SOUTH EAST WALES
VASCULAR NETWORK

GIG CYMRU NHS WALES

THE FUTURE PROVISION OF VASCULAR SERVICES FOR THE POPULATION OF SOUTH EAST WALES: A DISCUSSION DOCUMENT

Aneurin Bevan University Health Board

Cardiff and Vale University Health Board

Cwm Taf Morgannwg University Health Board

Powys Teaching Health Board

CONTENT

APPENDICES

FOREWARD FROM CHAIR OF THE VASCULAR JOINT EXECUTIVE BOARD AND CHIEF EXECUTIVES OF THE FOUR HEALTH BOARDS IN SOUTH EAST WALES.

In South East Wales, we are proposing a number of changes to improve our vascular service provision for the future and ultimately provide the best standard of patient care for our South East Wales population. But before we do this, we want to hear from you, to find out what you think of the suggested future model.

Vascular services are currently delivered from the University Hospital of Wales and the new Grange University Hospital. Until the latter end of last year, the Royal Glamorgan Hospital also offered vascular services. There is currently a temporary arrangement in place that sees services delivered from other sites.

This document shares the escalating challenges for our vascular services, and suggests how we can best maximise the potential of skills and staff to create a more sustainable future for vascular services. Most importantly, we expect the changes to lead to improved patient outcomes.

Please take the opportunity to read on and find out about the proposed changes, before submitting your feedback. These services are a vital part of our healthcare infrastructure in South East Wales and we value your feedback.

1. INTRODUCTION

This document is being shared with people across South East Wales, to start a conversation about how vascular services are organised in the future. It aims to share information and gain your views about:

- What vascular services are
- Which people may be in need of vascular care
- How vascular services are currently provided
- The challenges facing vascular services
- The options we have started to consider for how we could respond to these challenges
- A preferred way for organising services
- What the advantages and disadvantages may be of any future changes.

After considering the issues contained within the paper, we hope you will share your views, thoughts and ideas with us. We have offered a questionnaire at the end of this document, but should you wish to tell us about issues that are broader than this, please do not hesitate to do so.

Your responses should be with the team co-ordinating this by Friday 16th April 2021.

You can respond by:

E-mail	*sewales.vascular@wales.nhs.uk*
Post	*Engage With Us* *Woodland House* *Maes-y-coed Road* *Cardiff* *CF14 4HH*

Following this period of engagement, we may need to enter a more formal period of consultation about the services. If you are interested in continuing the conversation with us, please let us have the best contact details to keep you engaged with the conversation.

We recognise that this document will have some medical terms associated with vascular surgery within it. We have added a 'Glossary of Terms' to the end of the document to help with this.

We have also completed an equality impact assessment, which you can view at appendix C. We will use the information gained through the engagement process to increase our understanding here.

2. WHAT ARE VASCULAR SERVICES?

Vascular disease is any condition that affects the network of your blood vessels. This network is known as your **vascular** or circulatory system. The main aim of vascular services is to reconstruct, unblock or bypass arteries to restore blood flow to organs. These are often one-off procedures, to reduce the risk of sudden death, prevent stroke, reduce the risk of amputation and improve function. Vascular services are also provided to support patients with other problems such as kidney disease

Vascular disorders can reduce the amount of blood reaching the limbs, brain or other organs, causing for example severe pain on walking or strokes. Additionally, vascular abnormalities can cause sudden life-threatening blood loss if abnormally enlarged arteries burst. Vascular specialists also support other specialties, such as major trauma, cardiology, diabetic medicine, stroke medicine, kidney dialysis and chemotherapy.

The core activities of vascular specialists are:

- Preventing death from abdominal aortic aneurysm (AAA)
- Preventing stroke due to carotid artery disease
- Preventing leg amputation due to peripheral arterial disease
- Symptom relief from peripheral arterial and venous disease
- Healing venous leg ulceration
- Promoting cardiovascular health
- Improving quality of life in patients with vascular disease
- Assisting colleagues from other specialties with the control of vascular bleeding
- Providing a renal access service for patients requiring haemodialysis.

Aneurin Bevan University Health Board; Cardiff and Vale University Health Board; Cwm Taf Morgannwg University Health Board and Powys Teaching Health Board have worked together for a number of years to discuss the best way of delivering vascular services, and already have a number of shared arrangements already in place (e.g. out-of-hours rota). We are therefore collectively talking to you about the future of vascular services, following which we may enter a period of more formal consultation on the services.

3. **WHO NEEDS THESE SERVICES?**

The prevalence of vascular disease increases with age. Average life expectancy continues to rise, especially in males. This suggests that demand for vascular services is likely to increase over time. There are currently an estimated 200,000 people with diabetes mellitus in Wales, and prevalence is increasing.[1] Vascular disease is the major cause of morbidity in diabetes and the risks of disease progression are higher, with an epidemic of diabetic foot disease expected in the next decade.

Risk factors for vascular disease include:

- Being over the age of 50
- Smoking
- Being overweight
- Having abnormal cholesterol
- Having a history of cerebrovascular disease or stroke
- Having heart disease
- Having diabetes
- Having a family history of high cholesterol or high blood pressure
- Having high blood pressure
- Having kidney disease or haemodialysis

Early diagnosis is key to successfully treating vascular related disease. Patients will be admitted with a variety of both emergency and planned vascular conditions and not all patients will go on to require a complex surgical or interventional radiology procedure. Emergency care is immediate treatment to save a life or limb. Urgent care is planned treatment within a limited number of days.

Patients who receive vascular services may have:

- Had a stroke and be at risk of having further strokes
- Blocked arteries in the legs causing pain which may deteriorate further and threaten the leg
- A bulge in the wall of the body's main artery, which needs repair to prevent it rupturing
- Untreated or untreatable arterial blockages which mean they need a limb amputation.

Not all patients admitted to a specialist service will need a complex surgical or interventional radiology intervention. However, due to the nature of their condition, these patients need specialist assessment and care provided in a specialised vascular unit.

Vascular services are provided to the populations of South East Wales with the exception of Bridgend who receive care from the South West Wales vascular network. This is a population of approximately 1.6 million people.

To give a sense of demand for services, the following shows activity across the Health Boards for the 2019 year:

Matric	Period	Aneurin Bevan University Health Board	Cardiff and Vale University Health Board	Cwm Taf Morgannwg University Health Board	Powys Teaching Health Board	South East Wales Total
Population		600,000	472,000	450,000	132,500	1,654,500
Total Outpatient Appointments	**2019**	**830**	**2391**	**2340**	**N/A**	**5561**
New Patients	2019	462	867	1181	N/A	**2510**
Follow ups	2019	368	1524	1159	N/A	**3051**
Total number of Cases/Procedures	2019	456	437	355	N/A	**1248**

- Powys has a population of 132,500 people of which around 40,000 people in South Powys are served by vascular services in South East Wales. Other parts of Powys are served by vascular services in other parts of Wales and in England
- Activity data is collected on the basis of provider Health Board rather than place of residence. Activity for South Powys residents is therefore included within the provider activity for other health boards

4. HOW ARE SERVICES CURRENTLY PROVIDED?

National Context

Across the UK, vascular services have been reconfigured into a 'hub and spoke' integrated regional networks as a result of a number of recommendations and published evidence of the Department of Health (DH) in England, the Vascular Society of Great Britain and Ireland (VSGBI), and the Royal College of Radiologists (RCR). Evidence shows implementation has led to improved clinical outcomes following these changes, with reduced waiting times for patients and an improved ability to attract and retain staff ensuring these services are more sustainable in the long term. Most recently North Wales implemented an integrated network model with Ysbty Glan Clywd as a single hub for major arterial surgery in 2019, which means that South East Wales is now one of the last regions to form a hub and spoke network model.

