Cheshire and Merseyside Vascular Review

Report to commissioners

October 2011

Introduction

In 2010, I was asked to take forward the reconfiguration of vascular services in Cheshire and Merseyside. Our goal was to improve outcomes for patients by concentrating some aspects of these services on a smaller number of high-volume sites.

I convened a Project Board, which has met eleven times and now presents its report and recommendations to commissioners.

I am grateful to the members of the Project Board and of the Clinical Advisory Group for their contributions, and to the many other people who have helped to bring the work to this point.

Paul Brickwood
Chairman
Cheshire and Merseyside Vascular Review Project Board

Recommendations to commissioners

1. The numbers of patients needing arterial surgery in Cheshire and Merseyside and of consultants is enough to support two, but not three, vascular networks, each with one high-volume, high-quality arterial centre. Having two centres will mean enough activity at each arterial centre to secure excellent outcomes for patients, with an adequate margin to buffer variation in activity levels and staffing issues. **We recommend that two networks are commissioned, with one arterial centre in each network.**

2. To the north of the Mersey, we received an application for a network comprising the Royal Liverpool and Broadgreen University Hospitals NHS Trust, Aintree University Hospitals NHS Foundation Trust and Southport Hospital, part of the Southport and Ormskirk Hospitals NHS Trust. The commissioners and independent clinicians who advised us were keen to see the site of arterial centre resolved satisfactorily by consensus, which it has now been: the proposed arterial centre is at the Royal Liverpool University Hospital. The application meets all our requirements. **We recommend that this network is commissioned, and that it is implemented as soon as possible.**

3. We received an application from a network comprising Warrington and Halton NHS Foundation Trust and St Helens and Knowsley Teaching Hospitals NHS Trust. The proposed arterial centre for this Mid-Mersey network is at Warrington Hospital. This application was also assessed by the commissioners and independent clinicians and by the project board. We have concluded that these hospitals should form part of a larger network with other participants, rather than being commissioned as proposed. **We recommend commissioning services from the Mid-Mersey group of hospitals as part of a wider network including either at least one other hospital in Cheshire, or as part of the Liverpool network.**

4. We received an application from a network comprising the Countess of Chester Hospital NHS Foundation Trust and Wirral University Teaching Hospital NHS Foundation Trust. The proposed arterial centre for this South Mersey network is at Countess of Chester Hospital. To commission this network as proposed would be to exclude from it all the Mid-Mersey hospitals, which may not be appropriate. In addition, we are aware of continuing discussions between commissioners, Trust managers and clinicians about the details of the proposed network. **We recommend that these discussions be brought to a conclusion, whereupon commissioners should decide whether the Cheshire network should be centred at Chester or at Warrington.**

5. We are not making a recommendation between the alternative networks for the Cheshire, Warrington and Wirral cluster because there are a number of factors that require further consideration, work which is beyond the remit of the project board and is more properly addressed by commissioners. These factors include patient access, particularly by public transport, the links to co-dependent services, especially renal services, the existing skill base of staff and the rate at which implementation, which may be phased, could occur. The latter is important because of our goal of introducing aortic aneurysm screening between October 2012 and March 2013.

These factors need to be put alongside compliance with the clinical standards and the recommendations on impact mitigation expected from the assessment of impact work underway. **We recommend that commissioners decide between these alternatives, taking into consideration the factors we mention.**

6. Once these decisions are made, establishing and commissioning the networks can begin. We anticipate that this will be a complex process and will need careful management. **We recommend that an Implementation Board led by clinical commissioning groups is convened as soon as possible to oversee this.**

Background

In early 2010, commissioners in Cheshire and Merseyside set in motion a review of vascular services. Its goals were

1. To provide the best possible care for our patients
Treating vascular disease very well is not easy. Research shows that the chances of survival and improved quality of life after treatment of arterial diseases are greatest when patients are treated by a highly trained specialist team working in a large centre to which many patients are referred.

The more operations carried out at a particular hospital, the more likely it is that treatment will succeed. Seeing more patients allows doctors and other staff to hone their skills and maintain them at the highest level, ensuring that patients get the care they need.

This means that we need to have a small number of hospitals carrying out higher numbers of operations, rather than more hospitals carrying out fewer operations.

2. To ensure specialist doctors are available at all times
In some smaller hospitals, there are not enough consultants to provide high quality twenty-four hour care for patients with vascular diseases. By concentrating specialists in fewer hospitals and ensuring patients are taken to those hospitals promptly, we can ensure everyone gets the treatment they need, when they need it.

One particular issue is the availability of interventional radiology. Skilled consultants can use specialist techniques to save limbs and organs that might otherwise have to be removed. Changing the service so that round-the-clock interventional radiology rotas become possible will ensure that no-one misses out on these benefits because of where and when they become ill. Research has shown that the delay in accessing treatment due to ambulance transfers between hospitals does not create undue risk and will be more than outweighed by better outcomes and by the improved availability of consultant vascular surgeons and interventional radiologists within the network.

3. To meet the standards set by our doctors
Vascular specialists in the UK have set out how they think vascular services should be organised so that they can give their patients the best possible results. We have built on that work with specialists from Cheshire and Merseyside, developing our own clinical standards for our future services; these are in Appendix 3. We are determined to

improve our local NHS so that these standards are met in full. We can only achieve this by changing where some treatments are provided.

4. *To make sure that everyone has equal access to innovative procedures, such as keyhole techniques*

At the moment, patients in the region are not all able to access the latest treatments and techniques. For example, a type of treatment for blood clots which are blocking important arteries is not at present available at all times for everyone in Cheshire and Merseyside, because of the way in which interventional radiology services are arranged. We do not think that this is fair and want to make sure that all patients can benefit from innovations such as this.

5. *To be ready for a new screening programme*

The NHS is starting to screen older men for abdominal aortic aneurysms. Men who are discovered to have the condition need specialist treatment to reduce their risk of dying from their aneurysm. At present, local vascular services are not set up to undertake a screening programme that would meet the standards required by the NHS Abdominal Aortic Aneurysm Screening Programme.

The vascular review covers the population served by Cheshire and Merseyside providers. People living in Cheshire east of the M6 motorway whose local hospital is in Macclesfield are served by a vascular network from Manchester, and people in the south of Cheshire will in future be served by a vascular network which includes Leighton Hospital in Crewe and is based in Stoke-on-Trent. They are outside the scope of our review but are included in the reviews that are taking place in those areas.

