



Vascular Surgery

GIRFT Programme National Specialty Report

by **Professor Michael Horrocks**

GIRFT Clinical Lead for Vascular Surgery

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Contents

FOREWORD.....	3
Foreword from Professor Tim Briggs, GIRFT Programme Chair	3
Foreword from Professor Michael Horrocks, GIRFT Clinical Lead for Vascular Surgery.....	4
About this report.....	5
EXECUTIVE SUMMARY.....	6
List of recommendations.....	8
Next steps: implementation.....	9
WHAT IS VASCULAR SURGERY?.....	10
Pathway 1: Abdominal aortic aneurysm (AAA) screening and repair	11
Pathway 2: Carotid endarterectomy (CEA)	13
Pathway 3: Lower limb revascularisation (including amputation).....	15
RECOMMENDATIONS.....	17
Reconfiguring vascular care as ‘urgent’.....	17
Shorter stays, fewer readmissions.....	27
Improving data collection to improve our understanding.....	34
Increasing consistency and reducing costs in procurement	40
Reducing the impact of litigation.....	45
POTENTIAL IMPACT	46
ABOUT THE GIRFT PROGRAMME	48
GLOSSARY.....	51
ACKNOWLEDGMENTS	53

Foreword from Professor Tim Briggs, GIRFT Programme Chair

When I began my review of orthopaedic surgery more than five years ago, I was driven by a desire to improve the specialty I have devoted my career to, fix many of the issues I and my colleagues regularly face, and ensure better care and outcomes for the patients who put their trust in our hands.

What I found when visiting hospitals and more than 2,000 surgeons, clinicians, managers and support teams was that everyone shared my desire to improve practices, techniques and processes for the benefit of our patients. They recognised and supported the importance of having a better insight and understanding of how their specialty was performing and the kind of impact unwarranted variation was having on their services.

We examined the data on orthopaedic surgery, discussed the challenges they faced, debated the possible solutions, and where there was good practice, we held this up as an exemplar of how orthopaedic surgery in England could be improved. All this information and insight was captured in my first report, which coined the term 'Getting It Right First Time', giving this programme both its name and its mission statement.

The programme has now expanded to include 35 specialties – surgical and medical – and each review results in a report that includes a range of evidence-based recommendations that our clinical leads, all experts in their field, feel would truly make a difference to patient care and efficiency. In tackling the variation in the way services are provided and delivered, we are able to identify recommendations that can help improve the quality of care for patients and, in doing so, help make the NHS more financially sustainable.

Throughout, we have found a real willingness to engage with our programme and this review into vascular surgery has been no exception. I am delighted to present and recommend this report by Professor Michael Horrocks.

His review has helped to build a more detailed picture of vascular procedures, and how they are delivered, than ever before. His 17 recommendations offer opportunities to transform patient care and outcomes by reducing the unwarranted differences between hospitals treating vascular conditions. His report demonstrates how tangible efficiencies can be created by improving the provision of vascular surgery to enable more patients to receive urgent vascular surgery sooner, in turn reducing the likelihood of life-threatening strokes, transient ischaemic attacks, aortic aneurysm ruptures and arterial blockages.

This report brings real insight into what works and what isn't working and will enable clinicians and managers to consider how best to configure their vascular services as part of a 'hub and spoke' model for the benefit of their patients.

GIRFT and the other Carter programmes are already demonstrating that, by transforming provider services and investing to save, there are huge gains to be made for patient care and NHS finances. My hope is that GIRFT, through initiatives such as this report, will provide the impetus for clinicians, managers and programmes such as ours, to work together, shoulder to shoulder, to create solutions and improvements that for too long have seemed impossible to deliver.



Professor Tim Briggs is Consultant Orthopaedic Surgeon at the Royal National Orthopaedic Hospital (RNOH), where he is also Director of Strategy and External Affairs. He led the first review of orthopaedic surgery which became the pilot for the GIRFT programme, of which he is now Chair. Prof Briggs is also National Director for Clinical Quality and Efficiency.

Professor Tim Briggs

Foreword from Professor Michael Horrocks, GIRFT Clinical Lead for Vascular Surgery

Vascular surgeons and interventional radiologists routinely undertake complex and high-risk procedures that don't just save lives, but transform them. We protect people from strokes, can help restore mobility and relieve agonising pain. Over the past 20 years, our capacity to do all of this has increased, with the development of increasingly complex open and endovascular procedures that enable us to treat more patients with life-threatening conditions safely.

Yet the Getting It Right First Time (GIRFT) process – a combination of data analysis and in-depth face-to-face discussions during hospital visits with clinicians and managers – has also shown, in unambiguous terms, how much more we could be doing. It has demonstrated that, in many areas, patients have to wait too long for the vital surgery we can provide.

Wait times for critical surgery to prevent rupture of abdominal aortic aneurysms can be as long as 21 weeks. While some vascular units are able to undertake vital surgery to improve blood flow to the brain within five days of a patient experiencing a mini-stroke – and thus immediately reduce the risk of a major one – many other providers fail to meet the NICE guideline of delivering surgery within two weeks of diagnosis. Furthermore, there appear to be opportunities to reduce the number of lower limb amputations, by ensuring the risk is identified sooner so revascularisation procedures can be provided.

Through the GIRFT visits, we now have a greater understanding of what causes these delays; inevitably, there is no single or simple reason. Considered as a whole, however, the delays indicate a surgical service that is not configured to meet the clinical need. Like other disciplines, vascular surgery has been split into emergency and elective surgery. In my view, this divide is inappropriate, for a field of practice where surgery is almost always urgent.

Therefore, the pivotal recommendation this report makes is that arterial surgery should be reconfigured so that all patients

can be treated on an urgent basis – by establishing hub and spoke networks, where the hubs have the capacity and flexibility to offer a seven-day service. This model is already supported by the Vascular Society and NHS England; where it has been adopted and embedded well, we can see major improvements in wait times and other patient outcomes. Where well-embedded, this network model typically leads to improved perioperative care, by facilitating closer working with other medical specialties who are also treating these often very frail patients. That in turn could also help reduce length of stay and readmissions. These benefits underline the importance of ensuring that all vascular networks are established as required by the existing national service specification.

The potential to deliver substantial improvement in these core outcomes is why I believe the crucial next step for vascular surgery is to ensure that this network model becomes the norm, with all providers part of a network and work clearly and consistently distributed between the hubs and spokes.

The GIRFT programme has brought into sharp focus the need to improve the quality of data we collect about vascular patients and surgical activity, and the need to record data covering a greater proportion of vascular procedures. We know this because the number of vascular procedures recorded each year in the National Vascular Registry (NVR) is different from the number recorded in Hospital Episode Statistics (HES). Whilst the available data has proved vital to the GIRFT programme and to producing this report, increasing the quality of the data would enable clearer insight and thus potentially lead to further opportunities for improvement being identified. The report makes several practical recommendations to address data quality.

Being the clinical lead for the vascular surgery stream of the GIRFT programme has been a fascinating and rewarding experience. It has brought me into contact with outstanding surgeons, committed clinical teams and far-sighted hospital managers; I hope this report can help equip them to deliver their vital work to more patients.



Michael was Professor of Surgery in Bath before his recent retirement. He has been Secretary General of the European Society of Vascular Surgery and President of the Vascular Society of Great Britain and Ireland, President of the Association of Surgeons of Great Britain and Ireland (ASGBI) and a Council member of the Royal College of Surgeons, chairing Education and Professional Standards and elected senior vice-president.

Professor Michael Horrocks

About this report

This report sets out 17 recommendations to improve the way vascular surgery – surgery to repair and restore blood supply to organs and areas of the body – is delivered in the NHS in England. The recommendations focus primarily on the way vascular surgery is organised and delivered, with the central goal of enabling patients to receive urgent surgery sooner. Taken together, they could not only deliver better surgical outcomes for seriously ill patients but also reduce length of stay, cut readmissions and make better use of surgical resources.

The report also recommends steps to improve the quality of data gathered around vascular surgery, as a precursor to further long-term change, and identifies opportunities to deliver substantial cost savings on procurement of devices and consumables.

The report and recommendations are the output of work conducted under the NHS Improvement programme, Getting It Right First Time (GIRFT). Begun in 2012, the GIRFT programme uses existing NHS and wider healthcare data in a new and innovative way. Data from multiple NHS sources is consolidated and analysed to provide a detailed national picture of a particular area of practice. This process highlights variations in care decisions, patient outcomes, costs and other factors across the NHS. The data is then put to immediate use by experienced clinicians who visit individual hospital trusts to discuss the data, focussing on areas where that trust's approach appears to differ from the national norm.

This is an opportunity for both parties to learn; the individual trust can understand where its performance appears to be below average, and draw on clinical expertise to identify ways to address that, while the visiting clinicians can gain an insight into emerging best practices, to feed into the national picture and make recommendations for service-wide improvement.

The recommendations in this report are made following visits to all 70 of the NHS trusts in England that conduct vascular surgery. They have been reviewed and considered by relevant stakeholders before publication, securing strong support for both the overall direction and the specific detail of implementation. The aim is that they should serve as the catalyst for further discussion and action, at national, trust and individual surgeon level.



The Vascular Society

The Vascular Society is the largest professional organisation representing Consultant Vascular surgeons and trainees in Great Britain and Ireland. We welcome this report from the Getting It Right First Time initiative into vascular services. We are a relatively new surgical specialty in a period of transition and change. Our goal is to deliver the best possible care to our patients with vascular disease and this is a challenge. The society and our members have worked with the GIRFT team to complete this initial analysis of the vascular services we currently deliver. This identifies the strengths and weaknesses of our services and highlights the improvements we can make. This provides us with the benchmark from where we can plan further change. Working with the GIRFT team we believe we can improve the quality of care patients receive with better outcomes delivered at the right time. There are also potential cost savings highlighted in this report from reduced complications, hospital stays and re-admissions. There is therefore much to be gained from this report and implementing its recommendations.

Mr Kevin Varty MD FRCS BM BCh
President - The Vascular Society

EXECUTIVE SUMMARY

Vascular surgery covers a range of surgical procedures undertaken on veins and the lymphatic system – but the most important part of the vascular surgeon’s work is to reconstruct, unblock or bypass arteries that are blocked by atherosclerosis. In undertaking these precision procedures, vascular surgeons restore blood flow to organs of the body helping to reduce sudden death, preventing strokes, restoring movement and reducing the risk of amputation. A further central role for vascular surgery is to address aortic aneurysms, which, when these rupture, can rapidly lead to death.

Advances in techniques and technology over the last three decades have meant it is possible to carry out a greater number of these life-saving procedures, even on extremely frail patients. Seventy NHS trusts across England conduct vascular surgery, with some units managing hundreds of procedures each year. The Getting It Right First Time (GIRFT) programme has helped build a more detailed picture of those procedures, the patients who undergo them and the outcomes than ever before.

The GIRFT programme

Funded by the Department of Health and jointly overseen by NHS Improvement and the Royal National Orthopaedic Hospital NHS Trust, GIRFT seeks to identify variation within NHS care and then learn from it. GIRFT is one of several on-going work streams designed to improve operational efficiency in NHS hospitals. In particular, it is part of the response to Lord Carter’s review of productivity, and is providing vital input to the Model Hospital project. It is also closely aligned with programmes such as NHS RightCare, acute care collaborations (ACCs) and sustainability and transformation partnerships (STPs) – all of which seek to improve standards while delivering efficiencies.

Under the GIRFT programme, data from many NHS sources is consolidated and analysed to provide a detailed national picture of a particular area of practice. This process highlights variations in care decisions, patient outcomes, costs and other factors across the NHS. The data is reviewed by experienced clinicians, recognised as experts in their field, who visit individual hospital trusts to discuss the data with senior management and the clinical teams involved in the specialty under review. Discussion focuses on areas where the trust’s approach appears to differ from the national norm.

The analysis and visits lead not only to targeted action within individual trusts, but also a national report, including recommendations, backed by an implementation programme to drive change and address unwarranted variation.

Long waits for urgent care

The GIRFT team has visited all 70 trusts that offer vascular surgery in England and identified several key areas of variation. Arguably the most significant area of these was around wait times for surgery, where data shows that many patients experience long waits for procedures that are clinically urgent.

- Minor strokes or transient ischaemic attacks (TIAs) are recognised as a key warning that a patient is at risk of a major stroke. To prevent this, a carotid endarterectomy (CEA) – which involves improving blood flow through the carotid arteries to the brain – is often recommended. NICE guidance says that CEA should take place within 14 days of diagnosis. At least 18 providers failed to meet this standard and in four areas, the average wait for CEA was 28 days or more. By contrast, two providers were able to go from diagnosis to surgery within five days – thus making it far more likely that a major stroke can be avoided.
- Average wait times for elective abdominal aortic aneurysm (AAA) repair currently range from 35 days (5 weeks) to 145 days (21 weeks). This surgery is designed to avoid the AAA rupturing; the longer the delay, the greater the risk of rupture.
- Blocked arteries in the lower limbs can restrict movement, cause excruciating pain and, if left unattended, can lead to gangrene and the need to amputate. If identified early enough, blood flow to the lower limbs can be restored through revascularisation procedures. Currently, around 8,000 lower limb amputations are carried out on the NHS each year; some of these could be avoided by timely revascularisation.

The delays were discussed during GIRFT visits and a range of factors were identified as contributing, from lack of available facilities to lack of staff to lack of integration with other departments. Finally and crucially, the majority of vascular surgery has become restricted to ‘normal’ working hours, immediately limiting the number of procedures that can be carried out per week. At present, just six NHS hospitals in England offer elective vascular surgery at weekends, even though they will have teams on call for the small number of emergencies they will face.

The guiding recommendation: adopt a network model

In the context of patient need for vascular surgery, the divide between elective and emergency surgery is inappropriate. There are very few genuine emergencies, but almost all patients need surgery urgently. To that end, patients would be better served by units adopting a daily list for all vascular surgery procedures, with the view to all patients receiving urgent care seven days a week. This clearly cannot happen in every hospital, so to enable it, this report recommends that vascular surgery is delivered via a hub and spoke network model, as defined in the national service specification¹. To achieve the standards defined by this service specification, GIRFT and NHS England (NHSE) expect that there will need to be a reduction in the number of vascular units.

Working together to reduce length of stay and readmissions

This fundamental recommendation then underpins the other changes recommended in the report. For example, reflecting evidence gathered through the visits that sometimes patients spend longer in hospital than clinically necessary due to concerns about their overall health and care, it recommends working more closely with other departments and services – from cardiology and renal to physiotherapy – to improve prehabilitation. In a hub, where the caseload is higher, it will be easier to establish protocols for such working. The same applies to post-operative care, which can then help reduce readmissions.

Addressing data quality issues

Alongside these core recommendations to improve care, the report also highlights the need to improve data collection related to vascular surgery. The report notes a discrepancy between the volume of activity recorded in the National Vascular Registry (NVR) and that recorded in Hospital Episode Statistics (HES) and makes several recommendations to improve data capture.

Making it happen

The report makes 17 recommendations in total, covering a wide range of themes. However, the guiding recommendation is the first, relating to the establishment of effective hub and spoke networks. To support providers in building networks – or, where there is already a network of some form, strengthening them – the GIRFT programme has set up regional hubs that can provide practical advice based on data, the feedback from visits and the expert input of experienced clinicians.

¹ NHSE Specialised Vascular Services (Adults), available via www.england.nhs.uk/wp-content/uploads/2017/06/specialised-vascular-services-service-specification-adults.pdf

List of recommendations

1. Ensure all units are operating within a hub and spoke network model, as defined by the national service specification, emulating the most advanced hub and spoke models that exist currently. This in turn should deliver improved early decision-making capability and access to diagnostics, allowing early treatment, prioritised by degree of urgency.
2. Reduce the time from presentation to surgery for all patients in need of CEA to seven days from presentation.
3. Accelerate the referral to treatment time for all patients identified as in need of AAA surgery, whether identified via a screening programme or any other route.
4. Continue on-going work to promote the National AAA Screening Programme (NAAASP) to help ensure early identification, enabling treatment before emergencies occur.
5. Increase the early availability of revascularisation surgery where lower limb ischaemia is present, to help reduce amputation rates.
6. Ensure optimum list scheduling.
7. Assess the need and options to increase the vascular surgery and interventional radiology workforce to support sustainable delivery of recommendations 1-5.
8. Improve prehabilitation for AAA, PVD and CEA, particularly with regards to perioperative medical input.
9. Reduce avoidable readmissions by improving perioperative care and follow up.
10. Ensure case ascertainment to the National Vascular Registry reaches more than 85%.
11. Improve quality of routine data entry and collection.
12. Improve coding for complex aneurysms emergency vascular surgical activity.
13. Improve insight into patient experience in vascular services, to support clinically led improvement.
14. Require at appraisal surgeon-level intelligence on activity and outcomes.
15. Increase use of ward-based recovery to a level of approximately 90%.
16. Enable improved procurement of devices and consumables through cost and pricing transparency, aggregation and consolidation, and the spreading of best practice.
17. Reduce litigation costs by application of the GIRFT programme's five-point plan.

Next steps: implementation

This report has underlined a need to transform services and practice at pace, to reduce variation and, in so doing, deliver a higher quality, more sustainable service. As such, NHS Improvement's objective is for GIRFT implementation in vascular surgery to be complete, and a new business as usual phase reached, by July 2019. The principal mechanism for doing this will be delivery of tailored implementation plans in each trust, which will translate this report to meet local needs.

Trusts should begin developing their implementation plan, based on:

- the specific recommendations reported to the trust following the GIRFT visit;
- the recommendations in this national report.

In developing and delivering their implementation plans trusts should prioritise:

- the recommendations most emphasised in the GIRFT visit report, which would be based on both the data and the discussions during the visit;
- actions against this report's recommendations, based on the timeline indicated, with some requiring either immediate action, or progress by April or July this year.

To achieve results, it is vital that clinicians, management and all staff within trusts work together to progress these plans. Where this report recognises that national guidance, or any other national support, is needed prior to provider implementation, this is reflected in the timescales associated with our recommendations.

NHS Improvement and the GIRFT programme team recognise that developing implementation plans and delivering against them may be challenging. As such, GIRFT Regional Hubs across England will support trusts by providing advice and management support, including advice on developing and troubleshooting implementation plans, as well as access to clinical advice. The hubs will also lead a buddying process to help spread best practice between trusts, and manage dependencies with other transformation efforts including STPs, ACCs and NHS RightCare. The core GIRFT data will be updated on an annual basis, to enable trusts to monitor progress, and where necessary reprioritise their implementation efforts.

Central to this report is developing further the hub and spoke model of vascular services, as defined in the national service specification. Examples of this model are well developed in some parts of the country. Nonetheless, there remains a need to emulate the most advanced models more widely. To deliver this, GIRFT will work closely with NHSE Specialised Commissioning, alongside other partners.

We will also ensure policy links and dependencies with national bodies associated with this report are managed effectively. For example, we will notify NICE of all recommended changes to practice that might affect its guidelines relevant to vascular surgery, including the guideline under development for *Abdominal aortic aneurysm: diagnosis and management*.

To provide assurance of consistency within the service specification, NHS England will consider how best to reference this report.

The full report and executive summary are available to download as PDFs from
www.gettingitrightfirsttime.co.uk

WHAT IS VASCULAR SURGERY?

Vascular surgery covers a range of surgical procedures to improve blood supply to organs and areas of the body. While some vascular surgery is carried out to remove or repair veins, the vast majority is conducted on arteries: reconstructing damaged arteries, or unblocking or bypassing arteries that are blocked by atherosclerosis. Because it stops the blood flow to vital organs, atherosclerosis – often known as hardening or furring of the arteries – is one of the most common causes of death in the UK. It is a condition that develops over time, with clinical signs becoming apparent from middle age.

In many cases, when first diagnosed, blocked or narrowed arteries are treated with medication; surgery only takes place when blood flow is dangerously restricted. As a result, the majority of patients receiving vascular surgery are often very frail; the surgery is urgently needed to repair an aneurysm, improve blood flow to an organ (e.g. the brain) to prevent a stroke, or to a limb to avoid the need to amputate. Compared to some other surgical disciplines, there is little room here for delayed surgery – as whenever major surgery to arteries is needed, there is always a risk to life or limb.

Surgery is complicated by the common prevalence amongst patients of co-morbidities such as hypertension, diabetes, chronic lung disease and ischaemic heart disease. On average, vascular surgery patients have 1.7 co-morbidities and over a third of those undergoing surgery are over 75 years old. This in turn means their 'fitness' for complex surgery is often very low.

With lower fitness, the risk of complications and readmissions increases and more intensive post-surgical care is typically required. Mortality rates are also higher than in most other types of surgery.

Procedure volumes and types

Each year, approximately 43,000 vascular surgery procedures are carried out in England. The total number of procedures has gradually increased in recent years as new surgical techniques such as Endovascular Aneurysm Repair (EVAR) have been developed. Because these techniques are potentially less debilitating for patients, they have helped lower the threshold for surgical intervention and meant more unfit patients can receive surgery.

Vascular surgery is offered in 70 NHS trusts and there are approximately 450 consultant vascular surgeons. However, some procedures are also led or overseen by vascular interventional radiologists – again crucial in increasing the availability of vascular procedures.

As well as widening access, there have been concerted efforts to improve standards in vascular surgery, increase survival rates through more timely interventions and reduce waiting times. The National Abdominal Aortic Aneurysm Quality Improvement Programme (AAA QIP) was set up in response to recognition that post-operative mortality rates in the UK were higher than in other countries in Europe. This led to the creation of the National AAA Screening Programme (NAAASP), discussed further below.

In 2012, vascular surgery was formally recognised as a specialty in its own right, having previously been a subspecialty of general surgery. Around the same time, proposals were published to establish vascular surgery networks, consisting of surgical hubs – hospitals serving as a loco - regional centre for vascular surgery, that have the resources to provide surgery 24x7 – that work with additional spoke hospitals, which can conduct outpatients' services including screening and some minor surgical procedures. A growing number of hospitals are now part of a vascular network, but the model has not yet been fully established, as defined by the national service specification.