The last few years have seen great changes in vascular services in the UK, partly stimulated by challenges such as poor surgical outcomes and the introduction of national screening for Abdominal Aortic Aneurysm (AAA), but also endorsed by a specialist group trying to improve its quality and performance. This has meant a contraction of the service into a smaller number of higher volume centres to improve outcomes. Whilst complex inpatient work is concentrated in a single network centre, outpatient and outreach services for the entire network are provided locally so that patients attending smaller network hospitals are not disadvantaged.

Since 2001, the Vascular Society of Great Britain and Ireland (VSGBI) has funded and maintained a registry of index arterial procedures (National Vascular Registry – NVR). In 2008, data from the previous five years in the UK were included in a European report (Vascunet) that suggested the UK had the worst elective abdominal aortic aneurysm (AAA) mortality rates in Europe (7.5% versus 3.5% European average). This data was supported by similar results from the Vascular Anaesthesia Society audit and the Intensive Care Database. The main conclusion was that many patients were being treated in small UK centres undertaking a limited number of AAA repairs, with poorer outcomes. Studies have consistently shown that higher volume centres produce better outcomes for many surgical procedures, and this is well recognised for aortic aneurysm surgery. The conclusion was that concentrating aortic surgery in higher volume centres should improve surgical outcomes. Subsequently, similar conclusions

regarding improved outcome for patients have been drawn with regards to carotid surgery and lower limb revascularisation.

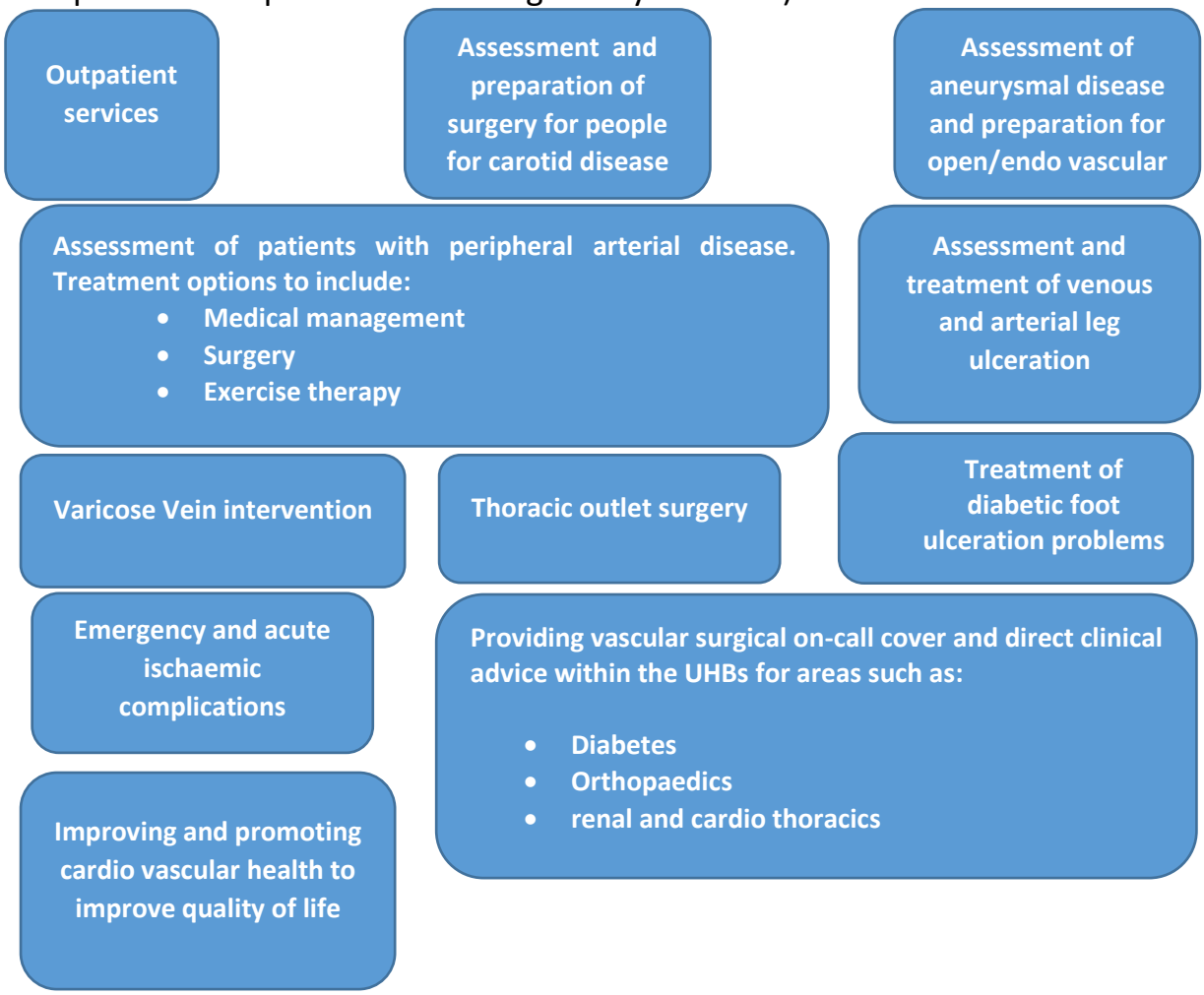
Local Context

Collectively, Aneurin Bevan University Health Board, Cardiff and Vale University Health Board and Cwm Taf Morgannwg University Health Board provide vascular services to the following populations:

ANEURIN BEVAN	CWM TAF MORGANNWG	CARDIFF and THE VALE OF GLAMORGAN	POWYS
Blaenau Gwent	Rhondda	Cardiff	S. Powys
Caerphilly	Cynon	Vale of Glamorgan	
Monmouthshire	Taff Ely		
Newport	Merthyr Tydfil		
Torfaen			

- *Note that the population of Bridgend is served by the South West Vascular network*

A summary of the services that are provided is offered here (you can find a simplified description of all in the glossary of terms):



To deliver these, each Health Board has full access to:

- A vascular team that comprises vascular surgeons, vascular anaesthetists, vascular interventional radiologists, clinical nurse specialists, podiatrists, tissue viability nurses, physiotherapists, occupational therapists, social workers, pharmacists and members of the prosthetics team. The teams are used to working across Health Board boundaries

- A dedicated vascular ward. There is a provision for inpatient facilities along with day case access for various veins and minor day case surgery. Outpatient clinics are held in each Health Board area.

