THE PROVISION OF VASCULAR SERVICES 2004

Vascular Surgical Society of Great Britain and Ireland

Approved at the AGM of the VSSGBI, Glasgow November 2003
Review date 2008

THE PROVISION OF VASCULAR SERVICES 2004

Contents:

Working Group:

Peter Lamont (Chairman), Consultant Vascular Surgeon, Bristol

Andrew Bradbury, Professor of Vascular Surgery, Birmingham

Hector Campbell, Consultant Vascular Surgeon, Wishaw, on behalf of the Scottish Office

Jonathan Davies, Consultant Vascular Surgeon, Truro

Chris Gibbons, Consultant Vascular Surgeon, Swansea

George Hamilton, Professor of Vascular Surgery, London

John James, previously Chief Executive Kensington & Chelsea and Westminster Health Authority, on behalf of the Department of Health

The Working Group are very grateful to the members of the VSSGBI, Council Members and Vascular Advisors who contributed information, feedback and advice during the revision of this document.

Peter Lamont, December 2003

THE PROVISION OF VASCULAR SERVICES

The aim of the Vascular Surgical Society of Great Britain and Ireland (VSSGBI) is to promote the best possible care for vascular patients. The Society produced a pivotal document in 1998, which described the essential components of a vascular service and which proved extremely useful to members of the Society when developing their local vascular services[1]. Various new developments in the way vascular surgeons work have evolved since the previous document was published. These developments have been stimulated in part by reforms of the training grades, by the European Working Time Directive, by the evolution of vascular emergency services, by developments in vascular interventional radiology and by discussions about new Consultant contracts. This revision of the original Provision of Vascular Services document is written with these developments in mind.

1. Summary

This document sets out the principles by which individual patients might obtain access to high quality vascular surgical services for both elective and emergency care.

1.1 Vascular services exist to treat patients with disorders of the arteries, veins and lymphatics. Patients with these disorders should expect to be cared for by a vascular specialist with a thorough understanding of their condition, who is able to organise all appropriate investigations and treatment, including lifestyle advice, drug therapy, interventional radiology and surgery.

1.2 Pressures for change in the way vascular services are delivered should be driven by patient outcomes. Poor patient outcomes in vascular disease include unnecessary deaths, strokes and limb amputations. These devastating outcomes are minimised by the presence of a locally available, specialist vascular service dealing with high volumes of such cases. Preventing these outcomes is a more cost-effective solution to the Health Service than the lifetime of care in the community that many of these patients would otherwise require.

1.3 This document explains the nature of vascular diseases and how their incidence and management are evolving. The development of new interventional techniques has occurred in the face of a shortage of practitioners trained to deliver them. This issue is driving pressures for change in the way vascular specialists are trained so that they can develop the necessary surgical and radiological skills to deliver both open surgical and endovascular treatments in the future.

1.4 Non-vascular generalist surgeons and radiologists no longer have the necessary skills to deal with vascular patients and produce demonstrably worse outcomes. In many hospitals generalists are still used to back-up the vascular service by providing out-of-hours emergency cover, but are rightly withdrawing this service on clinical governance grounds. Vascular services need to be re-configured to respond to this issue. There is an imbalance between the number of vascular specialists needed to run an elective service and the number needed to provide a 24 hour, seven day a week emergency on call rota.

1.5 The 1998 VSSGBI document encouraged centralisation of vascular services from adjacent hospitals onto a single site as a way to address the above imbalance between elective and emergency provision of vascular services. This strategy has so far proved unworkable in many areas, although there have been a few notable successes in large city conurbations. Many adjacent services have now started to collaborate in clinical networks instead, which are proving a safe and workable alternative. Such collaborations may in time facilitate the development of centralised services as adjacent units realise the advantages of working together more closely. This document outlines the different types of clinical network and describes the essential components of an effective vascular service.

1.6 Vascular services are not supported by a National Service Framework and so must work within existing resources to improve equality of access for patients to improve treatment outcomes. There is strong evidence of inequalities in patient outcomes according to the patient's geographical area. Poorer and often more costly outcomes occur where the patient does not have access to a vascular specialist opinion at their local hospital. Clinical networks with out-reach clinics offer a potential low-cost solution to this problem.

1.7 Patients should be able to obtain a specialist vascular opinion through out-patient clinics at their local hospital. Without this service patients are often managed in primary care rather than being referred to a more distant hospital, until such time as they either die, have a stroke or develop a gangrenous leg. In hospitals which cannot provide a comprehensive, high volume vascular service, a vascular surgeon from an adjacent hospital with such a vascular service should travel across to provide local specialist vascular clinics and in-patient consultations. After suitable assessment, patients may then transfer to the adjacent hospital to access investigative facilities, endovascular interventions, major surgery or emergency services.

2. Introduction

2.1 This document sets out the principles by which a 24 hour, high quality, Consultant led vascular service might best be provided to deliver optimal patient care.

2.2 The document is intended to assist those responsible for the provision and resourcing of health care. Potential mechanisms for the development of existing resources are discussed, which balance the needs of patient access with the provision of comprehensive vascular surgical services.

Current Problems and Pressures for Change

2.3 Both arterial and venous diseases are common in the community and their incidence and severity increase with age. An increasingly elderly population puts demands on the Health Service in every locality, large or small. Vascular surgery is concerned with the prevention of:

- Cardiovascular and cerebrovascular disease
- Death from ruptured abdominal aortic aneurysm
- Stroke due to carotid artery disease
- Lower limb amputation from peripheral arterial disease
- Venous ulceration in the lower limb

2.4 Vascular surgery in the UK and Ireland has emerged as a specialty from a background in General Surgery. The majority of members of the VSSGBI are general surgeons with an interest in vascular surgery rather than specialist vascular surgeons. The proportion of the latter is steadily rising and changes in surgical training will continue this trend as younger surgeons will not have sufficient experience outside vascular surgery to offer a general surgical service.

2.5 The demands of the 48 hour European Working Time Directive mean that trainee surgeons will have much less exposure to emergency general surgery than has been the case in the past. Daytime training in elective surgery will also be restricted and it will be difficult for trainees to obtain competence in more than one specialty area within general surgery in the time available. Patients now expect to be treated by a surgeon with specialist knowledge and experience of their condition. This demand cannot be met in any one specialty area of general surgery by a surgeon whose only experience in that specialty area has been a single year as a year 1-3 SpR.

2.6 SpRs who have not done Higher Specialist Training in vascular surgery no longer have sufficient experience to offer an emergency vascular service within the umbrella of a general surgery emergency take. Newly appointed consultant general surgeons without a vascular interest are no longer equipped to deal with vascular emergencies and rightly refuse to take them on[2]. This simple clinical governance issue has created an enormous pressure for change in the way that emergency vascular services are delivered, let alone the evidence that vascular surgeons achieve the best outcomes in this area.

2.7 As vascular surgeons become more specialised, they too become de-skilled in other areas of general surgery. This lack of elective practice also creates governance pressures on vascular surgeons to withdraw from the general surgery emergency rota as they instigate separate vascular emergency rotas. Non-vascular general surgeons should appreciate that their vascular colleagues cannot run a separate vascular emergency service without withdrawing in part or in whole from the general surgery rota in order to maintain equality of on call commitments.

2.8 There is a shortage of vascular interventional radiologists and most hospitals with a vascular service have only one or two vascular radiology Consultants, insufficient to provide 24 hour, seven days a week emergency cover for vascular patients. Emergency vascular radiology demands skills which cannot be provided by non-vascular radiologists and so the range of diagnostic and therapeutic options available to vascular patients out of hours is limited. Just as for surgeons, it is difficult for vascular radiologists to withdraw from their general radiology emergency duties to provide specialist vascular cover in a clinical network[3].

2.9 There has been little centralised strategic planning in the way vascular services are purchased and delivered. The recommendations of the previous Provision of Vascular Services document regarding coalescence of adjacent vascular services onto a single site[1] have proved impossible to achieve except in a handful of larger conurbations where existing services had already been in close proximity to each other. Moving surgeons and facilities into a different hospital has not proved easy. Hospitals within a single Trust have difficulties in rationalising vascular services on a single site, let alone hospitals in separate Trusts. Either the vascular surgeons themselves cannot agree on the best configuration or their colleagues may not want to lose their local vascular service. It can be difficult also for the selected hospital to offer the necessary accommodations that such reconfigurations demand in terms of space, equipment and resources.

2.10 The responsibility for purchasing vascular services has now moved into the hands of Primary Care Trusts (PCTs). Many of these PCTs currently lack experience in the issues surrounding configuration of hospital services and are unlikely to introduce radical changes whilst they lack a full understanding of the potential benefits. PCTs are also rightly more concerned with the provision of hospital services within their own patch rather than within a wider geographical area. The Strategic Health Authorities must play a major role in any reconfiguration of vascular services where more than one PCT is involved, in order to overcome these problems.

2.11 The Department of Health has identified Cancer and Cardiac Services among the highest priorities for improvements in health care, and has provided additional resources for their development. Diabetes too is the subject of a National Service Framework. Vascular services are among the many other specialty areas in which any developments will have to be funded from existing finite mainstream resources, as there is little likelihood of a Vascular National Service Framework to provide additional investment. Vascular services have a major role in the salvage of life and limb and in the prevention of stroke and are of key importance for the very large numbers of patients who suffer from vascular disease, many of whom also have heart disease or diabetes. Paradoxically the benefit from investment in service development to treat one condition may be erased by lack of investment in the other. It is therefore important that the NHS should consider the requirements of vascular services as part of its development of heart and diabetes services.