Terms of reference

The Project Board's terms of reference were:

1. To oversee the service review of vascular services within Cheshire and Merseyside

2. To develop and oversee the Clinical Advisory Group programme of work and achievement of key actions by November 2010

3. To establish appropriate mechanisms and structures that ensure a coordinated approach to the provision of vascular services and encourage effective and active involvement and participation of all key stakeholders

4. To provide support in managing and identifying risks and issues to the successful review and implementation of vascular services

5. To develop a shared vision for vascular services which will aim to provide equity of accessibility and delivery at all stages of the patient journey where practicable

6. To specify the appropriate service model and most suitable configuration for arterial surgical services, the standards required of participating NHS Trusts and the appropriate referral of care pathways necessary for optimal patient outcomes

7. To ensure the recommendations from the service review are in line with national recommendations, based upon best evidence and local need which maximises the benefits and opportunities by having a Cheshire and Merseyside approach.

Work in 2010

We convened a Clinical Advisory Group to develop service standards for vascular services in Cheshire and Merseyside. The Clinical Advisory Group met six times, and its recommendations and membership are in the Appendices to this report.

The Clinical Advisory Group recommended that arterial centres should carry out an annual minimum of fifty elective aortic aneurysm repairs, whether open or endovascular, and one hundred carotid endarterectomies. We are aware that in other parts of England, and of the North West, different minima have been recommended, but we believe our approach is appropriate here:

- These minima were considered carefully and unanimously agreed by the members of Clinical Advisory Group, who are the best available source of advice to commissioners. We would need pressing reasons to over-ride this advice. This is especially so given that the minima exist to ensure patient safety and a key purpose of the review is to prevent adverse patient outcomes.

- Elsewhere, commissioners serving rural areas have adopted lower minima to avoid patients facing unduly long journeys to the nearest arterial centre. The parts of Cheshire and Merseyside covered by the review are predominantly urban, so this argument does not apply.

- In future, the number of patients needing treatment each year may fluctuate, meaning that a centre which just achieves a minimum may slip below it at times. This poses less threat to patient safety if the minimum is higher.

- This clinical field is subject to rapid technological advance. Managing clinical innovation successfully will be easier at larger centres.

In parallel with the development of these clinical standards, we consulted clinical leads from Cheshire and Merseyside about clinically co-dependent services. Their recommendations are in Appendix 4.

Activity analysis

We analysed activity to inform a decision about the appropriate number of arterial centres for Cheshire and Merseyside (Appendix 5). The analysis was based on numbers of elective aortic aneurysm repairs and carotid endarterectomies, the two procedures for which the Clinical Advisory Group set minima. We were aware that these are minima, not targets; centres with higher numbers are likely to achieve even better results.

The analysis shows that the Liverpool network has enough activity for its single centre. The Liverpool and Stoke-on-Trent vascular networks are not intending to serve the catchment

populations of Arrowe Park, Countess of Chester and Warrington Hospitals, so this is the area on which we focussed further attention. The analysis shows that there would be enough activity at a single arterial centre serving this population to meet the minima for both index procedures. However, there is not enough activity in this area for either procedure to enable two arterial centres to achieve the minimum. Having one strong centre in this area is more likely to secure the improvements in clinical quality that are needed than having two subscale centres. Furthermore, the population of this area is not enough to support two centres both meeting the minimum 800,000 population required by the NHS Abdominal Aortic Aneurysm Screening Programme.

We expect the level of carotid endarterectomy activity to rise as unmet need is satisfied. However, this rise is not likely to be large enough to support two centres both achieving the minimum.

This is the basis of our recommendation that there should be two vascular networks in Cheshire and Merseyside.

Consultation

In January 2011, we published a consultation document. This set out the case for change in vascular services and our proposals that arterial surgery and complex interventional radiology should be carried out at a small number of arterial centres, with the remaining care continuing to be provided locally. The only services which we proposed to relocate were surgery on the arteries and some more complex endovascular procedures. There will be no change in the location of outpatient clinics, initial investigations, surgery for venous disease, amputation, some angioplasties and follow-up, all of which will continue to be available at local hospitals, provided they meet the appropriate NHS quality standards.

In the consultation document, we set out our view that two vascular centres would be optimal for Cheshire and Merseyside, and described our plans to invite applications from networks of NHS Trusts who wished to provide vascular services together in future.

We held two engagement meetings, one for the public and one for NHS staff, attended by a total of 119 people. We presented our proposals to the oversight and scrutiny committees of every local authority in Cheshire and Merseyside, wrote to all local members of parliament and briefed three in person. We also obtained views of 1,452 members of the public and 558 staff members, which resulted in a total of 2,010 respondents via engagement meetings and an internet survey.

The consultation asked respondents these questions

1. Having had the consultation and listening to the presentation, are you clear about the case for change?
2. Did you have an opportunity to have your views heard?
3. Do you feel your views will be considered in the final decision making process?
4. Do you agree that a reduced number of centres is acceptable?

Respondents were then asked to rank order the most important goals for proposed change:

1. Patient safety
2. Expertise of staff
3. Increased positive outcomes for patients
4. Access to services (locality, transport).

Some clear results[1] emerged:

- The need for change to improve service quality was universally accepted.
- The approach that we are taking was understood and supported. People agreed with the quality standards.
- There was understandable concern about access to local services, loss of revenue for hospital trusts, issues for specialist staff moving to high volume centres and wider workforce planning issues.
- Most people would be prepared to travel to receive care of high quality. Sixty-five percent of respondents to the internet survey gave patient safety as their highest priority in selecting arterial centres, ahead of seventeen percent who gave local access as top priority.

Network applications

In March 2011, we asked groups of Trusts which believed that they meet the standards for accreditation as arterial networks to apply for designation. The applications were first scrutinised by a panel of independent clinicians and, separately, by representatives from primary care trusts and clinical commissioning consortia from across Cheshire and Merseyside. The project board then reviewed the recommendations.

Aintree University Hospitals, Royal Liverpool and Broadgreen University Hospitals and Southport and Ormskirk Hospital NHS Trust applied to form a network. However, at the stage of their initial application, they had not resolved which hospital would be the arterial centre, so we asked them to try to settle this matter collaboratively.

Countess of Chester Hospital and Wirral University Teaching Hospitals made a joint application to form the South Mersey Vascular Network, with the arterial centre at Chester. While we welcomed this example of Trust collaboration and considered that the application had merit, there were a number of outstanding questions about how the proposed arterial centre would work clinically. That meant we could not recommend commissioning of the network when it was proposed.