- Access to Doppler ultrasound, Computer Tomography (CT) and Magnetic Resonance (MR) Angiography

- Vascular clinics within their area and weekly interventional radiology clinics in which patients are consented for interventional radiology procedures

- An interventional radiology suite with high-quality rotational fluoroscopic imaging, in a room which is equipped for a full range of anaesthetics. The rooms can be used for endovascular aneurysm repair, combined vascular surgery and interventional radiography techniques

- Day Case and Short Stay Facilities for minimally invasive varicose veins procedures are performed under local anaesthetic

- Operating theatres

- Vascular team access to a critical care unit

- Pathways in place for those patients presenting with critical limb ischaemia (CLI)

- Out-of-hours arrangements (which are already managed across Health Board sites). Normally, vascular patients are referred to the admitting general surgical on-call team. Depending on the urgency, the patient is either assessed by the emergency surgeon or referred directly to the vascular surgeon

- In-hours interventional radiology

- Out-of-hours interventional radiology which is managed via an on-call rota, meaning that outside of normal working hours, the patients are admitted by the on-call surgical team at UHW and assessed. If emergency interventional radiology input is required, the case is discussed with the vascular surgeon on for the region, who will in turn contact the on-call interventional radiologist.

It should be noted, however, that at the time of writing, temporary arrangements have had to be put in place to support Cwm Taf Morgannwg, whose vascular service has recently become unsustainable. These temporary arrangements are services being provided to patients from Rhondda, Cynon, Taff Ely and Merthyr Tydfil by vascular services in Aneurin Bevan University Health Board and Cardiff and Vale University Health Board.

5. HOW DO WE PERFORM?

The National Vascular Registry (NVR) is a national clinical audit commissioned by the Health Quality Improvement Partnership (HQIP) to measure the quality of care for patients who undergo vascular surgery in NHS hospitals. It was formed in January 2013. The NVR forms part of The Vascular Society and partner organisations' quality improvement programmes. Their aim is to drive up the quality of care for patients with vascular disease in the UK.

Each Health Board sends information to the NVR who then analyse this to provide information on their standard of clinical care and patient outcomes. This allows hospitals to know what they are doing well, as well as highlighting areas that they can improve.

The NVR measures currently collect information on five vascular surgical procedures:

- Repair of abdominal aortic aneurysm (AAA)
- Carotid endarterectomy
- Lower limb angioplasty
- Lower limb bypass
- Lower limb amputation

Below is the analysis of each surgical procedure for the South East Wales health boards.

- **Abdominal Aortic Aneurysm**

An **abdominal aortic aneurysm** (AAA) is a bulge or swelling in the **aorta**, the main blood vessel that runs from the heart down through the chest and tummy. An AAA can be dangerous if it is not spotted early on. It can get bigger over time and could burst (rupture), causing life-threatening bleeding

In the UK in 2019, 3445 people underwent surgery for abdominal aortic aneurysm. Of these, 80 people were from the South East Wales region. 44 were from the Aneurin Bevan University Health Board area, 21 from the Cardiff and Vale University Health Board area and 15 from within Cwm Taf Morgannwg Teaching Health Board.

The National AAA screening programme recommends that patients have treatment within eight weeks of referral (56 days). The actual wait nationally is on average 69 days. Performance in the South East Wales region is set out below:

Metric	Period	Aneurin Bevan UHB Figures	Cardiff & Vale UHB Figures	Cwm Taf Morgannwg UHB	National
Elective Infra-renal Cases	**2019**	**44**	**21**	**15**	
Type of elective infra-renal AAA repairs	2019	64% EVAR	62% EVAR	60% EVAR	61% EVAR
Average time from assessment to procedure	2019	67	68	111	69
Average length of stay for open repair	2019	9	9	9	7
Average length of stay for EVAR	2019	1	3	2	2
Risk adjusted survival	2017-2019	98.40%	94.40%	98.20%	98.60%

The average length of stay for patients in the South East Wales region is in line with the national range.

The Vascular Services Quality Improvement rated all three health boards in South East Wales 'Green' on a green, amber, red scale for elective abdominal aortic aneurysm outcomes.

- **Lower Limb bypass for peripheral arterial disease**

Peripheral artery bypass is surgery to reroute the blood supply around a blocked **artery** in one of your legs. Fatty deposits can build up inside the **arteries** and block them. A graft is used to replace or **bypass** the blocked part of the **artery**. In the UK between 2017 and 2019, 18090 people had a bypass of this kind. Of these, 6807 were undertaken as an emergency and 11283 as a planned procedure. Of these, 497 were in the South East Wales region.

Nationally, the average length of stay for a patient who has had a planned surgery is 5 days and average length of stay for a patient admitted as an emergency is 14. How Health Boards in the South East Wales region compare is outlined below

Metric	Period	Aneurin Bevan UHB Figures	Cardiff & Vale UHB Figures	Cwm Taf Morgannwg UHB	National
No. of Cases	**2017-2019**	**206**	**209**	**82**	
Average Length of stay	2017-2019	7	9	9	7
Risk adjusted survival	2017-2019	97.8%	96.8%	99.0%	97.6%

The Vascular Services Quality Improvement rated one of the Health Boards in the South East Wales area as 'Green' and two of the health boards as 'Amber' due to a slightly higher than expected length of stay in hospital.

- **Lower limb bypass angioplasty and stenting**

Angioplasty is a **procedure** to open narrowed or blocked blood vessels that supply blood to your legs. Fatty deposits can build up inside the arteries and block blood flow. A **stent** is a small, metal mesh tube that keeps the artery open. **Angioplasty and stent** placement are two ways to open blocked peripheral arteries. Between 2017 and 2019, 23881 procedures of this kind were carried out across the UK. Of these, 6605 patients were admitted as an emergency, and 17276 as planned procedures.

The number of patients across the South East Wales region during this period is recorded as 265. However there are some challenges with validation of the data in both Aneurin Bevan and Cardiff and Vale University Health Boards, so the actual figure is likely to be much higher.

Metric	Period	Aneurin Bevan UHB Figures	Cardiff & Vale UHB Figures	Cwm Taf Morgannwg UHB	National
No. of Cases	**2017-2019**	**25**	**90**	**150**	
Average Length of stay	2017-2019	0	2	0	100%
Risk adjusted survival	2017-2019	92.50%	97%	99.30%	98.40%

The Vascular Services Quality Improvement rated one Health Board in the region as 'Green' on a green, amber, red scale for lower limb angioplasty and stenting, and two as 'Red' based on incomplete data sets.

- **Major lower limb amputation**

There are occasions when the blood flow in the legs cannot be increased and an operation is not possible. In these cases, an amputation of the leg may be required. During 2017-2019, 10022 procedures of this kind were undertaken across the UK. The average length of stay for patients nationally is 23 days. All three Health Boards in the South East Wales region have higher lengths of stay than the national average.