2.12 The provision of an effective vascular service is relatively expensive. Vascular units have high bed occupancies and some of the patients may need prolonged hospital stays, particularly in centres where rehabilitation and community services are not readily available to take over the care of amputees or elderly patients. The surgery is technically demanding and consumes a lot of theatre time with significant demands on ITU/HDU facilities. There is a need for expensive and sophisticated interventional radiology facilities with experienced vascular radiologists and there is a need for vascular technology equipment and personnel. Replicating these facilities in adjacent hospitals is not cost effective, but must be balanced against issues of equality of patient access and patients' aspirations for a local service.

2.13 Patients who need emergency intervention are normally willing to travel to obtain appropriate vascular specialist care but provision of a local vascular service is important to achieve equality of patient access to the full range of elective care. There is evidence of a geographical variation in terms of volumes per capita of carotid and lower limb bypass surgery according to the level of local vascular services. Patients are more likely to undergo conservative management or amputation in hospitals with low volumes of vascular surgery rather than be transferred to adjacent high volume hospitals to access carotid or limb salvage surgery[4-8].

2.14 Every patient in the country should have the opportunity to consult with a specialist vascular surgeon at his or her local hospital[9]. It is not appropriate or practical to provide the full range of vascular surgical facilities on every hospital site. Hospitals with low volumes of vascular surgery achieve worse outcomes10-15 and in these circumstances the vascular surgeon should only offer out-patient services at the patient's local hospital and provide in-patient care at an adjacent higher volume hospital. Only after a full discussion with the vascular surgeon will the patient be in a position to make a fully informed judgment regarding the need to transfer to an adjacent hospital to access such specialist facilities. The vascular surgeon will also be in a position to educate local hospital and GP colleagues of the benefits to their patients that such transfers might offer. The provision of a local vascular presence can also help to alleviate concerns from Consultant colleagues in other specialties who depend on special relationships with vascular surgery.

2.15 In the absence of limitless resources a compromise must be achieved between local access and the delivery of specialist care. Vascular surgical outcomes are volume dependent[4], and better outcomes can be achieved in hospitals with a high throughput of vascular patients[10-15]. There needs to be a balance between the manpower, capital and other resources needed to provide an effective service with the demand per capita of that service. The driver for that balance must be the achievement of the best possible outcomes for individual patients.

3. The Nature of Vascular Services

3.1 Vascular services deal with disorders of the arteries, veins and lymphatics. Although related in some areas to cardiac surgery, the two services are quite separate and their training and expertise differ.

3.2 A majority of the patients referred to a vascular surgeon by their GP with diseases of their arteries do not require surgical treatment. Many require simple reassurance and lifestyle advice (stop smoking, lose weight, undertake regular exercise) coupled with measures to reduce their future risk of heart disease and stroke (aspirin and lipid-lowering therapy, blood pressure control). Some will require further investigation by vascular technologists or radiologists with a view to interventional radiology treatments such as balloon angioplasty or stenting. Only a small proportion will require surgery.

3.3 The medical management of peripheral vascular disease is provided in most hospitals by vascular surgeons. Access to interventional radiology also occurs through referral from vascular surgeons in most centres, as vascular radiologists do not normally offer out-patient consultations. It is important for surgeons to be involved with the care of these patients in case they need surgery for radiological complications. Increasing numbers of vascular surgeons are undertaking interventional radiology procedures themselves, in the emerging field of endovascular surgery.

3.4 Vascular services are ideally provided by multi-disciplinary teams. Vascular nurses and nurse consultants can provide claudication, diabetic foot and lifestyle advice clinics as well as managing dedicated vascular wards with special expertise in wound and ulcer care. Vascular research nurses play an important role in research and audit. Physiotherapists offer supervised exercise classes for claudicants and rehabilitation to amputees, where they work closely with limb fitting services. Occupational therapists assist in the return of amputees to the community. Vascular technologists offer diagnostic services and post-operative graft surveillance. Radiographers and radiologists offer diagnostic and interventional radiology. Vascular surgeons undertake surgical management and usually offer an overall co-ordinating role.

3.5 Patients are better cared for by specialist vascular teams than by general surgeons without a vascular interest. Specialist vascular teams achieve superior clinical outcomes in general[4,16] and specifically have lower mortality rates after abdominal aortic aneurysm repair[10,11,17], lower amputation rates for critical lower limb ischaemia[7,12,16] and lower stroke risks after carotid artery surgery[13,18]. The National Confidential Enquiry into Perioperative Deaths (NCEPOD) has continually emphasised the need for patients with acute vascular conditions to be treated by a specialist vascular team[19,20].

3.6 Up to one third of vascular patients present as emergency or urgent referrals. Consultants are directly involved in the care of the majority of such emergencies, given the complexity of the cases. The out of hours workload is therefore more onerous than in many other surgical specialties.

3.7 Data from Vascular Registry returns to the VSSGBI in 2003 shows that a population of 100000 generates an average of 70 (range 46-92) arterial operations, 47 (range 40-75) interventional radiology procedures and 81 (range 32-125) venous operations per annum (excluding renal access surgery). The threat to life and limb of the arterial conditions means that 30%-40% of these patients present as urgent or emergency cases.

3.8 To deal with these volumes, a hospital with a vascular service needs a minimum of one pure vascular surgeon per 150000 population, or one General or Transplant Surgeon with a major Vascular Interest per 100000 population, to reflect the time needed for their other interests. These figures assume an appropriate complement of junior surgical staff. Additional consultants will be required to manage the workload as the European Working Time Directive reduces junior support for the service. It is estimated that on a 48 hour working week, juniors will only be available for elective activities 3 days a week if they undertake a 1 in 9 emergency rota.

4. Factors Affecting Vascular Surgical Workload

4.1 The 1990s saw an increase in the volume of arterial reconstructions, coincident with an increase both in the number of vascular surgeons and their degree of sub-specialisation[21,22]. Between 1990 and 1995 the number of arterial reconstructions rose in one region from 20.8 to 28 per 100000 population per annum and the number of in-patient episodes for treatment of arterial disease rose from 35.7 to 47.6 per 100000[21]. More recent data from the Department of Health[23] suggests that volumes of arterial surgery have stabilised in England between 1998 and 2001 (Table 1).

Table 1: Summary of vascular operations in England. NHS Statistics (www.doh.gov.uk)

	1998-1999					2000-2001				
	FCE's (000's)	Male (%)	Emerg (%)	≥75y (%)	Bed days (000's)	FCE's (000's)	Male (%)	Emerg (%)	≥75y (%)	Bed days (000's)
Aorta (L16-26)	10.5	76	25	31	97	10	76	26	35	98
Carotid, cerebral and subclavian (L29-39)	14	51	16	13	89	13	50	19	14	82
Abdominal branches of aorta (L41-47)	4	61	17	16	18	3.5	59	19	17	16
Iliac and femoral (L48-63)	37	62	16	33	246	36	62	18	35	240
Other Arteries (L65-72)	12	49	39	28	71	11	48	44	30	62
Veins and other blood vessels (L74-97)	112	41	22	10	396	108	44	24	11	407
Varicose veins (L85-7)	56	32	0	3	43	45	33	0	3	32

The Impact of Risk Factors for Vascular Disease

4.2 The prevalence of vascular disease increases with age and more than 16% of the population are aged over 65 years. The complexity, outcome and costs of vascular intervention are age dependant. Average life expectancy continues to rise (Table 2) and this factor alone suggests that demand for vascular services is not likely to decline and may well increase with time.

Table 2: Male and female life expectancy in England (Office of National Statistics www.doh.gov.uk)

Age	Men			Women		
	1985	1995	1999	1985	1995	1999
Birth	72.0	74.4	75.4	77.8	79.6	80.2
50	24.9	27.0	27.9	29.9	31.4	32.0
60	16.8	18.5	19.4	21.3	22.5	23.0
70	10.5	11.6	12.2	13.8	14.7	15.1
80	6.0	6.6	7.0	7.8	8.6	8.7

4.3 There are between 2000 and 3000 diabetics per 100000 population and the prevalence rises steeply with age. Type 2 diabetes is up to six times more common in people of South Asian descent and up to three times more common in those of African and African-Caribbean descent. Mortality and morbidity are increased by socio-economic deprivation. Morbidity from the complications of diabetes is three and a half times higher in social class V than social class I. Vascular disease is a major cause of morbidity in diabetes and the risks of disease progression are higher. Over 17% of patients admitted under the care of vascular surgeons are diabetic. Lack of exercise, poor diet, obesity and increasing age are all associated with an increasing incidence of Type 2 diabetes.

4.4 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, this decline has now levelled off in both men and women under 65 years (Figure 3). Smokers are more at risk of complications from vascular interventions because of cardiac and respiratory co-morbidity and the longer-term success of vascular intervention is reduced in patients who continue to smoke. The incidence of vascular disease is unlikely to decline in future without a reduction in the prevalence of smoking.

Table 3: Prevalence (%) of smoking by age and gender in England (Office of National Statistics) www.doh.gov.uk

Age group	Men		Women	
	1990	2000	1990	2000
16-24	34	34	36	32
25-44	36	35	33	30
45-64	28	27	28	24
65 and over	22	14	16	14
Total	31	29	28	25

4.5 The affluence of modern society encourages high fat diets, obesity and lack of exercise. These factors all contribute to the development of hyperlipidaemia and hypertension, both potent risk factors for vascular disease. Childhood obesity has also been linked to the development of diabetes and hypertension in later life.

4.6 There is clear evidence that secondary prevention by antiplatelet therapy, lipid lowering therapy, control of hypertension, smoking cessation, exercise and weight loss play a major role in reducing the morbidity and mortality of atherosclerosis. Vascular services are taking on the additional role of advising primary care physicians in this growing field of secondary prevention for patients whose atherosclerosis affects their peripheral arterial system.