[1] A report on the consultation is available from Jackie Robinson (jacqueline.robinson@knowsley.nhs.uk).

Warrington and Halton Hospitals and St Helens and Knowsley Teaching Hospitals made a joint application to be a vascular network, with the arterial centre at Warrington. The independent clinical advisors and the commissioners, including Warrington Health Consortium and NHS Halton and St Helens, had a number of serious concerns about this application, and could not recommend its acceptance:

- There were too few surgeons and radiologists to satisfy the quality standards. Although new appointments were proposed, it was not clear whether these posts would be filled or how they would be sustainably funded.
- The carotid endarterectomy rate fell substantially short of the minimum specified in the quality standards.
- The application assumed a wider geographical reach for the network than seems likely, including Crewe, the whole of Knowsley Borough, Leigh and Irlam. In reality, we did not think the network's catchment would reach the 800,000 required.

Recent progress

Aintree University Hospitals, Royal Liverpool and Broadgreen University Hospitals and Southport and Ormskirk Hospitals responded positively to our request to consider again the site for their arterial centre. They decided that the Royal Liverpool University Hospital was the most appropriate site. They also resolved satisfactorily some matters of detail about how their network would function. For these reasons we are confident in recommending this proposed network to commissioners.

Countess of Chester Hospital and Wirral University Teaching Hospitals worked with us and independent clinical experts to resolve the issues which prevented acceptance of their application. Although there has been substantial progress, we have not reached the point where we can make a recommendation. We have concluded that there should only be one network for this part of Cheshire and Merseyside, but neither the Chester/Wirral nor the Mid-Mersey proposals covered this area in full. The next step for commissioners is to decide upon the solution that best fits the needs of the people we serve, including whether the second network should be centred at Chester or at Warrington.

Warrington Health Consortium has arranged an assessment of the impact if Warrington Hospital did not remain a site for arterial surgery. A report is expected soon.

Conclusion

We are delighted at the progress made in Liverpool, which has promptly and consensually produced a network that we feel confident to recommend to Merseyside's commissioners.

Progress elsewhere has been slower, but two clear options have now emerged. We hope that commissioners will soon make a choice between them and that the new arrangements can be speedily implemented, subject to consultation.

Once these changes are in place, the quality and outcomes of vascular care in Cheshire and Merseyside will be secured at a new and higher level.

Appendix 1: Project Board members

Paul Brickwood, Locality Director of Commissioning and Finance, NHS Knowsley, and Responsible Officer for the Vascular Review on behalf of the Directors of Commissioning of Cheshire and Merseyside (chair)

Sarah Baker, Accountable Officer, Warrington Health Consortium

Joe Banat, general practitioner, St Helens, and cardiovascular clinical lead, StHealth Clinical Commissioning Group

Leonie Beavers, Director of Strategy, Liverpool PCT

Simon Banks, Operational Director of Planned Care and Market Development, NHS Halton and St Helens

Hannah Chellaswamy, Director of Public Health, NHS Sefton

Tom Dent, project director

Craig Gillespie, general practitioner, Sefton, and Deputy Chair of Sefton Clinical Commissioning Group

Andrew Guy, consultant general and vascular surgeon, Mid Cheshire Hospitals NHS Trust and local representative to the Vascular Society of Great Britain and Ireland

Angela Haines, service improvement manager, Cheshire and Merseyside Cardiac and Stroke Network

Deborah Jones, Director of Strategy and Service Development, NHS Sefton

Ian Moses, Acting Head of Service Development, North West Ambulance Service

Claire O'Donnell, Clinical effectiveness specialist in public health, North West Specialised Commissioning Team

Jacqueline Robinson, Head of Engagement and Involvement, Knowsley Health & Wellbeing

Jo Stringer, Head of Communications and Engagement, North West Specialised Commissioning Team

Jan Vaughan, Director, Cheshire and Merseyside Cardiac & Stroke Network

Not all members attended all meetings, or served on the Board throughout the review.

Appendix 2: Clinical Advisory Group

Mr Andrew Guy, consultant general and vascular surgeon, Mid Cheshire Hospitals (chair)

Dr Gian Abbott, consultant radiologist, Countess of Chester Hospital

Mr Stephen Blair, consultant vascular surgeon, Arrowe Park Hospital

Mr John Brennan, consultant vascular surgeon, Royal Liverpool and Broadgreen Hospitals

Mr Sameh Dimitri, consultant vascular surgeon, Countess of Chester Hospital

Dr Rajesh Gedela, consultant radiologist, Southport and Ormskirk Hospitals

Dr Liz O'Grady, consultant radiologist, Aintree Hospital

Mr Magdi Hanafy, consultant vascular surgeon, Mid Cheshire Hospitals

Dr Simon Lea, consultant radiologist, Arrowe Park Hospital

Dr Richard McWilliams, consultant radiologist, Royal Liverpool and Broadgreen Hospitals

Dr Glenn Massey, consultant radiologist, Warrington and Halton Hospitals

Mr Frank Mason, consultant vascular surgeon, Southport and Ormskirk Hospitals

Mr Deji Olojugba, consultant vascular surgeon, Warrington and Halton Hospitals

Mr Francesco Torella, consultant vascular surgeon, Aintree Hospital

Dr Salman Zaman, consultant radiologist, Mid Cheshire Hospitals

Dr Oliver Zuzan, consultant anaesthetist, Royal Liverpool Hospital

Appendix 3: Quality standards for vascular services

Introduction

In June 2010, the Cheshire and Merseyside vascular review convened a Clinical Advisory Group to develop clinical standards for vascular services. These were to guide the reconfiguration of vascular services in the region, and specifically to ensure that hospitals providing arterial surgery were able to secure excellent outcomes for patients. The standards are partly based on *Quality Standards Services for People with Vascular Disease,* published by the West Midland Quality Review Service.

The standards refer to the vascular service, which is all the hospitals in Cheshire and Merseyside which provide care to patients with vascular disease, and to vascular centres, which are hospitals providing arterial surgery and higher risk interventional radiology as part of the vascular service.