Like other specialties that are being examined as part of the GIRFT programme, vascular surgery shows variation in demand, supply, treatment choices, outcomes and costs. To examine this variation, the report focuses on three core vascular surgery pathways:

- abdominal aortic aneurysm (AAA) screening and repair;
- carotid endarterectomy (CEA) to unblock the carotid arteries and reduce the risk of stroke;
- lower limb revascularisation (including amputation) to address peripheral vascular disease (PVD).

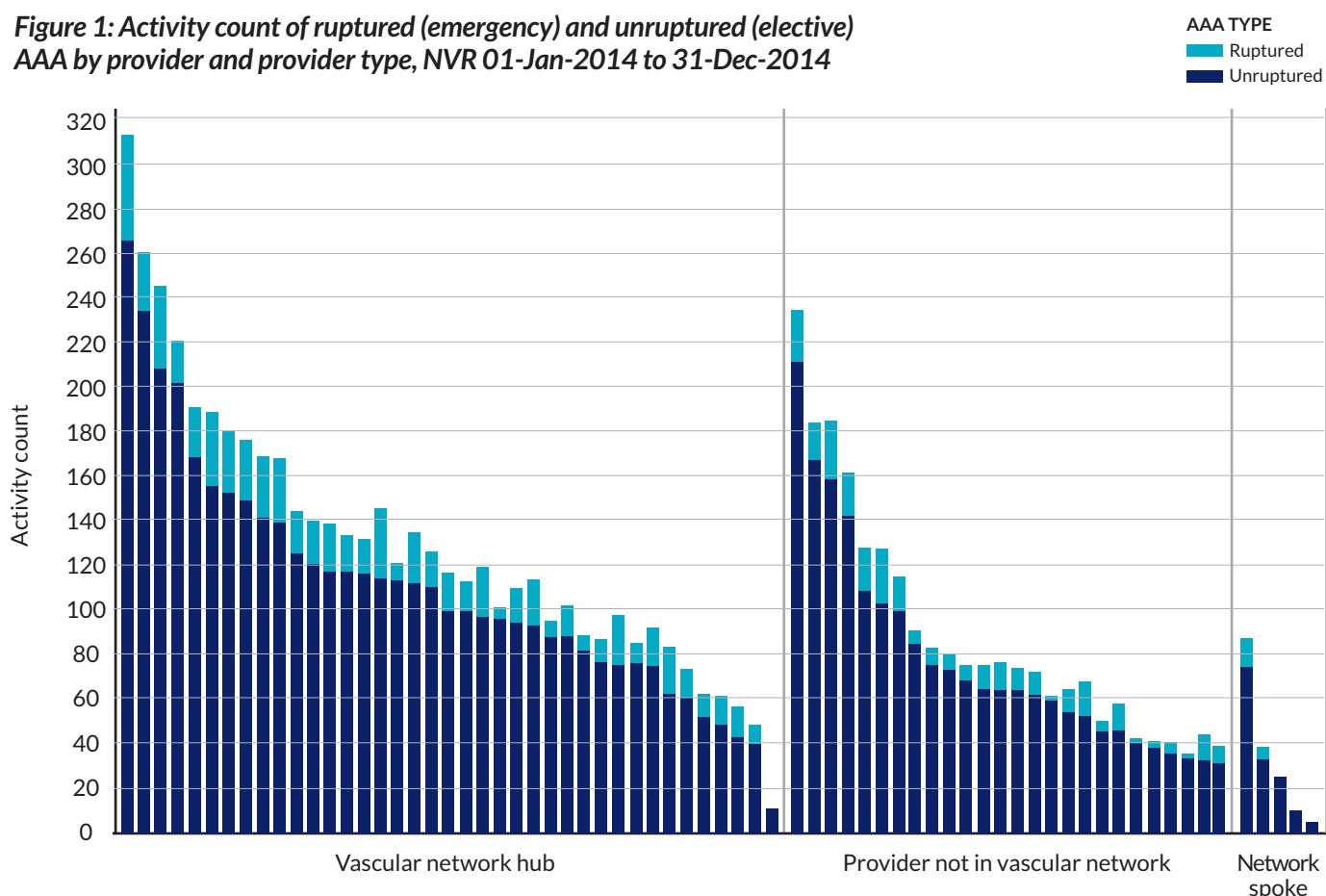
These three pathways, all of which address very serious conditions, represent a substantial percentage of all vascular surgery procedures. Furthermore, they have all been recorded in the National Vascular Registry (NVR) for some years; this means there is sufficient data around all three to derive findings and recommendations.

Pathway 1: Abdominal aortic aneurysm (AAA) screening and repair

An abdominal aortic aneurysm (AAA) is a bulge or swelling in the aorta. They typically occur below the kidneys and tend to grow slowly over a number of years. Some patients with an AAA experience pain in the abdomen, chest and lower back; in many people, there are no obvious symptoms. The main risk associated with them is rupture, leading to internal bleeding and a sudden loss of blood pressure. Rupture is usually fatal without emergency surgical treatment.

Vascular surgery is conducted as soon as possible when an AAA has ruptured; this is one of the few areas of vascular surgery that qualifies as a true emergency. Approximately 1,000 such procedures are conducted each year. However, as the chart below shows, the majority of procedures are on unruptured AAA: these are undertaken to try and prevent rupture.

Figure 1: Activity count of ruptured (emergency) and unruptured (elective) AAA by provider and provider type, NVR 01-Jan-2014 to 31-Dec-2014



In 2009, to identify patients with AAA and prevent rupture, the National Abdominal Aortic Aneurysm Screening Programme (NAAASP) was introduced. All men over the age of 65 – the demographic at greatest risk – are invited to be screened for AAA. This involves an ultrasound scan of their aorta; if patients have an aorta between 3cm and 5.4cm wide, they are asked to return annually for monitoring as this indicates the aorta is abnormally wide. Where an aorta is found to be 5.5cm or wider, surgery is usually recommended. This is deemed ‘elective’ surgery. In 2015, 4,198 elective AAA repairs were recorded in the National Vascular Registry.

The national target for the NAAASP is to screen 75% of all those eligible. Currently, screening rates nationally are 79.9%; however, there is considerable variation within this. Nationally, 41 Clinical Commissioning Groups (CCGs) failed to meet the target, 18 of which were in London. In one area of London, just 57.6% of eligible men over 65 have been screened. These figures suggest that while screening is available in the area, it is currently under-subscribed; the next step may be to focus on raising awareness at a local level of the importance and availability of screening to increase uptake amongst ‘under-screened’ groups.²

² It is important to note that the targets are based on percentages of the eligible population, not the total number screened. This means that areas with higher populations may be conducting as many, or more, screenings as those with lower populations, yet not meeting the target.

Initial projections were that for every 1,000 men screened, 14 would need monitoring, and one would require surgical intervention.³

Table 1: NAAASP screening volumes and referrals 01-Apr-2015 to 30-Mar-2016

	Initial screen activity	Initial screen percentages of total	Initial screen activity	Self-referral screen percentages of total
Number eligible	284,971	100%	24,701	100%
Number offered a screen	284,583	99.9% of those eligible are offered a screen	24,701	100% of those eligible are offered a screen
Number with conclusive screen	227,543	79.8% of those offered a screen obtain a conclusive screen	21,091	85.4% of those offered a screen obtain a conclusive screen
Number with aorta at 3cm or less	224,994	98.9% of those with a conclusive screen have a normal aorta	20,476	97.1% of those with a conclusive screen have a normal aorta
Number with aorta at 3cm or larger	2,549	1.1% of those with a conclusive screen require surveillance or surgery	615	2.9% of those with a conclusive screen require surveillance or surgery

Source data supplied by Public Health England: NHS screening programmes in England via Screening Management and Referral Tracking (SMaRT)

Clearly, once a patient is identified as at risk of rupture, surgery should be delivered urgently. One key issue emerging from GIRFT visits was that this does not always happen. Patients on the 'elective' list may receive a date several weeks away, bringing with it the risk of rupture in the meantime.

Where AAA surgery takes place, there are two main methods: open surgery and EVAR. As both involve repair to the aorta, both are complex, high-risk procedures; however, EVAR is less invasive and recovery times are typically shorter. As a result, around 75% of elective AAA surgery is now conducted by EVAR, with only one provider below the 50% mark. By contrast, approximately two-thirds of emergency AAA repairs are conducted by open surgery: though the number of emergency procedures is much lower, with only four providers undertaking more than 30 a year, the evidence suggests that hospitals are adhering to the more established approach in emergency care.

There are some indications that EVAR may not be as durable and effective in the long term, with some repairs effectively 'wearing out' after 10-15 years. One implication of this could be that where a patient's life expectancy is longer, open surgery may be a better option.

The GIRFT process identified substantial variation in the costs of AAA surgery. Reported costs for elective EVAR procedures varied between £2,251 and £19,690 with no apparent reason for this and no indication that lower cost procedures are less effective⁴. Though further investigation is needed, there would appear to be an opportunity to deliver efficiency savings related to this.

³ The Provision of Services for Patients with Vascular Disease 2015
https://www.vascularsociety.org.uk/_userfiles/pages/files/Resources/POVS%202015%20Final%20version.pdf

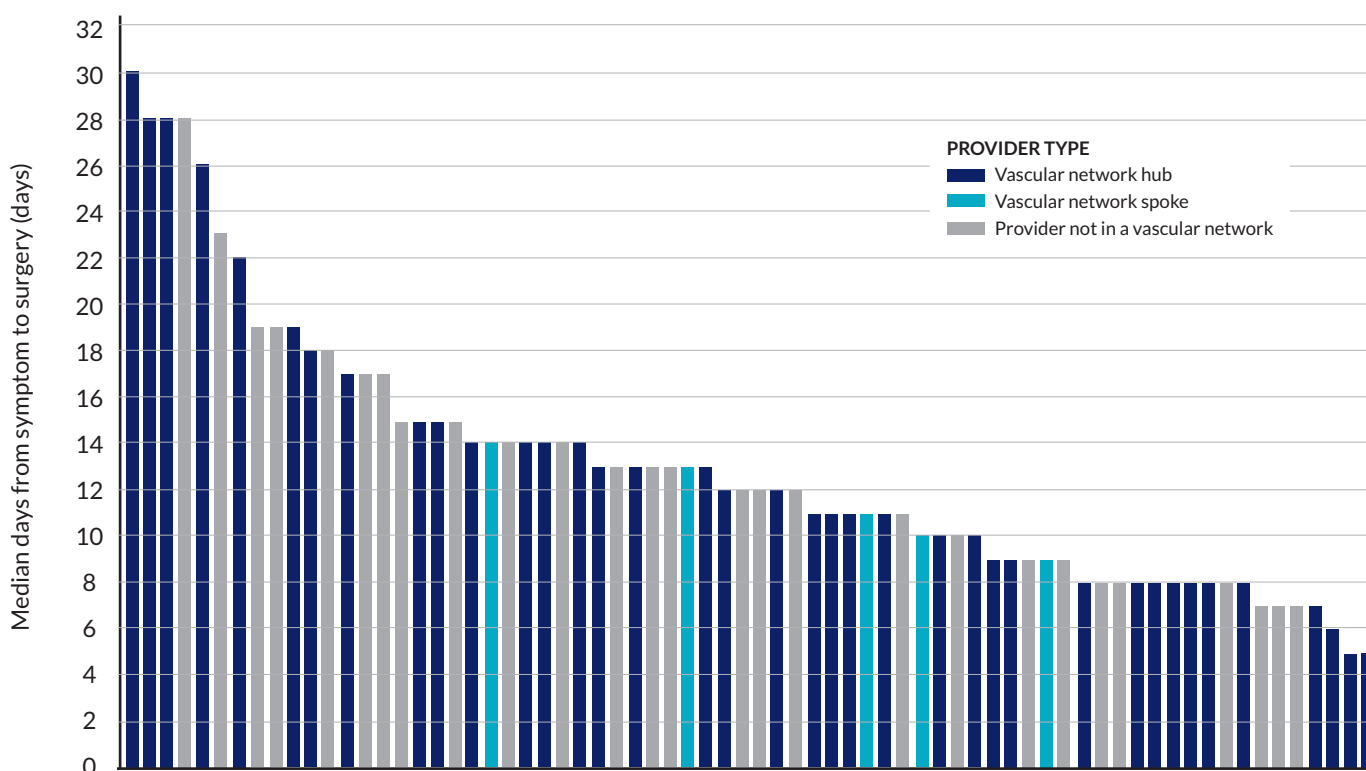
⁴ 2016/17 reference cost, HRG=YR04Z, excluding daycase and Providers with fewer than 10 procedures

Pathway 2: Carotid endarterectomy (CEA)

A carotid endarterectomy (CEA) is a procedure that removes the atherosclerotic build-up in the carotid arteries. These are the arteries that carry blood to the brain. It is typically carried out in patients who have had a minor stroke or transient ischaemic attack (TIA), with the aim of preventing a major stroke. (It is estimated that around a quarter of the 110,000 strokes recorded in the UK each year are related to narrowing of the carotid arteries). Approximately 4,200 CEA procedures are carried out by the NHS annually.

It's widely agreed that, to deliver the maximum chance of avoiding a major stroke, CEA procedures should be undertaken urgently following a minor stroke or TIA. NICE has set national targets of seven days from diagnosis to referral, and then a further seven days from referral to CEA surgery – meaning surgery should take place within two weeks of diagnosis. However, there is wide variation nationally in the median wait time from diagnosis to surgery for a CEA procedure, and in principle the sooner the operation is done following presentation the better.

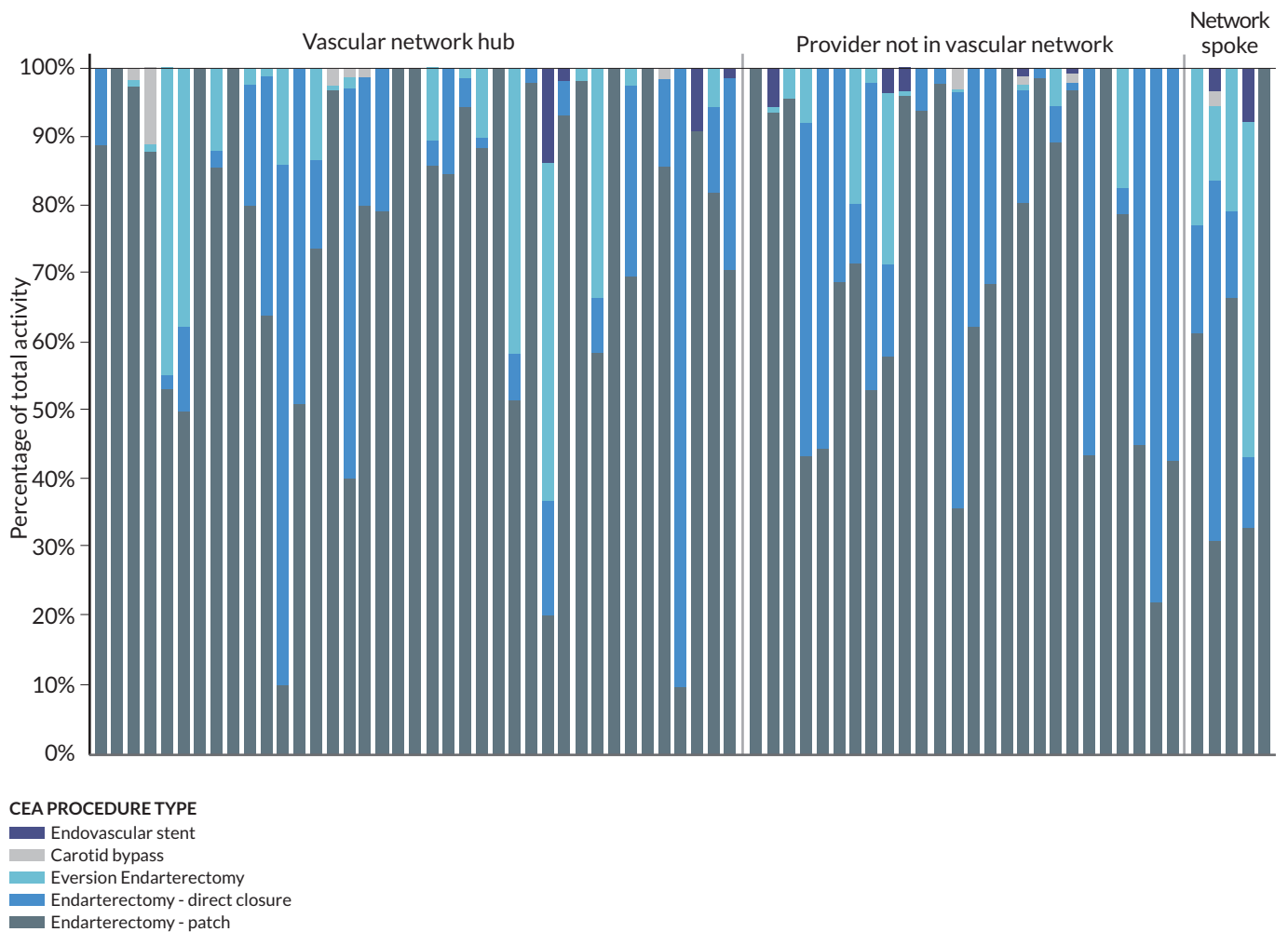
Figure 2: Median days from diagnosis of symptom to surgery for CEA repair by provider and provider type, NVR 01-Jan-2014 to 31-Dec-2014



The graph above shows that a significant number of providers are failing to meet the NICE target of 14 days. In some areas, surgery typically takes place within five days; in four areas, it takes 28 days or more. Closer inspection reveals there are many providers that meet one 'half' of the NICE guideline – delivering either diagnosis to referral within seven days, or referral to surgery within seven days – but not both. The reasons for not meeting the targets are not clear or consistent; the GIRFT visits indicated that in some cases it was a capacity issue, while in others, it was related to the overall pathway and connections between different services.

There are a range of different methods of CEA procedures; the most common is patch endarterectomy – using a small surgical patch to close the artery once the atherosclerotic deposit in it has been removed – followed by direct closure (stitching) and eversion endarterectomy. As the graph below shows, the majority of providers offer two procedure types, though some providers only undertake patch repair. In general, repair type is defined by surgeon's choice of what will offer the best outcome. The data here does not imply any recommendation of one repair type over others, but is included to provide useful context for surgeons and trusts, when discussing potential improvements.

Figure 3: Percentages of total CEA activity by repair type (modality of care) for all providers, NVR 01-Jan-2014 to 31-Dec-2014



Pathway 3: Lower limb revascularisation (including amputation)

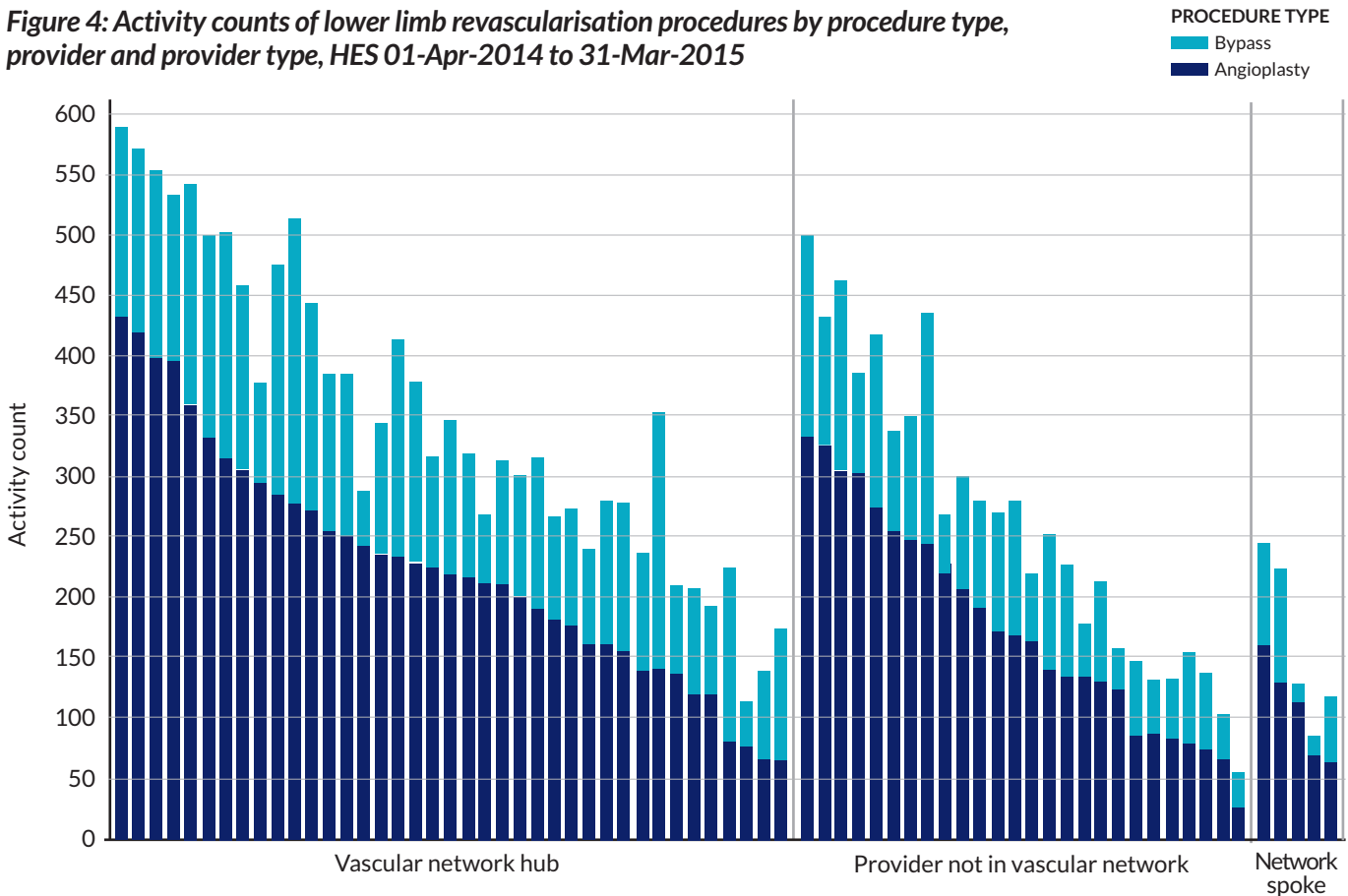
Lower limb revascularisation refers to procedures that treat the arteries in the legs for peripheral vascular disease (PVD). These procedures improve blood flow to these limbs and so make it easier and less painful for patients to move around. When done in a timely way, revascularisation can prevent the need to amputate. However, when examining this pathway, amputation has also been studied as it is often an alternative surgical option where revascularisation would not work, or has not worked.