4.7 There are variations in the prevalence of vascular disease between different parts of the country. These variations are shown in Table 4, where vascular disease is included within circulatory disease, cerebrovascular disease and thrombosis/embolism of other arteries. The reasons for this are complex and poorly understood but include genetic influences, diet, social class, age and possibly climate. This factor introduces geographical variations into the demands for vascular services. Popular retirement areas also create increased demand on vascular services as they have relatively higher proportions of elderly patients.

Table 4: Comparison of causes of death per 100000 in Great Britain (1997) and Ireland (1996) Data from WHO (www3.who.int/whosis)

	Scotland		Northern Ireland		England and Wales		Ireland	
	Men	Women	Men	Women	Men	Women	Men	Women
All cause	1140	1182	882	904	1031	1094	926	824
All malignancy	303	279	224	204	274	246	221	186
Diabetes	10	10	5	4	11	12	13	10
Circulatory diseases	484	527	385	391	426	448	399	367
Myocardial infarction	190	161	185	146	136	106	165	114
Cerebrovascular diseases	105	165	77	119	84	136	66	93
Thrombosis/embolism of other arteries	25	21	16	13	29	21	16	12

Lower limb ischaemia

4.8 Around 20% of the population over 60 years have peripheral arterial disease, although only a quarter of these are symptomatic. Smokers, diabetics and patients with coronary artery disease have a particularly high incidence and current emphasis on the health of patients with these latter two conditions is creating additional demands on the vascular service. Even if there are no symptoms, the presence of a reduced blood pressure at the ankle signifies a 3 to 4 fold increase in the risk of cardiac and cerebrovascular morbidity and mortality. As this morbidity and mortality can be significantly reduced by the use of secondary prevention, there is a case for population screening using the ankle/brachial pressure index to identify patients at risk.

4.9 Peripheral arterial disease produces pain in the leg on walking (claudication) in around 5% of the >60 years population. Symptoms become severe and progressive in only around 20% of these patients, but the remainder still need lifestyle advice, secondary prevention and the opportunity of supervised exercise classes. While many patients with mild symptoms are managed in primary care, there is still a large cohort with more severe symptoms who are referred to the vascular service for assessment. Some pose difficult diagnostic dilemmas and may require investigation and treatment for risk factors and associated diseases. A minority will require interventional treatment with balloon angioplasty or surgery if the symptoms are particularly disabling.

4.10 Peripheral arterial disease may progress to critical limb ischaemia, with constant and intractable pain preventing sleep, often with ulceration or gangrene of the extremity. These patients are at particular risk of losing their limb without treatment and a high proportion present as emergencies. Interventional treatment is essential to avoid amputation. Such treatment is both clinically valuable and cost-effective[4]. When loss of the limb becomes unavoidable, amputation and early post-operative rehabilitation is the responsibility of the vascular surgeon.

4.11 Around 1-2% of patients with claudication will eventually progress to amputation[24], although the risk is higher (5%) in diabetics. A large vascular unit serving a population of 500000 will expect to see around 100 of these patients per year. While the in-hospital costs of limb salvage surgery are equivalent to those of amputation, the subsequent community healthcare costs of amputation are way in excess of those following successful arterial reconstruction[25]. Many patients can no longer cope independently in the community without their leg and may require Nursing Home care.

4.12 There is evidence that hospitals providing high levels of interventional treatment also perform significantly fewer amputations (6 per 100000 per annum vs 10 per 100000 per annum, P=0.02 in one example[7]. They also perform a higher proportion of below knee amputations compared to above knee, which is beneficial because around 50% of below knee amputees become independently mobile with an artificial limb compared to only 25% of above knee amputees[26].

Abdominal aortic aneurysm

4.13 Aortic aneurysms occur when the aortic wall weakens and stretches, causing the aorta to expand like a balloon. They are commoner in the elderly and the incidence is rising as people live longer. When an abdominal aortic aneurysm grows to a critical size, the risk of rupture becomes significant as the wall becomes thinner and thinner. Rupture of an aneurysm into the abdominal cavity is fatal if untreated and many patients die rapidly from exsanguination before they can reach hospital. Emergency surgery is the only solution, but the patients are so ill from loss of blood that only half of those who reach the operating theatre survive. Ten thousand patients die each year from ruptured aneurysm in England and Wales (1.5% of all deaths). It is better to repair abdominal aortic aneurysms before rupture occurs, but as few patients have symptoms or signs, aneurysms can be difficult to detect clinically.

4.14 Abdominal aortic aneurysm (AAA) occurs in around 3% of the male population aged between 65-74 years[27]. Depending on the number of elderly people in the local population, a vascular service will operate on around 10 elective AAA per 100000 and 5 emergency ruptured AAA per 100000 population per annum[1, 23]. The volumes of elective procedures are likely to increase in the future. Elderly patients are fitter and demand surgery more readily in the current era. General practitioners are nowadays more likely to refer elderly or unfit patients for consideration of surgery. A general increase in diagnostic CT, MR and ultrasound scanning of the abdomen reveals more incidental aneurysms. Ultrasound scanning provides a cheap and effective method of detection and is the basis of selective population screening. A recent study has shown significant cost and clinical benefits for population screening in men over 65 years[27,28]. Screening programmes find significant numbers of asymptomatic aneurysms (up to 70 per 1000 men aged 65 - 74 years screened), but appropriate management of these aneurysms leads to a 50% reduction in the numbers of ruptured aneurysms presenting as emergencies over time.

4.15 Elective or emergency surgery to repair an abdominal aortic aneurysm is a major operation with a significant morbidity and mortality and requires adequate ITU/HDU facilities. There is no advantage to be gained from surgery to most aneurysms below 5.5 cm in diameter as the risk of rupture is no higher than the risk of elective surgery when the aneurysm is small[29]. It is quite safe to observe smaller aneurysms with regular ultrasound scanning until the aneurysm is over 5.5cm in diameter, unless the aneurysm grows quickly or causes symptoms. The risk of rupture increases in aneurysms over 6cm in diameter and elective surgery is appropriate in fit patients with aneurysms larger than 5.5cm. Patients return to a normal life expectancy for their age after successful aneurysm repair.

4.16 Minimally invasive treatment using covered aortic stent grafts introduced from the groin shows promise, although the medium and long-term risks associated with their use have yet to be established. Such endovascular aneurysm repair (EVAR) is a developing field and is beginning to show quite dramatic reductions in the mortality from ruptured AAA[30]. This clinical benefit would have a major impact on the need for out of hours interventional vascular radiology. Results continue to improve along with advances in stent design and technology, but the devices are expensive and the results of randomised trials comparing aortic stent grafts with conventional surgery are still awaited.

Carotid artery surgery

4.17 When the main blood vessels to the brain, the carotid arteries, become narrowed by arterial disease, disabling or fatal strokes may result. Around 80% of strokes are due to impaired blood supply and around half of these arise as a result of narrowing of the carotid artery in the neck. There is overwhelming evidence that carotid artery surgery is better than best medical therapy alone at reducing the risk of stroke in fit patients. This benefit is greatest in patients with a symptomatic >70% internal carotid stenosis without near-occlusion, but there is also a marginal benefit in symptomatic patients with a 50-69% stenosis and in those with a near-occlusion[31]. Patients under the age of 75 with asymptomatic carotid stenosis >75% also benefit from surgery but more asymptomatic patients need to be treated to prevent one stroke compared to symptomatic patients and it does take over 4 years after the operation for the overall stroke risk to show a benefit over best medical therapy[32]. Carotid endarterectomy is one of the few surgical operations shown to offer proven efficacy over medical therapy in randomised controlled trials.

4.18 There is evidence of significant inequalities in access to carotid surgery according to geographical area within the UK[5,6,16]. It is possible to calculate from the known incidence of the disease that each vascular service should be undertaking around 15 carotid endarterectomies per 100000 population per annum[33]. Although the numbers of operations performed are steadily increasing (there was a sixfold increase in Scotland between 1989 and 1995), there are still areas where the carotid endarterectomy rate remains at 0 per 100000[6].

4.19 The place of carotid endovascular stenting remains uncertain in the UK, but is likely to play a significant role in future as technology and experience develop. The risk of stroke arising from technical imperfections with this procedure mean that it should only be undertaken by those trained and experienced in vascular interventional radiology working in collaboration with a vascular surgeon. A cerebral protection device should be used if available and the procedure should only be performed in exceptional circumstances outside the context of further randomised trials against carotid surgery[34].

4.20 The current widespread introduction of specialist Stroke Units[35] will inevitably identify more patients who could benefit from carotid surgery.

Other arterial surgery

4.21 The commonest health gains from arterial surgery are relief of disability from lower limb ischaemia, prevention of amputation, reduction in deaths from abdominal aortic aneurysm and prevention of stroke. There are a number of other areas where vascular expertise is of value, particularly in the area of renal access surgery, which provides suitable conduits for connection to renal dialysis machines.

4.22 The numbers of patients requiring renal replacement therapy is steadily rising, from 400 per million population in 1993 to a projected 1000 per million in 2010[36]. This increase is due to the increasing prevalence of both Type 2 diabetes and of end stage renal disease with age and ethnicity. Vascular access surgery undoubtedly reduces the morbidity and mortality from haemodialysis catheter infection and can produce a workload of over 20 patients per 100000 per annum for the vascular service, which is projected to increase in line with the need for renal replacement therapy. This increasing workload also puts additional demands on the interventional radiology service, dealing with the complications of renal access procedures.

4.23 Rarer conditions include thoraco-abdominal aneurysms, mesenteric artery disease, renovascular disease, arterial infections, vascular trauma, arm vessel occlusions, arteriovenous malformations and carotid body tumours, all of which can be successfully treated by surgeons and/or interventional radiologists, often in experienced specialist centres.

