

Wiltshire Health
Select Committee
Briefing on the
development of
Vascular Services:
Recommended
Model of Care for
Approval



Wiltshire Health Select Committee Briefing on Recommended Developments to Vascular Services in the Bath, Bristol, Weston Vascular Network

For Information and Endorsement

First published: April 2014

Executive summary

This report outlines the review of Vascular services that has been conducted locally by NHS England's South West Specialised Commissioning Team, Clinical Commissioning Groups and the NHS Trusts as part of a wider review of vascular care across England as part of NHS England's national Specialised Service Specification Compliance Project that aims to ensure people receive the same high quality of care no matter where they live. The design of this network is supported by the Wiltshire CCG on condition that local GPs are involved in the design of the local clinical pathways for all the networks that serve the population of Wiltshire.

The population of Wiltshire are currently supported by hospitals that form three separate vascular networks: *the Dorset Vascular Network; the Gloucestershire and Swindon Vascular Network; and the Bath, Bristol and Weston Vascular Network*. The Dorset network is currently progressing towards service specification compliance, with Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust (RBCHT) selected as the 'hub' arterial centre and the Salisbury Foundation Trust and Dorset County Hospital as the 'spokes'. The emergency surgical work is currently delivered at Royal Bournemouth and Christchurch NHS Hospital Trust (RBCHT) with elective work due to follow across during this financial year.

The Gloucestershire and Swindon Vascular network is already operating to the standards set out on the service specification, with the arterial centre based in Cheltenham. The network continues to provide outpatient and daycase work at local hospitals, whilst all vascular surgery is undertaken at Cheltenham. Previous to the implementation of the network, neither Trust was able to fulfil the requirements of the service specification, nor provide consistent specialised out of hours care. In this case, patients were stabilised at their local hospital and then transferred to the 'on-take' Bristol Trust to receive specialised vascular care. Early feedback from patients concerning this network has been positive. Indeed, the model of care in Swindon and Gloucestershire that has increased patients' access to 24/7 arterial in-patient surgery and interventional radiology has influenced discussions in developing the proposals for the Bath, Bristol, Weston Network that is the subject of this report.

This report summarises the patient and public engagement work that has been carried out nationally *and* locally to develop the national service specification and shape the local model of care being proposed. However, **this briefing only relates to proposed changes to the Bath, Bristol, Weston Vascular network**. The research evidence presented here and national and local clinical and public opinion supports the recommended model (to concentrate inpatient vascular surgery in a specialised arterial centre at the new hospital being built at Southmead as opposed to Southmead, Bristol Royal Infirmary and Royal United Hospital, Bath as currently) that is expected to improve patient outcomes (in particular risk of mortality) and increase access to centre level care and outpatient clinics

for many vascular patients in a way that is safe and sustainable and able to meet expected increases in future demand. Therefore, Wiltshire Health Select Committee is asked to:

- Consider the evidence based improvements in patient outcomes the new model of care being offered by the Bath, Bristol, Weston Vascular Network is able to deliver;
- Consider the likely impact of the proposed model (to concentrate in-patient surgery at the new Southmead hospital as opposed to Royal United Hospital in Bath, the old Southmead and Bristol Royal Infirmary hospitals as currently) upon (some) Wiltshire residents has been kept to a minimum as only some (in-patient) surgery is being concentrated in Bristol to provide Wiltshire patients with a full 24/7 service whilst all other vascular support (outpatient, day case surgery etc.) will remain at Royal United Hospital, Bath (RUH) as currently. Moreover, a proportion of people from Wiltshire already need to go to Bristol for their vascular surgery as the service at RUH is only available during working hours, Monday to Friday. In addition, people from Wiltshire can access two further vascular networks: The Gloucestershire, Swindon Vascular Network and the Dorset Vascular Network which are summarised in this document for information. This briefing only relates to proposed changes to the Bath, Bristol, Weston Vascular network.
- Consider the increased access to centre level in-patient vascular surgery for Wiltshire patients from 5pm provision, Monday to Friday as currently to 24/7, 365 days in the future;
- Consider the support and involvement of local clinical leaders, patients, carers and members of the public in developing the recommended model of care;
- Consider that arrangements for outpatient and day case surgery will remain as currently, or access increased, to enable as much care as is safe and appropriate to be provided in 'spoke' vascular services at various sites closer to people's homes;
- Consider the dedicated vascular hybrid vascular theatre and 42 bed dedicated vascular ward that the new Southmead hospital will provide;
- Note the consideration that has been given to protecting the financial stability of Trusts and future development of vascular services;
- Endorse the implementation of the proposal to move elective and emergency vascular surgery to the new arterial centre in Bristol starting in the Autumn of 2014.

A brief video summarising the local case for change and what is being proposed can be found on the NHS England website: <http://www.england.nhs.uk/south/south/bnsssg-at/vascular-services/>

1 Purpose of the Report

The purpose of this report is to seek scrutiny support for the proposal to improve outcomes for vascular patients by commissioning a 'hub and spoke' model of care that concentrates in-patient vascular surgery in an arterial centre. Information on the three Vascular networks providing care to Wiltshire patients are given here although the focus of this report is on the Bath, Bristol and Weston Vascular Network which will provide vascular inpatient care in a new state of the art arterial surgical 'hub' being built at Southmead, Bristol whilst keeping all other vascular diagnostic, day case surgery and outpatient care in local 'spoke' services as currently. This will also enable the vascular services currently providing support for people from Bristol, North Somerset, (parts of) Somerset, South Gloucestershire, (parts of) Wiltshire and Bath and North East Somerset (BaNES) to work together as a network to jointly meet the criteria outlined in the national service specification that is to be implemented across England in a way that is safe, sustainable and increases access to centre level care for some people.

