



VASCULAR
SOCIETY

THE VASCULAR SOCIETY OF GREAT BRITAIN AND IRELAND



THE PROVISION
OF SERVICES
FOR PATIENTS WITH
VASCULAR DISEASE 2018

**“Urgent vascular care delivered by
integrated vascular networks.”**



Writing Group

Miss Sophie Renton	London
Mr Kevin Varty	Cambridge
Professor Ian Loftus	London
Mr Andrew Garnham	Wolverhampton
Professor Christopher Imray	Coventry
Mr Jon Boyle	Cambridge
Mr Keith Jones	Frimley
Mr Denis Harkins	Belfast

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Mike Jenkins	Mark McCarthy
Ian Chetter	Robert Lonsdale
Louis Figelstone	Rob Fisher
Ciaran McDonnell	Marcus Brooks
Waqar Yusuf	Sam Waton (NVR)
Sara Causley (SVT)	Nikki Fenwick (SVN)
Cliff Shearman (RCS)	Anna Murray Rouleaux
Naseer Ahmed	Adam Pichel
Martin Fox	Celia Riga
Nicholas Inston	

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1. Executive Statement

- 1.1 The Vascular Society of Great Britain and Ireland is actively engaged in providing patients with vascular disease the best possible world class care. The clinical vascular service should be patient focussed and configured to deliver the best possible outcomes. Vascular Surgery is predominantly an urgent service. Patients should not be denied timely access to effective interventions due to poorly organized networks and referral pathways. The recommendations in this document give detailed guidance relating to all aspects of service organization and structure. The aim is to assist commissioners, clinicians and service providers to deliver the best possible care for their vascular patient.
- 1.2 High quality urgent vascular care is best delivered in the UK and Ireland by the establishment of integrated vascular networks. This is also the central recommendation of the 2018 GIRFT review of vascular services. Such networks should consist of arterial centres which provide arterial surgery and complex endovascular interventions.
- 1.3 NHS and HSE services must reflect, and should be coordinated around and tailored to, the needs and preferences of patients. Therefore, all hospitals in the network need to continue to provide the following clinical support:- vascular clinics; diagnostics; interventions such as renal access and varicose vein procedures; review of in-patient vascular referrals; and rehabilitation. Day case (23 hour stay) peripheral angioplasty and stenting can also be performed at these local sites. This provides the patient with direct local access to the vascular service. The network will function best for the patient when travel to the arterial centre is only for specific arterial and complex endovascular interventions. The pre and post procedure care related to these interventions should be delivered whenever possible at the local non-arterial centre.
- 1.4 Vascular Nurse Specialists (VNS) are essential to the safe and efficient working of the network. Vascular Nurse specialists are a key to the safe and effective transfer of patients to the arterial centre for surgery. They can also support the NA centre out-patient clinics and daycase lists.
- 1.5 Concentrating arterial surgery and more complex endovascular interventions in one arterial centre has a number of benefits. Evidence shows that clinical outcomes are improved with increasing volumes of procedures. Sustainable on call rotas can be achieved. Effective multi-professional training is facilitated. Lack of exposure to sufficient numbers of training opportunities is the biggest problem facing current trainees. This problem is perpetuated when the training opportunities are distributed around a number of providers performing small numbers of cases in a regional network. Finally there are significant economic benefits to be gained by avoiding the replication of expensive technology and staff in hospitals throughout the network.
- 1.6 With larger teams in arterial centres, rotas and list scheduling can be designed to deliver urgent care as advocated in the 2018 GIRFT report. Extending the service to 7 day elective working can create additional capacity but requires significant additional resources to ensure that all the necessary supporting services are also available on a 7 day basis. Such developments will require careful planning and pilots to ensure they are safe and cost effective.
- 1.7 The high volume arterial hospital for the network should provide the following facilities:
- a) A 24/7 Consultant vascular rota of 1:6 or greater, to cover open and endovascular emergencies.
 - b) A 24/7 critical care facility with ability to undertake mechanical ventilation and renal support and with 24/7 on-site anaesthetic cover.
 - c) A dedicated ward for vascular patients.
 - d) At least one endovascular theatre or theatre specification endovascular suite is required, with high quality imaging, advanced applications, and a dedicated X-ray table (compliant with MHRA guidance).
 - e) A minimum number of 60 aortic aneurysms of any type and 40 carotid procedures (elective and emergency) are undertaken per annum. It is recommended that hospitals performing less cases than this, averaged over a 3 year period, should not continue to offer these procedures. However, in hospitals with a high volume of lower limb procedures, it may be appropriate to consider a lower minimum for aortic procedures, as long as the unit meets all the other criteria. Commissioners should monitor these numbers in the round.
 - f) The population covered by the network should be sufficient to generate the required volume of procedures at the arterial centre. A minimum of 800,000 is usually required for this.
 - g) An on-site vascular laboratory, or equivalent, must be available.
 - h) Hospitals, vascular surgeons and interventional radiologists should submit cases to the National Vascular Registry (NVR) and publish their outcomes in line with the National HQIP programme. Actions should be taken to ensure all outcomes are satisfactory. While no such registry exists in the Republic of Ireland, the establishment of one is strongly recommended.
 - i) Vascular surgeons should undertake regular review of their practice and outcomes through morbidity and mortality meetings and clinical governance.

- 1.5 Network care requires well organized, co-ordinated working between all units. When planning and organising a new vascular network the full patient pathway from primary care through to central intervention and return for rehabilitation needs to be clear. Patients, with their families and carers, where appropriate, should be involved in and consulted on all decisions about their care and treatment. Practical and functional emergency, urgent and elective pathways should be developed. Emergency transfer arrangements need to be robust. These can follow trauma network principles and national published guidance for ruptured aneurysms.
- 1.6 The surgical clinical commitments across the network should be shared between the vascular consultants as much as possible, with most having sessions at both the arterial and non-arterial centres. Consideration should be given to other health care professionals involved in vascular care (interventional radiologists, specialist nurses, podiatrists, scientists) working in a similar cross site manner. As networks develop, manpower planning and training will be increasingly important to deliver the correct numbers of these skilled professionals to maintain the service.
- 1.7 Many patients with vascular disease are elderly with a number of associated co-morbidities. A multi-disciplinary multi-professional approach to their care is required. Increasingly input from other specialists such as diabetes, stroke and elderly care will be central to providing the best care in all units of the network.
- 1.8 Less invasive treatment options can be advantageous and endovascular technology is constantly evolving to provide new treatment options. For a high quality service vascular surgeons and interventional vascular radiologists need to collaborate and lead effective teams in order to provide the necessary range of interventions on a 24/7 basis.
- 1.9 In many units complex endovascular procedures are performed by appropriately trained vascular surgeons while in other centres surgeons and interventional radiologists work together for certain procedures such as EVAR. Providing the arterial centre has appropriately trained clinicians and has satisfactory audited outcomes that meet national guidelines, endovascular interventions can be performed by vascular surgeons or interventional radiologists. Complex procedures should be performed by surgical teams with expertise in such procedures. Dual operating should be considered for such procedures
- 1.10 Endovascular procedures, particularly EVAR should be delivered in a cost effective way. Units should focus on delivering treatments that reduce hospital stays, reduce re-admission rates and lower re-intervention rates.
- 1.11 There is currently a particular shortage of practitioners trained to deliver endovascular therapies, out of normal working hours. Collaborative, network wide, on call rotas combining interventional vascular radiologists and endovascular competent surgeons are potential solutions to this problem.
- 1.12 The high volume arterial centres with surgeons who are in dedicated vascular practice should:
- i) provide training for vascular trainees.
 - ii) submit patients for research in to vascular disease
 - iii) Engage their patients and the public in developing services and actively encourage feedback
- 1.13 In summary, the Vascular Society believes that every patient has the right to consult with a vascular surgeon close to their local hospital, but they may have to travel to obtain access to more complex diagnostic and interventional facilities. This network model facilitates the urgent and emergency care vascular patients often require.

2. Introduction

The current service and future issues

- 2.1 This document sets out the principles by which a 24/7 high quality, consultant led vascular service might best deliver optimal patient care. The document is intended to assist those responsible for the provision and resourcing of health care, as well as for commissioners of the service.
- 2.2 This document outlines the personnel involved in the vascular service, the facilities required, organisation of networks, training and governance.
- 2.3 The current Vascular Society recommendation is that high quality urgent vascular care should be organized and delivered using integrated vascular networks. The details of how vascular networks should operate to optimize local assessment, diagnosis and rehabilitation of patients in non-arterial centres, whilst also delivering high volume interventions at arterial centres is described. The goal is a service which balances the needs of patient access with the provision of comprehensive safe vascular care and intervention.
- 2.4 Both arterial and venous diseases are common in the community and their incidence and severity increase with age. The core activities of the vascular and endovascular surgeon include:
- Preventing death from aortic aneurysmal disease and dissections.
 - Preventing stroke due to carotid artery disease
 - Preventing leg amputation due to peripheral arterial disease
 - Symptom relief from peripheral arterial and venous disease
 - Healing venous leg ulceration
 - Promoting cardiovascular health
 - Improving quality of life in patients with vascular disease
 - Assisting colleagues from other specialties with the avoidance and control of vascular bleeding
 - Assisting colleagues in the management of the vascular complications of diabetes and renal disease
 - Providing a renal access service for patients requiring haemodialysis
- 2.5 A number of less common and rare conditions that adversely affect quality of life also fall within the remit of the vascular surgeon. These include thoracic outlet syndrome, vascular malformations, hyperhidrosis, lymphatic disorders, the vasculitides and paediatric vascular anomalies. The vascular specialist team has access to both interventional and medical therapies that may alleviate the symptoms and complications of these disorders. Not all arterial centres will be able to manage the rarer conditions so networks should have pathways to deal with these patients.
- 2.6 The age of the average vascular patient is increasing with more associated co-morbidities. There is more emphasis now on the rigorous control of vascular risk factors to improve prognosis and outcomes. For our patients, this is led by the vascular surgeon but with the support of an increasing number of related medical, nursing and rehabilitation specialists. There are close links with cardiac surgery, cardiology, diabetology, care of the elderly, stroke services, nephrology and transplantation. The Vascular Nurse Specialist role is increasingly important when co-ordinating care across networks. Efficient one-stop clinic diagnostics and vital post procedure surveillance rely on input from Vascular Scientists.
- 2.7 Many vascular problems can now be treated by endovascular methods in both the elective and emergency settings. These vascular interventions are often performed in teams with close working relationships between surgeons, anaesthetists and interventional vascular radiologists delivering world class results. Selection of the most appropriate method of treating these patients should be made by this multi-disciplinary team. In such units surgical and IR trainees can gain vital experience of advanced vascular interventional techniques. The vascular patient will increasingly benefit from expert care delivered by broadly trained vascular surgeons with clinical, endovascular and surgical skills.
- 2.8 As many as 50% of patients with vascular disease present urgently or as an emergency to a Vascular service. The delivery of the vascular service on a 24/7 basis is therefore a central challenge. Sustainable on call rotas are required. A minimum of 6 specialists on a 1 in 6 rota is now the accepted basis for such sustainable on call rotas. If there is a move to 7 day working a minimum of 10 Consultants may be required.
- 2.9 Whereas only a small number of vascular conditions presenting to a vascular service need to be treated as an emergency – namely ruptured aneurysms, severe critical ischaemia and arterial trauma, the majority of patients presenting require urgent management. These patients may present to outpatients or the emergency room. Vascular Surgical Service needs to be defined as an urgent service with access times and time to treat targets for the majority of common conditions
- 2.10 Outcomes following high risk vascular interventions are better when they are performed by teams with high volumes. The VS reported outcomes after elective infra-renal AAA repair in 2012 as part of its quality improvement programme.¹ Analysis of unit volume in quartiles from the low volume units (mean of 10 cases per year) through to the high volume units (150 repairs per year) showed a consistent reduction in mortality across the quartiles from 4.4% to 1.9%. Previous analysis of HES data reported similar findings.² There is a clear need to move towards higher volume units.

- 2.11 In the AAA screening programme, aneurysms requiring treatment are referred to arterial centres in a vascular network serving a minimum population of 800,000. This has become the recommended minimum size therefore for all arterial centres. Units of this size should perform a minimum of 60 AAA procedures and 40 carotid endarterectomies, elective and emergency, per year on average. The Vascular Society recognises that the centralisation of services required to meet this level of population can be difficult. Population density, geography and patient access all need consideration. In most regions, the benefits of centralisation to large units will outweigh the difficulties related to local access and travel.
- 2.12 Regular team exposure to vascular procedures develops expertise in managing the condition and the patient. Minimising adverse outcomes is the most cost-effective way to deliver the service. Sometimes, withholding intervention (best medical therapy/palliative care) is the most appropriate management option. The support provided in large units with multi-disciplinary working assists with some of these difficult management decisions. The 2018 GIRFT³ report endorses this network approach to delivering urgent care whilst minimising costly re-admissions and complications.
- 2.13 The provision of an effective vascular service is relatively expensive. Vascular units have high bed occupancies, particularly when repatriation in the network is delayed. The surgery is technically challenging with significant demands on both theatre time and critical care. Readmission rates due to disease progression are significant. Advances in endovascular treatment may offset some of this expense, but many of these procedures are also technically demanding and time consuming and require sophisticated and often expensive facilities and disposables. Replicating these services in every hospital is not cost effective.
- 2.14 The non-arterial centres in the vascular network provide local assessment, diagnosis and less complex interventions. This local vascular service is crucial to the success of the network. The non-arterial centres require support and investment to maintain a vascular presence and service via a well organised and co-ordinated visiting service. Repatriation to the non-arterial centre for recovery and rehabilitation locally is a key part of the care pathway.
- 2.15 This document highlights the requirements of the non-arterial centre in the network. Lack of well supported non-arterial centres leads to depleted local care, patients travelling long distances, and arterial centres becoming overwhelmed and unable to deliver safe high quality care.
- 2.16 Each vascular surgeon should have knowledge of their own outcomes; this is an important component of clinical governance and is mandatory for individual revalidation and commissioning of vascular services. The National Vascular Registry (NVR) is the focus of data collection with respect to index vascular and endovascular procedures in the UK. Administrative support with data clerks for data entry and reports is essential. Results should be available in a way that is transparent and accountable and the specialist societies should provide back up and support for any service with evidence of a problem. The establishment of a similar Registry to capture data from surgeons working in the Republic of Ireland is strongly encouraged.
- 2.17 High quality research into methods of preventing and treating vascular disease is needed. The benefits of this are improved outcomes, identifying optimum treatments and evaluating new therapies. It is important for the specialty to continue to make the case for future research funding, given the ongoing evidence of high morbidity and mortality in vascular patients. Vascular surgeons should be encouraged to contribute to collaborative research that may help define future management strategies for vascular diseases. The Society actively encourages surgical research and supports a fundraising charity, the Circulation Foundation, and a grant giving body, administered by its Research Committee.

3. The Multi-Professional Vascular Service

Vascular Surgeon, Anaesthetist, Interventional Radiologist, Radiographer, Scientist, Nurse Specialist, Podiatry, Physio/OT/Prosthetics

The Vascular Consultant Surgeon

- 3.1 The Vascular Surgeon has the necessary clinical skills to provide care for patients with diseases of the arteries, veins and lymphatics. They have a sound knowledge of the relevant basic sciences and the roles of vascular medicine, vascular surgery and endovascular intervention in the treatment of vascular diseases. For non-invasive diagnosis they work closely with vascular scientists in the vascular laboratory utilizing haemodynamic assessments of vascular physiology and vascular ultrasound. They understand the role of a wide range of diagnostic imaging investigations that may be required to care for the patient.
- 3.2 The role of the vascular surgeon has evolved in response to changes in the way vascular diseases are managed. There is more medical management of cardiovascular disease. Advising patients on the best treatment options (medical, endovascular or open surgery) requires more communication and decision making skills. Planning and performing EVAR procedures is now a common activity. Other endovascular procedures (peripheral arterial and venous) are increasing in number. Wound management for the diabetic and venous leg ulcer patients is increasingly supervised by the vascular surgeon. Many vascular surgeons work in renal failure services, providing renal access surgery and in some units renal transplantation. The exact combination of specialist services provided will be determined by local requirements as well as the training and competencies of those providing it.

Workforce planning

- 3.3 Workforce planning is the process by which an organisation ensures it has the right number of employees with the right knowledge skills and behaviours in the right place, at the right time. A workforce survey for Vascular Surgery in the UK was carried out in 2013⁴ and updated in 2017. The current estimate for the UK population ratio of vascular surgeons is 1 per 130,000 population. Vascular Disease is a growing cause of morbidity, disability and mortality globally and in the United Kingdom and Ireland. The number of consultant vascular surgeons in the United Kingdom and Ireland is lower than other comparator countries in Europe, Austral-Asia and North America and should be at least 1 per 100,000 of population. In the UK and Ireland we need to expand the Vascular Surgery workforce to account for population growth and the challenges of modern work-patterns, including: portfolio practice; part-time working and statutory leave; safe work patterns and compensatory rest; mentoring and dual operating; as well as 7-day working.

- 3.4 The Centre for Workforce Intelligence (CfWI) on behalf of Health Education England (HEE) and the Department of Health (DoH) undertook a stocktake of the general surgery (and vascular surgery) workforce in England and published its results in 2016⁵. It projections patient demand for both general and vascular surgery may grow by 67% by 2029, as a result of a growing and ageing population, greater average individual patient need, and to allow for safer modern work-practices. Vascular Surgery separated from General Surgery as a new surgical specialty in 2012, it was recognised that to ensure sustainable specialty training and consultant staff provision up-to 21 % of legacy funding should be transferred to support the new specialty. The current number of training positions in vascular surgery in the United Kingdom is well below the preferred ratio of 0.4 and needs expansion if we are to maintain or expand vascular surgery services in the face of the increasing demand. There are specific concerns regarding under-provision of vascular surgery training numbers in several regions to include the Southwest of England, Wales, Scotland and Northern Ireland. As our population increases and the proportion of very old also increases, the demand for vascular surgery care also increases. In order to maintain safe delivery of vascular surgery services commissioners and workforce planners must ensure we have sufficient numbers of trained vascular surgeons.