Metric	Period	Aneurin Bevan UHB Figures	Cardiff & Vale UHB Figures	Cwm Taf Morgannwg UHB	National
No. of Cases	**2017-2019**	**132**	**113**	**86**	
Average time from assessment to procedure	2017-2019	8	10	37	7
Average length of stay	2017-2019	29	40	27	23
Risk adjusted survival	2017-2019	98.4%	96.2%	96.0%	95.4%

The Vascular Services Quality Improvement rated all three Health Boards in South East Wales 'Green' on a green, amber, red scale for lower limb amputation outcomes.

- **Carotid endarterectomy**

A **carotid endarterectomy** is a surgical procedure to unblock a carotid artery. The carotid arteries are the main blood vessels that supply the head and neck. During 2017 and 2019, 4141 of these procedures were carried out in the UK. The recommended time from symptom to treatment is 14 days.

75 of these patients were from the South East Wales region and were all treated underneath the minimum timescale of 14 days. The average national length of stay for patients who undergo this procedure is two days. Two of the three Health Boards are within this range, with one reporting a higher length of stay than the national average.

Metric	Period	Aneurin Bevan UHB Figures	Cardiff & Vale UHB Figures	Cwm Taf Morgannwg UHB	National
No. of Cases	**2019**	**49**	**4**	**22**	
Median time from symptom to procedure	2019	12	8	8	12
Median Length of stay	2019	1	7	2	2
Risk adjusted stroke free survival	2017-2019	96.60%	100%	98.60%	98.10%

The Vascular Services Quality Improvement rated two of three Health Boards in South East Wales 'Green' on a green, amber, red scale for carotid endarterectomy outcomes. Cardiff and Vale University Health Board were rated 'Red' due to a low ascertainment rate, i.e. an incomplete data set.

6. WHAT ARE THE CHALLENGES FACING THESE SERVICES?

Vascular services need to be provided in a safe and sustainable way that is consistent with National guidelines and best practice. The key challenges facing the service at this time are summarised below:

- **A growing need for the service –** There is an increasing demand on vascular services across the South East Wales region due an increasing population and worsening rates of diabetes. There are a number of issues that contribute to this:

    - **Age** - Vascular disease and its consequences increase with age. Our 65 to 84 and 85+ age groups are projected to have the largest increase by 2036, when an estimated one in four people in Wales will be aged 65 and over. These projections will have significant implications for the way in which we design and provide health (and increasingly integrated health and social care) services. With an increasing population and especially an increasing older population it is even more important that we support the people living in our communities to live long and healthy lives, free from the limiting effects of multiple chronic conditions.

    - **Diabetes –** There is a diabetes epidemic in Wales. There are more than 194,000 people over the age of 17 diagnosed with diabetes and, we estimate, a further 61,000 people living with undiagnosed Type 2. This takes the total number of people living with diabetes in Wales now to over 250,000. It is not just the raw figures that are concerning. Wales' prevalence as a proportion of its population is 7.4% – the highest in the UK and Western Europe. The number of people with diabetes has been steadily increasing and has doubled in the last 20 years. NHS Wales estimates 11% of our adult population will have the condition by 2030. This is mainly a result of the drastic increase in Type 2 diabetes. This is unsustainable, both for our health service and wider society. Vascular disease is the major cause of morbidity in diabetes and the risks of disease

progression are higher. Prevalence of peripheral arterial disease was 4.5% in the general population but increased to 9.5% in people with diabetes. It is likely that the great increase in the number of patients with diabetes over the next decade will have the biggest impact on vascular services. Many of these patients present as an emergency, and are at high risk of amputation. Prompt treatment of the infected diabetic foot can minimise the risk of subsequent amputation. Lower limb amputation is carried out more than 20 times as often in people with diabetes than it is in people without diabetes. Only around half of people who have lost a leg because of diabetes survive for two years.

Smoking – Smoking is a major cause of vascular disease and over 80% of vascular patients are current or ex-smokers. Smokers are at greater risk of complications from vascular interventions because of cardiac and respiratory co-morbidity. The longer-term success of vascular intervention is reduced in patients who continue to smoke. (HSE 2007)

- **Obesity –** Obesity and being overweight are linked to several factors that increase risk for cardiovascular disease. Almost 60% of adults in Wales are currently overweight or obese, of which 24% are obese. There is evidence of an upward trend in recent years. It is estimated that the percentage of adults who are overweight or obese will increase to around 64% by 2030 if the current pattern continues.

- **Minimum population requirements –** A minimum population of 800,000 is considered necessary for an Abdominal Aortic Aneurysm screening programme and is often considered the minimum population required for a centralised vascular service. This is based on the number of patients needed to provide a comprehensive emergency service; maintain competence among vascular specialists and nursing staff; ensure the most efficient use of specialist equipment, staff and facilities, and the improvement in patient outcome that is associated with increasing caseload. A minimum population of 800,000 would be appropriate but for a world class service a larger catchment area will be required. The population of SE Wales (the resident population of the Health Boards taking forward this proposal) is approximately 1.6 million (StatsWales 2016). The current configuration of services across separate hospital sites

across South East Wales are too small to meet the quality and safety standards set out by the Vascular Society and the Royal College of Surgeons. None of the current individual units meet this requirement.

- **Meeting quality standards –** Not all units are able to currently achieve the quality indicators individually as units. These are:

    - The Vascular Society recommends a vascular unit should be performing 60 elective aneurysm repairs per year. Collectively in SE Wales, 99 aneurysm repairs were performed in 2019. No units individually reached the required number
    - The Vascular Society recommends a vascular unit should be performing 40 carotid endarterectomies per year. Collectively in SE Wales, 75 were performed in 2019
    - Between 2017-19, 497 bypass procedures and 331 major limb amputations were performed in SE Wales.

- **Workforce –** A workforce survey undertaken by the Vascular Society for Great Britain and Ireland in 2019 concluded that both the number and complexity of vascular surgery procedures per capita population is increasing year-on-year. There is a worldwide shortage of vascular surgeons to meet increasing demand and this shortfall is significant in the UK. There are a few workforce challenges to note:

    - Vascular services need to be organised to allow reasonable volumes of elective activity to exist alongside an acceptable consultant emergency on-call rota thus ensuring appropriate critical mass of infrastructure and patient volumes

    - The Vascular Society recommend one surgeon per 100,000 of population. (it was previously one per 130,000 population). This would mean that South East wales should have 14 consultants supporting vascular services in the area. It actually has nine surgeons across the three provider Health Boards. Seven of these cover on-call arrangements too, which means there is very little opportunity to foster learning and growth in the workforce

    - There is challenge in recruiting to vascular posts in Wales. Even where appointments happen, retention proves very difficult

- The age profile of current consultants and vascular nurse specialists makes it very difficult to succession plan

- Disparate teams mean that there is little opportunity for people to specialise. However, this is something that we know would attract more consultants and specialist therapists.

- **Services spread across South East Wales –** The National Vascular Registry has shown a constant improvement in vascular surgical outcomes over the last 10 years. However, as shown above this could be improved further by concentration of services into a single arterial hub. The Getting It Right First Time (GIRFT) report showed co-location of vascular services with other specialist services such as nephrology, major trauma and interventional radiology improve outcomes. This is not currently the case within the South East Wales region.

