

Emergency Medicine Ultrasound

Level 1 training

Level 1 training is the standard of knowledge and practice that EM doctors should have in the future. The College recommends that all emergency physicians be trained to use US for FAST (which includes Echo in Life Support), Abdominal Aortic Assessment and Vascular Access.

Practice at this level would usually require the following abilities:

- ◆ To perform common examinations safely and accurately
- ◆ To recognise and differentiate normal anatomy
- ◆ To diagnose common abnormalities
- ◆ To recognise when a referral for a further opinion is indicated
- ◆ To understand the relationship between ultrasound imaging and other diagnostic imaging techniques

Theoretical training

Preliminary theoretical training should cover relevant anatomy, the physics of ultrasound, levels and sophistication of equipment, image recording, reporting, artefacts and the relevance of other imaging modalities to ultrasound. This element of training may be best delivered by linking with some of the excellent courses run by University departments accredited by the Consortium for the Accreditation of Sonographic Education (CASE).

Anatomy

- ◆ Normal anatomy of the abdomen and pelvis
- ◆ Normal anatomy of the neck, femoral triangle and antecubital veins.

Physics and instrumentation

- ◆ The basic components of an ultrasound system
- ◆ Types of transducer and the production of ultrasound, with an emphasis on operator controlled variables
- ◆ Use of ultrasound controls
- ◆ An understanding of the frequencies used in medical ultrasound and the effect on image quality and penetration
- ◆ The interaction of ultrasound with tissue including biological effects
- ◆ The safety of ultrasound and of ultrasound contrast agents
- ◆ The basic principles of real time and Doppler ultrasound including colour flow and power Doppler
- ◆ The recognition and explanation of common artefacts
- ◆ Image recording systems

Ultrasound techniques

- ◆ Patient information and preparation
- ◆ Indications for examinations
- ◆ Relevance of ultrasound to other imaging modalities
- ◆ The influence of ultrasound results on the need for other imaging
- ◆ Scanning techniques including the use of spectral Doppler and colour Doppler

Administration

- ◆ Image recording, storing and filing
- ◆ Reporting
- ◆ Medico-legal aspects – outlining the responsibility to practise within specific levels of competence and the requirements for training
- ◆ Consent
- ◆ The value and role of departmental protocols

Practical training

Practical experience should be gained under the guidance of a named supervisor trained in ultrasound within a training department.

The syllabus set out includes a competency assessment. This should be completed during the course of training, as it will help to determine in which area(s) the trainee can practise independently.

- ◆ Practical training should involve regular emergency department or radiology department ultrasound, with approximately five examinations performed by the trainee (under supervision) per week.
- ◆ A trainer should supervise a trainee. A trainer is defined as a Level 2 practitioner or a Level 1 practitioner with at least 6 months experience of Level 1 practice.
- ◆ The goal of training is adequate competency, and this must be demonstrated rather than rigid adherence to a fixed number of training scans. A trainer will assess a trainee based on their competency.
- ◆ It is strongly recommended that trainees keep a personal log of their ultrasound examinations, and a portfolio of a minimum of 10 supervised cases should be included, with details of follow up.
- ◆ A clinician working in emergency medicine will need to devote sufficient time to gain Level 1 competence. This may be as much as one session per week but is unlikely to be in dedicated blocks of time. Sessional attachment to an Ultrasound Department or another Emergency Department may be necessary. However, different trainees will acquire the necessary skills at different rates, and the key end point of the training programme should be judged by an assessment of competencies.
- ◆ Examinations should concentrate on the core clinical indications of trauma, aortic aneurysm and vascular access where there are benefits of an early focused ultrasound scan in the Emergency Department (ED), Acute Medical Assessment Area (AMU) or Intensive Care Unit (ICU).
- ◆ Trainees should attend an appropriate theoretical course and should be familiar with the published literature on focused emergency ultrasound.
- ◆ During the course of training competency assessment sheets should be completed for each of the skills, as these will determine in which area or areas the trainee can practise independently.
- ◆ From 2006, 3 competency assessments, namely FAST, Assessment of the Abdominal Aorta and Vascular access, have been in use. Since then the skills of visualising the pericardium and cardiac wall motility are added (essentially an extension of the FAST teaching), which results in the skills required for Echocardiography in Life Support (ELS). These are all detailed in the eLfh sessions (www.e-lfh.org.uk). Echocardiography in Life Support (ELS) is a limited echocardiogram used in the setting of non-shockable cardiac arrest rhythms (PEA and asystole). The heart is interrogated during a rhythm check for wall motion and the treatable causes of PEA (cardiac tamponade, hypovolaemia, and pulmonary embolism). The subxiphoid or the parasternal long axis views are used. In addition, the longitudinal subxiphoid view allows visualisation of the inferior vena cava (IVC) for assessment of diameter and collapsibility.

