EFSUMB
EUROPEAN FEDERATION OF SOCIETIES FOR ULTRASOUND IN MEDICINE AND BIOLOGY
'Building a European Ultrasound Community'

MINIMUM TRAINING REQUIREMENTS FOR THE PRACTICE OF MEDICAL ULTRASOUND IN EUROPE

Appendix 8: Vascular Ultrasound

Level 1 Training and Practice

- Practical training should involve at least two half day ultrasound clinics per week over a period of 6 months, with approximately four to six examinations performed daily by the trainee under supervision.
- A minimum of 250 imaging examinations of different types, equally distributed (eg carotid, lower limb venous, peripheral arteries etc) should be undertaken if this is the first practical training module undertaken.
- Examinations should encompass the full range of pathological conditions listed below.
- A log book listing the types of examinations undertaken should be kept.
- Training should usually be supervised by a Level 2 practitioner in vascular ultrasound. In certain circumstances it may be appropriate to delegate some of this supervision to an experienced level 1 practitioner with at least two years of regular practical experience. This will usually mean that training is carried out in dedicated vascular duplex sessions supervised by an accredited vascular physician/radiologist/technologist/scientist.
- Trainees should attend an appropriate theoretical course which fully covers all areas of the required knowledge base and should read appropriate textbooks and literature.
- During the course of training the competency assessment sheet should be completed as this will determine in which area or areas the trainee can practise independently.

Level 1 Knowledge Base

- Physics and technology, ultrasound techniques and administration (see Appendix 2).
- To have full working knowledge of the principles, techniques, instrumentation and practical working knowledge of real-time and Doppler ultrasound, and equipment controls. This includes colour flow and power Doppler, colour and pulsed wave, scale, gain, filter, priority,angle correction, electronic steering, invert, sample gating, power output, colour amplitude, velocity measurement, spectral changes and all other parameters required to perform a complete diagnostic vascular duplex study.
- Sectional and ultrasonic anatomy including common normal variants
  - peripheral extremity and pelvic arteries
  - peripheral extremity and pelvic veins
  - abdominal aorta visceral arteries
  - extracranial vessels
- Pathology and results of treatment in relation to ultrasound

- peripheral extremity arteries: patency, stenosis, occlusion, aneurismal dilatation
- peripheral extremity veins: patency, occlusion, deep venous thrombosis, reflux and incompetence
- abdominal vessels: patency, occlusion, aneurysmal dilatation of aorta
- extracranial vessels: patency, occlusion, stenosis
- appearances and sequelae of common surgical or endovascular intervene tions including
- angioplasty, stenting, grafts, Miller vein cuffs, dissections, and neointimal hyperplasia

Level 1 Competencies to be Acquired

To be able to:

- perform continuous wave hand-held Doppler and segmental pressures (ABPI)
- Lower extremity peripheral arteries and grafts

To be able to:

- perform a complete imaging ultrasound examination of the common iliac to popliteal and calf arteries
- recognise and assess patency, occlusion, stenosis and aneurysmal dilatation, and measure approximate extent of abnormality
- diagnose > 50% stenosis and assess the lenght of stenosis
- follow-up patients after surgical and endovascular procedures, recognise common complications like arterio-venous (AV) fistulas and pseudoaneurysm formation-

- Peripheral veins

  Lower extremity deep veins

To be able to:

- perform a complete imaging ultrasound examination of inferior vena cava, common illiac
- external iliac to popliteal and calf deep veins
- perform compression and augmentation
- recognise acute femoro-popliteal venous thrombosis
- recognise, diagnose and locate reflux

- Lower extremity superficial veins

  To be able to:

  - identify the saphenofemoral and saphenopopliteal junctions
  - recognise and locate clinically relevant venous reflux, incompetence and perforators
  - perform vein mapping and marking

- Abdominal vessels

  To be able to:

  - recognise and locate patency and occlusion of the abdominal aorta and large visceral
  - arteries, (including renal arteries, superior mesenteric artery and celiac trunk)

  - recognise and size aneurysmal dilatation of the abdominal aorta large visceral arteries
- Extracranial vessels

  To be able to:
  - recognise and locate patency, occlusion, plaque and stenoses in the carotid vessels and vertebral arteries

Level 2 Training and Practice

- Practical training should include at least one year of experience at Level 1 with continuous ongoing weekly ultrasound clinics.
- A log book of all examinations undertaken should be kept.
- Supervision of training should be undertaken by someone who has achieved at least Level 2 competence in vascular ultrasound and has had at least 2 years' experience at that level.

