

# Everyone's a radiologist now

Are ultrasound machines truly the stethoscope of the 21st century? Should all doctors keep one in their back pocket? **Jacqui Wise** reports on the battle over ultrasound imaging



**U**ltrasound machines were once the size of washing machines and used solely by radiologists and sonographers working in radiology departments. But in the past 10 years they have become cheaper, smaller, and more portable—the latest models are even pocket sized.

As a result ultrasound machines are increasingly used by non-radiologists as part of the clinical examination or to assist in practical procedures such as insertion of a central line. The number of general practitioners buying their own ultrasound machines has also gradually increased. So is this good or bad news for patients?

Gill Markham, vice president of the Royal College of Radiologists, says: “The price of an ultrasound machine has come down enormously to £5000-£10000 [€6000-€12000; \$10000-\$20000] and as a result they are used much more widely. Ultrasound has a reputation as a simple, easy test. It is easy to do but interpreting the results is not so easy and there are things that could be missed.”

Paul Allan, clinical director of radiology for Edinburgh, agrees: “There are people with very little training using ultrasound badly.” He says he is aware of surgeons doing ultrasound investigations for acute abdominal pain and mistaking invasive cancers for ruptured spleen.

The key issue is adequate training. As Dr Allan says, “I have no problem with who does ultrasound investigations, but they must be trained. Ultrasound looks very straightforward to use but it does require experience and expertise. There is no physical risk to the patient but there is a risk of false negatives or false positives.”

## Training needs

In some specialties, such as obstetrics and gynaecology, training and accreditation in ultrasonography is well established. Basic competencies are embedded in the core curriculum, and there are additional modules, such as fetal biometry, which can be taken at various stages of training. Echocardiography is another area that has its own published syllabus, stated competencies, and exam.

In other specialties, however, training tends to be more informal. For example, the use of ultrasound imaging is increasing in anaesthesia, critical care, and pain management, particularly since the UK National Institute for Health and Clinical Excellence recommended its use for the placement of

central venous catheters.<sup>1</sup> But as Andy Bodenham, a consultant in anaesthesia and intensive care at Leeds General Infirmary, wrote in the *British Journal of Anaesthesia* two years ago: “I suspect that most departments will not have any formalised training programmes or systems of accreditation. There is little specific guidance from the Royal College of Anaesthetists, or other relevant organisations, regarding the necessary equipment, knowledge base, skills or practical experience that are required before using such technology independently.”<sup>2</sup>

Dr Bodenham says he wrote the article to stimulate debate but feels nothing much has changed. He says he has found ultrasonography very useful but admits: “My training has been fairly informal; I partly trained myself.”

Different bodies have different interpretations of what experienced means in practice. One study found that doctors need to be involved in more than 200 cases during training to develop an acceptable level of competence.<sup>3</sup> The Royal College of Radiologists’ guidelines on ultrasound training for non-radiologists give varying minimum number of examinations depending on the specialty—for example, 250 for urological ultrasonography and 100 for vascular ultrasonography.<sup>4</sup> And the American Institute of Ultrasound in Medicine states that at least three months of diagnostic ultrasound training under the supervision of a qualified physician is needed, during which the trainee should have taken and interpreted at least

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300 sonograms or at least 500 if the doctor uses ultrasonography in multiple subspecialties or anatomic areas.<sup>5</sup>

However, Dr Bodenham worries that many of the courses available are modelled on training for radiographers and the time commitment is impractical for many full time clinicians. For example, many are block release courses of up to six months. “It is difficult to be too didactic about it as it depends on the background of the doctor; some will have a quicker learning curve than others,” he says.

## Lack of resources

The Royal College of Radiologists is concerned that there is a national shortage of trained sonographers to deliver training.<sup>3</sup> To train others, radiology departments will need additional staff, space, and equipment.

James Pilcher, consultant radiologist at St George's Hospital in London is pessimistic about the formal training of non-radiologists: "I just wonder if it is ever going to happen. I don't know where the money is going to come from. My impression is that where training is happening it is just if the radiologist is nice and helpful."

The British Medical Ultrasound Society has published a template business plan for clinical specialties intending to train specialist registrars in medical ultrasonography.<sup>6</sup> Dr Pilcher helped draw up the plan but knows of no cases where it has been taken up.

If doctors are not adequately trained they could leave themselves open to litigation. "A trust wouldn't be able to defend you if you couldn't demonstrate you had received a certain level of training and had failed to pick something up on ultrasound," Dr Pilcher says.

Alexander Woywodt, a consultant renal physician and nephrologist at Lancashire Teaching Hospitals NHS Trust, trained in Germany: "The majority of ultrasound in Germany is carried out by physicians rather than by radiologists or sonographers. I had six months of full time training in ultrasound and needed a certificate before I could use it unsupervised."

Dr Woywodt can see clear advantages in doing ultrasonography himself. "If I see a kidney transplant patient I can do ultrasonography at the same visit rather than the patient having to come back for another appointment, sometimes two weeks later. It also saves on paperwork. I also know the patient very well, have taken their history,



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**Abdominal ultrasound examination for cancer (right); with the arrival of handheld devices, will ultrasound examinations move from a dedicated department to the wards?**

and know precisely what I am looking for, and can quickly make a decision."