Clinical standards for vascular centres

Number	Standard	Demonstration of compliance
Staffing		
1.	The centre should have a nominated lead consultant vascular specialist (surgeon or radiologist), and nominated lead surgeon, radiologist and nurse with responsibility for ensuring implementation of the quality standards across the centre's catchment area.	Name of lead consultants and lead nurse. *Note: The lead clinicians may be supported by senior clinicians who take a lead role on particular aspects of the service, for example, screening or training.*
2.	A nurse should be available with specialist expertise in each of the following areas: a. Wound, ulcer and diabetic foot management b. Claudication, and lifestyle advice c. Amputation and liaison with rehabilitation and limb-fitting	Staffing details, including cover arrangements. *Notes:* *1. The nurse with specialist expertise in vascular access may be managed by the renal service or by the vascular service.*

	services d. Vascular access for patients with renal disease e. Aneurysms. These nurses should have responsibility for leadership and service development for their area of specialist expertise. There should be arrangements for cover during absences.	*2. These specialist roles may be undertaken on a full-time or part-time basis and may include, for example, senior ward nurses with additional responsibilities. Sufficient time should, however, be allocated for the leadership and service development aspects of the roles.* *3. Specialist expertise should be available to all patients from the centre's catchment area. The roles may, however, be undertaken by different people in different localities.*
3.	A consultant vascular surgeon should be available at all times.	Staffing details. *Note: A minimum of a 1:6 on call rota is required to achieve this standard.*
4.	Robust middle-grade cover must be in place.	Staffing details. *Note: As an aspiration, this middle grade cover should be provided by a vascular specialist trainee.*
5.	A consultant anaesthetist with up-to-date skills and competencies in managing vascular emergencies should be available at all times.	Staffing details
6.	A nominated lead consultant anaesthetist should be identified for liaison with the vascular service.	Name of nominated lead
Organisation of care		
7.	All patients should be treated in accordance with normal standards of consent, support and provision of written information.	Written policies
8.	The service should have defined the locations on which in-patient, day case and out-patient vascular services are provided. Each	Locations of services agreed by commissioners.

	vascular service should have only one in-patient arterial site. Out-patient vascular services should take place on, at least, all hospital sites accepting general medical and surgical emergency admissions.	*Notes:* 1. *In hospitals without on-site in-patient vascular services, out-patient and day surgery or interventional procedures may be provided by local vascular specialists or by specialists visiting from another hospital – usually the hospital with in-patient vascular services.* 2. *The best possible local access to vascular services should be achieved by providing out-patient and day case services as close to patients' homes as possible. This may include locations other than those admitting vascular, general medical and general surgical admissions.*
9.	A consultant interventional radiologist should be available at all times.	Staffing details. *Note: A minimum of a 1:6 on call rota is required to achieve this standard.*
10.	Participation in the interventional radiology service should be open to all interventional radiologists from hospitals in the centre's catchment area who wish to participate, subject to their maintaining competence.	Details of service available. *Notes:* 1. *The radiology service should satisfy the requirements in The Royal College of Radiologists' document 'Standards for providing a 24-hour interventional radiology service' (2008), The Royal College of Radiologists/British Society of Interventional Radiology document 'Achieving Standards for Vascular Radiology' (2007) and the RCR/RCN document 'Guidelines for Nursing Care in Interventional Radiology' (2006), or subsequent updates to these*

		documents. 2. *This standard does not require a separate vascular interventional radiology rota.*
11.	For arterial centres which are part of a trauma network, the on-call vascular specialist must be able to reach the trauma unit within thirty minutes.	Records of call-outs
12.	All emergency and elective vascular interventional procedures should be undertaken by consultant vascular specialists or by staff under their supervision. All vascular specialists should undertake sufficient interventional procedures (operations or interventional radiology procedures) per annum to maintain competence.	Details of staffing available. Audit results. *Note:* *For the purpose of considering interventional procedures to maintain competence, activity undertaken in hospitals other than the vascular centre may be included as part of surgeons'and radiologists' activity.* *Recommended staffing levels are one vascular surgeon per 150,000 population or one transplant surgeon with a vascular interest per 100,000 population.*
13.	Endovascular aortic aneurysm repair and carotid stenting should be undertaken only by vascular specialists with competence in these procedures.	Normal clinical governance arrangements in place and implemented. Audit results. *Note: Trust processes for introduction of new procedures should also be applied to the introduction of these procedures.*

14.	A vascular specialist and support staff with competence in interventional radiology should be available for all elective vascular radiology procedures.	Staffing details. *Notes:* 1. *Trust governance procedures must ensure that vascular specialists are competent in the procedures they propose to undertake.* 2. *In hospitals without on-site in-patient vascular services, the vascular specialist and support staff may be based in the local hospital or may travel from another hospital – usually the one where in-patient services are located.* 3. *These services should satisfy the requirements in The Royal College of Radiologists/British Society of Interventional Radiology document 'Achieving Standards for Vascular Radiology' (2007), or subsequent updates of this document.*
15.	An in-patient ward should be available, staffed by nurses and health care assistants with appropriate competence in the care of patients with vascular disease. The competence framework should cover at least: a. Acute Life-threatening Events Recognition and Treatment (ALERT) or similar b. Tissue viability and wound care c. Pain management d. Care of patients with diabetes	Staffing details, competence framework showing expected competences and summary of competence assessments.

	e. High dependency care f. Care of patients with disabilities, including patients with amputations.	
16.	Physiotherapy services should be available daily with time allocated for their work with in-patients with vascular disease.	Details of services available. *Note: These services should be available at weekends as well as Monday to Friday.*
17.	Access to the following services should be available for in-patients with vascular disease: a. Occupational therapy b. Social work. Staff providing these services should have specific time allocated to their work with the vascular service.	Details of services available. *Note: These services may be provided by staff who provide the post-discharge service or by different staff.*
18.	Vascular ultrasound should be available for all vascular out-patient services.	Staffing details. *Note: The service may be available within the out-patient clinic or imaging department. The service may be provided by a vascular technologist, radiographer, nurse or radiologist. More detail on the competences expected for these staff is available from Skills for Health.* *Further advice on competences is expected from the British Medical Ultrasound Society in the near future.* *In hospitals without in-patient vascular services, staff may be based in the local hospital or may travel from another*

		hospital, usually the one where in-patient services are located.
19.	In-patient and community-based rehabilitation services with expertise in the care of patients with vascular disease, including amputees, should be available, including at least: a. Physiotherapy b. Occupational therapy c. Limb fitting and orthoses.	Description of services available. *Note: These services should be available for the whole of the vascular centre's catchment population but may be organised in different ways in different locations.*
20.	Sufficient administrative, clerical and data collection support should be available.	Discussion with staff. *Note: 'Sufficient' is not strictly defined. Clinical staff should not be spending unreasonable amounts of time on administrative duties, including data collection, that detract from their ability to provide patient care.*
Facilities		
21.	The following facilities and services should be available at all times: a. Emergency theatre b. Vascular angiography suite c. Spiral CT d. Critical care (levels 2 and 3)	Details of facilities and staffing available. *Note:* *1. The Medicines and Healthcare Products Regulatory Agency has published guidance on facilities for endovascular aortic aneurysm repair (Joint Working Group to produce guidance on delivering an Endovascular Aneurysm Repair Service). The guidance*