2 Recommendations

In relation to the model of care being proposed by NHS England and the hospital Trusts that comprise the Bath, Bristol, Weston Vascular Network, Wiltshire Health Select Committee is asked to:

- Consider the evidence based improvements in patient outcomes the new model of care being offered by the Bath, Bristol, Weston Vascular Network is able to deliver;
- Consider the likely impact of the proposed model (to concentrate in-patient surgery at the new Southmead hospital as opposed to Royal United Hospital in Bath, the old Southmead and Bristol Royal Infirmary hospitals as currently) upon (some) Wiltshire residents has been kept to a minimum as only some (in-patient) surgery is being concentrated in Bristol to provide Wiltshire patients with a full 24/7 service whilst all other vascular support (outpatient, day case surgery etc.) will remain at Royal United Hospital, Bath (RUH) as currently. Moreover, a proportion of people from Wiltshire already need to go to Bristol for their vascular surgery as the service at RUH is only available during working hours, Monday to Friday. In addition, people from Wiltshire can access two further vascular networks: The Gloucestershire, Swindon Vascular Network and the Dorset Vascular Network.
- Consider the increased access to centre level in-patient vascular surgery for Wiltshire patients from 5pm provision, Monday to Friday as currently to 24/7, 365 days in the future;
- Consider the support and involvement of local clinical leaders, patients, carers and members of the public in developing the recommended model of care;
- Consider that arrangements for outpatient and day case surgery will remain as currently, or access increased, to enable as much care as is safe and appropriate to be provided in 'spoke' vascular services at various sites closer to people's homes;

- Consider the dedicated vascular hybrid vascular theatre and 42 bed dedicated vascular ward that the new Southmead hospital will provide;
- Note the consideration that has been given to protecting the financial stability of Trusts and future development of vascular services;
- Endorse the implementation of the proposal to move elective and emergency vascular surgery to the new arterial centre in Bristol starting in the Autumn of 2014.

3 Current Service - What Happens Now?

The scope of specialist vascular services can be briefly summarised as preventing death from aortic aneurysm, preventing stroke from carotid artery disease and preventing lower limb amputation from peripheral arterial disease and diabetes. In 2007 over 65,000 people in the UK had surgery for a problem relating to vascular disease (Vascular Society of Great Britain and Ireland - VSGBI, 2009). The prevalence of vascular disease increases with age meaning that demand for vascular services is likely to increase over time. In addition, there are currently an estimated 3 million people with diabetes in England and this prevalence is increasing; patients with diabetes and vascular disease have a worse outcome, as evidenced by the increasing rate of lower limb amputation in this patient group.

The outcomes from vascular surgery in the United Kingdom have not compared well internationally, with the UK until recently having the highest mortality rates in Western Europe for abdominal aortic aneurysm repair (VASCUNET, 2008). It is widely recognised that some models of vascular care in England are not sustainable in the long term in the face of growing demand and the need to adopt and develop new innovations that lead to better patient outcomes. Hence, it is a national priority for the NHS to ensure vascular services are configured in ways that reflect best practice to ensure their safety and quality both now and for years to come.

In 2012 VSGBI published a series of recommendations describing how vascular services should be organised to deliver the best outcomes for patients (Provision of Vascular Services, 2012). VSGBI also developed quality improvement frameworks (QIFs) for both abdominal aortic aneurysm (AAA) repair and lower limb amputation. The recently introduced NHS AAA Screening Programme has made adopting the AAA QIF mandatory for providers treating men referred from the programme.

In light of these recommendations NHS England, as the commissioners of specialist vascular services since April 2013, published a national specification for the provision of vascular services in July 2013. This specification sets out both the essential components of a specialist vascular service and the clinical outcomes that the service should achieve. A clinical reference group, comprised of patients and vascular and commissioning experts from all the regions of England and chaired by Prof. Matt Thompson, Professor of Vascular Surgery, has developed the service specifications and reporting outcomes of all vascular surgical procedures to the new National Vascular Registry will be mandatory. A copy of the service specification for vascular services can be found at:

<http://www.england.nhs.uk/wp-content/uploads/2013/06/a04-spec-vascu-adult.pdf>

Since the publication of the service specification we have been reviewing vascular services across the South West to determine the work needed to ensure local vascular provision complies with the best practices outlined in the service specification. The key elements of which are that providers of vascular services should:

- Serve a minimum population of at least 800,000 people to ensure an appropriate volume of procedures;
- Ensure that highly experienced staff are treating sufficient numbers of patients to maintain competency;
- Have 24/7 on site vascular surgery and interventional radiology on-call rotas that are staffed by a minimum of 6 vascular surgeons and 6 interventional radiologists;
- Provide access to cutting edge technology including a hybrid operating theatre for endovascular (minimally invasive) aortic procedures;
- Provide a dedicated vascular ward and nursing staff;
- Have a specialist team to manage patients with vascular disease that includes vascular surgeons, interventional radiologists, specialist nurses, vascular scientists, diabetes specialists, stroke physicians, cardiac surgeons, orthopaedic surgeons, and emergency medicine as part of a comprehensive multi-disciplinary service.

Central to national recommendations is the requirement for arterial surgery to be delivered out of fewer, higher volume specialist arterial surgical centres to improve clinical outcomes (in particular mortality rate) and deliver a range of other benefits to patients. Due to the way services are currently delivered at the majority of hospitals and the limited number of specialist doctors that are available it is currently not possible for patients to always be treated by a vascular specialist, especially out of normal working hours.

Patients from Wiltshire are currently supported by hospitals that form three separate vascular networks: the Dorset Vascular Network; the Gloucestershire and Swindon Vascular Network; and the Bath, Bristol and Weston Vascular Network. The tables below show the numbers of Wiltshire patients who were cared for by these networks.

Dorset Network

Procedure Type							
Trust	Year	Elective AAA (incl. EVAR)	Carotid Endarterectomy	Emergency AAA	Major Amputation	Leg Bypass	Total
Salisbury NHS Foundation Trust	2010 – 11	9	18	5	22	30	84
	2011 - 12	16	20	3	6	33	78
	2012 - 13	20	22	9	11	13	75
	2013 - to Nov 2013	7	14	2	5	10	38
	Trust Total	52	74	19	44	86	275
Oxford University Hospitals NHS Trust	2010 - 11	4	2	3	0	1	10
	2011 - 12	4	1	1	0	0	6
	2012 - 13	1	3	1	0	1	6
	2013 - to Nov 2013	4	2	0	0	0	6
	Trust Total	13	8	5	0	2	28

N.B the numbers of Wiltshire residents seen at Dorchester & Royal Bournemouth are <10 in total for the timeframe 2010-2014 so cannot be included here to protect patient confidentiality.

Swindon, Gloucestershire Network

Procedure Type							
Trust	Year	Elective AAA (incl. EVAR)	Carotid Endarterectomy	Emergency AAA	Major Amputation	Leg Bypass	Total
Great Western Hospitals NHS Foundation Trust	2010 – 11	0	5	0	5	8	18
	2011 - 12	1	7	0	2	6	16
	2012 - 13	0	3	0	7	3	13
	2013 - to Nov 2013	0	0	0	1	4	5
	Trust Total	1	15	0	15	21	52

N.B. the table does not include information for Gloucestershire Hospital because Wiltshire patients have only recently started to go there for aspects of their care and so it is too early to provide this.