But as Dr Pilcher argues, this may lead to bias. "The flipside is that a radiologist can give an unbiased opinion. It may be that the physician misinterprets the scan as they have already decided what they want to see."

At the Churchill Hospital in Oxford chest physicians now do all of the thoracic ultrasound examinations, having been trained by the radiology department according to the royal college guidelines. Naj Rahman, a chest registrar at the hospital says: "It provides a much better unified service for the patients. We have the expertise in pleural disease and we can scan them there and then."

But there is a downside according to Ferguson Gleeson, consultant radiologist in Oxford who trained Dr Rahman: "It is deskilling radiologists—we used to insert more than 100 chest drains a year under ultrasound guidance and now we do none."

Dr Gleeson says: "The problem is that skill



mix has grown organically and the boundaries have not been properly defined. When do you need to be seen by a radiologist? Is a non-radiologist making as good a scanning decision? Should the patient know who is performing the ultrasound and how much training they have had? There are no good data on all of this, which is what we now need."

But is this anything more than a turf war? "There is an element of that," admits Dr Markham. "But we cannot cope with the amount of work we do have."

Dr Markham also puts forward the resource argument: "Many machines have been bought by various departments and then sit idle for much of the week, which is not a good use of resources. If they were in the radiology department they would be used continuously."

Another problem is with the recording of data. The Royal College of Radiologists says that there must be a mandatory system for recording the results of any ultrasound examination so that they can be reviewed later. This is a problem with some of the cheaper, portable machines, as the images tend not to be stored. Even though it is usually possible to buy the appropriate equipment to download the images on to a computer, in practice this is often not done.

**Royal College of Radiologists competencies for ultrasonography<sup>9</sup>**

**Level 1**

- Perform common examinations safely and accurately
- Recognise and differentiate normal anatomy from abnormal
- Diagnose common abnormalities within certain organ systems
- Recognise when a referral for a second opinion is indicated
- Understand the relation between ultrasound imaging and other diagnostic imaging techniques

**Level 2**

Practice at this level requires the ability to do most or all of the following:

- Manage referrals from level 1 practitioners
- Recognise and diagnose almost all abnormalities in the relevant organ system
- Perform common non-complex ultrasound guided invasive procedures
- Teach ultrasonography to trainees and level 1 practitioners
- Conduct some research in ultrasonography

**Level 3**

Advanced practice including some or all of the following:

- Accept tertiary referrals from level 1 and level 2 practitioners
- Perform specialised examination and guided invasive procedures
- Conduct substantial research and development in ultrasonography
- Teach ultrasonography at all levels



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Paul Dubbins, consultant radiologist at Plymouth Hospitals NHS Trust, says there is often duplication of effort: “A patient may turn up in the radiology department and we have no records of any previous scan so we have to repeat it anyway.”

The Royal College of Radiology guidelines state: “It must be recognised that not all trainees have the aptitude to undertake ultrasound scanning and that some, despite undergoing training, may not acquire the appropriate skills ever to practise independently.”

Dr Gleeson agrees: “Maybe radiologists went into that branch of medicine because they like looking at pictures and are good at interpreting them. Maybe not all doctors can be trained in that way.”

Whatever the arguments, ultrasound is undoubtedly going to play a much bigger role in medicine in the years to come. One of the likely areas of expansion is in general practice. Stephen Field, chairman of the Royal College of General Practitioners, says: “Some general practitioners are using ultrasound machines now, but there is a slow uptake. But my hunch is that in 5-10 years they will be using instruments like ultrasound machines much more commonly in their day to day work.” Professor Field says this would improve quality of

care by reducing waiting times for appointments and anxiety for patients.

The college has worked with the Royal College of Radiologists to look at ways of improving general practitioners’ access to diagnostic procedures including ultrasonography.<sup>7</sup> One option is for radiologists or sonographers to come into surgeries. The alternative is for general practitioners to do the ultrasound examination themselves—those who are a long distance from diagnostic facilities may be particularly interested in doing this. Professor Field says the college is looking at providing training courses for general practitioners and at developing guidelines together with radiologists.

Dr Giles Maskell, consultant radiologist at the Royal Cornwall Hospital in Truro, believes ultrasonography should be taught to everyone in medical school: “It is a fantastic tool and every medical student should be taught to use ultrasound like they are taught to use a stethoscope. A lot of clinical examinations could be done much more accurately and quickly using ultrasound—for example, to see if the spleen is enlarged.”

This is already happening at one medical school in the United States. The University of South Carolina is pioneering

a project to train all medical students in ultrasonography.<sup>8</sup> The project, a partnership between the School of Medicine and GE Healthcare started in 2006. First and second year students get hands on training in laboratory sessions and use web based learning modules to understand the basics of the technology. Ultrasonography is also included in the clinical exams in the third year. For example, on the internal medicine rotation, students must take a history of a patient with symptoms of a thyroid problem, perform the appropriate physical examination followed by an ultrasound examination of the thyroid gland, and note any disease. This is not yet happening anywhere in the UK, although the Peninsula Medical School now uses ultrasonography to teach anatomy to students.

Dr Maskell says: “My personal view is that ultrasound is so vastly superior to clinical examination in so many areas that it should be used much more than it is at present by all doctors. In fact, if a doctor sticks a needle in to aspirate fluid without using ultrasound, I would say that was almost criminal.”

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