	e. Haematology (for urgent cross-match and blood products) f. Blood biochemistry and blood gas analysis g. Facilities for electronic transfer of imaging from, or ability remotely to view imaging at, other acute hospitals within the catchment area of the vascular centre. h. As an aspiration, fixed imaging facilities in a sterile theatre environment for endovascular aneurysm repair. These facilities should have staff with appropriate vascular expertise and sufficient capacity for the expected number of patients with vascular disease, including incoming transfers and unexpected rises in demand.	*does not require immediate cessation of endovascular aneurysm repair in hospitals without fixed imaging facilities in a sterile theatre environment.* *2. The angiography suite should be staffed as stated in the RCR / RCN guidance.* *3. Images must be available via Dicom links (i.e. on PACS) not via a web based system.*
22.	A vascular laboratory should be available at the vascular centre.	Viewing facilities
23.	Magnetic resonance angiography should be available during normal working hours.	Viewing facilities.
24.	In-patient wards for patients with vascular disease should have: a. Hand-held Doppler ultrasound machine b. Portable duplex device.	Viewing facilities.
25.	All vascular surgery should take place in a theatre with: a. All standards for sterility met b. Theatre staff trained in vascular instruments, prosthetics and techniques and in the use of cell salvage devices for	Viewing facilities.

	blood conservation c. Stocks of grafts, instruments and sutures required for patients with vascular disease d. Radiolucent operating tables and X-ray C-arms. X-ray C-arm should have DSA capability. A back up C-arm of similar specification must be available. e. Hand-held Doppler ultrasound machine and portable duplex devices f. Access to blood and blood products.	
26.	Elective clinic and theatre sessions for patients needing permanent dialysis access should be sufficient to meet the needs of patients from the catchment area with end-stage renal failure.	Details of vascular access services. *Notes:* *National recommendation is one session per week for every 120 adult patients on dialysis.*
27.	All vascular out-patient clinics should have: a. Hand-held Doppler ultrasound machine b. Portable duplex scanner c. Facilities to perform ankle brachial pressure tests.	Observation of facilities and equipment.
Clinical policies		
28.	Clinical guidelines should be agreed with the ambulance service covering the clinical indications for taking emergency patients to the vascular centre and the patients who may be taken to	Written guidelines agreed with the ambulance service.

	Emergency Departments without on-site in-patient vascular services.	
29.	Arterial surgery and higher risk arterial interventional radiological procedures are carried out at the arterial centre. Varicose vein surgery and lower risk arterial interventional radiological procedures are carried out at non-arterial centres. The appropriate site at which to carry out amputation will vary. The multi-disciplinary team will decide whether each patient's procedure is sufficiently low risk that it could be carried out appropriately at non-arterial centres, or higher risk and therefore suitable for the arterial centre.	Notes of meetings held.
30.	Clinical guidelines should be in use covering direct transfer from each of the following services to the vascular centre: a. Burns services b. Stroke services c. Neurosurgery services d. Spinal surgery services e. Cardiac services f. Trauma services	Written guidelines. *Notes:* *1. These guidelines should be based on agreed local clinical networks' or regional guidance and pathway or on the latest evidence-based national guidance, including NICE guidance.* *2. Guidelines must be clear about the arrangements for emergency transfer of patients with head injury, sub-arachnoid haemorrhage, hyper-acute stroke, ST elevation myocardial infarction and abdominal aortic aneurysm.* *3. The guidelines may also cover information required for referral, documentation, treatments to undertake before transfer and escorting staff.*

31.	Clinical guidelines should be in use throughout the vascular service covering assessment and management of: a. Open and endovascular repair of abdominal aortic aneurysm b. Surveillance of abdominal aortic aneurysm c. Carotid artery disease d. Diabetic foot e. Leg ulcers f. Claudication g. Varicose veins h. Limb-threatening ischaemia i. Lymphoedema. The guideline for amputation should comply with the standards published by the Vascular Society of Great Britain and Ireland, including their Quality Improvement Framework. These guidelines should cover: a. Indications for seeking advice b. Lifestyle advice c. Investigations	Written guidelines. *Notes:* *1. The guidelines should be explicit about who will undertake interventional imaging (i.e. interventional radiologist or vascular surgeon). Where a vascular service covers more than one hospital, this should be specified for each hospital.* *2. Guidelines on the assessment and management of abdominal aortic aneurysm should comply with the Vascular Society's document 'Framework for improving the results of elective AAA repair' (2009).* *3. Guidelines on carotid artery disease assessment and management should be agreed with local stroke / TIA service(s) and should ensure that, where indicated, carotid intervention takes place within 48 hours of referral.* *4. Guidelines on diabetic foot assessment and management should be agreed with the local diabetes service(s).* *5. The pre-operative assessment aspects of the guidelines should have been agreed with the local cardiology service/s.*

	d. Treatment options available, including surgical and radiological interventions and conservative options e. Indications for choice of treatment f. Investigation and management of emergency patients g. Management of haemodynamically unstable patients h. Indications and arrangements for emergency transfer i. Indications and arrangements for non-urgent referral j. Arrangements for transfer of cross-matched blood k. Pre-operative assessment l. Post-operative monitoring m. Management of side-effects and complications of treatment n. Follow up arrangements o. Referral for rehabilitation p. Responsibilities for giving information to patients and carers.	
32.	High-risk patients including all patients undergoing aortic surgery should be seen for pre-assessment by an anaesthetist with experience in elective vascular anaesthesia. Medication should be reviewed and optimised for the intervention.	Written guidelines.

33.	Centres treating patients with thoracic or thoracoabdominal aortic aneurysms need to have a system in place to treat spinal cord ischaemia with lumbar CSF drainage and blood pressure augmentation at all times.	Viewing equipment
34.	Guidelines on lifestyle advice for all patients should be in use covering, at least: a. Support for smoking cessation b. Dietary advice c. Programmes of physical activity and weight management.	Written guidelines.
35.	Clinical guidelines on monitoring and management of peripheral arterial disease risk factors should be in use covering, at least: a. Anti-platelet therapy b. Lipid reduction therapy c. Control of hypertension.	Written guidelines.
36.	Clinical guidelines on the management of patients with diabetes should be in use covering, at least: a. Management of ischaemia and sepsis in patients with diabetes b. Peri-operative management of patients with diabetes c. Indications for involvement of the diabetes service in the care of the patient.	Written guidelines agreed with the local diabetes service.