Source: Dr Foster, provided by South West Commissioning Support Unit 25.2.14

Both the Dorset Vascular Network and the Gloucestershire and Swindon Vascular Network were formed before NHS England took over responsibility for commissioning vascular services in April 2013. When we reviewed vascular services in Swindon and Gloucestershire they met the national specification. Consequently, in the absence of any quality or safety concerns, we will not be suggesting any developments to this network in the near future.

The Dorset network is currently progressing towards service specification compliance, with Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust (RBCHT) selected as the 'hub' arterial centre and the Salisbury Foundation Trust and Dorset County Hospital as the 'spokes' (these terms are explained more fully below). The emergency surgical work is currently delivered at Royal Bournemouth and Christchurch NHS Hospital Trust (RBCHT) with elective work due to follow across during this financial year. Outpatients and daycase work will continue to be undertaken at both Dorset County Hospital NHS Foundation Trust (DCH) and Salisbury NHS Foundation Trust (SFT). The above table does not include activity data for DCH and RBCHT because there were less than 10 patients from Wiltshire that attended in total over the entire recording period. We are unable to report this to ensure patient confidentiality.

The Gloucestershire and Swindon Vascular network is already operating to the standards set out on the service specification, with the arterial centre based in Cheltenham. The network continues to provide outpatient and daycase work at local hospitals, whilst all vascular surgery is undertaken at Cheltenham. Previous to the implementation of the network, neither Trust was able to fulfil the requirements of the service specification, nor provide consistent specialised out of hours care. In this case, patients were stabilised at their local hospital and then transferred to the 'on-take' Bristol Trust to receive specialised vascular care. Early feedback from patients concerning this network has been positive. Indeed, the model of care in Swindon and Gloucestershire that has increased patients' access to 24/7 arterial in-patient surgery and interventional radiology has influenced discussions in developing the proposals below for the Bath, Bristol, Weston Network that is the subject of this report.

Bath, Bristol, Weston Network

The table below shows the number of Wiltshire patients being cared for by the trusts within the Bath, Bristol and Weston Vascular network.

Procedure Type							
Trust	Year	Elective AAA (incl. EVAR)	Carotid Endarterectomy	Emergency AAA	Major Amputation	Leg Bypass	Total
Royal United Hospital Bath NHS Trust	2010 - 11	21	25	2	21	41	110
	2011 - 12	18	21	6	11	18	74
	2012 - 13	20	29	2	16	21	88
	2013 to Nov 2013	13	36	1	4	23	77
	Trust Total	72	111	11	52	103	349
North Bristol NHS Trust	2010 - 11	0	0	0	3	1	4
	2011 - 12	0	0	0	1	2	3
	2012 - 13	0	0	0	0	1	1
	2013 - to Nov 2013	1	1	0	0	0	2
	Trust Total	1	1	0	4	4	10
University Hospitals Bristol NHS Foundation Trust	2010 - 11	0	0	0	0	0	0
	2011 - 12	0	0	0	0	0	0
	2012 - 13	0	0	0	0	0	0
	2013 - to Nov 2013	0	0	0	2	1	3
	Trust Total	0	0	0	2	1	3

Source: Dr Foster, provided by South West Commissioning Support Unit 25.2.14

Current vascular services provide two care pathways for vascular patients: elective and emergency.

Elective pathway

Patients may enter an elective pathway via a GP referral, a referral from the emergency department, a referral from another secondary care specialty (e.g. diabetes or stroke) or through the AAA screening programme. If the referral is generated by secondary care the patient will tend to be seen in the same hospital from which the referral is generated. If the referral is made by a GP or from the screening programme the patient should be given a choice regarding which hospital they would like to attend.

For elective patients, the initial referral will normally be for an outpatient appointment. These currently take place at Frenchay Hospital, Southmead Hospital (NBT), the Bristol Royal Infirmary (UHB), the Royal United Hospital (RUH), Weston General Hospital (WAHT) as well as community clinics in Cossham, Yate and Clevedon.

Following an outpatient appointment people will normally be sent for diagnostics at their local hospital including vascular studies (through vascular laboratories) and radiology.

Following discussion at a multidisciplinary team (MDT) meeting, if the decision is made to operate, the patient will be listed either for surgery or an interventional radiological procedure (as either a day case or inpatient procedure). The patient will then be required to attend the hospital where they will be having surgery for a pre-operative assessment. At this stage it may also be determined that a high care bed is required and this will be requested. Currently surgery is provided by the RUH, NBT at Southmead and at University Hospitals Bristol (UHB at the Bristol Royal Infirmary - BRI). Patients from Weston Area Health Trust (WAHT) currently have their surgery at the BRI. Non-arterial surgery commissioned by local CCGs (e.g. varicose vein surgery) is also provided at each of these sites.

Following elective surgery patients recover in the hospital in which they had their surgery. They will then be discharged home or to a community provider (if further rehabilitation is required or if there are further co-morbidities or social issues).

Emergency Pathway

Patients may present as an emergency either via ambulance or through self-presentation to the emergency department. In hours (Monday-Friday 08:00-17:00) there is currently a vascular consultant presence at RUH Bath, UH Bristol and NBT. Any emergencies (either blue light or self-presenters) will be treated at each of these hospitals. There are occasional exceptions to this however (e.g. during consultant leave periods and at weekends) because there are currently insufficient numbers of consultants in each hospital to guarantee year round cover. In general, ambulances will take patients to the closest appropriate hospital.

Historically a vascular on call rota has existed between the two Bristol Trusts. However since February 2013 a vascular emergency on call rota was established involving surgeons from the RUH. However, the geographical distance between hospitals currently means the on call surgeon is only able to attend to the Bristol hospitals. Consequently, out of hours emergencies in Bath need to be transferred to the on take Bristol hospital. Currently the on call take hospital alternates weekly between the UH Bristol and North Bristol Trust hospitals.

Currently, ambulances will still take the patient to the closest hospital meaning that if this is not the on call hospital (either the RUH, WAHT or the non-on call Bristol Trust) the patient is stabilised and transferred to the on call hospital if surgery is required.

Following emergency surgery patients recover in the hospital in which they had their surgery. They will then be discharged home or to a community provider (if further rehabilitation is required or if there are further co-morbidities or social issues). Following discharge they may be referred for ongoing care/monitoring at either the same hospital or locally.

