

Vascular Surgery United Kingdom Workforce Survey 2018

Vascular Society of Great Britain & Ireland

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FOREWORD

Here we present the findings of the Vascular Surgery United Kingdom (UK) Workforce Survey 2018 on behalf of the Vascular Society of Great Britain & Ireland and Specialty Advisory Committee for Vascular Surgery. This document builds upon our previously published Vascular Surgery UK Workforce Survey 2013 and describes the characteristics of our new specialty of Vascular Surgery in 2018 (5 years on).

Vascular Surgery as a specialty represents one of the smaller physician specialty workforces, yet they treat a disease that is part of the number one killer in the UK and affects the fastest growing segment of the nation's population, atherosclerosis in the elderly. Vascular Services have evolved to incorporate the management of a vast array of conditions affecting the body's vascular system to include the arteries, veins, and lymphatics. The new generation of vascular surgeons must have a range of knowledge and technical skills consummate with the scope of modern vascular surgical practice to encompass vascular medicine, open surgery, and endovascular therapy.

Like the complex network of blood vessels throughout the body, so too there are many complex interactions between vascular surgeons, due to their specialist knowledge of blood vessels, and other specialists managing some of the most common and morbid conditions that affect our population such as stroke, heart disease, diabetes, trauma, and cancer. Vascular Disease such as atherosclerosis (blocked arteries), athero-embolism (stroke and limb ischaemia), venous thrombosis (clots), venous disease (varicose veins and ulcers), diabetic foot disease and aneurysm are amongst the commonest causes of disability, limb-loss (amputation) and death in our increasingly elderly population. By the nature of vascular disease vascular surgeons have a large urgent and emergency workload, also providing support for vascular trauma and bleeding catastrophes, making the vascular service integral to any acute clinical network.

Workforce planning is the process by which we ensure that an organisation has the right number of employees with the right knowledge skills and behaviours in the right place, at the right time. Workforce plans are the foundation that resource management activities such as recruitment, selection, orientation, training, and retention are built on. There are many factors which may impact on the shape of our vascular surgery service in the future and the workforce needed to provide it, and these include: reconfiguration of services; advances in healthcare practice; financial and political decisions. The Vascular Society of Great Britain & Ireland made recommendation on standards for a vascular surgery service in their documents "The Provision of Vascular Services 2018 (Updates on 2015 and 2012)". The Vascular Society has also made recommendations on the standards for Specialist Training in Vascular Surgery and Vascular Surgery Training Centres. Of course any planning must recognise the uncertainty of the future but using good intelligence, robust estimates can be made.

Thus, as we anticipate the changing demographics and treatable disease patterns over the next 40 years, it would appear inevitable that our specialty will be in short supply at a time when demand for our services is growing rapidly.

Mr Denis W Harkin MD FRCS FEBVS

Consultant Vascular Surgeon and Elected Council of Vascular Society Great Britain & Ireland.

On behalf of Vascular Society of Great Britain & Ireland

On behalf of the Specialty Advisory Committee for Vascular Surgery

EXECUTIVE SUMMARY

Vascular Surgery in the United Kingdom was established as a new surgical specialty in 2012. The Vascular Society of Great Britain & Ireland produced the first rigorous analysis of the specialty of Vascular Surgery in the UK with the publication of its United Kingdom Vascular Surgery Workforce Survey in 2013 and we now provide an updated assessment of the state of Vascular Surgery in the UK in the United Kingdom Vascular Surgery Workforce Survey 2018 (some 5 years on). Data from the National Vascular Registry were also analysed.

In developed countries Worldwide, both the number and complexity of vascular surgery procedures per capita population is increasing year-on-year. Worldwide there is considered to be a shortage of vascular surgeons to meet increasing demand and this shortfall is significant in the United Kingdom.

With the creation of the new specialty of Vascular Surgery the Stocktake of General (and Vascular) Surgery would suggest that at least 21% of the legacy General Surgery (including Vascular Surgery) workforce are specialist vascular surgeons and demand in both general and vascular surgery is predicted to increase by 67% by the year 2029 (13 years). In many regions when the surgical specialties of general and vascular surgery diverged the national training numbers (NTN) that should have transferred from general to vascular surgery did not follow, leading to a shortfall in training within vascular surgery which need to be addressed.

We found that the number of Consultant Vascular Surgeons in the devolved Nations and United Kingdom as a whole were as follows: England (n=445) 1 per 124,987 population; Scotland (n=42) 1 per 129,162 population; Wales (n=26) 1 per 120,200 population; Northern Ireland (n=9) 1 per 207,867 population; United Kingdom (n=522) 1 per 126,514 population. The United Kingdom nations varied widely in respect to their provision of vascular surgeons per capita population, with Northern Ireland having the least provision with only 1 per 207,867 population, nearly one-half of the provision available to England, Scotland and Wales.

We found the ratio of Vascular Surgeons per capita population varied widely between devolved nations and across regions of England. The provision across England from most to least was in North East (1 per 110,196), West Midlands (1 per 110,579), South West (1 per 111,186), London (1 per 113,141), Yorkshire & The Humber (1 per 113,544), North West (1 per 115,216), East of England (1 per 131,243), East Midlands (1 per 144,596) and South East (1 per 185,323).

When we compare the change in Consultant Vascular Surgeon numbers from 2013 to 2018 (5 years) we find improvements in England from 384 to 445 (+61), Scotland from 39 to 42 (+3) and Wales from 22 to 26 (+4). However, in Northern Ireland by contrast numbers have actually dropped from 13 to 9 (-4) making the level of under provision even worse with only 1 per 207,867 population compared to the United Kingdom average of 1 per 126, 514 population.

Our predictions for Expansion to create the recommended consultant workforce of 1 per 100,000 population would be as follows: England to expand and sustain the consultant workforce from 445 to 556 (+111) would require the NTN to increase from 178 to 333 (+155); Scotland to expand and sustain the consultant workforce from 42 to 54 (+12) would require the NTN increase from 17 to 39 (+22); Wales to expand and sustain the consultant workforce from 26 to 31 (+5) would require NTN increase from 10 to 17 (+7); Northern Ireland to expand and sustain the consultant workforce from 9 to 19 (+10) would require NTN increase from 4 to 18 (+14). Once a new steady state is achieved the workforce

could be sustained by applying maintenance numbers of NTN at a ratio of 0.4 (provided no additional Expansion is required).

The VSUKWS 2018, surveyed Members of the Vascular Society GB&I (VSGBI) based within the UK, and received 183 surveys completed by Consultant Vascular Surgeons and 47 Specialist Trainee in Vascular Surgery currently practicing in 70 Acute Hospital Trusts across the UK, 59 in England, 8 in Scotland, 2 in Wales and 1 in Northern Ireland and covering every Postgraduate Medical Training region in the UK (England, Scotland, Wales, and Northern Ireland).

It is undoubtedly clear that we need to plan for a significant expansion in the Consultant Vascular Surgeon Workforce over the short- and medium-term. To achieve this we urgently need an increase in National Training Numbers allocated to Vascular Surgery. To sustain and expand our Vascular Surgery Workforce it is essential we ensure training of sufficient numbers of new vascular surgeons.


RECOMMENDATIONS

We would make the following recommendations:

1. The demand for Vascular Surgery Services is increasing Worldwide and in the United Kingdom and we should expand Vascular Surgery Services to meet that increased demand.
2. The United Kingdom has significant geographical variation in the provision of Vascular Surgery Services and that should be addressed to ensure equality of access.
3. The United Kingdom must consider expansion in the number of Consultant Vascular Surgeons to achieve the recommended provision of 1 per 100,000 population.
4. The United Kingdom must consider expansion in the number of National Training Numbers in Vascular Surgery to maintain and expand its workforce.
5. Vascular Surgeons are contracted to work hours that are too long to be considered sustainable or provide a healthy work-life balance and this must be addressed by increasing overall numbers and creating more sustainable job-plans.
6. Vascular Surgery is a rapidly evolving acute specialty and Vascular Surgeons are performing an increasing number of Endovascular Interventions and that should be supported by providing access to Endovascular (image guided theatre) facilities and Radiography support.
7. Vascular Surgery has reconfigured to create regional managed clinical networks with central Arterial Hubs for inpatient care and complex procedures which support local Hospital Spokes which allow diagnosis and rehabilitation close to home.
8. Modern Vascular Surgeons provide a broad range modern vascular surgery services including vascular medicine, endovascular therapy and open surgery.

The Vascular Surgery UK Workforce Survey 2018


The survey shows more Vascular Surgeons and Vascular Trainees are needed for the growing demand for vascular disease care and expanding and aging population.



In the United Kingdom Vascular Disease accounts for:

- 1-in-3 Deaths from Cardiovascular Disease (166,000 Deaths)
- Peripheral Arterial Disease (PAD) affects 5 million people
- 3 million people are at risk of Diabetic Foot Disease


In the UK Vascular Surgeons manage Vascular Disease which affecting the bodies Arteries, Veins and Lymphatics.



Worldwide the demand for Vascular Care is increasing and need for more Vascular Surgeons is recognised:

- In USA (2008) Demand predicted increase by 72% (by 2030), headcount of Vascular Surgeons 1 per 108,000 Population
- In France (2011) Demand predicted increase by 61% (by 2030), headcount of Vascular Surgeons 1 per 107,000 Population
- In UK (2013) Demand predicted increase by 67% (by 2029), headcount of Vascular Surgeons 1 per 137,000 Population
- In UK (2018) headcount of Vascular Surgeons 1 per 126,000

In the UK demand for Vascular Care is increasing, yet we have fewer Vascular Surgeons per capita than comparable developed economies.




United Kingdom still has to few Vascular Surgeons:

Region	Consultants (2018)	Consultants (2013)	Change (5 Years)	Consultants (2018) per capita population
England	445	384	+61	1 per 124,987 population
Scotland	42	39	+3	1 per 129,162 population
Wales	26	22	+4	1 per 120,200 population
Northern Ireland	9	13	-4	1 per 207,867 population
United Kingdom	522	458	+64	1 per 126,514 population

Source: National Vascular Registry (2017) Vascular Surgeons who perform Abdominal Aortic Aneurysm (AAA) and Provision of Vascular Services (2018) which recommends Vascular Surgeon 1 per 100,000 capita of population. Office National Statistics (ONS) Population mid-year estimate 2018: United Kingdom (66,040,200); England (55,619,400); Scotland (5,424,800); Wales (3,125,200); Northern Ireland (1,870,800).
<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates>

The UK should invest overall and correct regional shortfalls in Vascular Services, Vascular Training and Vascular Surgeons.



United Kingdom needs significant expansion in Vascular Surgeons:

Region	Consultants (2018)	Consultants (Target)	Change (Number)	Change (%)	Target Consultants per capita population
England	445	557	+112	(25%)	1 per 100,000 population
Scotland	42	55	+13	(31%)	1 per 100,000 population
Wales	26	32	+6	(23%)	1 per 100,000 population
Northern Ireland	9	19	+10	(111%)	1 per 100,000 population
United Kingdom	522	663	+141	(27%)	1 per 100,000 population

Source: National Vascular Registry (2017) Vascular Surgeons who perform Abdominal Aortic Aneurysm (AAA) and Provision of Vascular Services (2018) which recommends Vascular Surgeon 1 per 100,000 capita of population. Office National Statistics (ONS) Population mid-year estimate 2018: United Kingdom (66,040,200); England (55,619,400); Scotland (5,424,800); Wales (3,125,200); Northern Ireland (1,870,800). Estimate for Change for Expansion rounded up to next whole consultant surgeon.
<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates>

Recommended expansion: 27% overall, up to 111% in Northern Ireland.

1. INTRODUCTION

Vascular Surgery

Vascular Surgery in the United Kingdom was established as a new surgical specialty by an Act of Parliament in 2012. Historically, in the United Kingdom (UK) vascular care was delivered by specially trained general surgeons with sub-specialty training in vascular surgery but in recognition of the increasing demand and highly-specialised nature of modern vascular care a new specialty was created. In many European countries and Worldwide, vascular surgery has been an independent specialty for several years. The General Medical Council (GMC) approved a new Vascular Surgery Curriculum detailing the scope of vascular surgery practice and the competencies required in vascular medicine, vascular surgery and endovascular therapy. The GMC established a network of new Specialty Training Programmes in Vascular Surgery in the UK with the support of the Surgical royal Colleges through the Joint Committee for Surgical Training (JCST) and Joint Committee for Intercollegiate Education (JCIE) and upon the advices of the new Specialty Advisory Committee (SAC) for Vascular Surgery.

Vascular Surgery treats vascular disease to include the arteries, veins and lymphatics. Vascular Disease such as atherosclerosis (blocked arteries), athero-embolism (stroke and limb ischaemia), aneurysms (to prevent rupture), venous thrombosis (clots), venous disease (varicose veins and ulcers) and diabetic foot disease are amongst the commonest causes of disability, limb-loss (amputation) and death in our increasingly elderly population. Vascular surgeons have a significant unscheduled (emergency) workload, managing sepsis, ischaemia, bleeding catastrophes and vascular trauma, making the vascular surgery service integral to any acute hospital or clinical network. Modern Vascular surgeons lead multidisciplinary teams who manage the broad scope of modern vascular surgical practice to encompass vascular medicine, open surgery, and endovascular therapy. In the United Kingdom vascular surgery became a separate specialty in 2012 and as we reconfigure acute and emergency services we must ensure that commissioners and workforce planners recognise the integral role of vascular surgeons in the delivery of those acute services.

Flashback to 2013: the First Vascular Surgery United Kingdom Workforce Survey 2013

The Vascular Society of Great Britain & Ireland (VSGBI) published a detailed survey of Consultant Vascular Surgeons in the United Kingdom conducted in 2013 (1). Using a self-reported questionnaire, the aim was to describe the demographic, training, and practice characteristics of consultant vascular surgeons across the UK. A secondary goal was to assess surgeons' workload and job satisfaction. A questionnaire was developed using a modified Delphi process to generate questionnaire items. The questionnaire was emailed to all consultant vascular surgeons (n=450) in the UK who were members of the Vascular Society of Great Britain & Ireland. We collated responses from 352 consultant vascular surgeons from 95 hospital trusts across the UK completed the survey (78% response rate). The mean age was 50.6 years old, the majority (62%) were mid-career, but 24% were above the age of 55. Currently, 92% are men and only 8% women. We found 93% work full-time, with 60% working >50 hours, and 21% working >60 hours per week. The average team was 5 to 6 (range 2 to 10) vascular surgeons, with 23% working in a large team of >8, and 17% still working in small teams of <3. Over 90% of consultant vascular surgeons perform the major index vascular surgery procedures (aneurysm repair, carotid endarterectomy, infra-inguinal bypass, amputation). While 84% perform standard endovascular abdominal aortic aneurysm repair (EVAR), <50% perform more complex endovascular aortic therapy. The majority of vascular surgeons "like their job" (85%) and are "satisfied" (69%) with

their job. We found 34% of consultant vascular surgeons indicated they were “extremely likely” to retire within the next 10 years.

Our study provided the first detailed analysis of the new specialty of vascular surgery in the UK.

Flashback to 2013: Estimating the Vascular Surgeon Workforce in the United Kingdom 2013

To arrive at an estimate of the current Vascular Surgeon Workforce in the UK and allow prediction of future workforce requirements we scrutinized data derived from the Vascular Surgery United Kingdom Workforce Survey (VSUKWS) 2013, National Health Service (NHS) Employers Electronic Staff Records (ESR), and the National Vascular Registry (NVR) surgeon level public report. The VSUKWS 2013, reported the views of 352 Consultant Vascular Surgeons, practicing in the UK. NHS Electronic Staff Records (ESR) represents an employer record of the physician workforce in the UK. The National Vascular Registry (NVR), records and reports on outcome activity data for vascular surgeons practicing in the UK (a legal requirement in England). VSUKWS 2013, surveyed 450 Members of the Vascular Society GB&I (VSGBI) based within the UK, and received 352 surveys (78% response rate) completed by Consultant Vascular Surgeons currently practicing in 95 NHS Hospital Trusts covering every Postgraduate Medical Training region in the UK (England, Scotland, Wales, and Northern Ireland). Respondents described themselves as Vascular Surgeons: none identified themselves as a General Surgeon. However, not all practicing Vascular Surgeons in the UK are members of the VSGBI. Therefore, other sources of information were considered. The National Health Service (NHS) collates data on consultant workforce primarily from Electronic Staff Records (ESR). Unfortunately, as a new specialty there is no historical data for Vascular Surgery, as previously a sub-specialty of General Surgery (pre-2013) even specialist Vascular Surgeons would have been coded as General Surgeons on these records. Therefore, we felt ESR data was currently unreliable and could not be used for further analysis. Without reliable data from employers we looked to other sources of information. The National Vascular Registry (NVR) “2013 Report on Surgical Outcomes Consultant-level Statistics” records that 458 surgeons in UK were conducting Abdominal Aortic Aneurysm (AAA) repair. With a UK population circa 63 million, this suggests that currently the ratio of vascular surgeons to capita population is 1 per 137,000.

The VSGBI recommends a minimum of 1 vascular surgeon per 150,000, and for large tertiary centres, due to added complexity of case load, 1 per 100,000 population. Many consider AAA repair to be an index procedure for a specialist vascular surgeon, and an essential skill for a Vascular Generalist equipped to manage un-selected Vascular Surgery Emergencies. Using this definition we felt the NVR data provided the most robust current estimate of vascular surgeons currently practicing in the UK, and these numbers are used in future predictions. We considered the ratio of consultant vascular surgeons, per capita population, across the UK. The Office for National Statistics gives the population for the Nations of the UK as of mid2010 to be as follows: Scotland, 5.3 million; Wales, 3 million; Northern Ireland, 1.8 million; England, 52.6 million. To determine whether there are sufficient numbers of Consultant Vascular Surgeons to deliver a safe level of Vascular Surgery Service across the respective UK Nations, we carried out weighted-capitation transformation based on assumed ideal numbers of consultant vascular surgeons' per capita population, as follows: 1 per 150,000 as VSGBI (minimum number); 1 per 137,000 as number registered by NVR (surgeons conducting AAA repair); 1 per 100,000 as VSGBI (number for tertiary centres).