Lower limb revascularisation is the most common type of vascular surgery with over 22,800 procedures conducted a year. There are two main types:

- angioplasty, which involves using a ‘balloon’ initially to widen the artery, sometimes also inserting a stent to help maintain patency;
- bypass, which involves diverting blood around the blocked arteries. To do this, surgeons build a ‘new’ blood vessel, either using vein from another part of the body or a prosthetic graft.

Bypass surgery takes longer to perform and longer to recover than angioplasty. The average length of stay for elective lower limb bypass is 3.8 to 14.8 days, compared with 0.5 to 4.5 days for elective angioplasty. The majority of providers carry out more angioplasty procedures than bypass, but in some areas, the reverse is true. This variation is often driven by availability of staff or resources.

Figure 4: Activity counts of lower limb revascularisation procedures by procedure type, provider and provider type, HES 01-Apr-2014 to 31-Mar-2015



Amputation is only considered when there is no revascularisation option. Approximately 8,000 lower limb amputations are conducted each year on the NHS.

Amputations are typically considered to be either major or minor. A major amputation is classified as a full lower limb amputation above or below the knee. Minor amputations involve incomplete amputation of the lower limb usually confined to the foot. Historically, there have been concerns about the high mortality rate following major amputations: in 2010 a Quality Improvement Framework (QIF) was introduced to address this issue. Latest data shows mortality is 7.5% for major amputation⁵.

What this figure underlines is that patients needing major amputation are often extremely frail and that surgery of this scale is a significant risk. This is also demonstrated by the high emergency 30-day readmission rate for any reason following a major lower limb amputation, which is 16.5%. Both the mortality and readmission rates are comparable to those seen for emergency laparotomy and can be greater than for some cardiac surgery. There are many factors that lead to higher mortality and readmissions rates. Forthcoming GIRFT workstreams in intensive and critical care and anaesthesia and perioperative medicine may provide further evidence to inform targeted improvements in these areas, to complement improvement led by vascular surgeons.

The overall picture

The variation summarised above is only a fraction of the data collected and analysed around these three core pathways. However, taken as a whole, it suggests:

- too many patients needing urgent surgery are facing long or uncertain waits – with national targets being missed; and
- a lack of consistency in the approach taken to the same condition – with different providers choosing different surgical methods in apparently similar circumstances.

The recommendations that follow are designed to address this variation, as well as some other issues that emerged from the data and visits.

⁵ In-hospital mortality during the initial admission or during an emergency readmission within 30 days of discharge, calculated using HES inpatient data April 2012 – December 2014

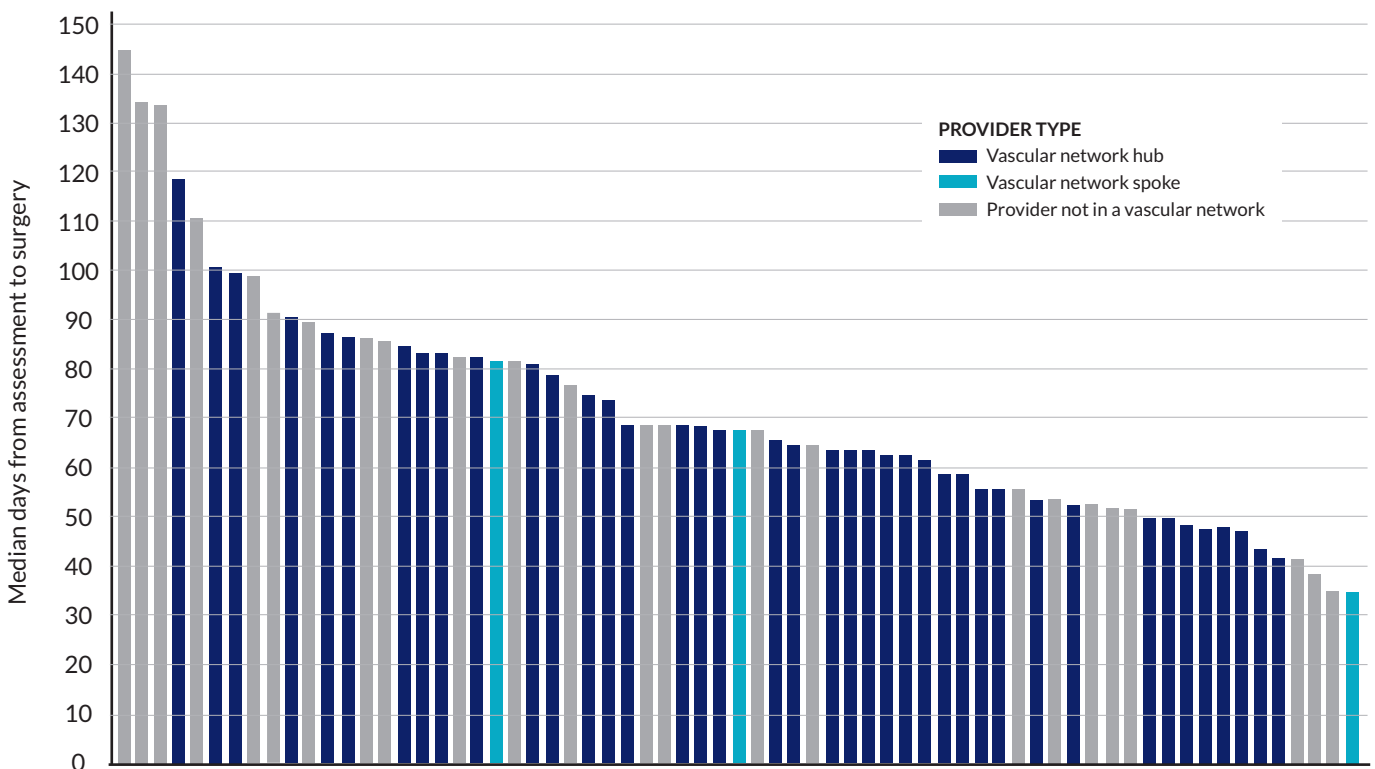
RECOMMENDATIONS

Reconfiguring vascular care as ‘urgent’

The majority of NHS surgery is divided into ‘elective’ and ‘emergency’. The theory is that this should ensure those in immediate need of surgery can be prioritised, while other patients can be operated on at a time that suits them and the provider. The model of provision is then structured to support this divide.

However, in vascular surgery, this divide doesn’t work. Only a fraction of arterial surgery – essentially that related to ruptured AAA or surgical bleeding – is a genuine emergency, where a delay of even an hour or two could be critical. Yet almost all arterial surgery is, for one reason or another, urgent; once someone is identified as at risk of AAA rupture, surgery should happen swiftly to avoid the rupture. However, for ‘elective’ AAA, wait times currently range from 35 days (5 weeks) to 145 days (21 weeks).

Figure 5: Median days from assessment to surgery for elective AAA repair by provider and provider type, NVR 01-Jan-2014 to 31-Dec-2014



This not only means patients are at risk of rupture, but also that they are having to wait for months with that risk hanging over them.

As discussed earlier, many providers are currently failing to meet the NICE target of undertaking CEA within 14 days following a TIA or minor stroke. TIA and minor stroke are clinical indicators that the patient is at a high risk of a major stroke. On this basis, the 14-day target itself is arguably too long: CEAs should ideally be undertaken as soon as possible after the patient has stabilised following a TIA or minor stroke. This would both benefit the patient and benefit providers (caring for a patient who has had a major stroke is more resource-intensive than delivering CEA surgery).

Delaying surgery beyond when a patient has stabilised following a TIA or minor stroke, does not reflect their level of need. These patients should be considered for urgent surgery; while they may not be emergencies insofar as they don’t need immediate surgery to save their lives, the risk of a stroke or a ruptured aneurysm grows with each passing day.

Yet evidence from the GIRFT visits indicated that there are also problems with urgent vascular surgery. Even though a patient has been identified as needing urgent surgery, providers are unable to confirm a time or date for the procedure. In many units, patients admitted as emergencies had to wait for angiography/angioplasty because lists were fully booked. The result is that critically ill patients are often simply kept in hospital until a surgeon, vascular radiologist and/or theatre is available.

The risk of patients diagnosed with one of these conditions dying or having a serious complication before surgery will be reduced by treating them in a more timely way, and this may also reduce the risk of mortality during surgery or in the days that follow. By changing the model to ensure all vascular surgery is provided as urgent, it should also reduce the likelihood of vascular patients presenting to emergency departments on a recurring basis, whilst they wait for surgery.

The causes of delays

When wait times were discussed with providers, a range of factors was identified as contributing, from lack of available facilities (theatres, beds, CT scanners) to lack of staff. The latter not only refers to surgeons but also the wider team: vascular interventional radiologists, anaesthetists, nurses and physiotherapists. For CEA in particular, the delay may reflect ineffective internal processes, with referrals from other departments – A&E, stroke physicians, cardiologists and GPs – taking a long time to reach the vascular team. Finally and crucially, there is also a sense that while an on-call roster can deal with emergencies out of hours, the majority of vascular surgery has become restricted to ‘normal’ working hours, immediately limiting the number of procedures that can be carried out per week. At present, just six NHS hospitals in England offer elective vascular surgery at weekends, even though they will have teams on call for the small number of emergencies they will face.

Based purely on clinical need, this model of care needs to change – and it requires first a shift in mind-set. Instead of dividing vascular surgery into elective and emergency streams, all arterial surgery should be recognised as urgent. To deliver sufficient procedures urgently, all surgical hubs should ideally provide theatre activity seven days a week.

Clearly, this cannot happen in every hospital; the costs would be too great and the volume of activity would not justify it. However, the national service specification has already defined that vascular surgery should be delivered via a hub-and-spoke network model, with hub hospitals fully equipped and resourced to carry out the majority of procedures.

The case for networks

Centralising resources and expertise at the hub has a number of benefits.

- It should mean there are more surgeons available in one location – so it becomes easier for the hub to undertake vascular surgery seven days a week.
- It means budgets can be pooled to invest in facilities such as CT scanners, hybrid theatres, where both endovascular and open surgery can be carried out (thus avoiding the need for a patient prepared for one technique to wait for the ‘specialist’ theatre to be ready) and larger, better equipped vascular wards.
- With a larger surgical team and a full range of facilities, it becomes easier to give patients a choice in the type of procedure they undergo and clinicians a choice in the type of procedure they recommend.
- At a hub with a higher number of patients, there will be a greater overlap with other medical disciplines, such as cardiology, radiology and care of the elderly. Building on this, it becomes easier to adopt a multidisciplinary approach, with standard protocols and processes for referral and post-operative care. On a practical level, it can mean working together to ensure that where surgery is provided seven days a week, relevant support from these other departments is available.

As acknowledged above, this is not a new argument. The proposal to adopt a hub and spoke network structure was first proposed by the Vascular Society more than ten years ago, and the model is reflected in the existing national service specification. Additionally, the 2013 Urgent and Emergency Care Review recommended better connections between urgent and emergency care services.⁶ However, progress to implement the model has been slow. At the time the data assessed as part of the GIRFT process was gathered, many providers were not part of a network; several of these are still not.

⁶ NHSE (2013) *Transforming urgent and emergency care services in England Urgent and Emergency Care Review End of Phase 1 Report* www.nhs.uk/NHSEngland/keogh-review/Documents/UECR.Ph1Report.FV.pdf

Figure 6: Hospital trusts offering vascular surgical services in England (January 2017)

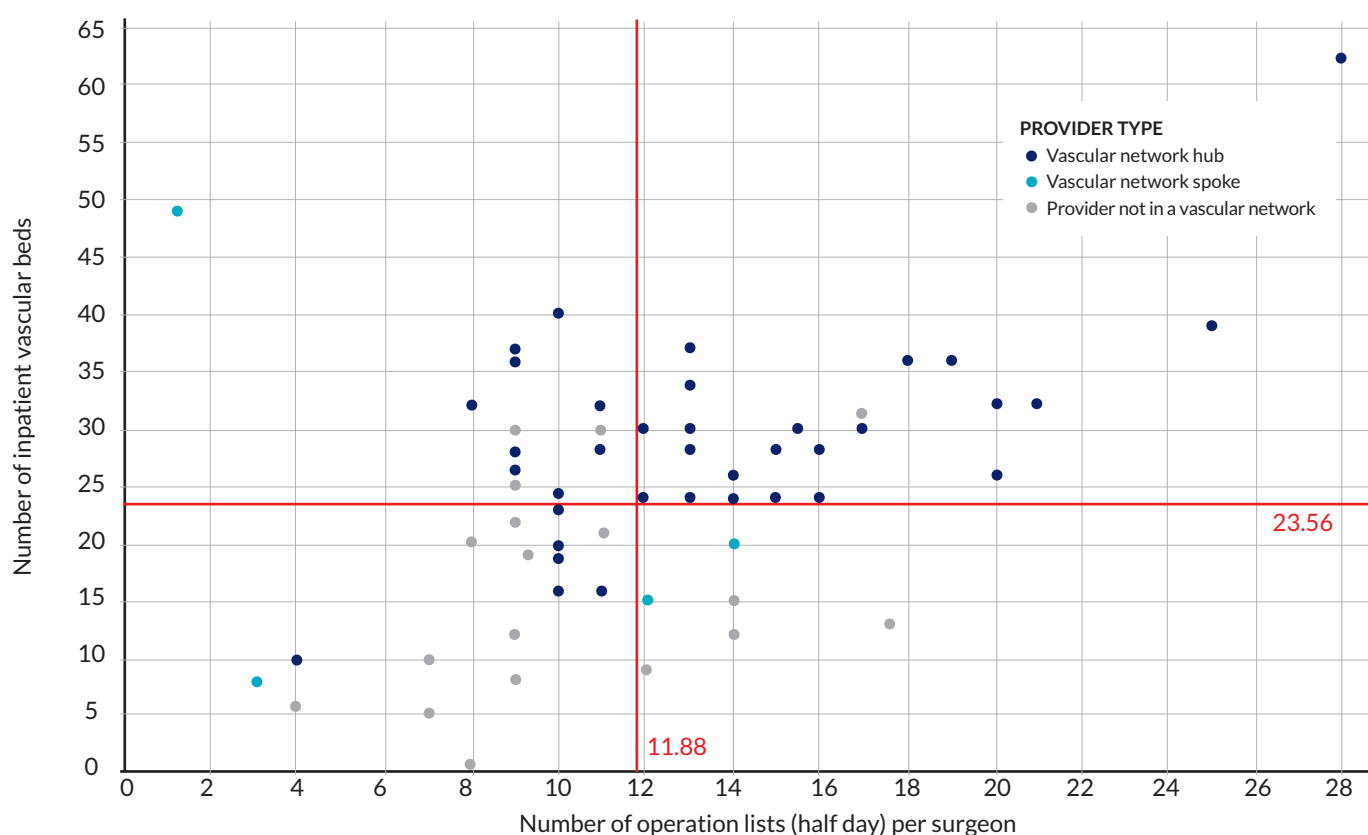


The networks themselves are at different levels of maturity; some are essentially networks in name only, and there is no clear agreement on the roles of the hub and spokes. As the graphs below show, this leads to huge variation in their size, staffing and throughput.

The largest hub has 60+ dedicated vascular beds and consultants complete 27 half-day lists a week; by contrast, one designated hub has just ten beds and its two consultants conducted four half-day lists a week between them.

One spoke has 45 dedicated vascular beds – the second most – yet completes just two half-day operation lists a week, potentially leaving these beds unused. Another spoke conducts 14 half-day lists a week, more than many hubs.

Figure 7: The number of half day operation lists per provider against the number of inpatient vascular beds by provider, and provider type NVR Oct-2015



These figures are highlighted to show the considerable difference in the implementation of a hub and spoke model to date, and help explain why – across all the data examined by the GIRFT team – some designated hubs have lower throughput, longer waits and poorer outcomes than some spokes and providers not in a network. It is also important to underline that in these spokes and non-network providers, there is often a great deal of excellent work being done by highly committed consultants and teams. Yet, the deep dive meetings have made clear that where the hub and spoke model is most advanced, where vascular surgery resources are clearly concentrated at the hub and – crucially – referral processes are well-established, there is a significant positive impact.

Based not only on this data, but also the need to reconfigure the vascular surgery model to treat all patients as urgent, the core recommendation of this report is to accelerate the implementation of the hub and spoke network model. The intention must be to emulate the well-developed hub and spoke networks which currently exist across the country.

This is no small task – as evidenced by the fact that it has not yet been delivered, despite strong recommendations to this same effect in the past. There are cultural, financial and logistical barriers, some of which continue even within established networks. Yet the network model remains the most practical and achievable way to deliver a vascular surgery service with the capacity and flexibility to provide urgent care for all patients.

Recommendation	Actions	Timeline
<p>1. Ensure ALL units are operating within a hub and spoke network model, as defined by the national service specification, emulating the most advanced hub and spoke models that exist currently.* This in turn should deliver improved early decision-making capability and access to diagnostics, allowing early treatment, prioritised by degree of urgency.</p>	<p>1A: Hubs must perform a minimum of 40 carotid endarterectomy and 60 AAA procedures a year and must be staffed by a minimum of six vascular surgeons and six vascular interventional radiologists. Hubs should seek to perform greater volumes than these minimums where possible.</p>	<p>By July 2018 for existing hubs.</p>
	<p>1B: Where appropriate, NHSE Specialised Commissioning hubs should consider using existing contract management levers to achieve compliance.</p>	<p>To be agreed with NHSE Specialised Commissioning.</p>
	<p>1C: Hubs to provide access to CT 24/7 within 30 minutes of patient arrival.</p>	<p>By July 2018 for existing hubs.</p>
	<p>1D: Hubs to provide rapid access to theatre for ruptured AAA, within 30 minutes, covering staff and facilities for both open and EVAR modalities, ideally in a hybrid theatre.</p>	<p>By July 2018 for existing hubs.</p>
	<p>1E: Hubs to provide scheduled operating, including at weekends.</p>	<p>By July 2018 for existing hubs.</p>
	<p>1F: Hubs to provide timely vascular opinion to spoke hospitals.</p>	<p>By July 2018 for existing hubs.</p>
	<p>1G: NHSE Specialised Commissioning to continue developing a service specification enabling consolidation of the most complex activity in a limited number of centres, seeking GIRFT clinical lead input as appropriate.</p>	<p>To be agreed with NHSE Specialised Commissioning.</p>
	<p>1H: NHSE Specialised Commissioning Regional Hubs and GIRFT Hubs to ensure existing hub selection activity and GIRFT programme activity is co-ordinated effectively.</p>	<p>To be agreed with NHSE Specialised Commissioning.</p>
	<p>1I: Prior to implementing new or developed hub and spoke arrangements, GIRFT to work with STPs to consider and provide for the resource impact on ambulance services, including the need for vehicles and paramedics. Any possible impacts on indicative activity plans or local quality requirements would need to be accessed.</p>	<p>To be agreed with NHSE Specialised Commissioning.</p>
	<p>1J: Prior to implementing new networking arrangements, financial impacts must be considered by both NHSE Specialised Commissioning and providers, with support from NHSI pricing and GIRFT, who are working together to address these issues.</p>	<p>To be agreed with NHSE Specialised Commissioning.</p>
	<p>1K: NHSE to lead proposed service changes, in collaboration with GIRFT, NHSI, STPs, and trusts, following necessary assurance changes.</p>	<p>To be agreed with NHSE and NHSI.</p>
	<p>1L: GIRFT to advise NICE of recommended change to practice for consideration in development of NICE Guideline <i>Abdominal aortic aneurysm: diagnosis and management</i>.</p>	<p>For delivery within NICE's Guideline development process.</p>
	<p>1M: GIRFT anaesthesia and perioperative medicine workstream to provide direct advice to providers to support implementation of urgent care, ensuring anaesthetic and perioperative medicine are co-ordinated effectively to support transition. Vascular workstream to provide reciprocal advice as necessary.</p>	<p>To be agreed with NHSE. Dependent on timescales agreed with NHSE.</p>
	<p>1N: GIRFT to add case studies of most well-developed hub and spoke models to the GIRFT Good Practice Manual.</p>	<p>Upon completion of GIRFT vascular revisits.</p>
<p>1O: GIRFT Regional Hubs to liaise with NHSI Operational Productivity Estates sub-programme.</p>	<p>Dependent on time scales agreed with NHSE.</p>	
<p>*to clarify, when selecting hub sites, the location of existing Major Trauma Centres would need to be considered. Emergency vascular and IR should not be separated from existing MTC sites.</p>		

The shift to a full network model is linked to a desire for urgent care across all core vascular surgery pathways. The following recommendations are therefore all connected.

Recommendation	Actions	Timeline
2. Reduce the time from presentation to surgery for all patients in need of CEA to seven days from presentation.	2A: Clinicians and providers to reduce presentation to operation to within seven days of onset of stroke or TIA symptoms, as recognised as desirable in the existing service specification, reflecting high risk of stroke in first 2 to 3 weeks from onset.*	For completion by July 2018.
	2B: GIRFT to inform NICE of change to practice applicable to existing guideline on <i>Stroke and transient ischaemic attack in over 16s: diagnosis and initial management</i> .	For delivery within NICE's Guideline development process.
	*to clarify, the treatment timeline recommended by GIRFT is shorter than that recommended by NICE and therefore compatible with the NICE guideline.	