- **Patient outcomes –** There is strong evidence that case volume influences outcomes. The 31 highest volume hospitals (which perform 57% of all elective Abdominal Aortic Aneurysm procedures in the UK) have mortality rates that are under half those seen in the 32 hospitals with the lowest volume of procedures. This data lends support to the current move towards performing major arterial surgery in larger volume units in order to further optimise outcomes. The Royal College/national professional view, is that it is no longer acceptable to provide elective or emergency vascular cover outside a fully centralised service or a formalised modern clinical network with a designated single site for all arterial interventions providing a 24/7 on-site service.

All of the issues outlined above mean that services are becoming increasingly unsustainable and could become unsafe unless changes are made to the way services are organised and delivered.

The service models emerging nationally across the UK all enable sustainable delivery of the required infrastructure, patient volumes, and improved clinical outcomes and are based on the concept of a network of providers working together to deliver comprehensive patient care pathways, centralising where necessary and continuing to provide some services in local settings. There are a number of reviews and reports that support this which include:

1. https://gettingitrightfirsttime.co.uk/wp-content/uploads/2018/02/GIRFT_Vascular_Surgery_Report-March_2018.pdf

7. WHAT OPTIONS HAVE WE CONSIDERED TO RESPOND TO THE CHALLENGES?

Our focus has to be on long-term resilience and sustainability of vascular services. Therefore, changes to how the services are currently being delivered will be required to ensure that everyone in need of vascular care receives it without unnecessary delay.

Our aim is to create vascular services that:

- Achieve best practice agreed by experts, to get the best outcomes for patients and the best chance of survival
- Ensure we have more doctors with the right specialist skills
- Meet national standards.

The issues outlined in the previous chapter that are facing the service have been emerging over recent years. Unsurprisingly therefore, our clinicians and senior leaders have already been giving some thought to how they may respond to the challenges.

During 2014, senior clinicians across the Health Boards undertook a clinical option appraisal about the best way that services may be organised in the future. They tested the following options for future delivery which would help reduce the risks of future delivery:

Option 1	**Do nothing** – Continue to deliver all services as they are with a thin layer of regional co-ordination to share best practice
Option 2	**Centralise delivery** – All services are delivered to the three Local Health Boards by a central team, located in one of the provider Health Boards. A single site for all vascular surgery services in South East Wales.
Option 3	**Single hub and spoke model –** Some functions, services and procedures (or elements of such) are delivered at scale by a central team, within one provider Health Board – the hub. These would only be provided at this central site location for SE Wales. Other functions and services are delivered on a more local basis, through spokes.

Option 4	**Multiple hubs** – Each LHB leads on a specific function or functions within the overall service, on behalf of all LHBs across SE Wales, e.g. arterial surgery.
Option 5	**Outsourcing –** All services are provided for Health Boards in South East Wales by another provider, which is not one of the constituent Health Boards of the network, but for which the network acts as the commissioner of the service.
Option 6	**A whole of South Wales option –** Widening the scope to include that which is currently provided by the South West Wales Vascular Network to establish a joined-up network across all of South Wales. If this was a viable option at this stage of the development of both networks, this would again then open up a range of future options to be considered, including many of the above, but on a wider South Wales basis. The initial option of considering this approach in this way at this stage was worth considering however, if only to discount it at this stage.

A range of clinical and managerial staff appraised the options against the following criteria:

- Quality and Safety (highest priority)
- Acceptability
- Strategic Fit
- Sustainability (ability for the services to be fit for now and the future)
- Access
- Achievability

They also considered the growing evidence base and used this to inform the proposed future service model for vascular surgery services in SE Wales. This includes a number of recommendations and published evidence of the Department of Health (DH) in England, the Vascular Society of Great Britain and Ireland (VSGBI), the Royal College of Radiologists (RCR), the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) and all relevant NICE Guidance.

Based on considering the evidence, and a full range of issues, the outcome from the clinical option appraisal was that the most feasible option for the future

delivery of vascular services in South East Wales is considered to be a hub and spoke model, managed through a clinical network as outlined in option 3.

There are a number of areas across the UK that are already configured in this way, and a number of reports and recommendations that support a networked arrangement for the organisation and delivery of vascular services with strong evidence that improvement to outcomes for patients undergoing vascular surgical procedures are seen as a result of centralising vascular surgery to a Major Arterial Centre. A more detailed description on the way we may organise delivery against a hub and spoke model is outlined in the following chapter.

8. PROPOSED SERVICE MODEL

There is strong National and International evidence that patients who need vascular interventions will receive a better quality of care and have a better chance of survival when they are treated and cared for by specialists (including vascular surgeons, interventional radiologists, nurses and therapists) who see a large number of these patients, which helps specialists to develop and maintain expertise in their field of work.

Based on considerations over recent years, there is good clinical consensus to proposed that if supported, the new vascular service will be based on a hub and spoke model and will have:

- Diagnosis and assessment of vascular disease (including the input of the vascular laboratory and diagnostic imaging)
- Outpatient management of patients with peripheral arterial disease
- Inpatient spells, emergency and elective activity
- Day case activity
- Multidisciplinary outpatient follow up of patients receiving vascular surgery/endovascular interventions
- Seamless repatriation of patients following rehabilitation care pathways particularly for post amputation care
- Limb Fitting Service – the vascular service must ensure its patients have access to a local limb fitting service, which meets the standards set by The British Society of Rehabilitation Medicine
- A dedicated vascular day case facility in both hub and spoke to allow day case surgical and interventional radiology procedure.

It is proposed that the hub and spokes have the following components:

HUB	**SPOKE**
➢ Emergency Vascular Service: • Amputations and "*nibbling"* • Aneurysm surgery	➢ Emergency Vascular Service:- • Angioplasty • Angiogram

• Patients requiring CEA within 48 hrs of index event • Peripheral arterial reconstructions.	• As noted above, the "front door" will remain the patient's local hospital, defined as a Local Hospital with an Emergency Department and an Emergency General Surgery Service • Rehabilitation.
➢ **Elective Vascular Service:** • Abdominal Aortic Aneurysm • Endovascular aneurysm repair • Carotid endarterectomy	➢ **Elective Vascular Service:-** • Venous surgery angiography and angioplasty • Outpatient clinics

Based on this, the main procedures that are expected to transfer from each of the current sites to any future hub are the following:

- Iliac and femoral artery procedures
- Carotid
- Open Abdominal Aortic Aneurysm
- Endovascular Abdominal Aortic Aneurysm
- Open Thoracic Aortic Aneurysm
- Thoracic endovascular aortic repair (TEVAR)
- Operations on vena cava
- Other artery.

