delivery of CEA in the UK
2. Assess variations in access and quality of care for patients needing CEA
3. Assess 30-day mortality and complications rate following CEA
4. Stimulate improvements over time in the quality of care provided to patients of CEA

3.2 Clinical Methods

3.2.1 Data collection

- The questionnaire was devised by the Steering Group to capture pertinent aspects of CEA provision in relation to describing the process and outcomes of care for a group of patients (referred to as cases) who have CEA in the UK based on the guidelines.
- This questionnaire was applied via the National Vascular Database online web tool. The full questionnaire may be seen in **Appendix 3**.
- All surgeons (consultant grade) who might potentially undertake CEA in the UK were contacted by the Project Team and 380 surgeons confirmed that they undertake the operation. This group are referred to throughout this report as 'eligible surgeons'.
- Surgeons were required to complete one questionnaire per CEA performed (case).
- This round of the audit collected CEA operations performed between 1st January 2008 and 30th September 2009 inclusive.
- The deadline for submitting data for this round was 31st December 2009.
- 6983 cases (with varying data completeness) were included in the analysis.

3.2.2 Presentation of results

- The average used to present results is the median because it is the middle point of the data and 50% of the values lie on either side.
- Results are also presented as totals, percentages, and/or inter-quartile ranges (IQR).
- The number of cases included in each analysis varies across questions as some were not answered for every case.
- For clarity of presentation, the term trust(s) is used generically for trusts and health boards.
- A full glossary is presented in **Appendix 1**.

3.3 Clinical Results

3.3.1 Participation

The Round 2 findings in this report are based on data submitted by a total of 352/380 (93%) surgeons representing 122/131 (93%) trusts.

Table 1: Case contribution to Round 2 of the clinical CEA report

Type of denominator	Number of cases
All cases (patients)	6983
All symptomatic (a patient showing symptoms) cases	5828
All cases with 30-day survival data	6151
All cases where a follow-up appointment was conducted	5503

All trusts submit basic details on admissions and procedures to a national agency (which is known as HES in England). Collectively, these agencies reported that there were 10,022 CEA operations during the equivalent time period across the whole of England, Northern Ireland, Scotland and Wales. This round of the audit, therefore, potentially represents 70% (6970/10,022) of CEA operations conducted in the UK which is an improvement on the last round which reported on 63%.

The median number of CEA cases per trust in England was:

- 43 (IQR 25-85) reported in the audit
- 74 (IQR 45-109) recorded on HES

It is encouraging that 93% of eligible trusts and surgeons submit a proportion of the CEA operations they perform to the audit, however, the number of cases submitted could be improved further. Whilst it is acknowledged that there may be some inaccuracy in the national agency figures, it is hoped that Round 3 of the audit will capture a much higher proportion of all carotid operations performed within the timeframe.

3.3.2 Patient demographics

Age is an important predictive factor for outcome. The risk of complications following surgery increases with age (Miller et al., 2009). The median age within the audit was 72 years which is consistent with the previous randomised controlled trials.

Twice as many men as women underwent carotid surgery. The indications for treatment are very similar in males and females (Kapral et al., 2003) suggesting that the difference in numbers between these two groups is a reflection of a difference in rates of disease rather than patient selection.

3.3.3 Patient symptoms

Carotid endarterectomy is performed on patients to reduce the risk of stroke caused by carotid stenosis. A symptomatic patient is a patient displaying outward symptoms of carotid stenosis whilst an asymptomatic patient does not yet show symptoms.

There is a robust evidence base (Rothwell et al., 2004) for providing CEA to symptomatic patients. There is less benefit in asymptomatic patients. Research evidence (Halliday et al., 2004) indicates that early intervention in appropriate patients will reduce the incidence of stroke.

Table 2: Symptoms that triggered referral

Symptom	National %
Amaurosis fugax (loss of vision in one eye) or Transient ischaemic attack (TIA)	63%
Stroke	33%
None of the three listed above	4%

Approximately one third of patients nationally presented with stroke and the remainder with TIA or amaurosis fugax.

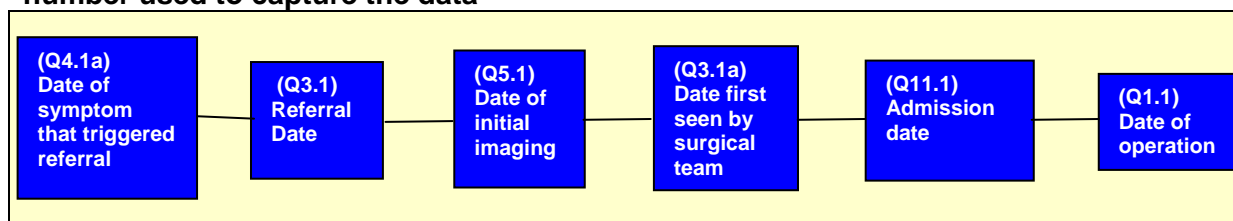
3.3.4 Summary of Key Delays

There is evidence that greater benefit from CEA is achieved when surgery is performed as soon as possible, ideally within two weeks of the initial symptom (Rothwell et al., 2004).

The typical patient pathway is set out in Figure 1 below:



Figure 1: Typical example of the patient path to operation and the audit question number used to capture the data



The ten year National Stroke Strategy sets a target of 48 hours from symptom to operation (to be effected by 2017) to minimise the risk of high risk patients with TIA developing a stroke. The current NICE guidelines recommend two weeks. This round of the audit showed:

- The median number of days from symptom to referral was 8 (IQR 3-26)
- The median number of days from referral to operation was 19 (IQR 7-47)
- **The median number of days from symptom to operation was 28 (IQR 12-64)***

*The symptom to operation median cannot be calculated from summing the symptom to referral median with the referral to operation median.

The data show that the current guideline is not yet being achieved and that the 2017 target is a long way off, however, the first round of this audit demonstrated longer delays in the lead up to treatment. In Round 1, 30% of patients had their operation performed beyond the time (more than 12 weeks) when the benefits of surgery outweigh best medical treatment and therefore the opportunity to prevent an early stroke was missed.

Within Round 2 of the audit, there was a considerable improvement in these delays. This occurred at all stages of the pathway from symptom to referral to investigation and to treatment. For example, the median time from referral to operation in Round 1 was 35 days whilst in Round 2 this was 19. Not only was there improvement between rounds 1 and 2, but if Round 2 is divided into three equal time periods there is a gradual reduction in the waiting times as the audit has progressed as in Figure 2.

Figure 2: Median number of days delay during Round 2

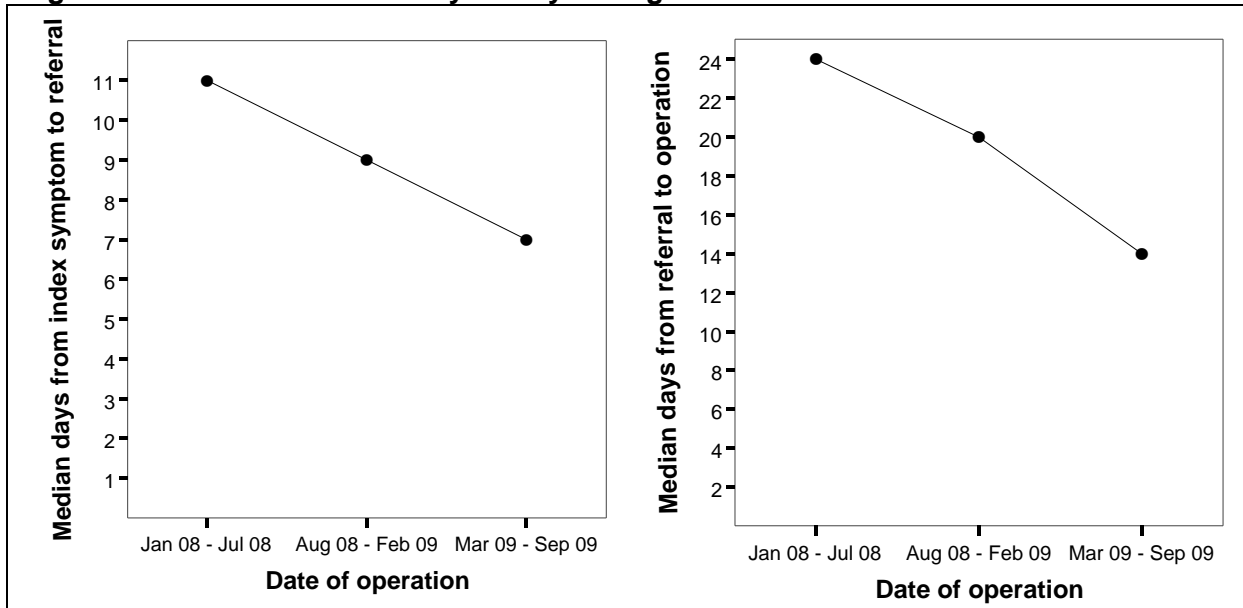


Table 3: Reasons for delays of more than two weeks between index symptom and surgery

Reason cited*	National N=1782 (%)
Delay in patient presenting at GP or hospital	312 (18%)
Delay in referral	716 (40%)
Delay in carotid imaging	156 (9%)
Patient cancellation/delay - unfit	127 (7%)
Patient cancellation/delay - patient choice	142 (8%)
Limited availability of surgeon	156 (9%)
Limited availability of anaesthetist	14 (1%)
Limited availability of radiologist	4 (0.2%)
Lack of operating time	138 (8%)
Other case took priority	28 (2%)
Other	211 (12%)

* More than one option could be selected.



These data show that the most common reasons for delay before surgery were related to presentation and referral. Raising public awareness of stroke and TIA has been a recent priority (for example the NHS F.A.S.T campaign) and should continue in order to educate the public and healthcare professionals of the importance of early referral and treatment. If patients are to be treated within two weeks, and ideally within 48 hours, further reorganisation of vascular services will be needed to minimise the delays associated with lack of operating time and limited surgeon availability.

3.3.5 Duration of surgery

There may be an increase in risk associated with very long or very short CEA operations. This round of the audit showed that CEAs take a median of 120 minutes (IQR 95-150).

3.3.6 Patient Outcomes and Complications

Carotid endarterectomy is a generally safe operation (Sheng & Busuttill, 1986). The likelihood of complication is low however it is important to understand the risks and how these may be reduced or approached.

When a complication occurs, it is likely to be one of the following:

- Bleeding
- Myocardial Infarct: Otherwise known as a Heart Attack, this involves the interruption of blood supply to part of the heart.
- Cranial Nerve Injury: Abbreviated to CNI, this is damage to one of the nerves to the face and neck.
- Transient Ischaemic Attack: A “mini-stroke” or TIA occurs when the blood supply to the brain is briefly interrupted.

The following table reports the rate of complication and death across the UK following CEA.

Table 4: Reported complications

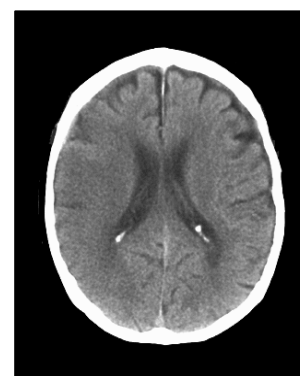
Complication	Stage complication was experienced	National N (%)
Myocardial Infarct (MI)	Inpatient	48/6983 (0.7%)
Bleeding	Inpatient	192/6983 (2.7%)
Cranial Nerve Injury (CNI)	Inpatient CNI	136/6983 (1.9%)
	CNI (found at follow-up)	135/5503 (2.5%)
Transient Ischaemic Attack	Inpatient	28/5274 (0.5%)
Stroke	Inpatient stroke	75/6983 (1.1%)
	Stroke at any point by follow-up	109/6151 (1.8%)
	Stroke within 30 days of operation *	83/6135 (1.4%)
Death	Inpatient death	38/6983 (0.5%)
	Death within 30 days of the operation	50/6151 (0.8%)
Stroke/Death	Death and/or stroke within 30 days*	112/6135 (1.8%)
MI/Stroke/Death	Inpatient	128/6983 (1.8%)

* Data not available for 16 cases.