4.24 Transthoracic endoscopic sympathectomy can alleviate symptoms of severe peripheral ischaemia or hyperhidrosis in the hands, as can phenol lumbar or open lumbar sympathectomy in the feet.

Venous Surgery

4.25 The main health gains of the management of venous disease are relief from the symptoms and complications of varicose veins and the healing and prevention of recurrence of chronic leg ulceration. Surgery remains appropriate for symptomatic but uncomplicated varicose veins, where patients gain a highly significant health benefit in terms of both generic and disease-specific quality of life[37,38].

4.26 Chronic venous disorders rarely threaten life or limb but can have significant effects on health and quality of life. The patients are best managed by vascular surgeons, who are the best equipped to undertake the sometimes quite complex evaluation, investigation and surgical treatment.

4.27 Over 30% of the population will develop varicose veins, although recent guidelines from the National Institute for Clinical Excellence (NICE) have undoubtedly reduced referrals to the vascular service from primary care. Despite this reduction, varicose vein surgery remains a significant demand on the vascular service for the 5% – 10% of the population who will develop skin changes as a result of chronic venous insufficiency and for those who have particularly troublesome symptoms.

4.28 Chronic venous ulcers occur in 1% - 2% of the population over the age of 60 years and consume up to 2% of total health spending, let alone the associated loss of economic productivity. Some ulcers may be due to venous insufficiency alone but there are often other contributory causes and surgery has a place in the treatment of some patients to reduce the risk of recurrence. Vascular Surgeons particularly need to be involved in the management of arterio-venous ulcers, which are not suitable for compression therapy alone and may need some form of arterial intervention. Leg ulcers can therefore pose complex problems requiring a team approach to optimise management.

4.29 Many of these patients can now be treated successfully by compression bandaging in community leg ulcer clinics, but there is a role for surgery to reduce the risk of recurrence in patients with ulceration arising from superficial venous incompetence with no evidence of previous deep vein thrombosis[39]. The development of community leg ulcer clinics has increased demand on the vascular service because the routine measurement of the ankle/brachial pressure index in the clinics has increased the identification of patients with mixed arterio-venous ulcers. These patients are then referred on to the vascular service for assessment and treatment of the arterial component of their ulceration.

Lymphatic Disorders

4.30 Patients with impairment of the lymphatic drainage from a limb develop chronic limb swelling and are at increased risk of infection in the 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, who often will not accept referrals of patients unless their lymphatic obstruction is due to cancer. This represents an area of serious under-provision in the NHS for those patients with benign causes of lymphoedema and vascular services need to try and develop local arrangements with their oncology colleagues. Only a small number of patients develop such severe limb swelling that they require surgical treatment, which is appropriately provided only in specialist centres.

5. Components of the Vascular Service

5.1 An effective vascular service requires a team approach, with each member of the team being aware of the potential contributions of the others and all working together to provide the best possible outcomes for the patient.

Vascular Surgery

5.2 A consultant surgeon with an interest in vascular surgery has the necessary clinical and surgical skills to manage relevant diseases of arteries, veins and lymphatics and can maintain an emergency surgical service in vascular surgery. These skills will include knowledge of the relevant diagnostic imaging investigations and of the role of a vascular laboratory in the diagnosis and management of vascular disease. He or she will also have a sound knowledge of the relevant aspects of basic sciences and critical care and of the roles of vascular medicine and interventional radiology in the management of vascular diseases.

5.3 Consultant surgeons with a significant interest and expertise in vascular surgery should commit at least half their clinical practice to the care of vascular patients in order to maintain their expertise. They may also participate in the acute general surgery or transplantation emergency rota and may maintain another specialty interest within general surgery. Increasing numbers of vascular surgeons no longer undertake general surgery (currently over 20% and rising) and may offer special expertise in renal access surgery, transplant surgery or endovascular surgery instead.

5.4 The weekly job plan for a consultant vascular surgeon should include at least two out-patient clinics, one all day operating list and one half day list for either day surgery or renal access. Emergency work, either when on call or when dealing with unexpected urgent surgery, is onerous in vascular surgery and should account for a minimum of two sessions per week according to local circumstances and the frequency of the emergency rota.

5.5 The increasing lack of vascular experience among junior surgical staff and the complexity of vascular surgical emergency work means that consultants must nowadays attend for most vascular emergency cases. This increased demand means that a vascular on call rota more onerous than 1 in 6 is no longer acceptable. Clinical networks covering populations in excess of 1 million people will have to deal with higher volumes of emergency cases and in such cases the emergency rota should be no more onerous than 1 in 8 to account for this. Elective work should be cancelled when on emergency duty for large populations and the emergency duties scheduled as fixed sessions in the consultant's weekly job plan.

5.6 A vascular surgical service should have at least two consultant surgeons (see section 6), supported by a minimum of one PRHO, one SHO and one SpR in order to deal with the complexity, co-morbidity and overall volume of vascular patients. As the European Working Time Directive reduces the availability and surgical expertise of junior support, some duties of the PRHO may be taken over by a ward based Vascular Nurse Specialist. The duties of the SHO and the SpR will need to be covered by an increase in the number of consultant vascular surgeons and the use of non-medical surgical assistants/practitioners as most vascular operations are complex and need experienced assistants.

5.7 Appointees to vascular consultant posts should normally have spent the last two years of their specialist registrar training in vascular units recognised for year 5/6 training by the Specialist Advisory Committee in General Surgery. Specifications for training centres and training goals for trainees have been specified by the VSSGBI in its document on "Training in Vascular Surgery". These are summarised in Appendix 1.

5.8 Examination and certification of completion of specialist training are currently in the subject of general surgery and there is no separate measure of knowledge or competence in vascular surgery. Vascular trainees may opt to have an oral in vascular surgery as part of their Intercollegiate exam, but this is not mandatory. The VSSGBI are working with the Intercollegiate Examination Board to try and improve the vascular component of this exam. There is a separate European Board of Surgery Qualification in vascular surgery, which can be taken only after achieving a Certificate of Completion of Specialist Training (CCST). The purpose of this specifically vascular exam is to ensure consistency of training standards across Europe, although it currently has no official standing in member countries with regard to certification.

5.9 Vascular surgeons are active in research, both clinical and laboratory based. Many University Hospitals have a Chair in vascular surgery and vascular surgeons are prolific contributors to surgical scientific meetings. Despite this enthusiasm for research, funding is difficult to come by. 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.

Interventional Radiology

5.10 Interventional radiology is recognised as a distinct subspecialty within radiology, although not all interventional radiologists work in the vascular field. Vascular surgeons work closely with their radiology colleagues and should meet weekly for a case conference to discuss the diagnosis and best management of patients with vascular disorders. The provision of vascular interventional radiology services is covered in a separate document produced jointly by the Royal College of Radiologists and the VSSGBI[3].

5.11 The vascular radiologist and the vascular surgeon should work on the same site and operate as a team in the provision of vascular services. Both should have an adequate knowledge of the relative benefits of endovascular and surgical procedures for common vascular problems. Both must be capable of decision making with respect to patient selection and management of complications.

5.12 In the event that a single site service cannot be offered, it is essential that both the vascular surgeon and radiologist are readily available to manage any complication that may occur.

5.13 Elective endovascular procedures should only be performed following discussion between the specialties involved. Minor vascular radiological procedures may be performed in the operating theatre by an adequately trained vascular surgeon without the presence of a vascular radiologist (e.g. intra-operative arteriography). More complex endovascular procedures (e.g. aortic stenting) need to be performed in a sterile environment such as an operating theatre or similar standard radiological suite and should involve vascular radiologists and surgeons working together, unless the surgeon has received specialist training in interventional radiology[40].

5.14 Dedicated vascular radiographers and interventional radiology nurses should be available for all elective and emergency vascular radiology procedures.

5.15 After vascular radiology procedures, patients need to be monitored by appropriately experienced staff on a dedicated vascular ward. Protocols should be available for the monitoring and care of these patients.

5.16 Emergency radiology suites must be available 24 hours a day for the provision of urgent vascular interventional procedures, including the management of complications.

5.17 Similar pressures apply within radiology as do within general surgery for the provision of emergency services. Many non-vascular radiologists are no longer comfortable performing arteriography and do not have the skills necessary for interventional treatment. There are few hospitals with enough vascular interventional radiologists to provide a 24 hour 7 day a week emergency service and non-vascular radiologists are reluctant to see their colleagues come off the general radiology emergency rota to allow participation in a separate vascular radiology rota[3]. Similar collaborative clinical networks to provide emergency arrangements between adjacent vascular surgery units should also apply to the provision of emergency radiology cover for patients who require immediate vascular imaging or interventional treatment out of hours. In the longer term, centralisation of adjacent vascular units to include radiologists as well as surgeons working in a single larger unit would go a long way towards addressing these manpower problems in the provision of an emergency vascular radiology service.

5.18 In the face of the current shortage of vascular interventional radiologists and the increasing role of endovascular surgery in the management of vascular patients, the VSSGBI recommends that in future vascular surgeons should develop the necessary skills to undertake diagnostic and interventional vascular radiology procedures. The acquisition of these skills should become an essential part of vascular surgical training.

5.19 Interventional cardiologists are skilled in the management of atherosclerosis of the coronary vessels but do not have the necessary training or background in the management of peripheral vascular disease and should not undertake interventions in this area.

Vascular Medicine

5.20 In the UK the medical management of vascular disease is mainly provided by vascular surgeons. Where available, vascular physicians can provide specialist advice on the medical management of vasospastic and inflammatory conditions of blood vessels as well as on the best medical management of risk factors for vascular disease and on the secondary prevention of cardiovascular and cerebrovascular diseases.