Job Plans

- 3.5 The weekly job plan for a vascular surgeon should be negotiated locally and should include sufficient outpatient clinics, all day operating lists, endovascular lists, day surgery, and renal access lists as required for the local service. Emergency work, either when on call or when dealing with unexpected urgent surgery, is onerous in vascular surgery and job plans should be designed locally to reflect the amount of on-call commitment expected. In addition, it is essential for multi-disciplinary team (MDT) meetings to be included in consultant job plans. The RCS England has a checklist for the approval of job descriptions which provides useful guidance⁶ Guidelines for the design of a job plan for a new Consultant Vascular Surgeon along with job plan templates can be found in Appendix A.
- 3.6 Elective work should not be programmed to coincide with emergency duties. These emergency duties may include daily ward rounds (including weekends) of all the vascular inpatients, as well as assessment and management of emergency admissions. These emergency duties should be scheduled as fixed commitments within the consultant's weekly job plan. The on call duties out of hours become more onerous for senior Consultants and local on call rota policies should include agreed age limits for these duties in the 55-65 years age range.
- 3.7 The vascular surgeon needs to be supported by an appropriate team; this may involve a combination of junior doctors, nurse specialists, surgical care practitioners and specialty registrars. Provision of this support out of hours is a particular challenge outside of larger units, and is another driver for centralising arterial services within networks.

3.8 Sustainable on call rotas are a fundamental consideration for the Vascular Surgical Consultant job plan. The workload is urgent in nature with a high level of out of hours work. The EWTR requires a maximum 48 hour working week. It is recommended that an optimal vascular service should comprise of at least six vascular surgeons for assessment, management and open surgery of the emergency take. A rota with a similar number of endovascular surgeons and interventional vascular radiologists offering endovascular intervention is also required. The exact numbers will depend upon the population size and skill mix. Where clinical services cover larger populations in excess of 800,000 a 1 in 8 rota or larger may be required. Centralisation of services with a larger number of consultants on one site facilitates reliable surgeon of the week models to provide consultant delivered care for emergencies.

3.9 Where services are unable to accommodate such changes and provide appropriate levels of care, consideration should be given to increasing the number of vascular and endovascular surgeons, or merging with adjacent units to provide a large enough team to care safely for the patients.

3.10 For complex interventional procedures, teams comprising more than one specialist (in either vascular surgery, endovascular intervention, or both) working together are becoming routine. Such practice needs to be supported by NHS trusts seeking to provide improved care for their patients.

The Vascular Anaesthetist

3.11 There is evidence that outcome after major arterial surgery is related to the caseload of both surgeons and anaesthetists. Anaesthesia for all patients undergoing major vascular surgery should therefore be provided by a consultant experienced in vascular anaesthesia.

3.12 Vascular anaesthesia is increasingly recognized as a sub-speciality within its own right and has its own specialist society, the Vascular Anaesthesia Society of Great Britain and Ireland (VASGBI). The central skills and knowledge required by vascular anaesthetists include risk-assessment and optimization of co-existent medical conditions in the high risk patient prior to major surgery. In the peri-operative period knowledge of invasive cardiovascular monitoring, cardiac and vasoactive drugs, methods for organ protection, management of major haemorrhage and maintenance of normothermia are all required. Additional skills include spinal cord protection, visceral perfusion and one lung ventilation.

3.13 Vascular Anaesthetists should be involved in the decision making process for vascular patients. There should be mechanisms for them to contribute to MDT decision making, and facilities for pre-operative assessment with vascular anaesthetic input. There should be a nominated clinical lead for vascular anaesthesia to assist in unit dialogue between vascular surgeons, IR and other appropriate specialists. This helps to build teamwork which is central to achieving good outcomes.

3.14 Anaesthetists undertaking major vascular surgical cases should be supported by adequately trained assistants who work regularly in vascular theatres.

3.15 Emergency anaesthetic cover for vascular surgery should ideally be available from a vascular anaesthetist 24/7. However if this cover involves anaesthetists without regular sessions in vascular theatres, provision should be made for them to spend time in a supernumerary capacity with a consultant anaesthetist who has a regular vascular commitment.

3.16 Further details are available from the Royal College of Anaesthetists website.⁷

The Interventional Radiologist

3.17 Interventional radiologists are radiologists who have undergone additional specialist training in the practical elements of interventional procedures. Interventional Radiology (IR) procedures are minimally invasive, targeted treatments performed under imaging guidance. A range of procedures are performed in oncology, urology, gynaecology, GI and hepatic conditions as well as vascular disease. Diagnostic radiology remains a core element of IR. There are however additional clinical responsibilities on the interventional radiologist for pre-intervention assessment, consent and follow-up.

3.18 Interventional Vascular Radiologists and Vascular Surgeons have traditionally worked in collaboration to provide endovascular aneurysm repair and angioplasty and stenting for the treatment of peripheral and aortic vascular disease. With the acquisition of specialty status and the development of a new curriculum, trainee vascular surgeons are becoming trained in a range of endovascular techniques. It is likely that vascular patients will continue to require the expertise of vascular surgeons and interventional vascular radiologists however both these specialist groups should recognise and utilise the skills of their colleagues and should have knowledge of the relative benefits of endovascular and surgical procedures for common vascular problems.

3.19 In some units complex endovascular procedures are performed by appropriately trained endovascular surgeons while in other centres surgeons and interventional radiologists work as a team. Providing the arterial centre has appropriately trained clinicians and has satisfactory audited outcomes that meet national guidelines endovascular interventions may be performed by vascular surgeons or interventional radiologists.

3.20 The VASGBI, RCR (Royal College of Radiologists) and BSIR recognise the changing roles of specialists in the provision of care to patients with vascular disease. Their aspiration is to train specialists with the necessary clinical and team-working skills to provide comprehensive care for patients with vascular diseases.

- 3.21 Regular MDT meetings underpin the planning of endovascular procedures. These should occur at least once a week. The decisions in these meetings should be recorded, and follow established care pathways. Time for these meetings should be available in the working week, and recorded as direct clinical care in IR Job Plans.
- 3.22 Provision of emergency services places pressures on interventional vascular radiologists that are similar to those described above for vascular surgeons. Currently many hospitals do not have sufficient vascular interventional radiologists to provide a 24/7 emergency service. Collaborative clinical networks should apply to vascular radiology units in a similar manner to those for vascular surgical units for patients who require immediate vascular imaging or interventional treatment out of hours. Commissioners of vascular services should consider whether the rationalisation of vascular surgery to larger volume hospitals should include interventional radiologists as well as surgeons in order to address these manpower problems. Appropriately trained endovascular surgeons may also be able to contribute to this out of hours provision in some units.

Interventional / Vascular Radiographers

- 3.23 Interventional Radiographers possess skills in ensuring the best quality images are obtained with the minimum patient dose. They have detailed knowledge of the safe and appropriate use of ionizing radiation, interventional equipment and procedures.
- 3.24 Interventional Radiology Nurses possess the skills of a theatre / recovery nurse with a detailed knowledge of the equipment and procedures performed within IR.
- 3.25 Dedicated vascular radiographers and IR / theatre scrub nurses are required for elective and emergency endovascular procedures. A minimum requirement for patient safety is one member of staff providing direct scrubbed assistance who is experienced with the equipment. A Vascular Radiographer to assist with imaging, and IR / theatre staff to assist with monitoring of the patient depending on whether the procedure is performed under LA or GA with anaesthetic input.

The Vascular Scientist / Sonographer

- 3.26 Vascular scientists provide routine and emergency clinical services to vascular surgeons, other physicians and GP's. They are usually based in a Vascular Studies Lab / Unit. This is an essential part of the vascular service, providing the ability to diagnose and monitor peripheral arterial and venous disease of the lower limbs, the upper limbs, the abdomen and the neck using ultrasound and other non-invasive techniques. These studies provide not just imaging but also haemodynamic information which can be especially useful for vascular diagnosis, decision making and management.

- 3.27 Vascular Scientists are Band 6 when in a training role and when fully qualified become Band 7. They clinically assess patients to determine the most appropriate diagnostic tests to perform, taking into account likely treatment options. A wide range of colour Duplex ultrasound examinations are performed and the scientist has the sole responsibility for producing a full diagnostic report of the scan findings. This involves analysis of the haemodynamic imaging information obtained as the scan is performed. This is then communicated in a clear and concise report to the referring clinician, identifying any technical limitations and recommending when alternative imaging is required. The Vascular Scientist is also expected to recognise conditions or act on results that require urgent medical attention and liaise with medical/surgical staff to admit or review the patient urgently either in the vascular studies department, the next clinic or at the arterial centre when appropriate.

The Vascular Nurse Specialist

- 3.28 Vascular nurse specialists (VNS) contribute to both inpatient and outpatient care. Whilst no two VNS posts will be identical, in terms of roles and responsibilities, there should be a high level of autonomous practice with the authority to make decisions in the assessment, diagnosis and treatment of patients. The VNS can provide out patient clinics which are independently run, based on agreed protocols and pathways. These may be condition specific clinics such as claudication, venous, abdominal aortic aneurysm and lower limb ulceration or may be generic vascular clinics based on the experience and competence of the VNS.
- 3.29 Although it is recognised that a variety of advanced nursing roles exist, the role of the VNS should be distinguished from that of the newer Advanced Nurse Practitioner (ANP) role. The ANP role has developed since the reduced number of foundation year doctors and predominantly focuses on vascular inpatient medical care. The two roles although advanced are fundamentally different and require a different skill set.
- 3.30 The VNS can provide timely review of inpatient referrals to establish diagnosis, refer for investigations, and to triage patients' needs and urgency. This will include assessment of whether the patient requires urgent transfer or a consultant review.
- 3.31 The VNS can support other specialties such as Diabetic Foot Services, and can provide the role of the vascular specialist within the Diabetic foot MDT.
- 3.32 There should be adequate provision of VNSs to cover both the arterial and non-arterial sites across the network, during standard working hours 5 days per week. VNS should rotate to ensure exposure to the arterial and non-arterial sites, allowing professional development, clinical governance and provide flexibility to cross over. As services develop towards 7 day working as such the VNS role within this should also be considered.

- 3.33 There should be a lead VNS for the network, to represent the nursing interest on the network board. They should be responsible for leading the VNS team, and developing and coordinating the service.
- 3.34 The VNS should have access to vascular consultant mentorship/supervision, provided either at the arterial center or locally by a visiting vascular consultant. There should be a degree of protected time for the VNS to achieve continual professional development.
- 3.35 The VNS can also play an important role in vascular research and audit, and are involved in the training and education of both community and hospital nursing staff.

Podiatry & Vascular Podiatrists

- 3.36 Podiatrists, as allied health professionals trained in the assessment, diagnosis and treatment of foot and lower limb problems, commonly see people who may have PAD in primary and secondary care. In the latter they are often key members of the diabetic foot team and are increasingly present working alongside vascular teams with complex foot wound care and amputation prevention. Podiatrists are often well placed to screen for and detect PAD early in community and Primary Care settings, as well as Non Arterial Centres. With severe limb-threatening PAD the speed of diagnosis and access to specialist podiatry and vascular care is especially important. This principle is captured well in the slogan “time is tissue”. The College of Podiatry in collaboration with the VSGBI have issued the following mission statement: “Podiatry will play a leading role in the early detection, diagnosis and best clinical treatment of people with PAD to help save limbs and more lives”. (www.scpod.org.uk). Vascular Specialist Podiatrists, who have been trained and supported by their local Vascular Teams, have already been developed in some NHS Trusts. They provide community-based PAD triage & treatment services, alleviating the pressure on Vascular units by ensuring that people with suspected PAD are initially triaged to Primary Care or Vascular Teams, depending on severity of disease or need. NICE has published examples of best practice in this area^{8,9}.
- 3.37 UK-wide implementation of such initiatives to support Vascular Services will require improved training in vascular disease and PAD recognition and management for interested podiatrists. Such vascular specialist podiatrists would be able to work within the multidisciplinary vascular team in secondary care and in more community-based PAD triage services. Vascular specialist podiatrists complement the role of the VNS.

Physiotherapy and Occupational Therapy

- 3.38 Vascular patients are often elderly or disabled and require specialist physiotherapy to aid their rehabilitation following vascular intervention. Amputees in particular need specialist facilities and equipment in a physiotherapy gym to rehabilitate to the stage where they can safely be discharged from hospital.

- 3.39 Supervised exercise classes are of significant value in the treatment of claudication and should also be provided in the gym by suitably trained physiotherapists with experience of exercising patients with cardiovascular disease. NICE recommends that all patients with intermittent claudication should be offered a supervised exercise programme NICE guidance cg147⁸.
- 3.40 Occupational therapists provide home assessment visits and co-ordinate safe discharge back into the community. This is particularly important for amputees.

Limb Fitting and Rehabilitation

- 3.41 PAD is one of the major indications for lower limb amputation. Vascular surgeons most commonly perform these operations. Patients need local access to a limb fitting service and although this need not necessarily be on the same site, there should be close collaboration with the prosthetists using a team approach tailored to the individual needs of each patient; a pre-amputation visit by the rehabilitation team is often valuable. A specialist rehabilitation unit is a more appropriate environment than an acute surgical ward for amputees who no longer require active surgical care, but have not yet reached the stage where they can manage at home.

Care of the Elderly Medicine

- 3.42 Patients with vascular disease are often very elderly. The NCEPOD review of the care of elderly patients undergoing surgery makes the following recommendations that are applicable to elderly vascular patients.¹⁰
- Routine daily input from medicine for the care of the elderly should be available to appropriate patients undergoing vascular surgery.
 - Co-morbidity, disability and frailty need to be clearly recognized as independent markers of risk in this elderly population. This requires skill and multidisciplinary input including early involvement of elderly care medicine.
 - Delays in surgery for the elderly are associated with poor outcome. They should be subject to regular and rigorous audit in line with agreed standards.
 - All elderly patients should have a formal nutritional assessment during their admission so that malnutrition can be identified and treated.
- 3.43 Care of the elderly Consultants can also support prehabilitation of patients prior to surgery. It is recognized that appropriate early input can reduce readmission rates for this elderly cohort of patients.

Collaborations with other Medical and Surgical specialties

Cardiac Surgery

- 3.44 In some centres, cardiac surgeons are involved with Thoracic Endovascular Aneurysm Repair (TEVAR). Ascending and arch aneurysms may require open surgery and full or left heart bypass. The management of thoracic and thoraco-abdominal aneurysms plus dissections should be based on close collaboration between regional cardio-thoracic units and the vascular surgeons and IR specialists at the arterial centres.
- 3.45 Peripheral arterial complications requiring vascular intervention occasionally occur after cardiac surgery. These often require emergency referral to the on call vascular surgeon and immediate repair. Clear referral and transfer pathways should be in place to deliver this care.

Cardiology

- 3.46 Patients with arterial disease frequently have cardiac disease, as the risk factors for peripheral arterial and cardiac disease are similar. Cardiac assessment and optimisation of cardiac status can improve the results of surgery, particularly in high risk patients undergoing aortic interventions. This should be managed in the majority of cases by agreed protocols, but cardiology input in complex cases (including pre-operative catheterisation and angioplasty/stenting) may occasionally be required.
- 3.47 Interventional cardiologists are skilled in the management of atherosclerosis of the coronary vessels. Unless they can demonstrate that they have received training in the management of peripheral vascular disease (and have the necessary competencies), they should not undertake interventions in this area.

Clinical Laboratory Services

- 3.48 Blood disorders may initiate or exacerbate vascular problems, and close collaboration with the haematology service is needed to deal with these patients effectively. There is frequently a need for blood replacement during major vascular interventions, although with continued development of modern surgical methods and the routine use of haemostats and cell salvage, the requirement for blood products is reducing. Nevertheless, vascular interventions should not be undertaken unless there is ready access to blood and blood products for transfusion.
- 3.49 Infective complications of surgery have particularly serious implications for patients with prosthetic arterial grafts. There should be an agreed unit policy on prophylactic antibiotics based on microbiology advice.

Dermatology

- 3.50 The management of leg ulceration involves an integrated approach between the vascular, dermatological and community leg ulcer services. This is a large and increasing workload that benefits from good co-ordinated care between dermatology and vascular surgery.

Diabetology (The Multi-disciplinary Diabetic Foot Team)

- 3.51 Patients with diabetes form a significant and increasing part of a vascular practice. The care of patients with diabetic foot problems across the modern vascular network involving both the Arterial and Non-Arterial centre is described in detail in section 5. NICE clinical guidance NG19 underpins this combined care with diabetologists leading the multidisciplinary foot team which includes podiatrists, specialist nurses, orthotists, vascular surgeons, orthopaedic foot surgeons, radiologists and microbiologists.⁹ The exact specialists involved in such a team will be determined by local interest and expertise.

Plastic Surgery

- 3.52 Once revascularisation has been achieved for critical leg ischaemia, collaboration with plastic surgeons may be needed to provide skin cover for soft tissue defects arising either from ulcers, from removal of gangrenous tissue or from fasciotomy incisions. Many vascular surgeons will be familiar with common skin grafting methods, for which plastic surgery advice is not needed. Complex reconstruction and microvascular free flap transfer needs plastic surgery input, and should only be undertaken by a vascular specialist with training in microvascular suture techniques. This also applies to arterial injuries in neonates. Hand surgery expertise may also be helpful in the management of gangrenous fingers to preserve maximum function.

Renal Services

- 3.53 Vascular patients are susceptible to acute kidney injury (AKI) either as a result of contrast induced nephropathy or following intervention. Facilities for haemofiltration must be available in HDU and ITU. Where AKI is recognised, the involvement of a nephrologist, or a physician with an interest in renal medicine, is required to minimise the risk of permanent renal failure.
- 3.54 Patients with vascular disease often have significant chronic kidney disease and expert nephrology input may help to minimise the adverse effect of surgical intervention on renal function. Nephrologists provide valuable assistance on the need for, and timing of dialysis in patients with established renal failure.
- 3.55 The management of renal artery stenosis and vascular access for dialysis require close collaboration between nephrologists, vascular, renal transplant and interventional specialists to provide optimal care.