To achieve delivery, there will be a number of infrastructure requirements for both the hub and the spoke:

HUB	SPOKE
➢ Dedicated vascular surgery ward(s). Beds will need to be staffed by an appropriate skill mix of nurses who have been trained in the care of vascular patients. Doppler investigation will need to be available on the ward ➢ Hybrid theatre, with experienced vascular theatre staff ➢ Scheduled elective lists (IP / DC) ➢ Anaesthesia – elective vascular services will have dedicated vascular anaesthetic input, from anaesthetists experienced in dealing with vascular patients and with a special interest in this area. This may include anaesthetists from Spoke sites given the opportunity to support elective lists in the hub ➢ Intensive Treatment Unit (ITU) and High Dependency Unit (HDU) – Facilities with full renal support must be available on-site to support the vascular service. Bookable HDU/ITU with sufficient beds will need to be available for elective patients	➢ Mixed surgical wards but with ring fenced vascular beds ➢ CEPOD theatre model ➢ Interventional radiology ➢ Scheduled elective DC lists ➢ Outpatient Clinics – including access to nurses/therapists experienced in ulcer and wound dressing. Doppler ultrasound machines should be available To support this, it is also assumed that each of the spoke sites will have the following: ➢ A consultant led Emergency Department (A&E) ➢ An Emergency General Surgery service.

➢ Interventional radiology suite with access to nursing staff trained in vascular procedures. ➢ Outpatients clinics	

Given the range of services already in situ on the University Hospital Wales site, its position as a specialist and tertiary provider, and the co-dependencies between them and the vascular service, particularly major trauma, interventional cardiology and cardio-thoracic surgery, the preferred option for the hub is identified as the University of Hospital Wales, Cardiff. Given the need for consultant led A&E and a general surgery emergency service, the spokes for each of the areas are proposed as:

- **Aneurin Bevan University Health Board** – Grange University Hospital and Royal Gwent Hospital
- **Cwm Taf Morgannwg University Health Board** – Royal Glamorgan Hospital, Llantrisant
- **Cardiff and Vale University Health Board** – Llandough Hospital Vale of Glamorgan.

It is important to note that the majority of pre- and post- operative care will continue to be provided locally. There are a few patient stories outlined below that help illustrate this.

Patient 1: Mrs Edmunds

Mrs Edmunds is an 81-year-old woman who has lived in Crickhowell all her life. Ten days ago, while getting ready for bed, her husband noticed that she was slurring her words and her right arm seemed clumsy and weak. Worried that his wife was having a stroke, Mr Edmunds dialled 999 and Mrs Edmunds was taken to Grange University Hospital by ambulance.

On admission to hospital she was assessed by the Acute Stroke Team and underwent a CT scan of her brain and the next day underwent an ultrasound scan (duplex scan) of her carotid arteries (these are the arteries in the neck that supply the brain). The duplex ultrasound scan showed that Mrs Edmunds had a 90% narrowing in her left carotid artery. The Acute Stroke Team told Mr Edmunds that he had done exactly the right thing.

The Stroke Physician telephoned the Vascular Surgical Regional Coordinator on the same day that the duplex scan was performed. After discussion with the duty Vascular Surgeon Mrs Edmunds was offered the choice between an operation at University Hospital of Wales (UHW) to "clear out" the blockage in her carotid artery (carotid endarterectomy) or continuing with medication. The Vascular Surgeon at UHW felt that, on balance, the operation would reduce her risk of stroke more than medication alone.

After discussion with her husband Mrs Edmunds decided that she would like to go ahead with surgery. She was transferred to Cardiff as a "day of surgery admission" and underwent left carotid endarterectomy under local anaesthetic. As is usually the case, she made an uncomplicated post-operative recovery and was allowed to go home to Crickhowell the next day. She was offered the choice of a telephone follow up consultation or a clinic appointment with a vascular surgeon at Nevill Hall Hospital in Abergavenny six weeks after the operation. At follow up she had fully recovered from her stroke and had made a good recovery from her operation.

Patient 2: Mr Evans

Mr Evans is a 71-year-old retired postman from Newport. He saw his GP because of sudden onset, two days previously, of pain in his right calf on walking. He could walk about 30 meters but then had to stop and rest because of the pain. The pain was relieved by rest. He described the pain to his GP as being "like severe cramp".

Because of the sudden onset of this pain the GP called the Vascular Surgical Regional Coordinator. Mr Evans was previously well. He had given up smoking 30 years ago and was not diabetic. The Coordinator arranged for Mr Evans to be seen in the Vascular Surgical "Hot Clinic" at Gwent Vascular Institute in Royal Gwent Hospital in Newport the following day. The coordinator also arranged for a CT scan of the arteries in Mr Evan's leg to be performed an hour before his clinic appointment.

Mr Evans was seen, with the result of his CT scan by a Consultant Vascular Surgeon. On further questioning the Vascular Surgeon discovered that Mr Evans had some numbness in the toes of his right foot. This numbness had been present and constant since the onset of the calf pain three days ago. The CT scan showed that there was an abnormally dilated artery behind Mr Evan's right knee (a popliteal artery aneurysm) and that there was a lot of thrombus (blood clot) in the abnormally dilated artery.

The Vascular Surgeon showed the CT images to Mr Evans to help explain what the problem was. He then informed Mr Evans of the choices with regard to management of his symptomatic popliteal artery aneurysm. Since there was a one in four risk of lower limb amputation if the aneurysm was not operated on, Mr Evans agreed that surgery was the best option. The Vascular Surgical Regional Coordinator arranged for Mr Evans to be admitted to University Hospital of Wales (UHW) in Cardiff under the Vascular Surgical Service from clinic. The next day an operation was performed to fix the popliteal artery aneurysm through an incision behind his knee.

Mr Evans made a good recovery after his operation. After input from the physiotherapists Mr Evans was allowed to go home three days after his operation. He was followed up six weeks later by a Vascular Nurse Specialist at Royal Gwent Hospital who noted that his surgical wounds had healed well and his symptoms had all resolved.

Patient 3: Mrs Richards

Mrs Richards is a 45-year-old teacher from Pontypool. During the summer she thinks that she suffered a nasty insect bite just above her left ankle on the inside of her leg, while having a BBQ. This was approximately four months ago. Over this time the "insect bite" became badly inflamed on two or three occasions. The GP treated her with antibiotics but, despite this, she developed an ulcer at the same site as the suspected insect bite.

The GP referred her to the South East Wales Vascular Network because of the lower limb ulcer. Mrs Richards was given a telephone appointment with a Consultant Vascular Surgeon two weeks later. Over the telephone the Vascular Surgeon found out that Mrs Richards left leg had been "a bit swollen" for two or three years. She also told the surgeon that she had had varicose veins affecting her left leg since the birth of her two children. The varicose veins had never really bothered her and she had never mentioned them to her GP.

The Consultant Vascular Surgeon explained, over the telephone, that the varicose veins were probably contributing to the leg swelling and the ulcer. Between them Mrs Richards and the Consultant Vascular Surgeon arranged for an ultrasound scan of the leg to be performed at Royal Gwent Hospital to investigate her veins. On the same day as the scan she was reviewed by a Vascular Nurse Specialist at Royal Gwent Hospital. The scan showed that Mrs Richards had a fairly typical pattern of varicose veins. The Nurse explained that by treating the varicose veins, the ulcer would heal more quickly and would be less likely to recur. The Vascular Nurse Specialist also gave Mrs Richards a prescription for moisturising cream and support stockings to help improve the condition of the skin on her left leg.