There were 33 deaths during admission recorded for England by the national agency (HES) but 38 reported in the audit.

The most common reason for return to theatre was bleeding (153/6983, 2.2%) which is similar to the findings of randomised controlled trials (Meier et al., 2010).

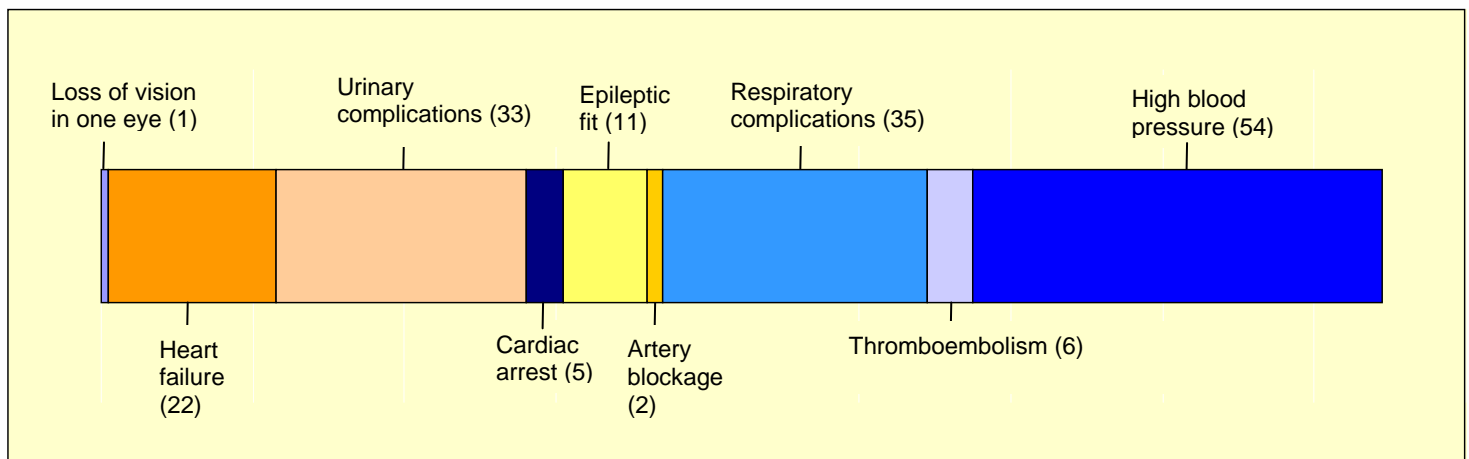
In Round 2 of the UK CEA Audit, the 30-day rate of death/stroke was only 1.8% (112/6135). This is at least half the rate observed in two recently published randomised trials involving CEA (Featherstone et al., 2004; Hobson 2000) which included independent (ie non-surgeon) assessment of outcomes. Accordingly, concerns remain regarding the accuracy of this 1.8% statistic (in relation to overall UK practice), as 30% of CEAs identified on HES were not included in Round 2 and the majority of cases that were included in the audit did not have independent outcome assessment (3% of assessments were by neurologists and 5% by stroke physicians). Participating centres are, therefore, actively



encouraged to ensure that all CEA patients are included in the UK CEA Audit and that independent assessment should become the norm rather than the exception. Without this, it will become increasingly difficult to perform meaningful statistical analyses to identify factors

that increase or lessen the risk of procedural stroke.

Figure 3: Total number of cases with other specified post-operative complications (N=169/5274, 3.2%)



The overall complication rate, including the 30-day stroke and death rate, is lower than expected from randomised controlled trials (Naylor, 2009).

3.4 Clinical Key Indicators

The eight key indicators for CEA are based on recent guidance and policy. The NICE Acute Stroke and TIA guideline and National Stroke Strategy have been selected in consultation with the VSGBI. This is the first time that these data are being presented and the maturity, volume and sensitivity of the available data warrants careful consideration. The steering group decided that, on this occasion, the results should be presented at two levels; all indicators at Strategic Health Authority (SHA) level and only a selection at trust-level.

The results are based on all symptomatic Round 2 cases (N = 5828) submitted to the audit by 122/131 (93%) trusts. The first column lists the number of cases (N) reported in the audit. The percentage of cases (%) reported in the audit which received care within the specified timeframe is then given. These are presented in alphabetical order by country, SHA then name of trust. The national figures are presented on the top row.

At trust-level and SHA-level

1. N (%) of patients referred within 2 days of symptom (Q4.1a - Q3.1)
2. N (%) of patients referred within 14 days of symptom (Q4.1a - Q3.1)
3. N (%) of patients receiving surgery within 2 days of referral (Q3.1 - Q1.1)
4. N (%) of patients receiving surgery within 14 days of referral (Q3.1 - Q1.1)
5. N (%) of patients receiving surgery within 2 days of symptom that triggered referral (Q4.1a - Q1.1)
6. N (%) of patients receiving surgery within 14 days of symptom that triggered referral (Q4.1a - Q1.1)

Due to the small volume of operations that are carried out at the individual trusts, some key indicator results for Northern Ireland, Scotland and Wales are presented at SHA-level only. The complication rate for CEA is very low, the sample would need to be much larger for statistical significance for each individual trust and no adjustment has been made for the age or severity of the patient who suffered complications compared to those who did not.

At SHA-level only:

7. N (%) of symptomatic patients, with stroke as the symptom that triggered referral, who had a stroke or died within 30 days of undergoing CEA
8. N (%) of symptomatic patients, with TIA or amaurosis fugax as the symptom that triggered referral, who had a stroke or died within 30 days of undergoing CEA

3.4.2 Clinical Key Indicator Results

Trust-level key indicators

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
EAST MIDLANDS												
Derby Hospitals NHS Foundation Trust	39	39	39	29	5 (17%)	21 (72%)	39	1 (3%)	14 (36%)	24	2 (8%)	9 (38%)
Kettering General Hospital NHS Foundation Trust	13	13	13	11	0 (0%)	4 (36%)	13	1 (8%)	8 (62%)	9	0 (0%)	3 (33%)
Northampton General Hospital NHS Trust	43	35	32	26	1 (4%)	15 (58%)	32	1 (3%)	12 (38%)	27	0 (0%)	3 (11%)
Nottingham University Hospitals NHS Trust	34	30	29	27	4 (15%)	14 (52%)	29	7 (24%)	12 (41%)	21	0 (0%)	6 (29%)
Sherwood Forest Hospitals NHS Foundation Trust	28	26	23	17	5 (29%)	9 (53%)	23	0 (0%)	3 (13%)	15	0 (0%)	0 (0%)
United Lincolnshire Hospitals NHS Trust	16	16	16	11	1 (9%)	4 (36%)	16	1 (6%)	3 (19%)	13	0 (0%)	4 (31%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
University Hospitals of Leicester NHS Trust	176	150	149	106	23 (22%)	78 (74%)	149	15 (10%)	90 (60%)	103	1 (1%)	60 (58%)
EAST OF ENGLAND												
Basildon and Thurrock University Hospital NHS Foundation Trust	11	6	6	3	1 (33%)	2 (67%)	6	0 (0%)	1 (17%)	3	0 (0%)	1 (33%)
Bedford Hospital NHS Trust	26	24	23	15	1 (7%)	6 (40%)	23	0 (0%)	7 (30%)	13	0 (0%)	2 (15%)
Cambridge University Hospitals NHS Foundation Trust	167	133	130	75	14 (19%)	42 (56%)	130	6 (5%)	42 (32%)	76	3 (4%)	12 (16%)
Colchester Hospital University NHS Foundation Trust	74	54	50	47	8 (17%)	34 (72%)	50	4 (8%)	24 (48%)	40	1 (3%)	13 (33%)
East and North Hertfordshire NHS Trust	38	31	30	20	1 (5%)	5 (25%)	30	0 (0%)	1 (3%)	18	0 (0%)	0 (0%)
Ipswich Hospital NHS Trust	59	44	42	22	1 (5%)	6 (27%)	42	0 (0%)	9 (21%)	19	1 (5%)	3 (16%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Mid Essex Hospital Services NHS Trust	No data											
Norfolk and Norwich University Hospitals NHS Foundation Trust	120	97	91	63	6 (10%)	27 (43%)	91	5 (5%)	27 (30%)	57	0 (0%)	9 (16%)
Peterborough and Stamford Hospitals NHS Foundation Trust	10	10	9	5	0 (0%)	0 (0%)	9	0 (0%)	0 (0%)	4	0 (0%)	0 (0%)
Princess Alexandra Hospital NHS Trust	40	33	32	19	0 (0%)	10 (53%)	31	6 (19%)	17 (55%)	19	0 (0%)	8 (42%)
Southend University Hospital NHS Foundation Trust	76	64	64	50	14 (28%)	43 (86%)	64	5 (8%)	48 (75%)	50	1 (2%)	31 (62%)
West Hertfordshire Hospitals NHS Trust	56	41	38	28	5 (18%)	25 (89%)	38	4 (11%)	29 (76%)	22	2 (9%)	11 (50%)
LONDON												
Barking, Havering and Redbridge Hospitals NHS Trust	32	32	31	29	6 (21%)	23 (79%)	31	1 (3%)	11 (35%)	26	0 (0%)	4 (15%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Barnet and Chase Farm Hospitals NHS Trust	48	27	26	21	3 (14%)	13 (62%)	26	1 (4%)	9 (35%)	16	0 (0%)	6 (38%)
Barts and The London NHS Trust	28	9	9	5	1 (20%)	2 (40%)	9	0 (0%)	5 (56%)	5	0 (0%)	1 (20%)
Ealing Hospital NHS Trust	No data											
Epsom and St Helier University Hospitals NHS Trust	20	16	12	11	4 (36%)	6 (55%)	12	2 (17%)	7 (58%)	11	0 (0%)	5 (45%)
Guy's and St Thomas' NHS Foundation Trust	24	18	18	17	7 (41%)	14 (82%)	18	5 (28%)	16 (89%)	18	0 (0%)	14 (78%)
Hillingdon Hospital NHS Trust	21	19	18	3	1 (33%)	1 (33%)	18	0 (0%)	8 (44%)	3	0 (0%)	1 (33%)
Imperial College Healthcare NHS Trust	196	126	113	46	3 (7%)	24 (52%)	113	21 (19%)	78 (69%)	32	0 (0%)	13 (41%)
King's College Hospital NHS Foundation Trust	16	12	12	10	4 (40%)	10 (100%)	12	0 (0%)	7 (58%)	8	0 (0%)	4 (50%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Lewisham Hospital NHS Trust	9	6	6	5	0 (0%)	3 (60%)	6	0 (0%)	0 (0%)	3	0 (0%)	0 (0%)
Mayday Healthcare NHS Trust	No data											
North West London Hospitals NHS Trust	19	15	15	4	1 (25%)	3 (75%)	15	1 (7%)	14 (93%)	4	0 (0%)	2 (50%)
Royal Free Hampstead NHS Trust	20	20	17	10	3 (30%)	8 (80%)	17	2 (12%)	11 (65%)	11	0 (0%)	5 (45%)
St George's Healthcare NHS Trust	83	73	71	63	7 (11%)	42 (67%)	71	19 (27%)	63 (89%)	37	2 (5%)	20 (54%)
University College London Hospitals NHS Foundation Trust	41	32	32	27	6 (22%)	22 (81%)	32	9 (28%)	24 (75%)	26	3 (12%)	13 (50%)
Whipps Cross University Hospital NHS Trust	9	8	8	6	0 (0%)	4 (67%)	8	0 (0%)	5 (63%)	6	0 (0%)	2 (33%)
Whittington Hospital NHS Trust	11	8	8	8	2 (25%)	4 (50%)	8	0 (0%)	4 (50%)	8	0 (0%)	2 (25%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
NORTH EAST												
City Hospitals Sunderland NHS Foundation Trust	85	61	60	22	4 (18%)	8 (36%)	60	0 (0%)	10 (17%)	22	0 (0%)	2 (9%)
County Durham and Darlington NHS Foundation Trust	84	77	77	40	14 (35%)	36 (90%)	77	5 (6%)	40 (52%)	38	0 (0%)	23 (61%)
Gateshead Health NHS Foundation Trust	25	25	25	15	1 (7%)	5 (33%)	25	0 (0%)	7 (28%)	15	0 (0%)	0 (0%)
Newcastle upon Tyne Hospitals NHS Foundation Trust	158	131	127	74	15 (20%)	54 (73%)	127	13 (10%)	78 (61%)	72	0 (0%)	34 (47%)
South Tees Hospitals NHS Trust	93	93	93	72	29 (40%)	62 (86%)	93	5 (5%)	58 (62%)	71	1 (1%)	26 (37%)
NORTH WEST												
Aintree University Hospitals NHS Foundation Trust	46	43	43	23	10 (43%)	19 (83%)	43	15 (35%)	37 (86%)	23	2 (9%)	15 (65%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Blackpool, Flyde & Wyre Hospitals NHS Foundation Trust	54	47	42	33	3 (9%)	22 (67%)	42	1 (2%)	10 (24%)	24	2 (8%)	6 (25%)
Central Manchester and Manchester Childrens' University Hospital NHS Trust	12	5	5	4	0 (0%)	3 (75%)	5	0 (0%)	2 (40%)	1	0 (0%)	0 (0%)
Countess of Chester Hospital NHS Foundation Trust	97	91	75	60	25 (42%)	39 (65%)	75	10 (13%)	31 (41%)	52	5 (10%)	20 (38%)
East Lancashire Hospitals NHS Trust	83	76	74	43	8 (19%)	33 (77%)	74	8 (11%)	29 (39%)	8	7 (88%)	8 (100%)
Lancashire Teaching Hospitals NHS Foundation Trust	14	11	9	7	1 (14%)	5 (71%)	9	0 (0%)	6 (67%)	1	0 (0%)	1 (100%)
Mid Cheshire Hospitals NHS Foundation Trust	44	36	36	13	3 (23%)	8 (62%)	36	1 (3%)	11 (31%)	13	1 (8%)	2 (15%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
North Cheshire Hospitals NHS Trust	45	42	41	30	2 (7%)	8 (27%)	41	1 (2%)	7 (17%)	14	1 (7%)	3 (21%)
North Cumbria Acute Hospitals NHS Trust	37	33	33	20	4 (20%)	14 (70%)	33	0 (0%)	12 (36%)	19	0 (0%)	3 (16%)
Pennine Acute Hospitals NHS Trust	146	122	111	72	11 (15%)	34 (47%)	111	1 (1%)	9 (8%)	53	3 (6%)	6 (11%)
Royal Bolton Hospital NHS Foundation Trust	25	25	20	15	1 (7%)	10 (67%)	20	3 (15%)	8 (40%)	7	1 (14%)	5 (71%)
Royal Liverpool and Broadgreen University Hospitals NHS Trust	58	52	49	43	8 (19%)	32 (74%)	49	3 (6%)	40 (82%)	32	1 (3%)	18 (56%)
Southport and Ormskirk Hospital NHS Trust	33	30	30	21	0 (0%)	3 (14%)	30	0 (0%)	1 (3%)	18	0 (0%)	0 (0%)
Tameside Hospital NHS Foundation Trust	59	54	53	30	3 (10%)	15 (50%)	53	0 (0%)	9 (17%)	9	1 (11%)	4 (44%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
University Hospital of South Manchester NHS Foundation Trust	99	73	68	43	5 (12%)	28 (65%)	68	2 (3%)	14 (21%)	13	1 (8%)	3 (23%)
University Hospitals of Morecambe Bay NHS Trust	60	48	45	20	2 (10%)	15 (75%)	45	8 (18%)	13 (29%)	2	2 (100%)	2 (100%)
Wirral University Teaching Hospital NHS Foundation Trust	92	88	83	72	9 (13%)	46 (64%)	83	3 (4%)	36 (43%)	37	2 (5%)	15 (41%)
Wrightington, Wigan and Leigh NHS Trust	18	17	17	6	1 (17%)	6 (100%)	17	0 (0%)	0 (0%)	5	1 (20%)	1 (20%)
SOUTH CENTRAL												
Basingstoke and North Hampshire NHS Foundation Trust	10	10	10	10	1 (10%)	3 (30%)	10	1 (10%)	2 (20%)	10	1 (10%)	1 (10%)
Buckinghamshire Hospitals NHS Trust	113	78	70	56	10 (18%)	39 (70%)	69	1 (1%)	25 (36%)	59	1 (2%)	14 (24%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Milton Keynes Hospital NHS Foundation Trust	8	5	5	4	0 (0%)	0 (0%)	5	0 (0%)	2 (40%)	4	0 (0%)	0 (0%)
Oxford Radcliffe Hospitals NHS Trust	128	102	100	51	11 (22%)	39 (76%)	100	6 (6%)	47 (47%)	41	2 (5%)	20 (49%)
Portsmouth Hospitals NHS Trust	61	53	53	50	9 (18%)	36 (72%)	53	2 (4%)	18 (34%)	40	1 (3%)	8 (20%)
Royal Berkshire NHS Foundation Trust	34	34	34	34	7 (21%)	22 (65%)	34	4 (12%)	23 (68%)	34	1 (3%)	16 (47%)
Southampton University Hospitals NHS Trust	113	76	75	50	9 (18%)	40 (80%)	75	5 (7%)	38 (51%)	43	1 (2%)	17 (40%)
Winchester and Eastleigh Healthcare NHS Trust	No data											

