Position of Faculty on Standards for Ultrasound

ULTRASOUND

Definitions:

Ultrasound for medical imaging purposes utilises high frequency sound waves too high for the human ear to detect. These waves are emitted by an ultrasound probe. The probe is held in contact with the surface of a patient. The sound waves enter the body and travel harmlessly through the various layers of tissue. The sound wave rebounds from the tissue back to the probe. The way in which these sound waves interact with different tissues in the body and the speed with which they rebound to the probe allow an image of the body part to be generated on a screen that is an integral part of the ultrasound machine. This image can be captured and photographed in hard-copy format or relayed to another screen as part of filmless systems such as picture archiving and communication systems (PACS).

Unlike x-rays, ultrasound does not employ ionising radiation and is therefore free of the risks associated with radiation. At present there have been no independently verified studies that have demonstrated any adverse biological effect of diagnostic ultrasound in vivo in humans.

Ultrasound imaging is routinely used for a wide range of medical applications to visualise many disease processes involving multiple body organs. It is also used to monitor the foetus and mother during pregnancy.

The use of ultrasound for medical imaging purposes requires a period of training.
Specialised **Ultrasound Radiographers**, or **Sonographers**, are paramedical personnel trained in the acquisition of images using ultrasound equipment. Radiographer training in Ireland is supervised by the relevant governing body for Radiographers, The Irish Institute of Radiographers and Radiation Therapy (IIRRT).
Radiologists are specialist doctors who have undergone advanced post-graduate training after qualifying with a basic degree in medicine. Radiology training in Ireland is controlled via the accredited training programme organised by the Faculty of Radiologists of the Royal College of Surgeons in Ireland.

Consultant Radiologists are specialist doctors who have successfully completed their training in Radiology and who have a minimum of 6 years practical experience in the field of Radiology. They are employed by hospitals to provide specialist services in medical imaging. Consultant Radiologists engage in Continued Medical Education programmes to facilitate skill maintenance in ultrasound and other imaging methods. Consultant Radiologists are legislatively mandated to comply with the Professional Competence Scheme for doctors to ensure that satisfactory professional standards in all areas of Radiological practise, including ultrasound, are met.

Ultrasound and sonography are synonymous terms for the same imaging modality.

Education & Training

Ultrasound training forms part of the Radiology Teaching Programme organised by the Faculty of Radiologists for qualified doctors. Entry to training is competitive. The teaching programme has a didactic centrally-delivered lecture-based component and a practical component delivered through affiliated teaching hospitals.

The training programme is of 5 years duration. During these 5 years, a minimum of 4 months is devoted to training in ultrasound. The lecture based component provides an extensive education in the theoretical background to ultrasound, including the physics of ultrasound, relevant anatomy, and the theory underlying practical techniques. The hospital based component covers focuses on the practical medical applications of ultrasound covering all body systems. Radiology trainees learn ultrasound under the supervision of a Consultant Radiologist. The curriculum, which is periodically updated to reflect the latest medical developments, covers the following areas:

(i) Cardiothoracic: Ultrasound imaging of the heart, pleura and thoracic fluid collections, including uses and applications of Doppler, colour Doppler and power Doppler imaging
(ii) Vascular: Ultrasound imaging of the arterial and venous systems, including uses and applications of Doppler, colour Doppler and power Doppler imaging.
(iii) Musculoskeletal: Ultrasound for the assessment of the skeletal system and soft tissues.
(iv) Gastrointestinal System: Transcutaneous imaging of the gastro-intestinal tract and upper abdominal organs; more advanced imaging techniques employing the use of endocavitary probes for transrectal imaging of the pelvis; optimisation of imaging in the abdomen with the use of Doppler techniques and contrast agents.
(v) Genito-urinary system: Ultrasound techniques for examining the renal tract and male and female genital tracts, including endocavity probes for transvaginal sonography of the female pelvis, and transrectal ultrasound of the prostate.
(vi) Obstetrics and Gynaecology: Monitoring pregnancy and possible complications such as ectopic pregnancy; more advanced imaging techniques such as sonohysterography.
(vii) Breast: to complement other imaging methods such as Mammography and MRI in the diagnosis of breast disease.
(viii) Paediatrics: Common paediatric ultrasound techniques, including cranial, musculoskeletal, abdominal and pelvic examinations, both in the newborn and in the older child.
(ix) Interventional Radiology: the use of ultrasound guidance for percutaneous procedures and invasive endocavitary techniques.
(x) The safe use and appropriate applications of ultrasound contrast agents for Contrast-enhanced ultrasound examinations (CEUS).