Table 1. Estimation of consultant vascular surgeons per capita population by UK region in 2013.

Table 1 – Estimation of vascular surgeons per capita population by UK region.

Weighted capitacion	Scotland	Wales	Northern Ireland	England	Greater London	Total
1 per 150,000 ^a	35	20	12	351	55	418
1 per 137,000 ^b	39	22	13	384	61	458
1 per 100,000 ^c	53	30	18	526	83	627

^a 1 per 150,000 as POVS (minimum recommended number).
^b 1 per 137,000 as number registered by NVR (surgeons in UK conducting AAA repair).
^c 1 per 100,000 as POVS (number for tertiary centres).

Flashback to 2016: General (and Vascular) Surgery United Kingdom Stocktake 2016

The Centre for Workforce Intelligence (CfWI) was commissioned by Health Education England (HEE) and the Department of Health (DH) to undertake a stocktake of the general surgery (and vascular surgery) workforce in England. The CfWI estimated the future number of CCT holders that would enable current levels of general surgery services per patient to be maintained to 2029. The CfWI also estimated how many general surgery trainees need to enter higher specialty training (HST) to ensure an adequate supply of CCT holders in the future to maintain current levels of general surgery services per patient by the end of the projection period (2029). In addition, it was recognised that there are a number of registered general surgeons who specialise solely in vascular surgery.

All English trained CCT holding surgeons currently specialising in vascular surgery gained their CCTs as general surgeons. Vascular surgery became a separate surgical specialty in 2012, at which point those surgeons specialising in vascular surgery should have ideally been re-coded from 'general' to 'vascular' surgeons on the ESR. However, most vascular surgeons have not yet been recoded so they are still registered on HSCIC systems as general surgeons.

HSCIC data (HSCIC, 2014) shows that there were 2,077 general surgery consultants (HC) in England in September 2013. The National Vascular Registry (NVR) records 458 surgeons (headcount (HC)) in the UK performing elective eAAA repair as at December 2012 (NVR, 2013). Of these, 417 indicated working within an NHS trust or health board based in England. The CfWI has calculated an average of 20 vascular surgeons completing training each year in England up to 2013, bringing the 2013 total to 437 vascular surgery consultants. Based on these figures and assumptions above it is fair to assume that as of September 2013 around 21 per cent (437/2,077) of general surgeons were practising as vascular surgery consultants.

The general surgery (including vascular surgery) consultant workforce has grown strongly over the past decade from 1,457 full-time equivalent staff (FTE) in 2003 to 2,029 FTE in 2013 (HSCIC, 2014); a 39 per cent increase and a compound annual growth rate of 3.4 per cent. The principal projection of patient demand for general surgery (including vascular surgery) forecasts growth of around 67 per cent by 2029, as a result of a growing and ageing population, greater average individual patient need and decreasing surgeon productivity.

Therefore, all available estimates would suggest that at least 21% of the legacy General Surgery (including Vascular Surgery) workforce are specialist vascular surgeons and demand in both general and vascular surgery is predicted to increase by 67% by the year 2029 (13 years).

Planning Vascular Surgery Training Requirements in the United Kingdom

Vascular surgery has recruited its own specialty trainees since 2013 and has proven a popular and competitive surgical specialty, with significantly more applicants per training number than general surgery and 100% uptake year-on-year of training positions. As a new specialty in 2013 the vascular surgery specialty estimated that around 20 new vascular surgeons per year would be required in UK and this was used to set the number of UK vascular surgery ST3 NTN in 2013, distributed across England (16), Wales (one), Scotland (two), and Northern Ireland (one). These 20 posts were not new commissions but were taken from general surgery posts, which was appropriate as vascular surgeons had previously trained within the general surgery curriculum. The vascular surgery specialty has more recently revised its projected vascular surgeon requirement to between 26 and 29 per year in the UK to maintain status quo. This was discussed with HEE and resulted in HEE medical education commissioning proposals to rebadge a further eight general surgery ST3 posts to vascular surgery in England for 2015/16 (HEE, 2015), bringing the total vascular surgery NTN in England to 24 from 2015.

To maintain a stable workforce the ratio of trainees in program to consultants in post is preferred at a ratio of 0.4, to maintain workforce supply. Considering England's training requirements if vascular surgeons represent 21% (417) of the legacy general surgery (including vascular surgery) consultant workforce, to maintain workforce supply England should have 169 (0.4 ratio) NTN in vascular surgery over a 6-year training programme that would represent and intake of 28 NTN in vascular surgery per year for England alone. Considering national recruitment for the entire United Kingdom that number to maintain the workforce would be at least 183 NTN or an intake of 30 NTN in vascular surgery per year. Obviously, there are other factors at play and as legacy general surgery (including vascular surgery) continue to separate fully and as we welcome the new consultants emerging from the specialist vascular surgery training programme in 2019 the position of vascular surgery within the wider umbrella of surgical specialties will become clear.

In 2013 we had concluded that to maintain workforce supply in United Kingdom we would recommend between 26 and 30 NTN in vascular surgery each year in the United Kingdom (26 to 28 in England).

A Worldwide Perspective: Vascular Surgery Workforce Worldwide

In the USA, the Healthcare Cost and Utilization Project Nationwide Inpatient Sample has reported a net increase in vascular surgery procedures and (based on these trends) they have predicted inpatient vascular surgery workloads to increase (compared with 2008) by 18% by 2015, 34% by 2020, and 72% by 2030. In the USA in 2008, it was reported that the estimated ratio of vascular surgeon per capita population was approximately 1 per 108,000 population. France, a close European neighbour to the UK with a similar population size, demographic, and socio-economic status, has 611 active vascular surgeons giving them an estimated ratio of vascular surgeon per capita population of approximately 1 per 107,000 population. France has also predicted a 61% increase in major vascular surgery interventions by the year 2030. Combined with the effect of an increasing and increasingly aged population, they have predicted that they would need a 30% (circa 183) increase in the numbers of consultant vascular surgeons. Both of these studies recognize a dramatic increase in vascular workload and recommend that vascular surgery training processes would need to adapt to ensure an adequate number of trained vascular surgeons are available to provide quality vascular care in the future. Obviously there are significant differences between the healthcare systems in these comparator countries, which make direct comparison difficult. However, despite their concerns both of these countries already have significantly greater numbers of vascular surgeons per capita population than

the UK where it may be as low as 1 consultant per 137,000 population (i.e. 7 vascular surgeons per million population).

Vascular surgery is a new surgical specialty in the UK but is well established as an independent specialty in several countries within Europe, and in North America, Australia, and Asia. In developed countries, both the number and complexity of vascular surgery procedures per capita population is increasing year-on-year. Fowkes et al., in their analysis of reported global trends noted a significant increase in the prevalence of peripheral arterial disease over the decade ending 2010. In the United States America (USA) the Healthcare Cost and Utilization Project Nationwide Inpatient Sample has demonstrated a net increase in vascular surgery procedures and based on these trends they have predicted inpatient vascular surgery workload to increase (compared to 2008) by 18% by 2015, 34% by 2020, and 72% by 2030. In the USA in 2008, it was reported that the estimated ratio of Vascular Surgeons per capita population of approximately 1 per 108,000 population. France, a close European Neighbour, by comparison to the UK has a similar population size, demographic, and socio-economic status. In France in 2011 it was reported that there were 611 active vascular surgeons for a population of circa 65 million, giving them an estimated ratio of Vascular Surgeon per capita population of approximately 1 per 107,000 population. They too recognized a substantial increase in vascular surgery procedures per capita population and predict a 61% increase in major vascular surgery interventions by the year 2030. Combined with the effect of an increasing and increasingly aged population, they predicted they would need a 30% increase in numbers of vascular surgeons.

Obviously, there are significant differences between the healthcare systems in these comparator countries, which make direct comparison difficult, but despite their obvious concerns both countries have significantly greater numbers of vascular surgeons per capita population than the UK.

Reconfiguration of Vascular Surgery Services in United Kingdom (2013 to 2018)

The Vascular Society of Great Britain & Ireland made recommendation on service reconfiguration in The Provision of Vascular Services 2012, updated in 2015 and 2018. There is substantive evidence that clinicians, clinical managers, and commissioning groups across the United Kingdom are engaged in a process of re-configuration of Vascular Surgical Services. This has led in many regions to the creation of organized clinical networks with inpatient vascular surgery services being provided in central “hub” hospitals by large teams (8, or more) and outpatient and day-case services being provided in the regional “spoke” hospitals by ambulatory vascular surgical teams.

Currently, if fully implemented these changes are likely to result in the re-configuration of emergency and inpatient Vascular Surgical Services to a smaller number of Vascular Surgery Centres, perhaps only 50, located in large Acute NHS Hospital Trusts across the United Kingdom. These Centres will provide for the needs of between 0.9 million and 1.26 million (or greater) population. It is also likely that a smaller number of these Centres, perhaps between 10 and 20, will become super-Specialist Tertiary Referral Centres for complex Open and Endovascular Surgery. These will provide for the needs of between 3.15 million and 6.3 million (or greater) population. To provide safe and sustainable 24/7 elective and emergency Vascular Surgery Services within these units, we should expect a significant expansion of current specialist Consultant Vascular Surgeons. Historically in the United Kingdom the majority of Surgical Emergencies, including Trauma, have been managed by General Surgeons. Many General Surgeons are no-longer equipped to manage Vascular Surgery Emergencies due to changes in their training curriculum, skill-set, and experience. Therefore, the majority of these units will have

between 8 and 10 Consultant Vascular Surgeons to provide safe and sustainable 24/7 emergency cover.

Sufficient Consultant Vascular Surgeons who are equipped as Generalist Vascular Surgeons, and able to manage an unselected emergency Vascular Surgery workload, are needed to provide safe and sustainable 24/7 emergency cover for vascular surgery services in the United Kingdom.

Summary

There is a recognition in developed economies Worldwide that due to changing demographics and vascular disease patterns that there is an increase in both the number and complexity of vascular surgery interventions. Furthermore, there is a recognition that there needs to be an increase in the number of Vascular Surgeons in those Countries if that increased demand is to be met. In the United Kingdom the number of Vascular Surgeons and Vascular Surgery Trainees per capita population is amongst the lowest of any developed economy Worldwide. Furthermore, within the United Kingdom there are gross regional disparities in the numbers of Vascular Surgeons serving those regional populations which can lead to a gross inequity of access to those essential vascular services.

2. WORKFORCE ANALYSIS 2018

Vascular Surgery in the United Kingdom was established as a new surgical specialty in 2012. The Vascular Society of Great Britain & Ireland produced the first rigorous analysis of the specialty of Vascular Surgery in the UK with the publication of its United Kingdom Vascular Surgery Workforce Survey in 2013 and we now provide an updated assessment of the state of Vascular Surgery in the UK in the United Kingdom Vascular Surgery Workforce in 2018 (some 5 years on).

Workforce planning is the process by which we ensure that an organisation has the right number of employees with the right knowledge skills and behaviours in the right place, at the right time. Workforce plans are the foundation that resource management activities such as recruitment, selection, orientation, training, and retention are built on. There are many factors which may impact of the shape of our vascular surgery service in the future and the workforce needed to provide it, and these include: reconfiguration of services; advances in healthcare practice; financial and political decisions. The Vascular Society of Great Britain & Ireland made recommendation on standards for a vascular surgery service in their documents “The Provision of Vascular Services 2018 (Updates on 2015 and 2012)”. The Vascular Society has also recommendations on the standards for Specialist Training in Vascular Surgery and Vascular Surgery Training Centres. Of course any planning must recognise the uncertainty of the future but using good intelligence robust estimates can be made.

Methodology

To arrive at an estimate of the current Vascular Surgeon Workforce in the UK and allow prediction of future workforce requirements we scrutinized data derived from the Vascular Surgery United Kingdom Workforce Survey (VSUKWS) 2018, National Health Service (NHS) Employers Electronic Staff Records (ESR), and the National Vascular Registry (NVR) surgeon level public report 2018.

The VSUKWS 2018, reports the views of Members of the Vascular Society of Great Britain & Ireland. VSUKWS 2018, surveyed Members of the Vascular Society GB&I (VSGBI) based within the UK, and received 183 surveys completed by Consultant Vascular Surgeons currently practicing in 70 Acute Hospital Trusts across the UK, 59 in England, 8 in Scotland, 2 in Wales and 1 in Northern Ireland and covering every Postgraduate Medical Training region in the UK (England, Scotland, Wales, and Northern Ireland). Respondents described themselves as Vascular Surgeons: none identified themselves as a General Surgeon. However, not all practicing Vascular Surgeons in the UK are members of the VSGBI. Therefore, other sources of information were considered. NHS Electronic Staff Records (ESR) represents an employer record of the physician workforce in the UK. The National Health Service (NHS) collates data on consultant workforce primarily from Electronic Staff Records (ESR). Unfortunately, as a new specialty there is no historical data for Vascular Surgery, as previously a sub-specialty of General Surgery (pre-2013) even specialist Vascular Surgeons would have been coded as General Surgeons on these records. Therefore, we felt ESR data was currently unreliable and could not be used for further analysis. Without reliable data from employers we looked to other sources of information.

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“2018 Report on Surgical Outcomes Consultant-level Statistics” records that 522 in UK were conducting Abdominal Aortic Aneurysm (AAA) repair. With a UK population circa 66 million, this suggests that currently the ratio of vascular surgeons to capita population is 1 per 126,000. Using this definition we felt the NVR data provided the most robust current estimate of vascular surgeons currently practicing in the UK, and these numbers are used in future predictions.

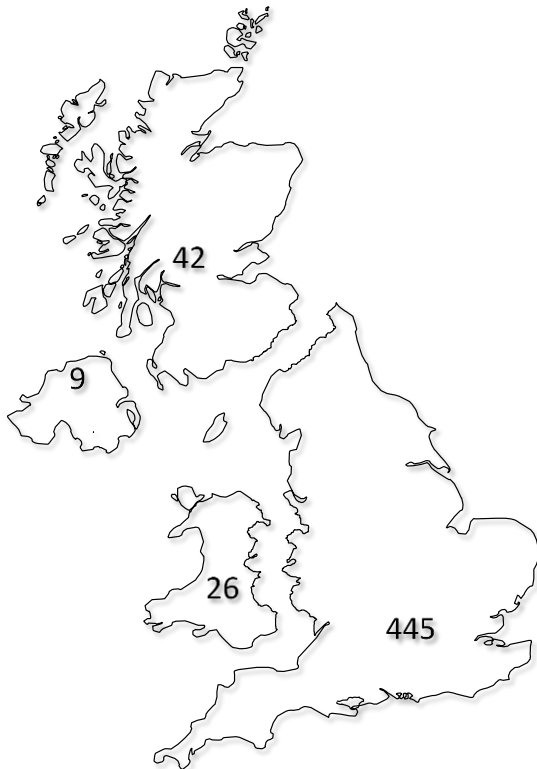
The VSGBI in its updated “Provision of Vascular Services 2018” recommends a minimum of 1 vascular surgeon per 100,000 population, comparable with other similar developed economies Worldwide. Currently the ratio of vascular surgeons per capita population in the United Kingdom is 1 per 126, 000.

Vascular Surgery Consultant Workforce in United Kingdom 2018

We considered the ratio of consultant vascular surgeons, per capita population, across the UK. The Office for National Statistics gives the population for the Nations of the UK as of Office National Statistics (ONS) Population mid-year estimate 2018: United Kingdom (66,040,200); England (55,619,400); Scotland (5,424,800); Wales (3,125,200); Northern Ireland (1,870,800). To determine whether there are sufficient numbers of Consultant Vascular Surgeons to deliver a safe level of Vascular Surgery Service across the respective UK Nations, we carried out weighted-capitation transformation based on assumed ideal numbers of consultant vascular surgeons' per capita population, as follows: Weighted capitation estimate as number registered by NVR (surgeons conducting AAA repair); 1 per 100,000 as VSGBI (recommended minimum number per population).

Figure 1. United Kingdom Vascular Surgery Workforce by Nation and per capita population in 2018.

United Kingdom Vascular Surgery Workforce (Consultants), by Nation and per capita population, 2018.



Region	Consultants (2018)	Population (2018)	Consultants (2018) per capita population
England	445	55,619,400	1 per 124,987 population
Scotland	42	5,424,800	1 per 129,162 population
Wales	26	3,125,200	1 per 120,200 population
Northern Ireland	9	1,870,800	1 per 207,867 population
United Kingdom	522	66,040,200	1 per 126,514 population

Source: National Vascular Registry (2017) Vascular Surgeons who perform Abdominal Aortic Aneurysm (AAA) and Provision of Vascular Services (2018) which recommends Vascular Surgeon 1 per 100,000 capita of population. Office National Statistics (ONS) Population mid-year estimate 2018: United Kingdom (66,040,200); England (55,619,400); Scotland (5,424,800); Wales (3,125,200); Northern Ireland (1,870,800). <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates>.

We found that the number of Consultant Vascular Surgeons in the devolved Nations and United Kingdom as a whole were as follows: England (n=445) 1 per 124,987 population; Scotland (n=42) 1 per 129,162 population; Wales (n=26) 1 per 120,200 population; Northern Ireland (n=9) 1 per 207,867 population; United Kingdom (n=522) 1 per 126,514 population. The United Kingdom nations varied widely in respect to their provision of vascular surgeons per capita population, with Northern Ireland having the least provision with only 1 per 207,867 population, nearly one-half of the provision available to England, Scotland and Wales. In a region such as Northern Ireland with one of the fastest growing populations this shortfall needs urgently addressed.