5.21 Vascular surgeons can obtain appropriate advice on medical treatment from rheumatologists, immunologists, clinical chemists, diabetologists, cardiologists, neurologists and care of the elderly physicians.

The Vascular Laboratory

5.22 The vascular laboratory provides ankle and toe blood pressure measurements using Doppler ultrasound, non-invasive imaging of arteries and veins using duplex ultrasound and other more complex physical tests of vascular function. Vascular technologists are specially trained and certified in the provision of these services, which are essential components in the diagnosis, pre-operative assessment and post-operative surveillance of arterial and venous disease.

5.23 A population of 500000 would generate between 3000 to 4000 tests per year in the vascular laboratory and requires a minimum of three full-time vascular technologists with appropriate clerical support. This figure excludes duplex ultrasound scanning for acute deep vein thrombosis, which is more often provided in the radiology department and which would demand more resources if performed in the vascular laboratory.

The Vascular Ward

5.24 Vascular patients are often elderly and their surgery is complex, so average length of stay is longer than for many other branches of surgery. 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 then this will also increase pressures on vascular bed capacity by delaying discharge after medical treatment is completed. Based on current experience, a population of 500000 will require a minimum of 25 to 30 beds on a dedicated vascular ward, excluding rehabilitation, short stay, day case and ITU/HDU beds.

5.25 The nursing care of vascular in-patients is a specialist area, 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 dedicated vascular ward is essential to ensure an appropriate skill mix of nurses who have been specially trained in the care of vascular patients.

The Vascular Nurse Specialist

5.26 Vascular nurse specialists and nurse consultants also contribute to out-patient care, through lifestyle advice clinics, claudication assessment clinics, leg ulcer clinics and diabetic foot clinics. They play an essential role in vascular research and audit and are involved in the training and education of both community and hospital nursing staff.

Vascular Out-patient Clinics

5.27 Clinics need to be staffed by nurses with expertise in ulcer and wound dressing. Sufficient examination rooms and nurses must be available to prevent hold-ups while patients' wounds are being re-dressed after a consultation. Hand held doppler ultrasound machines must be available for venous assessment and for measuring the ankle/brachial pressure index. A treadmill exercise machine is useful for the differential diagnosis of peripheral arterial disease.

Day Case and Short Stay Facilities

5.28 There need to be facilities for day care and 23 hour stays on site for the vascular service. These facilities are required for patients undergoing arteriography and interventional radiology, where access to expensive radiological equipment can only be provided on the same site as the vascular service. Although varicose vein surgery can be accommodated on split sites, it does remove surgeons from the vicinity of patients who by the nature of their arterial disease do frequently require immediate attendance for complications following intervention.

Operating Theatres

5.29 Vascular surgery is a complex technical area and theatre personnel need to be specially trained in the use of specialist instruments, prosthetics and techniques. Dedicated theatre nurses with special training in this area are required. A dedicated vascular theatre is also required to ensure that stocks of specialist grafts, instruments and sutures are stored readily to hand as they are often needed without delay. Theatre staff need to be capable of operating cell saver devices for blood conservation. Radiolucent operating tables and X-ray C-arms are required for on-table arteriography and interventional radiology. Those vascular surgeons who provide a central venous line placement service require access to ultrasound imaging in the theatre. A vascular access service will require one additional, dedicated theatre session/week/120 dialysis patients[36]. Many vascular operations take longer than a half day session and so each vascular surgeon will require one all day theatre list per week for elective cases plus access to an emergency session at least once a week for urgent cases. A 24 hour emergency CEPOD theatre must be available to deal with emergency vascular cases.

Anaesthesia, ITU and HDU

5.30 For optimal results, complex vascular cases require consultant anaesthetists and intensivists with specialist vascular expertise, particularly for emergencies such as ruptured aortic aneurysm[41,42].

5.31 An ITU is essential for the care of vascular emergencies, particularly ruptured aneurysm. The majority of elective vascular patients needing special care post-operatively can be managed in an HDU rather than an ITU, and so both ITU and HDU facilities must be available on site to the vascular service in sufficient numbers to prevent elective cancellations. The size of the ITU/HDU will vary according to population size and the influence of other specialties using the facilities, but the vascular service alone requires at least one ITU and one HDU bed per 500000 population[1].

Accident and Emergency

5.32 A vascular service needs to be sited in a hospital with an A&E department, in order to receive critically ill emergency patients. There is no need to have a vascular service in every hospital with an A&E department, but every A&E needs to know which adjacent hospital is on call for vascular emergencies and clear local protocols need to be developed with both clinicians and ambulance services if emergency patients are to be transferred appropriately[43]. On call General Surgeons need to be sufficiently trained in the assessment of vascular emergencies to be able to recognise and refer them appropriately to the vascular emergency service.

Renal Services

5.33 Vascular patients are particularly susceptible to acute renal failure and facilities for haemofiltration must be available in the ITU/HDU. Some patients may progress to the stage of needing full dialysis and access to this service should be readily available, although not necessarily on the same site.

5.34 Renal access surgery is often provided by the vascular service and requires close collaboration with the renal physicians.

Physiotherapy/Occupational Therapy

5.35 Vascular patients are often elderly or disabled and require specialist physiotherapy to aid in 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 be safely discharged from hospital. Occupational therapists provide home assessment visits and co-ordinate safe discharge back into the community.

5.36 Supervised exercise classes are of value in the treatment of claudication and can also be provided in the gym by suitably trained physiotherapists with experience of exercising patients with cardiovascular disease.

Limb Fitting Service/Rehabilitation

5.37 Peripheral vascular disease is one of the major indications for lower limb amputation, which is usually performed by vascular surgeons. 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 between surgeons and prosthetists with a team approach to tailor the individual needs of each patient to their care. A specialist rehabilitation unit is a more appropriate environment than an acute surgical ward for amputees who no longer require active medical treatment but have not yet reached the stage where they can manage at home.

Relationship with Other Specialties

5.38 **Cardiology**. Patients with arterial disease frequently have cardiac co-morbidity as the risk factors are very similar. Cardiac assessment and optimisation of cardiac status are frequently required in the peri-operative period. Vascular surgeons and interventional radiologists are also required on occasion to deal with the complications of cardiac catheterisation and intervention.

5.39 **Cardiac Surgery**. Peripheral arterial complications occur in cardiac surgery patients, requiring vascular intervention. Collaborative surgery is increasingly being requested by cardiac surgeons for patients with combined cardiac and carotid or aneurysmal disease. Stroke is a significant complication in older patients undergoing coronary bypass surgery and many such patients are now screened for co-existent carotid stenosis, increasing demand on the vascular duplex ultrasound service. Where significant stenosis is found, it may need correction either before or at the same time as their coronary surgery.

5.40 **Diabetology**. Some 17% of patients undergoing vascular surgery are diabetic, rising to over 30% in patients with critical limb ischaemia. Patients with vascular disease frequently present through the diabetic service and vascular surgeons may need help with the medical management of their diabetic patients, so close collaboration between the vascular and the diabetic service is essential.

5.41 **Dermatology**. The management of lower limb ulceration involves an integrated approach between the vascular, dermatological and community leg ulcer services.

5.42 **Clinical Laboratory Services.** Blood disorders may initiate or exacerbate vascular problems, and close collaboration is needed with the haematology service to deal with these patients effectively. There is also frequently a need for blood replacement products in the management of arterial cases, with ready access to blood transfusion services. Infective complications of surgery have particularly serious implications for patients with prosthetic arterial grafts, needing microbiological assessment and advice. Lipid disorders are a common cause of arterial disease and specialist lipid clinics are often offered by clinical chemists. Rapid access to haematology, blood biochemistry and blood gas analysis is also essential in the peri-operative management of vascular patients.

5.43 **Nephrology**. Renal artery stenosis is a cause of hypertension and chronic renal failure. The management depends on collaboration between renal and vascular services. Some renal transplant surgeons have specialist training and skills in vascular surgery and can offer a joint transplant and vascular service. It is not necessary for renal or transplant services to be on the same site as the vascular service, but if they are not then clear arrangements should be put in place to allow joint patient management, either through patient transfers or clinician visits.

5.44 **Neurology**. 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.

5.45 **Plastic Surgery.** Arterial injuries in neonates or other microvascular reconstructions for ischaemia are best left to plastic surgeons with expertise in the use of operating microscopes. Once revascularisation has been achieved for limb ischaemia, collaboration with plastic surgeons is desirable to provide skin cover for soft tissue defects arising either from ulcers, from removal of gangrenous tissue or from fasciotomy incisions. Hand surgery expertise may also be helpful in the management of gangrenous fingers to preserve maximum function.

5.46 **Other Surgical Disciplines.** 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 surgeon can arrive to assist. These events are rare and should not dictate service configuration. Hospitals without a vascular service do need to develop clear arrangements with adjacent vascular units for a vascular surgeon to travel to the patient when such emergencies arise in theatre, as patient transfers are often inappropriate in this setting. Vascular surgeons 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.

Vascular Training Units

5.47 The European Working Time Directive will have a major impact on vascular training. Training will have to become more focused and less service-oriented if trainees are to achieve sufficient experience in the time available[44]. The requirements for a vascular unit which offers specialist training in vascular surgery are more stringent for this reason, and are set out in Appendix 1.

Audit and Governance

5.48 Vascular services must be accompanied by a comprehensive programme for audit of clinical outcomes. The data system needs to be based on an adequate 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. Annual volumes of particular operations per surgeon are not high in arterial surgery, and it may take up to 9 years of data collection and analysis to decide whether or not clinical outcomes for an individual surgeon lie within the norm[45]. Vascular surgeons should submit their figures to the VSSGBI National Vascular Database and also need to become personally involved with their hospital's operation coding system to ensure that hospital activity and outcome returns to the Department of Health are as accurate as possible.