Training is facilitated by a Log-book in which the trainee records details of cases encountered during training.

Training is formally assessed via a 2-stage examination, taken at the end of year 1 and at the end of year 3. Satisfactory progress during practical attachments in hospitals also forms part of the assessment and is performed by supervising Consultant Radiologists. Log-book inspection is also evaluated. A trainee must demonstrate a

satisfactory level of theoretical and practical knowledge across all areas of Radiological practise, including ultrasound, before he can practise in an independent capacity, and before he/she is eligible to apply for a position as a Consultant Radiologist.

Radiologists performing US examinations in Ireland are trained to have a thorough understanding of the capabilities as well as the limitations of the technique and be familiar with relevant alternative and complementary imaging and diagnostic procedures, and be capable of correlating the results of these other procedures with the ultrasound examination findings.

Manpower

Ultrasound is a core radiological skill. All General Radiologists are trained for expert interpretation and reporting of ultrasound examinations. The Faculty also recognises a category of Consultants with a Special Interest in Ultrasound who have undergone longer and more extensive training in the modality and who are regarded are leaders in this field of Radiology.

Equipment maintenance

A QA programme for measuring and monitoring ultrasound equipment should be undertaken by all providers of medical ultrasound services in collaboration with personnel from Medical Physics & Clinical Engineering depts. Most larger hospitals will have appropriately trained personnel in these areas. Smaller hospitals and Imaging Clinics may have to obtain such expertise from outside sources, such as other larger hospitals or specialised departments in technologic institutes (e.g. Higher Institutes of Technology).

An important principle is to establish baseline system performance at the time of initial installation and monitor performance over time through regular QA to ensure that degradation does not take place.

Even with satisfactory readings obtained via a regularly performed QA programme the Faculty recommends that any equipment in use beyond 5 years should be considered obsolete and should be replaced.

Parameters that will be routinely assessed as part of Ultrasound QA include maximum beam penetration, grey scale detection, image resolution (both axial and in-plane). The use of test phantoms will form the basis for making objective measurements.

Practical Aspects regarding the performance of Ultrasound Examinations in Radiology Dept, Imaging Clinics and other Patient care facilities.

1. All diagnostic ultrasound examinations should be conducted at the request of, and by or on behalf of, a registered Medical Practitioner. The examination is typically initiated on receipt of a written request, or, where Information Technology systems are more advanced, by electronic ordering methods.

2. Ultrasound examinations on patients should only be conducted by competent personnel who are familiar with the use of the ultrasound equipment at their disposal. Scanning should be limited to provide the required diagnostic information.

3. Ultrasound examinations should be undertaken by those Medical Practitioners who have competence in the specific examinations they either perform personally, or for which they are independently responsible.

4. Some of the ultrasound examinations will be performed by the Radiologist or other appropriately trained Medical Practitioner to whom the patient is referred.

5. At many institutions and Imaging Clinics Sonographers are employed to conduct the image acquisition component of ultrasound examinations. In such circumstances It is essential for the supervising Medical Practitioner to ensure that the Sonographer is competent and involved in on-going education. The Medical Practitioner should be available for advice and in a position to extend the examination by acquiring additional images, where appropriate. The level of direct supervision of the Sonographer by the Medical Practitioner should be commensurate with the training and experience of the Sonographer.

6. Patient identification, date of service, name of the Medical Practitioner responsible for the conduct of the ultrasound examination and the name of the referring Medical Practitioner, are all imprinted in, or otherwise recorded with each film or other record as a matter of routine in Radiologist performed US examinations.

7. The Medical Practitioner should be present at the practice location and available for consultation where ultrasound examinations for which he/she is responsible are performed. He/She carries the responsibility to ensure that any ultrasound examination performed is in the best interests of the patient and is conducted using appropriate and properly maintained equipment. The Medical Practitioner should ensure that adequate facilities for patients are available, allowing due privacy while examinations are underway, and ensuring that waiting areas and changing rooms are of an acceptable standard. Working to achieve these requirements may involve collaboration with Hospital Management and Administrative sections of the Institution.