The current provision of care to meet the national standards is presented in the table below showing that the trusts within the Bath, Bristol and Weston Vascular Network do not currently meet the national service specification in full.

Provider	24/7 MDT	6 vascular surgeons	24/7 IR on call	Elective and emergency arterial surgery	In-patient non-arterial vascular services	AAA Screening	Outpatient Assessment	Diagnostic imaging (duplex, MRA and CTA)	Day case surgery
RUH	No	No	No	Yes	Yes	No	Yes	Yes	Yes
UHB	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
WAHT	No	No	No	No	Yes	No	Yes	Yes	Yes
NBT	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes

Royal United Hospital Bath NHS Trust (RUH)

University Hospitals Bristol NHS Foundation Trust (UHB)

Weston Area Health NHS Trust (WAHT)

North Bristol NHS Trust (NBT)

4 What is being proposed?

In line with the results of the local and national public and patient engagement that has been conducted and after 2 years of local clinical discussions, the table below summarises what local clinical leaders of vascular services are proposing to enable them to provide a 24/7 service that meets the criteria in the national service specification by working together in a network. This means that instead of approximately 80 Wiltshire patients per year going to RUH for their in-patient arterial surgery and a very few going to UHB in Bristol, all specialised in-patient arterial surgery and immediate recovery will be provided at the new arterial centre in the new NBT hospital at Southmead in Bristol. All other aspects of vascular care (outpatient clinics, day case surgery, non-arterial vascular surgery, diagnostic imaging etc) will remain where it is currently provided. In addition, the network are currently considering possible locations for additional community outpatient clinics so that as much care as is safe and appropriate can be delivered within the 90 minute maximum that people from Wiltshire told us they are willing to travel for an outpatient appointment.

As approximately 50% of the vascular workload is urgent or emergent, timely access to vascular outpatient clinics is essential. GP referrals will have access to a 'hot' vascular clinic Monday to Friday via a single point of contact (Network Coordinator or Vascular Nurse Specialist) at NBT and access to urgent review at NBT via the Emergency Department hot clinic as currently. In addition a consultant of the week (free from elective and operating commitments) will be available to offer telephone advice. Access to these 'hot' clinics will be aligned to diabetic foot services (i.e. access for the foot protection team) and stroke services (access from TIA/Stroke clinics). A hot clinic allows quick access to a specialist opinion and is designed to avoid unnecessary admission to hospital.

NBT will become the site of the new major arterial centre for the Bath, Bristol, and Weston Vascular Network as soon as is safe and appropriate after the new 42 bedded dedicated vascular ward and hybrid vascular theatre staffed by an expert vascular MDT opens.

NBT will provide 24/7 vascular surgery and 24/7 interventional radiology cover for vascular surgery patients, a dedicated vascular ward and state of the art 'hybrid' operating theatre.

The new arterial centre will deliver a sustainable consultant led vascular service with daily review of all inpatients by a consultant vascular surgeon and 24/7 vascular surgery and interventional radiology on call rotas.

All elective and emergency arterial surgery, including major lower limb amputation, for UHB, WAHT and RUH to transfer to the arterial centre to ensure care is delivered in line with national standards of best practice, both for arterial surgery and rehabilitation following major amputation, delivered by a specialist team managing a sufficient volume of cases.

This service will be delivered by specialists from NBT, UH Bristol, WAHT, and the RUH working together as in a modern vascular network to deliver arterial surgery, lower limb amputations and emergency vascular care from the single arterial centre. Thus retaining the expertise we have in the region.

Pre-operative assessment must be carried out where the patient will be having their surgery (i.e. at the arterial centre for inpatient elective and emergency arterial surgery). This is the only way to ensure patient safety by standardising workup for surgery and ensuring all local Trust requirements are met before admission (i.e. thromboprophylaxis and infection control screening). Where possible additional investigations will be arranged in the patients local hospital so that only a single pre-operative visit is needed to the arterial centre.

Day case vascular interventional radiology (i.e. peripheral angioplasty for patients with intermittent leg pain) will not transfer to NBT and local arrangements will be put in place for emergency vascular intervention and clinical governance.

The RUH would in addition provide inpatient non-arterial vascular services, for example varicose vein surgery and diabetic foot surgery.

Patients from Weston General Hospital will be transferred to Southmead hospital for surgery (as opposed to the BRI as currently occurs).

A triage policy will be required for all conditions and consideration given to which staff group has the appropriate competencies for triage. This policy will also need to define those conditions that trigger automatic transfer directly to the arterial centre (i.e. ruptured abdominal aortic aneurysm or acute limb ischaemia), bypassing the local hospital. These policies are being jointly developed with the ambulance service to minimise delay.

Robust pathways are being agreed (Network Repatriation Policy) to enable effective repatriation (return) of patients to a hospital closer to home following surgery (either for continued acute care or for rehabilitation) once specialist vascular care is no longer required. This is similar to other specialised services, such as major trauma care. Links with the tissue viability services will be maintained and rehabilitation for major amputees is being developed at both RUH Bath and WAHT.

Clinical protocols will be agreed for the management of patients presenting via TIA/stroke services or to diabetic foot teams at NBT, UH Bristol, RUH and WAHT to ensure timely access to vascular surgery or interventional radiology.

The network also aims to reduce current inequalities in access to these services and improve the timeliness with which they are delivered, with dedicated operating lists scheduled though the week at the major arterial centre to accommodate this activity.

The Bristol Heart Institute (BHI) currently delivers a regional service for patients presenting with thoracic aortic disease (thoracic aortic aneurysm and Type B aortic dissection). Increasingly these patients require endovascular stent grafting in place of open surgery as this has been shown to be safer. The vascular network will be expected to work with the BHI to deliver this service. The new arterial centre is also the preferred provider for regional complex endovascular services.

Effective pathways have already been agreed for the transfer of emergency patients from emergency departments to the on call vascular hospital. These do not need to change.

Daily access to a vascular surgical opinion for inpatients at the RUH, UHB and WAHT to be achieved by either network cover or a daily presence. How specialist cover is provided to ‘spoke’ (non-centre) hospitals and the location of additional community clinics were just two of the things that NHS England, CCGs and providers sought patient, carer and public views on during the programme of public and patient engagement outlined in Section 5 below.

