



THE SOCIETY FOR
VASCULAR TECHNOLOGY OF
GREAT BRITAIN AND IRELAND

VASCULAR ULTRASOUND SERVICE SPECIFICATIONS

1. EQUIPMENT

Specification

Duplex Doppler ultrasound machine with a wide range of imaging frequencies (approximately 3.0 to 17MHz), and Doppler frequencies of at least 3.0MHz to 5.0MHz, should be available depending on the examination, with colour and power Doppler capability.

Linear and curvilinear transducers should be available. Higher frequency transducers will be required for some examinations such as those involving assessment of the temporal artery, and where high resolution is required for B-mode measurements. There should be facilities to record images/measurements.¹ The Royal College of Radiologists (RCR) has more detailed technical standards for ultrasound equipment.²

The Joint Working Group gave recommendations for equipment specification, and in particular on the need for ultrasound scanners to be capable of making accurate velocity measurements³. It should be noted that a range of relatively low cost portable scanners are now available, not all of which will be suitable for vascular work. It is important that the duplex scanner is of ergonomic design to minimise the risk of operator work related musculoskeletal disorders,⁴ as explained in the health and safety section.

ABPI and Pre - Post Exercise ABPI (Exercise Test): Equipment

A hand held continuous wave (CW) Doppler unit is required, which has a pencil probe of nominal frequency 8MHz, although a lower frequency probe may be helpful for patients who have oedematous legs.^{5,6} Headphones may also be helpful.

For resting ABPI, use a sphygmomanometer with a dial gauge, and a blood pressure cuff that measures at least 20% wider than the diameter of the limb.⁷ For an exercise test, a treadmill can be used if available.

The examination couch should be height and tilt adjustable, ideally with electronic controls for both functions to minimise manual handling risks to staff.

Maintenance

Electrical safety testing is required annually, with regular maintenance and quality assurance tested to a specified level by qualified personnel in accordance with manufacturer's recommendations. Review of equipment should typically be undertaken four to six years after installation.⁸ Further information is available from the British Medical Ultrasound Society (BMUS): 'Extending the provision of ultrasound services in the UK.'⁹

Quality Assurance (QA) and Calibration

QA procedures should be in place to ensure a consistent and acceptable level of performance of all modes of the duplex scanner. Such procedures are likely to be set up with involvement from Medical Physics Departments or service engineers, as QA requires specialist skills and may utilise both imaging and phantoms.

Detailed guidance on QA of imaging modes of duplex scanners is contained in the Institute of Physics and Engineering in Medicine (IPEM) Quality Assurance of Ultrasound Imaging Systems report 102.¹⁰ The IPEM report 70 'Testing of Doppler Ultrasound Equipment' contains extensive information relating to performance testing of the pulsed and colour Doppler modes of duplex scanners.¹¹

Further general guidance is available in 'Guidelines for Professional working standards: Ultrasound practice.'¹²

Set up procedures for Ultrasound Diagnostic Vascular exams :

An appropriate probe should be selected. All duplex control settings should be set to defaults appropriate for the examination undertaken. Equipment manufacturers will usually provide appropriate default settings.

Set up procedures for Pre and Post Exercise ABPI (Exercise Test):

The manufacturer's application guidelines should be followed. However, there are very few controls on hand held CW Doppler units. The volume control needs to be adjusted to a level that enables the audible Doppler signal to be detected. Further guidance is given in the SVT vascular technology Professional Performance Guideline for Ankle Brachial Pressure Index Assessment (ABPI).¹³

Infection control

There are no nationally agreed standards for vascular ultrasound scanning but local infection control policies should be in place. BMUS⁹ advises users to refer to manufacturer's instructions for cleaning and disinfecting transducers, and general equipment care.

It should be noted ultrasound probes can be damaged by some cleaning agents, and so manufacturer's specifications should always be followed. Sterile ultrasound gel and sheaths should be available and used in appropriate cases. Where there are open ulcers the ulcerated area should be covered with cling film to prevent contamination of equipment.