37.	Clinical guidelines on the management of patients with, or at risk of, impaired renal function should be in use, including: a. Indications for involvement of the renal service in the care of the patient b. Prevention and management of complications.	Written guidelines agreed with the local renal service.
38.	A protocol for by-pass graft surveillance should be in place.	Written protocol. *Note: The protocol may be that no surveillance is undertaken unless further evidence of effectiveness becomes available.*
39.	Clinical guidelines should be in use covering indications for involvement of cardiology services in the care of patients with vascular disease.	Written guidelines agreed with cardiology service.
40.	Clinical guidelines should be in use covering indications and arrangements for referral for psychological support.	Written guidelines.
41.	There should be a local policy covering ultrasound screening of relatives of patients with abdominal aortic aneurysm.	Written policy. *Notes:* 1. *The policy should cover relatives of patients identified by both screening and symptomatic pathways.* 2. *The policy should be consistent with the information for patients.*
42.	Discharge planning guidelines should be in use covering, at least: a. Discharge to rehabilitation facilities	Written guidelines.

	b. Discharge home with support from local rehabilitation facilities c. Referral to limb-fitting service d. Communication with the patient's GP.	
43.	Guidelines, agreed with the specialist palliative care services serving the local population, should be in use covering, at least: a. Arrangements for accessing advice and support from the specialist palliative care team. b. Indications for referral of patients to the specialist palliative care team. c. Arrangements for shared care between the vascular service and palliative care services.	Written guidelines, agreed with specialist palliative care service(s) serving the local population.
44.	A protocol on driving advice should be in use, covering establishing the type of licence and giving appropriate advice on DVLA notification.	Written protocol. *Note:* *The protocol should comply with the latest version of 'Guidance to the current Medical Standards of Fitness to Drive' produced by the DVLA and reviewed every six months*.
45.	The vascular centre's staff should be aware of local guidelines for end-of-life care.	Availability of guidelines relating to end-of-life care that are used by specialist palliative care services in the local area.
Multi-disciplinary working		
46.	A multi-disciplinary team meeting to discuss the treatment of	Notes of meetings held.

	patients with abdominal aortic aneurysms and peripheral vascular disease should be held at least weekly. Job plans must include attendance at multi-disciplinary team meetings.	
47.	All images should be discussed at a multi-disciplinary team meeting attended by a consultant radiologist.	Notes of meetings held.
48.	A ward-based multi-disciplinary team meeting to discuss the care of patients with complex rehabilitation and discharge needs should be held at least weekly, involving at least: a. Ward manager b. Nurse with specialist expertise in care of patients with amputations c. Physiotherapy d. Occupational therapy e. Social work.	Notes of meetings held. *Note: Other staff, for example, community matrons, may also attend the multi-disciplinary team meetings.*
49.	Consultant and nurse representatives of the vascular service should participate regularly in multi-disciplinary meetings with services responsible for the care of: a. Patients with renal disease b. Patients with stroke or TIA	Discussion with renal, stroke and cardiothoracic surgery services.

50.	Multi-disciplinary clinics for assessment of patients with diabetes and complex foot problems should be held involving: a. Vascular surgeons b. Diabetes services c. Orthopaedic services d. Orthotic services e. Podiatry services.	Details of services available.
51.	A meeting with local rehabilitation services should be held at least annually to review the links with the vascular service and address any problems identified.	Notes of meetings held.
52.	The vascular centre should offer an educational session on the assessment of vascular emergencies for emergency department staff, general surgeons, GPs and ambulance staff at least annually.	Details of sessions provided. *Note:* *The educational session should be offered to staff from all hospitals within the catchment area of the vascular centre.*
Clinical audit		
53.	The centre should collect and submit data to the National Vascular Database (all index procedures) and British Society of Interventional Radiology Registries. This standard is of the highest importance.	National Vascular Database reports showing risk-adjusted comparative outcomes for the centre. BSIR Registries information. *Note:* *1. Data should cover all parts of the vascular service including activity in hospitals without on-site in-patient services.*

		2. *Appropriate support staff are needed to collect and upload data.*
54.	The centre should comply with national mortality standards.	Annual report
55.	The centre should have an annual programme of audits covering at least: a. Number of interventional procedures (surgical and interventional radiology) undertaken by each vascular specialist in the centre's catchment area b. Medical management of patients with peripheral vascular disease c. Compliance with evidence-based guidelines.	Details of audit programme. *Note: Audits should cover all parts of the vascular service including activity in hospitals without on-site in-patient services and should include comparison of HES data and National Vascular Database / BSIR Registries numbers. Audits of operations by surgeon should include all vascular operations, including any undertaken by general surgeons.*
56.	The centre should produce an annual report summarising activity, compliance with quality standards and clinical outcomes. The report should identify actions required to meet expected quality standards and progress since the previous year's annual report.	Annual report. *Note: The National Vascular Database reports will provide much of the data for the annual report.*
57.	All policies, procedures and guidelines should comply with Trust document control procedures.	Policies, procedures and guidelines meeting reasonable document control quality requirements of monitoring, review and version control.

Clinical standards for non-arterial centres

Number	Standard	Demonstration of compliance
Equipment and facilities		
1.	Vascular out-patient clinics should have: a. Hand-held Doppler ultrasound machine b. Portable duplex scanner Facilities to perform ankle brachial pressure tests.	Observation of facilities and equipment.
2.	The service should have defined the locations on which in-patient, day case and out-patient vascular services are provided. Each vascular service should have only one in-patient arterial site. Out-patient vascular services should take place on, at least, all hospital sites accepting general medical and surgical emergency admissions.	Locations of services agreed by commissioners. *Notes:* *1. In hospitals without on-site in-patient vascular services, out-patient and day surgery or interventional procedures may be provided by local vascular specialists or by specialists visiting from another hospital – usually the hospital with in-patient vascular services.* *2. The best possible local access to vascular services should be achieved by providing out-patient and day case services as close to patients' homes as possible. This may include locations other than those admitting vascular, general medical and general surgical admissions.*

3.	Vascular ultrasound should be available for all vascular out-patient services.	Staffing details. *Note: The service may be available within the out-patient clinic or imaging department. The service may be provided by a vascular technologist, radiographer, nurse or radiologist. More detail on the competences expected for these staff is available from Skills for Health.* *Further advice on competences is expected from the British Medical Ultrasound Society in the near future.* *In hospitals without in-patient vascular services, staff may be based in the local hospital or may travel from another hospital, usually the one where in-patient services are located.*
4.	Non-arterial centres should have available sets of instruments for common arterial procedures, in case they are unexpectedly required.	Inspection
Organisation of care		
5.	Arterial surgery and higher risk arterial interventional radiological procedures are carried out at the arterial centre. Varicose vein surgery and lower risk arterial interventional radiological procedures are carried out at non-arterial centres. The appropriate site at which to carry out amputation will vary. The multi-disciplinary team will decide whether each patient's procedure is sufficiently low risk that it could be carried out appropriately at non-arterial centres, or higher risk and therefore suitable for the arterial centre.	Notes of meetings held.