Recommendation	Actions	Timeline
3. Accelerate the referral to treatment time for ALL patients identified as in need of AAA surgery, whether identified via a screening programme or any other route.	3A: NHSE Specialised Commissioning to consider introducing a referral to treatment timeline of eight weeks, following definitive CT scan, for all AAAs of 5.5cm or above, regardless of whether they were identified via screening or not, given that unscreened AAAs represent higher risk. Treatment to include any medical support to optimise patient.	April 2018
	3B: Ahead of implementation, any impacts on local quality requirements and indicative activity plans would need to be assessed.	For action upon completion of 3A.
	3C: GIRFT to advise NICE of recommended change to practice for consideration in development of <i>Abdominal aortic aneurysm: diagnosis and management</i> .	For delivery within NICE's Guideline development process.

Recommendation	Actions	Timeline
4. Continue ongoing work to promote the NAAASP to help ensure early identification, enabling treatment before emergencies occur.	4A: GIRFT Regional Hubs to identify any options for joint working or information sharing with NHSE Local Area Teams.	On-going, throughout GIRFT implementation

Recommendation	Actions	Timeline
<p>5. Increase the early availability of revascularisation surgery where lower limb ischaemia is present, to reduce amputation rates.*</p>	<p>5A: GIRFT and NHSE to discuss faster referral to treatment times for revascularisation, as well as more rapid referral from primary care, and ensure evidence base for any proposed change.</p>	<p>To be agreed with NHSE.</p>
	<p>5B: Clinicians and trust management to progress as far as possible within units and existing networks.</p>	<p>Dependent on 5A.</p>
	<p>5C: The Vascular Society to design a Lower Limb Ischaemia Quality Improvement Framework (LLIQIF) to improve revascularisation rate and reduce amputation, indicating clear pathway timelines from referral.</p>	<p>July 2019</p>
	<p>5D: Providers to follow the requirements of the new LLIQIF, and NHSE Specialised Commissioning to consider reflection in service specification.</p>	<p>Upon completion of 5C.</p>
	<p>5E: Primary care to consider use of NICE clinical audit tool to implement diagnosis recommendations in NICE guideline <i>Peripheral arterial disease: diagnosis and management</i> and refer accordingly, alerting commissioners prior to change in practice.**</p>	<p>For immediate action.</p>
	<p>5F: GIRFT Regional Hubs to discuss provision of urgent outpatients' appointments for non-diabetic ischaemic foot with providers and CCGs to enable early referral and thus identification of the need for revascularisation.</p>	<p>Progress to have been made by July 2018.</p>
	<p>*to clarify, this recommendation is compatible with the recommendation in NICE Guideline <i>Peripheral arterial disease: diagnosis and management</i> to offer revascularisation.</p> <p>**to clarify, this recommendation supports implementation of the diagnosis recommendations in NICE Guideline <i>Peripheral arterial disease: diagnosis and management</i>.</p>	

In implementing this latter recommendation, it will be particularly important to address an issue that emerged during the GIRFT visits.

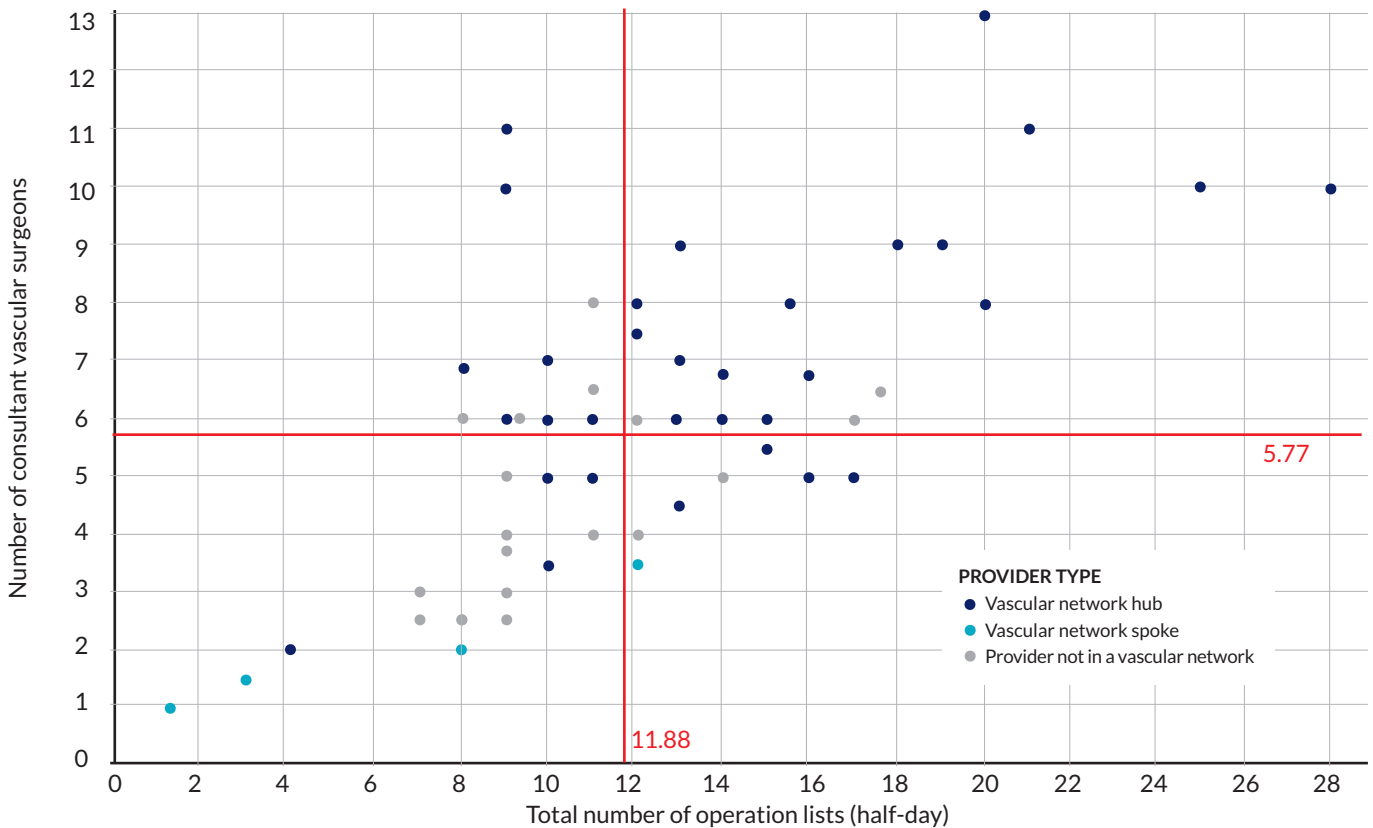
Many patients requiring lower limb vascular surgery have diabetes and because of the strong correlation between these two conditions, a large number of hospitals have regular diabetic foot clinics to deal with ulcers and infections. These are often the route by which patients are referred for revascularisation. However, non-diabetic patients do not have such regular clinics and as result the need for revascularisation may not be recognised early enough, particularly in primary care. Too often, these patients are referred at a comparatively late stage; meaning amputation is then more likely. An essential element of the pathway will therefore be to explore opportunities for earlier referral of non-diabetic patients.

The surgeons' workload

In moving to the urgent care model, there is clearly a need to prioritise patients, based primarily on their need. Therefore, both the overall list and the individual surgeons' lists should be managed by consultants, who can also identify where there is a genuine emergency.

To provide the urgent service envisaged above, it's not simply sufficient to increase the number of surgeons employed. There also needs to be greater clarity about the volume of work that trusts should require and expect of surgeons. This is important in terms of workforce planning at individual trust level and nationally. At present, there is wide variation not only in the number of surgeons that different hospitals employ, but also the workload they carry out – as the graph below shows.

Figure 8: The number of half day operation lists against the number of vascular surgeons by provider and provider type, NVR Oct-2015



Firstly, it should be noted that in general, it appears that hubs carry out more half-day operation lists than providers not in a network. Also, the units with the highest number of surgeons are all hubs. This is entirely how it should be. Further, this chart does not show the activity count of these units; it is possible that some are conducting many more operations than the number of lists would suggest.

However, while in some hubs – and a couple of non-network providers – surgeons are averaging three in-patient vascular half-day lists a week, there are others where surgeons appear to carry out just one or two half-day lists a week. At the extreme, one hub with 11 contracted surgeons reportedly completes just nine half-days lists a week. This appears unsustainable.

Of course, operation lists only represent part of the consultant’s workload and there always needs to be some consideration of emergency capacity. Evidence gathered during the GIRFT visits indicated that in many units, patients admitted as emergencies had to wait for angiography/angioplasty because lists were fully booked: clearly, this needs to change and the approach of moving all patients to a combined ‘urgent’ list can help address it. This approach would combine dedicated half-day lists with space to fit emergency cases in, and the overall list would be managed by consultants, based on clinical priority.

Recommendation	Actions	Timeline
6. Ensure optimum list scheduling.	6A: Trusts to organise vascular surgery around combined ‘urgent’ lists.	For completion by July 2018.
	6B: Clinicians and trust management to ensure surgeons perform a minimum of three inpatient half-day lists, two outpatient sessions and a day-case list per week.	For completion by July 2018.
	6C: GIRFT to work with Vascular Society to develop prioritisation methodology based on risk.	For completion by July 2019.
	6D: NHSI Operational Productivity Clinical Productivity sub-programme to reflect this recommendation in any guidance products, seeking further GIRFT Clinical Lead input as necessary.	To be considered within Clinical Productivity sub-programme.
	6E: Trusts to engage with NHSE Specialised Commissioning to inform them of any possible increase in activity flowing from this recommendation. Any possible impact of indicative activity plans would need to be assessed.	For action immediately, if applicable.
	*Note that a full day list should typically consist of two to three arterial cases, e.g. two open aneurysms but three carotid endarterectomy or lower limb bypass procedures.	

Based on this, a hub would need a minimum team of at least six consultants, backed by six interventional radiologists and other key team members. This works on the assumption that surgery should be provided over weekends too; teams already have to work at weekends when on call for emergency surgery, so it should be possible to change this to include scheduled urgent surgery too. That said, any change would need to be extended to other parts of the workforce too, so it would be important to gain their support.

Workforce planning

Setting standard parameters for consultants' workload helps with workforce planning at trust level. However, trusts can only recruit from the available vascular surgery workforce and concerns about whether or not this is sufficient have been long documented. In 2014, the Vascular Society published a Workforce Report⁷ that highlighted a range of issues. At present, in England there are approx. seven radiologists per 100,000 of the population (most of these will be non-interventional) and one vascular surgeon per 137,000. These figures are much lower than our international counterparts. Demand is rising and it is known that many vascular surgeons are expected to retire in the next decade. There is therefore a need to plan ahead and develop a workforce strategy – not just for surgeons but for all members of the vascular team. In particular, to ensure the workforce is sustainable, the numbers of vascular specialists in training will need to increase.

Recommendation	Actions	Timeline
7. Assess the need and options to increase the vascular surgery and interventional radiology multidisciplinary workforce to support sustainable delivery of recommendations 1-5.	7A: GIRFT and Vascular Society to discuss Workforce Report with HEE, to consider next steps.	For completion by July 2018.
	7B: GIRFT and NHSE Specialised Commissioning to discuss possible joint working in this area.	To be agreed with NHSE Specialised Commissioning.

One advantage of the hub model is that each hub is likely to conduct different procedures on a more regular basis than a spoke or smaller unit would be. This in turn means teams accumulate more experience in complex procedures. Evidence indicates this should improve outcomes; it's widely accepted that there's a 'minimum' number of procedures that surgeons should conduct each year to maintain their knowledge and skills, and it seems logical that a similar principle would apply to other members of the clinical team.

Important experience can also be gained when surgeons work alongside a more experienced colleague on the more complex procedures. This not only helps build their knowledge and experience but also serves to accelerate the procedure, reducing time under anaesthetic and thus reducing risk. Units that have adopted this approach have suggested that 'doubling up' doesn't reduce capacity or throughput but conversely increases it.

⁷ Vascular Society – Vascular Surgery UK Workforce Report 2014
https://www.vascularsociety.org.uk/_userfiles/pages/files/Document%20Library/VS-UK-Workforce-Report.pdf

Shorter stays, fewer readmissions

It's generally accepted that – as long as outcomes are good – shorter stays in hospital are evidence that a surgical service is functioning well.

When examining length of stay for vascular surgery, it is important to recognise the vast differences between procedure types and the recovery times associated with them. For AAA, EVAR procedures typically last a couple of hours and patients may be discharged within a day or two. Open surgery may take three or four hours to complete and patients may need to stay in for a week. Furthermore, in some cases, surgeons opt to undertake a staged closure following open repair of a ruptured aneurysm – meaning the patient receives two procedures, thus extending their stay.

Variation in length of stay for revascularisation

For lower limb revascularisation, there is a clear difference between angioplasty – where the national average elective length of stay varies from 0.5 to 4.5 days – and bypass, where elective patients are typically in hospital for between 3.8 to 14.8 days. In both cases, the longer stays are typically for patients who have diabetes.

Figure 9A: Average length of stay for elective lower limb angioplasty procedures (diabetic patients) by provider and provider type, HES 01-Apr-2014 to 31-Mar-2015

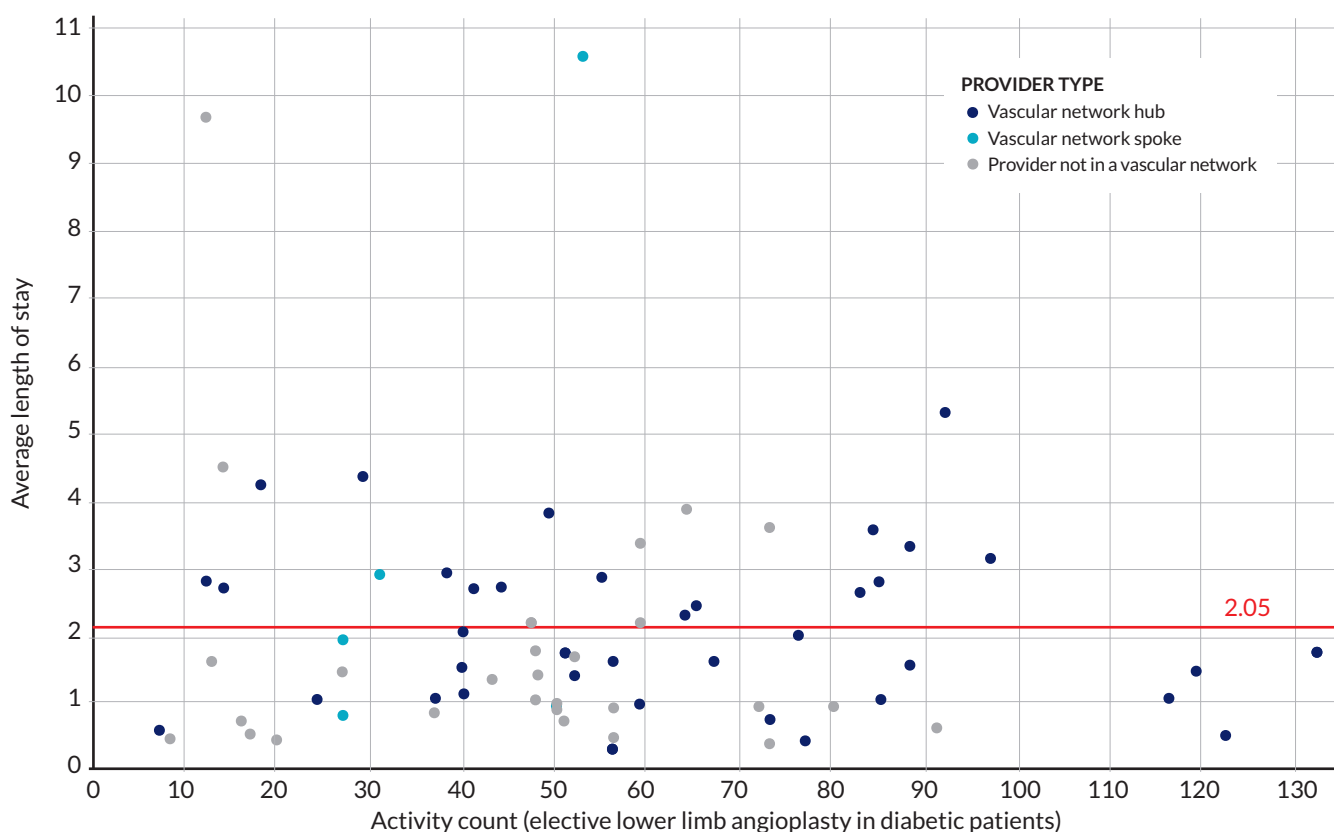
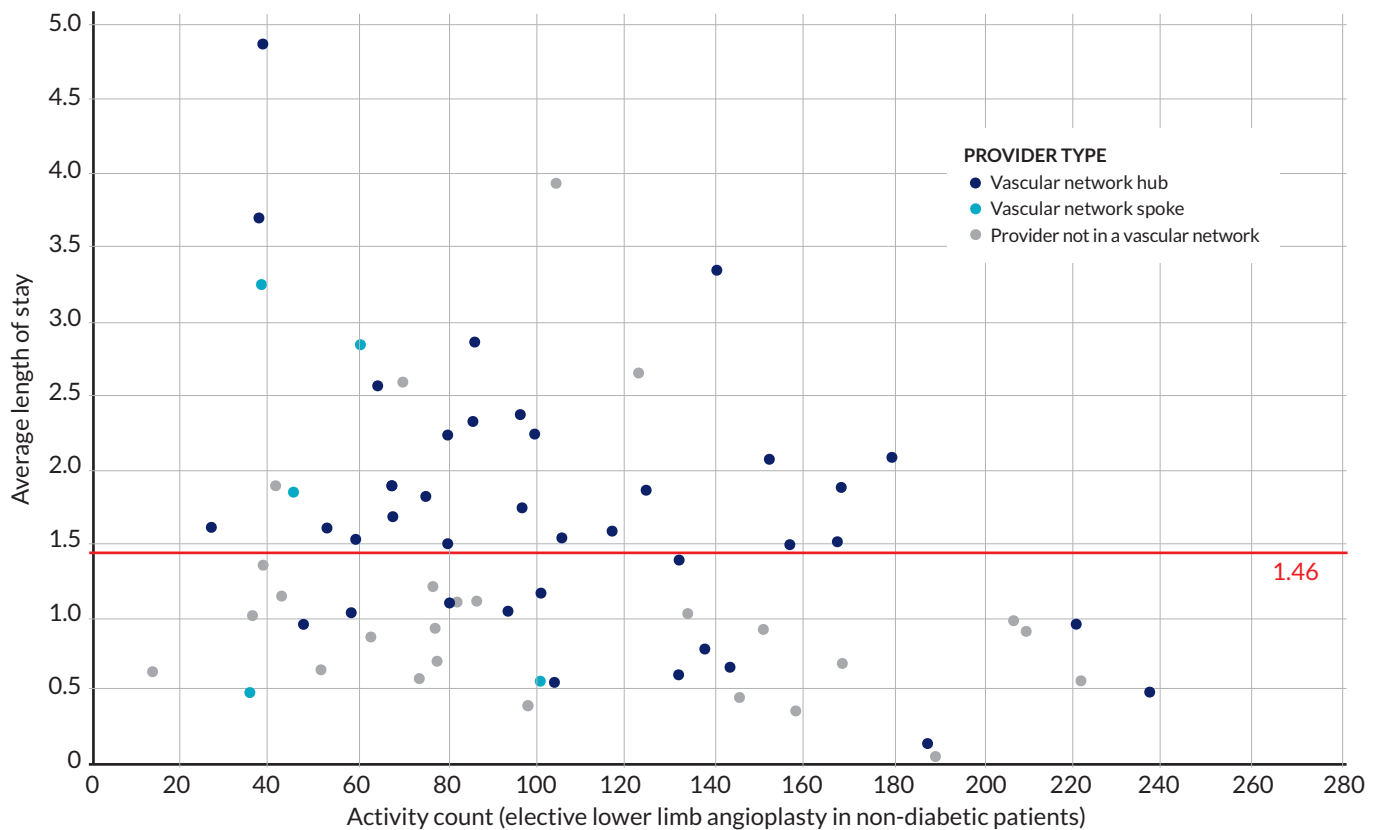


Figure 9B: Average length of stay for elective lower limb angioplasty procedures (non-diabetic patients) by provider and provider type, HES 01-Apr-2014 to 31-Mar-2015



This is a further complicating factor for vascular patients; as stated earlier, many are very frail and have multiple co-morbidities that need careful peri-operative management

Allowing for the fact that length of stay is affected by a range of issues, it is clear that there is substantial variation between units in length of stay for patients undergoing the same procedure. Around 35% of hospitals – including those who conduct the highest number of such procedures – typically undertake lower limb angioplasty as a day case. However, there are some providers who keep patients in for three or more days on average. One provider averages a length of stay of almost five days for lower limb angioplasty on non-diabetic patients and a different provider averages a length of stay in excess of 10 days for diabetic patients.

For bypasses, the variation is more extreme still, with a small number averaging less than five days but many providers keeping patients in for at least 10 days.

For lower leg angioplasty or bypass for peripheral arterial disease, if all providers with an average length of stay that is longer than the national average reduced length of stay to the national average, some 10,025 inpatient bed days a year could be released with a financial saving of £3 million a year – incentive enough to consider initiatives to reduce length of stay.

Addressing the causes of variation

During the visits, providers at both ends of the spectrum were asked about the average length of stay and this revealed some important considerations.