Assessment

Assessment of training should cover the following areas;

Knowledge

- ◆ Physics and technology, ultrasound techniques and administration
- ◆ Sectional and ultrasonic anatomy
 - Kidneys
 - Liver
 - Spleen
 - Retro-peritoneal structures (aorta, IVC)
 - Vessels: internal jugular veins, carotid arteries, femoral veins and arteries
 - Pericardium
 - Pleural recesses
- ◆ Pathology in relation to ultrasound
 - Kidneys: trauma/free fluid
 - Liver and spleen: trauma/free fluid
 - Retroperitoneal: presence or absence of abdominal aortic aneurysm (AAA)
 - Vessels: vascular access
 - Cardiac scan: trauma/pericardial tamponade, asystole
 - Pericardial effusions

Competencies

- ◆ To be able to:
 - Recognise normal anatomy
 - Use focused ultrasound to assist in bedside emergency department decisions
 - Recognise the limitations of a scan and be able to explain these limitations to patients/carers
 - Recognise patients requiring formal specialist sonographic assessment
 - Incorporate ultrasound findings with the rest of the clinical assessment
- ◆ To be able to use ultrasound in:
 - Focused assessment by sonography for trauma (FAST). This includes detection of pleural and pericardial fluid
 - Abdominal aorta assessment/detection in symptomatic patients
 - Peri-arrest scenario for pulseless electrical activity (PEA)/tamponade/effusion ie Echo in Life Support (ELS)
 - Central and peripheral vascular access

Maintenance of Skills and Governance

- ◆ Having been assessed as competent to practise there will be a need for CPD and maintenance of practical skills
- ◆ An emergency trainee will need to continue to perform ultrasound scans throughout the remainder of the training programme and into his/her consultant appointment. Such further ultrasound practice may be intermittent, but no more than 3 months should elapse without using the acquired scanning skills. If more than 3 months elapses an Emergency Physician (trainee or otherwise) must be re-assessed with a DOPS by a trainer, and note added to their portfolio.
- ◆ Each department should have a nominated EM Ultrasound Lead who agrees local arrangements with the Trust's Governance Leads regarding competency and training issues. All practitioners should have regular audit meetings within the department to ensure appropriate focused emergency ultrasound use. The departmental EM Ultrasound Lead should have regular contact with radiological colleagues and should have a named radiologist as an 'ultrasound mentor'.
- ◆ Practitioners should:
 - Include ultrasound in their ongoing CME/CPD
 - Audit their practice
 - Participate in multidisciplinary meetings
 - Keep up to date with relevant literature

Grandfather clause

Emergency Medicine practitioners who have used Ultrasound in Level 1 practice for some time, but have never been through an assessment process may be deemed to be "Level 1 competent" for the purposes of appraisal if they have a letter from a Consultant Radiologist or a Consultant in EM with extensive ultrasound experience confirming their competence. This letter should be held within their appraisal folder, and the Regional Ultrasound Co-ordinator should be made aware. This "Grandfather clause" is likely to be withdrawn by 2012.

Continuing Medical Education and Professional Development

The minimum amount of on-going experience in ultrasound as outlined in each syllabus should be maintained. CME/CPD should be undertaken which incorporates elements of ultrasound practice.

Regular audit of the individual's ultrasound practice should be undertaken to demonstrate that the indications, performance and diagnostic quality of the service are all satisfactory.

Further notes

Emergency ultrasound practitioners should be accredited at Level 1 for each application before independent interpretation of results and clinical application of findings. It is however foreseeable that positive, clinically relevant findings may be identified prior to full accreditation has been achieved. Likewise, it is recognized that for accredited practitioners, other incidental findings will occur (eg, gallstones seen on a FAST examination). Such positive findings should be recorded in the patient's notes and the treating team informed. Emergency ultrasound practitioners should not record negative findings other than for the focused examinations for which they are accredited.

The learning and practice outlined in this document refers to adults and children.

References:

"Ultrasound Training Recommendations for Medical and Surgical Specialties", Royal College of Radiologists, January 2005

Authors: College of Emergency Medicine Ultrasound Sub-committee

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