6. Strategies For Vascular Services

6.1 Every vascular patient should have equality of access and clinical outcomes and these goals should drive the strategy for every vascular service, large or small. Such services should aim to provide a local gateway for vascular patients into both elective and emergency vascular care.

6.2 There is clear evidence that, for whatever reasons, many patients are still not offered the full range of vascular services if they cannot access them from their local hospital. It appears that patients are more likely to suffer unnecessary strokes or amputations than be referred to a more distant vascular service capable of preventing these disastrous outcomes[4-7,16].

6.3 Vascular services need to be organised to allow reasonable elective activity to exist alongside an emergency on call rota of 1 in 6 or more. In a recent VSSGBI survey of 125 hospitals with a vascular service (Appendix 2), 45% of vascular units have two vascular surgeons, 21% have only one surgeon and just 5% have more than four surgeons. Thus most units need to coalesce or collaborate in clinical networks to achieve 24/7 emergency cover on the preferred rota of 1 in 6. Only 2% of vascular units have concrete plans in existence to coalesce services on a single site in the UK at the time of writing. Collaborative clinical networks appear much more popular, with 44% of hospitals currently participating in a network and another 23% with concrete plans to do so in the near future. There is a positive relationship between the existence of a clinical network and the provision of 24 hour vascular emergency cover, with 37/55 (67%) hospitals in a network providing full emergency cover compared to only 17/70 (24%) hospitals outside a network ($P < 0.01$, Chi Square Test).

6.4 Those services which do plan to coalesce on a single site must continue to provide dedicated vascular out-patient clinics to the adjacent hospitals by visiting vascular surgeons from the centralised site.

6.5 In many instances it will be necessary for vascular surgeons to consider the needs of patients in their geographical area rather than in an individual hospital catchment population.

Clinical Networks

6.6 A clinical network exists when two or more adjacent hospitals collaborate to provide a service to patients. That service might include both elective and emergency care or it might provide simply for emergencies. A number of models exist, according to the level of vascular service in the participating hospitals.

Hospitals With No Vascular Service

6.7 Some smaller or more remote hospitals do not have the staff or facilities to provide a vascular service. Patients served by these hospitals will not achieve equality of access to the clinical benefits of an elective vascular service unless the hospital provides out-patient clinic facilities to a visiting vascular surgeon from an adjacent unit. The patients are able to make a more informed choice about the pros and cons of transfer to an adjacent hospital to access specialist care if they have had a chance to hear advice from a vascular specialist who is capable of delivering it, and the specialist can educate local colleagues and GPs about the benefits such transfers can bring.

6.8 The visiting surgeon can also provide a consulting service for in-patients in other specialties at the hospital and may offer a day surgery service locally. The clinic will require a nurse with experience of wound and ulcer dressing and a simple hand-held Doppler ultrasound machine should be provided. If the local radiology department can provide duplex ultrasound with an operator experienced in arterial and venous duplex scanning, then this will save a number of patients from having to travel for further investigation. If a duplex machine is available but without an experienced operator then a vascular technologist might accompany the visiting vascular surgeon from the adjacent vascular service.

6.9 The physiotherapy/rehabilitation services at the local hospital should be familiar with the needs of amputees and other vascular patients referred back to the hospital once their acute care has been completed, so that their rehabilitation can be accomplished closer to their home and family.

6.10 These hospitals need a formal contractual arrangement with an adjacent hospital to provide emergency vascular cover, so that any patient presenting with a vascular emergency transfers without question or delay to the covering vascular emergency service in the network according to locally developed protocols. Very few hospitals (Appendix 2) are more than an hour by road from their neighbours and there is evidence that even with transfers of more than one hour, the patients' outcomes are improved substantially by transferring to a vascular unit. Patient survival after a ruptured aortic aneurysm is between 5% and 15% if they stay in a hospital with no vascular surgeon, compared to 35% to 65% if they transfer to an adjacent vascular service[46,47]. There is no relationship between time of presentation and survival from aneurysm repair unless the patient is hypotensive, but survival after surgery on a vascular unit is still around 35% after 4 hours of hypotension[48], which is a better outcome than leaving the patient where they are even if the hospital is remote[49]. The only exception is the patient who suffers a cardiac arrest on presentation. Such patients are unlikely to survive either the transfer or any subsequent surgery on a vascular unit[50].

Hospitals With A Single-Handed Vascular Service

6.11 It is not in the best interests of vascular patients to be served by a local single-handed vascular service. Such consultants must inevitably work in isolation, with limited opportunities for peer-related development or team working, and the elective service is suspended whenever the consultant is on leave. Many of these hospitals undertake a relatively low volume of vascular surgery and have limited facilities, which fall short of those recommended in Section 5. There is evidence that lower volume hospitals achieve poorer clinical outcomes for their patients[16]. Vascular emergency cover is likely to be provided by non-vascular general surgical colleagues who may be more inclined to conservative management in high risk vascular emergency cases, resulting in poorer outcomes for the patients[47].

6.12 The best strategy for a single-handed service will depend on local circumstances. If the hospital's catchment population will not sustain enough elective work for a second vascular surgeon then the hospital should merge its in-patient elective and emergency vascular service with an adjacent hospital, whilst maintaining the out-patient access and facilities described above under 'hospitals with no vascular service'. The single-handed surgeon might then start to work as part of a geographical unit, maintaining some local sessional commitment but taking vascular patients from the local hospital to an adjacent, fully-equipped hospital for investigation and in-patient care. The emergency vascular service based at the adjacent, larger unit will include emergency vascular patients presenting at and transferred from the local hospital.

6.13 If the catchment population would sustain a second vascular surgeon but the hospital is just a few miles from an adjacent larger vascular centre then it would make more sense to merge the service as in 6.12 above rather than try to set up a rival unit by appointing a second surgeon. The unnecessary duplication of facilities would be waste of scarce resources. Patients' interests would be better served in a single hospital with a higher volume of vascular activity while they continued to access the service from the clinics and the casualty department in their local hospital. The higher volumes of vascular activity would be a driver for the development of all the appropriate facilities described in section 5. The ability to deliver an acceptable on-call rota would be enhanced as would postgraduate training opportunities.

6.14 If the hospital is not in the vicinity of an adjacent larger unit and is committed to the development of a vascular service with all the necessary equipment and personnel specified in section 5, then it may be more appropriate to appoint a second vascular surgeon and develop the service locally if the catchment population is large enough to sustain this. Such local development should include participation in a collaborative clinical network with adjacent hospitals for the provision of vascular emergency cover as specified below. There is often an unmet need in the local population which only comes to light once appropriate services and facilities are in place and vascular consultants trained in the full range of vascular surgery start offering a service and educating local clinicians about what can be achieved.

Hospitals With Two Or More Vascular Surgeons

6.15 These hospitals should have all the facilities listed in Section 5, including a dedicated vascular arteriography suite with facilities for spiral CT and MRA, a vascular laboratory and a dedicated vascular ward. The ITU/HDU should be large enough to cope with the vascular workload, depending on the demands from other specialties within the hospital.

6.16 Adjacent hospitals with two or more vascular surgeons should explore methods of collaboration to provide an emergency service. Such hospitals could in theory merge with adjacent units to centralise vascular services with 6 or more surgeons on one site, as described in the original Provision of Vascular Services document[1]. In practice this has proved hard to achieve. Either the surgeons do not want to move or their colleagues do not want them to move or there is insufficient capacity on a single site to manage the increase in workload. Many of these units are now exploring clinical networks with adjacent hospitals instead, particularly to provide emergency cover. Different models exist, but the commonest is for the patient to transfer to the hospital on call. This requires active support and collaboration with the ambulance services. Alternative models involve the surgeon moving between hospitals out of hours to operate on the patients without transferring them. In normal working hours each hospital looks after its own emergencies. Both of these systems work well in practice, with no detriment to patient outcomes[51-54] and are described in more detail in the VSSGBI Provision of Emergency Vascular Services document[43]. Two or three hospitals can collaborate as equal partners and the network arrangements allow an acceptable on call rota for each surgeon.

6.17 If the hospitals are close enough to each other, as in some major cities, then consideration should be given to amalgamating vascular in-patient and diagnostic facilities on one site, leaving out-patient facilities at the other. This adjustment prevents duplication of expensive equipment on two sites, makes the arrangements for emergency care more straightforward, enhances the experience available for training and provides enough members of the vascular team to develop individual expertise in service development, administration, teaching and research alongside their clinical activities.

6.18 Sometimes the partnership is not so equal and in these cases the network may function at a more formal contractual level. One hospital may arrange a contract with an adjacent hospital to provide an emergency service for its patients when its own vascular surgeons are not on call for the general surgery emergency rota. This arrangement allows the local vascular surgeons to honour their general surgical commitments but they do not offer a reciprocal vascular emergency service to the adjacent, often larger hospital. The contractual arrangement allows a transfer of resources to the adjacent hospital so that it can cope with the additional workload involved. In adjacent hospitals with no vascular surgeons, the contract may cover all elective and emergency services.

6.19 Where there is an adjacent hospital with no vascular service, vascular surgeons should take active steps to initiate an out-patient consulting service at the adjacent hospital and to transfer vascular emergency patients from it to their base hospital for treatment. This initiative will better serve the needs of the patients in the locality and allow equality of access to all of the facilities and treatments available at the base hospital. Any increase in workload may provide justification for additional vascular consultant appointments and facilities at the base hospital.