Discussions with those providers that manage a high percentage of surgery as day cases showed that many have shaped their service to allow more patients to be admitted on the day of surgery, and avoid the need to admit the day before. This is beneficial to patients and also delivers cost savings.

In practical terms, this typically involves the development of a dedicated admissions unit, tasked with checking the patients are ready for surgery, completing paperwork and generally preparing them on the day to prevent delay in starting the operating list. Many units already operate in this way and it clearly enables them to complete more procedures as day cases.

Not all vascular patients can be treated as day cases; for example, patients needing a CEA may well be in hospital following a stroke. In general, as emphasised throughout this report, many vascular surgery patients are frail and have multiple co-morbidities. Often, these need to be managed before surgery, to ensure the patient is sufficiently well to undergo what will often be a debilitating procedure. This requires planning the patient's recovery and discharge and ensuring there will be sufficient relevant support available post-surgery.

This will require the involvement of other clinical teams – such as cardiology, pulmonary diabetic and renal specialists and, in terms of discharge planning, physiotherapy and even community health and social care. However, according to GIRFT visits, this is often a cause of delay in the process, with very ill patients being kept in hospital before surgery awaiting the input of other teams.

Essentially, it appears that care is often not effectively integrated; each department has its own workload and priorities, and these are not managed together. To reduce the average length of stay for vascular patients, cross-departmental referral pathways need to be developed, with agreed and achievable timescales. In a true hub-and-spoke network, where hubs are managing many more such procedures and patients, the incentive to integrate will be greater.

The same issues apply post-surgery, with evidence from visits indicating that patients are sometimes kept in hospital for longer periods due to a lack (or perceived lack) of adequate care post-discharge. Vascular teams may be concerned about both the availability of outpatient care, including whether or not the patient could have an appointment at a nearby spoke hospital within a few days of surgery and, where the patient has co-morbidities that need managing, about support from other disciplines.

In general, feedback and observations from the GIRFT visits would suggest that where providers have introduced physician management of patient co-morbidity into the vascular service, outcomes, length of stay and re-admissions have improved.

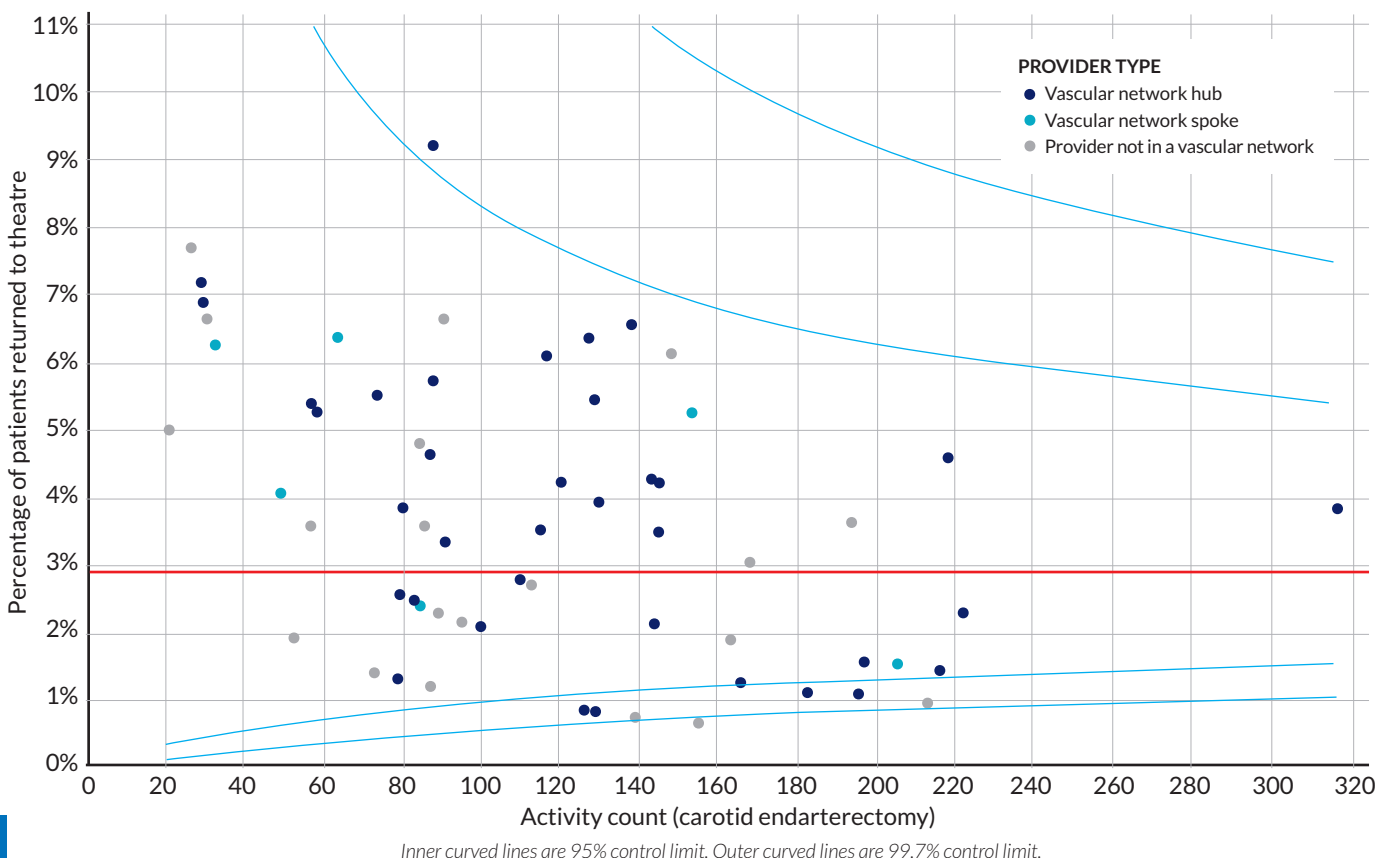
Finally, during the GIRFT visits, some providers indicated that longer stays could, in part, be an inadvertent result of a funding issue. Current rules mean that where a provider readmits a patient as an emergency within 30 days of surgery, the provider may face a financial consequence. To try and mitigate this risk, some units may have kept patients in under observation for longer than clinically necessary. For all sorts of reasons, this would not be desirable: it means valuable vascular resources would be being used to monitor patients that may not need monitoring or additional care, while others in need of surgery might have to wait for a bed to be free. The extent to which this issue is material is unclear. As providers work to reduce length of stay, GIRFT hubs will be aware of this possible barrier to improvement. Where the issue appears to be material, this should be discussed with commissioners with a view to mitigating it.

Recommendation	Actions	Timeline
8. Improve prehabilitation for AAA, PVD and CEA, particularly with regards to perioperative medical input.*	8A: Clinicians and providers to improve use of multidisciplinary prehabilitation using known best practice.	For delivery by July 2018.
	8B: GIRFT to inform NICE of proposed changes to practice linked to this recommendation for consideration in development of NICE Guideline Abdominal aortic aneurysm: diagnosis and management.	For delivery within NICE's Guideline development process.
	8C: NHSE Specialised Commissioning to review AAAQIF with a view to promoting consistency in prehabilitation.	To be agreed with NHSE Specialised Commissioning.
	8D: GIRFT Regional Hubs to identify cases in which the 30-day readmissions rule appears to be contributing to increased length of stay and discuss with commissioners and providers a possible review of thresholds. GIRFT to inform NHSI and NHSE pricing teams of any evidence emerging.	On-going, throughout GIRFT implementation.
	8E: GIRFT to add relevant existing guidance to the GIRFT Good Practice Manual, as well as any case studies it identifies.	On-going, throughout GIRFT implementation.
*To clarify, implementation of this recommendation will be aided by the GIRFT Anaesthesia and perioperative medicine workstream, which may provide further recommendations on prehabilitation.		

Return to theatre

A further factor that can influence length of stay is the need for patients to return to theatre. Given the fact that vascular patients are typically very frail, it is to be expected that return to theatre may be higher than in some other surgical specialties. However, the variation found in return to theatre rates across different units indicates this is not simply a standard risk.

Figure 10: Percentage of patients who return to theatre during the inpatient spell of a CEA procedure by provider and provider type, NVR 01-Jan-2014 to 31-Dec-2014



As can be seen, there are a larger number of trusts where over 5% of patients return to theatre and one where the figure is as high as 9%. By contrast, there are several under 1% with eight reporting no returns to theatre.

For AAA repair, the variation is if anything broader still, though as noted above there are some providers who deliberately conduct a staged second look operation repair for open surgery.

The variation needs to be examined and that should start locally. Trusts should review all returns to surgery at vascular mortality and morbidity meetings to identify whether there are common factors and address any issues of quality, whether during surgery itself or post-operative care.

Variation in emergency readmissions

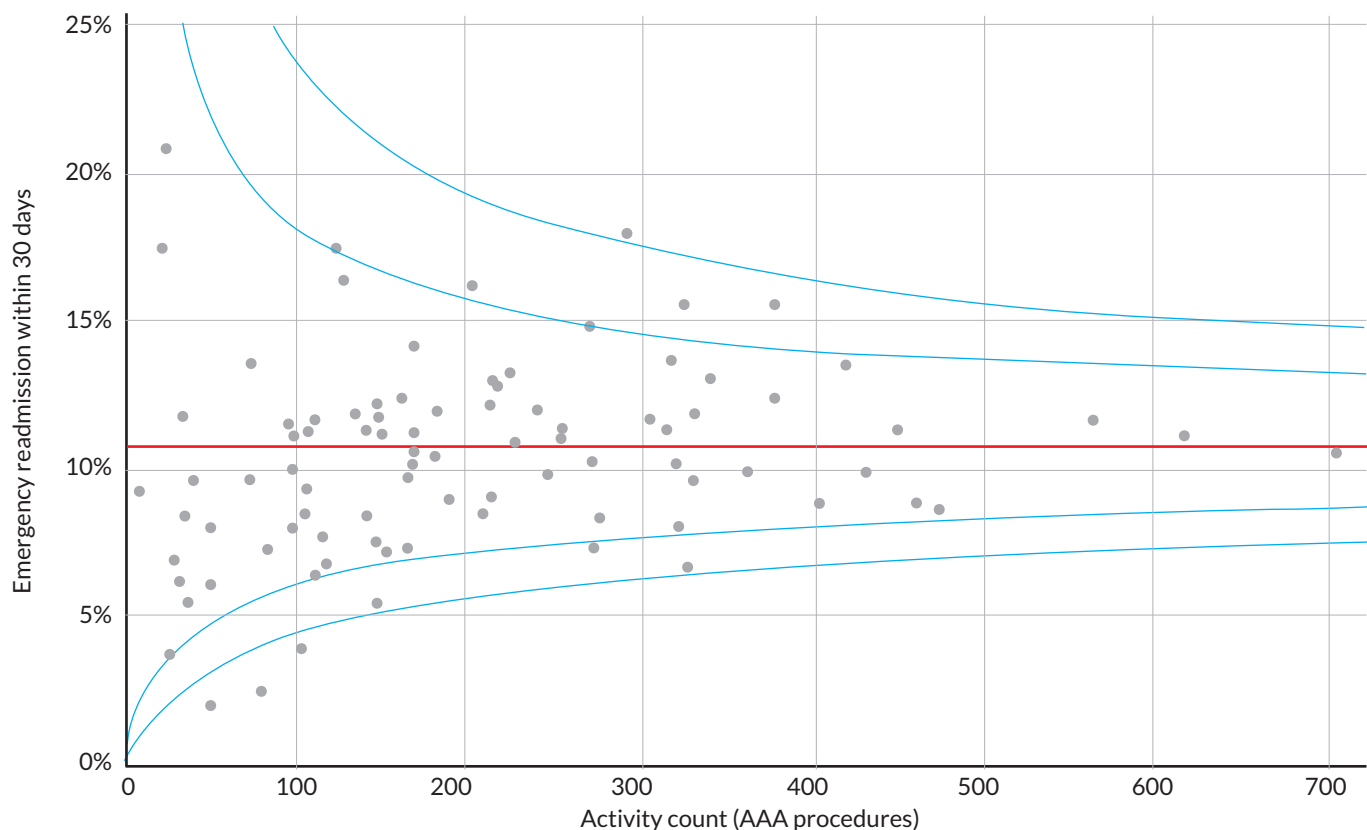
Some of the factors considered around returns to surgery clearly apply to readmissions too.

In general, readmissions following vascular surgery are high compared to many other surgical disciplines: approximately 10% of AAA patients are readmitted to hospital for any emergency reason within 30 days, as are approximately 8% of CEA patients and 16.5% of patients who underwent a major amputation for lower limb vascular disease.

Most emergency readmissions are a consequence of performing surgery on patients who are frail and have multiple co-morbidities. The importance of good perioperative care was raised frequently in GIRFT visits, is well understood by vascular surgeons, and can be addressed immediately. Future GIRFT workstreams, in particular the intensive and critical care and the anaesthesia and perioperative medicine workstreams, will support vascular surgeons to improve perioperative care for patients.

Even allowing for these factors, the variation in emergency readmissions is surprisingly broad. For AAA, the trust percentages range from below 5% to above 20%.

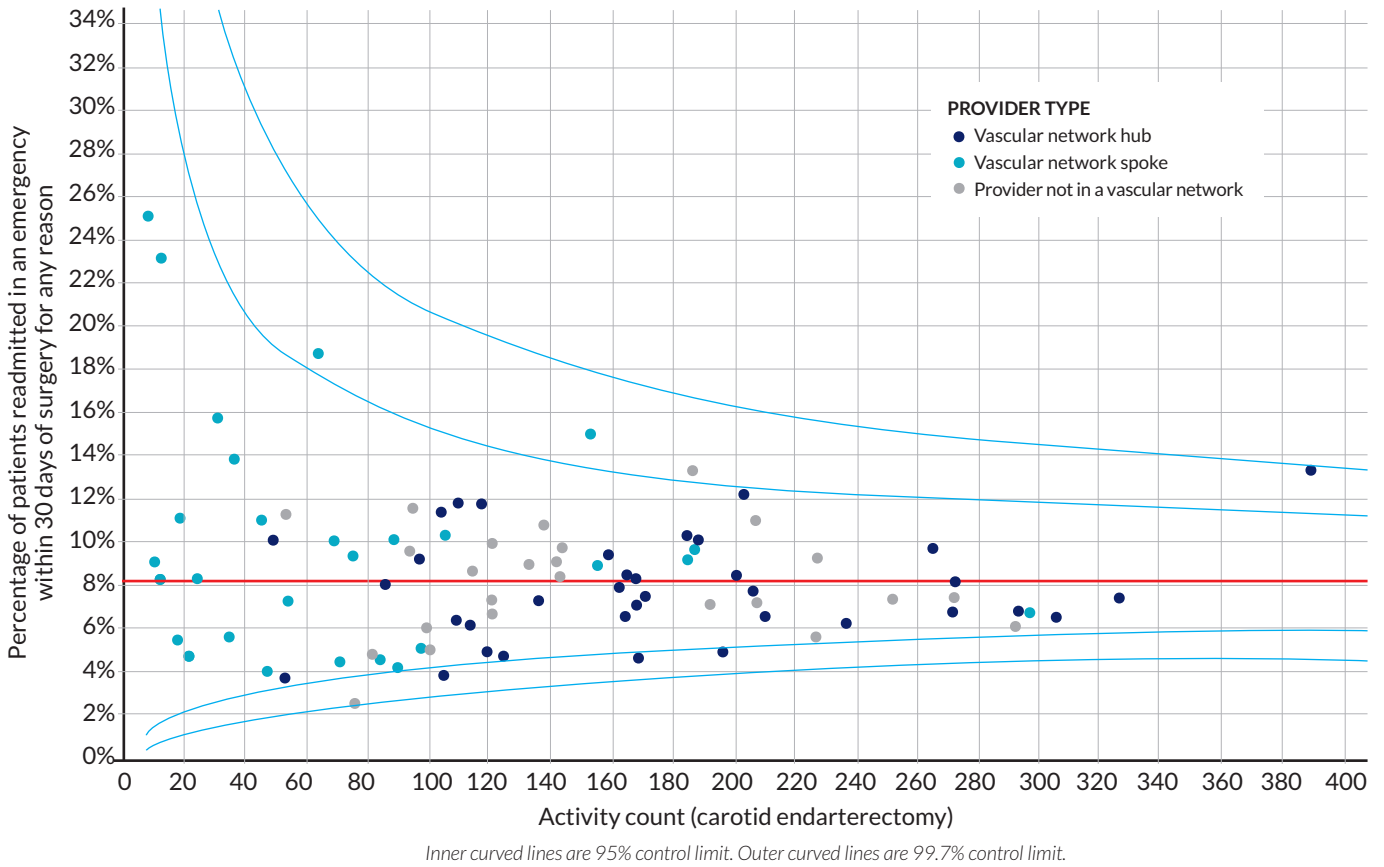
Figure 11: Percentage of patients readmitted in an emergency within 30 days following an AAA procedure by provider, HES initial admission 01-Apr-2012 to 31-Dec-2014



Inner curved lines are 95% control limit. Outer curved lines are 99.7% control limit.

For CEA, the variation between trusts was also extensive, ranging upwards from 2%.

Figure 12: Percentage of patients readmitted in an emergency within 30 days for any reason following a CEA procedure by provider and provider type, HES initial admission 01-Apr-2012 to 31-Dec-2014



Following major lower limb amputation, the average 30-day readmission rate for any reason is 16.5%. Further investigation is needed to understand the factors underlying the variation.

Overall, across all vascular procedures considered in this report, if all providers with above-average readmission rates improved to reach the national mean, some 160 readmissions a year would be avoided.

Understanding emergency readmissions

There might be a link between the choice of procedure and the frequency of readmissions. Yet the data gathered to date does not support this; nationally, 10% of patients who underwent open repair for AAA were readmitted in an emergency within 30 days, compared to 11% of those who underwent EVAR.

The views expressed during the GIRFT visits indicated that a high percentage of readmissions are due to non-surgical complications, usually related to co-morbidities. It should be possible to reduce these readmissions substantially, through better post-operative support and discharge planning, involving other disciplines as well as the vascular team. Physiotherapy in particular can be invaluable here, as can home care, to support frail and elderly patients in their recovery. In general, it is often clear which patients are at greatest risk of readmission; it should be possible to provide such patients with a greater level of support, rather than providing a 'standard' level for all.

As indicated above, where surgical work is concentrated in hubs, it may be easier to achieve this multidisciplinary approach, while the role of spokes in providing outpatient services and early post-operative monitoring is equally key.

Recommendation	Actions	Timeline
9. Reduce avoidable readmissions by improving perioperative care and follow up*.	9A: Clinicians and trust management to ensure close liaison with medical specialties and seven-day physiotherapy, as part of multidisciplinary package of enhanced recovery.	For delivery by July 2018.
	9B: Clinicians and trusts to ensure early post-operative contact with patients, as well as readily available emergency contact information and outpatient clinics for patients with concerns.	For delivery by July 2018.
	9C: GIRFT to add existing guidance relevant to the GIRFT Good Practice Manual, as well as any case studies it identifies.	Ongoing, until business as usual.
	9D: NHSI Operational Productivity Clinical Productivity sub-programme to reflect recommendation in any guidance products, seeking further GIRFT Clinical Lead input as necessary.	To be considered within Clinical Productivity sub-programme.
	*To clarify, implementation of this recommendation will be aided by the GIRFT anaesthesia and perioperative medicine workstream, which may provide further recommendations on prehabilitation.	

Improving data collection to improve our understanding

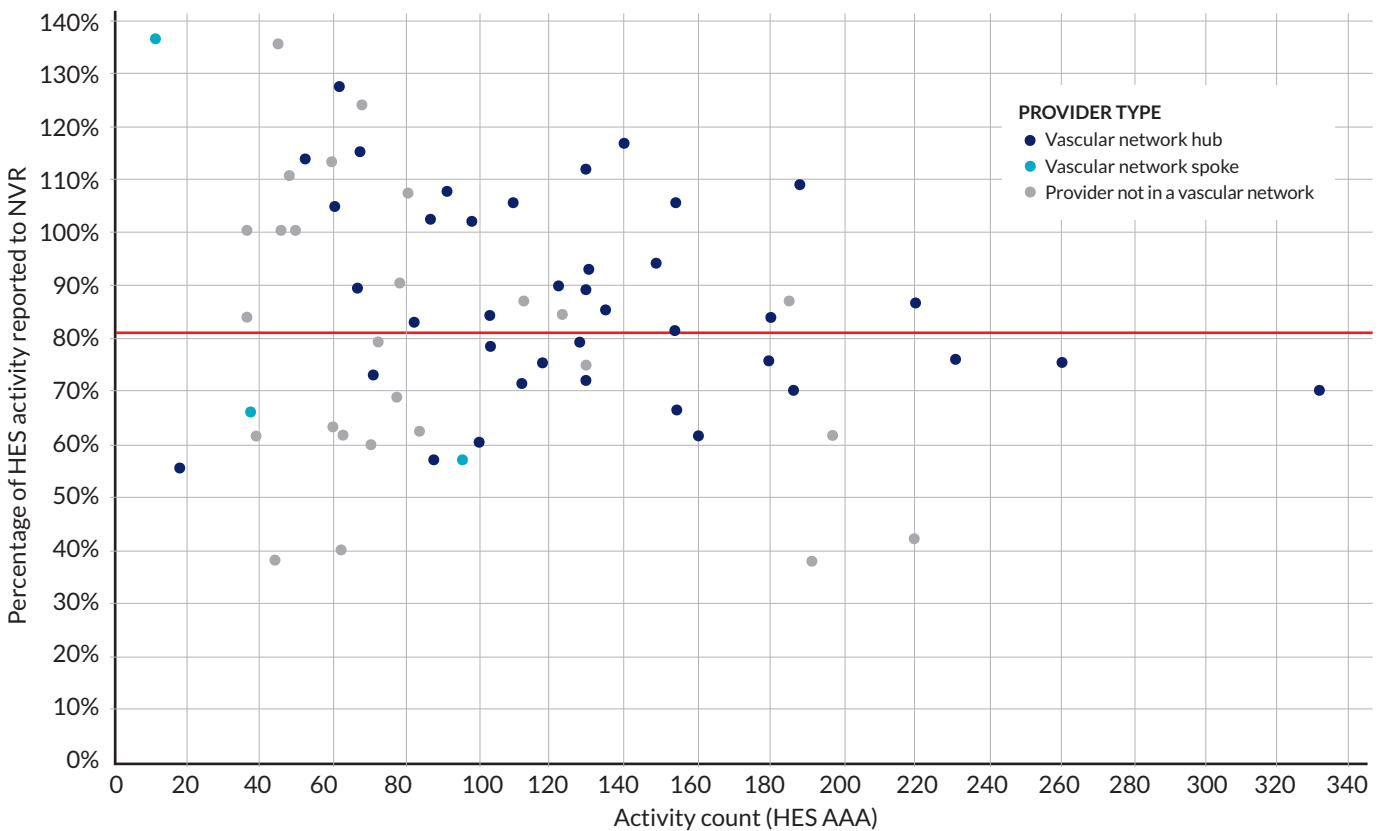
The National Vascular Registry (NVR) has been a major asset to vascular surgery since it was originally established as the National Vascular Database by the Vascular Society. It provides an annual snapshot of the vascular surgery workload and how it is changing; it has been a crucial source of information for this report, particularly about procedure choice. However, the GIRFT process has also served to highlight the limitations of the NVR – particularly when NVR data is compared to the other key source of data used by the GIRFT team, Hospital Episode Statistics (HES).