Northern Ireland having the least provision with only 1 per 207,867 population, a level of provision nearly one-half of the provision available to England, Scotland and Wales

Table 2. United Kingdom Vascular Surgery Workforce by Region per Capita Population in 2018.

United Kingdom Vascular Surgery Workforce (Consultants), by Region per Capita Population (2018).

Region	Consultants (2018)	Population (2018)	Consultants (2018) per capita population
East Midlands	33	4,771,666	1 per 144,596
East of England	47	6,168,432	1 per 131,243
London	78	8,825,001	1 per 113,141
North East	24	2,644,727	1 per 110,196
North West	63	7,258,627	1 per 115,216
South West	50	5,559,316	1 per 111,186
South Central*	20*	-	-

South East Coast~	29~	-	-
South East (includes*~)	49 (*~)	9,080,825 (includes*~)	1 per 185,323
West Midlands	53	5,860,706	1 per 110,579
Yorkshire & The Humber	48	5,450,130	1 per 113,544
England	445	55,619,400	1 per 124,987
Scotland	42	5,424,800	1 per 129,162
Wales	26	3,125,200	1 per 120,200
Northern Ireland	9	1,870,800	1 per 207,867
United Kingdom	522	66,040,200	1 per 126,514 population

Source: National Vascular Registry (2017) Vascular Surgeons who perform Abdominal Aortic Aneurysm (AAA) and Provision of Vascular Services (2018) which recommends Vascular Surgeon 1 per 100,000 capita of population. Office National Statistics (ONS) Population mid-year estimate 2018: United Kingdom (66,040,200); England (55,619,400); Scotland (5,424,800); Wales (3,125,200); Northern Ireland (1,870,800).

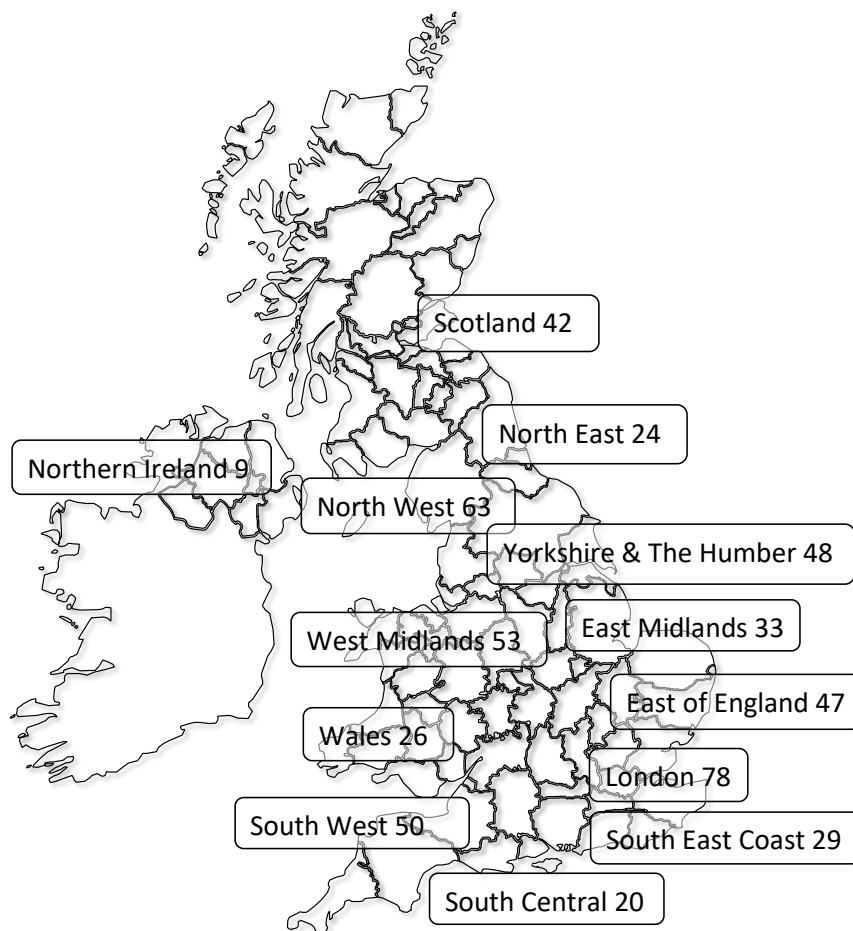
<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates>.

Furthermore, we analysed the number of vascular surgeons per capita population for each of the devolved Nations and by administrative region within England. We found the ratio of Vascular Surgeons per capita population varied widely between devolved nations and across regions of England. The provision across England from most to least was in North East (1 per 110,196), West Midlands (1 per 110,579), South West (1 per 111,186), London (1 per 113,141), Yorkshire & The Humber (1 per 113,544), North West (1 per 115,216), East of England (1 per 131,243), East Midlands (1 per 144,596) and South East (1 per 185,323).

The South East region (which incorporates South Central and South East Coast) would appear to have the least provision in England but it is recognised that there is a degree of population overlap in these administrative regions with centralised vascular surgery centres providing care to populations across some region (**Figure 2**).

Figure 2. United Kingdom Vascular Surgery Workforce by Geographical Region.

United Kingdom Vascular Surgery Workforce, 2018.



The last Vascular Surgery UK Workforce analysis in 2013 had highlighted a significant under provision of vascular surgery services across the UK. Stakeholders including the Departments of Health and those tasked with sustaining our workforce recognised the need for an expansion in numbers and had supported that in several of the devolved nations of the UK. When we compare the change in Consultant Vascular Surgeon numbers from 2013 to 2018 (5 years) we find improvements in England from 384 to 445 (+61), Scotland from 39 to 42 (+3) and Wales from 22 to 26 (+4). However, in Northern Ireland by contrast numbers have actually dropped from 13 to 9 (-4) making the level of under provision even worse with only 1 per 207,867 population compared to the United Kingdom average of 1 per 126, 514 population (**Table 3**).

The numbers of Consultant Vascular Surgeons over the last 5 years have increased in England, Scotland and Wales but in contrast have reduced in Northern Ireland.

Table 3. United Kingdom Vascular Surgery Workforce (Consultants), Change 2013 to 2018 (5 Years).

Region	Consultants (2018)	Consultants (2013)	Change (5 Years)	Consultants (2018) per capita population
England	445	384	+61	1 per 124,987 population

Scotland	42	39	+3	1 per 129,162 population
Wales	26	22	+4	1 per 120,200 population
Northern Ireland	9	13	-4	1 per 207,867 population
United Kingdom	522	458	+64	1 per 126,514 population

Source: National Vascular Registry (2017) Vascular Surgeons who perform Abdominal Aortic Aneurysm (AAA) and Provision of Vascular Services (2018) which recommends Vascular Surgeon 1 per 100,000 capita of population. Office National Statistics (ONS) Population mid-year estimate 2018: United Kingdom (66,040,200); England (55,619,400); Scotland (5,424,800); Wales (3,125,200); Northern Ireland (1,870,800).
<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates>.

Whilst improvement in numbers has been noted in most regions we still need more. The Vascular Society of Great Britain & Ireland recommends the minimum number of Consultant Vascular Surgeons to provide safe provision of vascular surgery services is 1 per 100,000 population. That number is comparable to the provision in other similar developed economies Worldwide. To achieve that goal we considered what degree of expansion in numbers would be need across the devolved Nations and the United Kingdom as a whole (Table 4).

Table 4. United Kingdom Vascular Surgery Workforce (Consultants), needed to achieve recommended target of Vascular Surgeons, 1 per 100,000 Population.

Region	Consultants (2018)	Consultants (Target)	Change (Number)	Change (%)	Target Consultants per capita population
England	445	557	+112	(25%)	1 per 100,000 population
Scotland	42	55	+13	(31%)	1 per 100,000 population
Wales	26	32	+6	(23%)	1 per 100,000 population
Northern Ireland	9	19	+10	(111%)	1 per 100,000 population
United Kingdom	522	663	+141	(27%)	1 per 100,000 population

Source: National Vascular Registry (2017) Vascular Surgeons who perform Abdominal Aortic Aneurysm (AAA) and Provision of Vascular Services (2018) which recommends Vascular Surgeon 1 per 100,000 capita of population. Office National Statistics (ONS) Population mid-year estimate 2018: United Kingdom (66,040,200); England (55,619,400); Scotland (5,424,800); Wales (3,125,200); Northern Ireland (1,870,800). Estimate for

Change for Expansion rounded up to next whole consultant surgeon.

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates>.

Summary

We have analysed the Consultant Vascular Surgery Workforce in the United Kingdom from the best currently available data-set, namely the National Vascular Registry. We found that the number of Consultant Vascular Surgeons in the devolved Nations and United Kingdom as a whole were as follows: England (n=445) 1 per 124,987 population; Scotland (n=42) 1 per 129,162 population; Wales (n=26) 1 per 120,200 population; Northern Ireland (n=9) 1 per 207,867 population; United Kingdom (n=522) 1 per 126,514 population. The United Kingdom nations varied widely in respect to their provision of vascular surgeons per capita population, with Northern Ireland having the least provision with only 1 per 207,867 population, nearly one-half of the provision available to England, Scotland and Wales. Furthermore, within England we found the ratio of Vascular Surgeons per capita population varied widely across regions which can lead to inequity of access to these essential services.

3. TRAINING THE FUTURE WORKFORCE

New Specialty of Vascular Surgery

Vascular Surgery was established as a new surgical Specialty by Act of Parliament in 2012. The extensive Scope of Vascular Surgery Practice is outlined in our approved curriculum⁴. The Vascular Society has made recommendations on the standards for Specialist Training in Vascular Surgery. The new Specialty Advisory Committee (SAC) for Vascular Surgery Training, on behalf of the Joint (Surgical Colleges) Committee for Surgical Training (JCST), was established to provide expert advice to the General Medical Council (GMC) and Postgraduate Training Deaneries on the Vascular Surgery Curriculum content and delivery. The new generation of Vascular Surgeons will need to have a range of new skills consummate with the scope of modern vascular surgery practice to encompass vascular medicine, open surgery, and endovascular therapy.

Vascular Surgery Training

The General Medical Council (GMC) approved 14 Training Programmes across the United Kingdom in 2013. Vascular Surgery was allotted only 20 National Training Numbers (NTN) per year. The 273 applicants for Vascular Surgery went through a National Selection process and 20 were selected. The current specialist training programme for vascular surgery is 6 years. However, it takes a minimum of 10 years from point of graduation from medical school to train a consultant vascular surgeon (2 years foundation training, 2 years core surgery training, and 6 years specialist vascular surgery training). Historically specialty training for a large minority would have been extended further by the addition of Out-of-Program-Experience (OOPE) in a specialist centre in the United Kingdom or Internationally for 1 or 2 years. However, new specialist training programmes for vascular surgery are designed to deliver high-quality training commensurate with the requirements of the vascular surgery curriculum and are eligible from a certificate of completion of training and appointment as a Consultant vascular surgeon within the United Kingdom.

Table 5. Current Numbers National Training Numbers for Vascular Surgery in United Kingdom, 2018.

Region	NTN Vascular Surgery	NTN General Surgery (Vascular Subspecialty)	Total NTN
East Midlands	9	2	11
East of England	13	0	13
London	29	15	44
Northern	8	2	10
North West + Mersey	20	1	21
Severn + Peninsula	6	1	7
Oxford + Wessex			10
Kent, Surrey & Sussex	5	2	7
East Midlands	9	2	11
West Midlands	15	5	20
Yorkshire & The Humber			22*
England			176
Scotland	11	4	15

Wales	5	1	6
Northern Ireland	3	0	3
United Kingdom			200

Data from Vascular Surgery Specialty Advisory Committee and Deanery, Jan 2018.

Whilst the level of service provision will ultimately be based on governmental healthcare policy in this area, it is undoubtedly clear that we need to plan for a significant expansion in the Consultant Vascular Surgeon Workforce over the short- and medium-term.

To achieve this we urgently need an increase in National Training Numbers allocated to Vascular Surgery. To sustain and expand our Vascular Surgery Workforce it is essential we ensure training of sufficient numbers of new vascular surgeons (**Table 6**). Most forecasts assume for sustainability a Consultant to Trainee Ratio of 0.4, and using that factor we can predict how many additional trainees would be required to create the recommended Consultant Vascular Surgery Workforce of 1 per 100,000 population.

Table 6. United Kingdom Vascular Surgery Workforce (Trainees), by Region to Achieve and Sustain Recommended Consultants per Capita Population (2018).

United Kingdom Vascular Surgery Workforce (Trainees), by Region to Achieve and Sustain recommended Consultants per Capita Population (2018).

Region	Population (2018)	Consultants (2018)	Trainees (Ratio 0.4)	If Consultants (1 per 100,000)	NTN (+138) Expansion	NTN (Ratio 0.4) Maintenance	NTN Total
East Midlands	4,771,666	33	13	48 (+15)	+15	19	34
East of England	6,168,432	47	19	62 (+15)	+15	25	40
London	8,825,001	78	31	88 (+10)	+10	35	45
North East	2,644,727	24	10	26 (+2)	+2	10	12
North West	7,258,627	63	25	73 (+10)	+10	29	39
South West	5,559,316	50	20	56 (+6)	+6	22	28
South Central*	-	(20)*	(8)*	(37)*	(+17)*	(15)*	(22)*
South East Coast~	-	(29)~	(12)~	(53)~	(+24)~	(21)~	(45)~
South East (includes*~)	9,080,825*~	49	20	90 (+41)	+41	36	77
West Midlands	5,860,706	53	21	59 (+6)	+6	24	30
Yorkshire & The Humber	5,450,130	48	19	55 (+7)	+7	22	29
England	55,619,400	445	178	556 (+111)	+111	222	333 (+155)
Scotland	5,424,800	42	17	54 (+12)	+12	27	39 (+22)
Wales	3,125,200	26	10	31 (+5)	+5	12	17 (+7)
Northern Ireland	1,870,800	9	4	19 (+10)	+10	8	18 (+14)
United Kingdom	66,040,200	522	209	660 (+138)	+138	269	407 (+198)

Source: National Vascular Registry (2017) Vascular Surgeons who perform Abdominal Aortic Aneurysm (AAA) and Provision of Vascular Services (2018) which recommends Vascular Surgeon 1 per 100,000 capita of population. Office National Statistics (ONS) Population mid-year estimate 2018: United Kingdom (66,040,200); England (55,619,400); Scotland (5,424,800); Wales (3,125,200); Northern Ireland (1,870,800). South East Administrative Region contains South Central* and South East Coast~ Training Regions. South <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates>.

To expand the consultant workforce to a ratio of 1 per 100,000 population we would need new NTN in a 1 to 1 replacement ratio and then to sustain that corrected workforce we would need a maintenance ratio of 0.4 NTN per consultant. Our predictions for Expansion to create the recommended consultant workforce of 1 per 100,000 population would be as follows: England to

expand and sustain the consultant workforce from 445 to 556 (+111) would require the NTN to increase from 178 to 333 (+155); Scotland to expand and sustain the consultant workforce from 42 to 54 (+12) would require the NTN increase from 17 to 39 (+22); Wales to expand and sustain the consultant workforce from 26 to 31 (+5) would require NTN increase from 10 to 17 (+7); Northern Ireland to expand and sustain the consultant workforce from 9 to 19 (+10) would require NTN increase from 4 to 18 (+14). Obviously, the population and respective workforce needs may increase during the 6 year training cycle and the ultimate requirements may be higher. Once a new steady state is achieved the workforce could be sustained by applying maintenance numbers of NTN at a ratio of 0.4 (provided no additional Expansion is required).

We will need to train and appoint sufficient numbers of new Consultant Vascular Surgeons in the United Kingdom to maintain the status quo.

Summary

With the creation of the new specialty of Vascular Surgery the Stocktake of General (and Vascular) Surgery would suggest that at least 21% of the legacy General Surgery (including Vascular Surgery) workforce are specialist vascular surgeons and demand in both general and vascular surgery is predicted to increase by 67% by the year 2029 (13 years). In many regions when the surgical specialties of general and vascular surgery diverged the national training numbers (NTN) that should have transferred from general to vascular surgery did not follow, leading to a shortfall in training within vascular surgery which needs addressed.

Our predictions for Expansion to create the recommended consultant workforce of 1 per 100,000 population would be as follows: England to expand and sustain the consultant workforce from 445 to 556 (+111) would require the NTN to increase from 178 to 333 (+155); Scotland to expand and sustain the consultant workforce from 42 to 54 (+12) would require the NTN increase from 17 to 39 (+22); Wales to expand and sustain the consultant workforce from 26 to 31 (+5) would require NTN increase from 10 to 17 (+7); Northern Ireland to expand and sustain the consultant workforce from 9 to 19 (+10) would require NTN increase from 4 to 18 (+14). Once a new steady state is achieved the workforce could be sustained by applying maintenance numbers of NTN at a ratio of 0.4 (provided no additional Expansion is required).

In 2018 (5 years on) the shortfall in Vascular Surgery Training Numbers is even more acute than in 2013 and if we are to address the shortfall in consultant vascular surgeons by training additional surgeons we may require expansion of vascular surgery training numbers from 209 to 407 (+198), or an increase from 35 to 68 NTN in vascular surgery per year, to address the shortfall in consultant numbers and maintain the workforce in the new steady-state. Obviously, such an increase would depend upon a political will to improve the vascular service and may need to be managed in a staged fashion to allow increase in training positions and to reduce the risk of destabilising other similarly under-resourced specialties. There also need to be a focus upon regional sustainability by appointing training numbers to regions where the shortfall in consultant vascular surgeons is most acute.

