

## FOR DEBATE

## Should UK emergency physicians undertake diagnostic ultrasound examinations?

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Ultrasound has always been an attractive imaging modality for emergency physicians because of its availability, portability, ability to examine more than one system, non-invasive nature, and its facility to continuously image structures. American emergency physicians have enthusiastically developed a training programme over the past decade<sup>1</sup> and currently more than 100 emergency departments provide an ultrasound service that is performed by emergency physicians.<sup>2</sup> That emergency physicians can perform ultrasound examinations with a limited number of very specific questions to be answered is not in doubt and there are many studies demonstrating sensitivities and specificities comparable with those of radiologists. Examples of such "focused" examinations include the detection of an intrauterine fetus in those with suspected ectopic pregnancy,<sup>3-6</sup> the presence of intra-abdominal fluid in blunt trauma,<sup>7-9</sup> and the detection of pericardial tamponade<sup>10 11</sup> and haemothorax.<sup>12</sup> It has also been demonstrated that these emergency physician examinations reduce the time taken to diagnose potentially life threatening conditions<sup>13-16</sup> and the length of stay of patients when compared with those departments that don't have a 24 hour, radiology provided, ultrasound service.<sup>4 6</sup> The question facing the specialty in the UK is: should we copy the American model when the epidemiology of conditions that would benefit from ultrasound imaging, funding of emergency services, and existing hospital ultrasound services are likely to be different from those in America? In order to start addressing this issue it is important to establish the perspective from which the problem is viewed. One may take a "specialty" viewpoint looking solely at how such an activity impacts on the accident and emergency (A&E) service. If however, from a broader "hospital" perspective, diagnostic ultrasound by emergency physicians is not cost effective then it is unlikely that such an ultrasound service will be adopted or sustained except in one or two centres with strongly committed enthusiasts.

Taking a "hospital" perspective the following points need to be considered.

### (1) Existing ultrasound service

It is likely, in the absence of any evidence found to the contrary, that there is a wide variation in the provision of emergency ultrasound both in

terms of its availability, the seniority of the operator involved, and response times. For those hospitals with an excellent service already in place delivered by radiologists and ultrasonographers there is no need to change it. But for those hospitals not so served the question then becomes should the existing ultrasound service be augmented or should a completely new service delivered by emergency physicians be initiated? The issue is the difference in terms of the cost effectiveness of the two services which is likely to vary between hospitals.

### (2) Costs

It is helpful when thinking of the costs (in both time and equipment) to think also in terms of the opportunity costs—that is, what else could be done with the resources used to provide this service? For example when a consultant radiologist is training an emergency physician or reviewing his work he is not imaging as many patients and they will have to wait longer. Similarly the money spent on ultrasound equipment for the emergency department cannot be spent on something else or may have been taken away from an existing budget.

### (3) Training, quality assurance, and maintenance of skills

#### TRAINING

Currently the Society for Academic Emergency Medicine task force recommends 40 hours of instruction for training in ultrasound, a total of 150 examinations, and that more than 50% of these examinations should be in those patients for whom it is clinically indicated.<sup>1 17</sup> This short training programme contrasts with those of other specialty groups where up to 100 hours of continuing professional development and 500 examinations are needed.<sup>17 18</sup> Yet these requirements do not reflect the very specific and limited nature of the ultrasound studies undertaken by emergency physicians.

#### QUALITY ASSURANCE

The very nature of the skills required to undertake ultrasound—that is, a combination of psychomotor and cognitive skills, explains why ultrasound examinations are so operator dependent and why quality assurance programmes are so important. One such programme in America includes the review of

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Accepted 11 February 1999

30% of a credentialed emergency physician's studies by other emergency physicians and colleagues from the department of radiology.<sup>19</sup> However there is no agreed policy and programmes vary considerably (D Jehle, October 1998 and CHY Shih, August 1998, personal communication). Not only must the studies be reviewed but a minimum number must be undertaken. All this activity is costly in terms of time both for the emergency department and radiology.

#### MAINTENANCE OF SKILLS

Clearly this is related to the frequency of patients attending with conditions that would benefit from ultrasound. If we take trauma as an example, using data from the Trauma Network (UK), it is possible to estimate how many trauma patients/1000 new patients attending UK A&E departments might have undergone an ultrasound examination for the exclusion of free intra-abdominal fluid and pericardial tamponade. This works out at one case/1000 new patients, which for an average sized UK department is roughly one case per week.<sup>20</sup> American studies from level 1 and level 2 trauma centres give estimates of <1–13 cases/week.<sup>9 16 21</sup> An American study in a busy urban emergency department looking at the detection of ectopic pregnancy in complicated first trimester pregnancies recruited 136 patients in six months.<sup>3</sup> Similar exercises need to be carried out for the other conditions that would benefit from a focused ultrasound examination. It is likely that these conditions will present to UK A&E departments with a relatively low frequency and when the number of people needed to provide a 24 hour service is considered the number of cases per emergency physician that might benefit from a focused ultrasound examination is still likely to be small.

#### (4) Alternatives to ultrasound

If other diagnostic modalities exist for those conditions that are the subject of focused ultrasound examinations then they may have an important impact on whether or not the provision of emergency ultrasound is worthwhile. For example diagnostic peritoneal lavage (DPL) is as sensitive in detecting haemoperitoneum as ultrasound,<sup>7 21</sup> and requires little equipment, minimum training, and can always be done immediately. However it is well recognised that DPL leads to an increase in the number of non-therapeutic laparotomies performed.<sup>7 21</sup> Similar arguments can be made for pericardiocentesis, which is also therapeutic as well as diagnostic. For those conditions where immediate recognition is not essential, for example cholecystitis and renal colic, then there are arguments for these patients waiting for the usual hospital service.

#### Summary

From the published evidence there is no doubt that emergency physicians in America can undertake focused ultrasound examinations and that, by extrapolation, this would also be the case for UK emergency physicians. If this skill is to become part of the diagnostic armamentarium of the emergency physician, however, it needs to be demonstrated to be cost effective compared with the alternatives already available to the hospital. Trials to test for this benefit should adopt a hospital and not an emergency department perspective if the results are to influence health policy and specialty training.

The authors would like to thank Marilyn Woodford for her help with the retrieval of data from the UK Trauma Network Database.

Conflict of interest: none.

Funding: none.

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