Accessory equipment

Examination couches and scanning stools must be of an appropriate safety standard and ergonomic design to prevent injury. Particular consideration should be given to reducing the risk of operator work related musculoskeletal disorders.⁴

2. PATIENT

Information and consent

There is no legal requirement for written patient consent to be obtained prior to a vascular ultrasound scan. However, patients should be fully informed about the nature and conduct of the examination so they can provide verbal consent. It is desirable for this information to be provided in written format, prior to their attendance.¹⁴ This information should also be verbally explained to the patient when they attend for the investigation. Examples of additional patient information to include can be found at the RCR http://www.rcr.ac.uk/docs/patients/worddocs/CRPLG_US.doc

The Circulation Foundation produces leaflets that provide further information to patients: www.circulationfoundation.org.uk.

Explanation of Examination and Patient History

The CVS undertaking the examination should introduce themselves, confirm the patient's identity according to local policy (e.g. full name and date of birth), and explain the procedure, why it is being performed and its duration. Consideration should be made to the patient's age and mental status, and consent for the examination should be obtained.

Relevant medical history should be taken and suitability for the examination assessed. When appropriate, a limited physical exam relevant to the diagnostic scan may be undertaken. Consideration of risk factors, and results from other relevant diagnostic tests may also be helpful. Prior to starting the ultrasound scan, the CVS should verify the requested procedure correlates with the patient's clinical presentation. Depending on the examination been undertaken, it may be necessary to offer a chaperone.¹⁵ During the examination the CVS should monitor the patient's mental and physical status and modify the examination accordingly.

Clinical history

The referral for the investigation should contain relevant clinical history. This information should be verified and clarified for discrepancy. This should include any history of previous intervention. The nature and duration of symptoms should be established and relevant risk factors established.

Preparation

Please refer to Performance Guidelines for each diagnostic exam.

Reporting:

The report is a record of observations and interpretations made during the duplex ultrasound examination. It should be written, signed and dated by the CVS undertaking the examination and viewed as integral to the whole examination.¹⁶ Where a computer generated reporting system is used, the local verification and authorisation procedure should be followed. Ideally, the report should be made available to the referring clinician on the day of the test. Referral of critical results should be made to the referring consultant or appropriate medical / surgical team (as per local protocol), so treatment plans can be developed, enforced or expedited accordingly.

The report should include:

- correct patient details; examination type and date; name and status of CVS
- which vessels were examined
- presence, location and degree of any abnormality; flow characteristics;
- anything limiting the examination
- a note of any follow up or referral as a result of the scan.

An appropriate number of annotated images should be taken and stored, in accordance with local protocols representing the entire examination. Further explanation and guidance is given in section four of the UKAS Guideline¹² and SVT image storage guidelines.¹

There are no specific recommendations for the structure and content of reports for vascular ultrasound scans, but many referrers find a pictorial report with written conclusions helpful.

For more specific guidelines regarding examination technique and reporting, please see individual guidelines.

3. ENVIRONMENT

The environment in which ultrasound scanners are used can have a profound effect on the efficiency of a service. A private room is preferable to carry out the scan, although it may be possible to use a curtained area in a larger multi-scan bay unit, if provision is made to ensure privacy for each patient. On occasion, scans may need to be carried out in other localities e.g. in theatre, theatre recovery or at the patient's bedside. These scans may be limited due to poor environmental conditions, are time-inefficient, pose additional ergonomic risks for the operator and should be minimised where possible.

Room lighting should be dimmable to ensure reflections do not interfere with the operator's view of the screen, and air-conditioning is recommended to prevent excessive temperatures. Operators can seek advice from ultrasound manufacturer's regarding exact requirements. Sufficient electrical power sockets are needed to support the demands of the scanner, couch, IT equipment and any accessories. Socket positions should be carefully planned to prevent trailing leads. Image storage and reporting on PACS or a similar system is recommended, IT provision should be compatible with efficient use of such systems, for example, dual monitors on computer workstations.

ENVIRONMENT for Pre and Post Exercise ABPI (Exercise Test):

ABPIs may be carried out in primary care, including in a patient's own home. A quiet room/area is required to ensure the patient is as relaxed as possible, and there should be facility to ensure the patient can lie flat to minimize any measurement errors due to differences in height of the limbs. This will help reduce fluctuations in blood pressure. If the room is too cold, arteries may constrict and be difficult to locate.

If an exercise test is to be carried out, the environment should be suitable for this and risk factors should have been assessed. It is essential an emergency call system is in place and is easily accessible.