The two datasets do not match. There are sizable differences in the number of procedures recorded in each, with the NVR suggesting that some vascular surgery teams are conducting many more procedures each year than are shown in HES. This means providers may not have an accurate view of activity levels, which may make it more difficult to effectively plan and improve services.

The NVR is already a major asset to the profession and the data gathered within it can be put to real use – the GIRFT programme being just one example. However, clinicians, clerks and others responsible for the data entry must do more to improve recording of procedures in both NVR and HES.

Perhaps the simplest demonstration of this relates to case ascertainment for the NVR. For AAA repair, recorded case ascertainment rates vary between 0% - in two providers with low activity levels who appear simply not to record this at all – to several providers with rates well over 100%. This may indicate: (1) duplicate recording of procedures in the NVR, or failure to record procedures in HES; (2) poor recording of procedures in NVR; or (3) poor selection of OPCS (procedures) codes either by hospital coders or the GIRFT analyst team. The mean level is just over 80%, suggesting that at least one in five AAA procedures is undertaken with no record in the NVR.

Figure 13: Case ascertainment rate, all AAA procedures by provider and provider type, NVR and HES 01-Jan-2014 to 31-Dec-2014



The variation in case ascertainment rates is even more striking for lower limb revascularisation. Average case ascertainment rates for bypass procedures are around 55% and, for lower limb angioplasty, just four providers have a case ascertainment rate over 60% with a majority under 10%.

Figure 14A: Case ascertainment rate for all lower limb bypass revascularisation procedures by provider and provider type, NVR and HES 01-Jan-2014 to 31-Dec-2014

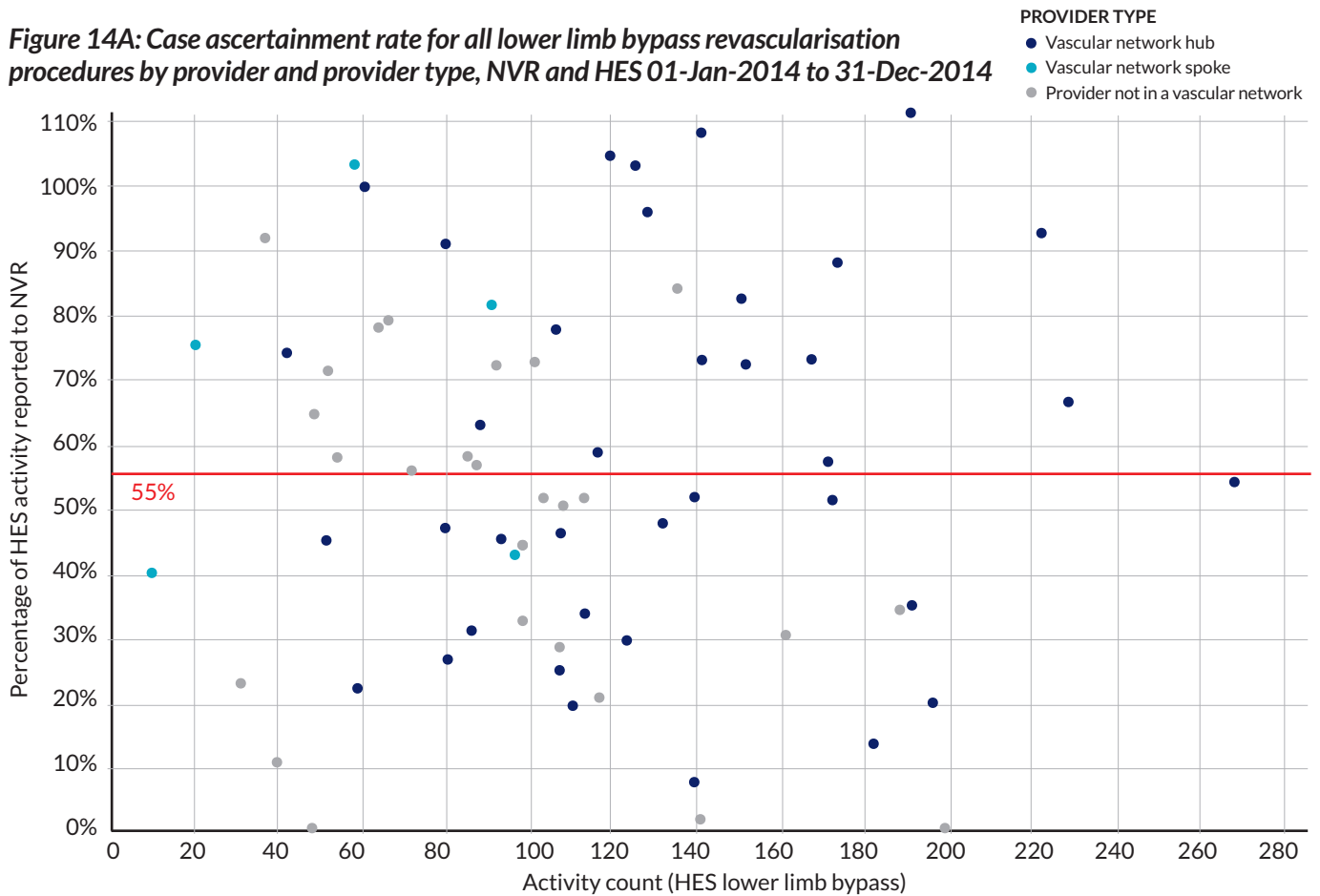
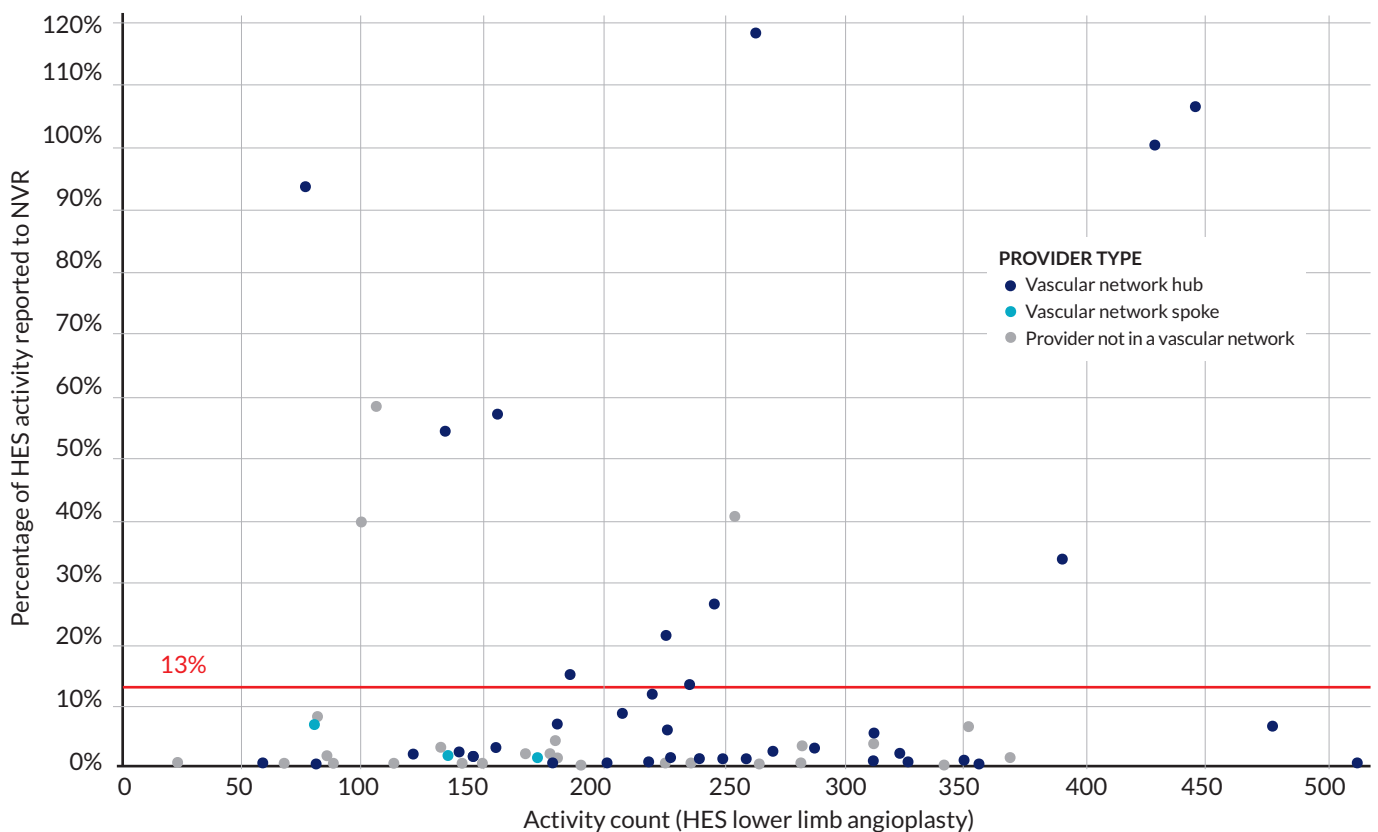


Figure 14B: Case ascertainment rate for all lower limb angioplasty revascularisations by provider and provider type, NVR and HES 01-Jan-2014 to 31-Dec-2014



In 2014 recording of major and minor amputations in NVR was poor.

In addition to the recording of procedures within the NVR, we support substantial improvement of recording of the Fontaine score⁸ against lower limb admission records in the NVR. This score classifies the level of pain patients are experiencing and whether this has progressed to skin destruction, ulceration and/or gangrene. Improved recording of this score would aid analysis of the need to amputate and potentially lead to more consistent clinical decision-making.

Figure 15A: Case ascertainment rate for all major lower limb amputation procedures by provider and provider type, NVR and HES 01-Jan-2014 to 31-Dec-2014

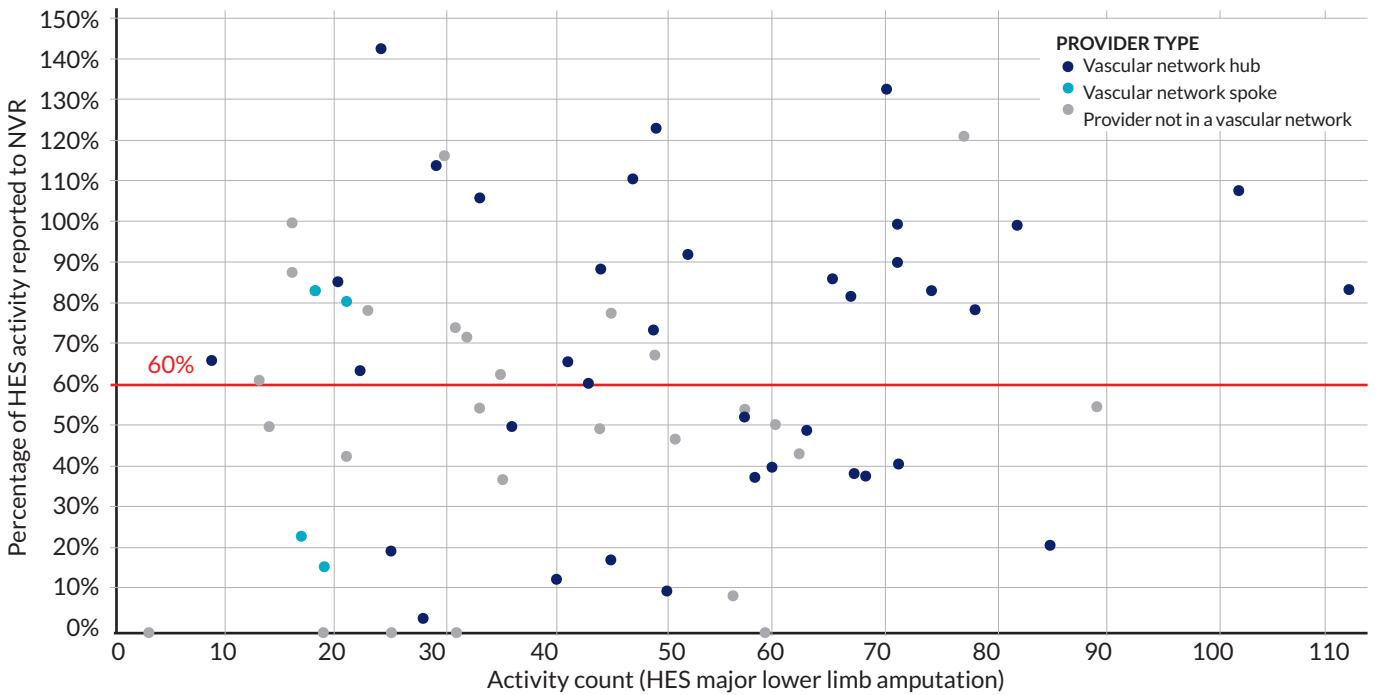
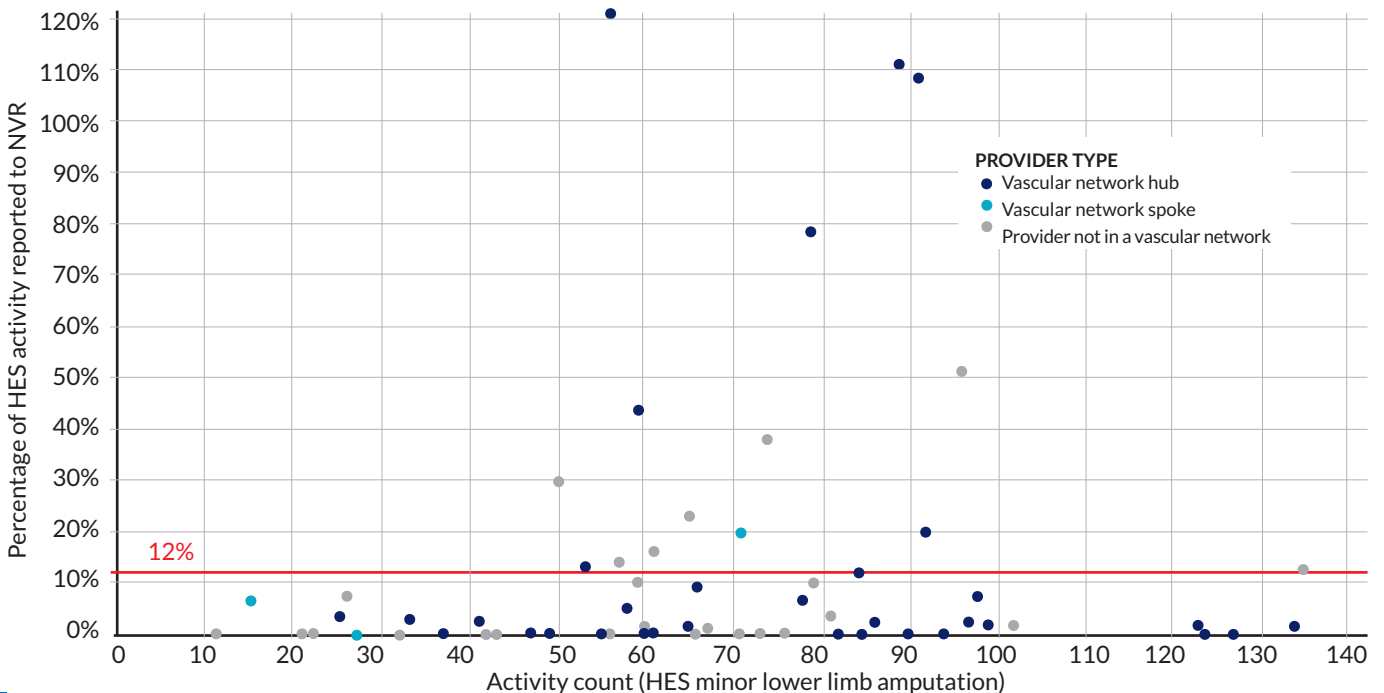


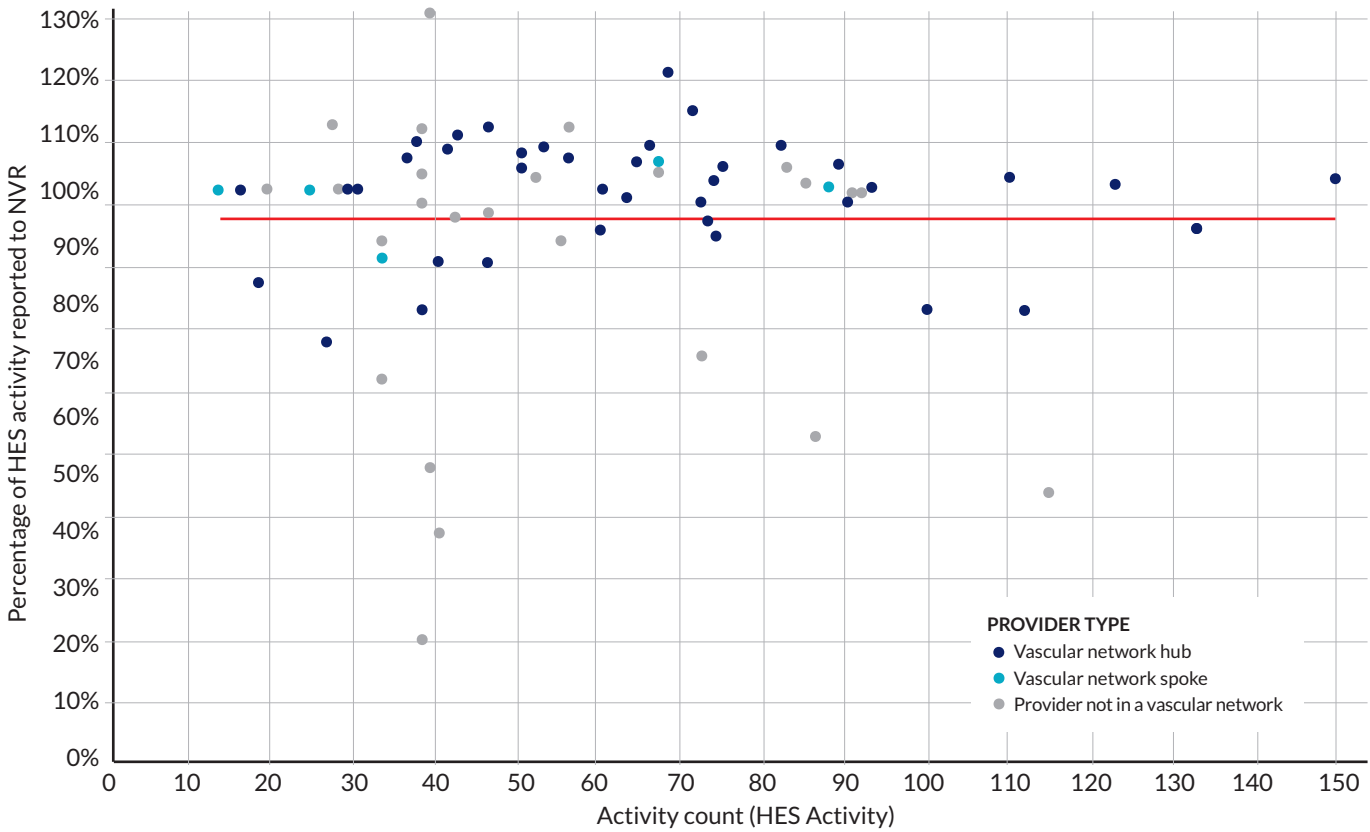
Figure 15B: Case ascertainment rate for all minor lower limb amputation procedures by provider and provider type, NVR and HES 01-Jan-2014 to 31-Dec-2014



⁸See www.angiologist.com/arterial-disease/fontaine-classification/ for a simple description of this scale

The recording of lower limb procedures in the NVR compares starkly with the third core pathway, CEA, where the national average ascertainment rate is around 96%.

Figure 16: Case ascertainment rate for all CEA procedures by provider and network status, NVR and HES 01-Jan-2014 to 31-Dec-2014



Explanations for poor data quality

Ultimately a cultural shift is needed; one that places increased value on the importance of record keeping. This report makes recommendations for clarifying responsibilities around data collection to make the NVR and HES more valuable resources for commissioners and clinicians.