4. WORKFORCE SURVEY 2018

Workforce planning is the process by which we ensure that an organisation has the right number of employees with the right knowledge skills and behaviours in the right place, at the right time.

Bodies such as the Centre for Workforce Intelligence (CfWI) (<http://www.cwfi.org.uk>) are working in conjunction with the National Health Service to plan for the future needs of the health service so that we can implement systems now try and ensure we have the workforce needed to provide it. Workforce plans are the foundation that resource management activities such as recruitment, selection, orientation, training, and retention are built on. There are many factors which may impact of the shape of our vascular surgery service in the future and the workforce needed to provide it, and these include: reconfiguration of services; advances in healthcare practice; financial and political decisions. Of course any planning must recognise the uncertainty of the future but using good intelligence robust estimates can be made.

Before we can design the future we must have a clear understanding of the past and present, and this paper will discuss the evidence which might inform our future planning and present a strategy for looking forward.

Methodology

The Vascular Surgery UK Workforce Survey 2018 represents an update of our previous survey conducted in 2013, and was conducted on behalf of the membership of our Specialty Association, the Vascular Society of Great Britain & Ireland and in conjunction with the Specialty Advisory Committee (SAC) for Vascular Surgery of the Joint Committee for Surgical Training (JCST).

The Vascular Surgery United Kingdom Workforce Survey 2018 used the same questionnaire as that designed and used previously in 2013, designed using a common web-survey platform (SurveyMonkey®) and contained 86 questions covering the following domains: Personal Characteristics (Q1-6); Job Characteristics (Q7-38); Vascular Surgery Practice (Q39-52); Hospital Resources (Q53-68); Professional Activities (Q69-77); Work-life Balance (Q78-86), **Appendix 1**.

We have considered survey responses under the following themes:

- Human Characteristics
- Job Characteristics
- Scope of Practice
- Clinical Networks & Hospital Resources
- Health & Wellbeing

All Ordinary-Members of the Vascular Society GB&I, our specialty association, who were based within the UK were invited to participate in the survey. Invitations from the Vascular Society GB&I were sent to the registered email address of 450 Ordinary Members in September 2017, and reminders were sent in December 2017 and January 2018. As of January 2018 we had received 230 (Compared to 402 in 2013) completed surveys, of which 183 (as compared to 352 in 2013) were completed by Consultant Vascular Surgeons currently practicing in the United Kingdom, and 47 were completed by specialty trainees in vascular surgery training in the United Kingdom, and these represented our cohort for analysis.

4.1 HUMAN CHARACTERISTICS

Total Cohort Characteristics

We asked respondent to identify their current job (Q1 What is the job title for your current position?) and respondents for Total Survey includes: 183 Consultants; 47 Specialty Trainees; 3 Specialty Doctors.

Figure 8. Job Title.



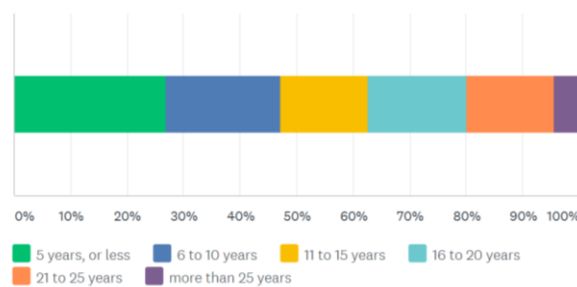
ANSWER CHOICES	RESPONSES
▼ Consultant	79.57% 183
▼ Specialist Registrar	20.43% 47
TOTAL	230

The distribution of responses are representative of the respective numbers of each workforce group, the recommended ratio of Consultant to Trainee to sustain a surgical specialty is 0.4.

Consultant Career Demographics

We asked Consultants how long they had been in their current position (Q2 How long have you been in your current position?).

Figure 9. Consultants How Long in Current Position.



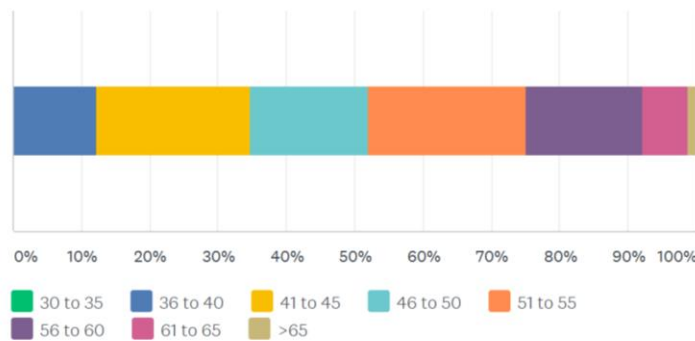
ANSWER CHOICES	RESPONSES
▼ 5 years, or less	26.92% 49
▼ 6 to 10 years	20.33% 37
▼ 11 to 15 years	15.38% 28
▼ 16 to 20 years	17.58% 32
▼ 21 to 25 years	15.38% 28
▼ more than 25 years	4.40% 8
TOTAL	182

The majority of Consultants are in early to mid-career, with 27% of respondents in post only 5 years, or less, which would suggest if respondents are reflective of the overall consultant workforce that we are a growing specialty.

Consultant Age Demographics

We asked Consultants what age they were (Q4 What is your age?), and we had no respondents under the age of 36, years old and must assume the majority of consultant vascular surgeons are appointed at that age or greater.

Figure 10. Consultant Age.

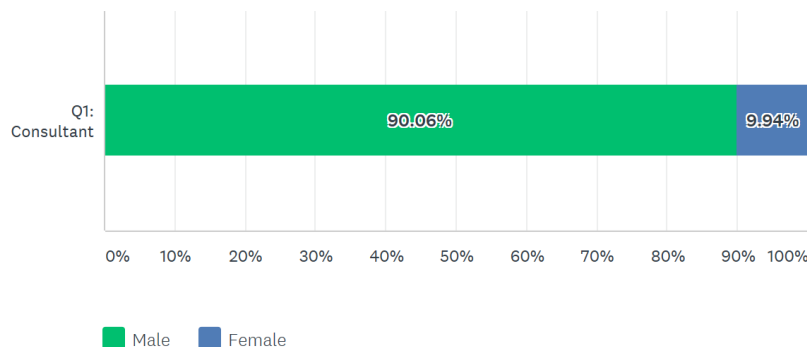


The age distribution is standard for a medical workforce with few people working beyond 60 years old.

Consultant Gender Demographics

We asked Consultants to declare their gender status (Q3 Are you male or female?), and found that over 90 percent of Consultant Vascular Surgeons in the United Kingdom are Male. This represents a slight improvement since 2013 when 92.5 percent were noted to be male but needs significant improvement.

Figure 11. Consultant Gender.

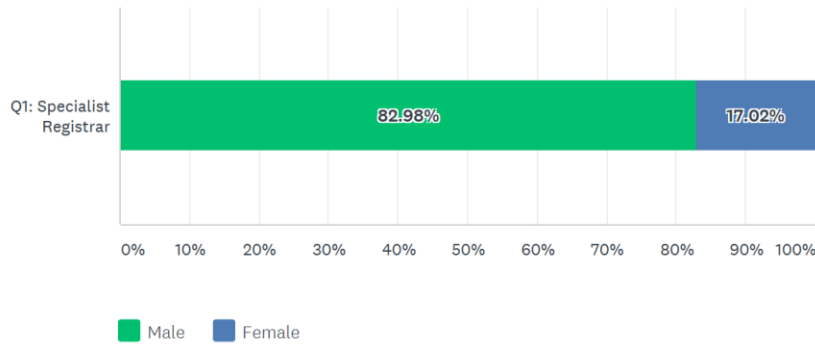


Specialty Trainee Gender Demographics

We also looked at gender within the specialty trainee grade and across the respective consultant career points. Reassuringly nearly twice as many of the new specialty trainees than current

consultants are female which as they become consultants will narrow the gender gap but a lot more needs to be done to encourage more female doctors into Vascular Surgery.

Figure 12. Specialty Trainee Vascular Surgery Gender.

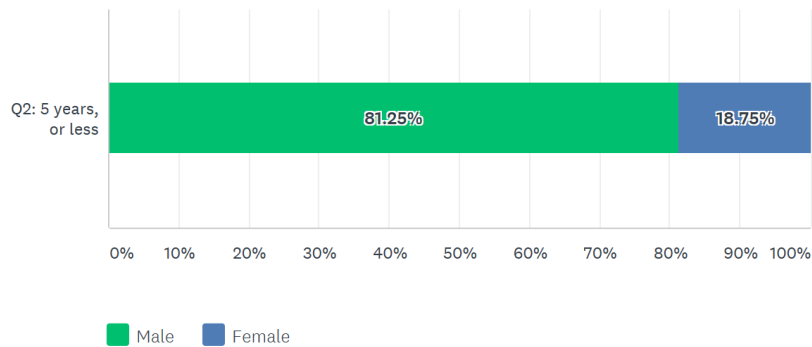


We also need to be aware going forward that Gender may no longer be considered Binary and future surveys should also allow the opportunity to define oneself as Gender Non-Binary.

New Consultants and Gender

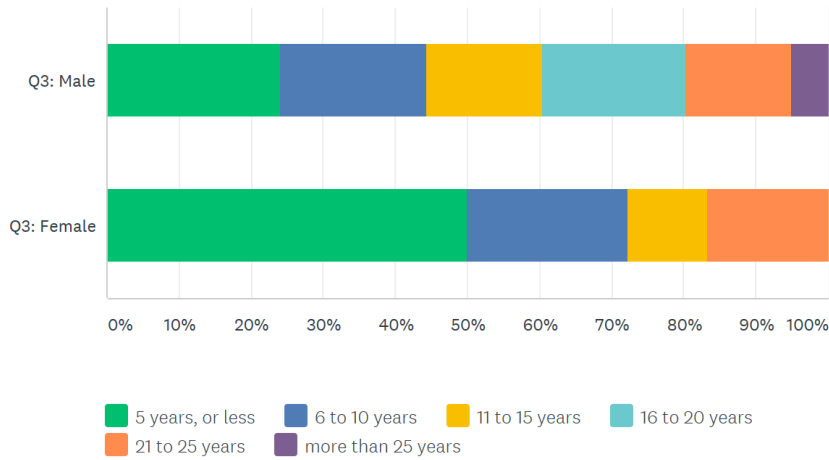
We asked New Consultants in post for 5 years, or less to declare their gender status and reassuringly the number New Consultants appointed who are female is representative of the training cohort.

Figure 13. Newly Appointed Consultants Gender.



Perhaps more importantly when comparing the stage of career (Q2 How long have you been in your current position?) against gender we see that the percentage of female consultant vascular surgeons appointed is significantly greater in the last 5 years and more than double that of any historical 5 year period over the preceding 25 years.

Figure 14. Consultant Career Point and Gender.

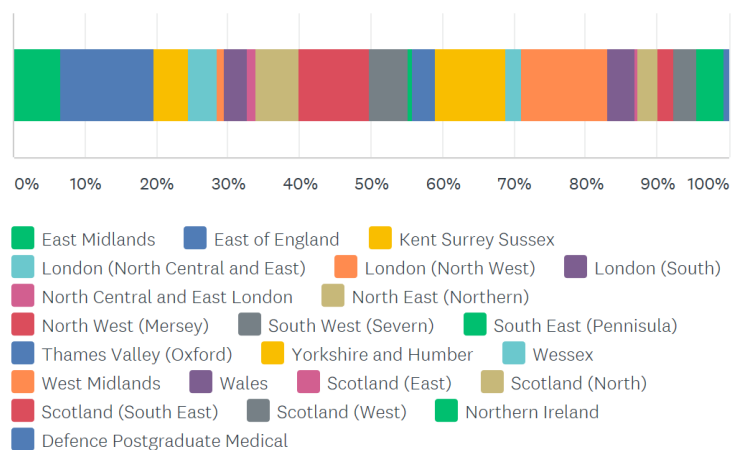


These results would suggest increasing numbers of female Vascular Surgery Consultants are being appointed and will act as positive role models to encourage further gender rebalancing within our specialty, but again much more needs to be done to make Vascular Surgery and attract career choice for female surgeons.

Regional Distribution

We asked respondents to identify from which region of the UK they were based (Q5 In which postgraduate education deanery of the United Kingdom do you work?) and received responses from every region of the United Kingdom and as such our survey is again representative of Vascular Surgery practice in England, Scotland, Wales and Northern Ireland.

Figure 15. Regional Distribution Respondents.



Reconfiguration of vascular surgery services has occurred across most regions of the UK to create clinical networks with Hub-and-Spoke and inpatient arterial workload being conducted at the central Hub. Consultants specified (Q6 What NHS Hospital(s) do you carry out inpatient arterial work in?) where they carry out their inpatient arterial work, in 2013 this included over 95 Acute Hospital Trusts but by 2018 that number has now reduced to only 70 Acute Hospital Trusts across the UK, 59 in England, 8 in Scotland, 2 in Wales and 1 in Northern Ireland.

Centralisation has seen the number of Inpatient Arterial hubs reduce from 95 (2013) to 70 (2018) across the United Kingdom.

Summary

The human characteristics in vascular surgery are similar to that seen within other surgical specialties. There is a significant lack of female vascular surgeons but there is some evidence that in respect to training positions in vascular surgery and indeed appointments of new consultant vascular surgeons over the last 5 years that the number of female vascular surgeons is increasing and we would hope that will continue. We need to do more to make vascular surgery an attractive specialty by improving access to the specialty and allowing more flexible work-patterns.

4.2 JOB CHARACTERISTICS

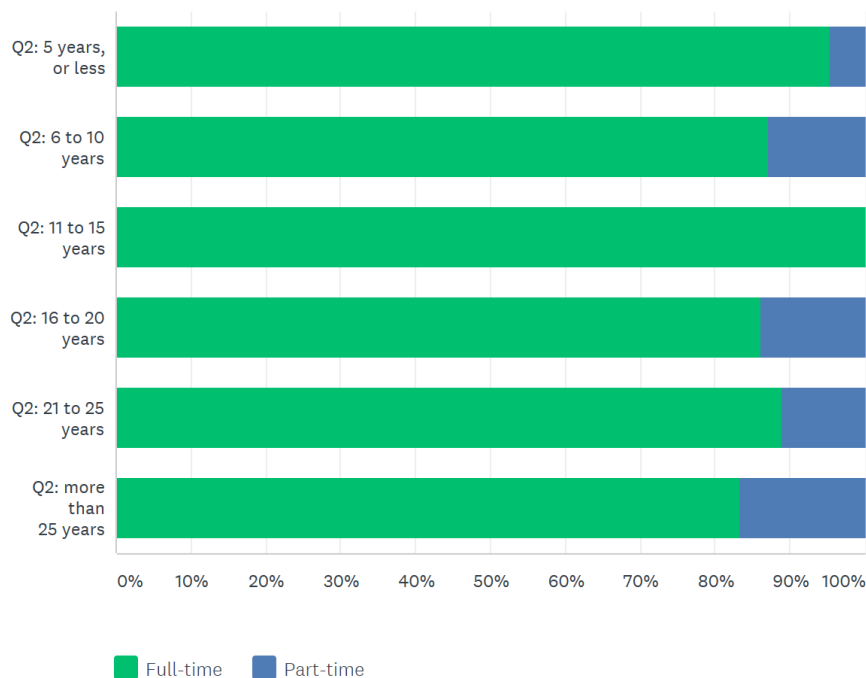
Consultant Job Characteristics

The Consultant survey population considered their job function (Q7) to be considered a Vascular Surgeons (89%), a General and Vascular Surgeon (10%) and a Trauma Surgeon (1%). Considering new consultants in post 5 years, or less, the vast majority (96%) considered themselves as specialist Vascular Surgeon. The vast majority (95%) of respondents in total and amongst new consultants confirmed that the majority of their job (50%, or more) was in Vascular Surgery (Q8).

Full-time or Part-time Working

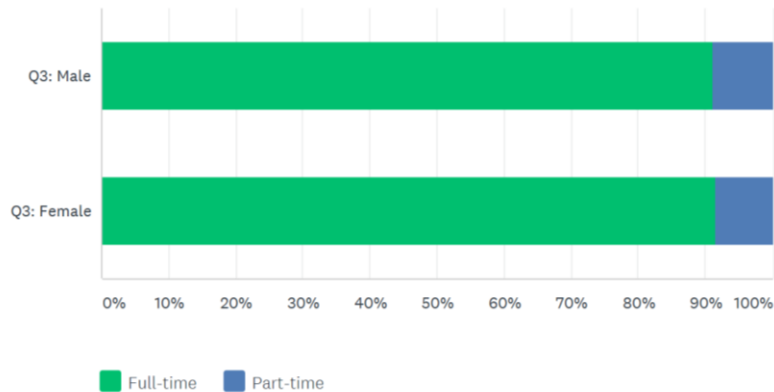
We asked Consultant whether they worked full-time or part-time (Q17 Is your job full-time or part-time?), and most consultants (91%) continue to work full-time. The majority also continue to work full-time through the respective phases of their career with even most (83%) of those established in post for over 25 years.

Figure 16. Full-time Working across the Career Points.



It is also of interest to note that there is no obvious difference in the percentage of female as compared to male consultant vascular surgeons who work part-time as compared to full time, when we compared working-time (Q17) with gender. Only a small percentage of just over 8% working part-time.

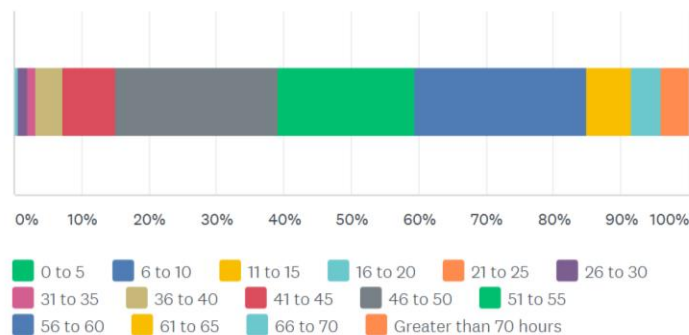
Figure 17. Full-time Working by Gender.