Stroke Medicine

- 3.56 Neurologists or other physicians who manage the stroke service or rapid access TIA clinics collaborate closely with the vascular service, both for duplex ultrasound imaging of the carotid arteries and for vascular procedures in those patients where intervention is indicated. It is important that acute or hyper-acute stroke units (providing 24/7 thrombolysis) are closely linked to the arterial centres. The recommended service configuration is for such acute stroke units to be co-located at the arterial centre. Agreed protocols and close MDT working are needed to ensure timely access to carotid intervention.

Other Surgical Disciplines

- 3.57 Vascular injuries may occur during the course of any surgical intervention in any surgical discipline. Local pressure or packing to control haemorrhage is needed until a vascular specialist can arrive to assist, or the patient is stable for transfer; this will depend on local protocols. These events are rare and should not dictate service configuration. Hospitals without a vascular service should develop clear arrangements with adjacent vascular units for a vascular specialist to travel to the patient when such emergencies arise in theatre, as patient transfers are often inappropriate in this setting. Vascular specialists from an adjacent site need to be consulted in advance regarding availability when vascular difficulties are anticipated before the surgery, such as when a tumour is seen to be encroaching around major vessels on pre-operative scans.

Multi-disciplinary Team (MDT) working

- 3.58 The multidisciplinary team meeting is an essential part of the functionality of the vascular network. This is a key component in delivering quality outcomes. These take a number of formats. Some units have a single weekly large MDT others have condition specific MDTs (aortic, carotid, renal access and peripheral) with input from the appropriate aligned specialties. Technology should be available at all sites to allow all those who wish to participate to do so without the need to travel. MDTs should be timetabled to allow maximum participation.
- 3.59 The multidisciplinary team meeting should include vascular surgeons, interventional radiologists, and vascular anaesthetists. The MDT should have an MDT coordinator and be fully minuted. Outcomes should be documented in the patients notes.
- 3.60 All clinicians (including those from NA sites) taking part in the network should have job plans that allow a minimum attendance of 50% at the main network MDT. Some NA sites may have MDTs to discuss patients who will primarily have their care delivered at that site through day case procedures.

4. Facilities and Infrastructure

- 4.1 The facilities required to deliver vascular services will differ between the Arterial centre and the Non-arterial centre. The organisation and facilities required at the Non-arterial centre are described in more detail in section 5.
- 4.2 In the arterial centres, complex hybrid procedures and evolving technology places significant demands on the service in terms of infrastructure and staff to deliver first class care, 24/7. This includes significant investment in hybrid theatres, ITU/HDU support, diagnostics and on call rotas.

The Vascular Ward

- 4.3 The nursing care of vascular in-patients requires specialist skills, combining aspects of general surgical nursing, critical care, limb and wound assessment, tissue viability, wound care, rehabilitation, care of the disabled and care of the elderly. A ward dedicated to the care of vascular patients is essential to ensure an appropriate skill mix of nurses who have been specially trained in the care of vascular patients. The input of physiotherapists, occupational therapists and social workers is central to the successful discharge of frail and disabled patients. This process is best managed in the context of regular discharge-planning meetings.
- 4.4 The older the patient demography in the population served, the bigger will be the demand for vascular beds. If local rehabilitation and nursing home facilities are limited, this will also increase pressures on vascular bed capacity by delaying discharge after medical treatment is completed. Based on current experience, and depending on local case-mix, a population of 800,000 will require approximately 20-25 beds (3 per 100,000) on wards dedicated to vascular patients, excluding rehabilitation, short stay, day case and intensive care unit (ITU) or high dependency unit (HDU) beds. This is based on current aortic practice.

The Vascular Laboratory

- 4.5 All arterial centres should have a vascular laboratory. This provides both duplex ultrasound scanning of the vascular system and tests of vascular physiology. The exact arrangement to provide these diagnostics varies between centres, but they are essential requirements. Clinical vascular scientists often provide this service, it can be supplemented by input from vascular sonographers.
- 4.6 A population of 800,000 generates between 4500 to 6000 tests per year in the vascular laboratory and requires a minimum of 3-4 full-time clinical vascular scientists with appropriate clerical support. Workload is rising particularly with the expansion of services dependent on ultrasound such as renal access. This workload excludes duplex ultrasound scanning for the diagnosis of acute deep vein thrombosis, which is more often provided in the radiology department.

- 4.7 The equipment required in the Vascular Laboratory will depend on the size of the unit and range of services provided. A number of high resolution imaging ultrasound duplex scanners with colour, power and pulsed Doppler modalities will be needed. These should be able to record images. Maintenance, calibration and quality assurance is important for this equipment. Rooms for physiology tests will include a treadmill exercise machine.
- 4.8 More details on the specifications required for non-invasive duplex vascular investigations are available on the Society of Vascular Technologists website (www.svtgbi.org.uk/professional-issues/).

Vascular Radiological Diagnostics

- 4.9 CT and MR angiography can also be used for vascular diagnostics. High quality CT imaging requires access to scanners capable of isometric volume reconstruction at 1 mm minimum and appropriate image processing software. These are expensive items and require a strategy of sustained long-term investment in hardware and staff. All clinicians with responsibility for planning interventional procedures should have access 3-D workstations.

Vascular Outpatient Clinics

- 4.10 Clinics need to be appropriately staffed by nurses with expertise in ulcer and wound dressing. Sufficient examination rooms and nurses must be available to prevent delays while wounds are being redressed after consultation.
- 4.11 Hand-held Doppler ultrasound machines should be available for measuring the ankle/brachial pressure index. It is recommended that all centres in the vascular network offer single visit clinics with access to duplex imaging for the majority of patients.
- 4.12 Many specialists also employ portable duplex devices that may be used for investigation, or as part of an endovenous therapy. Foam sclerotherapy, and endo-thermal venous ablation are increasingly performed in the outpatient area. Both techniques are performed using ultrasound guidance.

Day Case and Short Stay Facilities

- 4.13 There needs to be facilities for day care and 23-hour stay for the vascular service. These facilities are required for patients undergoing diagnostic angiography, selected interventional procedures, varicose vein treatment and renal access work. Written protocols for the management of complications must be in place.
- 4.14 Endovenous procedures, renal access and varicose vein surgery all require a clean/sterile environment with a recovery area. This may best be provided through a day case facility, although some of these services are increasingly being undertaken in outpatients. Such day care does not need to be at the arterial centre and often provision nearer to the patient's home may be preferable.

Operating Theatres and Hybrid Interventional Theatres

- 4.15 Arterial surgery and endovascular procedures are technically complex and theatre personnel need to be specially trained in the use of specialist instruments, stents, prosthetics and techniques. Theatre nurses with specific training in this area are valuable. Theatre staff need to be capable of operating cell salvage devices for blood conservation.
- 4.16 A vascular theatre also requires stocks of specialist grafts, stents, catheters, wires, instruments, haemostatic agents and sutures that are stored nearby, as they are often needed without delay.
- 4.17 Many interventions are no longer just open surgery but will be a combination of open and endovascular or purely endovascular. For this type of work a hybrid endovascular theatre is recommended. This combines access for open surgery (with lighting, table clamps, sterile air exchange, and full anaesthetic facilities) with the ability to introduce high quality rotational fluoroscopic imaging. For the safe performance of endovascular aneurysm repair, specific guidance on the facilities required has been issued by the MHRA. These recommendations arose after reports of adverse events related to EVAR performed with inadequate facilities. The MHRA guidance therefore concludes with the following; *“it has been recognized that problems with facilities and equipment may have contributed to adverse outcomes from EVAR. We therefore recommend that Trusts providing EVAR services, follow these recommendations to ensure that adequate facilities are available to perform EVAR safely and successfully”*.
- 4.18 Many vascular operations take longer than a half-day session and so arrangements should ensure that vascular teams have access to sufficient all day theatre lists for their elective workload. In addition, many vascular procedures are unscheduled and there should be easy access to additional urgent theatre time as required. A 24/7 emergency CEPOD theatre must be readily available at the arterial centre to undertake emergency vascular procedures.
- 4.19 Radiation protection for patients is governed by the Ionising Radiation (medical exposures) Regulations 2017¹¹. All doses to patients and staff should be kept As Low As Reasonably Practicable (the “ALARP principle”) and consistent with the intended diagnostic and therapeutic purpose. Responsibility for radiation protection lies with the employer (The Trust).
- 4.20 Occupational exposure limits as defined by the International Commission on Radiological Protection (ICRP) are 20mSv for the whole body and 20mSv for the eye lens. Any employee who is likely to exceed 30% of any dose limit is designated a *classified worker* and would be subject to additional health surveillance and may require adjustment in working practices and workload. Once a pregnancy has been declared to the employer the foetal dose should be as low as reasonably practicable and should not exceed 1 mSv for the remainder of the pregnancy.
- 4.21 All staff who are frequently required to work in a Controlled Area must adhere to Local rules and be issued with at least 2 individual personnel dosimetry badges: 1 under shield and 1 outer thyroid. These should be returned and re-issued on a monthly basis. All staff engaging in endovascular procedures must have access to protective clothing: lead aprons, thyroid shields and eyewear. It is the responsibility of the senior operator to ensure procedures comply with the ALARP principles (protective material and beam limiting device use, appropriate examination protocol selection) and formally report any radiation incidents. All medical staff engaging in endovascular procedures should complete a validated IRMER Course prior to undertaking any clinical work. Trainees should be aware of their own annual cumulative dose prior to undertaking new placements. Real-time radiation dose monitoring and feedback is recommended for high exposure practices.

ITU, HDU and PACU (post-anaesthesia care unit)

- 4.22 A Critical Care facility is essential for the care of patients treated for a vascular emergency, particularly those with a ruptured aortic aneurysm. The majority of elective vascular patients can be managed in an HDU or PACU rather than an ITU.
- 4.23 Both ITU and HDU beds must be available on site at the arterial centre for the vascular service, in sufficient numbers to prevent cancellation of elective procedures due to lack of facilities. The size of the critical care ward will vary according to population size and the influence of other specialties using the facilities.
- 4.24 GIRFT³ recommends the increased use of ward based recovery. This will require high quality nursing care. Plans to increase ward based recovery should be made in close collaboration with anaesthetic and intensive care units. Ward based recovery requires monitored beds and appropriate nursing ratios for high care areas.

Major Trauma Centres / Emergency Departments

- 4.25 It is recommended that designated arterial centres are co-located with major trauma centres or trauma units with an accident and emergency department. If an existing vascular service is sited in a hospital without a trauma or emergency department, there must be robust mechanisms available for the direct admission of vascular emergencies. Many patients needing vascular expertise will present to an emergency department; if the vascular service is not in the same hospital, there need to be clear protocols for the management of such patients. Emergency clinicians and ambulance services should be involved in the development and monitoring of emergency transfer pathways.

5. The Non-Arterial Centre in the Vascular Network

For reconfiguration, this should be read alongside “Top Tips for reconfiguring vascular services” (Appendix B)

- 5.1 The number of non-arterial centres will differ between networks and will depend on local geography and population. The key to a functional network is that patients have equity of access irrespective of the site they present to. Networks should aim to deliver as much of the patients care as close to home as possible. This should include outpatient clinics, timely inpatient review, day case lists (surgery and endovascular), Diabetic Foot Services and Pre-assessment for surgery.

Vascular Consultant presence at Non-Arterial site

- 5.2 Vascular surgeons should provide outpatient clinics, day case surgery and angioplasty, together with timely review of inpatients under other specialties. Surgeons should have sufficient time in their job plans for patient administration at non arterial sites. These sessions should be spread through the week to facilitate in patient review within 48 hours where possible. The visiting consultant should be timetabled for whole days were possible to avoid excess traveling time.
- 5.3 It is not necessary for an onsite presence Monday to Friday 9-5, but the extent of cover should be related to size of hospital covered and the specialties on that site. An onsite presence should not be required on a just in case basis.
- 5.4 All surgeons in the network should take equal responsibility for providing non arterial site cover and each site should have more than one surgeon assigned to allow cover. It is anticipated that 40% of an individual surgeon's contract will be focused supporting NA sites. Consistency of consultant support is important for the development of clinical relationships with both GPs and consultant colleagues at the NA site.
- 5.5 There needs to be clear pathways in place describing the management of urgent referrals and vascular emergencies requiring transfer to the arterial centre.
- 5.6 In most NA sites there will be minimal junior doctor cover and trainees who require a vascular surgery experience should be based at the arterial centre site. However it may be appropriate they attend sessions at the NA site for specific educational activity.

Vascular Nurse Specialists

- 5.7 Vascular Nurse Specialists (VNS) are essential to the safe and efficient working of the network. All NA hospitals should have VNS support. There should be more than a single VNS at each site or the posts should rotate between sites to allow consistent cover. Vascular Nurse specialists are the key to the safe and effective transfer of patients to the arterial centre for surgery. They can also support the NA centre out-patient clinics and daycase lists.

Emergency cover

- 5.8 General Surgery Consultants at the NA centre no longer have sufficient expertise in vascular surgery to manage emergencies presenting “on take”. However, they should be sufficiently skilled to assess and triage patients appropriately with referral to the emergency vascular surgeon when indicated.
- 5.9 Clear transfer protocols should be in place for both the patient presenting at NA centres and vascular emergencies occurring at these sites. These should be discussed and agreed with local ambulance services. There are already national guidelines for the transfer of ruptured AAA's.¹²
- 5.10 If an unforeseen vascular emergency occurs at the NA site, the initial call for help should be directed to the on call vascular surgeon at the arterial centre.

Outpatient Clinics

- 5.11 Adequate outpatient capacity should be available in the NA sites to allow patients to be seen at their local site. The capacity should be sufficiently flexible to allow rapid assessment of new patients, with appointments being available in week for urgent referrals from either GP or A and E. This may require adjustment of job plans within the network to facilitate this.
- 5.12 It is recommended that, where appropriate, new patients should be offered a ‘one-stop’ service, with consultation and Duplex scanning taking place at their initial visit. This is convenient for patients and reduces the demand for follow-up appointments.
- 5.13 Provision can be made for Vascular Pre-assessment clinics in the NA centre to reduce the number of visits a patient has to make to the Arterial Centre, however the prerassessment should be consistent across the network.
- 5.14 Provision should be made for the transfer of patient information between the arterial and non-arterial centres. If electronic patient records are used, it is important that this information can be transferred between sites so that clinicians can have access to the full patient record.

Vascular Laboratory support

- 5.15 An adequately resourced Vascular Laboratory or Sonography service should be available at each site in the network. It is recommended that the services work together to provide a consistent governance and quality assurance between sites. Urgent appointments should be available to facilitate the stroke and diabetes services. The laboratory should have systems in place to ensure the capacity for laboratory based follow up for patients post bypass and EVAR.

- 5.16 Cross-site cover by vascular technologists within the network in order to cover significant gaps in service at NA sites is recommended.

Diagnostic and Assessment services

- 5.17 Non-invasive imaging (CT and MRI) scanning should be available in a timely fashion at the NA site. Image transfer by PACS should be available and suitable protocols should be in place for the urgent transfer of images both in and out of normal working hours.
- 5.18 CPET, stress echocardiography and other cardiorespiratory work up can be performed in the NA centre, where available, to minimise travel for patients. If the NA centre is sufficiently large, anaesthetic pre-assessment clinics can be held on the NA site. However these may not be available at smaller NA sites.

In Patient referrals

- 5.19 There should be sufficient capacity in consultant and VNS job plans to allow in patient assessment within 48Hrs. There should be an established mechanism on site to deal with these. If urgent review cannot take place the patient should be discussed with the consultant on call at the arterial centre.

Day Case lists

- 5.20 These will be the bulk of the operating in the NA centre allowing the vast majority of venous and renal access surgery to be performed locally. Day case angioplasty should also be performed by interventional radiologists and/or endovascular surgeons locally.
- 5.21 Day case procedures requiring general anaesthesia can be carried out on site and there should be local arrangements for the occasional patient needing to stay overnight, rather than transfer to the arterial. Patients requiring renal access under general anaesthesia may require admission to the arterial site if more than an overnight stay is anticipated.

Repatriation and Rehabilitation

- 5.25 The majority of elective patients at the arterial centre will be fit to be discharged home relatively soon after treatment and for these repatriation is not a major issue. An outpatient appointment at their local hospital with their vascular or diabetic specialist concludes a satisfactory episode of care.
- 5.26 Occasionally patients, particularly with amputations or stroke, may need repatriation and this should be done according to their ongoing care needs. This will usually be under diabetes, stroke or elderly care medicine. Vascular surgeons and VNS should support the review of these patients on the NA site. All units should have a repatriation coordinator and agreement with non arterial centres regarding pathways.

- 5.27 It is strongly recommended that there are no named vascular beds in NA sites as this has potentially serious implications for continuity of care and cover, both in and out of hours. Vascular review by visiting surgeons and locally based VNS will continue to be a feature of care but vascular input should really be minimal once deemed fit for transfer.

- 5.28 Many patients require rehabilitation following surgery. Pathways should be developed to access appropriate rehabilitation facilities in the network. Rehabilitation requirements should be assessed by physiotherapy, occupational therapy and the rehabilitation team at the earliest opportunity to avoid delayed discharge.

Secretarial & administration support

- 5.29 Administrative support is vital in order to support the smooth running of the service at NA sites and to act as an interface with the arterial centre. The level of support will depend on the size of the Non-Arterial centre and number of vascular surgeons involved. With on-site presence 3-5 days per week and co-ordination with the arterial centre a full time band 4 or above secretary will be required in many units.
- 5.30 Administrative support at the NA centre is fundamental to the safe care of patients in the network. Most NA centres will require a minimum of one whole time band 4 secretary. Input of a network coordinator is strongly recommended for the transfer of patient information and investigations between sites. The network coordinator will need to work closely with secretarial teams on each site to make maximum use of the theatre and inpatient angiographic facilities.
- 5.31 Vascular surgeons with commitments to NA sites should have ready access to a desk and PC and should be able to access relevant IT systems in the arterial centre remotely and vice versa.