Contracting the Service

6.20 The above scenarios involve collaboration between adjacent hospitals in clinical networks. The VSSGBI has produced practical guidance on how to set up emergency networks[43] and the need for additional resources will very much depend on the type of network which is envisaged. Some emergency networks can be accomplished within existing resources but more complex contractual networks may need investment to support the infrastructure. Individual Primary Care Trusts are not in a position to promote the development of these kinds of service collaboration as they cross their boundaries. Strategic Health Authorities need to co-ordinate planning for these services over a wider sphere.

6.21 Every patient has the right to consult with a vascular specialist at their local hospital, but may have to travel to obtain access to diagnostic and interventional facilities. Only in this way can equality of access and the patients' desire for a local service[9, 55] be delivered alongside the best possible elective and emergency outcomes for individual patients.

References

1. The Vascular Surgical Society of Great Britain and Ireland. *The Provision of Vascular Services*. London 1998.
2. The Royal College of Surgeons of England. *The Provision of Emergency Surgical Services: An Organisational Framework*. London 1997.
3. The Royal College of Radiologists and the Vascular Surgical Society of Great Britain and Ireland. *Provision of Vascular Radiology Services.* London 2003.
4. Michaels J, Brazier J, Palfreyman S, Shackley P, Slack R. Cost and outcome implications of the organisation of vascular services. *Health Technology Assessment* 2000; Vol 4 (11).
5. Oliver SE, Thomson RG. Are variations in the use of carotid endarterectomy explained by population need? A study of health service utilisation in two English health regions. *Eur J Vasc Endovasc Surg* 1999; 17: 501-506.
6. Adam DJ, Bain M, Shanks E, Bradbury AW. Geographical inequality in the provision of carotid endarterectomy in Scotland. Scottish Vascular Audit Group. *Br J Surg* 1998; 85: 1075-1079.
7. Michaels JA, Rutter P, Collin J, Legg FM, Galland RB for the Oxford Regional Vascular Audit Group. Relation between rates of leg amputation and distal arterial reconstructive surgery. *Br Med J* 1994; 309: 1479-1480.
8. Ebskov LB, Schroeder TV, Holstein PE. Epidemiology of leg amputation: the influence of vascular surgery. *Br J Surg* 1994; 81: 1600-1603.
9. Department of Health. *Keeping the NHS Local – A New Direction of Travel*. London, 2003.
10. Dimick JB, Stanley JC, Axelrod DA, Kazmers A, Henke PK, Jacobs LA, Wakefield TW, Greenfield LJ, Upchurch GR Jr. Variation in death rate after abdominal aortic aneurysmectomy in the United States: impact of hospital volume, gender and age. *Ann Surg* 2002; 235: 579-585.
11. Katz DJ, Stanley JC, Zelenock GB. Operative mortality rates for intact and ruptured abdominal aortic aneurysms in Michigan: an eleven-year statewide experience. *J Vasc Surg*. 1994; 19: 804-815.
12. Clason AE, Stonebridge PA, Duncan AJ, Nolan B, Jenkins AM, Ruckley CV. Acute ischaemia of the lower limb: the effect of centralizing vascular surgical services on morbidity and mortality. *Br J Surg* 1989; 76: 592-593.
13. Ruby ST, Robinson D, Lynch JT, Mark H. Outcome analysis of carotid endarterectomy in Connecticut: the impact of volume and specialty. *Ann Vasc Surg* 1996; 10: 22-26.
14. Flood AB, Scott WR, Ewy W. Does practice make perfect? Part 1: the relation between hospital volume and outcomes for selected diagnostic categories. *Med Care*. 1984; 22: 98-114.
15. Dimick JB, Cowan JA Jr, Henke PK, Wainess RM, Posner S, Stanley JC, Upchurch GR Jr. Hospital volume-related differences in aorto-bifemoral bypass operative mortality in the United States. *J Vasc Surg*. 2003; 37: 970-975.
16. Michaels JA, Browse DJ, McWhinnie DL, Galland RB, Morris PJ. Provision of vascular surgical services in the Oxford Region. *Br J Surg*. 1994; 81: 377-381.
17. Samy AK, MacBain G. Abdominal aortic aneurysm: ten year's hospital population study in the city of Glasgow. *Eur J Vasc Surg*. 1993; 7: 561-566.
18. Segal HE, Rumind L, Wu B. The utility of PRO data on surgical volume: the example of carotid endarterectomy. *Qual Rev Bull.* 1993; 19: 152-157.
19. Campling EA, DevlinHB, Hoile RW, Lunn JN. *The Report of the National Enquiry into Perioperative Deaths 1993/94.* London 1996.
20. Gallimore SC, Hoile RW, Ingram GS, Sherry KM. *The Report of the National Enquiry into Perioperative Deaths 1994/95.* London 1997.
21. Galland RB, Magee TR. Survey of changes in the provision of vascular surgical services in the Oxford Region over 5 years. *Br J Surg* 1998; 85: 637-640.
22. Sutton CD, Gilmour JP, Berry DP, Lewis MH. The evolution of a vascular surgeon at a district general hospital: is sub-specialisation inevitable? *Ann R Coll Surg Engl* 2000; 82: 272-274.
23. Department of Health. *Hospital Episode Statistics England: Financial Year 2001-02*. London 2002.

24. Management of Peripheral Arterial Disease (PAD). TransAtlantic Inter-Society Consensus (TASC). *Eur J Vasc Endovasc Surg* 2000; 19 (Suppl A): S1-S250.

25. Cheshire NJ, Wolfe JH, Noone MA, Davies L, Drummond M. The economics of femorocrural reconstruction for critical leg ischaemia with and without autologous vein. *J Vasc Surg* 1992; 15: 167-174.

26. De Luccia N, Pinto MA, Guedes JP, Albers MT. Rehabilitation after amputation for vascular disease: a follow-up study. *Prosthet Orthot Int.* 1992: 16: 124-128.

27. Ashton HA, Buxton MJ, Day NE, Kim LG, Marteau TM, Scott RA, Thompson SG, Walker NM, Multicentre Aneurysm Screening Study Group. The Multicentre Aneurysm Screening Study (MASS) into the effect of abdominal aortic aneurysm screening on mortality in men: a randomised controlled trial. *Lancet* 2002; 360: 1531-1539.

28. Multicentre Aneurysm Screening Study Group. Multicentre aneurysm screening study (MASS): cost effectiveness analysis of screening for abdominal aortic aneurysms based on four year results from randomised controlled trial. *Br Med J* 2002; 325: 1135.

29. The UK Small Aneurysm Trial Participants. Mortality results for randomised controlled trial of early elective surgery or ultrasonographic surveillance for small abdominal aortic aneurysms. *Lancet*. 1998; 352: 1649-1655.

30. Lachat ML, Pfammatter T, Witzke HJ, Bettex D, Kunzli A, Wolfensberger U, Turina MI. Endovascular repair with bifurcated stent-grafts under local anaesthesia to improve outcomes of ruptured aortoiliac aneurysms. *Eur J Vasc Endovasc Surg.* 2002; 23: 528-536.

31. Rothwell PM, Eliasziw M, Gutnikov SA, Fox AJ, Taylor DW, Mayberg MR, Warlow CP, Barnett HJM for the Carotid Endarterectomy Trialists' Collaboration. Analysis of pooled data from the randomised controlled trials of endarterectomy for symptomatic carotid stenosis. *Lancet* 2003; 361: 107-116.

32. Asymptomatic Carotid Surgery Trial collaborators. Presented at the European Society for Vascular Surgery annual meeting, Dublin 2003.

33. Ferris G, Roderick P, Smithies A, George S, Gabbay J, Couper N, Chant A. An epidemiological needs assessment of carotid endarterectomy in an English health region. Is the need being met? *Br Med J* 1998; 317: 447-451.

34. Veith FJ, Amor M, Ohki T, Beebe HG, Bell PR, Bolia A, Bergeron P, Connors JJ 3rd, Diethrich EB, Ferguson RB, Henry M, Hobson RW 2nd, Hopkins LN, Katzen BT, Matthias K, Roubin GS, Theron J, Wholey MH, Yadav SS. Current status of carotid angioplasty and stenting based on a consensus of opinion leaders. *J Vasc Surg* 2001; 33 (2 Suppl): S111-S116.

35. The Department of Health. *National Service Framework for Older People*. London 2001.

36. National Kidney Federation. *End Stage Renal Failure – a Framework for Planning and Service Delivery.* London 2001.

37. Durkin MT, Turton EP, Wijesinghe LD, Scott DJ, Berridge DC. Long saphenous vein stripping and quality of life – a randomised trial. *Eur J Vasc Endovasc Surg* 2001; 21: 545-549.

38. Mackenzie RK, Lee AJ, Paisley A, Burns P, Allan PL, Ruckley CV, Bradbury AW. Patient, operative and surgeon factors that influence the effect of superficial venous surgery on disease-specific quality of life. *J Vasc Surg* 2002; 36: 896-901.

39. Barwell JR, Taylor M, Deacon J, Ghauri AS, Wakely C, Phillips LK, Whyman MR, Poskitt KR. Surgical correction of isolated superficial venous reflux reduces long-term recurrence rate in chronic venous leg ulcers. *Eur J Vasc Endovasc Surg* 2000; 20: 363-368.

40. The Vascular Surgical Society of Great Britain and Ireland. *Training in Vascular Surgery*. London 2001.

41. Gibbs PJ, Darke SG, Parvin SD. Survival after repair of ruptured aortic aneurysm: an anaesthetic view. *Br J Surg* 1998; 85: 554.

42. Sandison AJ, Wyncoll DL, Edmondson RC, Van Heerden N, Beale RJ, Taylor PR. ICU protocol may affect the outcome of non-elective abdominal aortic aneurysm repair. *Eur J Vasc Endovasc Surg* 1998; 16: 356-361.