Estimated Hours Worked

We asked Consultant Surgeons how many hours they worked in an average week (Q What is the average number of hours you work per week?). We found the majority work much longer hours than is recommended for a healthy work-life balance.

Figure 18. Consultants average hours worked per week.

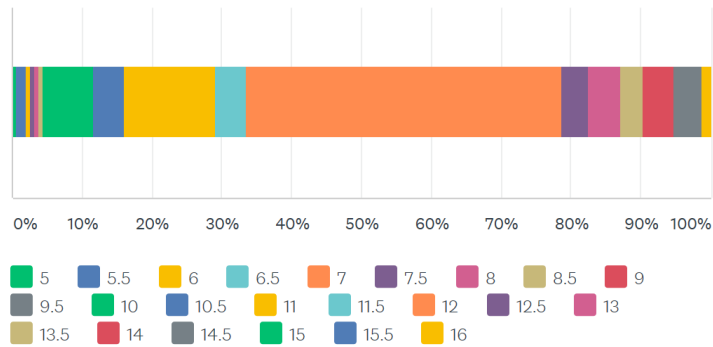


Over 70% of consultant vascular surgeons work between 46 and 60 hours per week, with over 60% of consultant vascular surgeons reporting that they work over 50 hours per week which is significantly more than recommended for a healthy work-life balance. There is no significant difference in hours worked between the genders.

Contracted Hours Worked

We asked Consultant Surgeons to declare from their job-plan how many hours they were contracted to work (Q In your job-plan how many total programmed activities?).

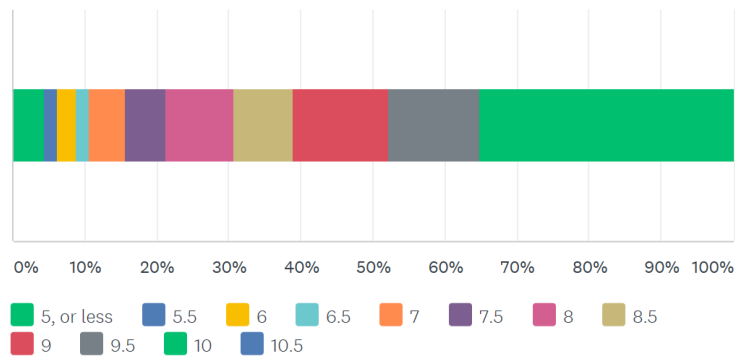
Figure 19. Total Job-plan Programmed Activities (PA).



The commonest (45%) Job-plan for consultant vascular surgeons was a total of 12 Programmed Activities (PA), but concerningly over 88% are working more than the recommended 10 PA contract. There is no significant difference in Job-planned PA allocation between the genders.

We asked Consultant Surgeons to declare from their job-plan how many hours they were contracted to work which involved direct clinical care (Q In your job-plan how many programmed activities involve direct clinical care?). The component devoted to Direct Clinical Care (DCC) was an average of 8.46 PA (SD 2.85), with the commonest (35%) allocation being 10 PA for DCC.

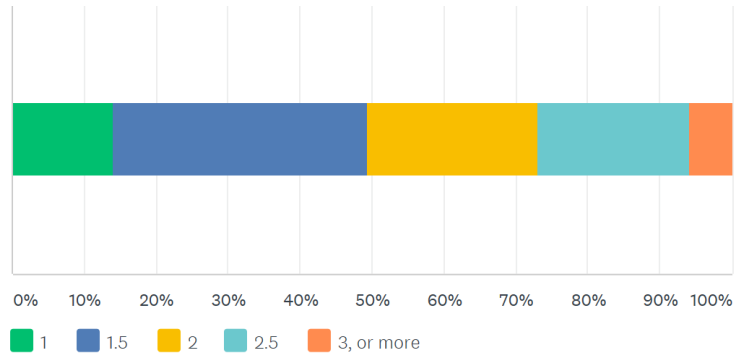
Figure 20. Consultants programmed Direct Clinical Care Professional Activities (DCC PA).



The typical Job-Plan includes as part of Direct Clinical Care (DCC) some 2 Theatre Sessions, 1 Day Procedure Unit (DPU) Session and 2 Outpatient Clinic Sessions.

We asked Consultant Surgeons to declare from their job-plan how many hours they were contracted to work which involved supporting professional activities (Q In your job-plan how many programmed activities are for supporting professional activities?).

Figure 21. Consultants programmed Supporting Professional Activities (SPA).

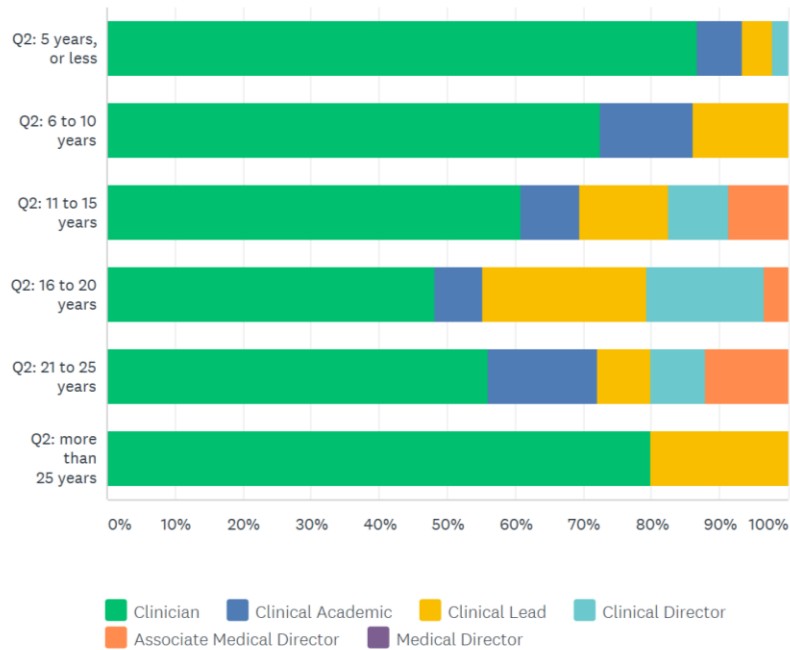


These are essential to maintain continued professional development and allow preparation for annual appraisal and cyclical revalidation. The commonest SPA allocation is 1.5 PA (35%), but the average is higher 2.69 SPA (SD 1.12).

Career and Changing Job Roles

Job roles do vary throughout a career (Q69 What is your job role?) with increasing responsibility for clinical management assuming roles such as clinical lead or clinical director which peaks in late mid-career with over half (52%) of those 16 to 20 years in post with a senior academic or management role.

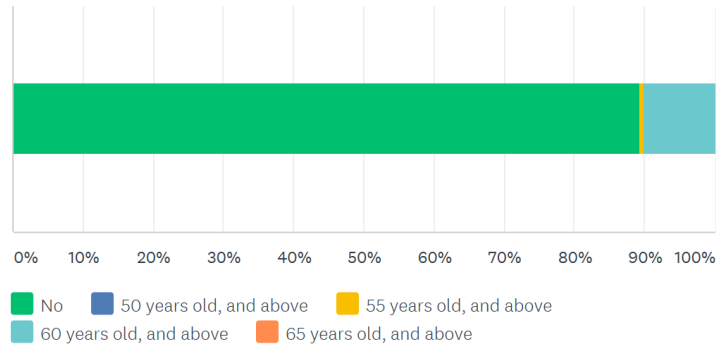
Figure 22. Consultants Additional Job Roles by Career Stage.



The proportion who have a clinical academic role also reassuringly appears relatively constant.

As the complexity and demands of out-of-hours on-call cover increase one must pose the question is it appropriate for older surgeons to continue to deliver this physically and mentally demanding role. We asked whether surgeons leave the on-call rota at a certain age (Q35 Do you allow surgeons to leave the on-call rota at a certain age?)?

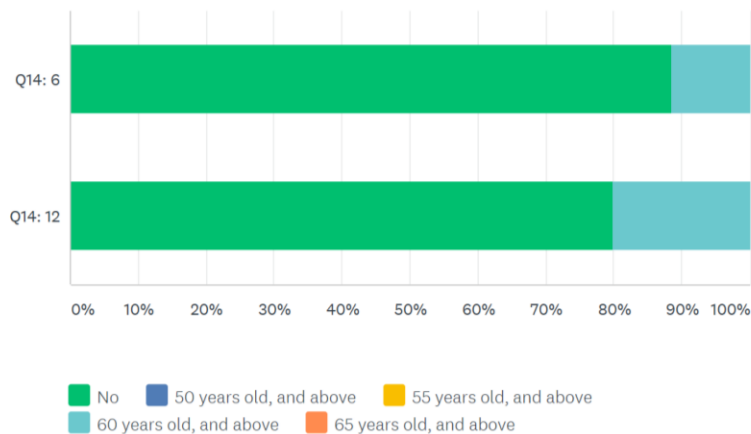
Figure 34. Do Consultants stop On-call when Older.



Unfortunately, currently the majority (89%) of teams do not, but encouragingly a minority (10%) allow surgeons 60 years old, and above to leave the on-call rota. One of the most commonly cited reasons for not allowing older surgeons to leave the on-call rota is that the condensed on-call burden will increase for the remaining team members.

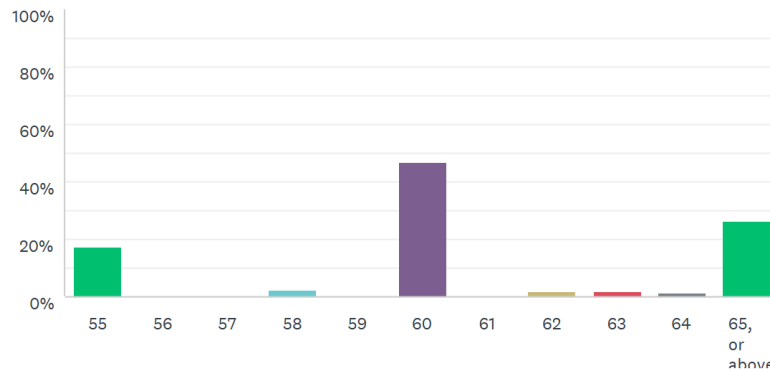
We can see that larger teams (Q14: 12 surgeons) are almost twice as likely as smaller teams (Q14: 6 surgeons) to allow older surgeons to leave on-call rota.

Figure 35. Do Consultants stop On-call when Older (Small Teams compared to Large Teams).



We asked surgeons at what age they felt it inappropriate to be on-call for vascular surgery emergencies (Q36 Above what age do you feel it would be inappropriate to be on-call for vascular surgery emergencies?)?

Figure 36. What age should Vascular Surgeons stop doing On-call.



The majority (68%) specified at 60 years old, or younger, with a significant proportion recommending stopping on-call at 55 years old (17%) and if not at 60 years old (47%).

Summary

The job characteristics within vascular surgery again show that vascular surgeons are being contracted for an working too many hours to maintain a sustainable work-life balance. In a high intensity procedural specialty such as vascular surgery long hours lead to early burn-out of surgeons with both professional and personal problems and this is a risk to patient safety. Many studies have shown the detrimental effects on health of night-work and shift-working and those dangers increase with duration and age. Because of its large emergency workload and the time-sensitive nature of many acute vascular catastrophes such as aneurysm rupture, limb ischaemia and vascular trauma the intensity of on-call work has increased. We are also covering much larger catchment areas as we have regionally reconfigured to centralised emergency vascular Hubs and whilst we have excellent trainees they require close supervision in the modern surgical environment. When teams increase in size the frequency of on-call reduces and allows the opportunity to remove surgeons in later career from the on-call rota perhaps ideally at age 55 years old.

Vascular Surgery is high-intensity workload and excessive hours can lead to early burn-out of surgeons and ideally vascular surgeons should be allowed to withdraw from emergency rotas at 55 year-old.

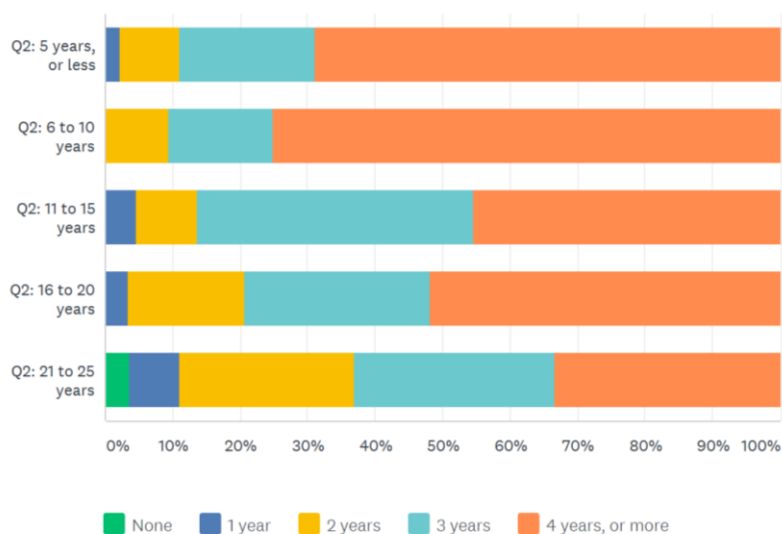
4.3 SCOPE OF PRACTICE

Vascular Surgeons treat a broad range of conditions affecting the arteries, veins and lymphatics. In a rapidly evolving specialty such as Vascular Surgery the modern Vascular Surgeon requires a range of competencies in vascular medicine, vascular surgery and endovascular therapy. Workforce planning is the process by which we ensure that an organisation has the right number of employees with the right knowledge skills and behaviours in the right place, at the right time. The Vascular Society of Great Britain & Ireland made recommendation on standards for a vascular surgery service in their documents “The Provision of Vascular Services 2018 (Updates on 2015 and 2012)”. The Vascular Society has also recommendations on the standards for Specialist Training in Vascular Surgery and Vascular Surgery Training Centres. With the evolution of Vascular Surgery to become a separate surgical specialty there has been an increase in the amount of training time spent in specialist vascular surgery and a reduction in in exposure to general surgery. Many vascular surgeons also seek additional out of programme training to gain additional skills in high-volume super-specialists units in the United Kingdom or overseas.

Specialty Training in Vascular Surgery

Vascular Surgery Training has also changed, to meet the modern demands of Vascular Surgery, with the trend over the years to spend more dedicated time in recognised specialist vascular training units (Q9 During specialist registrar training how long did you spend in recognised specialist vascular training unit?), with newer consultants appointed over the last 5 to 10 years having spent over 70% of their training in specialist vascular training units compared to more established consultants who had perhaps spent only 30%. That is a reflection of vascular surgery as a sub-specialisation of general surgery and then developing to become a separate surgical speciality.

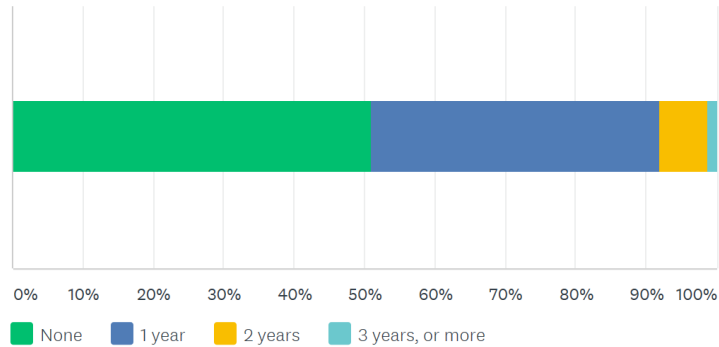
Figure 23. Specialist vascular surgery training by Career Stage.



Out of Programme Experience (OOPE) to obtain additional training in vascular surgery remains popular (Q10 Did you receive out of programme experience in vascular surgery?) with nearly one-half (49%)

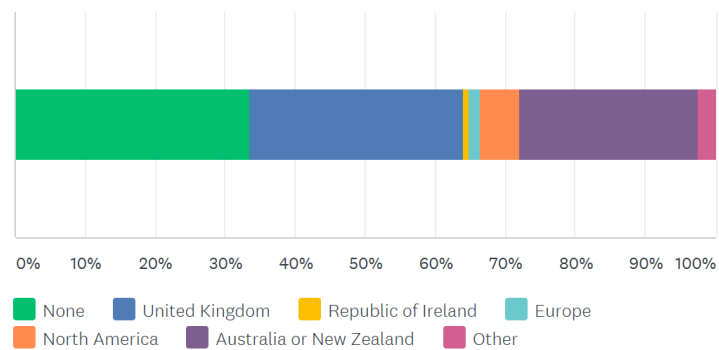
of Consultants obtaining at least 1 years of OOPE, and that remains relatively constant when considering established and more newly appointed consultants.

Figure 24. Additional out of programme training in vascular surgery.



Approximately half of those who obtained OOPE received it within the UK (Q11 If you obtained out of programme training, where did you train?), of the other half travelling overseas the most popular destination by far remains Australia and New Zealand, with a small number travelling to North America but very few to Europe.