This proposed model will meet the evidence based requirements in the national service specification across the Bath, Bristol and Weston Vascular Network is outlined here. The 24/7 network provision will also meet the requirement for MTD and appropriate numbers of vascular and IR consultants for the on-call rota.

Provider	Inpatient Vascular arterial procedures					AAA Screening	Outpatient Assessment	Diagnostic imaging (duplex, MRA and CTA)	Daycase Surgery
	Emergency AAA	Elective AAA	Carotid endarterectomy	Lower limb arterial bypass	Major amputation				
RUH	No	No	No	No	No	No	Yes	Yes	Yes
UHB	No	No	No	No	No	No	Yes	Yes	Yes
WAHT	No	No	No	No	No	No	Yes	Yes	No
NBT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5 Local Impact Assessment

The table below shows the average impact on public and private travel times for residents of Wiltshire that were calculated using the Government’s transportdirect website:

<http://www.transportdirect.info/Web2/Home.aspx?&repeatingloop=Y>

The journey start time was set at 8am on a Monday morning following advice from scrutiny colleagues and the table presents the mean average of the times and mileage from 10 randomly sampled postcodes of current Wiltshire patients. Please note, the postcode of the current Southmead hospital and the proposed arterial centre are identical.

Patient Postcodes from	Receiving hospital	Receiving hospital postcode	Public transport (mins)	Car (minutes)	Distance (miles)
Wiltshire	Southmead Hospitals (NBT)	BS10 5NB	143.4	51.1	31.17
Wiltshire	Bristol Royal Infirmary (UHB)	BS1 3NU	127	47.6	31.51
Wiltshire	Royal United Hosp., Bath	BA1 3NG	102	41	18.88

This means that the few Wiltshire patients that would currently go to UHB for in-patient vascular surgery will have to travel approximately 5 minutes longer by car to attend the new Southmead hospital on average. However, (approximately) 80 patients that currently travel to RUH would have approximately 10 further minutes to travel.

Nevertheless, while the travel time to the arterial centre by car is well within the 90 minute limit set by local people, the public transport time exceeds it. Consequently, the network have been asked to ensure vascular in-patients are informed about the new free non-emergency patient transport service in Wiltshire to ensure patients travel times do not exceed the maximum local people have set and that patients with low incomes have equality of access.

It is also worth noting that 100% of survey respondents said they currently use their own car to travel to vascular services. Although the sample size was small so are overall patient numbers, therefore we do not expect patient transport services to see much increase in demand as a result of this request. How we will work with transport services to monitor demand and capacity. Information about the new transport service can be found below:

<http://www.wiltshireccg.nhs.uk/news/new-patient-transport-service-for-wiltshire>

In terms of the impact of the proposal on the NHS Trusts that currently provide vascular surgery, we considered:

- The estimated annual cost of each service now;
- The impact on those figures change as a result of concentrating in-patient surgery at NBT;
- The different between the cost of each service before and after the service development as a proportion of the Trust net annual income.

The publically reported income of each Trust in the network is presented below. Due to ongoing contract negotiations we are unable to provide exact figures regarding the flow of income related to vascular services at this time. However, we know enough at this time to confidently assert that in

each instance we expect the value of surgery moving to NBT would be less than 1% of a Trust's total net income.

Value of NBT service (2013/14 Business Plan): ~ £533million

Value of UHB service (Annual Report and Accounts, 2012/13): ~ £520million

Value of RUH service (Annual Accounts 2012/13): ~ £215million

Value of WAHT service (Annual Accounts 2012/13): ~ £82million

6 Public and Patient Involvement & Experience

The national clinical reference group that developed the service specification that is driving the proposed developments was comprised of patient and carer representatives as well as clinical and commissioning experts from across England and representative of the Vascular Society of Great Britain throughout its development. Following this a national programme of public and patient engagement informed the production of the final service specification that specialised commissioning teams have now been asked to implement across England. NHS England's response to the public consultation can be located at:

<http://www.england.nhs.uk/wp-content/uploads/2013/07/consult-ssscp-13-14-sum.pdf>

However, to help us determine the impact of the proposed model of care on *Wiltshire* patients and hear local people's views all patients who had vascular surgery at the RUH (where the majority of people from Wiltshire affected by the proposal attend) in the last 12 months were invited to attend a public event on the 6th of March 2014 and/or to complete a survey that ran alongside the event, which was also published on various NHS England, CCG and Healthwatch websites. People from outside Wiltshire and BaNES were not prohibited from attending the event, although the location (Bradford on Avon) was selected to target them as the populations most affected by the proposed service development in line with the government's Consultation Principles. The event and the survey were advertised on a number of CCG, NHS England and Healthwatch websites and Healthwatch and scrutiny colleagues were invited to submit questions they would like us to ask local people. Wiltshire members raised the following concerns that we discussed with people who attended the events:

- Many parts of Wiltshire already have long travel times to hospitals, don't want them to get any longer, especially in urgent/emergency situations for elderly patients;
- Concern over viability of local hospitals and the 'salami slicing' of services away from them (particularly, Salisbury);
- Lack of evidence to support suggested improvement in outcomes.

Approximately 50 people attended (exact figures cannot be given as we had to bring in additional seating to accommodate several people who arrived after attendance had been recorded), with one person from Somerset and the remainder from Wiltshire (~60%) and BaNES (~40%). All but five members of the audience were there as patients, carers or

members of the public, including some who were also members of their local Healthwatch. The following summary provides the themes of what people said at the public event and survey responses received to date mirror these. A copy of the questions and the answers we gave at the public event immediately following presentation from NHS England, and consultant vascular surgeons from RUH and UHB and full preliminary results and notes from both the event and survey are available at the following website.

<http://www.england.nhs.uk/south/south/bnsssg-at/vascular-services/>

Local views

Once people learned that no vascular service was being closed and had listened to the two Consultant Vascular Surgeons (from the two Trusts that have most to lose in financial terms) explain the reasons why they support in-patient arterial surgery they currently provide being moved to the arterial centre in Bristol and provided the evidence that leads them to suggest this is better for patients (by reducing risk of mortality and improved prognoses), there was support for the clinical model and people said they understood the reasoning behind it and the benefits to them as patients of the service.

There were understandable concerns around travelling distance and the need for clearer directions to Southmead hospital and sufficient available parking. However, once someone in the audience told everyone about the free community transport service that operates in Wiltshire concerns about distance moved to concerns about the ability of ambulance and community transport services to cope with additional demand. Consequently, commissioners are asking vascular providers to include information about available community support, such as transport, in patient information packs as standard, and are working transport services to monitor capacity and demand.