Level 2 Knowledge Base

- Peripheral arteries and grafts
- Peripheral deep and superficial veins
- Abdominal Aorta branches
- Transcranial Doppler ultrasound:
  - ultrasonic anatomy, common normal variants and principles and practice of the technique
  - clinical indications and ultrasonic findings in common clinically relevant Abnormalities

Level 2 Competencies to be acquired

- Competencies will have been gained during training for Level 1 practice and then refined during a period of practice

To be able to:

  - perform a complete imaging ultrasound scan and identify all abnormalities detailed in Level 1 in the upper and lower extremities, from common iliac to pedal vessels and subclavian to radial and ulnar arteries and veins and to identify all kinds of non-atherosclerotic diseases (vasculitides,
  - compression syndromes, etc), as well as all kinds of vascular malformation
- Extracranial vessels

To be able to:

  - recognise and diagnose patency, occlusion, stenosis, reverse flow and steal in the carotid and vertebral vessels
  - grade degrees of carotid stenosis and plaque type in accordance with local criteria and standards, and to follow-up patients after endarterectomy, carotid artery stenting, and angioplasty
- Abdominal vessels

To be able to:

- recognise common normal variants, aneurysmal dilatation, patency, stenosis and occlusion of the major abdominal and iliac vessels, including themesenteric and renal vessels

Level 3 Training and Practice

- A Level 3 practitioner is likely to spend the majority of their time undertaking vascular ultrasound.
- He/she will accept tertiary referrals from Level 1 and 2 practitioners.
- He/she should have the capability to utilise developing technologies and ultrasound techniques,
- develop research and teaching skills and the performance of specialised examinations including the use of non-invasive physiological studies, contrast agents, intravascular or intra-operative ultrasound and ultrasound guided interventional procedures (like US guide treatment of pseudonaeurysms, US guided RFA of varicose veins, etc).

Maintenance of skills: **All Levels**

- Having been assessed as competent to practise there will be a need for continued medical education and maintenance of practical skills.
- A trainee should continue to perform ultrasound scans during the remainder of his/her training programme, ideally one session weekly and at least 300 examinations per year.
- A similar minimum ongoing commitment should be required from a trained practitioner. It is recognised that due to training or clinical circumstances such further ultrasound practice may be intermittent. If a significant period has elapsed after the use of such skills, a period of re-training is required which should be agreed and documented with the practitioner, local trainers and assessors.
- Practitioners should:
  - include ultrasound in their ongoing continued medical education (CME) and continued professional development(CPD)
  - audit their practice
  - participate in multidisciplinary meetings
  - keep up to date with relevant literature

'EFSUMB is grateful to the Royal College of Radiologists, London, for their permission to adapt their 'Ultrasound Training Recommendations for Medical and Surgical Specialties' document published in 2005. Adaptations of these have been undertaken by members of the EFSUMB Education and Professional Standards committee for use elsewhere in Europe.

The Minimum Training Recommendations for the Practice of Medical Ultrasound were published under the EFSUMB Newsletter section in the Ultraschall in der Medizin/European Journal of Ultrasound, Volume 27, issue 1 February 2006 page 79-105.

This document has been revised in July 2008 and has been published on the EFSUMB website.

APPENDIX 8: VASCULAR ULTRASOUND TRAINING COMPETENCY ASSESSMENT SHEET

Trainee _____ Trainer _____

Core Knowledge Base Level 1

	Trainer Signature	Date
• Physics and technology		
• Practical instrumentation/use of ultrasound controls		
• Ultrasound techniques		
• Administration		
• Sectional and ultrasonic anatomy		
• Pathology in relation to ultrasound		

Competencies/skills to be acquired - Level 1

To be competent to perform/diagnose the following:

	Trainer Signature	Date
Essential Principles		
• CW hand-held Doppler and segmental pressures		
• caliper measurements of distance and size		
• colour flow and spectral analysis		
• velocity measurement and Doppler angle		
Peripheral arteries and grafts		
• recognise normal anatomy and common variants		
• scan common illiac to calf arteries		
• recognise patency, occlusion and aneurysm		
• recognise and differentiate 50% stenosis and measure the lenght of occlusion		
• follow-up patients after surgical/endovascular treatment and recognise common complications		
Peripheral deep veins		
• recognise normal anatomy and common variants		
• Scan external iliac to popliteal veins		
• perform compression and augmentation		
• recognise acute femoro-popliteal DVT, illiac, femoro-popliteal and LE DVT		
• diagnose and locate reflux		

To be competent to perform/diagnose the following:

	Trainer Signature	Date
Peripheral superficial veins		
• recognise normal anatomy and common variants		
• identify sapheno-femoral and sapheno-popliteal junctions		
• diagnose reflux, incompetence, perforators		
Abdominal ultrasound		
• recognise patency and occlusion of aorta		
• recognise and size aortic aneurysm		
Extracranial vessels		
• recognise normal anatomy and common variants		
• recognise patency, occlusion, plaque and stenosis		
• other competencies acquired		
General		
• know when to refer to a more expert ultrasonologist		

APPENDIX 8: VASCULAR ULTRASOUND TRAINING COMPETENCY ASSESSMENT SHEET

Trainee Trainer

Core Knowledge Base Level 2

	Trainer Signature	Date
• Peripheral arteries and grafts		
• Peripheral deep and superficial veins		
• Transcranial Doppler		
• Renal artery		
• Mesenteric artery		

Competencies/skills to be acquired - Level 2

	Trainer Signature	Date
To be competent to perform/diagnose the following:		
• assessment from iliac to pedal arteries and veins		
• assessment from subclavian to radial and ulnar arteries and veins		
• patency, occlusion, stenosis, reverse flow and steal in the carotid and vertebral vessels		
• grade degrees of carotid stenosis and plaque type		
• normal variants, aneurysmal dilatation, patency, stenosis and occlusion of major abdominal and iliac vessels		
• all kinds of non-atherosclerotic disease (vasculitis, compression syndromes		