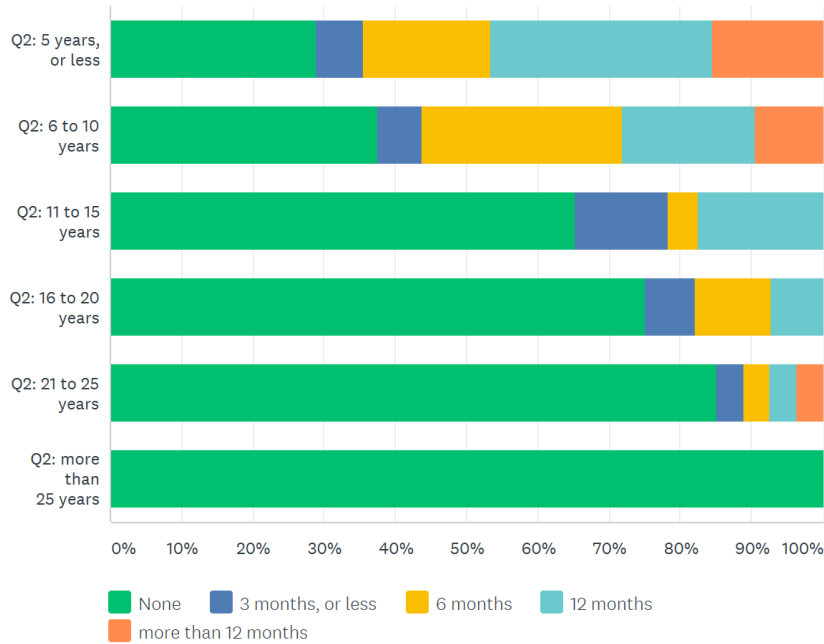
Figure 25. Where did you obtain your additional specialist vascular surgery training.



Given the proximity and the knowledge that many excellent training opportunities exist within Europe one must assume the most likely barrier for UK trainees to training in Europe is linguistic.

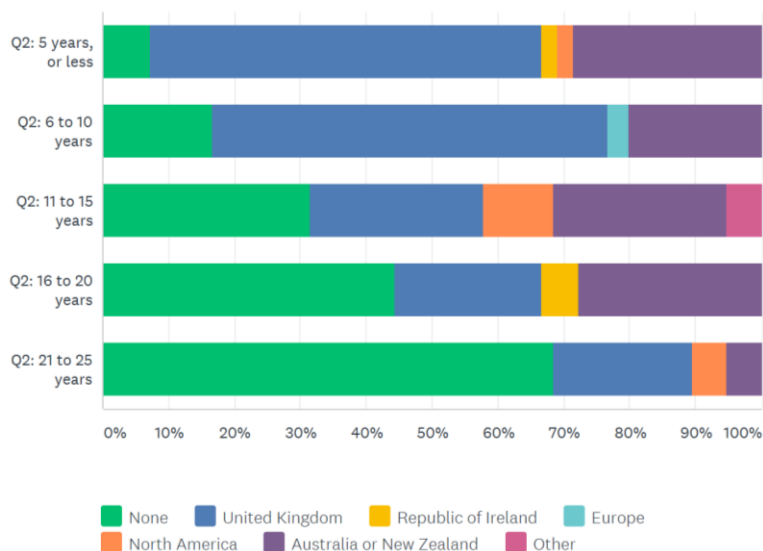
We also asked if consultant vascular surgeons had completed an endovascular training fellowship (Q12 Did you complete an Endovascular Training Fellowship?) and compared the likelihood of that across the last 25 years, from newly appointed to late career. We found that the likelihood of having had additional endovascular training and the duration of that additional endovascular training has progressively increased from none reported in the mature consultants (more than 25 years) to over 71% of newly appointed consultants (5 years or less), of whom over 15% have had at least 12 months additional endovascular training.

Figure 26. Endovascular Training Fellowships by Career Stage.



It is also of interest that it has been progressively more likely that that endovascular training has been obtained within the United Kingdom, from 21% (21 to 25 years, ago) to over 60% (5 years, or less), as we have developed both capacity for excellence in endovascular practice within the UK and specialist training programmes to support that.

Figure 27. Endovascular Training Fellowships by Location and Career Stage.

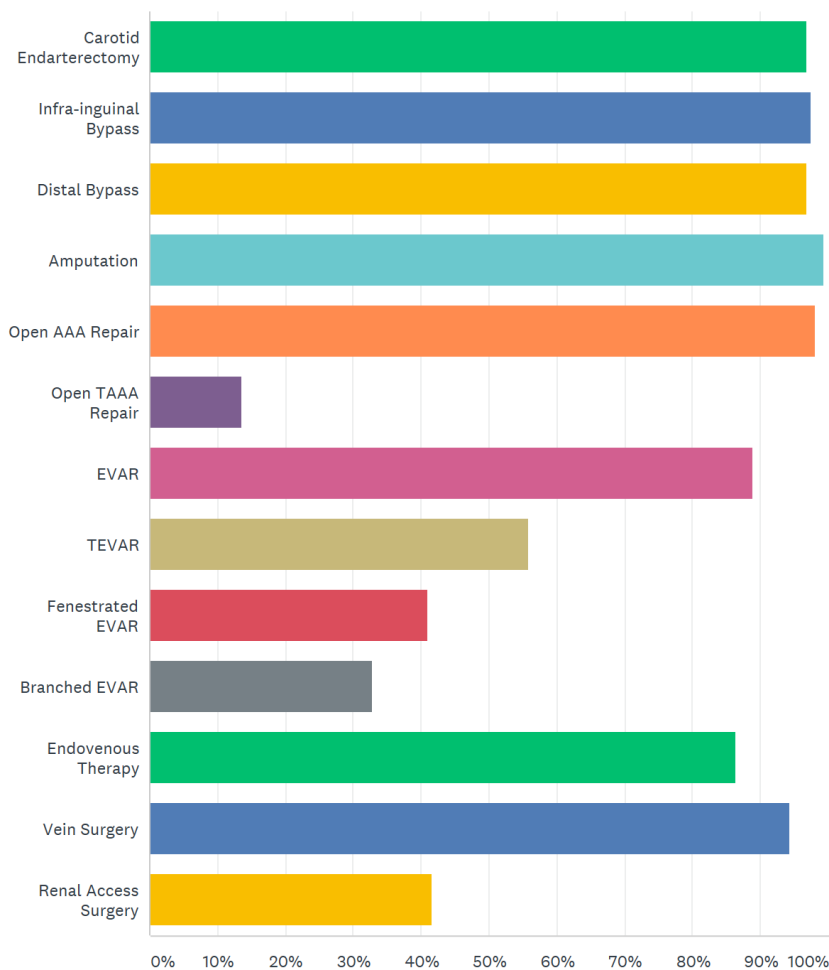


However, overseas training particularly in Australia and New Zealand, 21%, remains popular.

Consultant Scope of Practice

We asked consultants to describe the scope of their vascular surgery practice (Q52 Which of these operations do you perform?). The vast majority of consultant vascular surgeons perform the major index procedures of Carotid Endarterectomy (97%), Infra-inguinal Bypass (98%), Distal Bypass (97%), Amputation (99%), Open Abdominal Aortic Aneurysm (AAA) Repair (98%) and Endovascular AAA Repair (EVAR) (88%). Most also perform treatments for Varicose Veins by Vein Surgery (94%) and Endovenous Therapy (88%).

Figure 37. Scope of Operations Performed.

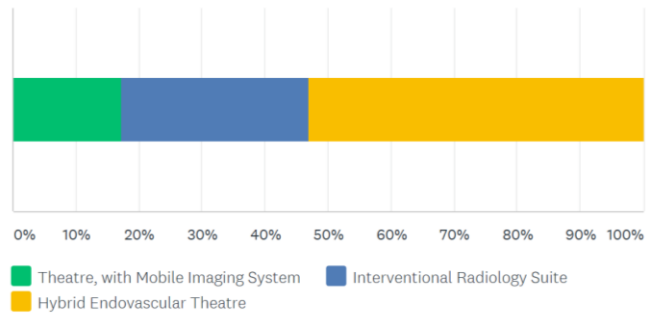


As expected the more complex endovascular procedures are performed by a smaller proportion of vascular surgeons, in order of increasing complexity a decreasing proportion perform Thoracic Endovascular Aortic Aneurysm Repair (TEVAR) (56%), Fenestrated EVAR (41%) and Branched EVAR (33%). With reconfiguration of services and commissioning many of these procedures are concentrated in large tertiary vascular centres and conducted by teams with enhanced endovascular skills and experience.

In the early days of endovascular practice the majority of EVAR and TEVAR were conducted in vascular theatres supported by a mobile Imaging System (C-Arm). We asked consultant vascular

surgeons where they now perform the majority of EVAR (Q64 If you do EVAR, where do you perform the majority of your cases?)? The majority (53%) now perform these in a dedicated Hybrid Theatre and only a minority (17%) continue to use a Theatre with mobile imaging.

Figure 38. Where do you perform Endovascular Aneurysm Repair.



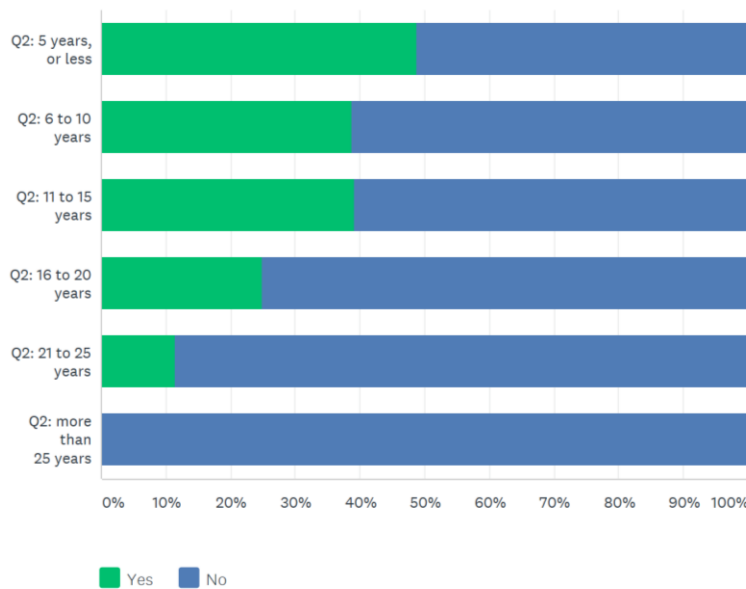
To improve imaging quality, radiation safety and facilitate more complex endovascular and joint open and endovascular hybrid therapies most large centres have installed hybrid theatres.

Career Stage and Scope of Practice

In some areas of vascular surgery practice one can see a very clear difference in practice between new consultants and those towards the end of their career and this is most apparent in Endovascular Practice.

We see that the proportion of consultants who perform peripheral angioplasty has progressively increased over the years (Q47 Do you perform peripheral angioplasty?).

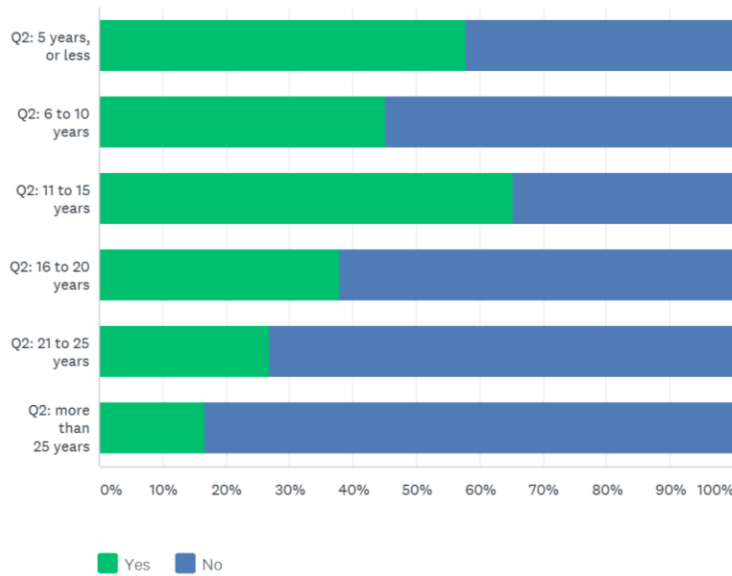
Figure 39. Percentage Surgeons performing Peripheral Angioplasty by Career Stage.



Consultants approaching the end of their careers, more than 25 years in practice, report none perform angioplasty and yet we see a progressive increase in uptake of these skills, with new consultants (5 years or less) of whom nearly half (49%) now perform their own angioplasty.

A similar trend is seen in complex endovascular aortic intervention with branched or fenestrated endovascular aortic intervention (Q45 Do you perform fenestrated or branched EVAR?), with progressively increasing proportions including that vanguard who developed many of these new techniques now 10 to 15 years in practice and leading the way for the new wave of consultants the majority (58%) of whom are using these advanced skills.

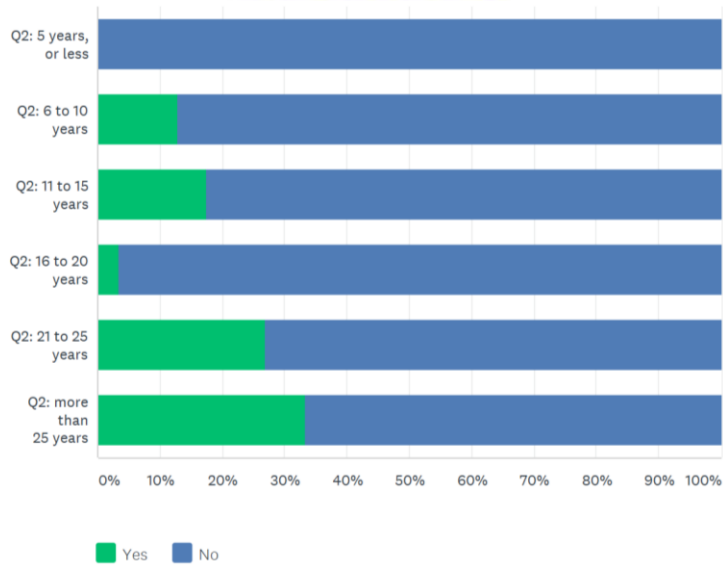
Figure 40. Percentage Surgeons performing complex EVAR.



Clearly modern Vascular Surgeons in the United Kingdom have now adopted many of the Endovascular Skills required for patient care and come into line with our counterparts in Europe, North America, and the rest of the World.

That trend is reversed for complex open aortic surgery in part due to modern treatment of these conditions often involving complex endovascular intervention for these conditions previously treated by complex open surgery.

Figure 41. Percentage Surgeons performing complex Open Aortic Surgery.



It is of some concern that when considering new consultants, in post 5 years, or less, none perform open thoracic aortic surgery. It would appear that such procedures may now require post-CCT training with a more senior and experienced consultant mentor.

Vascular Surgeons are performing many new endovascular techniques in the United Kingdom.

Summary

In general most vascular surgeons continue to deliver a broad vascular surgery practice performing the majority of index procedures such as aneurysm repair, carotid surgery, limb bypass and amputation. They also perform both open and endovascular aneurysm repair and both open and endovenous therapy for varicose veins. There is clear evidence that vascular surgeons have been adopting endovascular and endovenous therapies alongside their established open surgical practice. A large number of newly appointed vascular surgeons also have the skills to perform peripheral angioplasty and complex endovascular aneurysm repair with fenestrated or branched endografts. It is clear that in the United Kingdom the modern vascular surgeons is not only an open surgeons but also an endovascular therapist and that allows vascular surgeons to offer the best option to their patients be it open surgery, endovascular intervention or a combination of hybrid open and endovascular intervention. Within teams there are developing subspecialty interests which should be encouraged. Healthcare planners need to recognise the changing scope of vascular surgery practice both Worldwide and now also in the United Kingdom to ensure suitably skilled vascular surgeons are supported to develop their endovascular practice within the multi-disciplinary team.

4.4 CLINICAL NETWORKS AND HOSPITAL RESOURCES

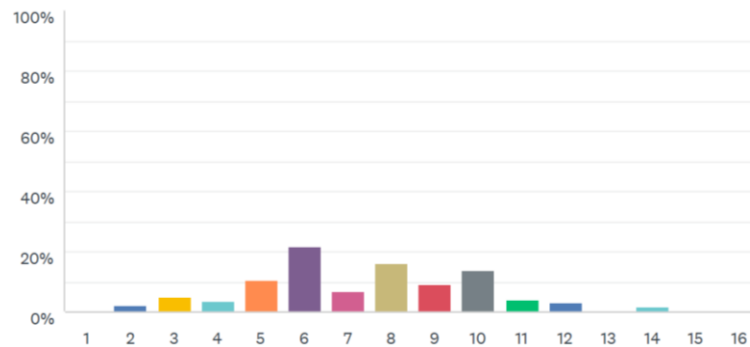
The survey show that both nationally and within regions there has been a reconfiguration of vascular surgery services with clinical networks created to manage centralised inpatient arterial hubs supporting a group of spoke hospitals within the region.

The typical surgeons week still includes on average 2 outpatient clinics (1 may be a joint clinic with an allied medical specialty) and 2 arterial theatre sessions and 1 day-procedure session which dependant upon skill-set may involve peripheral angioplasty, endovascular or endovenous therapy.

Consultant Teams

Reconfiguration has led to the creation of clinical networks with centralised inpatient arterial Hubs supporting regional Spoke Hospitals. To support 24/7 emergency vascular services and on-call rotas at the inpatient arterial Hub larger Teams have formed (Q14 How many consultant vascular surgeons are there in your hospital?). The median Team size is now 7 surgeons (Range 2 to 14), and the vast majority work in Teams of 6, or more (79%).

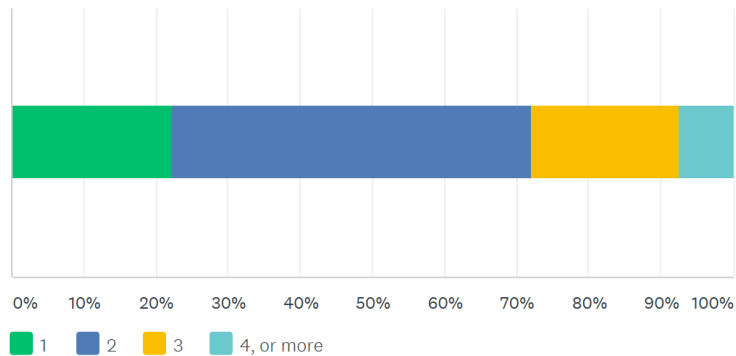
Figure 28. Consultant Team Size.