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
SOUTH EAST COAST												
Ashford and St Peter's Hospitals NHS Trust	5	4	4	4	0 (0%)	1 (25%)	4	0 (0%)	0 (0%)	3	0 (0%)	0 (0%)
Brighton and Sussex University Hospitals NHS Trust	43	39	37	17	3 (18%)	12 (71%)	37	1 (3%)	13 (35%)	16	0 (0%)	2 (13%)
Dartford and Gravesham NHS Trust	No data											
East Kent Hospitals NHS Trust	140	118	112	57	12 (21%)	38 (67%)	112	27 (24%)	50 (45%)	56	4 (7%)	26 (46%)
East Sussex Hospitals NHS Trust	34	34	34	22	1 (5%)	6 (27%)	34	0 (0%)	3 (9%)	19	0 (0%)	0 (0%)
Frimley Park Hospital NHS Foundation Trust	79	73	65	41	11 (27%)	30 (73%)	65	7 (11%)	34 (52%)	41	0 (0%)	16 (39%)
Maidstone and Tunbridge Wells NHS Trust	26	11	10	9	2 (22%)	5 (56%)	10	1 (10%)	3 (30%)	6	0 (0%)	2 (33%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Medway NHS Foundation Trust	41	30	29	23	4 (17%)	14 (61%)	29	2 (7%)	10 (34%)	22	0 (0%)	6 (27%)
Royal West Sussex NHS Trust	7	7	7	7	0 (0%)	2 (29%)	7	0 (0%)	5 (71%)	7	0 (0%)	2 (29%)
Surrey and Sussex Healthcare NHS Trust	54	46	45	28	5 (18%)	25 (89%)	45	2 (4%)	21 (47%)	18	0 (0%)	5 (28%)
Western Sussex Hospitals NHS Trust	93	84	80	64	8 (13%)	42 (66%)	80	6 (8%)	24 (30%)	61	0 (0%)	8 (13%)
SOUTH WEST												
Dorset County Hospital NHS Foundation Trust	46	42	40	16	4 (25%)	8 (50%)	40	6 (15%)	12 (30%)	14	1 (7%)	4 (29%)
Gloucestershire Hospitals NHS Foundation Trust	78	69	65	31	4 (13%)	21 (68%)	65	4 (6%)	31 (48%)	26	2 (8%)	11 (42%)
North Bristol NHS Trust	47	44	43	24	4 (17%)	16 (67%)	43	4 (9%)	25 (58%)	24	2 (8%)	10 (42%)
Northern Devon Healthcare NHS Trust	44	38	37	22	4 (18%)	14 (64%)	37	3 (8%)	11 (30%)	16	0 (0%)	6 (38%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Plymouth Hospitals NHS Trust	99	69	67	26	10 (38%)	21 (81%)	67	7 (10%)	34 (51%)	22	1 (5%)	12 (55%)
Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	113	106	99	44	5 (11%)	36 (82%)	99	11 (11%)	53 (54%)	33	1 (3%)	13 (39%)
Royal Cornwall Hospitals NHS Trust	106	93	91	61	10 (16%)	52 (85%)	91	15 (16%)	56 (62%)	58	4 (7%)	29 (50%)
Royal Devon and Exeter NHS Foundation Trust	31	26	26	24	8 (33%)	17 (71%)	26	3 (12%)	8 (31%)	23	2 (9%)	5 (22%)
Royal United Hospital Bath NHS Trust	25	15	14	14	7 (50%)	10 (71%)	14	5 (36%)	8 (57%)	14	2 (14%)	7 (50%)
Salisbury NHS Foundation Trust	21	17	17	18	5 (28%)	13 (72%)	17	0 (0%)	5 (29%)	14	1 (7%)	5 (36%)
South Devon Healthcare NHS Foundation Trust	44	39	36	15	3 (20%)	11 (73%)	36	0 (0%)	14 (39%)	15	0 (0%)	6 (40%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Taunton and Somerset NHS Foundation Trust	86	78	76	37	9 (24%)	20 (54%)	76	3 (4%)	25 (33%)	37	1 (3%)	9 (24%)
University Hospitals of Bristol NHS Foundation Trust	94	80	78	42	10 (24%)	33 (79%)	78	6 (8%)	36 (46%)	39	0 (0%)	18 (46%)
WEST MIDLANDS												
Dudley Group of Hospitals NHS Trust	54	37	36	31	3 (10%)	11 (35%)	36	1 (3%)	9 (25%)	28	0 (0%)	2 (7%)
Heart of England NHS Foundation Trust	20	18	18	6	0 (0%)	1 (17%)	18	2 (11%)	4 (22%)	6	0 (0%)	1 (17%)
Mid Staffordshire NHS Foundation Trust	30	25	24	13	2 (15%)	6 (46%)	24	0 (0%)	3 (13%)	13	0 (0%)	2 (15%)
Royal Wolverhampton Hospitals NHS Trust	46	34	33	27	3 (11%)	16 (59%)	33	2 (6%)	13 (39%)	23	1 (4%)	5 (22%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Sandwell and West Birmingham Hospitals NHS Trust	66	55	55	34	4 (12%)	22 (65%)	55	1 (2%)	14 (25%)	32	0 (0%)	3 (9%)
Shrewsbury & Telford Hospital NHS Trust	71	55	50	46	12 (26%)	29 (63%)	50	2 (4%)	17 (34%)	42	0 (0%)	11 (26%)
University Hospital of North Staffordshire NHS Trust	4	3	3	0	No data	No data	3	1 (33%)	2 (67%)	0	No data	No data
University Hospitals Birmingham NHS Foundation Trust	112	65	64	57	17 (30%)	46 (81%)	64	7 (11%)	29 (45%)	34	9 (26%)	18 (53%)
University Hospitals Coventry and Warwickshire NHS Trust	81	74	69	45	12 (27%)	29 (64%)	69	4 (6%)	32 (46%)	33	3 (9%)	13 (39%)
Walsall Hospitals NHS Trust	19	16	16	14	1 (7%)	4 (29%)	16	1 (6%)	4 (25%)	13	0 (0%)	1 (8%)
Worcestershire Acute Hospitals NHS Trust	99	78	76	39	6 (15%)	19 (49%)	76	13 (17%)	53 (70%)	33	0 (0%)	12 (36%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
YORKSHIRE & THE HUMBER												
Bradford Teaching Hospitals NHS Foundation Trust	74	71	63	29	6 (21%)	20 (69%)	63	14 (22%)	53 (84%)	26	0 (0%)	14 (54%)
Calderdale and Huddersfield NHS Foundation Trust	26	26	26	24	3 (13%)	16 (67%)	26	0 (0%)	2 (8%)	15	0 (0%)	1 (7%)
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	78	71	71	29	1 (3%)	9 (31%)	71	1 (1%)	19 (27%)	20	1 (5%)	4 (20%)
Hull and East Yorkshire Hospitals NHS Trust	No data											
Leeds Teaching Hospitals NHS Trust	50	47	45	30	9 (30%)	23 (77%)	45	19 (42%)	36 (80%)	29	3 (10%)	22 (76%)
Mid Yorkshire Hospitals NHS Trust	78	70	70	36	6 (17%)	24 (67%)	70	6 (9%)	19 (27%)	35	1 (3%)	10 (29%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	17	14	12	6	0 (0%)	3 (50%)	12	0 (0%)	1 (8%)	4	0 (0%)	1 (25%)
Scarborough and North East Yorkshire Healthcare NHS Trust	24	24	21	0	No data	No data	21	1 (5%)	3 (14%)	0	No data	No data
Sheffield Teaching Hospitals NHS Foundation Trust	89	73	70	58	4 (7%)	32 (55%)	70	11 (16%)	41 (59%)	54	0 (0%)	17 (31%)
York Hospitals NHS Foundation Trust	109	93	92	59	9 (15%)	36 (61%)	92	19 (21%)	68 (74%)	57	1 (2%)	28 (49%)
NORTHERN IRELAND												
Belfast Health and Social Care Board	257	182	181	124	9 (7%)	44 (35%)	181	15 (8%)	84 (46%)	119	0 (0%)	20 (17%)
Southern Health and Social Services Board	14	14	14	14	3 (21%)	13 (93%)	14	0 (0%)	7 (50%)	11	0 (0%)	4 (36%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
Western Health Social Services Board	4	3	3	3	0 (0%)	1 (33%)	3	0 (0%)	1 (33%)	3	0 (0%)	0 (0%)
WALES												
Wales Mid and West	92	80	77	45	7 (16%)	22 (49%)	77	3 (4%)	14 (18%)	44	0 (0%)	4 (9%)
Wales North	45	44	41	29	4 (14%)	15 (52%)	41	2 (5%)	16 (39%)	25	0 (0%)	8 (32%)
Wales South East	150	124	117	59	18 (31%)	33 (56%)	117	2 (2%)	34 (29%)	60	1 (2%)	9 (15%)
SCOTLAND												
NHS Ayrshire	29	24	20	14	3 (21%)	8 (57%)	20	0 (0%)	4 (20%)	12	0 (0%)	3 (25%)
NHS Dumfries and Galloway	16	13	12	11	0 (0%)	5 (45%)	12	1 (8%)	3 (25%)	10	0 (0%)	1 (10%)
NHS Fife	18	18	18	18	1 (6%)	8 (44%)	18	0 (0%)	6 (33%)	17	0 (0%)	1 (6%)
NHS Forth Valley	33	32	27	12	2 (17%)	7 (58%)	27	3 (11%)	10 (37%)	10	2 (20%)	3 (30%)
NHS Grampian	23	20	20	7	3 (43%)	5 (71%)	20	0 (0%)	7 (35%)	8	0 (0%)	3 (38%)
NHS Greater Glasgow and Clyde	11	11	11	5	0 (0%)	2 (40%)	11	0 (0%)	9 (82%)	4	0 (0%)	0 (0%)