All equipment should be purchased with consideration for infection control requirements, and should easily be cleaned and disinfected. Facilities for timely replacement, regular servicing, maintenance and safety checking should be in place.

The ability to minimise ergonomic risks should also inform ultrasound scanner, couch and seat/stool purchasing decisions. The maximum weight of the couch should be clearly displayed and consideration should be given to the provision of tilting couches for some vascular scans.

Further general guidance on the environment is given in the BMUS document “Extending the provision of ultrasound services in the UK”⁹ and United Kingdom Association of Sonographers “Guidelines for Professional Working Standards”¹² and the Royal College of Radiologists document “Standards for the provision of an ultrasound service.”²

4. PROCEDURE, INTERPRETATION and REPORT

For detailed information on PROCEEDURE, INTERPRETATION and REPORT please refer to Professional Performance guidelines <https://www.svtgbi.org.uk/professional-issues/>

5. WORKFORCE

It is well recognised that ultrasound diagnosis is highly operator dependent. It is essential the workforce has the appropriate knowledge and competence. This is achieved by ensuring the workforce has followed recognised education and training routes. This applies to both medically and non-medically qualified individuals.

For education and training requirements for personnel carrying out Pre and Post Exercise ABPI measurements, please refer specific service specification guidelines.

Education and training requirements

All staff performing and reporting investigations should have successfully completed one of the following education and training routes:

1. Full SVT accreditation (Accredited Vascular Scientist)
<http://www.svtgbi.org.uk/education>
2. Post graduate qualification in ultrasound imaging from a Consortium for Accreditation of Sonographic Education (CASE) accredited course, with successful completion of a vascular module that included clinical competence in the relevant ultrasound modality. A list of CASE accredited courses can be found at <http://www.case-uk.org/>
3. Medical staff should have successfully followed the RCR recommendations for training in vascular scanning to level 2 competence in the relevant ultrasound modality BFCR(17)3 <https://www.rcr.ac.uk/publication/ultrasound-training-recommendations-medical-and-surgical-specialties-third-edition>

4. Completion of the NHS Scientist Training Programme specialising in Vascular Science and statutory registration as a Clinical Scientist with the Health and Care Professions Council (HCPC.) <http://www.nshcs.hee.nhs.uk/join-programme/nhs-scientist-training-programme>

It is recommended staff perform local competence reviews, and are involved in audit (both peer audit and results) to maintain high standards.

https://www.bmus.org/static/uploads/resources/Peer_Review_Audit_Tool_wFYQwtA.pdf

6. Regulation

It is important both staff and employers are aware that although ultrasonography is not currently a regulated profession, there is a move towards future statutory regulation of all healthcare science groups. Current statutory or voluntary registration includes:

- (i) Registered on the SVT Voluntary Register
- (ii) UK Registered Physicians on the General Medical Council (GMC) Specialist Register
<http://www.gmc-uk.org/doctors/register/LRMP.asp>
- (iii) Registered Clinical Scientist (**vascular**) with Health and Care Professions Council (HCPC) <http://www.hpc-uk.org/check/>
- (iv) Registered on the Public Voluntary Register of Sonographers held by the Society and College of Radiographers (SCoR.) <https://www.sor.org/practice/ultrasound/register-sonographers>
- (iv) Registered with the Academy of HealthCare Science. <https://www.ahcs.ac.uk/patients-public/the-register-and-regulation/search-the-register/>

Maintaining competence

It is important scanning competence is maintained by all personnel performing these investigations, either by performing a minimum number of scans per year, or through a CPD scheme. Criteria for ensuring continuing competence are set by professional bodies.

Continuing Professional Development (CPD)

Staff must undertake CPD to keep abreast of current techniques and developments, and to renew or extend their skills.

- I. SVT accredited sonographers must maintain their accreditation by meeting the CPD requirements of the SVT:
<https://www.svtgbi.org.uk/education/maintaining-avs-registration/>
- II. Staff with a post graduate qualification in ultrasound imaging should meet the CPD requirements for SCoR registration:
<http://www.sor.org/learning/document-library/continuing-professional-development-professional-and-regulatory-requirements>
- III. Medical staff should follow the requirements required for maintaining their skills, as well as the need to include ultrasound in their ongoing CME:
<https://www.rcr.ac.uk/clinical-radiology/cpd-scheme>
- IV. Clinical Scientists should meet the CPD requirements to maintain HCPC registration.
<http://www.hpc-uk.org/registrants/cpd/standards/>

7. AUDIT, SAFETY & QA

Safety

The provider should be aware of the guidelines for the safe use of ultrasound equipment produced by the Safety Group of BMUS. In particular, they should be aware of ultrasound safety precautions related to vascular scanning. All staff should be aware of local safety rules and resuscitation procedures.

