Echocardiography for the anaesthetist

Echocardiography is a technology that will become all-pervasive and influence every aspect of clinical practice. In the clinical practices of those who are skilled in its use, greater accuracy and clarity results.

But for those who are contemplating its use, and worse, for those who cannot see how it would be useful, or who have always been “perfectly competent” without it, there may be some trepidation commencing practice with it. This lecture will be directed towards those who are not already intimately familiar with ultrasound technologies. Consequently, the first hurdle that is encountered is a mental one.

It is a myth that the only people who can drive on a public road are highly experienced racing drivers using a Formula 1 racing car. In other words, it is not necessary to complete protracted and highly complex courses, or to use the most advanced echocardiography equipment available in order to get some value from this technology. This is referred to as “point of care” ultrasound “for the masses”. What is meant by this is that one can gain enough basic experience to learn the principles of limited ultrasound use by intensive pre-course reading material, and then combine this with a short practical course. It is estimated that, subsequent to this course, 25-40 cases need to be completed in order to make that person sufficiently “proficient” for acceptable professional clinical use in a limited and defined capacity. The precedent for this existed before our training courses were initiated (such as the FAST examination), and is not entirely new. However, such skills as ultrasound-guided vascular access, ultrasound-guided nerve blocks, basic general vascular or venous ultrasound, or limited transthoracic echocardiography (HARTscan), can be learned in this manner.

In particular, there is mention of transthoracic echocardiography, rather than transoesophageal echocardiography. The reason for this is that it is entirely non-invasive, quite simple to learn and has tremendous benefit, even when used in a limited (non-diagnostic) capacity. For example, simply being able to accurately determine the basic haemodynamic state that exists in the patient at that time is a major advance over sophisticated clinical examination, and even an improvement over sophisticated invasive pressure monitoring such as Swan-Ganz catheter assessment. Consequently, the treatments that follow are likely to be better or more appropriate. Another example would be to determine whether a valve “flow murmur” was “significantly” abnormal, sufficient to interfere with haemodynamic management, such as undergoing anaesthesia and surgery. It is not necessary to be able to quantify the degree of abnormality to influence clinical management. Rather, the understanding that something is mild and therefore “nothing to worry about”, or reasonably abnormal and therefore “significant”, is key in changing clinical approaches or management. Limited transthoracic echocardiography is likely to provide 90% of the clinically useful information in about 90% of cases, and within about 10 minutes.

The approach to workshops is to provide intensive pre-course reading materials which generally require 30-40 hours to complete. None of this is revised at the workshop, and all of the time is spent on practical experience with instructors. In the case
of the transthoracic echocardiography (HARTscan) course, the time that is not spent directly scanning is spent in a mentored group environment, reviewing pathological studies.

Key initial barriers to adopting this approach include personal anxiety, fear of criticism by colleagues, personal expectations of professional perfection from the outset, administrators who have excessive zeal in their considerations for conferring credentials, and competing clinical groups such as cardiologists or radiologists fighting a “patch war”. Generally, less common barriers include the absence of appropriate ultrasound machines and appropriate training packages to provide limited, but practical, experience. A barrier could be that some find that they are “too busy” to use the technology, or to learn it; yet those who are skilled in its usage find that it saves time, and improves accuracy and quality consistently. Others resist progress and prefer to criticise. Despite these hurdles, the rapidly diminishing cost of the technology is leading to a profound revolution in clinical practice. There are approximately 40 tutorials for the certificate. Additionally, DICOM case studies are provided, in addition to the Fuji film ProSolv echocardiography viewing software, and students are expected to review these studies, perform the appropriate measurements using the software, and complete reports which are then compared to the faculty answer. In this way, experience in using the software and experience in reviewing pathological cases can be gained. The University of Melbourne course may be completed full-time (one semester), or part-time (two semesters).

For the minority, a more advanced degree of knowledge, skill, and range of ultrasound technologies allows a considerably more advanced application. It was our impression that, beyond cardiac anaesthetists and cardiologists, few people would be interested in full diagnostic echocardiography, including transoesophageal echocardiography. Perhaps this underestimates the proportion of people who will progress in their learning and gain advanced knowledge in ultrasound technologies. Already, we have observed frequent enrolments to our advanced courses from general (non-cardiac) anaesthetists, intensive care specialists, and accident and emergency specialists. Beyond a brief exploration of ultrasound-guided procedural work, the applicability for advanced echocardiography (or other ultrasound) diagnostic level of capability exists and can be performed by appropriately-trained specialists from any specialty, not just from cardiology or radiology.

The diploma can commence upon completion of the certificate, and includes an additional four subjects of a similar nature.

In summary, we teach transoesophageal echocardiography as part of our postgraduate diploma level course, as transoesophageal echocardiography is almost always associated with a full diagnostic study. Also, because of its invasive nature, it is unlikely to be used outside the fields of cardiac surgery as a matter of routine, unless for the purposes of a full diagnostic study. This course provides a knowledge base of an equivalent standard to a cardiologist wishing to pursue a career reporting echocardiography, and is therefore applicable for advanced diagnostic use in any clinical specialty, including cardiac anaesthesia.

We plan to commence a Masters course in 2012 to provide for very advanced, or otherwise novel, ultrasound uses which are expected to appeal to a small number of people who may wish to become trainers or heads of diagnostic laboratories.