8. The Medical Practitioner is responsible for establishing local department practice guidelines covering such areas as: (i) Standardisation of imaging protocols for commonly performed ultrasound examinations, (ii) how much of the examination should be shown and demonstrated to the patient, (iii) how much information the Sonographer might independently pass on to the patient, (iv) how the examination

should be recorded, what record should be provided for the referring Medical Practitioner and what, if any, should be made available directly to the patient.

9. A written report should be issued on all ultrasound examinations by the responsible Medical Practitioner and should be provided as soon as practicable after the examination is completed. Hard copy film or other records should be made at the time of any referred diagnostic ultrasound examination. Communication of critical, urgent, and clinically unexpected findings on ultrasound examinations should take place in a timely manner to the referring Medical Practitioner, and in a mechanism that reflects local policy and national guidelines governing such matters. The Radiologist is expected to take a lead role in formulating such policy at local level. In a teaching institution a pre-fellowship trainee Radiologist may issue a provisional report but it is not considered a finalised approved report until countersigned by the relevant supervising Consultant.

The finalised radiologist's report should draw upon all available information, which may include communication with the sonographer, reviewing the sonographer's images, seeking further information on the clinical history by talking to the patient, clinically examining the patient, re-scanning the patient, or observing the sonographer scan in real time. The report should reflect the radiologist's expertise as a medical practitioner and medical imaging specialist.

10. A register of ultrasound examinations performed should be kept by each Medical Practice.

11. While all Medical Practitioners should be free to request ultrasound examinations dependent on their clinical experience and judgment, a specialist in diagnostic ultrasound has a duty to decide whether a requested investigation is appropriate, having regard to the level of diagnosis required and cost effectiveness of the examination.

12. Sonographers should not practice independently of Medical Practitioners.

13. While specialists in medical diagnostic ultrasound should participate in undergraduate and postgraduate education for non-radiologists and in the continuing education of other (non-Radiologist) Medical Practitioners and Sonographers, their primary educational responsibility lies in the training of Radiologist trainees. Expansion of the educational role to other areas, while desirable, is dependent on the availability of adequate resources, both in terms of available personnel and equipment.

Ultrasound by non-Radiologists

The Faculty accepts that it is sometimes reasonable for non-radiologists to perform diagnostic medical ultrasound examinations. Such practices should be subject to the same high standards that apply to Radiologist performed US. In particular an adequate level of supervised training should be ensured. Such training should be transparent and open to objective evaluation. Medical Practitioners emerging from such training programmes should be subject to ongoing audit to ensure that their diagnostic

competence is equivalent to that of Radiologists. Adequate methodology for the appropriate conduct of ultrasound examinations by non-radiologist medical practitioners, including image acquisition, interpretation and report generation, should be ensured by independent assessment made by external experts in the field of medical imaging. Ultrasound equipment used by non-Radiologists should be maintained in the same high standard as that in Radiology departments in accordance with documented quality assurance programmes. The Faculty endorses the training criteria and recommendations of major International professional bodies, the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB), and Royal College of Radiologists, London, UK (refs 4, 5).

The Faculty strongly opposes the use of ultrasound for medical diagnostic purposes when conducted by personnel who have not undergone appropriate training on the grounds that patient care could be significantly compromised.

References:

1. Guidelines for the safe use of diagnostic ultrasound equipment. BMUS Bulletin (Aug 2000, BIR/BMUS).
2. Guidelines for Ultrasound policy documentation, Royal Australian and New Zealand Royal College of Radiologists (www.RANZCR.com).
3. Guidelines for the Implementation of a National Quality Assurance Programme in Radiology – Version 2.2, Faculty of Radiologists, RCSI (February 2012).
4. European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB): Minimum Training Requirements for the Practice of Medical Ultrasound in Europe. European Journal of Ultrasound, volume 27, issue 1, February 2006: 79-105.
5. Royal College of Radiologists, London, UK: Ultrasound Training Recommendations for Medical and Surgical Specialties (January 2005).

Faculty of Radiologists, Royal College of Surgeons in Ireland (February 2012)