Recommendation	Actions	Timeline
10. Ensure case ascertainment of the National Vascular Registry to HES reaches 85% for AAA, CEA and lower limb revascularisation and amputation procedures.	<p>10A: Trusts to improve data recording to the National Vascular Registry and HES to achieve case ascertainment of at least 85%.</p> <p>10B: NHSE Specialised Commissioning to consider use of Information Breach, or alternatively a Data Quality Improvement Plan to encourage delivery of 10A.</p>	<p>For delivery by July 2018.</p> <p>To be agreed with NHSE Specialised Commissioning.</p>

Recommendation	Actions	Timeline
11. Improve quality of routine data entry and collection.	11A: GIRFT and NVR to consider providing guidance on the coding and recording of complex aneurysms, and the definition of elective/emergency or planned/urgent with respect to vascular surgery procedures.	For immediate discussion, with any action delivered subject to agreement, by January 2020.
	11B: GIRFT to discuss with the NVR a change to the post-surgical destination data item to include enhanced ward-level care	As above
	11C: Trusts and surgeons to improve recording of the Fontaine classification in the NVR, as a standard clinical scale for lower limb ischaemia.	For delivery by July 2018.

Recommendation	Actions	Timeline
12. Improve coding for complex aneurysms and emergency vascular surgical activity.	12A: Surgeons to meet with trust information teams to implement changes to coding practice which would provide improved clinical accuracy as defined by NVR and GIRFT.	For completion by April 2018.
	12B: Trusts to agree any proposed changes internally with a view to any change impacting on NHS Standard Contract service conditions on the counting and coding of activity, being proposed to commissioners.	For completion by July 2018.
	12C: If and once agreed with commissioners, trusts to implement any change.	To a timeline defined in accordance with the NHS Standard Contract.
	12D: Surgeons to meet trust information team and coders and review activity attributed to them once a month.	For continual action, co-ordinated with 12A to C as agreed locally.
	12E: Trust management to facilitate time for surgeon and coder engagement, using job planning if needed.	For completion by July 2018
	12F: GIRFT to consider development of guidance, consistent with existing coding guidance, to support improved collaboration between coders and surgeons.	For immediate consideration, for any guidance to be developed by January 2020.

One particular gap in the data around vascular surgery relates to patient experience. The Friends and Family Test (FFT), a standard measure across all NHS care, is vastly underused in vascular surgery. As a first step, providers could simply consider how they could increase their response rates, where it appears low.

However, it is also recognised that the FFT is a measure of overall experience and was not designed to support clinically led improvements. As a result, it does not record the patient's condition, nor the procedure they underwent. Further consideration is needed around how best to capture insight on patient experience to support improvements to clinical care.

Recommendation	Actions	Timeline
13. Improve insight into patient experience in vascular services, to support clinically led improvement.	13A: Vascular surgery providers to review their FFT response rates and, where response rate appears low, use suggestions in FFT guidance to improve rate.	For continual action.
	13B: GIRFT to work with other national bodies to consider how best to gather and apply insights on patient experience to support improvements in clinical care – including by engaging with on-going work on FFT.	On-going, as agreed with national bodies, until January 2020.
	13C: NHSE Specialised Commissioning to seek GIRFT Clinical Lead involvement in its work on Patient Reported Outcome Measures and Patient Reported Experience Measures.	To be agreed with NHSE Specialised Commissioning.

Better data to inform surgeon appraisal

Finally, there is another key use of data that needs to be considered: data about individual surgeon performance. At present – as was raised in the GIRFT report into General Surgery – once qualified, surgeons are generally left to manage their own professional development. Whilst the majority of surgeons are both conscientious and professionally curious, studying new approaches through journals and conferences, the current model can mean surgeons not keeping abreast of developments in their specialist field.

Data about the activity each surgeon conducts – in particular, the number of procedures they carry out and the procedural choices they make (e.g. EVAR or open surgery) – can help identify if surgeons appear to favour one method over another. While that in itself is not ‘wrong’, with different surgeons having different areas of expertise, it may also reflect a lack of knowledge or experience in a different method. Data about outcomes can also indicate a development need.

The NVR gathers such data; it seems a logical step therefore to use NVR data routinely at appraisal, to support professional development.

Recommendation	Actions	Timeline
14. Require at appraisal surgeon-level intelligence on activity and outcomes.	14A: Trust management to ensure all appraisals are informed by best quality data.	Substantial progress to have been made by July 2018.

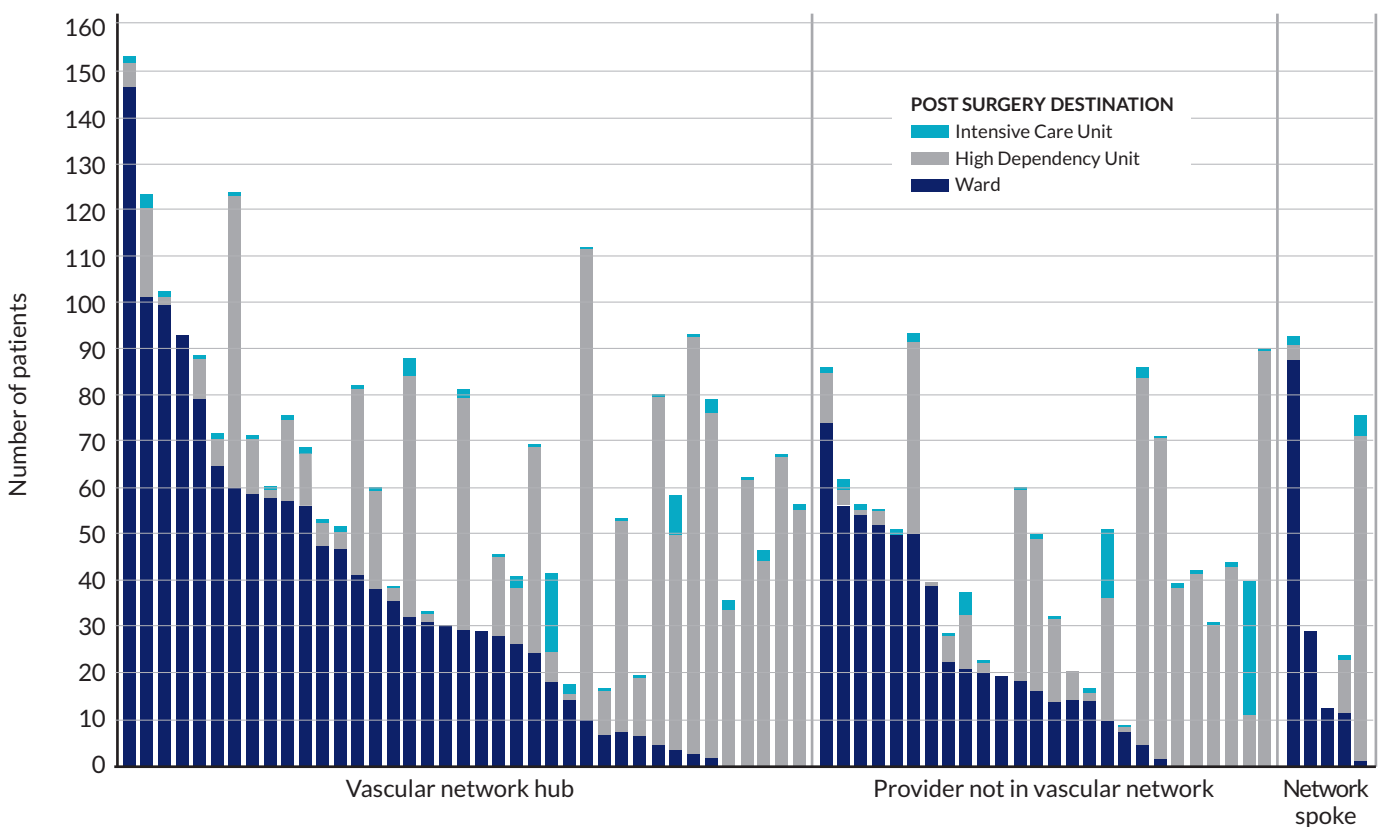
Increasing consistency and reducing costs in procurement

One of the core questions posed to GIRFT teams is whether there are opportunities to find efficiency savings in their area of practice. As part of this, teams examine the comparative costs incurred by different units in conducting the same or similar procedures. While some variation in these costs is expected, the data for vascular surgery has revealed substantial variation – which does not correlate with variation in outcomes. Put another way, some units are conducting the same or similar procedures, but are spending less to do so. It is in all of our interests to learn from this.

As noted earlier, the GIRFT process identified substantial variation in the costs of EVAR procedures to address AAA: for elective procedures reported costs ranged from £2,251 to £19,690, while for non-elective procedures the range was between £4,000 and £16,050⁹. Preliminary enquiries have not been able to establish the cause of this variation, so further investigation is needed.

Costs reported by trusts for CEA vary between £2,150 and £8,250. The GIRFT team were able to identify that where patients recover after surgery can have a substantial impact on costs. Some units routinely send CEA patients to the HDU or ICU after surgery, while others return them all to vascular wards with enhanced nursing staff numbers.

Figure 17: Patient count by post-surgical destination type post CEA procedure by provider, NVR 01-Jan-2014 to 31-Dec-2014



The available evidence suggests that – unless the patient requires the additional resources that may be available in HDU or ICU – there is no clinical benefit to recovery there as opposed to in the ward. Moreover, insights derived from the GIRFT visits indicated that patients are often more comfortable and happier in the vascular ward, especially if they already know members of the nursing team there. Whilst the system is under significant pressure to adequately staff wards and theatres with sufficiently expert nursing and AHP staff, a majority cohort of patients would be better served in terms of experience and outcome, in dedicated vascular beds with specialist vascular nurses.

One study indicated that care on an HDU is double the cost of enhanced care on a ward, and in ICU the figure is higher still. While clearly post-surgical recovery destination reflects a range of factors, from the patient’s overall health and wellbeing to the availability of beds in different locations, this study suggests that recovery on an enhanced ward is a more cost-effective option.

Recommendation	Actions	Timeline
15. Increase use of ward-based recovery to a level of approximately 90%.*	15A: Trusts to assess needs for enhanced nursing numbers and medical input on ward to deliver this recommendation.	As required, to meet timeline for 15B.
	15B: Trusts to recover patients to the ward, unless contraindicated, or where nursing and medical input cannot be achieved on the ward.	Change to be established by July 2018.
	*this recommendation should be implemented in a risk-averse manner that is compliant with <i>safe staffing for nursing in adult inpatient wards in acute hospitals</i> ¹⁰	

Reducing procurement costs

The annual costs of procuring medical devices and consumables related to vascular surgery is over £40 million. Clearly, the devices and consumables are essential to surgical outcomes; however, available data demonstrates that there is significant variation in both the types of equipment used by different surgeons and in different locations, and in the prices trusts pay for what appear to be similar items.

Analysis shows that together the seventy trusts providing vascular surgery are buying stents and grafts from more than 130 different brands. Furthermore, they are working with 32 different suppliers in doing so.

Table 2: Examples of procurement variation in vascular surgery

Device	Total Qty	Total Spend (£)	% of Total	National Price Variance (£)	Brand Count	Supplier Count
Grand Total	33,153	£32,032,301	-	£5,375,123	135	32
Stent Graft	4,548	£14,435,176	45.06%	£1,989,516	40	13
Stent	17,443	£10,367,503	32.37%	£1,152,713	61	25
Graft	11,162	£7,229,621	22.57%	£2,232,895	36	14

Unsurprisingly, this vast range of products then leads to considerable variation in price for ostensibly similar items: the national average cost for one brand of stent graft for AAA repair was £4,122.66, compared to £2,751.34 for a different brand. More significantly still, some providers paid substantially more per item than their peers. This variation was observed within the same geographical region, meaning that issues such as logistics should not have affected price.

Whilst there will always be a clinical need for using specific devices for certain patient indications, this data indicates there is clearly scope to reduce variation and streamline the supply chain, which will lead to aggregated volumes, reduced prices and lower inventories.

A preliminary assessment of the variation in prices and brands contained within the NHS Improvement Purchase Price Index and Benchmark (PPIB) data suggests that as much as £6.5m a year could be saved by improving procurement and supply chain efficiency within vascular surgery alone.

¹⁰NICE (2014)

The key places to start will be the top ten suppliers, which account for 95% of the total spend, and the top ten brands, which account for around 50% of the total spend. However, there is also significant variation in the prices paid for lower-volume items.

In the coming months, the GIRFT team will be working with trusts to understand why this variation exists. Inherent in this question is the recognition that there will often be sound clinical reasons behind the choice of devices and of treatment methods, and that patient quality outcomes, product evidence and product innovation are key considerations alongside supply chain efficiency and best value. As part of this exercise, the GIRFT team will provide a curated Clinical Procurement Benchmarking and PPIB data-pack to trusts' Heads of Procurement for validation and feedback before any conclusions are drawn or more specific recommendations made.

For tariff excluded devices, NHS England is already seeking to reduce some of this variation through their High-Cost, Tariff-Excluded Devices (HCTED) programme, and GIRFT is committed to working closely with the HCTED team to develop standard specifications for these products.

The GIRFT team will also be working closely with NHS Improvement and the Department of Health to review the potential opportunities that new procurement or payment initiatives such as the Category Towers bring to vascular surgery.

Recommendation	Actions	Timeline
16. Enable improved procurement of devices and consumables through cost and pricing transparency, aggregation and consolidation, and the spreading of best practice.	16A: GIRFT to work closely with sources of procurement data such as PPIB and relevant clinical data to identify optimum value for money procurement choices, considering both outcomes and cost/price.	July 2018
	16B: GIRFT to identify opportunities for improved value for money, including the development of benchmarks and specifications, and locate sources of best practice and procurement excellence, identifying factors that lead to the most favourable procurement outcomes.	September 2018
	16C: GIRFT to engage the NHS procurement community, including the new Category Towers and the HCTED programme, to develop commercial plans for supporting trusts and STPs to deliver the identified value for money opportunities.	October 2018

Reducing the impact of litigation

As well as looking at addressing variation in clinical practice, each of the GIRFT clinical workstreams has been asked to examine the impact and causes of litigation, with a view to reducing the number of incidents that lead to litigation

Data obtained from NHS Resolution shows that litigation claims following a vascular procedure are estimated to value between £26 and £41 million per year over the last five years. This means that the average cost of litigation per admission in the vascular surgery specialty was £128. However, if only major vascular surgery is included (i.e. AAA, CEA or lower limb revascularisation or amputation) then the average cost increases to £650 per admission, an unacceptably high level.

What's more, there are vast differences between providers: the best performer pays an average of £0 per vascular admission, while at the other end of the scale, one provider has paid out an average of more than £868 per admission into the vascular surgery specialty. However, for major vascular surgery, the variation expands such that one provider's litigation costs was estimated at £6,413 per admission.

Figure 18: Variation in vascular surgery estimated litigation costs per admission between English trusts, NHS Resolution (denominator includes day case, elective and emergency admission into the vascular surgery specialty for patients of all ages) 01-Apr-2012 to 01-Mar-2017

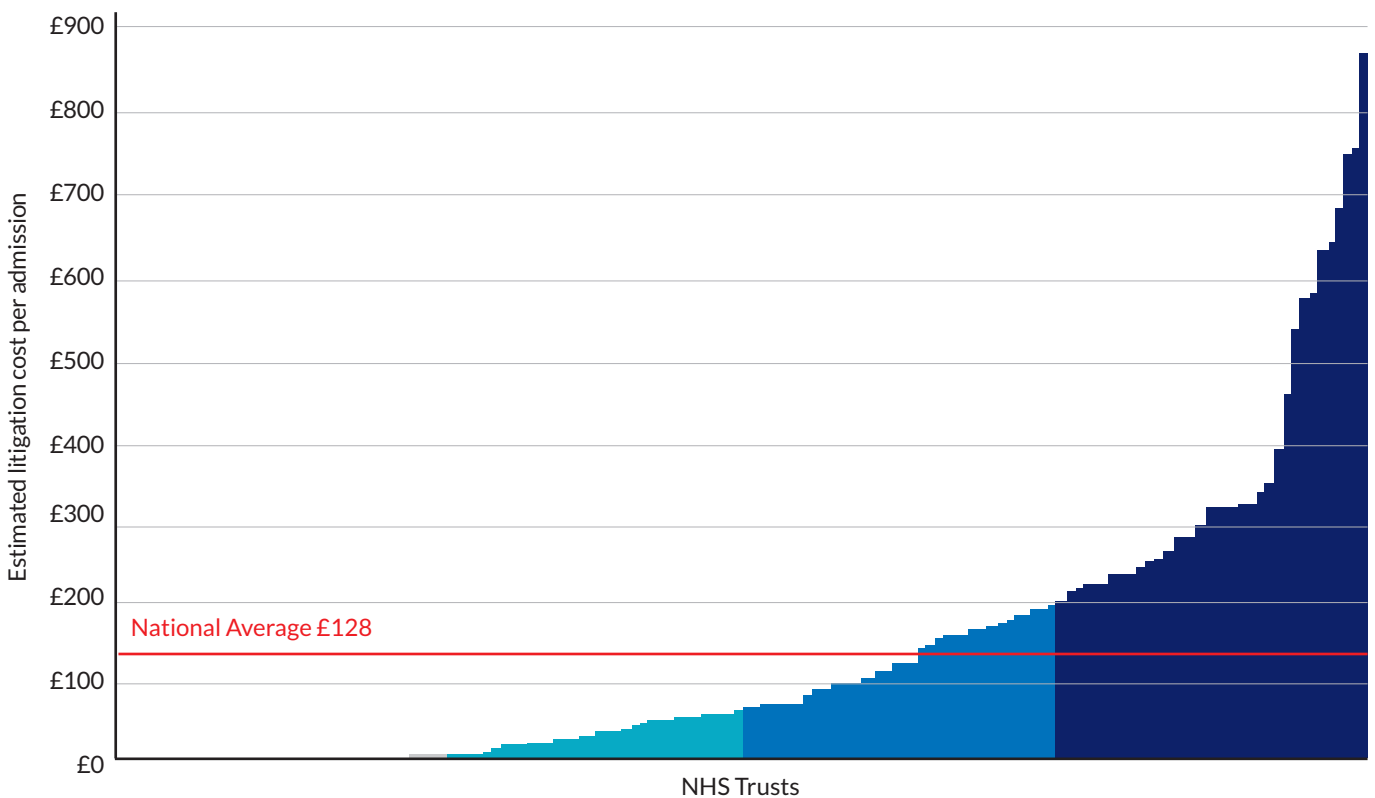
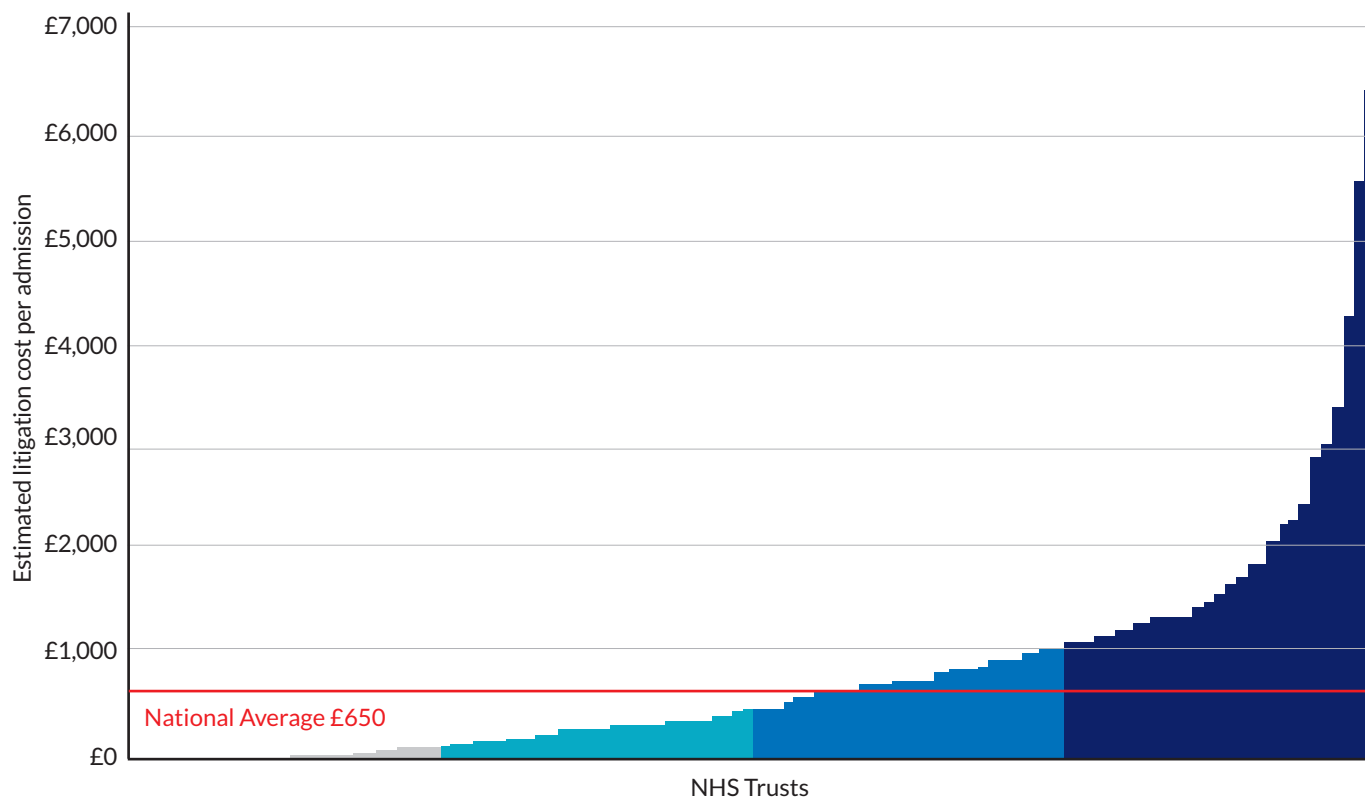


Figure 19: Variation in vascular surgery estimated litigation costs per admission between English trusts, NHS Resolution (denominator includes day case, elective and emergency admission for major vascular surgery [excluding varicose vein procedures] for patients of all ages) 01-Apr-2012 to 01-Mar-2017



The year-on-year data indicates that the number of claims is gradually increasing and the total costs remain high. As there has not been a corresponding increase in the number of procedures conducted each year, this indicates that incidents leading to litigation are becoming more common with an associated increase in financial pressure.