Diabetic Foot Services in the NA Centre

Emergency treatment of diabetic foot sepsis

- 5.32 When the diabetic foot team in the NA centre diagnoses diabetic foot sepsis with no arterial compromise, a local referral should be made if possible. In some centres this service will be provided by a local orthopaedic team or it may be possible to drain the foot on a NA site vascular list if the patient is an inpatient. If this is not available there should be clear protocols in place for urgent transfer of these patients to the arterial centre.
- 5.33 Surgery for these patients should be carried out by surgeons with the necessary expertise and training. This should not be delegated to junior surgeons with limited training in diabetic foot surgery.

Vascular Assessment of the Diabetic Foot

- 5.34 Initial assessment will usually be carried out by a member of the diabetic team (Consultant, VNS or specialist podiatrist). This assessment may also be initially carried out by a Podiatrist or Nurse working as part of the Foot Protection Team in a community setting. If there is significant concern the on call vascular surgeon at the arterial centre should be contacted. They will decide if immediate transfer is required or be able to arrange review in the NA centre in the next out patient clinic.
- 5.35 Vascular imaging should be available on an urgent basis at the NA centre for the ischaemic diabetic foot. This should not incur long delays as this would precipitate increased potentially unnecessary transfer in 48Hrs.

Vascular Intervention

- 5.36 Imaging should be reviewed by both radiologist and vascular surgeon and the results should be discussed with the diabetic foot team. If the patient is suitable for intervention a clear decision should be made as to where that intervention should be undertaken. There should be written guidance in the network for which patients are treated in the NA centre. If the patient is to be treated with intervention at the arterial centre their transfer should not be delayed. All patients requiring a revascularisation procedure at the arterial centre should be transferred on an urgent basis.

Critical Limb Ischaemia (CLI) at the NA Centre

- 5.40 Patients with critical limb ischaemia will present with chronic ischaemic rest pain in the foot or ulceration / gangrene. These patients may present in a number of different ways and may be admitted under other specialties as in patients or may be seen in the out patient clinic or emergency department.
- 5.41 General surgeons and emergency physicians should have the necessary skills to assess and triage patients presenting with CLI. Patients with severe ischaemia should be discussed with the on call vascular consultant and transfer arranged.

- 5.42 Inpatients should be seen and assessed within 48hrs and emergency department physicians should have access to urgent next available outpatient appointments at the NA and arterial sites. If patients are attending outpatients under other specialties referral to outpatients or discussion with the on call vascular surgeon should be undertaken depending on urgency.
- 5.43 NA centres should have sufficient outpatient capacity to see urgent referrals
- 5.44 Equal access to treatment should occur irrespective of where in the network a patient presents. Written pathways should exist to allow transfer within the network with minimal delays.
- 5.45 Leg ulcers are common in the elderly hospital population. A large proportion will be venous but some will be arterial or arterio-venous. Severely painful ulcers of the leg, with exposed deeper structures or necrotic tissue and absent pulses should be considered for more urgent management. Although ulcers with these features may not directly meet the criteria for CLI they should be referred to the vascular service using the CLI pathway.

Amputations

- 5.50 Toe and ray amputations can be undertaken at the NA centre with sufficient expertise. These should be performed or closely supervised by a consultant surgeon and performed on vascular lists.
- 5.51 Amputations above the ankle should take place in the arterial centre. Patients requiring ongoing rehabilitation can be repatriated to the NA centre under the care of an appropriate non vascular consultant (elderly care, diabetes or rehabilitation medicine).

6. Pathways of Care from Primary Care to Secondary Care

- 6.1 Primary care has an important role in the management of arterial disease with responsibility of early recognition and modulation of risk factors. The NICE guidelines for peripheral vascular disease recommend patients with claudication be referred to supervised exercise prior to referral to a vascular clinic⁸.
- 6.2 Currently, good referral pathways to secondary care exist for the major vascular conditions such as aneurysmal disease and peripheral vascular disease, however leg ulceration and foot ulceration are often managed initially in the community.
- 6.3 Leg ulceration is a very common problem. It is estimated that 1 in 1000 people in the UK will have a leg ulcer at some stage in their lives. Leg ulcers become more common with age. The health improvement network database¹³ has been used to estimate the economic burden of chronic wounds in the UK. From this database it is estimated that there are 2.2 million wounds per annum affecting 4.5% of the adult population. Of these, approximately 700,000 are leg ulcers, >70% will have a correctable venous aetiology. The cost to the NHS of caring for such patients in the community is estimated to be between £1.5 and £2 billion per annum.
- 6.4 NICE guidance 2013¹⁴ recommended that patients with a venous leg ulcer should be referred to vascular service. Patients with confirmed varicose veins should be treated. The EVRA trial has demonstrated that early intervention to manage the venous disease improved healing time and helped prevent recurrence¹⁵. Early treatment is cost effective. Patient care pathways need to be developed so that these patients are seen and assessed by a Vascular specialist.
- 6.5 Early referral of patients with leg ulcers to a vascular specialist will allow early identification of arterial ulcers which would benefit from revasculariation. Our recommended referral and management pathway can be found in Appendix C.

Amputation avoidance

- 6.6 There are approximately 5-6000 major lower limb amputations undertaken each year in the UK. The path to an amputation usually begins with an ulcer. Ulcers can occur in patients with diabetes, peripheral arterial disease, venous disease and lymphoedema.
- 6.7 Diabetes is the most common cause of non-traumatic limb amputation, with diabetic foot ulcers preceding more than 80% of amputations in people with diabetes. The framework to improve care for patient with diabetic foot disease aims to improve the speed with which patients with foot ulceration access specialist care. The whole pathway has three areas: foot screening, foot protection for those identified through screening to be at high risk of foot disease, and a multidisciplinary foot care service for those with active diabetic foot disease – as outlined in the NICE guidelines⁹.
- 6.8 Foot ulcers in patients without diabetes have no clear pathway of care. However, these patients are at risk and many have critical limb ischaemia. The Manchester Amputation reduction strategy (MARS) is a current innovation in development which proposes managing all foot and leg ulcers through one pathway of care from district nurse and podiatric care in the community through to specialist clinics in secondary care. It also includes a public health and early intervention arm, building on existing vascular podiatry collaborations, that will ensure the early diagnosis and aggressive management of cardiovascular risks in people with non severe PAD, involving working with GPs, Podiatry, Nursing and supervised exercise & education services, with access to Cardiac Rehab programmes for people with PAD. Patients will move through the pathway appropriately if they develop leg or foot ulcers or as their wounds change. This excellent innovation will offer equity of access to all patients with leg and foot ulcers and commissioners should consider developing similar programs throughout the UK.

7. Vascular Surgery is an Urgent Care Service

- 7.1 Many of the conditions presenting to vascular services are urgent in nature. They fall between requiring immediate treatment as an emergency but are not elective in the sense that they can safely be added to a waiting list for treatment in turn. The degree of urgency in each case is determined by the responsible Consultant using their clinical experience and judgement. There are recommended timeline targets for the delivery of carotid procedures, aortic aneurysm repair and lower limb revascularisation designed to improve patient care and outcomes. More recently we have new evidence that patients with venous ulcers also need more rapid treatment.
- 7.2 Patients with all these conditions require access to a pathway providing rapid assessment in clinics, early diagnostics and subsequent interventions. Urgent cases can be admitted as in-patients to wards for work up and subsequent procedures. However, this is less efficient and costly. Well designed out-patient pathways reduce the need for these admissions. The aim should be to use in-patient admission as a last resort applied to a small number of cases which are urgent bordering on emergency in nature.
- 7.3 The 2018 GIRFT³ report called for vascular services to be reconfigured for urgent care in order to reduce delays to treatment. The precise local arrangements to deliver this urgent care will differ between networks but there are a number of key principles that need to be considered in the design of these urgent pathways.

Access to Out Patient Clinics

- 7.4 A system to allow for rapid access to urgent assessment (24-48 hours) is required. A number of models exist, reserved slots in clinics, specific “hot” clinics, ward or vascular lab room assessments. Co-ordination and triage of referrals to maximise ease of access but avoid inappropriate use. These may need a trained co-ordinator, Vascular nurse or Consultant of the week input. There is growing interest in using technology to improve referral pathway flows, mobile devices, messaging, photographs, ebooking etc.

Access to Diagnostics

- 7.5 One stop clinics are common with colour duplex available at the time of clinical assessment. These are strongly recommended. This does rely on adequate Vascular laboratory and/or sonographer resources which are vital for the delivery of urgent care to vascular patients. Specific arrangements for expedited CTA /MRA access should also be agreed with the local radiology service. For more complex patients requiring several assessments prior to major surgery, a one stop, single day, visit to deliver a range of cardiac, respiratory, CPEX, anaesthetic, geriatric assessments can significantly reduce pathway delays.

Scheduling Interventions

- 7.6 The traditional model of named Consultant procedure lists can reduce flexibility for urgent care. Consideration needs to be given to urgent lists with scheduling based on clinical risk assessment. Reserved urgent slots within lists can serve the same function if sufficient to meet demand. Changing established models for booking lists along these lines requires close cooperation with theatres, IR and anaesthetics.
- 7.7 Some urgent lists may be organised along the lines of a NCEPOD emergency day time list. These can be useful for urgent less complex limb revascularisations, major and minor amputations freeing up space in dedicated vascular lists for more complex procedures. GIRFT suggests larger teams should be able to run some of the above capacity across 7 days. For weekend lists the same level of service support should be available as there is in the working week to maintain safety and best outcomes.

Optimising Patient Outcomes

- 7.9 High risk procedures require the most experienced team (surgeon, anaesthetist, IR, theatre staff). Protocols should acknowledge the need to balance urgency against availability of the optimal team for the procedure. Some delay in order for the best team to perform the procedure with the best facilities will be necessary on occasions.

Recommended Timelines for Urgent Care

- 7.10 Abdominal Aortic Aneurysms should be treated within 8 weeks of diagnostic confirmation, in both screened and unscreened patients
- 7.11 Carotid endarterectomy for symptomatic patients should be performed within 7 days from referral. These timelines for surgery have been recommended in the GIRFT report³.

Critical limb ischaemia

- 7.11 Critical limb ischaemia (CLI) is the advanced stage of peripheral arterial disease. Once a patient has developed critical limb ischaemia, the blood supply to the extremity (usually the foot) is no longer adequate to sustain the basic metabolic needs of the tissue. This results in ischemic rest pain, ulceration and gangrene. The latter two conditions are jointly referred to as tissue loss. CLI has a negative impact with 1-year amputation rates of approximately 12% and mortality of 50% at 5 years and 70% at 10 years.¹⁶ It is recognised as an urgent condition and, depending on the clinical presentation, may require urgent admission.

- 7.12 If a decision is made to admit the patient urgently, the following are recommended timelines for management. These apply regardless of where the patient presents (arterial, NA centre or primary care) and refer to the time from receipt of the initial referral by the arterial centre.

Recommended timelines for admitted pathway for critical limb ischaemia (rest pain and/or tissue loss)			
			% of patients who should achieve this target
Time to admission	< 48 hours from decision to admit/ transfer	StAMP ¹⁷	>80%
Consultant review	< 12 hours from urgent admission < 24 hours from elective admission	NHS England NCEPOD ¹⁸	>80%
Investigation for revascularisation	< 48 hours from admission	StAMP	
Primary revascularisation procedure	<5 days		

- 7.13 In some cases of CLI, the patient may present with a stable manifestation of the disease such as mummified toes and initial investigations can be done urgently through out patients. The table below outlines the recommended timeframe for the non-admitted pathway.

Recommended timelines for non-admitted pathway for critical limb ischaemia (rest pain and/or tissue loss)		
		% of patients who should achieve this target
Vascular assessment and imaging	7 days	>80%
Revascularisation	14 days	>80%

Amputation

The following are guidelines for care drawn from the VS document "A Best Practice Clinical Care Pathway for Major Amputation Surgery"

Recommended timelines for the amputation pathway			
			% of patients who should achieve this target
Admission for CLI	< 48 hours from decision to admit	StAMP	>80%
Consultant vascular surgeon review	< 12 hours from urgent admission < 24 hours from elective admission	NHS England NCEPOD	>80%
Diabetic review	< 12 hours from admission	NCEPOD	>80%
Pain team review	< 12 hours from admission	NCEPOD	>80%
Investigation for revascularisation	< 48 hours from admission	StAMP	>80%
Procedure	< 48 hours from decision to amputate	NCEPOD	>80%

8. Training and Assessment of Competence

- 8.1 Vascular surgery is now well established as a separate specialty with trainees following a Vascular Curriculum¹⁹. The first vascular trainees will complete training in 2019. Until this time general surgical trainees with a vascular interest and a certification date before 31st December 2018 will continue to follow the 2010 General Surgical Curriculum.²⁰ Currently, the latter trainees seeking appointment to vascular surgical posts should have spent a minimum of the last two years of their specialist registrar training in recognised vascular training units (see below). Specifications for training units and goals for trainees have been specified by the VSGBI in its document on Training in Vascular Surgery.²¹ It is important that the competencies of vascular specialists are clearly identifiable to their NHS Trust and to the public.
- 8.2 Trainees in Vascular Surgery will undergo core training (CT1-2) followed by a period of 6 indicative years of specialty training (ST3-ST8). The purpose of the vascular curriculum is to train vascular surgeons up to CCT level who will be able to work independently and to the standard of a consultant or equivalent. As such, most of their skills will relate to the management of 'everyday' vascular elective and emergency surgery and this forms the basis of the curriculum, with the competencies, both non-operative and operative being completed by the final year of training. This curriculum also allows a degree of flexibility to respond to the changing needs of our patients and the development of new models of healthcare delivery, and to incorporate technological advances, particularly in the endovascular field. The syllabus includes elective and emergency Vascular Surgery topics which need to be completed by all trainees to enable them to manage the conditions listed in the Scope and Standards of Vascular Surgical Practice key topics.
- 8.3 The syllabus also includes specific competencies in elective and emergency gastro-intestinal surgery to complement the management of intra-abdominal vascular conditions and these will normally be obtained during one indicative year of upper and lower gastro-intestinal surgery to be undertaken during intermediate training in ST3/ST4.
- 8.4 Some complex vascular and endovascular procedures are performed in only a few specialised centres and so do not require every trainee to reach a stage of full competence by the time of CCT. It is expected that trainees wishing to work in such centres will seek further experience and mentorship after CCT, although all trainees will be expected to have knowledge of these procedures so that they can initiate appropriate referral to a specialist centre. Early exposure to endovascular techniques is encouraged and this may be achieved by one endovascular training session a week.

Stages of Training

- 8.5 The syllabus may be considered in 3 stages. Satisfactory completion of the core (early years). Intermediate and final stages will lead to the award of a CCT.

Core stage

- 8.6 In the core stage (early years training), the Vascular Surgery trainee may not have even decided upon a career in Vascular Surgery. They will undergo broad based core surgical training, while being able to sample a range of surgical specialties. The objectives will be to attain the knowledge skills and behaviours required of all surgeons (i.e. the common competencies), together with some initial competencies relevant to the specialty of Vascular Surgery. At the end of this period of training, the trainee will have decided upon a career in Vascular Surgery, and will seek to enter Vascular Surgery training. In 2019 the Improving Surgical Training (IST)²² pilot programme in vascular surgery will commence and the successful applicants will be appointed to run-through training in vascular surgery at ST1.

Intermediate stage

- 8.7 The majority of vascular interested trainees will undertake a competitive national application and interview for entry into vascular training at ST3 level. The Intermediate stage (ST3 & 4) emergency and elective vascular surgical experience is developed to enable the trainee to have a breadth of experience of the common vascular surgical emergencies as well as gaining exposure to all of the elective vascular specialist areas. In addition, competence to manage patients undergoing vascular procedures within the abdomen will require training for one year in gastrointestinal surgery. One to two years of emergency general surgery also provides useful experience in this area.

Final stage

- 8.8 The Final stage (ST5 - 8) includes both vascular surgical and endovascular procedures and it is expected that by the end of ST8 the trainee will be able to manage competently unselected vascular surgical emergencies when on call. It is anticipated that certain complex emergencies may still need the assistance of more experienced or subspecialist colleagues. The specialty components of the Final stage include the breadth of conditions likely to be encountered in specialist practice. The degree of specialisation may vary depending on individual career aims. The necessary skills should be acquired in four indicative years.

Structure of Training

- 8.9 All three stages of Vascular Surgery training allow exposure to emergency care. All trainees should include a regular on-call commitment in their job plans. In addition the use of 6 month rotating posts, with trainees working for different consultants every six months, allows a breadth of experience to cover all of the subspecialty areas of Vascular Surgery. All Vascular training should take place in Specialist Vascular Training Centre. The definition of these can be found in Appendix E.
- 8.10 The ASPIRE programme. The Vascular Society Education Committee has established a yearly residential training programme for all vascular trainees. ASPIRE 3 is embedded within the vascular curriculum and attendance is mandatory for new ST3 trainees. The ASPIRE programme has been designed to incorporate training in operative and endovascular techniques, simulation, cadaveric dissection, radiation protection and preparation for the vascular examination and consultant practice. Attendance to all ASPIRE courses will be supported by TPDs and trainees are expected to attend. Trainees returning to practice from a period of statutory leave or OOP activity will be supported to attend the relevant ASPIRE course.

Training Progression

- 8.11 Progression through training is demonstrated by acquisition of the levels of knowledge and clinical and technical skills determined for each stage. Trainees progress is assessed at the Annual Review of Competence Assessments (ARCP). The ARCP panel will make recommendations regarding future placements on the regional vascular training programme to ensure comprehensive training.
- 8.12 Vascular trainees keep detailed records of their training progression and competency assessments, through the use of appropriate logbooks together with relevant records of research, training courses and an audit of personal cases performed. This portfolio will continue into consultant practice.