Following discussion and explanation of the different treatment options available for varicose veins Mrs Richards and the Vascular Nurse Specialist agreed that a minimally invasive procedure (Radiofrequency Ablation/Endothermal Ablation) would be the most appropriate way to treat the varicose veins in Mrs Richard's case. Radiofrequency ablation of the left varicose veins was performed for Mrs Richards eight weeks later. This procedure was performed at Royal Gwent Hospital as a "walk in – walk out" procedure under local anaesthetic. By the time she attended for the treatment the ulcer was well on the way to healing thanks to the moisturiser and support stockings.

Mrs Richards was not given a routine follow up appointment but was given a card with the contact details for the vascular nurse specialists at Royal Gwent Hospital in case she needed them. She made a good recovery and was delighted with the result of her treatment. She did not need to contact the Vascular Surgical Unit again.

Patient 4: Mr Williams

Mr Williams is a 78-year-old retired builder from Treorchy. He was generally fit and well but needed admitting to Royal Glamorgan Hospital after becoming increasingly short of breath. After investigation by the Care of the Elderly Medical Team he was found to have pneumonia and dehydration. He was started on a drip to give him fluid as well as intravenous antibiotics.

At 11 o'clock at night he complained to his nurse that his right hand had suddenly become painful and cold and he had noticed that his arm and hand were weak. The ward doctor examined him and found that as well as the coldness and weakness the hand was pale and the doctor couldn't feel any pulses in Mr Williams's right arm. The ward doctor did some blood test and arranged for an electrocardiogram (ECG) to be performed. The ECG showed that Mr Williams had developed an irregular heartbeat, probably as a result of the pneumonia and dehydration. The ward doctor wondered if Mr Williams had "thrown a clot" (an embolus) down the arteries to his right arm. With this in mind he telephoned the on call Vascular Surgical Registrar for advice.

The Vascular Surgical Registrar arranged emergency ambulance transfer for Mr Williams from Royal Glamorgan Hospital to the Vascular Surgical Unit at University Hospital of Wales (UHW) in Cardiff. Before the journey Mr Williams was given an injection of blood thinning drugs. When he arrived at UHW Mr Williams was taken straight to the CT scanner where a scan of the arteries in his right arm was performed. This scan confirmed an arterial embolus.

Because his arm was profoundly ischaemic Mr Williams was taken to theatre that night to remove the blood clot from the arteries in his right arm. The operation was performed under local anaesthetic by the on-call Consultant Vascular Surgeon and the On Call Vascular Surgical Registrar. The operation was successful. Apart from some bruising around the surgical incision the arm and had were pink, ward and working normally. Mr Williams was relieved and delighted.

Because he was still recovering from pneumonia Mr Williams was transferred back to Ysbyty Cwm Rhondda Hospital on the following day by ambulance. This made it a lot easier for his son and daughter to visit him as he recovered from his pneumonia in his local general hospital.

Patient 5: Mr Roberts

Mr Roberts is a 70-year-old gentleman from Penarth who had a small Abdominal Aortic Aneurysm (AAA) diagnosed five years ago, when he was invited to attend the Welsh Abdominal Aortic Aneurysm Screening Programme at the age of 65. At his last, scan earlier in the week, he was told that his aneurysm now measured 56mm in diameter. He understood from the patient information sheets given to him and the conversations that he

had had with the staff at the screening programme that this was the size at which interventions began to be considered to reduce the risk of aneurysm rupture.

Mr Roberts was referred to the South East Wales Vascular Network Coordinator. He was given an outpatient appointment for two weeks later. He was booked to have a CT scan of his aneurysm at 09:00 in the morning and a clinic appointment with a Consultant Vascular Surgeon at 11:00; both at University Hospital of Wales. The Consultant Vascular Surgeon showed Mr Roberts the images from his CT scan along with some diagrams to help explain what the problem was and what options were possible regarding treatment of the AAA. The anatomy of Mr Roberts's AAA meant that the "keyhole" technique of Endovascular Aneurysm Repair (EVAR) was not likely to be successful. Mr Roberts and the Vascular Surgeon agreed that Open Surgical Repair (OSR) of his AAA was preferable to continuing with conservative management. Mr Roberts understood that Open Surgical Repair of an Abdominal Aortic Aneurysm was major surgery. He understood the risk of surgery had read that the results of this operation were better when it was done in centres that performed a lot of these operations. He was therefore relieved and pleased to find out that the operation would be performed at The Major Arterial Centre at UHW in Cardiff. He understood that he would probably need to be in the Intensive Care Unit in Cardiff for a day or two after his operation. All being well he was told to expect to be in hospital for between seven and 10 days.

The Vascular Network Coordinator arranged for Mr Roberts to have an Echocardiogram and a bicycle test (Cardio Pulmonary Exercise Test CPET) to assess his fitness for surgery. Four weeks after his referral both these tests were performed at University Hospital of Wales. Mr Roberts was then seen by a Consultant Anaesthetist to further explain the risks of surgery and what was involved regarding an anaesthetic for major surgery.

Seven weeks after his initial referral to the Vascular Surgical Service Mr Roberts was admitted to UHW through the "Day of Surgery Admission" unit. His operation was performed by two Consultant Vascular Surgeons and a Vascular Surgical Registrar. After his operation Mr Roberts only needed to spend one night on Intensive Care. By the third post-operative day he was recovering well. His pain was well controlled, he was eating and drinking and was walking around the ward with some help from the Physiotherapists or Ward Nurses.

After discussion with Mr Roberts it was agreed to transfer him to University Hospital Llandough, closer to home for a few more days of hospital care while he recovered from his operation. He no longer needed any specialist vascular surgical input. This transfer to Mr Roberts local hospital made it easier for his family to visit him while providing him with the medical, nursing and physiotherapy input that he needed.

Mr Roberts was discharged from University Llandough Hospital nine days after his operation. He was followed up six weeks later in University Hospital Llandough by a Specialist Vascular Nurse who documented that Mr Roberts had made a good post-operative recovery.

9. ADVANTAGES/DISADVANTAGES and IMPACT

WHAT ARE THE ADVANTAGES OF THE PROPOSED CHANGES?

There are significant benefits to the model proposed:

- A sustainable delivery model that will provide the best outcomes to all patients within the region as advised by the Vascular Society. The vascular surgeons will work as a team to provide a resilient vascular surgical workforce model for the region's patients.

- Patients admitted to the 'Hub' will be nursed on a specialist vascular ward and receive daily review, including weekends, by a consultant vascular surgeon ('Consultant of the Week') working within a specialist multi-disciplinary team.

- Patients admitted to the 'Hub' will have on site access 24/7 to both vascular surgery and vascular interventional radiology.

- Aside of surgery, all other parts of a patient's treatment and rehabilitation will happen in their own area (with the exception of Powys residents who may access services from Cwm Taf Morgannwg University Health Board or Aneurin Bevan University Health Board).