Trust name	All cases in the audit	Symptomatic patients		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery		
		Symptomatic cases	Patients referred because of stroke or TIA or amaurosis fugax	Patients with exact symptom and referral dates	Patients referred within 2 days of symptom	Patients referred within 14 days of symptom	Patients with exact referral and operation dates	Patients receiving surgery within 2 days of referral	Patients receiving surgery within 14 days of referral	Patients with exact symptom and operation dates	Patients receiving surgery within 2 days of symptom that triggered referral	Patients receiving surgery within 14 days of symptom that triggered referral
National <i>Median per Trust</i>	6983 43	5828 38	5568 36	3564 24	646 (18%)	2255 (63%)	5566 36	470 (8%)	2480 (45%)	3044 19	97 (3%)	1005 (33%)
NHS Highland	71	70	68	29	3 (10%)	16 (55%)	68	1 (1%)	37 (54%)	30	0 (0%)	6 (20%)
NHS Lanarkshire	No data											
NHS Lothian	141	140	134	71	18 (25%)	57 (80%)	134	10 (7%)	98 (73%)	66	0 (0%)	28 (42%)
NHS Tayside	26	25	24	22	4 (18%)	18 (82%)	24	0 (0%)	15 (63%)	17	0 (0%)	8 (47%)

SHA-Level indicators

SHA	All cases in the audit		Symptomatic cases														
			Index symptom		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery			30-day outcomes			
	Total number of cases reported in Round 2	Total cases complete to Phase 2 (required for 30-day outcome evaluation)	Total symptomatic cases	Total cases referred with stroke or TIA or amaurosis fugax as the index symptom	Total cases with exact symptom and referral dates	Total cases referred within 2 days of symptom	Total cases referred within 14 days of symptom	Total cases with exact referral and operation dates	Total cases receiving surgery within 2 days of referral	Total cases receiving surgery within 14 days of referral	Total cases with exact symptom and operation dates	Total cases receiving surgery within 2 days of symptom that triggered referral	Total cases receiving surgery within 14 days of symptom that triggered referral	Total cases, referred because of stroke, whose 30-day outcomes can be evaluated	Total cases, referred because of stroke, with stroke or death within 30 days	Total cases, referred because of TIA or amaurosis fugax, whose 30-day outcomes can be evaluated	Total cases, referred because of TIA or amaurosis fugax, with stroke or death within 30 days
National	6983*	6151 (88%)	5828	5568	3564	646 (18%)	2255 (63%)	5566	470 (8%)	2480 (45%)	3044	97 (3%)	1005 (33%)	1691	41 (2.4%)	3180	54 (1.7%)
East Midlands	349	319 (91%)	309	301	227	39 (17%)	145 (64%)	301	26 (9%)	142 (47%)	212	3 (1%)	85 (40%)	90	0 (.0%)	182	2 (1.1%)
East of England	677	563 (83%)	537	515	347	51 (15%)	200 (58%)	514	30 (6%)	205 (40%)	321	8 (2%)	90 (28%)	137	5 (3.6%)	286	4 (1.4%)
London	577	512 (89%)	421	396	265	48 (18%)	179 (68%)	396	61 (15%)	262 (66%)	214	5 (2%)	92 (43%)	145	3 (2.1%)	203	3 (1.5%)
North East	445	369 (83%)	387	382	223	63 (28%)	165 (74%)	382	23 (6%)	193 (51%)	218	1 (0%)	85 (39%)	109	4 (3.7%)	206	3 (1.5%)
North West	1022	896 (88%)	893	834	555	96 (17%)	340 (61%)	834	56 (7%)	275 (33%)	331	30 (9%)	112 (34%)	217	3 (1.4%)	508	8 (1.6%)
South Central	467	428 (92%)	358	347	255	47 (18%)	179 (70%)	346	19 (5%)	155 (45%)	231	7 (3%)	76 (33%)	129	3 (2.3%)	189	3 (1.6%)
South East Coast	522	491 (94%)	446	423	272	46 (17%)	175 (64%)	423	46 (11%)	163 (39%)	249	4 (2%)	67 (27%)	142	3 (2.1%)	254	9 (3.5%)
South West	834	738 (88%)	716	689	374	83 (22%)	272 (73%)	689	67 (10%)	318 (46%)	335	17 (5%)	135 (40%)	217	7 (3.2%)	385	8 (2.1%)

SHA	All cases in the audit		Symptomatic cases														
			Index symptom		Time from index symptom to referral			Time from referral to surgery			Time from symptom to surgery			30-day outcomes			
	Total number of cases reported in Round 2 Total cases complete to Phase 2 (required for 30-day outcome evaluation)		Total symptomatic cases Total cases referred with stroke or TIA or amaurosis fugax as the index symptom		Total cases with exact symptom and referral dates Total cases referred within 2 days of symptom Total cases referred within 14 days of symptom			Total cases with exact referral and operation dates Total cases receiving surgery within 2 days of referral Total cases receiving surgery within 14 days of referral			Total cases with exact symptom and operation dates Total cases receiving surgery within 2 days of symptom that triggered referral Total cases receiving surgery within 14 days of symptom that triggered referral			Total cases, referred because of stroke, whose 30-day outcomes can be evaluated Total cases, referred because of stroke, with stroke or death within 30 days Total cases, referred because of TIA or amaurosis fugax, whose 30-day outcomes can be evaluated Total cases, referred because of TIA or amaurosis fugax, with stroke or death within 30 days			
National	6983*	6151 (88%)	5828	5568	3564	646 (18%)	2255 (63%)	5566	470 (8%)	2480 (45%)	3044	97 (3%)	1005 (33%)	1691	41 (2.4%)	3180	54 (1.7%)
West Midlands	602	500 (83%)	460	444	312	60 (19%)	183 (59%)	444	34 (8%)	180 (41%)	257	13 (5%)	68 (26%)	117	3 (2.6%)	251	3 (1.2%)
Yorkshire and The Humber	545	477 (88%)	489	470	271	38 (14%)	163 (60%)	470	71 (15%)	242 (51%)	240	6 (3%)	97 (40%)	141	3 (2.1%)	268	6 (2.2%)
ENGLAND	6040	5293 (88%)	5016	4801	3101	571 (18%)	2001 (65%)	4799	433 (9%)	2135 (44%)	2608	94 (4%)	907 (35%)	1444	34 (2.4%)	2732	49 (1.8%)
NORTHERN IRELAND	275	259 (94%)	199	198	141	12 (9%)	58 (41%)	198	15 (8%)	92 (46%)	133	0 (0%)	24 (18%)	57	1 (1.8%)	129	0 (.0%)
SCOTLAND	368	323 (88%)	353	334	189	34 (18%)	126 (67%)	334	15 (4%)	189 (57%)	174	2 (1%)	53 (30%)	122	4 (3.3%)	171	3 (1.8%)
WALES	287	263 (92%)	248	235	133	29 (22%)	70 (53%)	235	7 (3%)	64 (27%)	129	1 (1%)	21 (16%)	68	2 (2.9%)	148	2 (1.4%)

*Thirteen cases of no direct attribution were included in the national figures.

3.5 Clinical Recommendations

3.5.1 Participation

This is the largest continuous audit of CEA in the UK (12,496 cases) and whilst contributing surgeons are to be congratulated on their commitment to audit and improvement in care for carotid patients, the impact is reduced because there is still not 100% participation of surgeons and not all operations are captured. The minority of non-contributing surgeons cannot ensure that the management of, and outcomes in, their CEA patients are comparable with national data. It is recommended that:

- Trusts should provide surgeons with any necessary support to allow them to participate in the National CEA audit as this is a core part of supporting professional activity

3.5.2 Key delays

The ten year National Stroke Strategy states a target of 48 hours from symptom to operation to minimise the chance of high risk patients with TIA developing a stroke. The current NICE guidelines recommend two weeks. This report shows that since the last round of the audit there has been considerable reduction in the time taken from referral to operation. It has reduced from a median of 35 days in the first round to 19 days in this round. There is further evidence that, even within the current round, waiting times are continuing to reduce with a steady improvement over three equal time periods from a median of 24 to 20 to 14 days.

Whilst the direction of travel is encouraging, it is acknowledged that there are still some patients experiencing very long delays.