Clinical audit		
6.	All policies, procedures and guidelines should comply with Trust document control procedures.	Policies, procedures and guidelines meeting reasonable document control quality requirements of monitoring, review and version control.
7.	The centre should collect and submit data to the National Vascular Database (all index procedures) and British Society of Interventional Radiology Registries.	National Vascular Database reports showing risk-adjusted comparative outcomes for the centre. BSIR Registries information. *Note:* *1. Data should cover all parts of the vascular service including activity in hospitals without on-site in-patient services.* *2. Appropriate support staff are needed to collect and upload data.*
8.	The centre should have an annual programme of audits covering at least: a. Number of interventional procedures (surgical and interventional radiology) undertaken by each vascular specialist across the centre's catchment area. b. Medical management of patients with peripheral vascular disease. c. Compliance with evidence-based guidelines.	Details of audit programme. *Note:* *1. Audits should cover all parts of the vascular service including activity in hospitals without on-site in-patient services and should include comparison of HES data and National Vascular Database / BSIR Registries numbers. Audits of operations by surgeon should include all vascular operations, including any undertaken by general surgeons.* *2. Data should cover all parts of the vascular service including activity in hospitals without on-site in-patient*

		services. *3. Appropriate support staff are needed to collect and upload data.*

Appendix 4: Inter-dependent clinical services

Patients often have more complex care needs which overlap several clinical services. We need to make sure that, after the change in vascular services, patients get care that is at least as joined up as at present.

The most important of these linked services are those for people with kidney failure, stroke, diabetes and trauma. Clinicians have recommended arrangements to ensure services work well together:

Stroke

The National Stroke Strategy requires that patients presenting with a high-risk transient ischaemic attack or minor stroke should be assessed for possible carotid endarterectomy within 24 hours, and within seven days in all other cases, with carotid intervention within 48 hours of referral where clinically indicated.

The future model of care in Cheshire and Merseyside is that patients with an obvious stroke will be taken direct to a hyper-acute stroke centre for immediate imaging, thrombolysis and other urgent management. After a few days, they will be transferred to a more local hospital to continue rehabilitation.

- It is highly desirable, but not essential, that arterial centres are co-located with hyper-acute stroke centres. This is because it will expedite carotid endarterectomy for those patients admitted there.
- The arterial centre will need to be able to offer treatment in line with these standards to patients presenting there and at other hospitals.
- The selection of a hospital as a hyper-acute stroke centre will be a factor in its favour when identifying arterial centres.

Diabetes

Most patients with diabetes presenting with vascular disease can be investigated at a non-arterial centre hospital and referred if necessary as an outpatient. Inpatients can be investigated and in most cases treated with angioplasty without recourse to open vascular surgery. The minority of patients presenting with an acutely ischaemic limb or other vascular emergency would need transfer to the arterial centre. Inpatients with diabetes benefit from specialist diabetic input, and there is evidence that this may shorten length of stay.

- The arterial centre will need to be able to offer immediate admission to diabetic patients with vascular emergencies.
- Arterial centres will need to ensure adequate input from the diabetes team.

Critical care and trauma

The reconfiguration of trauma services on Cheshire and Merseyside is likely to culminate in the designation of four or five hospitals as trauma units; no hospital in the North-West has all the clinical components necessary for trauma centre status. Only a small minority of trauma cases involve vascular injury, so it is desirable but by no means essential that these hospitals should be arterial centres – in any case, the likely number of these centres is fewer than the number of trauma units.

When a patient with vascular trauma is admitted to a hospital without arterial surgery on site, a general surgeon can treat the haemorrhage and stabilise the patient, while a vascular surgeon is called from elsewhere. The vascular surgeon's role is to repair and reconstruct the damaged vessels, and s/he would need to be onsite within thirty minutes of being called.

With regard to critical care, all hospitals in Cheshire and Merseyside are expected to have a 24/7 intensivist rota, and nearly all do. Any hospital offering arterial surgery should offer this level of cover.

- The selection of a hospital as a trauma unit, and especially as a trauma unit plus, will be a factor in its favour when identifying arterial centres.
- Critical care capacity should be considered in the configuration of vascular services, with a requirement for 24/7 intensivist cover.

Renal services

Hospitals fall into three categories: those with no haemodialysis facilities, those offering nurse-led haemodialysis to outpatients supported by a visiting nephrologist, and those with a full-scale renal unit. There are three of the latter in Cheshire and Merseyside: the Royal Liverpool, Aintree and Arrowe Park Hospitals.

There are three areas where renal and vascular services intersect:

Creating and maintaining arterio-venous fistulae for haemodialysis patients
From April 2011, Trusts face financial penalties if more than 20% of patients on long-term haemodialysis lack permanent vascular access via an arterio-venous fistula. Fistulae need to be created within six weeks of referral to a surgeon. Fistulae sometimes stenose or thrombose, both of which need prompt interventional radiology to maintain or restore patency.

For this reason, onsite vascular services contribute substantially to the success of a haemodialysis centre.

The management of acute renal failure after vascular surgery
Patients with acute renal failure after surgery need expert management, not least to shorten the length of stay in critical care. Nephrologists are helpful in such situations, but an appropriately trained intensivist is also fully satisfactory.

The management of peripheral vascular disease in patients on dialysis
Cardiovascular and peripheral vascular disease is common among patients on dialysis. When they are admitted for any reason, patients on dialysis need particularly expert treatment because of their renal failure. Therefore, many hospitals without a full renal service have a policy of not admitting patients on dialysis for any indication. So substantial clinical difficulties would arise for a renal centre which was not also an arterial centre, unless existing clinical relationships could mitigate the problem.