- Rapid access to diagnostics and interventions forms part of a high-quality service. The need for this has been an important driver for centralisation, as it requires around the clock working, which larger units are better placed to provide. The units would be staffed by vascular specialists and would operate 24 hours a day, seven days a week.

- Performing all complex procedures at central units would ensure all patients have their surgery at a high-volume hospital by an experienced vascular specialist, using the latest technology and techniques

- Centralisation should ensure improved facilities for patient care (dedicated vascular wards), investigation (larger radiology units with 24/7 interventional radiology) and treatment (vascular operating theatres and staff, vascular anaesthetists, improved facilities for endovascular management, better critical care).

WHAT WOULD THE IMPACT BE?

The proposals could mean:

- Patients would potentially need to travel further for their operation, as would their visitors
- Patients would be treated at a centre carrying out higher volumes of complex work, which is linked to improved outcomes
- Patients would be treated by a surgeon or interventional radiologist carrying out large volumes of complex work
- Patients would be able to access the full range of procedures 24/7

ARE THERE ANY DISADVANTAGES TO THE PROPOSALS?

Some patients from the Aneurin Bevan and Cwm Taf Morgannwg areas will need to travel to University Hospital of Wales – rather than the Royal Gwent or Royal Glamorgan Hospitals – to receive surgery, (as they do now out of hours). Powys residents will need to go to University Hospital of Wales for their surgery rather than to the Grange University Hospital in Cwmbran.

10. HOW YOU CAN CONTRIBUTE: ENGAGEMENT AND CONSULTATION.

This is the beginning of our conversation with you about vascular services in South East Wales. We would like to hear your thoughts about what you have read. Specifically:

- Whether you have an understanding of what vascular services are
- How services are currently provided
- The challenges facing the services and some of the options that have been considered for the future organisation and delivery of the services.

A questionnaire is available in the summary document to aid your response. It should be returned to:

Engage With Us
Woodland House
Maes-y-coed Road
Cardiff
CF14 4HH

We would welcome your feedback by Friday 16th April 2021.

WHAT NEXT?

When this engagement exercise has ended, the four Health Boards will consider all of the feedback and share this with the individual Health Boards and the relevant Community Health Councils. We will also publicly make available a report that outlines a summary of what has been received. We will consider all of the issues and whether there are any mitigating actions that need to be taken. We will also use the information received to update the Equalities Impact Assessment.

Subject to further discussions with the Community Health Councils, we may wish to enter a period of formal consultation. If we do that, we will once again invite your views.

APPENDIX A - GLOSSARY OF TERMS

Abdominal Aortic Aneurysm (AAA)	An **abdominal aortic aneurysm** (AAA) is a bulge or swelling in the **aorta**, the main blood vessel that runs from the heart down through the chest and tummy. An AAA can be dangerous if it is not spotted early on. It can get bigger over time and could burst (rupture), causing life-threatening bleeding
Aneurysmal Disease	An **aneurysm** occurs when part of an artery wall weakens, allowing it to balloon out or widen abnormally. The causes of **aneurysms** are sometimes unknown. Some may be congenital, meaning a person is born with them. Aortic **disease** or an injury may also cause an **aneurysm**
Arterial Disease	A common circulatory problem in which narrowed arteries reduce blood flow to your limbs
Arterial Duplex scan	Arterial **duplex scan** is a painless exam that uses high-frequency sound waves (ultrasound) to capture internal images of the major arteries in the arms, legs and neck. A special jelly is placed on the area being examined while a wand-like device called a transducer is passed lightly over the skin above the artery
Arterial Ulcer	**Arterial Ulcer**. An **ulcer** is simply a break in the skin of the **leg**, which allows air and bacteria to get into the underlying tissue. This is usually caused by an injury, often a minor one that breaks the skin. ... **Arterial ulcers** are often very painful, they are often on the foot, around the ankle, sometimes the lower **leg**
Carotid Disease	**Carotid** artery **disease** occurs when fatty deposits (plaques) clog the blood vessels that deliver blood to your brain and head (**carotid** arteries). The blockage increases your risk of stroke, a medical emergency that occurs when the blood supply to the brain is interrupted or seriously reduced
Critical limb ischaemia	A severe blockage in the arteries of the lower extremities, which markedly reduces blood-flow. It is a serious form of peripheral arterial disease, or PAD, but less common than claudication. ... Left untreated, the

	complications of CLI will result in amputation of the affected **limb**
Doppler Ultrasound scan	A **Doppler ultrasound** is a **test** that uses high-frequency sound waves to measure the amount of blood flow through your arteries and veins, usually those that supply blood to your arms and legs. Vascular flow studies, also known as blood flow studies, can detect abnormal flow within an artery or blood vessel
Endovascular aneurysm repair (EVAR)	A minimally invasive procedure in which an interventional radiologist places a covered stent (a metal mesh tube covered with fabric) into the area with the aneurysm so that blood can flow through the vessel
Endovascular Surgery	**Endovascular surgery** is an innovative, less invasive procedure used to treat problems affecting the blood vessels, such as an aneurysm, which is a swelling or "ballooning" of the blood vessel. The **surgery** involves making a small incision near each hip to access the blood vessels
Fluroscopic imaging	**Fluoroscopy** is a type of medical **imaging** that shows a continuous X-ray image on a monitor, much like an X-ray movie. During a **fluoroscopy** procedure, an X-ray beam is passed through the body
Interventional Radiology	A medical specialisation that involves performing a range of imaging procedures to obtain images of the inside of the body. The **interventional radiologist** carefully interprets these images to diagnose injury and disease, and to perform a range of **interventional** medical procedures
Ischaemic Complications	A restriction in blood supply to tissues, causing a shortage of oxygen that is needed for cellular metabolism (to keep tissue alive). Ischemia is generally caused by problems with blood vessels, with resultant damage to or dysfunction of tissue
MR angiography	**MR angiography** (MRA) uses a powerful magnetic field, radio waves and a computer to evaluate blood vessels and help identify abnormalities
Thoracic outlet surgery	**Surgery** for **thoracic outlet syndrome** involves decompression of the **thoracic outlet** – removal of the first rib or an anomalous rib, partial removal of the

	anterior and middle scalene muscles, and decompression of the brachial plexus. ... This operation is performed through a two-inch incision in the axilla
Varicose Veins	**Varicose veins** are swollen and enlarged **veins** that usually occur on the legs and feet. They may be blue or dark purple, and are often lumpy, bulging or twisted in appearance. Other symptoms include: aching, heavy and uncomfortable legs. swollen feet and ankles
Vascular	**Vascular**: Relating to blood vessels. For example, the **vascular** system in the body includes all of the veins and arteries. And, a **vascular** surgeon is an expert at evaluating and treating problems of the veins and arteries
Vascular Team	The **vascular** department is a multidisciplinary **team** who provide outpatient and inpatient care for people with diseases of the circulation
Venous Disease	When the venous wall and/or the valves in the leg veins are not working effectively