The audit measured delays at all stages of the pathway and found significant delays between the index symptom and presentation. It is recommended that:

- Work should continue to educate the public and healthcare professionals of the importance of early diagnosis and treatment of patients with TIA and stroke
- Trusts should develop clear pathways that enable symptomatic patients to be identified and treated quickly. This will require a multidisciplinary (medical with surgical) approach to develop a more efficient system. GPs should be referring via this pathway ensuring rapid access to investigation and treatment
- Access to vascular surgical operating time remains a cause for delay in some cases and vascular surgical services need to be configured in order to allow CEA to be undertaken more expeditiously

3.5.3 Complications

The complication rates following CEA in this audit remain low with a 30-day stroke and death rate of 1.8%. If this reflects the true stroke and death rate in this patient group this is commendable and is an improvement on the rates reported in some of the older randomised trials. There is, however, concern that the stroke rate could be higher than this if there was independent assessment of these patients by physicians with an interest in stroke. It is recommended that:

- All patients undergoing CEA should have an independent assessment at follow-up by a physician with an interest in stroke who should contribute the outcome data to this audit
- There should be closer examination of possible cranial nerve injury (CNI) post-operatively in addition to stroke, myocardial infarction (MI) and death rates

3.5.4 Limitations to the clinical audit

The cohort in this audit includes only patients who received CEA. The findings, therefore, exclude patients that were referred for consideration but did not undergo CEA, for example, because they:

- Declined the offer to undergo CEA
- Did not have appropriate symptoms
- Were clinically unfit for CEA
- Developed an inoperable stenosis (occluded) whilst waiting for CEA
- Had a disabling stroke whilst waiting for CEA

3.6 Clinical Summary

There has been considerable reduction in the delays to treatment reported in Round 1 and the time between the patient having their first symptom of TIA or stroke and receiving surgery is continuing to decrease. There is still significant room for improvement, however, and many patients are still not receiving their surgery within the recommended timeframe set by NICE (two weeks) or the National Stroke Strategy (48 hours).

The rate of participation in the audit by surgeons has continued to rise and this is encouraging. There are, however, still some surgeons who are not contributing and it is necessary to achieve 100% participation in order to be confident of reporting data which is truly representative of the national practice. The VSGBI considers that contribution to this type of national audit should form a core part of supporting professional activity for vascular surgeons.

It is apparent from this report that the complication rates of CEA are very low. This is reassuring but it is important to check that this is correct as these figures are at odds with some of the national randomised controlled trials. This report therefore recommends that stroke physicians should be conducting independent follow-up of patients who have CEA.

The overall aim of this audit is to improve the care of patients who can benefit from CEA. The VSGBI believe that surgeons and stroke teams across the UK have made considerable improvements in the care provided to this group of patients over the last five years and are continuing to do so. This audit maintains the impetus to do this and highlights the areas which require concentration of our efforts. Considerable work has been done but there remains a lot to do in order to provide our patients with the best possible service.

Chapter 4: CONCLUSION

This report demonstrates the importance of professional audit in identifying the current state of vascular surgery in the United Kingdom as well as the shortcomings in service organisation. The report is intended to be shared widely and used to inform re-configuration and commissioning of services. The Vascular Society of Great Britain & Ireland recognises that there is a relationship between volume of surgery undertaken and clinical outcomes. Smaller volume units may not be able to demonstrate safe clinical practice. The development of formal networks with strong team working is an important part of developing a safe service. Complex surgical procedures should be undertaken in units performing significant numbers, while the network can provide more routine day to day care closer to the patient.

Vascular networks need to develop strong referral and management protocols so that patients can be seen quickly and transferred for surgery rapidly to minimise delays and improve outcomes. This applies particularly to carotid endarterectomy (CEA). Reducing the time from symptoms to treatment is a key part of a safe service.

Vascular surgeons play a central role in the care of patients with vascular disease. They need to contribute all their index cases to national audit, through the National Vascular Database. The third round of the clinical CEA audit is already underway. This will include all carotid operations performed between 1st October 2009 and 30th September 2010 which are submitted via the NVD website before 31st December 2010.

This report is being circulated widely throughout the health communities and publicly. It is being sent to Strategic Health Authorities, the Department of Health and the Healthcare Quality Improvement Programme. It is hoped that it will be used to drive service improvement and support the development of national audit as a tool for improving outcomes for patients with vascular disease.

Queries to:

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Appendices

Appendix 1:

Organisational Audit of Vascular Services 2009

Our Ref:
<<>>

Section 1: Index vascular procedures [Elective and emergency]

The table below states the total volume of cases; for five vascular procedures as recorded by Hospital Episode Statistics (HES) as being performed at your Trust for the 2008 (calendar year). We recognise that there may be discrepancies between the HES data and your own Trust records. **Table 1** is designed to investigate how big or small these differences might be.

Table 1: Volume of vascular procedures

a. Procedure <small>[Elective & emergency]</small>	b. N cases recorded on HES for 2008 <small>[1st Jan 08 – 31st Dec 08]</small>	c. Give the number of cases treated in your Trust in 2008 according to your own records <small>[1st Jan 08 – 31st Dec 08]</small>
<p>The respective procedure codes on which the HES figures (Table 1 (part b.) are based are listed in Appendix 1]</p>		
<p style="font-size: small;">[We are basing the volume of cases as recorded on HES for the year 2008 (Table 1 (part b.)). This is because data for 2009 are not available for another six months.]</p>		
<p style="font-size: small;">[Please ensure that the figure you add to each of the fields in (Table 1 (part c.)) is representative of the TOTAL number of procedures carried out at ALL the relevant hospitals within your Trust]</p>		
<p>1.1 Infrainguinal Bypass Surgery [Procedure Code(s): L56.5, L57.2, L57.3, L58.1, L58.2, L58.3, L58.4, L58.5, L58.6, L58.7, L59.2, L59.3, L59.4, L59.5, L59.6, L59.7, L70.9</p>	<<>>	<input type="text"/> <input type="text"/> <input type="text"/> [Number of Infrainguinal bypass procedures]
<p>1.2 Amputation [Leg amputations] [Procedure Code(s): X09.3, X09.4, X09.5]</p>	<<>>	<input type="text"/> <input type="text"/> <input type="text"/> [Number of leg amputation procedures]
<p>1.3 Carotid Endarterectomy (CEA) [Procedure Code(s): L29.4 & L29.5]</p>	<<>>	<input type="text"/> <input type="text"/> <input type="text"/> [Number of CEA procedures]
<p>1.4 Carotid stenting [Procedure Code(s): L31.4]</p>	<<>>	<input type="text"/> <input type="text"/> <input type="text"/> [Number of carotid stenting procedures]
<p>1.5 Abdominal Aortic Aneurysm Repair (AAA) [Procedure Code(s): L18.4, L18.5, L18.6, L19.4, L19.5, L19.6, L19.8, L21.8, L27.1, L27.5, L27.6, L27.8, L27.9, L28.1, L28.5, L28.6, L28.8, L28.9]</p>	<<>>	<input type="text"/> <input type="text"/> <input type="text"/> [Number of AAA procedures]

From this point forward the information you give should describe your service as at 1st December 2009.

Carotid Endarterectomy

1.6 Is your Trust currently able to offer URGENT Carotid Endarterectomy for high risk patients? Yes No

1.6a If Yes, please specify how quickly your Trust offers urgent Carotid Endarterectomy for Stroke or TIA patients:

- Usually ≤48 HOURS after Stroke or TIA
- Usually >48 HOURS but ≤ 2 WEEKS after Stroke or TIA
- Mixture [Mixture of: Usually ≤48 HOURS after Stroke or TIA and Usually >48 HOURS but ≤ 2 WEEKS after Stroke or TIA]

Abdominal Aortic Aneurysm (AAA)

1.7 Endovascular aneurysm repair for infrarenal Abdominal Aortic Aneurysm

1.7a Does your Trust provide endovascular aneurysm repair for infrarenal Abdominal Aortic Aneurysm? Yes No

1.7ai If Yes, who does this? [Please tick all that apply]

Radiologist following surgical cut down Vascular Surgeon Combined surgeon and radiologist

1.7b Which of the following do you have available in theatre for Abdominal Aortic Aneurysm repair? [Tick all that apply]

Cell salvage Rapid infuser

Rapid access to blood products (< 1hr) Haemostatic agents incl. glue

1.7c In what environment do you routinely perform EVAR? [Tick all that apply]

Sterile environment Non-sterile environment

1.8 Abdominal Aortic Aneurysm screening

1.8a Does your Trust participate in the NHS Abdominal Aortic Aneurysm Screening Programme (NAAASP)?

[Tick 1 option]

Yes No Applied and NOT yet approved Applied and approved but not yet started

1.8b Does your Trust participate in your own local screening programme that is NOT part of the NHS Abdominal Aortic Aneurysm Screening Programme?

Yes No

Section 2: Vascular Networks [Definition: Networks between Trusts]

2.1 Is your Trust currently part of a Vascular Network? Yes No [If No, please go to 3.1]

2.1a If Yes, is your Trust part of a: FORMAL Network INFORMAL Network [Tick both if applicable]

2.1b(i) Name of the Vascular Network:

2.1b(ii) Name of the Chair/Lead of the Vascular Network:

2.1b(iii) Email address of the Chair/Lead:

2.1b(iv) Telephone number of the Chair/Lead:

2.1c What function does the Vascular Network serve? [Tick both if applicable]

Trust emergency vascular on call rota

Audit and governance for elective surgery

Other, specify.....

2.1d How often does your Vascular Network meet? [Tick 1 option]

Weekly Twice weekly Fortnightly Monthly Quarterly

Other, specify

2.1e Who regularly attends the Vascular Network meetings? [Tick all that apply]

Surgeon(s) Radiologist(s) Specialist Nurse(s)/Practitioner(s) Anaesthetist(s)

Stroke physician(s) Neurologist(s) Vascular Sonographer(s)/Technologist(s)

Manager(s) Secretary (ies) Other (please specify):

2.1f Which Trust (s) is/are in your Vascular Network?

Section 3: Staffing within your Trust [as at 1st December 2009]

Table 2: Staffing

[Please ensure that the figures you add to each of the fields in **Table 2** (parts **a**, **b** and **c**) are representative of the **TOTAL** number of procedures carried out at ALL the relevant hospitals within your Trust]

Staff	a. Total number of individuals	b. Total number of programmed activities (PAs)	c. Give an estimate of what percentage of their typical workload overall is VASCULAR service-related?	
3.1 Consultant Vascular Surgeon(s)	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> [PAs]	<input type="checkbox"/> <25%	<input type="checkbox"/> 25% - 49%
			<input type="checkbox"/> 50% - 74%	<input type="checkbox"/> ≥75%
3.2 Vascular SpR(s)	<input type="text"/> <input type="text"/>	N/A	<input type="checkbox"/> <25%	<input type="checkbox"/> 25% - 49%
			<input type="checkbox"/> 50% - 74%	<input type="checkbox"/> ≥75%
3.3 Consultant Interventional Radiologist (s)	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> [PAs]	<input type="checkbox"/> <25%	<input type="checkbox"/> 25% - 49%
			<input type="checkbox"/> 50% - 74%	<input type="checkbox"/> ≥75%
3.4 Interventional Radiology SpR(s)	<input type="text"/> <input type="text"/>	N/A	<input type="checkbox"/> <25%	<input type="checkbox"/> 25% - 49%
			<input type="checkbox"/> 50% - 74%	<input type="checkbox"/> ≥75%
3.5 Vascular Nurse Specialist(s)	<input type="text"/> <input type="text"/>	N/A		N/A
3.6 Vascular Technologist(s)	<input type="text"/> <input type="text"/>	N/A		N/A

3.7 Do the consultant vascular surgeons in your Trust also cover?

General surgery Yes No

Transplant surgery Yes No

Vascular Access Yes No

Weekly elective vascular theatre lists [Total during STANDARD working hours – as defined by your Trust]