Vascular Clinical Networks

The reconfiguration of vascular surgery services has seen most regions creating managed vascular clinical networks with a central inpatient arterial hub and a range of spoke hospital services supporting outpatient assessment, diagnostics and day-procedure interventions closer to the patients home. To support this many consultants work across multiple hospital sites as part of their weekly job-plan. We asked consultants in a typical week, in how many hospitals do you work (Q29 In a typical week, in how many hospitals do you work?)?

Figure 28. Number of Hospitals in which Consultant Works.

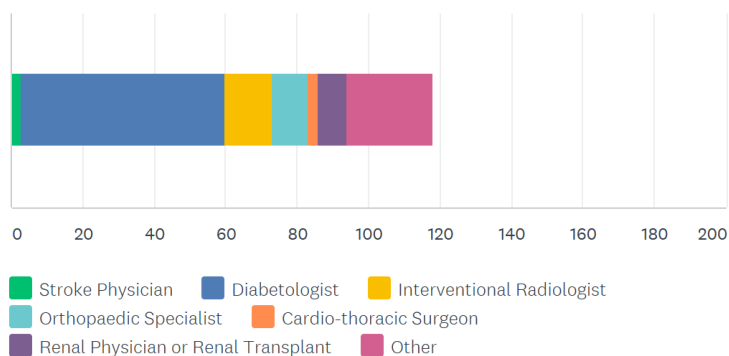


We see that surgeons are most likely to work across 2 sites (50%), and that the vast majority (78%) are working across 2, or more, sites. The days of single site working would appear to be being consigned to the past. Most believe to create equitable and sustainable teams the demands of multi-site working and travel to spoke sites should be shared across the team members, so one would expect in future the small number (22%) of single site workers may reduce further.

Joint Outpatient Clinics

Vascular Surgeons work collaboratively with a number of medical specialties to deliver joint care for patients vascular disease. We asked consultants with which specialties did they conduct joint OPC (Q28 What joint outpatient clinics with other specialties do you do?). The commonest areas in which to have joint outpatient clinics (OPC) are Diabetic Foot Disease (66%), Interventional Radiology (15%), Orthopaedics (11%), Renal (9%) and Others, the majority of which are Podiatrists and Podiatric Surgeons (28%).

Figure 29. Joint Vascular Clinics with Other Specialties.

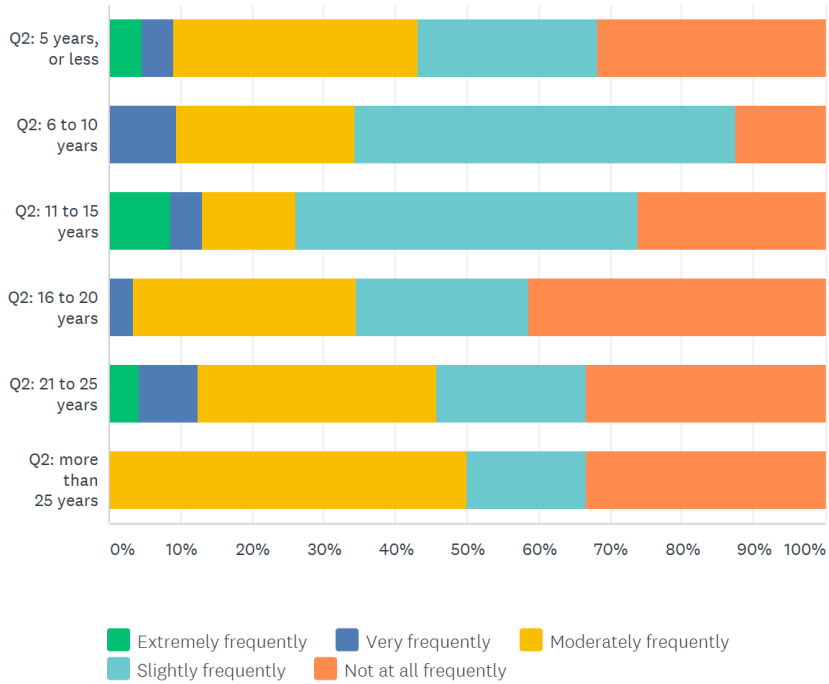


The rising public health concern regarding the rapidly increasing incidence of Diabetes Mellitus, brings with it increasing numbers of Diabetic Foot Complications which often require a Multi-disciplinary Team (MDT) approach with care jointly delivered to reduce the risk of minor or major limb amputation by Diabetologists, Podiatrists, Vascular and Orthopaedic (Foot) Surgeons. The other growing area of practice is that of end stage chronic kidney disease (CKD), due to hypertensive or diabetic complications, where vascular surgeons provide renal access (arterio-venous fistula) surgery and support.

Dual Consultant Operating (Mentoring)

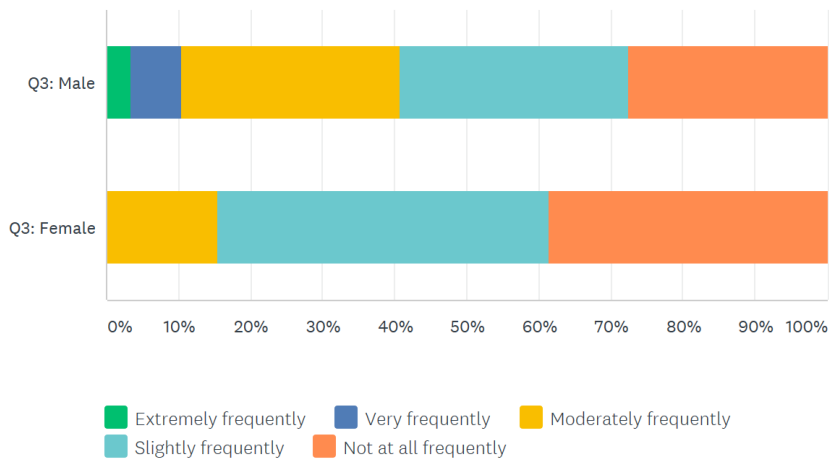
Dual Consultant operating has become a more common phenomenon but does not appear to be based upon inexperience as the frequency is roughly similar across the career (Q26 In the past 12 months, how frequently did you operate with a second consultant?).

Figure 30. Dual Consultant Operating.



Interestingly, consultants who are male as compared to female are more than twice as likely to operate with a second consultant, with 41% men and only 15% of female consultants declaring they dual operate moderately, very or extremely frequently with a second consultant.

Figure 31. Dual Consultant Operating by Gender.

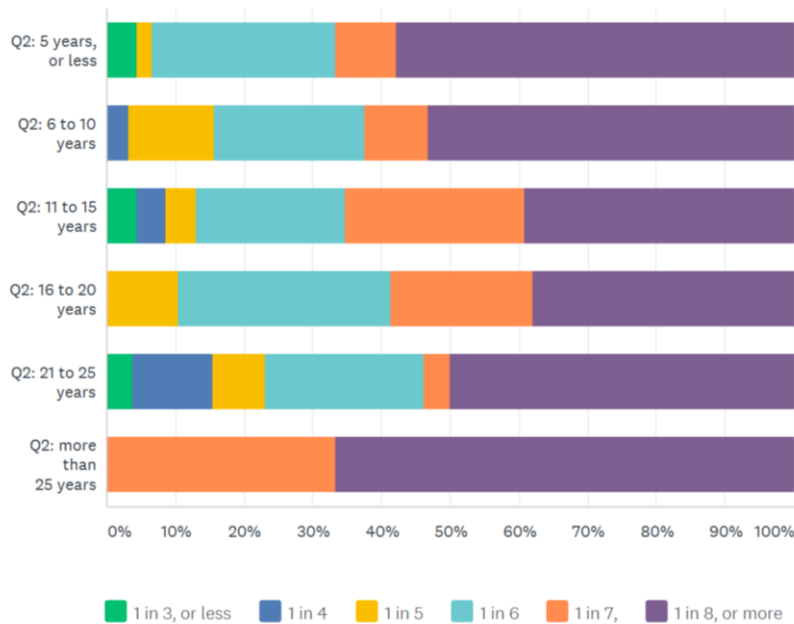


Dual consultant operating on complex cases has become an important part of our practice and we need to ensure both male and female surgeons feel equally comfortable operating with a colleague and equally able to ask for help when required.

On-call Commitment

Vascular Surgery has a high proportion of emergency workload and such emergencies are often life and limb threatening conditions which can present 24/7. We asked what on-call commitment (Q33 What is your on-call commitment?), and the frequency of on-call for the majority is 1 in 6, or greater. The physical and mental demands of emergency on-call work are significant and the adverse health effects of the associated stress and disruption to circadian rhythms have been well documented. There is some reassurance that most surgeons in the later part of their career in post more than 25 years and over 60 years of age are typically on less frequent on-call rotas or no longer on-call.

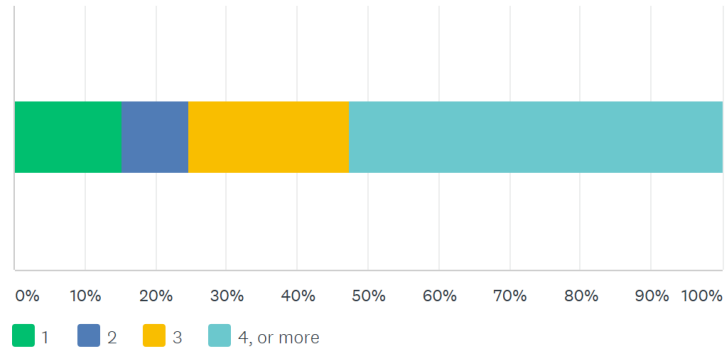
Figure 32. On-call Frequency by Career Stage.



We asked consultants what types of surgery they cover when on-call for emergencies and as expected the vast majority now cover vascular surgery only (86%), a small minority still cover general and vascular surgery on-call (5%) and one would expect that to reduce further as the majority of our workforce become specialist vascular surgeons. We note that as Trauma Networks mature in certain regions Vascular Surgeons contribute to vascular and trauma on-call emergencies (8%).

We asked consultants how many hospitals do they cover when on-call for emergencies (Q34 How many hospitals do you cover when on-call?)? With reconfiguration to centralised arterial hub supporting a clinical network of spoke hospitals as expected the number of hospitals covered has increased with the majority (85%) of surgeons covering 2, or more, hospitals when on-call.

Figure 33. Number of Hospitals Covered when On-call.



Providing on-call emergency cover to a large network of hospitals have increased the demands upon the on-call surgeon and team, both in respect to the number and complexity of emergencies to manage.

Summary

Reconfiguration has seen within regions the creation of clinical networks with inpatient arterial hubs supporting a range of spoke hospitals. This has allowed concentration of both human and environmental resources for the complex needs of these inpatients. Larger teams have been created to cover the emergency on-call and emergency surgeon of the week duties in the central arterial hub and allow surgeons not rostered for emergencies that week to travel to spoke hospitals to conduct outpatient clinics and day-procedures.

Regional Clinical Vascular Surgery Networks based upon a Hub-and-Spoke model are recommended to manage complex inpatient treatment centrally and deliver diagnostics and community care locally.

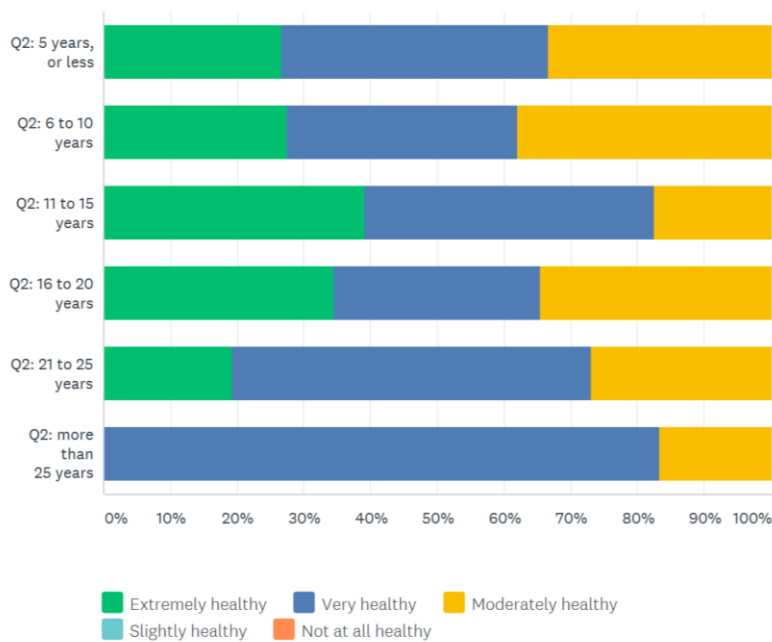
4.5 HEALTH AND WELLBEING

The survey reveals the pattern of health and job-satisfaction within the vascular surgery community in the United Kingdom

Health and Satisfaction

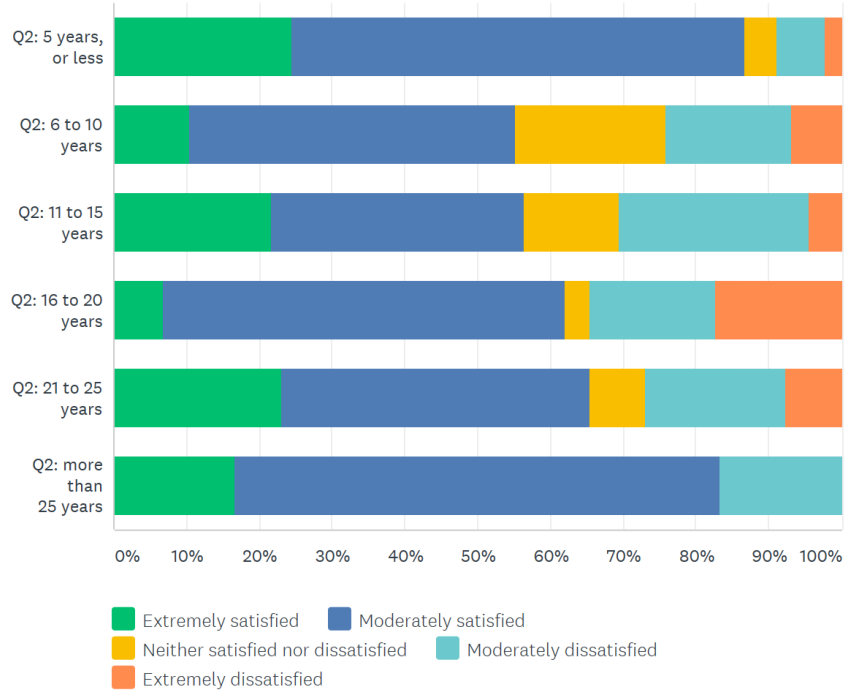
We asked consultants how healthy they were (Q78 How physically healthy are you?). All consultants thought they were either moderately, very or extremely healthy, with none declaring they were not at all healthy. Older consultants did not consider themselves extremely healthy.

Figure 42. Physical Health.



We asked about job satisfaction (Q79 Are you satisfied with your job, neither satisfied nor dissatisfied with it, or dissatisfied with it?), and again the majority reported they were either moderately or to a lesser degree extremely satisfied. In mid-career a significant minority are dissatisfied with their career and that would appear to peak in late mid-career after 16 to 20 years, with significant numbers moderately (17%) or extremely (17%) dissatisfied. This is a concern and would be a typical career point to develop signs of burn-out.

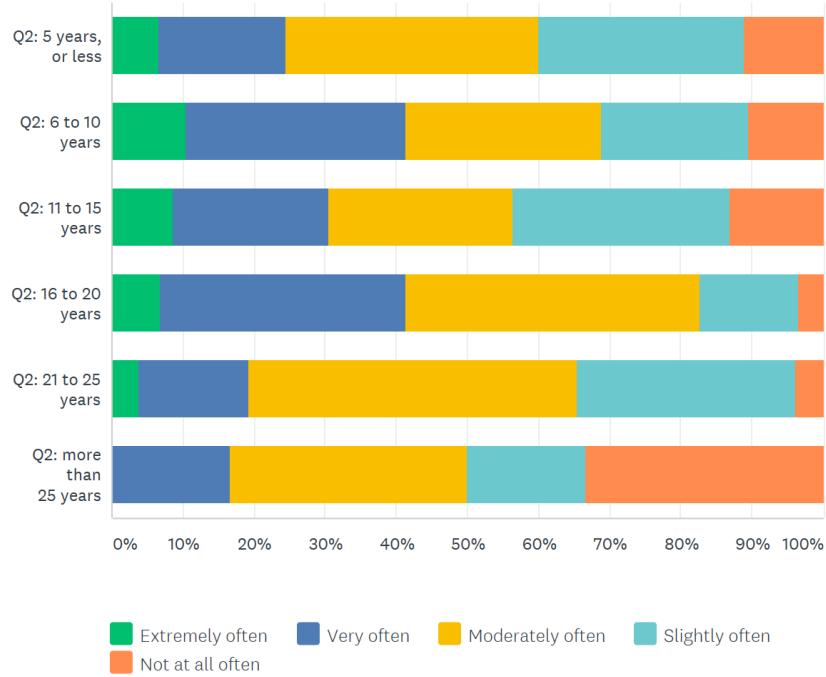
Figure 43. Job Satisfaction.



Stress at Work

This is also reflected in respondents experience of feeling stressed at work (Q80 In a typical week, how often do you feel stressed at work?) which is common across the career points but peaks in early career after 6 to 10 years when nearly half (41%) report feeling stressed very or extremely often (41%) and again peaks around late mid-career after 16 to 20 years when nearly half (41%) report feeling stressed very or extremely often.