Sonographers are at risk of work related musculoskeletal disorders. To minimise this risk the scanner and its control panel, the examination couch and scanning stool must be of appropriate safety standard and ergonomic design.

The published document by the Society of Radiographers (SCoR) 'Prevention of Work Related Musculoskeletal Disorders in Sonography'⁴ gives clear guidance on this issue as well as 'Guidelines for Professional Working Standards Ultrasound Practice.'¹²

QA and Audit

There are no specific requirements, but a mechanism of audit/quality control to ensure patients continue to receive high level of diagnostic accuracy should be in place. QA and audit programs should cover:

- Equipment performance
- Patient service
- Quality of investigation.

The BMUS document⁹ and UKAS Guidelines¹² also give guidance. Equipment QA is covered in section six of this document.

8. WEBSITES:

www.rcr.ac.uk

www.bmus.org

www.svtgbi.org.uk

www.svunet.org

www.case-uk.org

www.ipem.ac.uk

www.hpc-uk.org

www.rcplondon.ac.uk

www.vascularsociety.org.uk

www.circulationfoundation.org.uk

www.sor.org

www.nice.org.uk

9. References:

1. SVT Guidance on Image Storage and use, for the vascular ultrasound scans 2012. <https://www.svtgbi.org.uk/professional-issues/>
2. Standards for the Provision of an Ultrasound Service' Royal College of Radiologists 2014 <https://www.rcr.ac.uk/publication/standards-provision-ultrasound-service>

3. Joint recommendations for reporting carotid ultrasound investigations in the United Kingdom' Oates CP et al Eur J Vasc Endovasc Surg 2009 37: 251-261.
4. Prevention of Work Related Musculoskeletal Disorders in Sonography - Society of Radiographers 2014
https://www.sor.org/sites/default/files/documentversions/sor_industrystandards_prevention_musculoskeletal.pdf
5. NICE guideline Lower Limb Arterial Disease Diagnosis and Management:
<http://publications.nice.org.uk/lower-limb-peripheral-arterial-disease-diagnosis-and-management-cg147>
6. Introduction to Vascular Ultrasonography Zwiebel Pellerito Fifth Edition 2005
Chapter 5 Nonimaging Physiological Test for Assessment Lower Extremity Arterial Occlusive Disease
7. Ward et Al. Blood pressure measurement, Continuing Education in Anaesthesia Critical Care & Pain, Volume 7, Issue 4, 1 August 2007, Pages 122–126
8. 'Standards for Ultrasound Equipment' Royal College of Radiologists 2014
<https://www.rcr.ac.uk/publication/standards-provision-ultrasound-service>
9. Extending the provision of ultrasound services in the UK' BMUS 2003
https://www.bmus.org/static/uploads/resources/EXTENDING_THE_PROVISION_OF_ULTRASOUND_SERVICES_IN_THE_UK.pdf
10. Quality Assurance of Ultrasound Imaging Systems' IPEM report 102 2010
11. Testing of Doppler Ultrasound Equipment' IPEM report 70 1994
12. Guidelines for Professional Working Standards Ultrasound Practice. UKAS
http://www.sor.org/system/files/documentlibrary/members/sor_D41663_Prof_Guidelines_Booklet.pdf
13. https://www.svtgbi.org.uk/media/resources/ABPI_at_rest_and_post_exerciseSept2015edit.pdf
14. Improving Quality in Physiological Sciences (IQIPS) Standards and Criteria
<http://www.iqips.org.uk/documents/new/IQIPS%20Standards%20and%20Criteria.pdf>
15. Society for Vascular Technology Professional Standards Committee Chaperone Guidelines April 2012 www.svtgbi.org.uk
16. Society and College of Radiographers and British Medical Ultrasound Society: Guidelines for professional ultrasound practice 2016 <https://www.sor.org/learning/document-library>

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