Completion of training

- 8.13 The Intercollegiate Fellowship of the Royal College of Surgeons (FRCS) examination in vascular surgery commenced in 2018. Trainees on the General Surgery 2010 curriculum will continue with the subspecialty examination in Vascular Surgery until the completion of their training.
- 8.14 There is a separate European Board of Surgery Qualification in vascular surgery (FEBVS – Fellowship of the European Board of Vascular Surgery)²³, which can be taken by those within six months of their CCT. The purpose of this vascular examination is to ensure consistency of training standards across Europe.

9. Research

- 9.1 Research is important to vascular patients. Best care involves understanding the relevant literature, the quality of the evidence and planning the best intervention for the individual.
- 9.2 There is good evidence to show that higher research activity in acute English NHS Trusts is associated with lower mortality outcomes for emergency admissions²⁴.
- 9.3 Research is referenced in the NHS Constitution. It was last updated October 2015 and has seven overriding key principles. The third 'The NHS aspires to the highest standards of excellence and professionalism' states *'the NHS provides high quality care that is safe.... and through its commitment to innovation and to the promotion, conduct and use of research to improve the current and future health and care of the population.'*²⁵
- 9.4 Whilst some clinicians may choose to take a formal University academic pathway, the opportunity to take part in clinical research is open to every consultant. Within the national job planning guide agreed by the BMA & NHS Employers, section 7.9 clearly outlines amongst potential objectives for the forthcoming year as being academia. Evidence that can be presented within the optional activities that form part of the SPA assessment include research, and so can form part of every clinician's job plan.²⁶

10. Audit, Governance & Quality Improvement

- 10.1 Vascular services must be accompanied by a comprehensive programme for audit of clinical outcomes. The data system needs to be based on an adequate information technology (IT) infrastructure and needs to be sufficiently detailed so that analysis for clinical governance purposes can take full account of case mix and physiological status. This type of audit requires financial support, not just for computer hardware and software, but also for someone to support, monitor and maintain the database in larger units. Annual volumes of particular operations per surgeon are not high in arterial surgery, and it may take up to nine years of data collection and analysis to decide whether or not clinical outcomes for an individual surgeon lie within the norm.²⁷ There are methods to use standard data collected in every hospital to prove evidence of safety.²⁸
- 10.2 Vascular surgeons in the UK are required to submit their figures to the NVR and will then be provided with risk-adjusted comparative outcomes for their procedures compared with their peers in the UK. For revalidation in England, data submission is mandatory for all procedures. Elsewhere it is voluntary. There is no equivalent system in the Republic of Ireland. The establishment of such a Registry for Vascular Surgeons working in the HSE is strongly recommended by the Vascular Society.
- 10.3 The Vascular Society has a standard that all index vascular procedures should be entered on the NVR. Surgeons must have identified time in their work programme through SPA activity to ensure both adequate data entry into national clinical audit and to quality assure the coding of vascular procedures within their unit. A minimum of 0.25 SPA (0.5 in busy units) per surgeon should be identified to support national clinical audit. Audit of outcomes benchmarked against peers should form an integral part of a vascular surgeon's annual appraisal and will be an essential requirement for revalidation.
- 10.4 The UK Government has indicated that it will continue to require publication of data from individual surgeons in the public domain²⁹. It is therefore in the interests of the vascular specialist to become personally involved with their hospital's operation coding system to ensure that hospital activity and outcome returns to HQIP are as accurate as possible. Good outcomes are fundamental to the cost effectiveness of vascular interventions. Ten years ago the UK did not compare well with international comparators for some vascular procedures. It had the highest mortality rates in Western Europe following elective AAA surgery and was among the slowest nations for uptake of new endovascular technology. Since the national Quality Improvement Programme for AAA repair, there has been significant improvement and it is vital that these standards are maintained and further improved upon going forward.

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12. Appendix A

Template for a new Consultant Vascular Surgeon's Job Plan

This should be taken in conjunction with the job planning advice from the British Medical Association and NHS employers. It has been written to take account of the current imperative to centralise services and it is appreciated that it may need to be flexible to take account of local service need. A full time post will constitute 10 PAs however some trusts may wish to offer additional sessions to consultants.

Fixed Commitments (DCC's):

A consultant vascular surgeon will require at least 3 operating half days per week. Each half day session will usually equate to 1 PA. (This will not usually include pre and postoperative visiting). These may be main theatre, day surgery or endovascular lists. Incorporated within this is Dual Consultant operating.

Main Theatre: As a minimum it is expected that a consultant vascular surgeon should have access to the equivalent of an all-day operating list on a weekly basis. All day lists are more suited to the nature of the surgery than half day lists. This amount of operating will ensure adequate access to major vascular cases to maintain competence. These lists may take place in an operating theatre, hybrid suite or an interventional radiology suite.

Day Surgery: A consultant vascular surgeon will require access to day surgery lists in order to deliver venous and vascular access surgery according to local need. These lists may take place outside the arterial centre and travel time will need to be accounted for as part of the job plan.

Endovascular Lists: Vascular surgeons are undertaking interventional peripheral procedures and require access to either a hybrid theatre or an interventional radiology suite. There should be documented available access to endovascular facilities within the job plan. This may be delivered within the NA centre.

Ward rounds and Ward referrals: Sufficient time should be allocated in the job plan to review in patients operated on by the consultant. In addition with the network nature of most posts there should be time allocated in job plans for reviewing inpatient referrals both at both arterial and NA centres. Around 40% of an individual's timetable may be at the NA centre. There should be on site vascular presence at the NA centre on at least 3 of the 5 weekdays, with likely at least 2 Consultants providing this service and the appropriate leave cover.

Outpatient Clinics: Most job plans will include a minimum of two outpatient clinics to deliver an adequate amount of operative work for a consultant surgeon. These will usually represent 1 PA each. With the current structures of clinical networks it is anticipated that job plans will include both in and outreach clinics. (With outreach clinics travel time needs to be included in job plans in addition to the time allotted to the clinic). It may be necessary to incorporate diabetic foot reviews into the N/A centre unit / outreach OPD or for the podiatry OPD to run in parallel.

Non-invasive imaging: Although many consultants will undertake this as part of their regular clinic activity and this will be counted within these sessions, some consultants may develop or have a special interest in this area and therefore need dedicated sessions in this area.

Acute Vascular Service: A lot of units utilise a Consultant of the Week model with a consultant (on a rotational basis within the unit) managing all the acute in patients and providing cover for / undertaking CEPOD operating. If this is undertaken over 5 days for the time period; 0800 – 1800, then this equates to 12.5 PA. This increases the total PA count over the on-call (minimum 6 week) period.

On call: As units are now engaged in centralisation no consultant should be on an on call rota more onerous than 1 in 6. The on call consultant should be free of elective duties. Predictable activities such as ward rounds on call should be timetabled in. Unpredictable on call commitments should be subject to a diary exercise, for new appointments it should be assumed that individuals will take a proportionate share in the unpredictable on call commensurate with the rota frequency. The weekend on call cover would include a daily review / ward round. This can be timetable as predictable activity.

MDT: Attendance at multidisciplinary team meetings is essential for the high quality delivery of patient care. Adequate time should be scheduled into a job plan for this, it is anticipated that this will amount to a least 1PA per week. In many services there will be more than one MDT in the service including MDTs at N/A centre sites and separate meetings for specialist areas such as renal access. This may also include an MDT ward round or clinic for Diabetic Foot care.

Supporting Professional Activities:

A full time consultant post will typically be balanced between clinical PAs and supporting professional activities (SPAs) in a 7.5:2.5 ratio for a full time consultant. The SPA component is often a 1.5 minimum with the potential for an additional 1 PA for specified additional activity (audit, teaching, training, governance roles). The provision of this time is essential in a high quality service.⁴⁴

The time agreed as APA for the provision of these would be subject to local agreements.

From an educational perspective 0.25PA of ePA activity is recognised for the educational supervisor activity (AES) per trainee.

Governance / Audit and Clinical or Network lead roles will have locally agreed time / PA levels allocated.

Mentoring of Junior Colleague should be recognised with the SPA agreement locally if undertaken as a defined role.

Research activity should be available as APAs and should be reflected as part of a job planning process.

For new consultants trusts should identify the funds and a transparent method to allocate research PAs and so pump-prime their research activity in order to develop their research activity.

The Royal College of Surgeons of England have produced guidance on Job plans, which can be found on the college and Vascular Society website. With regard to SPA allocation they state the following: "In line with the Academy of Medical Royal Colleges¹⁸, 1.5 SPAs is viewed as a minimum requirement for personal revalidation development of safe practice. We expect a job plan to allow for sufficient time for non-clinical duties and activities, therefore any job plan with only 1.5 SPAs leaves no time for teaching, undergraduate examination, research, trainee supervision, managerial input or clinical governance work outside of audit of personal practice. The College considers that a typical job description for an established surgical Consultant would need 2.5 SPAs to fulfil these commitments as a 7.5: 2.5 split or be offered a contract with Additional Programmed Activities beyond 10 PAs. The College recognises, however, that there might be a need for flexibility for new Consultants whose duties may not initially necessitate that split. The College recommends that there should be a job plan review for every appointee within 12 months of starting their post, so that additional SPA time can be allocated should any additional activities have been undertaken by the appointee".

Established consultants are often involved with roles in running the service. This can also be beneficial for the development of newly appointed surgeons who often bring with them a wealth of ideas having worked in a variety of units. The use of their SPA time within service development can greatly enhance a service to which they are appointed.

The PA requirements to meet the above are:

- 3 PA Operating
- 2 PA Outpatients
- 1 PA MDT
- 0.5 PA Ward Round
- 0.5 PA Travel
- 1 PA Administration
- 1.5 SPA personal CPD
- 1.5 PA On call

This gives 11 PA job plan with requirement for that to be 12 PA if do any teaching/ management/ Research etc. Therefore some commitments may need to be delivered in alternate weeks or shared with colleagues.

Example timetables are outlined here:

Example 1: Job Plan with sessions in arterial and NA centre; 11 PA

Day	Week 1	Week 2	PAs
Monday am	0800-10.30 MDT 10.30 – 12.30 Departmental planning	0800-10.30 MDT 10.30 – 12.30 Departmental planning	0.5 DCC 0.5 DCC (admin)
Monday pm	12.30 – 13.30 Travel to N/A centre 13.30 – 15.00 Ward Round 15.00 -17.30 Diabetic Foot MDT	12.30 – 13.30 Travel to N/A centre 13.30 – 15.00 Ward Round 15.00 -17.30 Diabetic Foot MDT	0.25 DCC 1.0 DCC

Monday evening			
Tuesday am	0800 -12.00 Hybrid / Endo- cases	0800 -12.00 Hybrid / Open cases	1 DCC
Tuesday pm	1200 – 1600 Hybrid / Open cases	1200 – 1600 Hybrid / Endo- cases	1 DCC
Tuesday evening			
Wednesday am	0800 – 0900 Post op reviews 0900 -1300 SPA	0800 – 0900 Post op reviews 0900 -1300 SPA	0.25 DCC 1.0 SPA
Wednesday pm	13.30 – 17.30 Specialist Vascular OPD	13.30 – 17.30 Specialist Vascular OPD	1.0 DCC
Wednesday evening			
Thursday am	0800 – 1300 N/A centre Angio list	0800 – 1300 N/A centre DSU list	1 DCC
Thursday pm	13.30 – 17.30 N/A centre General Vascular OPD	13.30 – 17.30 N/A centre General Vascular OPD	1 DCC
Thursday evening			
Friday am	0800-1000 N/A centre Administration 1000 – 1200 SPA	0800-1000 N/A centre Administration 1000 – 1200 SPA	0.5 DCC 0.5 SPA
Friday pm			
Friday evening			
Saturday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	1.5 DCC for on call
Saturday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	
Sunday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	
Sunday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	

Total PA count is 11 PA

With Consultant of the Week this is 11.5 PA

This is calculated as 0800 – 1800 daily being 2.5PA giving 12.5PA for this week.

If do a 1 in 6 rota then this gives 10PA per week with the additional 1.5 PA of on call = 11.5 PA

Would only have 1.25 SPA if assume none in on call week.

Therefore to have 1.5 SPA are required to do a 11.75 PA job plan.

If do Educational supervision for 1 trainee also, are undertaking a 12 PA job plan

Example 2: Job Plan with sessions in arterial and NA centre - 10PAS

Day	Week 1	Week 2	PAs
Monday am	0800-10.30 MDT 10.30 – 12.30 Departmental planning	0800-10.30 MDT 10.30 – 12.30 Departmental planning	0.5 DCC 0.5 DCC (admin)
Monday pm	12.30 – 13.30 Travel to N/A centre 1400– 15.00 Ward Round 15.00 -16.00 N/A centre Administration	12.30 – 13.30 Travel to N/A centre 1400– 15.00 Ward Round 15.00 -16.00 N/A centre Administration	0.25 DCC 0.5 DCC
Monday evening			
Tuesday am	0800 -12.00 Hybrid / Endo- cases	0800 -12.00 Hybrid / Open cases	1 DCC
Tuesday pm	1200 – 1600 Hybrid / Open cases	1200 – 1600 Hybrid / Endo- cases	1 DCC
Tuesday evening			
Wednesday am	0800 – 0900 Post op reviews 0900 -1300 SPA	0800 – 0900 Post op reviews 0900 -1300 SPA	0.25 DCC 1.0 SPA
Wednesday pm	13.30 – 17.30 Specialist Vascular OPD	13.30 – 17.30 Specialist Vascular OPD	1.0 DCC
Wednesday evening			
Thursday am	0800 – 1300 N/A centre Angio list	0800 – 1300 N/A centre DSU list	1 DCC
Thursday pm	13.30 – 17.30 N/A centre General Vascular OPD (with Diabetic Foot appts)	13.30 – 17.30 N/A centre General Vascular OPD (with Diabetic Foot appts)	1 DCC
Thursday evening			
Friday am	0800 – 1200 SPA at N/A centre	No Activity	0.5 DCC
Friday pm			
Friday evening			
Saturday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	1.5 DCC for on call
Saturday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	
Sunday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	
Sunday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	

Example 3: Arterial centre 10 PA

Day	Week 1	Week 2	PAs
Monday am	0830-10.30 MDT 10.30 – 12.30 Departmental planning	0830-10.30 MDT 10.30 – 12.30 Departmental planning	0.5 DCC 0.5 DCC (admin)
Monday pm	13.30 -1730 Hybrid Theatre Endo vascular list	13.30 -1730 DSU AV Fistula list	1.0 DCC
Monday evening			
Tuesday am	0900 -13.00 Vascular OPD	0900 -13.00 Vascular OPD	1 DCC
Tuesday pm	13.30- 17.30 SPA	13.30- 17.30 SPA	1 SPA
Tuesday evening			
Wednesday am	0800 -12.00 Hybrid / Open cases	0800 -12.00 Hybrid / Open cases	1.0 DCC
Wednesday pm	1200 -16.00 Hybrid / Open cases	1200 -16.00 Hybrid / Open cases	1.0 DCC
Wednesday evening	16.00 – 18.00 Hybrid / Open cases	16.00 – 18.00 Hybrid / Open cases	0.5 DCC
Thursday am	0800 – 0900 Post op reviews 0900 -1300 Diabetic Foot MDT clinic / Lower Limb OPD	0800 – 0900 Post op reviews 0900 -1300 Diabetic Foot MDT clinic / Lower Limb OPD	0.25 DCC 1.0 DCC
Thursday pm	1400 – 1500 Patient Administration 1500-1700 SPA	1400 – 1500 Patient Administration 1500-1700 SPA	0.25 DCC 0.5 SPA
Thursday evening			
Friday am			
Friday pm			
Friday evening			
Saturday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	1.5 DCC for on call
Saturday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	
Sunday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	
Sunday	1 in 6 Vascular on Call	1 in 6 Vascular on Call	

12. Appendix B

'Top Tips' for Reconfiguring Vascular Services

1. Introduction

These 'top tips' are aimed at anyone, and everyone, involved in the reconfiguration of local vascular services to produce a united network of partner hospitals. They are based on practical experience of reorganisation and have been compiled with the help of all disciplines within vascular services, together with their Commissioning and Public Health colleagues.

The advice that follows contains practical, experience based, pointers to help vascular services still not fully configured into a network model in which a single arterial centre provides specialist inpatient vascular care. We have assumed that a network will serve a population size of at least 800,000 people, usually more, generating over sixty abdominal aortic aneurysm repairs per year.

Whilst the guidance is aimed predominantly at those working within hospitals and their commissioning colleagues, it is important to remember the roles played by council oversight and scrutiny committees, ambulance services, rehabilitation professionals and patient groups in developing the new network structures; their close involvement from the outset has often been a marker for a successful outcome.

This document is organised into sections that follow logically from a high-level decision to reorganise local vascular services, through the process of reorganisation and concluding with the final operational points that make a new network work well. Each section can stand alone, so that you can dip in and out, to suit your present progress through the reconfiguration process. If things aren't going well it is worth looking back at the previous section to see if perhaps something important has been missed or not given a sufficient priority.

2. Understand the process

2.1 **Reorganisation of services is not easy**, this goes some way to explaining why the reorganisation into vascular networks remains incomplete in England. It requires commitment from all parties:

- **NHS England/NHS Scotland/NHS Wales/HSC in Northern Ireland/HSE**, as commissioners of specialised services. Reorganisation is the 'day job' of commissioners and reconfiguration can flounder without strong commissioning lead for change;
- **Local Clinical Care Groups (CCGs) or Commissioning Groups (LCGs) or Health Boards**, who are already driving change and transformation in local health systems. Their importance is two-fold. First, as commissioners of many of the interdependent services, such as diabetic foot and venous services (in England). Second, because of the impact of Sustainability and Transformation Partnership (STP) programme leads across the whole health economy;

Vascular service reorganisation is only part of wider change in health service delivery that is underway across the NHS. Many of these changes will support rather than impede the setting up of vascular networks and so involvement is essential.