Figure 44. Stress at Work.

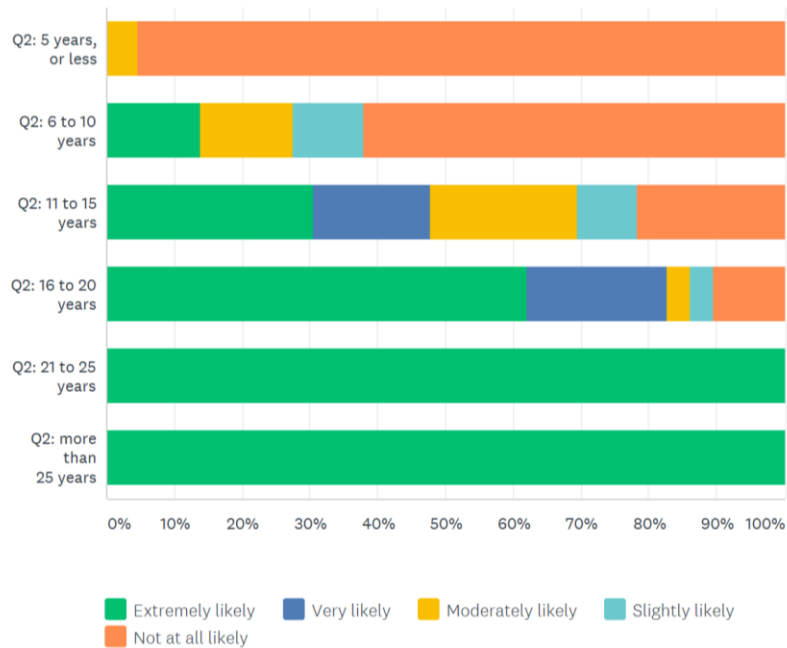


Those self-reported rates are too high for a healthy workforce and the factors causing that need further interrogation to maintain the safety of our workforce and our patients. Further research is required by occupational health.

Intention to Retire

One of the big challenges for the health service is retention of experienced staff. We asked consultants how likely they were to retire in the next 10 years (Q84 How likely are you to retire in the next ten years?) and the results are shocking.

Figure 45. Likelihood to Retire in Next 10 Years.



With our most senior consultants as expected indicating they would be extremely likely to retire within 10 years but also significant proportions of those in early and mid-career: those 11 to 15 years (30%); those 16 to 20 years (62%); those 21 to 25 years (100%). The concern is that we will be losing some of our most experienced surgeons to early retirement and that knowledge base will take years to replace.

Summary

In several countries concerns have been raised about burn-out rates amongst surgeons exposed to busy and stressful jobs which detrimentally affect work-life balance. These effects are perhaps most acutely felt in rapidly evolving specialties like vascular surgery where in addition to the workload surgeons are continually having to adapt to new techniques.

To recruit new staff and retain experienced staff vascular surgery must change to allow a healthier work-life balance and to allow surgeons to progress through different career stages with mentoring in early career and planned withdrawal from front-line duties in later career.

CONCLUSIONS

Vascular Disease is a growing cause of morbidity and mortality globally and in the United Kingdom. The number of consultant vascular surgeons in the United Kingdom is lower than other comparator countries in Europe, Austral-Asia and North America and should be at least 1 per 100 thousand of population. The current number of training positions in vascular surgery in the United Kingdom is well below the preferred ratio of 0.4 and is insufficient to maintain or expand vascular surgery services in the face of increasing demand. In several countries concerns have been raised about burn-out rates amongst surgeons exposed to busy and stressful jobs which detrimentally affect work-life balance. These effects are perhaps most acutely felt in rapidly evolving specialties like vascular surgery where in addition to the workload surgeons are continually having to adapt to new techniques.

Hiring more staff is one option, another is changing how we practice to better use our limited resources. Vascular Surgeons do not work in isolation but as part of a multi-disciplinary team delivering vascular care alongside their colleagues from vascular physicians, vascular nurse specialists, vascular technologists, vascular anaesthetists and radiologists. The vascular surgeons should be used effectively by optimising the time they spend in the operating theatre or endovascular suite using the specialists skills they have trained for many years to acquire. The significant proportion of the vascular workload that does not involve procedural intervention may be more efficiently conducted by other team members using their respective skills in assessment, diagnostics, counselling, risk-factor management and best medical therapy. The specialist team at the Hub can effectively communicate with primary care and spoke hospitals use of modern technology utilising effective diagnostic algorithms, digital image transfer and telemedicine. Effective triage should ensure we only need to see patients with proven vascular disease who would benefit from treatment from a specialist vascular surgeon. Vascular nurse specialists often working in conjunction with vascular technologists have proven they can effectively manage the majority of vascular referrals ensuring appropriate assessment and treatment advice for those not requiring intervention and escalating referrals which may require intervention to further assessment by a vascular surgeon. Specialist clinics with clear clinical pathways have been effectively run by vascular nurse specialists for Claudication, Varicose Veins and Small Aneurysm. If intervention may be required a risk-benefit analysis must be considered and for that vascular nurse specialists in conjunction with vascular physicians and vascular anaesthetists may conduct pre-assessment clinics, medical optimisation and even consider frailty and turn-down for active treatment decisions. The vascular surgeons should really only become involved if intervention may be required and the diagnostic information is available to make an informed decision with the patient whether to intervene or not.

Whilst Worldwide Vascular Surgeons have evolved to combine new endovascular skills with their established open surgery skills, and that process which started later and has progressed more slowly in the United Kingdom is slowly gaining momentum. It is somewhat strange that in a public Healthcare system such as the NHS where doctors' pay is not linked to procedural numbers that such resistance to change has been noted between the two major Endovascular practitioners in Vascular Surgery and Radiology. It is clear that surgeons should clearly lead on open surgery and hybrid procedures in which open access is an essential component of the overall combined open and endovascular procedure. So too percutaneous procedures can be conducted without need for a theatre environment and can be conducted by suitably qualified physicians from a vascular surgery or radiology background. Rather than turf-wars, keeping the patient at the centre to ensure they are treated in a timely and skilled



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manner by the most appropriate team member, should help build trust and build cohesive functioning teams. Vascular surgeons and radiologist should not be competing for the same patient but rather treat the patient with the best treatment option, be it open or hybrid or endovascular, and by the most appropriate team.

Vascular Disease is finally getting the attention it deserves and we should create effective vascular networks which by combining the skills of the team create synergy and good teamwork for the benefit of the patients. Building strength through respect and equality for the different but complimentary skills of all team members to include nurses, physicians, radiologists and vascular surgeons.

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Appendix 1. National Vascular Registry Consultant Vascular Surgeons per Trust & Region UK.
Scotland Vascular Surgery Workforce (Consultant), by Region, 2018.

Scotland Region	Number Consultants
NHS Ayrshire & Arran	2
NHS Forth Valley	3
NHS Grampian	5
NHS Greater Glasgow and Clyde	10
NHS Highland	4
NHS Lanarkshire	5
NHS Lothian	7
NHS Tayside	6
NHS Dumfries and Galloway	0*
NHS Fife	0*
Total	42

Source: NVR Consultant performing AAA, 2018. *Hospital performs Carotid Endarterectomy (CEA) but not AAA. Highlighted Arterial Hubs performing AAA with less than recommended Team (6, or more).

Wales Vascular Surgery Workforce (Consultant), by Region, 2018.

Wales Region	Number Consultants
Abertawe Bro Morgannwg University Health Board	8
Aneurin Bevan University Health Board	6
Betsi Cadwaladr University Health Board	5
Cardiff and Vale University Health Board	7
Cwm Taf University Health Board	0*
Total	26

Source: NVR Consultant performing AAA, 2018. *Hospital performs Carotid Endarterectomy (CEA) but not AAA. Highlighted Arterial Hubs performing AAA with less than recommended Team (6, or more).

Northern Ireland Vascular Surgery Workforce (Consultant), by Region, 2018.

Northern Ireland Regions	Number Consultants
Belfast Health & Social Care Trust	9
South Eastern Health & Social Care Trust	0
Southern Health & Social Care Trust	0
Northern Health & Social Care Trust	0
Western Health & Social Care Trust	0
Total	9

Source: NVR Consultant performing AAA, 2018. *Hospital performs Carotid Endarterectomy (CEA) but not AAA. Highlighted Arterial Hubs performing AAA with less than recommended Team (6, or more).

England Vascular Surgery Workforce (Consultant), by Region, 2018.

England Regions	Number Consultants
East Midlands	33
Derby Teaching Hospitals NHS Foundation Trust	7
Northampton General Hospitals NHS Trust	6
Nottingham University Hospitals NHS Trust	6
United Lincolnshire Hospitals NHS Trust	5
University Hospitals of Leicester NHS Trust	9
East of England	47
Basildon and Thurrock University Hospitals NHS Foundation Trust	3
Bedford Hospital NHS Trust	4
Cambridge University Hospitals NHS Foundation Trust	9
Colchester Hospital University NHS Foundation Trust	8
East and North Hertfordshire NHS Trust	4
Mid Essex Hospital Services NHS Trust	3
Norfolk and Norwich University Hospitals NHS Foundation Trust	7

Princess Alexandra Hospital NHS Trust	2
Southend University Hospital NHS Foundation Trust	2
West Hertfordshire Hospitals NHS Trust	5
London	78
Barking, Havering and Redbridge University Hospitals NHS Trust	5
Barts Health NHS Trust	11
Guy's and St Thomas' NHS Foundation Trust	17
Imperial College Healthcare NHS Trust	9
King's College Hospital NHS Foundation Trust	5
London North West Healthcare NHS Trust	7
Royal Free London NHS Foundation Trust	15
St George's University Hospitals NHS	9
University College London Hospitals NHS Foundation Trust	0*
North East	24
City Hospitals Sunderland NHS Foundation Trust	5
County Durham and Darlington NHS Foundation Trust	8
Newcastle upon Tyne Hospitals NHS Foundation Trust	5
South Tees Hospitals NHS Foundation Trust	6
Gateshead Health NHS Foundation Trust	0*
North West	63
Countess of Chester Hospital NHS Foundation Trust	11
East Lancashire Hospitals NHS Trust	6
Lancashire Teaching Hospitals NHS Foundation Trust	12
Manchester University NHS Foundation Trust	13
North Cumbria University Hospitals NHS Trust	6
Pennine Acute Hospitals NHS Trust	5

Royal Liverpool and Broadgreen University Hospitals NHS Trust	10
South Central	20
Oxford University Hospitals NHS Foundation Trust	11
University Hospital Southampton NHS Foundation Trust	9
South East Coast	29
Ashford and St Peter's Hospital NHS Foundation Trust	6
Brighton and Sussex University Hospitals NHS Trust	10
East Kent Hospitals University NHS Foundation Trust	4
Frimley Health NHS Foundation Trust	6
Medway NHS Foundation Trust	3
South West	50
Gloucestershire Hospitals NHS Foundation Trust	8
North Bristol NHS Trust	10
Plymouth Hospitals NHS Trust	5
Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	6
Royal Cornwall Hospitals NHS Trust	8
Royal Devon and Exeter NHS Foundation Trust	5
Taunton and Somerset NHS Foundation Trust	5
Torbay and South Devon NHS Foundation Trust	3
West Midlands	53
Heart of England NHS Foundation Trust	7
Shrewsbury and Telford Hospital NHS Trust	6
The Dudley Group NHS Foundation Trust	9
University Hospital of North Midlands NHS Trust	11
University Hospitals Birmingham NHS Foundation Trust	9
University Hospitals Coventry and Warwickshire NHS Trust	6
Worcestershire Acute Hospitals NHS Trust	5

Yorkshire and The Humber	48
Bradford Teaching Hospitals NHS Foundation Trust	4
Calderdale and Huddersfield NHS Foundation Trust	4
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	9
Hull and East Yorkshire Hospitals NHS Trust	7
Leeds Teaching Hospitals NHS Trust	10
Sheffield Teaching Hospitals NHS Foundation Trust	7
York Teaching Hospital NHS Foundation Trust	7
England Total	445

Source: NVR Consultant performing AAA, 2018. *Hospital performs Carotid Endarterectomy (CEA) but not AAA. Highlighted Arterial Hubs performing AAA with less than recommended Team (6, or more).

Appendix 2. Vascular Surgery United Kingdom Workforce 2018 Survey Questions

Personal Characteristics

1. What is the job title for your current position?
2. How long have you been in your current position? (round up to the nearest whole number)
3. Are you male or female?
4. What is your age?
5. In which postgraduate medical education deanery of the United Kingdom do you work?
6. What NHS Hospital(s) do you carry out inpatient arterial work in?

Job Characteristics

7. Which of the following best describes your job function?
8. What percentage of your job involves vascular surgery?
9. During specialist registrar training how long did you spend in recognised specialist vascular training unit?
10. Did you receive Out of Programme Experience (OOPE) in Vascular Surgery?
11. If you obtained Out of Programme Experience (OOPE), where did you train?
12. Did you completed an Endovascular Training Fellowship (please specify)?
13. If you obtained Endovascular Training, where did you train?
14. How many consultant vascular surgeons are there in your Hospital?
15. How many UNFILLED consultant vascular surgeon posts are there in your hospital?
16. If you have unfilled posts, please state reason post is unfilled?
17. Is your job full-time or part-time?
18. In your job-plan how many programmed activities (PA) involve direct clinical care (DCC)?
19. In your job-plan how many programmed activities (PA) are for supporting professional activities (SPA)?
20. In your job-plan how many TOTAL programmed activities (PA)?
21. What is the average number of hours you work per week?
22. In a typical week, how many Theatre Sessions do you have?
23. In a typical week, how many Day Procedure Sessions do you have?
24. In a typical week, how many Endovascular/Angio Sessions do you have?
25. To maintain your surgical skills how many surgery sessions per week would be optimal?
26. In the past 12 months, how frequently did you operate with a second consultant?
27. In a typical week, how many Outpatient Clinics do you have?
28. What joint outpatient clinics with other specialists do you do? (Select all that apply)
29. In a typical week, in how many hospitals do you work?
30. Does your hospital provide 24/7 cover for Vascular Surgery?
31. What type of surgery do you cover when oncall for emergencies?
32. When oncall are you free from daytime elective commitments?
33. What is your oncall commitment?
34. How many hospitals do you cover when oncall?
35. Do you allow surgeons to leave the oncall rota at a certain age, if so please specify?
36. Above what age do you feel it would be inappropriate to be oncall for vascular surgery emergencies?
37. Do you do scheduled theatre sessions at weekends?
38. Would you do scheduled theatre sessions at weekends, if it were appropriately jobplanned?

Vascular Surgery Practice

39. Do you perform Carotid Endarterectomy?
40. Do you perform infra-inguinal bypass surgery?
41. Do you perform amputations?
42. Do you perform Open Abdominal Aortic Surgery?
43. Do you perform Open Thoracic Aortic Surgery?
44. Do you perform Endovascular Aneurysm Repair (EVAR)?
45. Do you perform Fenestrated or Branched EVAR?
46. Do you perform TEVAR?
47. Do you perform peripheral angioplasty?
48. Do you perform Open Vein Surgery?

49. Do you perform Endovenous Therapy?
50. Do you perform Duplex Ultrasound (for endovenous therapy)?
51. Do you perform renal access surgery?
52. Which of these operations do you perform (Select all that apply)?

Hospital Resources

53. Do you have specialist vascular surgery beds?
54. How many specialist vascular surgical beds do you have in your hospital?
55. How many specialist vascular surgical beds do you have per consultant in your hospital?
56. Does your hospital have 24/7 Emergency Department?
57. Does your hospital have a Level 1 Trauma Centre?
58. Do you have access 24/7 to an Intensive Care Unit?
59. Do you have access to a 24/7 CEPOD Emergency Theatre in your hospital?
60. Do you have access to 24/7 Hybrid Interventional Suite with fixed imaging equipment?
61. Do you have access to 24/7 Vascular Imaging (CTA or MRA) in your hospital?
62. Do you have access (daytime, monday to friday) to a vascular laboratory for vascular ultrasound imaging?
63. Do you have access (out of hours, weekend) to a vascular laboratory for vascular ultrasound imaging?
64. If you do EVAR, where do you perform the majority of your cases?
65. Do you have access to 24/7 Interventional Radiology cover in your hospital?
66. How many Interventional Radiologist are in your hospital?
67. Is your hospital a National AAA Screening Programme recognised treatment centre?
68. Which surgical specialties do you have in your hospital? (Select all that apply)

Professional Activities

69. What is your job role?
70. What educational roles do you have?
71. What roles do you have as an Examiner?
72. Is there a consultant vascular surgeon in your hospital who has an official university academic appointment, please specify?
73. Do you attend a weekly Multi-disciplinary Team Meeting?
74. Do you attend a monthly audit meeting to included Morbidity and Mortality data?
75. Do you submit your outcomes data to the National Vascular Registry (NVR)?
76. Has your hospital been approved by the GMC and Vascular Surgery SAC for new Specialist Registrar Training in Vascular Surgery?
77. Do your surgical trainees receive training on procedural skills simulators (arterial/venous/endovascular) before treating patients?

Work-life Balance

78. How physically healthy are you?
79. Are you satisfied with your job, neither satisfied nor dissatisfied with it, or dissatisfied with it?
80. In a typical week, how often do you feel stressed at work?
81. Do you like your job, neither like nor dislike it, or dislike it?
82. How useful is it in your opinion to have a mentor?
83. How likely are you to drop your vascular surgery commitments and continue as a general surgeon?
84. How likely are you to retire in the next ten years?
85. If you plan to retire in the next 10 years, please indicate how soon you plan to retire?
86. If you plan to retire, please state your reason for leaving?