3.8 What is the WEEKLY total number of? :

ELECTIVE vascular operating sessions [Definition: A half day list is equivalent to 1 session]

Additional endovenous sessions [Not necessarily in theatre]

Emergency on call rota [Out of hours]

3.9 Is there a 24/7 vascular on call rota in your Trust? Yes No

3.9a If Yes, please specify the VASCULAR rota for each surgeon involved [e.g. 1:4]

Surgeon 1 : Surgeon 2 : Surgeon 3 : Surgeon 4 : Surgeon 5 :
Surgeon 6 : Surgeon 7 : Surgeon 8 : Surgeon 9 : Surgeon 10 :

3.10 Do you have access to a designated emergency theatre? [Tick 1 option]

Yes, night time ONLY Yes, night and day No [If No, go to Q3.11]

3.10a If you have access to a designated emergency theatre, is it shared with other specialties? Yes No

3.11 What is the total number of hospitals that the Consultant vascular surgeons cover on the ON CALL ROTA?

Number of hospitals within OWN Trusts Number of hospitals within OTHER Trusts

3.12 Whilst on call, the Consultant Vascular Surgeons: [Tick all that apply]

Cover BOTH vascular and general surgery Yes No [If Yes, go to Q3.12a must be completed]

Do elective activity Yes No

Are ALWAYS on call with a Specialist Registrar or equivalent Yes No [If Yes, go to Q3.13]

3.12a If your surgeons cover BOTH vascular and general surgery please specify the general surgery rota for each surgeon:

Surgeon 1 : Surgeon 2 : Surgeon 3 : Surgeon 4 : Surgeon 5 :
Surgeon 6 : Surgeon 7 : Surgeon 8 : Surgeon 9 : Surgeon 10 :

3.13 If the Consultant Vascular Surgeon is ALWAYS on call with a Specialist Registrar, does the Specialist Registrar also cover general surgery whilst on call for vascular surgery? Yes No

3.14 Is there a FORMAL Interventional Radiology on call rota in your Trust? Yes No

3.15 Is there a FORMAL VASCULAR Anaesthetic on call rota in your Trust? Yes No

Trainee posts

3.16 Does your Trust provide vascular training? Yes No

3.16a Which of the following training is provided by your Trust?

Training of surgical trainees in vascular interventional radiology Yes No

Training of radiological trainees in vascular surgery Yes No

Training of radiological trainees in vascular interventional radiology Yes No

Section 4: Multidisciplinary Team meetings

4.1 Does your Trust have a dedicated vascular Multidisciplinary Team meeting? Yes No

4.1a How often does the Multidisciplinary Team meet? [Tick 1 option]

Daily Twice weekly Weekly Monthly Other (please specify) -----

4.1b Who regularly attends the Multidisciplinary Team meeting(s)? [Tick all that apply]

Surgeon(s) Radiologist(s) Specialist Nurse(s)/Practitioner(s) Anaesthetist(s)

Stroke physician(s) Neurologist(s) Vascular Sonographer(s)/Technologist(s)

Manager(s) Secretary (ies) Other (please specify): -----

4.1c Is appropriateness of intervention for the listed elective cases discussed at a Multidisciplinary Team meeting with relevant specialists? :

- | | | | | | |
|-----------------------------------|---------------------------------|--|------------------------------------|---------------------------------|--------------------------------|
| Infrarenal aortic aneurysm repair | <input type="checkbox"/> Always | <input type="checkbox"/> Nearly always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Rarely | <input type="checkbox"/> Never |
| Carotid Endarterectomy | <input type="checkbox"/> Always | <input type="checkbox"/> Nearly always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Rarely | <input type="checkbox"/> Never |
| Infrainguinal bypass | <input type="checkbox"/> Always | <input type="checkbox"/> Nearly always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Rarely | <input type="checkbox"/> Never |

Section 5: Outpatient Clinics

5.1 Do the consultants at your Trust do 'Hub and Spoke' clinics at other Trusts? Yes No

5.2 What is the total number of clinics done by your consultant vascular surgeons PER MONTH? [Total in all hospitals]

[Number of all clinics, in all hospitals]

5.3 Which of the following outpatient clinics does your service provide cover for? [Tick all that apply]

- Nurse-led community based
- Vascular clinic NOT involving any other specialty
- JOINT Vascular clinics with another specialty [If you have NOT selected this option go to **5.4**]

5.3a If your service provides outpatient clinic cover for *JOINT Vascular clinics with another specialty* which of the following specialties are involved? [Tick all that apply]

- Diabetes
- Stroke/TIA/Neurology
- Radiology
- Vascular Malformations
- Wound care/ulcer
- Podiatry
- Other, specify -----

5.4 Do you have any of the following equipment available in your Trust for use in the OUTPATIENT clinics? :

- Hand held Doppler Yes No
- Treadmill for exercise testing Yes No
- Portable duplex scanner Yes No

Section 6: Diagnostic Services/Investigations

6.1 Does your Trust have 24/7 access to the following: [Tick all that apply]

- Computed topography angiography (CT) Yes No
- Magnetic resonance angiography (MRA) Yes No
- Vascular ultrasound Yes No
- Catheter angiography Yes No
- Aneurysm ultrasound Yes No

Section 7: In-patient Stay

Pre-operative assessment

7.1 Does your Trust have a pre-admission clinical assessment service in which vascular patients are assessed? Yes No

7.1a Which of the following clinical categories receive pre-operative risk scoring assessment for patients undergoing major vascular surgery? [Tick all that apply]

- Cardiac
- Respiratory
- Renal
- Diabetes Mellitus
- Peripheral Vascular Disease
- None of these

7.1b For which of the following patient categories does your Trust have defined pathways for the correction of significant risk factors in vascular patients before intervention? [Please tick all that apply]

Cardiac Respiratory Renal

7.2 Are all patients undergoing major vascular surgery seen for pre-assessment by an anaesthetist experienced in vascular anaesthesia? Yes No

7.3 Does your Trust have beds dedicated to vascular surgery patients ONLY? Yes No

7.3a If Yes, what is the total number of dedicated vascular beds (as at 1st December 2009)?

7.3b If No, what type of bed are vascular patients admitted to?

General surgical beds Other, please specify -----

7.3c If vascular patients are admitted to general surgical beds, do the nurses have vascular nursing expertise? Yes No

7.4 Is the following available at your Trust? :

Cardiac intervention [e.g. coronary stenting] Yes No

Cardiopulmonary exercise testing Yes No

Post-operative in-patient stay

7.5 Is renal replacement therapy available at your Trust? [Haemofiltration/dialysis] Yes No

7.6 Which of the following units do you have access to for vascular surgery within your Trust? :

7.6a Type of unit

7.6a(i) Intensive therapy unit

Yes No

7.6a(ii) High Dependency unit

Yes No

7.6a(iii) Post anaesthetic care unit or equivalent

Yes No

7.6b Total number of beds

7.6b(i) If Yes, please specify the total number of beds for ALL specialties:

7.6b(ii) If Yes, please specify the total number of beds for ALL specialties:

7.6b(iii) If Yes, please specify the total number of beds for ALL specialties:

7.7 Were any elective vascular surgery cases cancelled in the last 12 months due to lack of a critical care bed? Yes No

7.7a If Yes, how many cases were cancelled?

Number of cases that were cancelled

Exact number Estimate

Section 8: Tertiary service

8.1 Is your Trust a vascular tertiary referral receiving centre? Yes No [If Yes, go to **8.1a**] [If No, go to **8.1b**]

8.1a If Yes, which Trust (s) do you have a formal/regular arrangement with to PROVIDE vascular services? -----

8.1b If applicable, which Trust (s) do you SEND your vascular referrals to as part of a formal/regular arrangement? -----

Section 9: Patient Involvement

9.1 Are patient views sought on vascular services? Yes No

9.1a Which of the following aspects of the service are patient views sought on?

Varicose veins (PROMs) Varicose veins (not PROMs) Other vascular procedures

9.1b (i) Is patient feedback on vascular services analysed and reported? Yes No [If No, go to **10.1**]

9.1b (ii) If Yes, has a report been produced within the past 12 months which analysed the views of patients? Yes No

Section 10: Data submission

10.1 Who completed this questionnaire? [Please tick 1 option only and give your name and email address]

The lead surgeon (nominated by VSGBI)

Nurse

Manager [please specify department/division]: -----

Other (specify) -----

10.2 Please supply the following contact information in case we need to contact you to clarify any of the responses you have given before we start the data analysis. -----

Appendix 2: Glossary

Abdominal Aortic Aneurysm repair	The surgical repair of a ballooned or ruptured section of the artery near the kidneys.
Amaurosis fugax	Transient loss of vision in one eye due to a interruption of blood flow to the retina.
Appropriateness of Intervention	A decision on whether it is appropriate to have the operation based on a number of key factors.
Asymptomatic Patient	A patient who does not yet show any outward signs or symptoms of plaque.
Carotid Endarterectomy (CEA)	Carotid Endarterectomy is a surgical procedure in which build up is removed from the carotid artery.
Carotid Stenting and Angioplasty	Narrowed artery is opened by blowing up a balloon inside narrowing and is kept open by a hollow support called a stent.
Carotid Stenosis	Abnormal narrowing of the neck artery to the brain.
Cell salvage	A method for collecting blood lost during/after an operation to be given back to the patient.
Comorbidity	The coexistence of two or more diseases.
Cranial Nerve Injury (CNI)	Damage to one of the 12 nerves supplying the head and neck.
Critical Care	Intensive medical and nursing care delivered on HDU or ITU for a patient who is either critically injured or critically ill.
Endovascular surgery	A method of accessing many regions of the body via major blood vessels in a minimally invasive procedure.
Endovascular aneurysm repair	The use of endovascular surgery to treat Abdominal Aortic Aneurysm.
Haemostatic agents	A substance that stops bleeding.
High Dependency Unit (HDU)	A unit in a hospital which is designed to monitor seriously ill patients and provides specialist nursing care. An HDU provides a level of care which is between that available on general wards and in the ITU.
Hospital Episode Statistics (HES)	HES is the national statistical data warehouse for England regarding the care provided by NHS hospitals and for NHS hospital patients treated elsewhere. There are equivalent agencies in Northern Ireland, Scotland and Wales but in this report, the term HES is used generically to describe data that are collected by any of these national agencies.
Infrainguinal Bypass Surgery	The surgical bypass of a blocked or narrowed artery in the leg
Intensive Therapy Unit (ITU)	A unit in a hospital which is designed to provide specialised and strictly monitored health care for critically ill and immediately postoperative patients by specialist multidisciplinary staff.
Interventional Radiology	Minimally invasive surgery guided by x-ray imaging to treat disease.
Inter-quartile range (IQR)	Once the data are arranged in ascending order, the central 50% of all values and is otherwise known as the 'middle fifty' or IQR.
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.
Multidisciplinary Team Meeting (MDT)	A meeting involving a group of people from more than one clinical discipline.