- **Chief Executive** within acute hospital Trusts, along with their executive boards;
- **Clinicians**
 - o working within vascular services, including vascular surgeons, interventional radiologists, vascular nurse specialists and clinical vascular scientists;
 - o working in inter-dependent services, including emergency departments, diabetologists, stroke physicians, cardiologists and cardiac surgeons, rehabilitation physicians and their teams;
 - o wider colleagues;
- **NHS Ambulance Trusts**, who will need to develop acute patient transfer protocols;
- **In England, Local Authority Oversight and Scrutiny Committees (OSCs)**, almost all Health OSCs consider vascular reorganisation a significant change. NHS England provides national guidance on consultation and stakeholder engagement. Consider asking patient support groups and/ or other patients who use other services in which there are 'hub and spoke' network arrangements to join the engagement and consultation processes; their experience is informative, and their insight valued by local people who will be affected by the changes. Patient and public voice colleagues are invaluable supports at public meetings;
- **Patients, patient relatives and patient carers**, though a formal process of public and patient engagement, this includes online information and public meetings. Using local NHS guidance on consultation and engagement will mean all the important stakeholders are involved early on;

2.2 **Barriers to forming a successful network exist**, experience is that there are several perceived, and many real, barriers that will need to be overcome. Amongst the most common are:

- The wide geographical distances a network may have to cover to serve the population, resulting in increased travel for patients and their families;
- Significant distances between partner organisations, with the implications for the delivery of remote outreach clinics;
- Commissioning arrangements are often not robust. There can be a perception amongst both clinicians and Trust managers that commissioners lack the appetite to enforce change;
- A feeling of division between the designated arterial centre and the non-arterial vascular centres in the partner hospitals. This is felt by Trusts and staff alike;
- The perception of **'winners' and 'losers'** with a sense of inferiority and loss of services and status felt by non-arterial vascular centre Trusts, and those who work there, as opposed to being part of something bigger, the new Vascular Network;

- A lack of will or desire to change years of practice.

On a practical level too, vascular networks with a single arterial centre create operational difficulties:

- Having employees within different organisations can create barriers to consistent job planning;
- Capacity issues at the arterial centre for inpatient beds, theatre sessions, interventional radiology, vascular imaging (including the number of vascular scientists) and outpatient clinics;
- Maintenance of expertise in the non-arterial centres;
- Repatriation agreements being tested by the pressure on acute admissions to non-arterial centres;
- Incompatible information systems for sharing between partner hospitals;
- Concerns about less than hospitable working conditions, onerous rotas and lack of junior staff;
- Travel and parking;
- Financial constraints.

2.3 **Successful reconfiguration requires a well led steering committee** (or 'Reconfiguration Board').

A successful and sustainable new network model will only be achieved by:

- **Strong commissioning**, this needs to be someone's specific job, not just another 'pot boiling' in the commissioning office. Service redesign is the daily bread and butter of healthcare commissioners. In common with other service reconfigurations developing a new vascular network requires a steering committee with representation from across the geography involved. This must include Commissioners, Hospital Executives, local CCGs or Health Boards, the Ambulance Trust and clinical input from a Clinical Advisory Group (see below);
- **Engaged clinicians**, the clinical advisory group is the central plank in getting agreement on clinical protocols etc. for the new network (see below). This group should lead on the development of the network clinical model. Their work must start early, well before the site of the arterial centre has been agreed. Regular meetings of clinicians of all disciplines from across the network, both within the formal structure of the clinical advisory group and informally (i.e. following MDT meetings, evening meals or visits from clinicians working in areas that have already reorganised) are important so that the future can begin to be described in a level of detail that can allay some fears;

- **Establishing the view from the CEOs**, are there other services that require a change in delivery so that it would be sensible to consider them together?

- **A well-managed change project**, the NHS Change Model is extremely helpful and a comprehensive repository of resources. Ideally an individual experienced in the change process will have a prominent role in the reorganisation project; this is particularly helpful to set out clear timelines for change and provide support when these are not being met.

There is mileage in using a change methodology with which people are familiar; most institutions will have a favourite approach and using this can save time.

- 2.4 **Change is hard**, one vascular surgeon remarked '*disappointingly the only way to do it seems to be properly*' after going through a service reconfiguration. **There are no shortcuts.**

To be successful the steering committee, which provides Executive and Commissioner leadership, will need to be supported by two key groups to help address the challenges and operational difficulties of developing the new network structures:

Clinical Advisory Group

This group is composed of local vascular surgeons, interventional radiologists, specialist nurses and vascular scientists. It goes without saying that all organisations potentially involved in the reorganisation should have representation on the group that will define the future for them all.

- Topic specialists should take the lead in forging the agreements that result in the supporting documents that describe the clinical pathways for the new network;
- This group must look outwards to the interdependent specialities. A reconfiguration that leaves the diabetic foot protection services in partner hospitals in disarray, or disrupts an interventional radiology rota, could not be considered successful;
- Vascular nurse specialists and vascular scientists may need their own sub-groups to ensure all disciplines are able to make progress speedy. They are key to getting agreed pathways and common reporting standards;
- There are lots of documents from clinical advisory groups about and so those yet to reconfigure can easily adapt and adopt rather than writing these from scratch.

Operational Implementation Group

Service managers also need their own group. It again goes without saying, that all involved organisations should have representation on the group that will define the future for them all

- There is so much to consider in reorganising vascular services that it is unrealistic to think that clinicians will update their managerial colleagues following meetings;
- This group must work closely with IT teams in all involved organisations;
- Just as for the clinical documents, many services have successfully reconfigured and the inter-institution agreements (i.e. Service Level Agreements 'SLAs') can easily be collated, adapted and adopted rather than starting with a blank page.

3. Change is inevitable

The first national GIRFT report for vascular surgery in England written by Professor Mike Horrocks has recently been published. The first recommendation states *"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."*

The report makes explicit that full implementation of vascular networks is a key recommendation and that the NHS in England could save more lives by enabling patients to receive urgent vascular surgery sooner.

In response NHS England have, from April 2018, commenced a peer review process for vascular networks based on the vascular service specification and POVS 2015.

It is a matter of when, not if, English vascular services that aren't compliant with the NHS England Specialised Service commissioning guidelines must change.

It is vital that the Steering Committee, the Clinical Advisory Group and the Operational Implementation Group provide a reality check that change is inevitable.

Change is hard to adapt to, but the sky doesn't fall in when reorganisation happens. In the best interests of patients, the tax payer expects health professionals to just get on with it:

- Discussions and agreements at CEO level are vital so that it's clear to everyone that there is going to be change;

- The benefits of service redesign in terms of improved clinical outcomes and cost effectiveness should be restated regularly and should drive the process;
- Early engagement with local patient groups and local health overview and scrutiny committees is a common feature in successful service reconfigurations.

Successful reorganisations are achieved when the needs of patients, expressed in clinical terms by the clinical advisory group in their pathways, and improved through the implementation group and consultation with patient groups and Health Oversight and Scrutiny Committees or Health Boards, are understood.

This process does not function when one or more individuals, often Consultant Surgeons, but also Chief Executives, dominate discussions and drive a different clinical agenda.

- Being part of change is better than having it imposed upon you, which is what will happen if people, or organisations, choose not to participate;

How would you explain to local patients that your system hasn't reorganised when others have and their patients are reaping the benefits?

4. Agree the clinical model

The first stage in the reorganisation process is to get agreement in principle over what you are trying to achieve within your network. This process must be informed by:

- Vascular Society of Great Britain and Ireland's Provision of Vascular Services (POVS 2015)
- Royal College of Radiologists and British Society of Interventional Radiology Provision of Interventional Radiology Services (POIRS 2014)
- NHS England National Vascular Service Specification (Specialised Vascular Services)

These documents set out how services must look both at the network arterial centre and at the non-arterial vascular centres:

- **The specification is the specification**, service specifications and POVS specify what happens in an arterial centre and what can take place in the non-arterial vascular centres, **there is no wriggle room.**
- **Sixty abdominal aortic aneurysm (AAA) repairs per annum** is the minimum for a vascular network. In published studies improvements in outcome are observed to around 100 AAA repairs per annum¹. In a small number of the least densely populated areas, such as Western Ireland, Mid and West Wales, the SW Peninsula and N Cumbria the minimum should be the standard. In densely populated (i.e. urban settings) commissioners should aim to develop networks with higher AAA volumes.

¹ Few UK units perform more than 100 AAA per annum, it's not known if improvement continues thereafter.

Establishing the site of the arterial centre

In some networks this may be an easy decision, for others this decision can derail the entire reconfiguration process. This is particularly the case when two or more arterial centres of similar size and volume are reorganising into a network model.

Remember that the patients come first and so, where everything else is equal, factors such as accessibility, 'fit' with other health system changes or geography may be determining factors.

5. Barriers to change

Due consideration must be given to the following four blocks to successful reconfiguration:

- **Vascular surgeons and interventional radiologists are loyal to their teams.** Consultants will often oscillate back and forth between the arterial centre and the non-arterial vascular centres, the nurses, radiographers, clinical vascular scientists and others with whom they have close long term relationships will be facing significant job changes. Everyone finds this hard;
- **Non-arterial work,** vascular surgeons, interventional radiologists, nurse specialists and vascular scientists may perform other, non-vascular, roles (e.g. clinical, educational or managerial). They will have formed close working relationships with colleagues in other specialities in their Trust, and not just within surgery and radiology;

These bonds can be painful to break, with some clinicians deciding to forego their arterial work.

- Lack of clarity in what the future might mean, experience suggests that this uncertainty about the future prevents change. It's the human things like the provision of a desk, somewhere to park and access to a secretary that make the difference;
- Perceived loss of status amongst the teams who move. Change can be highly emotive, when one vascular surgeon was asked "What would make it OK for you to work in another centre?" the reply was "If I wasn't made to feel like a loser when I went there".

6. Lessons learned

The following four lessons have been learned from talking to both individuals and teams who have been through a partial or complete reorganisation of services into a modern vascular network:

- **Be aware of the importance of 'status',** non-arterial centres will perceive themselves as having 'lost' their vascular service. Emphasise the detail of the service at these partner hospitals, e.g. being able to confirm that a vascular consultant will be available on weekdays and a vascular nurse specialist every day, together with continued input into the diabetic foot protection service, renal access and day case angioplasty (if this was offered before) can smooth the transition;
- **Acknowledge individual choices,** some people won't want to be part of the new network and that's their professional choice. The reality is that they can choose to be part of the new structure or they can develop non-vascular areas of practice. Sometimes resistance arises from a lack of familiarity with techniques or different ways of working. Consultant to consultant and/or team to team mentoring has been used to address this with good effect;

Continued resistance to the change won't stop it happening. The choices of one or more individuals must not outweigh the benefits to patients of a successful service reconfiguration.

- **Avoid inequality,** or any perception of differences or superiority, regarding vascular surgeons, interventional radiologists, specialist nurses or vascular scientists, who have always been based at the Trust providing the network arterial centre and staff who have been based at partner hospitals;

Over time, inequalities become a significant obstacle to developing an effective and sustainable network team. They should be avoided at all costs.

- **Accept help,** there is almost always a need for some significant organisational development input from an external source to transform disparate clinicians into a network team. One day is never enough but depending on the level of acrimony, the equivalent of one week might be.

7. Once the arterial centre has been identified

This may come early or late in the reconfiguration process. Either way it is an important milestone when the steering committee agrees the arterial site because work on pathways and protocols can then progress to final versions for sign off by the reconfiguration steering group:

- Standardise referral protocols into the arterial centre, together with the investigations and the capacity of the non-invasive imaging that is available in the non-arterial network hospitals. Inevitably there will be differences, but as far as possible try to get consistency for the sake of smooth, rapid transfer of patients. For example, we have often found great variation in the way diabetic foot services work in the partner hospitals or the investigations that can be undertaken in a non-arterial vascular site. None of this serves the patients well;

Start this work early because it can involve the partner hospitals in complicated, and occasionally difficult, negotiations with each other and with their CCGs.

This is also what is promised in patient and public consultation so it's important to deliver on it.

- **Agree repatriation ‘rules’** this can make or break the capacity of an arterial centre to deliver good, timely care and so again, needs early agreement. Usually this needs to be at executive level because of the implications it has on the wider functioning of all hospitals concerned;
- **Retain vascular nurse specialist posts**, losing any of these vital members of the vascular team will have a detrimental effect on the network. A specialist nurse presence in the non-arterial vascular hospitals is the glue that holds the network together. Amongst other things, they ensure timely review of internal requests for vascular opinions, that relevant investigations are performed and available and the smooth transfer of patients to and from the arterial centre;

It is equally important that nurse specialists spend time in the arterial centre to attend the multi-disciplinary team and management meetings, to maintain their expertise and to gain experience.

- **Vascular clinicians** should all be given the opportunity, and be encouraged, to become part of the new vascular network.

Vascular nurse specialists

In general, vascular nurse specialists will face a change in how they execute their role, but their jobs remain intact. They are still subject to significant change and this has challenges.

In common with other senior clinical staff they face

- A new management structure;
- An increase in time spent travelling to the arterial centre and non-vascular hospitals;
- New ways of working, such as review of inpatient referrals at non-arterial centre hospitals;
- The need to bring often disparate operational practices together across sites;
- The challenge of forming new relationships with a significantly expanded clinical team and across a number of clinical sites.

- **As far as possible, banish the divide between the arterial centre and the non-arterial vascular hospitals**, experience suggests that ideally all vascular surgeons and vascular radiologists who are part of the service and the out of hours’ rotas, should have their contracts held at the arterial centre;

When a vascular service is transferred between independent hospital Trusts, vascular clinicians will have their contracts moved by the legally binding TUPE (‘Transfer of Undertakings, Protection of Employment, Regulations’) process to the new single Trust provider. This may need to be a staged process, but if that’s the case, there should be a clear completion date.

- **New appointments should be by the arterial centre**, as this goes a long way to eliminate the divide and avoid perceptions of inequality. It encourages loyalty to a single provider – the named vascular network - rather than competing loyalties between partner Trusts;

Steering committees should consider how this may relate to the vascular nurse specialists and other clinical staff too. Networks in which contracts are retained in the non-arterial vascular hospitals will find it decreases the ability of the service to respond quickly and flexibility to changing service needs.

- **Centralisation encourages and ensures a single point of job planning** for consultants and vascular nurse specialists. It also encourages the organisation to hold the consultants accountable for planned clinical sessions;

There should be near parity in job plans for out-patient sessions, whether at the arterial centre or non-arterial vascular centre. The same is true for arterial centre theatre and angiography sessions and cross cover for study/annual leave or during the emergency week on call.

- **Be cautious about ‘transition arrangements’** especially if they are badged as a move to something along the lines of ‘one service delivered on two/three/four sites’. This option only pays lip service to the network model. Whilst a period of transition is essential for an orderly transfer of inpatient activity, extended transition proposals are dangerous. They are often argued to give the opportunity for ‘common protocols’ etc. to be developed prior to a move, but are ultimately a delaying tactic. In our experience, agreeing to a ‘transition period’ with no endpoint in sight means there are always reasons why the ‘shared protocol’ hasn’t been able to be produced in the time available, e.g. heavy on-call, delays in getting it through the approval boards in all institutions etc. Once these delays happen, if it’s been agreed that all these needs to be in place before the move, the move is put back;

Most importantly, whilst transition arrangements are going on, it does not bring any of the benefits of reorganisation to patients.

- **If faced with a ‘transition package’** ask yourself what will have changed in 2yrs, 3yrs or 5yrs – whatever the transition period suggested – that will make the shift ok when it isn’t now? The suggested timescales are rarely arbitrary. They are usually chosen by those who opposed the change and often correspond to the career change-over time of management/commissioning personnel with the subsequent loss of organisational memory;

The risk is that delay gives those opposing changes the opportunity to go back to square one, claiming things have changed and suddenly, you’re back into another review process.

- **Consider ‘buddying up’ key members** with their counterparts in a network that is up and running. There are few problems that you will encounter that haven’t happened before. A lot of time and anguish can be avoided by working with others who’ve been through the experience. Members of NHS England’s Vascular Clinical Reference Group are useful contacts.

8. Assuring success

8.1 *Managing aspirations, disappointments, people and personalities.*

A key role for not only the steering committee but for all concerned in managing the process of reorganisation is to understand the aspirations, disappointments, people and personalities involved:

- **A shared vision really does help**, people in successfully reorganised vascular services have an agreement on what they are trying to achieve. Their commitment is first to patient care within the population they serve, second the hospital, and third the individual’s own interest;

Knowing that everyone has accepted change which may not be to their own benefit builds trust.

- **Clinical leads must lead by example**, successful leaders go out of their way to accommodate their patients and their colleagues, whilst still maintaining the shared vision. They prove to be the impartial voice of reason. Their actions demonstrate that shared vision for the service, rather than just paying lip service to it. The on call and clinical commitments of clinical leads are no better nor worse than anyone else – neither is their office!
- **The network MDT process will almost always require change**, with non-confrontational, supportive membership as the norm. All consultants, whether originally from the hospital that is now the arterial vascular centre or from a non-arterial vascular hospital, need equal opportunity to attend and present their cases. There needs to be less of what in the past was characterised as ‘alpha male’ behaviour and more explicit demonstrations of support, particularly from the senior members of the team. Many of the junior/less experienced consultants use the MDT as a mechanism for helping with their decision making or even formulating their thoughts. This requires patience and support from the others with greater clarity or brevity of thought and word or to whom decision making comes more easily, usually because of time and experience;
- **There will always be the odd naysayer** or the outlier who feels themselves marginalised when all the other members of the network buy into the shared vision. Such individuals need to be offered encouragement and opportunity to get back in the fold or support to consider and take up other options. Experience tells us they often come around, even if partially and that makes a big difference. Or some leave which, for both the individual and the network, should be viewed an opportunity rather than a loss.