In relation to concerns about ambulance capacity to cope with the transport and repatriation of in-patients between the arterial centre and outlying spoke hospitals NHS England is in discussions with the ambulance team and the network to ensure robust and sustainable transport protocols are agreed before the arterial centre opens.

In addition people at the event were asked how far they would be willing to travel for in-patient arterial surgery and how far they would be willing to travel to an outpatient clinic. We asked this to help the network and commissioners decide the location of additional outpatient services that are needed to ensure equality of access. People were unanimously agreed that they are willing to travel up to 90 minutes for surgery at an arterial centre and 1 hour to an outpatient clinic. This is currently being used to inform planning discussions regarding where to develop additional outpatient provision.

People also wanted GPs to be given information packs for new patients regarding the service and any practical support they can access to facilitate as much of their care being delivered close to or at home as possible and help them to manage their own health to maintain their independence. They also suggested GPs should be made aware of any changes to vascular services and referral pathways before any changes are implemented to ensure new patients are correctly referred.

Current vascular patients also wanted to know 'what do we need to do?' 'Do we need to register somewhere or do anything different?' The consultant vascular surgeons from RUH

and UHB explained that most aspects of pre and post operative care would remain where they are, with the front door of the service being their local hospital or GP who would explain what they would need to do in relation to any elective procedures. They were told that patients needing emergency procedures would most likely be transported by a blue lit ambulance straight to the nearest arterial centre and would be too unwell to choose a different hospital.

Some patients from Wiltshire were surprised to learn they could access three vascular networks and asked our advice on which of the three networks they should choose for their elective and outpatient care. People at the event were told NHS England plans to publish this information online some time this year so patients can compare services more easily. However, currently clinical outcomes are collected through the National Vascular Registry (NVR) which replaced the National Vascular Database (NVD) in December 2014. We have yet to have an NVR report released so the latest data is from the NVD and the associated Royal College of Physicians Carotid Audit. Surgeon level data for AAA repair and CEA was released by HQIP last summer. Vascular Society QIP Reports are located at:

<http://www.vsqip.org.uk/reports/>

Two people who were initially concerned that the proposal was to move all vascular care from RUH to Bristol later asked us why it takes so long to make improvements to services when we know it will lead to improved clinical outcomes and save lives. We are now working hard to secure the support of the local health overview and scrutiny committees in Bristol, Bath and North East Somerset, Somerset, North Somerset, South Gloucestershire and Wiltshire before June 2014, with a view to implementing the model of care that is supported by local clinicians and the majority of local people by the Autumn.

All information related to the public and patient engagement, including a video explaining the reason for the proposed development, presentation slides from the event, a link to an electronic version of the questionnaire and a summary of the event and analysis of the survey conducted by Wiltshire CCG can be found at:

<http://www.england.nhs.uk/south/south/bnsssg-at/vascular-services/>

7 Expected Benefits: The evidence

There is a large body of evidence to support the model of care being proposed. For example,

Volume-outcome relationship: The case for concentrating in-patient surgery

As a rule, and not surprisingly, the risk of dying decreases when patients receive their surgery from teams that operate on higher numbers of patients. The relationship between the volume of cases undertaken and the outcomes achieved has been demonstrated most clearly for elective abdominal aortic aneurysm repair. A meta-analysis¹ based on over

¹ In statistics, a **meta-analysis** refers to methods focused on contrasting and combining results from different studies, in the hope of identifying patterns among study results, sources of disagreement among those results, or other interesting relationships that may come to light in the context of multiple studies.

400,000 elective AAA repairs world-wide concluded in favour of higher volume centres (Holt, Poloniecki, et al., 2007). More recent research by Holt et al. also found an 8.5 per cent mortality rate in lower volume centres compared to 5.9 per cent in higher ones (Holt, Poloniecki, & al., 2010). Holt et al have also found mortality differences between hospitals in the lowest and highest volume quintiles of providing ruptured abdominal aortic aneurysm repair of up to 24% (Holt, Karthikesalingam et al., 2010). There is evidence that similar relationships affect the performance of other vascular procedures including lower limb arterial reconstruction and carotid endarterectomy (Karthikesalingham, et al., 2010; Moxey, et al., 2012).

New technology:

A major driver for the proposed model of care has been the introduction of minimally invasive endovascular techniques (i.e. the use of interventional radiology to treat arterial disease thereby avoiding open surgery and reducing recovery time). Such techniques have reduced mortality, morbidity and hospital length of stay (EVAR1 Trial, 2005), but they require specific infra-structure, such as hybrid operating theatres that are equipped with advanced medical imaging (CT, MRI) devices, and are dependent on an adequate case volume (higher number of patients) to ensure their safe introduction. Evidence suggests that high volume centres are more likely to adopt new technologies (Dimick & Upchurch, 2008) and a hybrid vascular theatre that enables this is being built at the proposed centre at Southmead.

In other words the new arterial centre would provide complex aortic endovascular procedures from a dedicated vascular hybrid theatre supported by 24/7 vascular surgery and 24/7 interventional radiology. This would bring together the expertise and experience of key clinicians in these techniques and would offer both elective endovascular procedures but in addition emergency ones, such as endovascular repair for ruptured abdominal aortic aneurysm which has the potential to significantly improve length of recovery and reduce risk of mortality as compared to conventional open repairs.

The impact of travel distance and times:

Irrespective of what local people say about how far they will travel, there may be understandable concerns that having to travel further for surgery will put their lives at risk. However, numerous studies have been published reporting no [statistically] significant impact of distance on mortality for vascular surgery. For example, Cassar et al. studied nearly a decade of records from Raignor hospital in the Scottish highlands and reported no significant difference in the community mortality rate after ruptured aortic aneurysm between patients living within or further than 50 miles from the hospital (Cassar et al., 2001). Interestingly, a significantly **lower** hospital mortality rate was in fact reported in the study for those patients living greater than 50 miles from the hospital than those living within 50 miles (26 percent compared with 60 percent) although this was likely due to factors including likelihood to refer patients with a poor prognosis and differential diagnosis quality by general practitioners as opposed to distance travelled (Cassar et al., 2001).