Myocardial Infarct (MI)	Otherwise known as a Heart Attack, MI involves the interruption of the blood supply to part of the heart muscle.
National Confidential Enquiry into Patient Outcome and Death (NCEPOD)	NCEPOD provides critical examination, by senior and appropriately chosen specialists, of what has actually happened to patients in the event of death. It covers everything from individual clinical practice to national healthcare organisation, always with the aim of improving patient care and safety.
NHS Abdominal Aortic Aneurysm Screening Programme	An NHS programme to reduce deaths from abdominal aortic aneurysms, through early detection.
Occluded artery	An artery that has become blocked and stops blood flow.
Operating list	An operating theatres timetable defined for this audit as half a day.
Plaque	Scale in an artery of 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.
POVS	The Provision Of Vascular Service (POVS) sets out the principles for high quality vascular services.
Prosthetic Graft	A tube or sheet of prosthetic material used to replace or bypass sections of veins or arteries.
Quality Improvement Framework (QIF)	A set of guidelines designed by the Vascular Society of Great Britain and Ireland to improve the quality of care.
Rapid infuser	A machine required for the safe and rapid delivery of intravenous (IV) fluids to patients.
Rapid access to blood products	When surgeons have access to blood and blood products within one hour whilst in theatre.
Strategic Health Authority (SHA)	An organisation, accountable to government, that assesses the health needs of local people and ensures that local health services are commissioned and provided to meet those needs.
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.
Transient ischaemic attack (TIA)	A "mini-stroke" where the blood supply to the brain is briefly interrupted and recovers within 24 hours.
Trust or Health Board	A public sector corporation which contains a number of hospitals, clinics and health provisions. For example, there were 4 hospitals in the trust and 3 trusts in the SHA.
Vascular anaesthetist	An anaesthetist with specialist vascular expertise.
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.
Vascular Specialist Registrars (SpRs)	A doctor receiving advanced training as a vascular specialist in order to qualify as a consultant.

Appendix 3:

National Clinical Audit of Carotid Endarterectomy Phase 1 [Referral to hospital discharge]

Section 1: Demographics

- 1.1 Date procedure was undertaken: _____ [DD/MM/YYYY]
- 1.1a **New!** Was this procedure successfully completed? Yes Abandoned
- 1.1b **New!** If procedure was *Abandoned*, give reason: _____
- 1.2 RCP surgeon code: _____
- 1.2a **New!** GMC Number: [On the web tool, this field is filled automatically once Q1.2 is filled] [7 digits]
- 1.3 Hospital name: _____
- 1.4 RCP Hospital code: [On the web tool, this field is filled automatically] once Q1.3 [3 digits]
- 1.5 Date of birth: _____ [DD/MM/YYYY]
- 1.6a Patient code: [Describes a random number (up to 3 digits) given to the patient for anonymity]
- 1.6b **New!** Patient hospital number: [As a local hospital patient identifier, this field is visible to hospital staff only]
- 1.7 Gender: Male Female [Tick 1 option only]
- 1.9 Ethnicity: [Tick 1 option only]
- | | | |
|-------------------------------|-----------------------|---|
| White | <input type="radio"/> | British, Irish, Any other white background |
| Mixed | <input type="radio"/> | White and Black Caribbean, White and Black African, White and Asian, Any other Mixed background |
| Asian or Asian British | <input type="radio"/> | Indian, Pakistani, Bangladeshi, Any other Asian background |
| Black or Black British | <input type="radio"/> | Caribbean, African, Any other Black background |
| Chinese or other ethnic group | <input type="radio"/> | Chinese, Any other |
- 1.10 **New!** Which of the following procedures was performed? [Tick 1 option only]
- Surgical carotid endarterectomy Angioplasty/stent Combined CEA and angioplasty/stent
- 1.11 Date patient was admitted to this Hospital in **this episode** of care: _____ [DD/MM/YYYY]

Section 2: Risk Factors

- 2.1 Diagnosed Diabetic: Yes No [Tick 1 option only]
- 2.2 Any current symptoms of or treatment for ischaemic heart disease or congestive heart failure?
Yes No [Tick 1 option only]
- 2.3 **New!** Known peripheral arterial vascular disease (symptoms or previous intervention) Yes No
- 2.4 Pre-operative blood pressure (e.g. taken on day or prior to surgery or in clinic):
Systolic BP (mmHg): [] [Min= 20, Max=350]
New! Diastolic BP (mmHg): [] [Min= 20, Max=350]

Section 3: Referral to surgeons

- 3.1 Date of referral to team under whose care surgery or angioplasty/stenting was undertaken: [DD/MM/YYYY]
- 3.1a **New!** Date patient was first seen by team under whose care surgery or angioplasty/stenting was undertaken: [DD/MM/YYYY]
- 3.2 Who referred the patient to the team under whose care surgery or angioplasty/stenting was undertaken?
[Tick 1 option only]

General Practitioner Neurologist Stroke Physician **New!** Radiologist
 Care of the Elderly Consultant **New!** Vascular Surgeon **New!** Cardiologist/Cardiothoracic surgeon
New! Ophthalmology **New!** Self referral **New!** Other Surgeon Other

3.2a If answered *Other* to 3.2, specify: _____

3.3 **New!** Was the patient referred from another Trust? Yes No [Tick 1 option only]

Section 4: Indications that triggered referral

4.1 Was the patient symptomatic for carotid disease? Yes No [Tick 1 option only]

4.1a **New!** If 'Yes', give the **date** the patient experienced the symptom that triggered referral for surgery or angioplasty/stent: _____ [DD/MM/YYYY] Date not known

4.1b **New!** If *Date Not known*, estimate the time between the date the patient experienced the symptom and the date that the initial referral for surgery or angioplasty/stent was made: [Tick 1 option only]

1-2 days 3-7 days 8-14 days 15-21 days 22-28 days >28 days

4.1c What was the symptom that triggered referral for surgery or angioplasty/stent?
 Amaurosis fugax Transient ischaemic attack Stroke
New! Chronic cerebral hypoperfusion **New!** Other

4.1d **New!** If answered *Other* to 4.1c, specify: _____

4.1e **New!** If 'No' to 4.1, is CEA or angioplasty/stent being undertaken prior to major surgery (e.g. CABG) or as part of randomised trial? [Tick 1 option only]

Major surgery (e.g. CABG) Randomised trial Neither of these

Section 5: DIAGNOSTIC carotid imaging [i.e. Imaging that identified ICA stenosis requiring treatment]

5.1 Date of the initial DIAGNOSTIC carotid imaging that identified ICA stenosis requiring treatment: _____ [DD/MM/YYYY]

5.2 Specify imaging modalities used on date given in 5.1: [Select at least 1 option]

Duplex MR angiogram Catheter angiogram CT angiogram Other or Not documented

5.2a Grade of ipsilateral carotid stenosis (based on **NASCET** criteria): [Tick 1 option only]
 <50% 50%-69% 70%-89% 90%-99% Occluded

5.2b Grade of contralateral carotid stenosis (based on **NASCET** criteria): [Tick 1 option only]
 Not done <50% 50%-69% 70%-89% 90%-99% Occluded

5.3 **New!** Has the patient had further pre-operative carotid imaging after initial scan, to confirm diagnosis?
 Yes No [If No, go to 6.1] [If Yes, 5.3a must be completed]

5.3a **New!** Date patient had further pre-operative carotid imaging after initial scan, to confirm diagnosis:
 _____ [DD/MM/YYYY] [Date entered MUST be BEFORE date of procedure (1.1)]

5.3b **New!** Specify imaging modalities used on date given in 5.3a: [Select at least 1 option]

Duplex MR angiogram Catheter angiogram CT angiogram Other or Not documented

5.3c **New!** If answered Yes to 5.3, specify grade of ipsilateral carotid stenosis (based on **NASCET** criteria):
 <50% 50%-69% 70%-89% 90%-99% Occluded

5.3d **New!** If answered Yes to 5.3, did the patient have a string sign (with a collapsed ICA)? Yes No

5.3e **New!** If answered Yes to 5.3, specify grade of contralateral carotid stenosis (based on **NASCET** criteria):
 Not done <50% 50%-69% 70%-89% 90%-99% Occluded

Section 6: Most recent carotid imaging prior to undergoing this surgery or angioplasty/stent

- 6.1 **New!** Has the patient had further pre-operative carotid imaging to confirm patency immediately prior to surgery or angioplasty/stent? Yes No
- 6.1a **New!** If answered Yes to 6.1, give date of pre-operative imaging to confirm patency prior to surgery or angioplasty/stent: _____ [DD/MM/YYYY]

Section 7: Function prior to undergoing this surgery or angioplasty/stent

- 7.1 **New!** Give date of the most recent ISCHAEMIC event prior to surgery or angioplasty/stent: _____ [DD/MM/YYYY]
- 7.2 Rankin score immediately pre-operatively or prior to angioplasty/stent: [Tick 1 option only]
- 0 Asymptomatic
 - 1 Non-disabling symptoms no interference with lifestyle
 - 2 Minor disability some restriction in lifestyle but does not interfere with patient's capacity to look after self
 - 3 Moderate disability symptoms significantly interfere with lifestyle or prevent totally independent existence
 - 4 Moderately severe symptoms prevent independent existence but patient does not need attention 24hrs
 - 5 Severely disabled totally dependent day and night

Section 8: Previous carotid interventional procedures

- 8.1 Previous ipsilateral carotid surgery: Yes No [Tick 1 option only]
- 8.2 Previous ipsilateral carotid angioplasty or stent: Yes No [Tick 1 option only]

Section 9: Tests prior to undergoing this surgery or angioplasty/stent

- 9.1 Creatinine: [] (mmol/L) [Min=5 Max=1000]

Section 10: Drug therapy prior to undergoing this surgery or angioplasty/stent

- 10.1 Was the patient on anti-platelet/thrombotic treatment prior to surgery or angioplasty/stent? Yes No
- 10.2 Which of the following drugs was the patient taking prior to surgery or angioplasty/stent:
Aspirin Clopidogrel Dipyridamole Warfarin **New!** Other
- 10.2a Was ASPIRIN stopped prior to surgery or angioplasty/stent? Yes No [If No, ignore 10.2b]
- 10.2b If ASPIRIN was stopped, specify the number of days it was stopped prior to surgery or angioplasty/stent:
[] [Days]
- 10.2c Was CLOPIDOGREL stopped prior to surgery or angioplasty/stent? Yes No
- 10.2d If CLOPIDOGREL was stopped, specify the number of days it was stopped prior to surgery or angioplasty/stent: [] [Days]
- 10.2e Was DIPYRIDAMOLE stopped prior to surgery or angioplasty/stent? Yes No
- 10.2f If DIPYRIDAMOLE was stopped, specify the number of days it was stopped prior to surgery or angioplasty/stent:
[] [Days]
- 10.2g Was WARFARIN stopped prior to surgery/angioplasty/stent? Yes No
[If No, ignore 10.2h]
- 10.2h If WARFARIN was stopped, specify the number of days it was stopped prior to surgery or angioplasty/stent: [] [Days]
- 10.3 Was the patient on statin therapy prior to surgery or angioplasty/stent? Yes No
- 10.4 Was the patient on beta-blockers therapy prior to surgery or angioplasty/stent? Yes No

Section 11: Delay to surgery or angioplasty/stent

11.1 **New!** If elapsed time between the symptom that triggered referral and surgery or angioplasty/stent is greater than 2 weeks, specify reason(s):

Delay in presentation	<input type="checkbox"/>	Limited availability of surgeon	<input type="checkbox"/>	Other	<input type="checkbox"/>
Delay in referral	<input type="checkbox"/>	Limited availability of anaesthetist	<input type="checkbox"/>		
Delay in carotid imaging	<input type="checkbox"/>	Limited availability of radiologist	<input type="checkbox"/>		
Patient cancellation/delay - unfit	<input type="checkbox"/>	Lack of operating time	<input type="checkbox"/>		
Patient cancellation/delay – patient choice	<input type="checkbox"/>	Other case took priority	<input type="checkbox"/>		

11.1a **New!** If answered *Other* in 11.1, specify: _____

Section 12: Procedure details

12.1 Which carotid artery was treated? Left Right [Tick 1 option only]

12.2 Start time: [:] [Hours:Minutes]

12.3 Finish time: [:] [Hours:Minutes]

12.3a **New!** If length of procedure is <1hour or >3hours, give reason: _____

12.4 Grade of most senior surgeon in theatre: [Tick 1 option only]
 Consultant Non consultant career grade Specialist registrar

12.4a **New!** If most senior surgeon in theatre was *Specialist registrar*, specify year of training:
 Year 1 Year 2 Year 3 Year 4 Year 5

12.5 **New!** Was this a joint consultant operation with two consultant surgeons operating together? Yes No