8.2 **Organising the network.** A new network will only work well if sufficient planning has gone into ensuring its function and organisation:

- **Networking arrangements are new** to vascular services and change is disruptive. Due consideration should be given to staff who must change to working in unfamiliar hospitals and working environments with new colleagues;

Another time, another place and it could apply to anyone.

- **Working across different hospital sites** poses challenges for staff. However, the obvious benefits in patient care, improved outcomes and work-life balance with sustainable on call rotas should overshadow the changes to established or historical practice, along with being part of a wider more supported organisation – the Vascular Network;
- **Cross cover arrangements** improve operating theatre and interventional radiology utilisation for the provider organisation. This ensures patients are treated in a timely manner on a vascular list. It also provides equity in theatre/angio. suite access for elective vascular lists for all interventional radiologists and vascular surgeons, whilst being recognised by the job planning processes;
- **Fair and equitable distribution of vascular sessions** at the arterial centre is important to all consultants in the network. Having fixed sessions at the arterial centre (e.g. theatre lists) with corresponding fixed sessions at the non-arterial vascular centre (e.g. outpatient clinics) is often best for job planning and ensures predictability;

Cross cover for consultant of the week / study / annual leave should be shared and offered equitably to all consultants in the network.

- **Outpatient facilities** need to be available daily at the arterial centre and at least twice weekly at non-arterial vascular centres to ensure access for the population served by the entire network;
- **Surgeons/Interventional Radiologists with non-arterial site commitments** during the day of the MDT may need the opportunity to discuss their patients first. Although everyone should have the MDT timetabled into their job plan, things can over run and it’s only polite to extend this courtesy to those who must travel afterwards;
- **On-call rotas** should consider a later start to the after-hours on call (6.30 – 7pm) to allow consultants to complete daytime commitments to the non-arterial vascular centres with time for handover from the on-call consultant of the week at the arterial centre;
- **Job plans** should also account for travel times between sites. Wherever possible, sensible job planning should avoid repeated daytime travel back and forth between sites at peak hours;

- **On-site support**, simple things such as suitable office space, access to IT systems and a computer together with a secretary both at arterial centre and non-arterial vascular centres should be mandatory. These arrangements are important for providing equality and should be a priority for the operational implementation group;
- **Parking arrangements** at both sites for consultants travelling back and forth are essential. Any priority parking permits should be available to all for the duration of on call;
- **Shaping networking alliances, rotas and working arrangements**, in many networks the vascular surgeons have taken a lead role in this aspect of designing the network. Often vascular interventional radiology has suffered in comparison. Vascular network structures must consider the needs of interventional radiology provision both at the arterial centre and at the non-arterial network hospitals.

There may already be a short-fall of interventional radiology support within some Trusts. Vascular reorganisation must not destabilise these services further. It is helpful if the vascular surgical networking arrangements support similar interventional radiology networking based on local policies.

10. Helpful contacts

The following have offered to help networks seeking assistance with reconfiguration:

Organisation	Contact details	
Vascular Society of Great Britain and Ireland (VSGBI)	Secretary	Sophie Renton Email: secretary@vascularsociety.org.uk
	Wales	Louis Fligelstone
	Northern Ireland Republic of Ireland	Denis Harkin Ciaran McDonnell
British Society of Interventional Radiology (BSIR)	Council	BSIR Council Email: council@bsir.org
Society of Vascular Nurses (SVN)	President	Nikki Fenwick Email: nikki.fenwick@sth.nhs.uk
The Society for Vascular Technology of Great Britain and Ireland (SVT)	President	Helen Dixon Email: h.dixon@nhs.net
NHS England Vascular Clinical Reference Group (Vascular CRG)	North	Michael Wyatt Trevor Cleveland Email: mike.wyatt@nuth.nhs.uk Email: trevor.cleveland@sth.nhs.uk
	Midlands and East	Arun Pherwani Paul Tisi Email: arun.pherwani@uhn.nhs.uk
	South	Lasantha Wijesinghe Marcus Brooks Email: marcus.brooks@nbt.nhs.uk
	London	Rachel Bell Alun Davies Email: rachel.bell@gstt.nhs.uk
Professor Rob Sayers (Chair) Email: Rs152@leicester.ac.uk		
Steven Duckworth (Commissioner) Email: steven.duckworth@nhs.net Tel: 0113 825 3050 Mobile: 07730 376516		
Claire O'Donnell (Public Health) Email: claireo'donnell@nhs.net Tel: 0113 825 2754 Mobile: 07825 282041		

9. Take home messages

Reconfiguration of services is never easy but those about to embark on a vascular reorganisation may find they have opportunities that were not available before. In England, the advent of the Sustainability and Transformation Plans (STPs) are heralding health service change on a scale not seen for some time. This fluidity may serve to remove what is perhaps the single most important barrier to reconfiguration, namely a misplaced institutional 'pride'.

An atmosphere in which the designated arterial centre is viewed as the 'winner' and the partner hospitals as the 'losers' can hold a vascular network back for years.

Conversely, a health economy in which there is simultaneous change in all providers across a range of services has a much better chance of creating an environment of evolution rather than revolution,

Reconfiguration is neither quick nor easy but the benefits to patients are now so apparent, that an unwillingness to tackle the difficulties can no longer be considered a justifiable stance for those involved in the delivery of health care.

12. Appendix C

The Venous Forum Pathway of Care for Venous Leg Ulcers

Summary

Chronic leg ulceration is an enormous cause of patient distress and expense to the NHS. The prevalence of leg ulceration is increasing and the vast majority of patients have an underlying vascular cause. All patients require specialist assessment and most would benefit from compression and venous treatment. Despite evidence-based NICE guidelines for referral and treatment, current service provision is poor.

Urgent action is needed to ensure that all patients with leg ulceration are offered current best practice.

The challenge

- Chronic leg ulcers are non-healing wounds, often occurring on the lower part of the leg and usually due to an underlying vascular problem (venous and/or arterial disease). Chronic venous hypertension is the most common cause of leg ulceration, accounting for >70%.
- Chronic leg ulcers often persist for many months and once healed, are at high risk of recurrence.
- With an aging and increasingly overweight population, the prevalence of chronic leg ulcers is widely expected to increase significantly.
- Often managed in community healthcare settings, patients with chronic leg ulcers may be reluctant to attend hospital.
- There is a perception among some healthcare professionals that because patients with leg ulcers are often elderly, they may be too frail for treatment. With modern, endovenous interventions, this is not true.

150,000

The number of people in the UK with active leg ulcers. A further 3-4 times as many are at high risk of developing an ulcer

Potential treatments

- All patients with leg ulcers should have an ankle brachial pressure index (ABPI) assessment to assess the arterial circulation. If the ABPI is normal (>0.9), compression therapy should be initiated.
- Patients should undergo specialist colour venous duplex assessment to look for treatable varicose veins, which are present in most patients with chronic leg ulcers.

- Treatment of varicose veins reduces the risk of ulcer recurring once healed and may improve the healing of some ulcers. The majority of varicose veins treatments are performed using minimally invasive endovenous interventions (such as laser ablation, radiofrequency ablation or foam sclerotherapy).

NICE guidance 2013

The NICE varicose vein guidance included very clear recommendations for patients with leg ulcers:

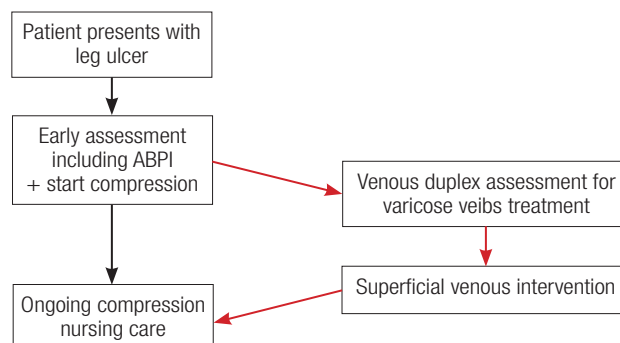
- Patients should be referred to a vascular service if they have a venous leg ulcer (a break in the skin not healed within 2 weeks) or a healed leg ulcer.
- Colour duplex scanning should be used to identify varicose veins and plan intervention.
- Patients with confirmed varicose veins should be offered thermal ablation (first line), ultrasound guided foam sclerotherapy (second line) or open surgery.

70%

The proportion of patients with leg ulcers who could benefit from minimally invasive varicose vein treatments.

Suggested patient pathway

- While the specific patient pathway will vary from region to region, most patients will present to primary care services.
- Early assessment of ABPI and initiation of appropriate compression therapy is strongly recommended.



- **As per NICE guidance, referral to local specialist Vascular services should be arranged, for appropriate assessment and treatment of underlying venous disease.**

12. Appendix D

The Vascular Patient and Vascular Conditions

Vascular services deal with disorders of the arteries, veins and lymphatics.

The Vascular patient will suffer from at least one of these conditions. The vascular service deals with all atherosclerotic arterial disease outside of the heart and brain. The national service specification for vascular services includes the treatment of the following arterial conditions: lower limb ischaemia; abdominal aortic aneurysm; stroke prevention (carotid artery intervention); venous access for haemodialysis; suprarenal and thoraco-abdominal aneurysms; thoracic aortic aneurysms; aortic dissections; mesenteric artery disease; renovascular disease; arterial/graft infections; vascular trauma; upper limb vascular occlusions; vascular malformations and carotid body tumours. In addition some less common arterial conditions not related to atherosclerosis, including arteritis and compression syndromes may require input from the vascular service.

Venous disease due to valvular insufficiency and thrombosis is an expanding part of the vascular workload with the development of more effective treatments for both superficial and deep venous insufficiency. Venous disease commonly causes lower limb swelling and ulceration. Lymphoedema leads to chronic limb swelling, pain and reduced mobility.

Cardiovascular Risk

Specific regional arterial problems present to the vascular service. However when assessing and treating the vascular patient they should be considered within the broad spectrum of cardiovascular disease (CVD). The underlying pathology is atherosclerosis (thickening, narrowing and occlusion of arteries) which can affect many parts of the arterial tree. Although a patient may present with a particular set of symptoms, it is important their treatment considers their CVD in general. This will include coronary artery disease, stroke, hypertension, hypercholesterolaemia, diabetes, chronic kidney disease, peripheral arterial disease, and vascular dementia. Lifestyle advice (stop smoking, lose weight, and take regular exercise) anti-platelet and lipid-lowering therapy, diabetes screening and blood pressure control are all required. There is clear evidence that this secondary prevention plays a major role in reducing the morbidity and mortality of atherosclerosis. This is consistent with the National Cardiovascular Disease Outcomes Strategy published in 2013.¹

The prevalence of CVD is set to rise related to an increasingly elderly population with increasing levels of obesity and diabetes. By 2022 the number of people at more than a 20% risk of CVD could rise from 3.5 million in 2010 to 4.2 million.¹ Vascular disease is the major cause of morbidity in diabetes and the risks of disease progression are higher. Over 40% of patients admitted under the care of the vascular team have diabetes.

Smoking is a major cause of vascular disease and over 80% of vascular patients are current or ex-smokers. Although there was a rapid decline in the proportion of smokers during the 1980s, when 39% of adults smoked, the rate of decline has slowed. Data from 2017 show that 15% of adults in England smoke with slightly higher rates in the other devolved nations.² Smokers are at greater risk of complications from vascular interventions because of cardiac and respiratory co-morbidity; in addition, the longer-term success of vascular intervention is reduced in patients who continue to smoke.

Peripheral Arterial Disease

Peripheral arterial disease (PAD) commonly affects the leg arteries with 20% of people over 60 years of age estimated to suffer with PAD. The symptoms are of cramping in the legs on walking, intermittent claudication (4% of patients > 60 yrs. of age) and 20% of these will deteriorate and develop critical limb ischaemia (CLI). NICE published their clinical guideline for PAD in 2012 CG147, updated in 2018,³ and the ESVS produced their guidelines in 2017.⁴

The NICE guidance made a number of recommendations. Information should be made available to patients explaining the condition, the risk factors, importance of life style changes and risk factor medication, treatment options, pain control and how to get support for depression and anxiety. Secondary prevention was again highlighted.

Once the diagnosis of PAD is confirmed, NICE advocate offering a supervised exercise programme to all patients with IC. There is evidence that the provision of this service varies across the country. NICE have identified this as a high priority area for quality improvement.⁵

The incidence of CLI in the UK is estimated at between 500-1000 patients per million population. A vascular unit serving a population of 800,000 will therefore expect to see around 350-400 patients with CLI per year. Patients with CLI are often referred urgently or as emergencies requiring admission and vascular intervention in an attempt to avoid amputation.

The number of vascular interventions for PAD performed in English trusts between 2009 and 2013 was published in the National Vascular Registry (NVR) annual progress report (Table 1).⁶ Endovascular procedures are under reported in the NVR, therefore we are dependent on HES data for activity (see table below), this demonstrates that endovascular procedures have increased 5% over this period, while the rates of surgery have fallen.

Table 1: Number of revascularisations relating to PAD in Hospital Episode Statistics (HES)

Year	Endovascular			Bypass		
	No. of procs	% bilateral	% elective	No. of procs	% bilateral	% elective
2009	16,249	9.22	74.90	3,860	5.34	62.51
2010	22,418	9.27	75.77	5,289	6.12	62.52
2011	24,066	9.34	76.24	5,258	5.78	64.19
2012	25,183	8.75	74.68	5,080	6.38	63.73
2013	25,605	8.24	72.92	5,194	6.29	61.25
2014	24,787	7.99	73.12	4,170	6.60	61.99
2015	24,098	8.13	71.72	4,417	6.02	61.91

NB: These are numbers of procedures, not numbers of patients. Please also note that the quality of coding on laterality in HES is not as good as it should be, so the proportions of bilateral procedures should be treated as rough estimates only.

For the OPCS codes used to define endovascular and bypass procedures, see NVR Progress Report 2014, Appendix 4.

Limb salvage interventions aim to avoid the large community healthcare costs of amputation which are greatly in excess of those following successful revascularisation.⁷ Many patients can no longer cope independently in the community after amputation and may require nursing home care.

It is likely that the great increase in the number of patients with diabetes over the next decade will have the biggest impact on vascular services. Many of these patients present as an emergency, and are at high risk of amputation. Prompt treatment of the infected diabetic foot and revascularisation, if required, can minimise the risk of subsequent amputation⁸.

Acute limb ischaemia (ALI) occurs when the circulation is suddenly reduced by an embolus (a clot, often from the heart) or thrombosis within the limb arteries. The pathology is therefore different to the gradual onset of limb ischaemia due to atherosclerosis seen in PAD. ALI presents as an emergency. It is more common in the elderly, and the rate of hospital admissions for ALI has risen significantly; 60.3/100,000 population in 1999, 94.3/100,000 in 2011.⁹ In some cases surgery to remove the clot is required, or the clot can be “dissolved” by thrombolysis, an endovascular approach. Despite the significant rise in the number of admissions for ALI in England, the number of interventions has not risen. More medical management may account for this. Of the interventions performed, endovascular procedures account for just 17% of the total.

Amputation

In 2010 the Vascular Society produced a Quality Improvement Framework (QIF) in an attempt to improve the care and outcomes for patients undergoing major lower limb amputation. There was an aspiration to improve patient information, pain control, rehabilitation, discharge planning and above all reduce high operative mortality rates. This was followed by a NCEPOD review of patients undergoing amputation in 2012-13. This reported in 2014.¹⁰ There remains room for improvement with many aspects of the QIF not being implemented in practice.

The specific challenges identified in the NCEPOD report into amputations were: lack of clinical pathways of care; lack of early support from diabetes and acute medicine for medical optimisation; need for improved rehabilitation planning coincident with the decision to amputate; more procedures to be undertaken on elective lists during working hours; no delays beyond 48hrs from the decision to operate; and for emergency admissions to be reviewed by a Vascular Surgeon within 12 hours.

A key recommendation of the NCEPOD report was that a best practice clinical care pathway supporting the aims of the QIF should be developed. Clinical benchmarks which can be audited via the NVR to monitor the care of patients undergoing major amputation have been developed. These benchmarks cover the principle areas of an updated QIF. Annual national reporting in the National Vascular Registry¹¹ for amputation outcomes will be used to drive up the quality of care for patients undergoing amputation.

Abdominal aortic aneurysm

An abdominal aortic aneurysm (AAA) occurs when the wall of the abdominal aorta weakens and stretches, caused by atherosclerotic degeneration. AAA are commoner in elderly men. The more the aorta dilates, the weaker it gets, increasing the risk of rupture. Rupture of an aneurysm into the abdominal cavity is fatal if untreated. Emergency open or endovascular repair is the only possible treatment. The in-hospital mortality remains high at 30-40%, total overall mortality (including prehospital deaths) is about 85%. A national screening programme is now in place in order to detect AAA's prior to rupture.

Screening for AAA

The NHS AAA Screening Programme is based on the MASS randomized trial.¹² The service specification is available on-line.¹³ Men aged 65 all receive a written invitation to a single ultrasound scan. Men with a small or medium AAA (3-5.4cm diameter) are offered regular ultrasound surveillance. Men with a large AAA, or expansion >1cm in 1 year, are referred to an accredited vascular service for investigation and consideration of treatment. There are access standards for initial outpatient appointment (2 weeks) and intervention (8 weeks from referral) that are monitored as part of the NAAASP QA process.

The introduction of NAAASP has required the formation of local screening units based on a minimum population of 800,000.¹⁴ Men with a screen-detected AAA may only be referred to a vascular service that meets the VSGBI Quality Improvement Framework standards, and have been through NAAASP pre-implementation quality assurance. Local screening programmes are managed by the national screening team, but each service has a programme board, usually chaired by a representative of the local specialist commissioning team.

Population screening for AAA in men by ultrasound scanning has been shown to reduce disease-specific mortality by about 50% in a meta-analysis of the existing randomised trials.¹⁵ It remains cost effective at current prevalence rates, and despite the increasing cost of interventions. Since April 2013, all men aged 65 in England are offered an invitation for ultrasound screening for AAA. Similar screening programmes are also operating in Wales, Scotland and Northern Ireland.