Several further studies attempting to determine the impact of distance on mortality have showed similar results. Butler et al. (1978) studied the impact of regional hubs delivering vascular surgery on mortality outcomes and found no significant difference in operative mortality following ruptured abdominal aortic aneurysm (RAAA) between patients admitted from the local catchment area (58%) and those transferred from other centres for surgery (54%). Similar results were reported in studies by Fielding et al. (1984), D'Sa Barros (Barros, 1990), van Heeckeren (1970), Amundsen et al (1989), Farooq et al. (1996) amongst others, all reporting that centralisation does not prejudice the community mortality outcome for RAAA.

In terms of patients attitudes towards travel for specialist services, an extensive study by Holt et. al (2009) reported that 237 of the 258 patients questioned (92 percent) stated a willingness to travel for at least one hour beyond their nearest hospital. Patients also had a stronger willingness to travel to access services with lower peri-operative mortality, stroke and amputation rates, routine availability of EVAR and an experienced surgical team as opposed to other considerations such as length of stay, seeing the same doctor every time, waiting lists and car parking. The authors of this paper strongly endorse the idea of concentrating vascular surgery in regional centres to achieve the desired mortality outcomes.

Despite the evidence on outcomes and preferences, the Bath, Bristol, Weston Vascular Network is working to mitigate concerns with distance as far as possible and a key principle of the planning process has been to ensure that any care that can safely be provided locally will be. This includes outpatient clinics, access to diagnostics, minor day case procedures and follow up care. Repatriation and rehabilitation pathways will also be developed to enable patients to recover close to home following their surgery. Vascular consultants, specialist nurses and other specialist vascular professionals will continue to maintain a daily presence at those hospitals that are not the designated arterial centre to ensure equity of access to specialist input remains across the region and to support other acute services (e.g. stroke, diabetes). The development of clearly defined pathways and ensuring continued specialist presence at the non- arterial centres will also address concerns such as those raised by Adam et al. amongst others that fewer patients may be considered for surgical intervention outside of the central hub (Adam et al. , 1999). The network is also working with local patients to determine the location of additional outpatient clinics to minimize the travel for patients that live some distance from their nearest spoke service.

Expected Measurable Outcomes:

The over-riding aim of this proposal is to improve the outcomes for patients requiring vascular surgery with patient safety at the centre of what drives this proposal. The primary benefits and measures of success therefore are to achieve measurable improvements in each of the following areas. Progress against these targets will be monitored regularly by NHS England to ensure the expected benefits to patients are realised:

- Deliver an elective mortality for abdominal aortic aneurysm surgery of less than 3.5%, in line with the Vascular Society abdominal aortic aneurysm quality improvement programme;
- Reduced rate of amputation in patients with diabetes and a mortality rate for major amputation surgery of less than 5%, in line with Vascular Society Amputation quality improvement programme;
- Increase the percentage of patients with symptomatic carotid stenosis assessed as high risk of stroke treated within 48 hours and of low risk patients by 2 weeks by 2014, in line with National Stroke Strategy.

On call rota:

Providing a 24/7 vascular surgery and interventional radiology rotas is vital to ensure patients have emergency access to vascular specialists. Due to the consultant numbers at each site this is only achievable by having a single rota across the four organisations. Patient safety will be increased by having a single arterial site since any emergencies (either post operatively following elective work or via blue light admissions) can be managed in one place.

In summary, the expected benefits for patients are:

- Improved clinical outcomes, in particular patient mortality;
- Development of skills and expertise so that patients are better able to manage their condition and recovery;
- Shorter length of stay;
- Improved resources at arterial centre at NBT (hybrid theatre, dedicated ward etc.);
- Increased access to outpatient clinics;
- Increased access to arterial surgery (from 9-5 Monday to Friday to 24/7 provision);
- Clear lines of accountability and clinical governance that puts clinicians and patients at the heart of performance monitoring and service development.

Other benefits include:

- Standardised methods and promotion of best practice across the clinical teams;
- A more productive and efficient service (minimisation of duplication and waste);
- Improved opportunities for training, research and innovation;
- Reduced length of stay for patients and more effective pathway links with community providers to support timely repatriation of patients following surgery;
- Surgery undertaken in a modern, innovative new hospital;
- The co-location of the arterial centre with the major trauma unit;
- Compliance with the quality assurance standards of the Bristol, Bath and Weston Abdominal Aortic Aneurysm Screening Programme to have a single arterial centre providing aortic aneurysm repair for the programme.

8 Risks and/or disbenefits of not implementing the proposed service improvement

The current vascular services delivered by North Bristol Trust, University Hospital Bristol and the Royal United Hospital Bath do not meet the national service specification for vascular surgery. In the near future such providers are unlikely to be commissioned to provide this work - leading to a contractually necessary service development of services to centres that do meet the required specification and costly procurement processes.

In addition, the new specialty status for vascular surgery changes to junior doctor working patterns and increasing recognition of the need for seven day working weeks make delivery of arterial surgery unsustainable without a minimum of six vascular surgeons and six interventional radiologist based on a single site.

Failure to deliver would be a missed opportunity to bring together and retain expertise developed at the local hospitals, to improve patient outcomes and build a regional complex endovascular aortic service (including fenestrated and branched aortic stent grafts) for the South West and may put current vascular services that do not meet the service specification at risk if commissioners had to put the service out to tender.

There would also be a negative impact on NBT's ability to move other services to the new hospital, which could significantly delay the new hospital's ability to become fully operational. The cost impact of this to NBT would also be substantial.

NHS England would be unable to assure the safety and sustainability of current arrangements as services struggle to cope with expected increases in demand.

9 Timescales and Next Steps

The Hospital Trusts working together on this change in service in line with the national service specification are continuing to finalise pathway details to ensure that the stepped transfer of services will be implemented in a safe manner by the Autumn 2014.

10 Recommendations

Wiltshire Health Select Committee is asked to:

- Consider the evidence based improvements in patient outcomes the new model of care being offered by the Bath, Bristol, Weston Vascular Network is able to deliver;
- Consider the likely impact of the proposed model (to concentrate in-patient surgery at the new Southmead hospital as opposed to Royal United Hospital in Bath, the old Southmead and Bristol Royal Infirmary hospitals as currently) upon (some) Wiltshire residents has been kept to a minimum as only some (in-patient) surgery is being concentrated in Bristol to provide Wiltshire patients with a full 24/7 service whilst all other vascular support (outpatient, day case surgery etc.) will remain at Royal United Hospital, Bath (RUH) as currently. Moreover, a proportion of people from Wiltshire already need to go to Bristol for their vascular surgery as the service at RUH is only

available during working hours, Monday to Friday. In addition, people from Wiltshire can access two further vascular networks: The Gloucestershire, Swindon Vascular Network and the Dorset Vascular Network. This briefing only relates to proposed changes to the Bath, Bristol, Weston Vascular network.