43. The Vascular Surgical Society of Great Britain and Ireland. *TheProvision of Emergency Vascular Services.* London 2001.

44. Sandermann J, Panduro Jensen L. The Danish specialist training in vascular surgery. *Eur J Vasc Endovasc Surg* 2002; 23: 353-357.

45. Irvine CD, Grayson D, Lusby RJ. Clinical governance and the vascular surgeon. *Br J Surg.* 2000; 87: 766-770.

46. Adam DJ, Mohan IV, Stuart WP, Bain M, Bradbury AW. Community and hospital outcome from ruptured abdominal aortic aneurysm within the catchment area of a regional vascular surgical service. *J Vasc Surg* 1999; 30: 922-928.

47. Basnyat PS, Biffin AH, Mosely LG, Hedges AR, Lewis MH. Mortality from ruptured abdominal aortic aneurysm in Wales. *Br J Surg* 1999; 86: 765-770.

48. Barros D'Sa AA. Optimal travel distance before ruptured aortic aneurysm repair. In *The Causes and Management of Aneurysms.* Greenhalgh RM, Mannick JA, Powell JT (eds). WB Saunders, London 1990.

49. Cassar K, Godden DJ, Duncan JL. Community mortality after ruptured abdominal aortic aneurysm is unrelated to the distance from the surgical centre. *Br J Surg* 2001; 88: 1341-1343.

50. Farooq MM, Freischlag JA, Seabrook GR, Moon MR, Aprahamian C, Towne JB. Effect of the duration of symptoms, transport time and length of emergency room stay on morbidity and mortality in patients with ruptured abdominal aortic aneurysms. *Surgery* 1996; 119: 9-14.

51. Dawson K, McFarland R, Halliday A, Thomas M. Shared emergency vascular cover between two district general hospitals: implications for a consultant service. *Br J Surg* 1998; 85: 564.

52. Cook SJ, Rocker MD, Jarvis MR, Whiteley MS. Patient outcome alone does not justify the centralisation of vascular services. *Ann R Coll Surg Engl* 2000; 82: 268-271.

53. Woodcock SA, Hulton N. The provision of an emergency vascular service: a three hospital model. *Br J Surg* 1999; 86: 703-704

54. Baird RN, Baker AR, Hine C, Lamont PM, Lear PA, Loveday E, Mitchell DM, Morse M, Munro EN, Murphy KP, Rees MR, Smith FCT, Thornton MJ. Interhospital provision of emergency vascular services for a large population: early outcomes and clinical results. *Br J Surg* 2001; 88: 620-621.

55. Shackley P, Slack R, Michaels J. Vascular patients' preferences for local treatment: an application of conjoint analysis. *J Health Serv Res Policy* 2001; 6: 151-157.

Appendix 1

Training Requirements in Vascular Surgery[40]

Vascular Surgery Units

A Specialist Vascular Unit must have two or more surgeons who are either dedicated to or take a major interest in the speciality of Vascular Surgery. Vascular Surgery will comprise at least 70% of the unit's combined in-patient elective surgical workload.

A three surgeon unit might have two SpRs in any year of training, but would be most suited to year 5/6 trainees for a one year period or to year 3 trainees for a six month period. Two year 5/6 trainees may be attached to a unit at the same time, provided they rotate to work for all of the surgeons during the course of a year and are exposed to appropriate volumes of operative cases. A two surgeon unit would have only one SpR. All SpRs training in Vascular Surgery should spend both year 5 and year 6 attached to a Specialist Vascular Unit.

A General Vascular Unit must have two or more surgeons who are General Surgeons with a Vascular Interest. Vascular Surgery will comprise at least 50% of the unit's combined in-patient elective workload.

A three surgeon unit might have two SpRs and a two surgeon unit would have one SpR. These SpRs would not necessarily be committed to a speciality interest in Vascular Surgery. These posts would only be suitable for year 1-3 SpRs.

Both types of unit will have:

- At least two consultants who are members of the VSSGBI and regularly attend its meetings.
- A vascular surgical workload sufficient for training. This need not be fully comprehensive in each unit, provided the overall SpR programme gives full coverage.
- A ward with nursing staff experienced in looking after Vascular Surgery patients.
- Appropriate investigative facilities, including access to comprehensive angiology, CT scanning, MR scanning and Duplex ultrasound.
- Close collaboration and weekly clinical meetings with Vascular Interventional Radiologists.
- A multidisciplinary approach to vascular disease incorporating close links to related specialities, including care of the elderly/rehabilitation, limb fitting, neurology, cardiology, diabetology, nephrology, haematology and dermatology.
- An ITU and an HDU facility.
- Regular Postgraduate meetings and a climate which encourages health promotion and clinical risk management.
- A regular audit programme of vascular surgical caseload and outcomes with submission of data to the National Outcome Audit run by the VSSGBI.
- A climate which encourages clinical research.

In addition, a specialist vascular unit will have:

- A workload sufficient to provide personal operative experience for each trainee to achieve competence by year 6 in the index procedures of aortic aneurysm repair (elective and emergency), carotid endarterectomy and infra-inguinal bypass.
- Non invasive vascular laboratory facilities, including teaching of techniques and familiarity with Duplex ultrasound.
- A dedicated Vascular Emergency rota.
- Twenty four hour access to Vascular Radiology
- The opportunity to obtain training in Vascular Interventional Radiology.
- A programme of prospective vascular research projects, which are presented regularly at National Societies and which are published in peer-reviewed journals.

Vascular Surgery Trainees

- All Vascular Surgery trainees will have completed basic surgical training and will have passed the MRCS examination or equivalent.
- Training in General Surgery must be sufficient to ensure that trainees are competent to manage the full spectrum of Emergency General Surgery. This will require involvement in the rota for unselected General Surgical emergencies for a minimum of four years of Higher Surgical Training.
- Training in Vascular Surgery must be sufficient to ensure that trainees are competent to manage all vascular surgery emergencies.
- Vascular surgical trainees must pass the Intercollegiate Examination or equivalent and would normally submit Vascular Surgery as a Speciality interest.
- Year 6 vascular surgery trainees in possession of the Intercollegiate Examination or equivalent may wish to sit the EBSQ-Vasc.
- Training in SpR years 1-3 should be in General Surgery and should include at least one six month attachment to a General Vascular Unit.
- The flexible year should normally be spent in a clinical post relevant to Vascular Surgery, either in the UK or abroad. Only those trainees with a demonstrable commitment to a career in academic surgery should use their flexible year in research.
- SpR years 5 and 6 must be spent on a Specialist Vascular Unit.
- All Vascular Surgical trainees must keep a logbook of operative experience, including assisted, personal assisted and personal cases.
- By the end of year 6, all vascular trainees should have been involved in at least 200 arterial reconstructions. This experience must include as principal operator a minimum of 20 elective aortic aneurysm repairs, 5 ruptured aortic aneurysm repairs, 20 carotid endarterectomies and 10 infra-popliteal bypass grafts. At least 50% of each of these procedures should be personal assisted cases.

- Failure to obtain the operative experience detailed above by the end of year 6 should be addressed by an extra period of focused training on a Specialist Vascular Unit.

- The future development of effective competency assessments may allow the above targets to be modified according to individual SpR progress and achievement.

- There should be sufficient training in interventional radiology to perform the basic range of intra-operative interventions (arteriography and thrombolysis) as specified at level 2 by the joint VSSGBI/RCR working group[40].

- By the end of year 6, vascular surgery trainees should have obtained exposure to the majority of procedures specified in the Vascular Surgery Specialist Curriculum[40].

- Trainees in Vascular Surgery are encouraged to become Affiliate Members of the VSSGBI and attend its AGM. They are also encouraged to join the Rouleaux Club and to attend courses and workshops relevant to Vascular Surgery.

- Trainees in Vascular Surgery should show evidence of original thinking in the subject, either through the award of a Higher Degree in a vascular topic or through the publication of papers relevant to vascular surgery in peer-reviewed journals.

- Trainees in Vascular Surgery will have an annual appraisal by their VSSGBI Vascular Advisor. The advisor will make recommendations to the local Surgical Training Committee regarding future attachments on the SpR programme to ensure an adequate training in Vascular Surgery according to the above parameters.

Appendix 2

VAC Survey of Vascular Network Arrangements

125 Hospitals in 13 Regions Surveyed

Number of Vascular Consultants in hospitals with a vascular service

One	21%
Two	45%
Three	16%
Four	13%
Five	4%
Six	1%

Hospitals Providing 24/7 Vascular Emergency Service = 43%

Remote Hospitals > I hour by road from nearest adjacent hospital = 3%

Number of Centralised Services Actual = 2% Planned = 2% No Plans = 96%

Hospitals in Clinical Networks Actual = 44% Planned = 23% No Plans = 33%

Relationship Between Clinical Networks And 24/7 Vascular Emergency Cover In 125 Hospitals

	24/7 Emergency Cover	No 24/7 Emergency Cover	Total
Clinical Network	37	18	55 (44%)
No Clinical Network	17	53	70 (56%)
Total	54 (43%)	71 (57%)	125

Opinion of 13 Vascular Advisors

What is minimum acceptable vascular emergency rota? 1 in 4 = 2
1 in 5 = 3
1 in 6 = 7
1 in 8 = 1

In future, should all vascular emergencies be performed by vascular surgeons? Yes = 13 ; No = 0

Has the time come for vascular surgery to become a separate specialty? Yes = 9 ; No = 4

The Vascular Society of Great Britain and Ireland
at the Royal College of Surgeons
35-43 Lincoln's Inn Fields
London WC2A 3PE
Tel: 020 7973 0306
Fax: 020 7430 9235
E-mail: administrator@vssgbi.org
Website: www.vssgbi.org