- Ideally renal and vascular units should co-exist on the same site. Any other arrangement requires close discussion between hospitals to ensure that these standards are achieved.

A renal unit's key requirements for vascular support are:

1. Access to imaging for work up of a new vascular access (within four weeks).

2. Access to imaging for diagnosis in cases of sub-optimally performing fistulas (within two weeks, degree of urgency will depend of degree of fistula underperformance).

3. Facilities for long-line placement with radiology imaging and interventional radiologist expertise (within 24 hour interval to reduce the number of temporary procedures and duration of in-patient stay)

4. Elective list time for placement of Tenchkoff catheters and peripheral haemodialysis access (enough list space so that 80% of patients known to nephrology for over 90 days and planned for peritoneal dialysis start on that treatment and 80% of patients start haemodialysis with peripheral access).

5. Access to theatres (and surgical staff) for uncontrollable haemorrhage, or graft or peritoneal sepsis (within hours).

6. Access to ultrasound for diagnosis of acutely thrombosed fistulae (09.00 to 17.00 seven days a week)

7. Access to interventional radiology for diagnosis, angioplasty and thrombolysis (09.00 to 17.00 7 days a week).

8. Access to theatres and surgical staff for fistula thrombectomy (09.00 to 17.00 seven days a week).

Appendix 5: Details of analysis for index procedures

We carried out analysis to support an assessment of whether we should recommend two or three arterial centres in Cheshire and Merseyside.

We assumed that the North Mersey vascular network would take on all the current activity of its constituent hospitals, and that the activity at Leighton Hospital Crewe would transfer to the North Staffordshire Hospital in Stoke-on-Trent. Therefore, the activity for the remaining Cheshire and Merseyside centre(s) is the activity now carried out at Arrowe Park, Countess of Chester and Warrington Hospitals. Data on this activity from the Trusts' application documentation is shown in Tables 1 and 2.

Table 1: Annual activity data for index arterial procedures, Aintree, Royal Liverpool and Southport Hospitals

Hospital	Elective open aortic aneurysm repairs	Elective endovascular aortic aneurysm repairs	Carotid endarterectomies	Time period
Aintree	17	0	108*	2009/10
Royal Liverpool	24	115		2009/10
Southport	13	0		2009/10
Total	*54*	*115*	*108*	

*All three hospitals

Source: Trusts' applications for network status, April 2011

Table 2: Annual activity data for index arterial procedures, Arrowe Park, Countess of Chester and Warrington Hospitals

Hospital	Elective open aortic aneurysm repairs	Elective endovascular aortic aneurysm repairs*	Carotid endarterectomies	Time period
Arrowe Park	22	0	62	2009/10
Countess of Chester	6	19	54	2009/10
Warrington	16	32	42	1 September 2010 to 31 August 2011
Total	*44*	*51*	*158*	

*Including, in the case of Warrington, procedures performed at the Royal Liverpool Hospital for training purposes.

Source: Trusts' applications for network status, April 2011, updated to August 2011 for Warrington.

The Clinical Advisory Group recommended that arterial centres should perform **at least** fifty elective open and endovascular aortic aneurysm repairs and one hundred carotid endarterectomies per year. These were minima; activity levels above this will ensure that the arterial centre is achieving the high through-put necessary to ensure that the clinical team gains and maintains the necessary skills and experience and that quality and safety are optimised within the vascular network.

Table 1 indicates that the annual number of elective aortic aneurysm repairs in the population served by the three hospitals in the North Mersey network is about 170 and exceeds the minimum. The number of carotid endarterectomies is about 108, also exceeding the minimum. There is enough activity here to support the proposed single arterial centre.

Table 2 indicates that the annual number of elective aortic aneurysm repairs in the population served by Arrowe Park, Countess of Chester and Warrington Hospitals is about 95, and the number of carotid endarterectomies is about 160. Neither the number of aortic aneurysm repairs nor the number of carotid endarterectomies is enough to support two arterial centres in the area served by these three Trusts.

However, there is substantial unmet need for carotid endarterectomy, and rates are rising as services for people with stroke or transient ischaemic attack improve. About 15 carotid endarterectomies are needed annually per 100,000 population.[2] This estimate is based on epidemiological research in Oxfordshire. Need might be higher in the North West because of deprivation; however, the prevalence of smoking, the prevalence of hypertension and mortality from stroke have all fallen since the 1990s, when the research was conducted [3]. This indicates that the incidence of cerebrovascular disease is likely to be lower now than it was then, counteracting the effect of deprivation. An arterial centre is likely therefore to need a catchment population of at least 700,000. [4]

The population of Cheshire West and Chester, Halton, St Helens, Warrington, Wirral and half of Knowsley (the other half being likely to use the arterial centre in Liverpool) is about 1.203 million[5]. Therefore we can be confident that there will be enough activity to support an arterial centre serving the combined catchments of these three hospitals, and that such a network would have the 800,000 population needed to form part of the national aortic aneurysm screening programme. However, the population falls short of the 1.4 million needed for two arterial centres to each achieve 100 carotid endarterectomies per year, and even further short of the 1.6 million needed for two aneurysm screening centres.

---

[2] Ferris G, Roderick P, Smithies A, el al. An epidemiological needs assessment of carotid endarterectomy in an English health region: is the need being met? *BMJ* 1998; 317: 447-51.

[3] Lakhani A, Olearnik H, Eayres D (eds). Compendium of Clinical and Health Indicators. London: The Information Centre for health and social care / National Centre for Health Outcomes Development, 2011.

[4] 15 procedures per 100,000 per year for 700,000 people = 105 procedures.

[5] Office for National Statistics population estimates 2009, released September 2010.

Conclusions and implication

1. The North Mersey network meets the minimum activity levels.

2. Assuming that the North Mersey vascular network and the network centred in Stoke-on-Trent are commissioned as planned, there would be enough activity at a single arterial centre serving the catchment populations of Arrowe Park, Countess of Chester and Warrington Hospitals to meet the minima for both index procedures.

3. There is not enough elective aortic aneurysm repair or carotid endarterectomy activity in this area to commission two arterial centres which could each achieve the minimum activity.

4. The level of carotid endarterectomy activity will rise as unmet need is satisfied. However, this rise is not likely to be large enough to support two centres both achieving the minimum.

5. Having one strong centre for this area is more likely to secure the improvements in clinical quality that we seek than having two subscale centres.

We therefore recommend that there should be two vascular networks in Cheshire and Merseyside, one centred at the Royal Liverpool University Hospital and the other serving the Cheshire, Warrington and Wirral cluster.