- Consider the increased access to centre level in-patient vascular surgery for Wiltshire patients from 5pm provision, Monday to Friday as currently to 24/7, 365 days in the future;
- Consider the support and involvement of local clinical leaders, patients, carers and members of the public in developing the recommended model of care;
- Consider that arrangements for outpatient and day case surgery will remain as currently, or access increased, to enable as much care as is safe and appropriate to be provided in 'spoke' vascular services at various sites closer to people's homes;
- Consider the dedicated vascular hybrid vascular theatre and 42 bed dedicated vascular ward that the new Southmead hospital will provide;
- Note the consideration that has been given to protecting the financial stability of Trusts and future development of vascular services;
- Endorse the implementation of the proposal to move elective and emergency vascular surgery to the new arterial centre in Bristol starting in the Autumn of 2014.

Glossary

Abdominal aortic aneurysm repair	Abdominal aortic aneurysm (AAA) repair is a procedure used to treat an aneurysm (abnormal enlargement) of the abdominal aorta. Repair of an abdominal aortic aneurysm may be performed surgically through an open incision or in a minimally-invasive procedure called endovascular aneurysm repair (EVAR).
Angioplasty	<i>Angioplasty</i> is the technique of mechanically widening narrowed or obstructed arteries.
Arterial surgery	This includes a range of procedures to prevent death from aortic aneurysm, prevent stroke from carotid artery disease, and prevent lower limb amputation from peripheral arterial disease and diabetes.
Carotid endarterectomy	A <i>carotid endarterectomy</i> is a surgical procedure to unblock a carotid artery (blood vessels that supply the head and neck).
Clinical Reference Groups	The specialised commissioning function of NHS England is supported by a devolved clinical leadership model. Seventy-five Clinical Reference Groups (CRGs) covering all prescribed specialised services draw membership from each of the 12 geographical areas in England. CRGs bring together clinicians, commissioners, and Public Health experts with the patients and carers who use specialised services. Members are volunteers who have a particular interest, knowledge or experience of a specific area of specialised healthcare and wish to contribute to its development. They are responsible for preparing national specialised service level strategy and developing specialised service contract products such as service specifications and commissioning policies.
Comorbidities	Comorbidity is the presence of one or more additional disorders (or diseases) co-occurring with a primary disease or disorder; or the effect of such additional disorders or diseases. The additional disorder may also be a behavioral or mental disorder.
CT	A CT scan is a specialised X-ray test. It can give quite clear pictures of the inside of your body. In particular, it can give good pictures of arteries, which do not show on ordinary X-ray pictures.
Endovascular stent grafting	An endovascular stent graft is a tube composed of fabric supported by a metal mesh called a stent. It can be used for a variety of conditions involving the blood vessels, but most commonly is used to reinforce a weak spot in an artery called an aneurysm. Over time, blood pressure and other factors can cause this weak area to bulge like a balloon and it can eventually enlarge and rupture. The stent graft is designed to seal tightly with your artery above and below the aneurysm. The graft is stronger than the weakened artery and it allows your blood to pass through it without pushing on the bulge.

EVAR	See Abdominal aortic aneurysm repair.
Hot clinics	A 'hot clinic' is a clinic available for review of urgent patients to avoid unnecessary admissions to hospital while ensuring a more senior review within 24 hours. Orthopaedics ('fracture clinic') and Emergency Department ('review clinic') have used this model for some time whereby junior doctors can direct patients into clinics in which they will be seen by a senior. The vascular team will offer such reviews at NBT (5 days a week) and RUH (exact days TBC).
Interventional radiology	Interventional Radiology is a medical sub-specialty of radiology utilizing minimally-invasive image-guided procedures to diagnose and treat diseases in nearly every organ system. The concept behind interventional radiology is to diagnose and treat patients using the least invasive techniques currently available in order to minimize risk to the patient and improve health outcomes. These procedures have less risk, less pain and less recovery time compared to open surgery.
MRI	<i>Magnetic resonance imaging (MRI)</i> is a type of scan that uses strong magnetic fields and radio waves to produce detailed images of the inside of the body.
Peri-operative	The <i>peri-operative</i> period is the time period describing the duration of a patient's surgical procedure.
Peripheral arterial disease	<i>Peripheral arterial disease (PAD)</i> is a common condition in which a build-up of fatty deposits in the arteries restricts the blood supply to leg muscles.
Public and patient engagement	'Engagement', 'involvement', 'consultation', 'co-production' and 'participation' are all words that can be used to describe communicating with and listening to patients, carers and members of the public. This ranges from providing information to people about NHS services and commissioning decisions to working with patients and carers at a strategic level so their experiences and insight can be used to shape NHS policy and commissioning decisions.
Service specification	A service specification is a description of what a service should include. For example the number and skills of the staff that provide the service, registration with professional bodies or the environment in which certain procedures and care are carried out (like special thermo-regulated rooms for people being treated for severe burns).
Specialised services	Specialised services generally involve complex procedures that only a few people may have the skills and experience to perform or because they use very specialised, expensive equipment that the NHS simply could not afford to put into every local hospital and/or because the people who need these services are relatively few in numbers, such as very premature babies or people with rare cancers or genetic conditions.
Thoracic aortic disease	Thoracic aortic aneurysms — bulges in the wall of the aorta – are more common than doctors originally thought. If it tears the aorta, the main pipeline for blood from the heart to the body, suddenly bursts, cutting off the supply of life-sustaining blood and flooding

	the chest or abdomen with blood.
Thromboprophylaxis	Thromboprophylaxis prevents death from thrombosis (blood clots in the veins).
TIA	<i>A transient ischaemic attack (TIA)</i> or 'mini stroke' is caused by a temporary disruption in the blood supply to part of the brain.
Triage	Triage is the process of determining the priority of patients' treatments based on the severity of their condition.
Vascular studies	Vascular studies are a non-invasive (the skin is not pierced) procedure used to assess the blood flow in arteries and veins. A transducer (like a microphone) sends out ultrasonic sound waves at a frequency too high to be heard. When the transducer is placed on the skin at certain locations and angles, the ultrasonic sound waves move through the skin and other body tissues to the blood vessels, where the waves echo off of the blood cells. The transducer picks up the reflected waves and sends them to an amplifier, which makes the ultrasonic sound waves audible.
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