AAA Repair

Elective repair of AAA is one of the main functions of a vascular unit. The volume of elective procedures will increase due to early detection through the NAAASP, whilst the number of operations for rupture should gradually decline. Although some elderly patients will not be suitable for operative repair many are relatively fit and request intervention, particularly if suitable for endovascular repair. The ESVS have produced guidelines for the management of AAA, updated in 2018¹⁶. The Society of Vascular Surgery have also updated their guidance¹⁷. NICE guidance for the management of AAA will be published in December 2018.

Elective or emergency open surgery to repair an AAA is a major operation with a significant morbidity and mortality and requires adequate critical care facilities. There is no significant survival advantage to be gained from surgery to most aneurysms below 5.5 cm in diameter as the risk of rupture is less than the risk of open surgery.¹⁸

An alternative treatment in selected cases is endovascular aneurysm repair (EVAR) using a covered stent graft introduced from the groin, an operation that is less stressful for the patient. Not all patients have an aneurysm that is anatomically suitable for EVAR using current technology, but this is a fast moving field. NVR data shows that 70% of AAA repairs in 2016 were by EVAR.¹⁹

EVAR has not been shown to reduce overall mortality after four years compared to open repair in randomised trials. Nevertheless, there are short term advantages in reduced early mortality, length of hospital stay and improved quality of life.²⁰ Issues of long term durability and cost remain challenges. In December 2018, NICE will be updating their guidance on AAA management and will not be recommending EVAR for elective AAA repair except for specific indications. However the Vascular Society believes patients need to be given a choice. Fitter patients with a good life expectancy should be offered open surgical repair. Where concern exists about fitness for open surgery, a full anaesthetic review with input from an experienced Vascular Anaesthetist is required. The MDT discussion should be part of the decision making process. Patients need to be fully counselled with regards to their treatment options. For patients medically unsuitable for open surgery, the decision to offer EVAR or no intervention requires careful consideration. Patients with limited life expectancy and significant co-morbidities may not benefit from intervention. Co-morbidities should be medically optimised with referral to the relevant speciality as required. However, where the responsible physician and patient decide no intervention is not in their best interests, EVAR should be offered.

EVAR is recommended by NICE for ruptured AAA repair in some patient groups.²¹

Thoracic aortic aneurysms can also be treated by EVAR. Open repair is associated with significantly higher morbidity and mortality. Isolated aneurysms of the descending thoracic aorta are technically easier to stent. When the ascending aorta and aortic arch are involved a staged or combined procedure with cardiothoracic surgical input may be required. However, endovascular techniques for stenting into the arch are being developed but are more complex.

Complex Endovascular Aortic Aneurysm Repair

In some cases the endovascular repair of an aortic aneurysm involves preservation of branch vessels with fenestrated and branched devices. In particular the renal and visceral branches may be involved in the aneurysmal disease. The great vessels from the aortic arch may also be preserved with similar endovascular technology. These cases are more complex than most infra-renal EVAR procedures. The NHS Clinical Commissioning Board published a policy on Complex endografts in 2013.²² This policy is due to be updated in 2018/19. It is likely that these more complex EVAR procedures will need to be centralised to a smaller number of centres where expertise can be achieved through sufficient case numbers.

The policy applies to the use of fenestrated and or branched endovascular stent grafts, whether custom made, off the shelf, or modified at the time of operation. The recommendations focus on the careful selection of patients for these procedures in order to maximize cost effectiveness. Units providing this service should be experienced in these complex techniques and the recommended annual caseload is 24-30 cases. Incidence estimates suggest that these units will serve a population of 2.4 – 3 million. These arterial centres should therefore be highly specialized, taking tertiary referrals for this type of workload. Named endovascular surgeons and interventional radiologists should be identified as a team specializing in this type of work. The centre should have a MHRA compatible intervention suite / hybrid theatre or advanced plans to introduce such facilities. The policy makes provision for these centres “hosting” visiting vascular teams from other units, with the aim of maintaining and disseminating the skills for these procedures. Should their use become more widespread then there would be scope, in the future, for more units to provide this service.

NICE have recommended complex EVAR only as part of a randomised controlled trial in their consultation on AAA management in 2018.²¹

Carotid Artery Intervention

Stroke prevention is a priority for the Department of Health. A small number of patients who suffer a stroke will have had warning symptoms from a transient ischaemic attack (TIA) or temporary blindness (amaurosis fugax). These symptoms can be caused by embolization from a ruptured plaque in the carotid arteries. There is good evidence that patients with symptoms and a >50% stenosis have an increased risk of subsequent stroke²³. This excess risk can be reduced by carotid endarterectomy (CEA). The maximum benefit is seen in patients with 70-99% stenosis, where the number needed to treat (NNT) to prevent one stroke is about five.²⁴

Recent research suggests that the risk of stroke is highest soon after the onset of symptoms and that the quicker CEA is done, the greater the reduction in the risk of subsequent stroke. NICE guidelines advocate surgery within 14 days of symptoms.²⁵ Meeting these timelines is a challenge for many units, requiring the development of new referral and diagnostic pathways, and close co-operation with stroke physicians and neurologists.²⁶ The time to surgery and the mortality and morbidity associated with CEA are all published as part of the national outcomes programme from HQIP using data from the NVR.

An alternative to CEA is carotid artery stenting (CAS), which does have potential advantages over carotid endarterectomy (no incision, no risk of cranial nerve injury). Randomised trials however have concluded that the 30-day stroke and death rates were significantly lower following CEA compared to CAS.²⁷

Recommendations may change as the results of further trials become available, but at present CAS should normally be performed as suggested by NICE guidance.²⁵ The risk of stroke arising from technical complications during carotid stenting means that it should only be undertaken by those trained and experienced in this type of intervention. Centres performing high volumes of stenting with low audited procedural complications may continue to treat patients on an individual case basis.

Intervention for patients with asymptomatic carotid artery stenosis >75% is somewhat controversial. A small proportion of these patients are at significant risk of stroke and benefit from intervention but identifying this small subgroup is difficult with current standard imaging modalities. See ESVS guidelines.²⁴

Normal risk patients with an asymptomatic carotid stenosis should not currently undergo carotid stenting unless as part of a controlled trial. Data from on-going trials of asymptomatic patients are awaited.

Haemodialysis Access Intervention

Patients undergoing haemodialysis require regular access to the circulation to allow withdrawal and return of blood so that it can pass through a dialysis machine at a rate of at least 300ml/min. This can be achieved using a double lumen central venous catheter in the short term, but long term catheter use is associated with increased infection, higher mortality and central venous stenosis or thrombosis. Central venous catheter use should be minimised. Formation of an arteriovenous fistula, preferably in the non-dominant arm, before the anticipated need for renal replacement therapy is the ideal.

Approximately 70 patients per million population start haemodialysis in the UK every year. These new access procedures plus revisions generate an annual workload of 100–130 operations per million population.

Most patients can be operated on under local anaesthesia and many of the operations can be performed as a day case procedure. In addition, there is a need for up to 2 IR sessions per week per 100 patients on dialysis for preoperative imaging, postoperative surveillance and for percutaneous angioplasty or thrombectomy of failing or thrombosed AV fistulae and grafts.

Involvement of vascular surgeons in access surgery has increased as more peripheral dialysis units are opened outside transplant centres and their involvement is fundamental to provision of expedient dialysis access. There is a considerable under-provision of vascular access surgery in the UK, resulting in long waiting times for definitive vascular access and a much higher proportion of patients starting and continuing to dialyse on a central venous catheter compared with other European countries and Japan. Vascular surgeons should work with their local nephrologists to ensure sufficient outpatient assessment and surgery is available to patients prior to starting dialysis.

The Vascular Society recommends that patients receive vascular access surgery from any competent practitioner. In larger centres this may be a transplant service, but where none exists, or local skills demand it, vascular surgeons should be willing to provide this service. Surgeons providing vascular access, need this included in their job plans, to ensure that the service is properly resourced. Dedicated operating list space needs to be provided to ensure that provision of this service is not squeezed by the demands of more immediately life threatening vascular cases. Lists in non-arterial centres can be used for A-V fistula procedures. When there is a dialysis unit in a non-arterial centre the level of input from the visiting vascular service should be increased in order to ensure adequate cover for the additional workload generated by access procedures.

Surgeons providing vascular access services should audit their performance to ensure that it meets acceptable standards.

Venous disease

Although rarely a threat to limb or life, chronic venous disorders represent a significant component of the workload of a modern vascular unit. The expert assessment and treatment of patients with acute and chronic venous conditions should be considered a core service.

Varicose veins are one of the most common reasons for referral to a vascular service. Recent NICE guidance has stated that patients with symptomatic varicose veins should be offered intervention, in addition to patients with complicated venous disease.²⁶ This may result in an increase in numbers of patients referred and offered varicose vein treatments. In compliance with NICE recommendations, a vascular service should have ready access to colour duplex imaging as the first line investigation of venous disease. The vascular service should be able to offer a range of superficial venous interventions, including an endovenous thermal ablation procedure, ultrasound guided foam sclerotherapy and traditional surgery (including phlebectomies). Ideally, units should be able to offer concomitant endovenous thermal ablation and avulsions in appropriate patients.

In recent years, vascular surgical departments have become increasingly involved in the management of acute deep vein thrombosis (DVT), particularly ilio-femoral and upper limb DVT. Catheter directed or pharmaco-mechanical thrombolysis procedures are increasingly recognised as having a role in some patients to reduce post thrombotic syndrome severity.²⁷ These interventions should now be offered by departments with the necessary multidisciplinary skill mix and appropriate specialists. Close working between vascular surgery, haematology and acute medicine is now required to deliver the best outcomes to patients.

Endovascular and open procedures for the management of chronic deep venous occlusive disease should only be offered by specialist centres with specialists trained in these complex procedures.

With an ageing and increasingly overweight population, the incidence of chronic venous ulceration is expected to increase significantly. The recent EVRA trial has demonstrated that early endovenous ablation of superficial reflux in patients with venous ulcers results in better rates of healing than compression therapy alone and is cost effective.²⁸ Vascular units should manage these patients in an appropriate multidisciplinary setting, with the specific involvement of specialist nursing staff trained in the assessment and treatment of leg ulcers. Services should offer appropriate vascular assessment, be able to deliver compression therapy and provide timely assessment and endovenous ablation of superficial venous reflux.

Lymphatic Disorders

Patients with impairment of the lymphatic drainage develop chronic leg swelling (lymphoedema) and are at increased risk of infection in that limb. Most patients can be treated with a combination of massage and compression bandaging, but surgery is occasionally needed in severe cases. Appropriate conservative management from specially trained nurses is commonly available only in oncology centres, but they will often not accept external patient referrals unless their lymphatic obstruction is due to cancer. This continues to be an area of serious under-provision in the NHS and vascular specialists should develop local arrangements with their oncology colleagues for the effective management of patients with lymphoedema. Only a small number of patients develop such severe limb swelling that they require surgical treatment, which is appropriately provided only in a few specialist centres.

Other conditions requiring vascular care

Rarer conditions that require a vascular specialist include mesenteric artery disease, renovascular disease, arterial/graft infections, vascular trauma, upper limb vascular occlusions, vascular malformations and carotid body tumours. All can be successfully treated by surgeons and/or interventional radiologists with appropriate training/experience and in units with adequate back up.

Vascular specialists should be readily available to assist colleagues from other specialties in the advent of unexpected vascular trauma. This may either be at the arterial centre or in a non-arterial hospital within the network. Protocols must be in place to ensure 24/7 availability of the vascular team for the immediate treatment of patients suffering iatrogenic vascular trauma. This will be more challenging when it occurs at a non-arterial site and arrangements should be in place for the transfer of vascular instruments and grafts when necessary

Vascular surgeons may also undertake transthoracic endoscopic sympathectomy, a procedure that can alleviate symptoms of hyperhidrosis or severe peripheral ischaemia in the hands. They also perform thoracic outlet surgery to alleviate upper limb neurological symptoms, to prevent recurrent axillary vein thrombosis and to minimise the complications associated with occlusive and aneurysmal subclavian arterial disease.

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12. Appendix E

Specialist Vascular Training Units

Vascular training is provided in specialist units with surgeons who are in dedicated vascular practice. They also need to have been trained as educational and/or clinical supervisors and be registered for the Intercollegiate Surgical Curriculum Programme (ISCP). Vascular surgery units who wish to provide training must demonstrate (1) a high volume of work, (2) outcomes in line with national defined standards and (3) a consultant rota which provides a sustainable 24/7 emergency surgical and IR service. Consultants should not have any elective commitments when on-call. The rota may be supported by non-consultant career grades (Associate Specialists, Staff Grades & Clinical Fellows).

Most vascular training units have insufficient specialty trainees to provide middle-grade cover, especially at night. There will be only approximately 150 vascular trainees in the UK, because a ratio of 1 trainee to 3 consultants is required to conform to workforce planning requirements. The timetable for vascular trainees from ST5 upwards should maximise their supervised elective and emergency vascular experience. Shift-working will not deliver this experience. Alternative arrangements such as on-call from home, or long-day rather than night working are required.

If there are more approved training places than trainees, placements will be allocated on the basis of the quality of training and outcomes. However, popular units must ensure that there is sufficient capacity for each trainee.

Specialist vascular units should have an elective and emergency vascular workload that provides sufficient supervised experience for trainees to achieve the expected competencies for their level of training. Trainees should work within a team with one assigned educational supervisor and at least 2-3 clinical supervisors during a year to ensure adequate supervision and experience. If there is more

The volume of work should be sufficient to achieve outcomes in line with national standards for all index procedures (Open AAA repair, EVAR, carotid endarterectomy, infra-inguinal bypass, major amputation, arterio-venous fistula and varicose veins). Whenever possible, all elective and emergency procedures (part or whole) should be performed by a trainee under consultant supervision, if a trainee at the appropriate level is available. Sufficient elective and emergency experience cannot be delivered by shift-working.

A UK training unit should be recognised by the UK NHS AAA Screening Programme as an AAA treatment centre. A dedicated vascular hybrid interventional suite with high-quality fixed imaging equipment, theatre-specification room with adequate radiation protection, full anaesthetic facilities and trained staff should be available. Detailed requirements of this have been published by an Expert Vascular Advisory Group in association with the MHRA.

Dedicated wards for vascular patients are required, with nursing staff experienced in looking after these patients. The unit should also have dedicated vascular outpatient clinics at least twice a week, with links to diabetic foot clinics and other specialties such as IR and stroke-prevention, plus vascular access clinics.

24/7 access to ITU, HDU and post-operative care facilities are essential. There should be access to a CEPOD theatre during daytime/evening hours to avoid delays for patients who require urgent intervention.

In addition, a 24/7 vascular emergency rota and 24/7 access to on-site diagnostic and interventional vascular radiology facilities are required, including digital subtraction angiography, spiral CTA and MRA. Units should also provide regular exposure for vascular trainees in axial imaging and IR, appropriate to their level of competence and subspecialty ambitions. Trainees should be able to access non-invasive vascular ultrasound facilities, with accredited clinical vascular scientists or sonographers, and regular sessions for vascular trainees to obtain experience in duplex ultrasound.

Weekly MDT's with nursing staff, physiotherapists, occupational therapists, interventional radiologists and relevant physicians (anaesthetists, cardiothoracic surgeons, diabetologists, nephrologists, stroke physicians) are essential.

Outcome data should be recorded or audited independent of the clinician who performed the procedure, and all index data should be submitted to the NVR. A climate which encourages clinical audit, research and participation in relevant multicentre randomised clinical trials is encouraged.

Consultant clinical supervisors should be registered with the ISCP, maintain a CPD portfolio and be trained in assessment and giving feedback. Educational Supervisors should have completed their School of Surgery/Deanery training requirements and should have allocated SPA time for supervision of trainees. Clinical Supervisors must have time for teaching in outpatients, on ward rounds and in the operating theatre.

There should be access to a procedural skills centre with appropriate facilities to allow trainees to achieve adequate competence on simulators before treating patients, according to the national framework for simulation training. Adequate provision must be in place for attendance at regional training courses and/or funding to permit trainees to attend the ASPIRE programme and the key national courses recommended in the vascular curriculum.

13. List of Abbreviations

AAA	Abdominal Aortic Aneurysm
AKI	Acute kidney injury
BSIR	British Society of Interventional Radiology
CAS	Carotid artery stenting
CCT	Certificate of Completion of Training
CEA	Carotid endarterectomy
CTA	Computerized Tomographic Angiography
DoH	Department of Health
DVT	Deep venous thrombosis
EVAR	Endovascular aneurysm repair
EWTR	European Working Time Regulation
FEBVS	Fellowship of the European Board of Vascular Surgery
FRCS	Fellowship of the Royal College of Surgeons
HDU	High dependency unit
HES	Hospital Episode Statistics
IR	Interventional radiology
ITU	Intensive care unit
MDT	Multi-disciplinary team
MRA	Magnetic Resonance Angiography
NAAAASP	National Abdominal Aortic Aneurysm Screening Programme
NCEPOD	National Confidential Enquiry into Peri-operative Deaths
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NNT	Number needed to treat
NVR	National Vascular Registry
PACU	Post-anaesthesia care unit
PAD	Peripheral arterial disease
RCR	Royal College of Radiologists
SAC	Specialty Advisory Committee
ST3-8	Specialty training years 3-8
SVN	Society of Vascular Nurses
SVT	Society for Vascular Technology of Great Britain and Ireland
TAAA	Thoracoabdominal aortic aneurysm
TEVAR	Thoracic endovascular aneurysm repair
TIA	Transient ischaemic attack
UK	United Kingdom
VASGBI	Vascular Anaesthesia Society of Great Britain and Ireland
VM	Vascular malformation

Notes

Notes



VASCULAR
SOCIETY

Tel: 020 7205 7150

Email: admin@vascularsociety.org.uk

Website: www.vascularsociety.org.uk