Table 3: Volume and cost of litigation claims within the vascular surgery specialty notified to NHS Resolution 01-Apr-2012 to 01-Mar-2017

Year	No. of claims	% change in No. of claims	Estimated litigation costs (£)	% change in estimated cost
2012/13	96	-	26,030,317.12	-
2013/14	128	33.33	29,804,828.70	14.50
2014/15	114	-10.94	40,911,522.04	37.26
2015/16	135	18.42	31,598,585.40	-22.76
2016/17	140	3.70	39,066,093.05	23.63
Total	613	-	167,411,346.30	-

The most common causes for claims were 'judgement/timing' (377 claims, 61.50%), 'interpretation of results/clinical picture' (102 claims, 16.64%), 'unsatisfactory outcome to surgery' (62 claims, 10.11%), 'fail to warn/informed consent' (38 claims, 6.20%) and 'inadequate nursing care' (36 claims, 5.87%). The impact of informed consent on surgical claims is more significant than the 38 claims which were directly identified. Lack of fully informed consent has played a role in many claims which were attributed to 'unsatisfactory outcome of surgery' and the patients' perception of poor 'judgement or timing'. Many of these claims are likely to be avoidable through an adequate consenting process in which an informed patient is involved in shared decision-making.

It was clear during GIRFT visits that many providers had little knowledge of the claims against them. This includes some with high litigation costs per admission as well as those at the low end. As a consequence, very few lessons have been learnt from the claims to inform future practice.

There was also a sense that too often vascular surgery departments had been unable to defend claims adequately due to a lack of documentation showing the decisions that were made and rationale behind them. Moreover, in some cases, vascular surgery teams knew or suspected that they were recorded as being responsible for incidences where the key failing or error was made by a different team. Again, the vascular surgery departments didn't have the information to support their opinion.

The issue here is not to try and shift the blame, but rather to take a more systematic approach to addressing claims: accepting responsibility where appropriate but also learning from previous claims and helping other departments to do the same. With litigation levels so high in vascular surgery, it is the responsibility of the whole department to address this; if even £1 million of the £39 million that is expected to be paid out for the claims notified last year could be redirected into frontline care, that would potentially pay for 120 EVAR AAA procedures.

Recommendation	Actions	Timeline
17. Reduce litigation costs by application of the GIRFT Programme's five-point plan.*	17A: Clinicians and trust management to assess their benchmarked position compared to the national average when reviewing the estimated litigation cost per activity. Trusts will have received an updated version of this for vascular surgery in the GIRFT 'Litigation in surgical specialties data pack', December 2017	For immediate action.
	17B: Clinicians and trust management to discuss with the legal department or claims handler the claims submitted to NHS Resolution included in the data set to confirm correct coding to that department, and inform NHS Resolution of any claims which are not coded correctly to the appropriate specialty via CNST.Helpline@resolution.nhs.uk	Upon completion of 17A.
	17C: Once claims have been verified clinicians and trust management to further review claims in detail including expert witness statements, panel firm reports and counsel advice as well as medical records to determine where patient care or documentation could be improved. If the legal department or claims handler needs additional assistance with this, each trusts' panel firm should be able to provide support.	Upon completion of 17B.
	17D: Claims to be compared with learning themes from complaints, inquests and serious untoward incidents (SUI). Where a claim has not already been reviewed as SUI, this should be carried out to ensure no opportunity for learning is missed.*	Upon completion of 17C.
	17E: Where trusts are outside the top quartile for litigation costs per activity, GIRFT to ask national clinical leads and regional hub directors to follow up and support trusts in the steps taken to learn from claims and share examples of good practice where it would be of benefit.	For continual action throughout GIRFT programme.
	*As described in GIRFT 'Litigation in surgical specialties data pack', Dec 2017. Note that actions 17A to 17D are part of a continual improvement cycle.	

POTENTIAL IMPACT

The central focus of the GIRFT Vascular Surgery report is to improve patient care for the benefit of patients. The recommendations put forward to achieve this goal have far reaching impacts including: reductions in returns to theatre, stroke, emergency readmission and mortality rates, as well as reductions in lengths of stay. Most also offer the NHS opportunities to make savings or improve productivity. Table 4 illustrates a financial opportunity of between £7.6 million and £16 million. This opportunity is in addition to a £6.5 million financial opportunity in procurement and, more importantly, an opportunity to prevent over 100 deaths.

It should be noted that this section does not comprehensively list the opportunities discussed in this report – only selected metrics have been included below as examples of what might be possible. Furthermore, these metrics only identify variation, some of which will be warranted and some of which will be unwarranted.

The GIRFT programme emphasises that these opportunity values are for illustration only. Individual providers and clinicians should assess their own services to determine the unwarranted variation that exists, the associated opportunity and thus the prioritisation of service changes that they wish to deliver.

Table 4: the potential impact of GIRFT implementation in Vascular Surgery

Improvement	National mean average or better			Top quartile or better		
	Target	Activity opportunity	Gross notional financial opportunity	Target	Activity opportunity	Gross notional financial opportunity
Improving AAA mortality rates (inpatient mortality, following any repair procedure) Source & year: National Vascular Registry Organisational Audit 2015	1.44% or below	17 deaths avoided	n/a	0.7% or below	31 deaths avoided	n/a
Improving major lower limb amputation mortality rates (during the inpatient spell or readmission within 30 days) Source & year: HES Original admission April 2012 – December 2014	7.37% or below	36 deaths avoided	n/a	5.17% or below	77 deaths avoided	n/a
Improving stroke / mortality rates for carotid endarterectomy (during the inpatient spell) Source & year: National Vascular Registry Organisational Audit 2014	1.84% or below	16 strokes or deaths avoided	n/a	1% or below	37 strokes or deaths avoided	n/a
Reducing readmissions after AAA open procedure (any emergency readmission within 30 days) Source & year: HES Original admission April 2012 – December 2014 Gross notional financial opportunity based on average PBR cost of readmission spells	9.6% or below	20 spells	£175k	7.1% or below	40 spells	£350k
Reducing readmissions after AAA endovascular procedure (any emergency readmission within 30 days) Source & year: HES Original admission April 2012 – December 2014 Gross notional financial opportunity based on average PBR cost of readmission spells	11.3% or below	55 spells	£420k	8.4% or below	150 spells	£1,145k
Reducing readmissions after carotid endarterectomy procedure (any emergency readmission within 30 days) Source & year: HES Original admission April 2012 – December 2014 Gross notional financial opportunity based on average PBR cost of readmission spells	8.1% or below	40 spells	£200k	6.6% or below	74.6 spells	£375k
Reducing readmissions after major leg amputation (any emergency readmission within 30 days) Source & year: HES Original admission April 2012 – December 2014 Gross notional financial opportunity based on average PBR cost of readmission spells	16.5% or below	45 spells	£480k	14.2% or below	80 spells	£850k
Reducing length of stay for elective AAA endovascular procedures Excludes revisions and complex procedures Source & year: HES April 2014 – March 2015	2.9 days or below	3140 days	£920k	1.9 days or below	7230 days	£2,115k
Reducing length of stay for non-elective AAA endovascular procedures Excludes revisions and complex procedures Source & year: HES April 2014 – March 2015	14.2 days or below	2400 days	£740k	11 days or below	4990 days	£1,540k
Reducing length of stay for elective AAA open procedures Excludes revisions and complex procedures Source & year: HES April 2014 – March 2015	10.5 days or below	1200 days	£350k	8.6 days or below	2370 days	£695k
Reducing length of stay for non-elective AAA open procedures Excludes revisions and complex procedures Source & year: HES April 2014 – March 2015	16.4 days or below	1800 days	£555k	12.2 days or below	4015 days	£1,240k
Reducing length of stay for elective lower limb angioplasty in diabetic patients Source & year: HES April 2014 – March 2015	2 days or below	2135 days	£625k	0.9 days or below	4360 days	£1,275k
Reducing length of stay for elective lower limb angioplasty in non-diabetic patients Source & year: HES April 2014 – March 2015	1.3 days or below	2575 days	£755k	0.7 days or below	4855 days	£1,420k
Reducing length of stay for elective lower limb bypass in diabetic patients Source & year: HES April 2014 – March 2015	9.3 days or below	2080 days	£610k	6.3 days or below	4500 days	£1,315k
Reducing length of stay for elective lower limb bypass in non-diabetic patients Source & year: HES April 2014 – March 2015	7.6 days or below	3235 days	£945k	5.7 days or below	6745 days	£1,975k
Reducing length of stay for elective carotid endarterectomy procedure Source & year: HES April 2014 – March 2015	3 days or below	950 days	£280k	2.2 days or below	2082 days	£610k
Reducing length of stay for non-elective carotid endarterectomy procedure Source & year: HES April 2014 – March 2015	9.6 days or below	1880 days	£580k	7.5 days or below	3585 days	£1,105k
Reducing return-to-theatre rates for AAA procedures (based on overall figures i.e. not casemix-adjusted) Source & year: National Vascular Registry Organisational Audit 2014	6.9% or below	75 theatre returns	n/a	4.3% or below	165 theatre returns	n/a
Reducing return-to-theatre rates for carotid endarterectomy procedures Source & year: National Vascular Registry Organisational Audit 2014	2.9% or below	70 theatre returns	n/a	1.3% or below	145 theatre returns	n/a
Total			£7,635k			£16,010k

Note: unless stated otherwise in the table above, gross notional financial opportunities are based on bed day savings, costed at the average 2015/16 Reference Cost excess bed day cost for vascular surgery (elective or non-elective, as appropriate).

ABOUT THE GIRFT PROGRAMME

Getting It Right First Time (GIRFT) is a national programme designed to improve medical care within the NHS. Funded by the Department of Health and jointly overseen by NHS Improvement and the Royal National Orthopaedic Hospital NHS Trust, it combines wide-ranging data analysis with the input and professional knowledge of senior clinicians to examine how things are currently being done and how they could be improved.

Working to the principle that a patient should expect to receive equally timely and effective investigations, treatment and outcomes wherever care is delivered, irrespective of who delivers that care, GIRFT aims to identify approaches from across the NHS that improve outcomes and patient experience, without the need for radical change or additional investment. While the gains for each patient or procedure may appear marginal they can, when multiplied across an entire trust – and even more so across the NHS as a whole – deliver substantial cumulative benefits.

The programme was first conceived and developed by Professor Tim Briggs to review elective orthopaedic surgery to address a range of observed and undesirable variations in orthopaedics. In the 12 months after the pilot programme, it delivered an estimated £30m-£50m savings in orthopaedic care – predominantly through changes that reduced average length of stay and improved procurement.

The same model is now being applied in more than 30 different areas of medical practice. It consists of four key strands:

- a broad data gathering and analysis exercise, performed by health data analysts, which generates a detailed picture of current national practice, outcomes and other related factors;
- a series of discussions between clinical specialists and individual hospital trusts, which are based on the data – providing an unprecedented opportunity to examine individual trust behaviour and performance in the relevant area of practice, in the context of the national picture. This then enables the trust to understand where it is performing well and what it could do better – drawing on the input of senior clinicians;
- a national report, that draws on both the data analysis and the discussions with the hospital trusts to identify opportunities for NHS-wide improvement; and
- an implementation phase where the GIRFT team supports providers to deliver the improvements recommended.

The programme relies on engagement by NHS trusts and foundation trusts. At the outset of the programme, letters are sent from the GIRFT clinical lead for each area of practice to the chief executive, the medical director and the heads of service for the relevant specialty, of all NHS trusts and foundation trusts in England. This letter calls on the provider to engage with the programme, and to date providers have responded well to this call.

GIRFT and other improvement initiatives

The GIRFT programme is founded on using data to understand unexplained variation to provide an opportunity for standardisation and improvement.

It also reflects experience in the NHS and internationally accepted best practice that the most effective initiatives to improve quality, productivity and efficiency are clinically led. As well as support from the Department of Health and NHS Improvement, it has the backing of Royal Colleges and professional associations.

GIRFT is part of an aligned set of work streams within the Operational Productivity Directorate of NHS Improvement. It is the delivery vehicle for one of several recommendations made by Lord Carter in his February 2016 review of operational efficiency in acute trusts across England.

GIRFT has a significant and growing presence on the Model Hospital portal, with its data-rich approach providing the evidence for hospitals to benchmark against expected standards of service and efficiency. The programme will also work with a number of wider NHS programmes and initiatives which are seeking to improve standards while delivering savings and efficiencies, such as NHS RightCare, acute care collaborations (ACCs), and sustainability and transformation partnerships (STPs).

Data analysis

The data analysis exercise brings together a wealth of existing NHS data in an innovative way to paint a comprehensive picture of this aspect of medical practice. It includes Hospital Episode Statistics (HES), relevant registry or professional body data, mortality data, demographic information and patient survey data. Alongside this, a specific questionnaire is sent out to all trusts that have agreed to participate.

The output is a data pack consisting of standard and novel metrics, covering input, activity, process and outcomes. For example, it will typically address issues such as:

- quality of care – using indicators such as mortality and readmission rates;
- factors linked to outcomes – including adoption of best practice, low volumes of procedures, and time to surgery;
- access – e.g. standardised activity per 100,000 population;
- efficiency – length of stay and costs; and
- patient experience.

The resulting data pack provides a detailed, data-led view of the way this area of practice is currently delivered across the country. It shows where there is variation in both provision and outcomes, and helps identify patterns which could indicate opportunities to improve care or deliver efficiencies.

The data sources are selected and the metrics for each area of practice are developed in partnership with GIRFT programme clinical leads for that area, thus ensuring they are relevant to the decisions a senior clinician in that field may have to make. The core sources used to analyse vascular surgery are the National Vascular Registry (NVR) – a database set up 20 years ago by the Vascular Society to record data about major vascular procedures – and Hospital Episode Statistics. In addition, data has been drawn from the National Abdominal Aortic Aneurysm Screening Programme. Further sources were trust reference costs and NHS Resolution data. Patient-reported outcome measures (PROMs) are not yet widely validated in vascular surgery: in particular, the use of the Friends and Family Test is very limited. As the programme develops, it is intended to develop more informative and actionable metrics.

The discussions

With the national picture clear, the data analysis team then generate data packs for each hospital trust that is participating in the programme. These reports compare the trust's performance with the national data, enabling the trust to see how its activity levels, commissioning decisions, costs and patient outcomes for different procedures measure up to those of its peers.

These individual data packs are not designed for wider publication but rather to give the trust an insight into this area of practice. They are issued to the trust in advance of a scheduled meeting between clinical leads appointed by the GIRFT programme and senior staff at the trust. At the meeting, the clinical leads discuss the data packs with the trust, with a particular focus on the areas where the data shows variation between national norms and the trust's performance. Where the data indicates the trust may be underperforming in some way, this is explored in more detail to see whether there is an alternative explanation for the data; where appropriate, the trust can then draw on the expertise of senior clinicians in the field as they discuss specific challenges they face and consider potential changes to practice.

Conversely, where the data indicates the trust is outperforming its peers, clinical leads seek to understand what the trust is doing differently and how its approach could be adopted by others to improve performance across the NHS.

Feedback from trusts has been uniformly positive and in every case, actionable steps have been identified to improve aspects of local provision.

The report

The Orthopaedic GIRFT pilot project identified that, following about 30 Trust reviews, the problems and potential solutions identified were the same across all subsequent trust visits. After all the visits have been completed the clinical lead oversees the creation of a national GIRFT report into their specialty. The report provides an overview of the way this area of practice is delivered across the country, examples of best practice and recommendations for potential improvements at the national level. This is one such report.

Implementation

GIRFT has developed a comprehensive implementation programme designed to help trusts and their local partners to address the issues raised in trust data packs and national specialty reports and improve quality.

Supporting the work of the GIRFT Clinical Leads, GIRFT Regional Hubs have been established. The hubs' clinical and project delivery leads visit trusts and local stakeholders in each region on a regular basis to advise on how to reflect the national recommendations into local practice and support efforts to deliver any trust-specific recommendations emerging from the GIRFT clinical lead visits. These teams will also help to disseminate best practice across the country, matching up trusts that might benefit from collaborating in selected areas of clinical practice.

GIRFT will be working closely with other NHS programmes working at national, regional and local level, such as NHS England Specialised Commissioning, RightCare and STPs, to ensure a complementary approach and to streamline requests to providers. GIRFT is also working with a range of wider partners such as the Royal Colleges, NICE and national professional associations and societies on ensuring that GIRFT recommendations are reflected in best practice guidelines.

Through all our efforts, local or national, GIRFT will strive to embody the 'shoulder to shoulder' ethos which has become GIRFT's hallmark, supporting clinicians nationwide to deliver continuous quality improvement for the benefit of their patients.

Medical/surgical terminology

Abdominal aortic aneurysm (AAA)

A blood-filled bulge in the weakened wall of the aorta (the body's largest artery). When an AAA ruptures, it can be fatal, so vascular surgery is recommended to repair the aneurysm when it is deemed at risk of rupture (typically, when the diameter reaches 5.5cm.)

Angioplasty

An interventional radiological vascular procedure used to dilate blocked or narrowed arteries. It typically involves the insertion of a balloon to open the artery and sometimes a stent to help ensure the artery remains open. In this report, it is predominantly referred to when used in lower limb revascularisation.

Atherosclerosis

The build-up of fatty material in the wall of arteries. This can lead to arteries becoming blocked preventing blood flow to vital organs.

Bypass

An open vascular surgical procedure used to restore blood flow to parts of the body, by redirecting the blood around a blocked artery. A small section of vein taken from elsewhere in the body or a prosthetic graft is sewn from above to below a blocked segment of artery. In this report, it is predominantly referred to when used as a means of lower limb revascularisation.

Carotid endarterectomy

An open vascular surgery procedure used to remove fatty plaque in the carotid arteries, which supply blood to the brain. NICE guidance recommends that it take place within fourteen days of a minor stroke or transient ischaemic attack, to help prevent a major stroke.

Co-morbidities

The simultaneous presence of two or more chronic diseases or conditions in a patient.

Diabetic foot

Diabetes can cause a reduced blood supply to the feet and also cause a loss of feeling, meaning patients may not recognise when their feet are injured. This in turn may give rise to skin ulceration, infection and tissue loss requiring amputation. To help address this, many hospitals run diabetic foot clinics.

Endovascular Aneurysm Repair (EVAR)

A minimally invasive method of surgery for AAA. It involves making one or more small incisions in the groin and then using X-rays to guide the surgeon/radiologist as he or she inserts a small tube at the site of the aneurysm. An expandable stent-graft is then inserted through the tube into the aneurysm to strengthen the wall. Blood can then flow through the stent-graft and avoid pressure on the aneurysm wall.

Hybrid theatre

An operating theatre that is equipped to conduct both open surgery and has full X-ray facilities to conduct interventional radiology procedures such as EVAR.

Interventional radiology

A range of techniques that use radiological images to diagnose and treat diseases in a minimally invasive way.

Ischaemia

Ischaemia is damaged tissue as a result of severely reduced blood supply usually as a result of narrowed or blocked arteries

Length of stay

This is a term to describe the duration of a single episode of hospitalisation

NAAASP

The National Abdominal Aortic Aneurysm Screening Programme. All males over 65 in England should be offered screening.

NVR

The National Vascular Registry. It was launched in 2013 as a successor to the National Vascular Database, which had been established by the Vascular Society over 20 years ago to record details of vascular surgery in the UK. Now maintained by the Vascular Services Quality Improvement Programme.

Peripheral Vascular Disease

Blockages and damage to 'peripheral' arteries – i.e. not the aorta, the carotid arteries or other main arteries. Generally refers to the arteries in the leg.

Revascularisation

Vascular surgery procedures designed to address peripheral vascular disease and enable the blood to flow around the body. In this report, it generally refers to procedures to improve the blood supply to the legs.

Stent

A small metallic mesh tube used to re-open narrow or blocked arteries. Once inserted, it helps to ensure the artery remains open to maintain blood flow.

Transient ischaemic attack (TIA)

Often referred to as a 'mini-stroke', a TIA is a temporary disruption in blood flow to the brain. The symptoms can be similar to a stroke, but only last a short period – sometimes just minutes. A TIA is recognised as a key warning sign that the person is at risk of a major stroke.

NHS organisations and terminology

Clinical Commissioning Groups (CCGs)

These were created following the Health and Social Care Act in 2012, and replaced Primary Care Trusts on 1 April 2013. CCGs are clinically led statutory NHS bodies responsible for the planning and commissioning of healthcare services for their local area. There are now 207 CCGs in England.

Commissioners

Commissioning is the process through which the health needs of the local population are identified and the services purchased and reviewed to meet those needs.

Friends and Family Test

The Friends and Family Test is an important feedback tool that supports the fundamental principle that people who use NHS services should have the opportunity to provide feedback on their experience.

www.england.nhs.uk/ourwork/pe/fft/

Hospital Episode Statistics (HES)

Data collected during a patient's time at hospital and submitted to allow hospitals to be paid for the care they deliver. The aim is to collect a detailed record for each 'episode' of admitted patient care delivered in England, either by NHS hospitals or delivered in the independent sector but commissioned by the NHS.

Healthcare Quality Improvement Partnership (HQIP)

An independent organisation led by the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices.

www.hqip.org.uk

NHSE

NHS England

NHSI

NHS Improvement

NHS RightCare

Reducing unwarranted variation to improve people's health.

www.england.nhs.uk/rightcare

NICE - the National Institute for Health and Care Excellence

Improving health and social care through evidence-based guidance.

www.nice.org.uk

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Professor Michael Horrocks

GIRFT Clinical Lead for Vascular Surgery

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