12.6 Type of surgery: Elective Unplanned/Emergency [Tick 1 option only]

12.7 Type of anaesthetic used during surgery? General Local/Blocks
New! Started with LA, switched to GA

12.8 Grade of most senior anaesthetist in theatre: [Tick 1 option only] [If NOT Specialist registrar, go to 13.1]
 Consultant Non consultant career grade Specialist registrar

12.8a **New!** If most senior anaesthetist in theatre was *Specialist registrar*, specify year of training:
 Year 1 Year 2 Year 3 Year 4 Year 5

Section 13: Specific procedure data [Complete Q13.1 to Q13.1b and 13.10 to 13.12 ONLY if the patient had angioplasty/stent]

13.1 **New!** If angioplasty/stent only performed was conventional was surgery an option? Yes No

13.1a **New!** Whose care was the patient under when they underwent angioplasty/stent? [If NOT Other, go to 13.2]
 Vascular surgeon Neurosurgeon Radiologist Stroke Physician Other

13.1b **New!** If answered *Other* to 13.1a, specify: _____

13.2 **New!** Was this patient in a stenting versus surgery clinical trial? Yes No

13.2a **New!** If the patient was in a stenting versus surgery trial were they in ICSS or ACST-2? ICSS ACST-2

13.3 **New!** Pathology: [Select at least 1 option] [If NOT Other, ignore 13.3a]

Atherosclerosis Post endarterectomy restenosis Post radiotherapy Other

13.3a **New!** If answered *Other* to 13.3, specify: _____

13.4 Was a carotid shunt used? Yes No **New!** Attempted and abandoned [Tick 1 option only]

- 13.5 Type of endarterectomy: Standard Eversion [Tick 1 option only]
- 13.6 Was a carotid patch used? Yes No [Tick 1 option only]
- 13.7 Were distal tacking sutures used? Yes No [Tick 1 option only]
- 13.8 Was heart surgery undertaken synchronously? Yes No [Tick 1 option only]
- 13.9 **New!** Which of the following completion assessment techniques were used? [Select at least 1 option]
 None Angiography Duplex scan Angioscopy Hand-held Doppler

- 13.10 **New!** Site of angioplasty/stenting: [Select at least 1 option]
 Carotid bifurcation (including proximal ICA) Distal ICA (below base of skull)
 Common Carotid artery External Carotid artery
- 13.11 **New!** Procedure details: Angioplasty alone Stent Cerebral protection device
- 13.11a **New!** If answered *Stent* to 13.11, specify type: [Select at least 1 option] [If NOT Other, ignore 13.11b]
 Abbott XAct Abbott Acculink Bard Vivax Boston Scientific Wallstent
 Boston Scientific NEX stent Cordis Precise InveTec Cristallo Medtronic Exponent
 Other
- 13.11b **New!** If answered *Other* to 13.11a, specify: _____
- 13.11c **New!** If answered *Cerebral protection device* to 13.11, specify type:
 Filter Flow reversal Proximal occlusion (MoMa) Distal occlusion (PercuSurge)
 Other
- 13.11d **New!** If answered *Other* to 13.11c, specify: _____
- 13.12 **New!** Grade of most senior radiologist performing intervention: [Tick 1 option only]
 Consultant Non consultant career grade Specialist registrar

Section 14: Destination post-operatively or post angioplasty/stent

- 14.1 **New!** Time spent in recovery area: [Tick 1 option only]
 None <4 hours >4 ≤ 12 hours >12 hours
- 14.2 Where was the patient admitted post-operatively or post angioplasty/stent (after any period in recovery)?
 Intensive care unit High dependency unit Ward **New!** PACU

Section 15: Complications during inpatient stay

- 15.1 Did the patient suffer any complications during inpatient stay? Yes No [If No, go to 15.6]
- 15.1a **New!** If answered 'Yes to 15.1', which of the following complications did the patient experience?

Myocardial Infarct	<input type="checkbox"/>	Cranial nerve injury (includes neuropraxia)	<input type="checkbox"/>	Occlusion of treated carotid artery	<input type="checkbox"/>
Stroke	<input type="checkbox"/>	Heart Failure (includes cardiac arrhythmia)	<input type="checkbox"/>	Respiratory	<input type="checkbox"/>
TIA	<input type="checkbox"/>	Urinary	<input type="checkbox"/>	Thromboembolism related to the treated carotid artery	<input type="checkbox"/>
Amaurosis fugax	<input type="checkbox"/>	Cardiac arrest	<input type="checkbox"/>	Post-intervention hypertension	<input type="checkbox"/>
Bleeding	<input type="checkbox"/>	Fit	<input type="checkbox"/>	Other	<input type="checkbox"/>

- 15.1b If answered 'Other' to 15.1a, specify: _____
- 15.2 **New!** If the patient experienced a *myocardial infarct*, specify timing: [Tick 1 option only]
 ≤24hrs of undergoing procedure
 >24hrs after undergoing procedure and prior to discharge
- 15.3 If the patient experienced a *stroke*, specify timing: [Tick 1 option only]
New! During procedure (woke up with a stroke)
 ≤24hrs of undergoing procedure
 >24hrs after undergoing procedure and prior to discharge
- 15.3a **New!** If patient experienced a stroke >24hrs after undergoing procedure and prior to discharge, give date patient of stroke: _____ [DD/MM/YYYY] [

- 15.3b **New!** Side of stroke: Side on which this procedure was done Contralateral side
- 15.3c Severity of stroke: *[Tick 1 option only]*
- 0 Asymptomatic
- 1 Non-disabling symptoms no interference with lifestyle
- 2 Minor disability some restriction in lifestyle but does not interfere with patient's capacity to look after self
- 3 Moderate disability symptoms significantly interfere with lifestyle or prevent totally independent existence
- 4 Moderately severe symptoms prevent independent existence but patient does not need attention 24hrs
- 5 Severely disabled totally dependent day and night
- 15.3d **New!** Give date the assessment in 15.3c was made: _____ *[DD/MM/YYYY]*
- 15.4 **New!** If patient experienced TIA, specify timing:
 ≤24hrs of undergoing procedure >24hrs after undergoing procedure and prior to discharge
- 15.5 **New!** If patient experienced *cranial nerve injury*, specify date injury was found: _____ *[DD/MM/YYYY]*
- 15.5a **New!** Affected cranial nerve (or branch): *[Select at least 1 option]*
 Hypoglossal Facial Glossopharyngeal Vagus Recurrent laryngeal
- 15.6 **New!** Did the patient return to theatre for ANY reason during hospital stay? Yes No
- 15.6a **New!** If answered Yes to 15.6, specify reason patient returned to theatre: *[Select at least 1 option]*
 Bleeding Stroke Thromboembolism related to the treated carotid artery Other
- 15.6b If answered *Other* to 15.6a, specify: _____
- 15.7 Did the patient die during inpatient stay? Yes No *[Tick 1 option only] [If No, go to 16.1]*
- 15.7a If answered Yes to 15.7, give the date that the patient died: _____ *[DD/MM/YYYY]*
- 15.7b **New!** Specify PRIMARY cause of death: Myocardial Infarct Bleeding Stroke Other
- 15.7c **New!** If answered *Other* to 15.7b, specify: _____

Section 16: Discharge data

- 16.1 Date patient was discharged by team under whose care surgery or angioplasty/stent was performed: _____ *[DD/MM/YYYY]*
- 16.2 Date patient was discharged from hospital: _____ *[DD/MM/YYYY]*
- 16.3 Discharge Destination: Home Care Home Other Hospital Other
- 16.3a If answered *Other* to 16.3, specify: _____
- 16.4 What was the Rankin score at hospital discharge? *[Tick 1 option only]*
- 0 Asymptomatic
- 1 Non-disabling symptoms no interference with lifestyle
- 2 Minor disability some restriction in lifestyle but does not interfere with patient's capacity to look after self
- 3 Moderate disability symptoms significantly interfere with lifestyle or prevent totally independent existence
- 4 Moderately severe symptoms prevent independent existence but patient does not need attention 24hrs
- 5 Severely disabled totally dependent day and night

Section 17: Phase 1 Data entry

- 17.1 **New!** Who completed Phase 1? *[Tick 1 option only]*
 Surgeon Specialist Registrar (Surgical) Basic surgical trainee Nurse
 Audit personnel Radiologist Specialist Registrar (Radiological) Other
- 17.1a **New!** If answered *Other* to 17.1, specify: _____

Phase 2 [30-day survival/Follow-up assessment]

Section 18: Patient status at 30days after undergoing procedure

- 18.1 Did the patient die following discharge (up to 30 days after undergoing this procedure)? Yes No
- 18.1a If answered Yes to 18.1, give date patient died: _____ *[DD/MM/YYYY]*
- 18.1b Cause of death: Myocardial infarct Bleeding Stroke Other Unknown
- 18.1c If answered *Other* to 18.1b, specify: _____ *[Go to 21.1]*

Section 19: Follow-up attendance

- 19.1 Was the patient offered a post-discharge follow-up appointment? Yes No

- 19.2 If answered Yes to 19.1, did the patient attend post-operative follow-up appointment?
Yes No [Tick 1 option only] [If No, go to 21.1]
- 19.2a If answered Yes to 19.2, give date of post-discharge follow-up assessment: _____ [DD/MM/YYYY]
- 19.2b **New!** Form of follow-up: [Tick 1 option only]
Patient seen in OPD (own Trust) Patient seen in OPD (other Trust) Telephone follow-up
Postal follow-up
- 19.3 Specify speciality of professional that assessed the patient: [Select at least 1 option]
Surgeon Neurologist Stroke Physician Care of the Elderly Consultant
Cardiologist/Cardiothoracic surgeon Other [If NOT Other, go to 20.1]
- 19.3a If answered Other to 19.3, specify speciality: [e.g. Vascular SpR] _____

Section 20: Post-operative follow-up data

- 20.1 **New!** Was the patient re-admitted for a complication <30days after operation and after hospital discharge?
Yes No [If No, go to 20.2]
- 20.1a **New!** If answered Yes to 20.1, give date patient was re-admitted: _____ [DD/MM/YYYY]
- 20.1b **New!** Specify reason for re-admission: Stroke Cardiac Respiratory Other
- 20.1c **New!** If answered Other to 20.1b, specify: _____
- 20.2 Was evidence of cranial nerve injury found at follow-up (that was NOT identified prior to discharge)?
Yes No [If 'No', go to 20.3]
- 20.2a **New!** If answered Yes to 20.2, which nerve (or branch) was affected? [Select at least 1 option]
Hypoglossal Facial Glossal pharyngeal Vagus Recurrent laryngeal
- 20.3 Has the patient had a stroke **since discharge**? Yes No [If No, go to 20.4]
- 20.3a If answered Yes to 20.3 give date patient experienced stroke (if exact date is not known, give best estimate): _____
- 20.4 Rankin score at this visit (follow-up): [Tick 1 option only]
0 Asymptomatic
1 Non-disabling symptoms no interference with lifestyle
2 Minor disability some restriction in lifestyle but does not interfere with patient's capacity to look after self
3 Moderate disability symptoms significantly interfere with lifestyle or prevent totally independent existence
4 Moderately severe symptoms prevent independent existence but patient does not need attention 24hrs
5 Severely disabled totally dependent day and night
- 20.5 What drug therapy is the patient on post-operatively? [Select at least 1 option]
Anti-platelet/thrombotic Statin Beta-blockers
- 20.5a If answered Anti-platelet/thrombotic to 20.5, specify drug(s):
Aspirin Clopidogrel Dipyridamole Warfarin **New!** Other
- 20.5b **New!** If answered Other to 20.5a, specify: _____
- 21.1 **New!** Who completed Phase 2? [Tick 1 option only]
Surgeon Specialist Registrar (surgical) Basic surgical trainee Nurse
Audit personnel Radiologist Specialist Registrar (radiological) Other
- 21.1a **New!** If answered Other to 21.1, please specify: _____