Echocardiography training for the intensivist

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ABSTRACT

The value of echocardiography in the critically ill patient is well established, yet applying the modality to patients who could benefit presents considerable logistical challenges. Central is a lack of readily available, trained operators. Although many intensive care specialists and trainees are keen to fill this gap, there are numerous hurdles to obtaining the necessary training.

To address this problem, the Australian and New Zealand Intensive Care Society has set up a Committee on Echocardiography Training and Certification for Intensivists. The Committee proposes a formal training and assessment program. This would not only provide guidance to intensivists wishing to learn echocardiography, but also clearly set out acceptable levels of expertise. It is important that, after training, intensivists can be readily credentialled in their home institutions.

The intensive care community needs to determine the vehicle for training and credentialling in echocardiography. This could be achieved solely by bodies representing intensive care or in collaboration with the Australasian Society for Ultrasound in Medicine.

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The value of ultrasound in the rapid and accurate assessment of cardiovascular function in the critically ill patient is well established. Difficulties arise in having the modality readily available, with the result that many patients miss out on its potential benefits or undergo invasive, potentially damaging, and often less helpful methods of assessing cardiac function. If staff from outside the intensive care unit or emergency department can readily provide echocardiography, both during and after usual working hours, then there is no need for the intensive care team to duplicate the service. However, intensivists commonly complain that an echocardiography service based outside the ICU often involves delays in response, is available only intermittently, and even when it performs a standard cardiac examination, this is inadequate from a critical care perspective. An ICU-based echocardiography service has been achieved over the past two decades by a few Australian and New Zealand critical care physicians. However, the demand for such a service continues to grow,[1] bringing a timely debate about what we could, and should, do to make it more widely available. The Australian and New Zealand Intensive Care Society (ANZICS) database lists 179 ICUs in the two countries, representing a considerable training task, even if a conservative target — two specialists competent in echocardiography in half these units — were to be entertained.

Emerging interest in critical care echocardiography internationally means these challenges are not unique to Australia and New Zealand; neither is the desire to find constructive solutions.[2-4] The evolution is similar, with enthusiastic proponents who have succeeded in their own institutions being unable to match the training demands of the wider critical care community on their own. Similar questions arise in regard to desired levels of competency: how does an individual intensivist gain the requisite training and expertise, and once obtained how is it recognised? Added to these challenges is the growing role of ultrasound in the emergency department, expanding from examination of the abdomen (FAST — Focused Abdominal Sonography in Trauma) to include the chest (RACE — Rapid Assessment by Cardiac Echo). It is likely that in the future this early and rapid application of the emergency ultrasound examination will extend to pre-hospital and retrieval settings.

International critical care echocardiography initiatives

Strong international links, developed either between individuals or through national societies, have always been an attractive and desirable feature of the intensive care medicine community. Such links are increasingly expressed in the critical care echo community, as evidenced by reviews of publications in high-impact intensive care journals.[5,6] Group activities created by national intensive care societies and enthusiastic interest groups, such as WinFocus (http://www.winfocus.org), are bridging national barriers. It is easy to appreciate the advantages of further developing these links, as local problems are similar to those encountered in other countries, and sharing experiences will be of benefit. For example, discouragement and even outright hostility to intensivists performing echocardiography is commonly reported from other medical craft groups (especially cardiologists). Yet, the success of the French Intensive Care Society in developing an impressive educational program[7] has come about because of close cooperation with the French Cardiac Society.

Critical care echo in Australia and New Zealand today

In Australia and New Zealand, the strong desire by many intensivists to utilise echo for their own patients has led

Table 1. ANZICS Committee on Echocardiography Training and Certification for Intensivists*

Objectives of the Committee

The following need to be determined:

- A suitable level of training for intensivists performing echocardiography.
- How to assist intensivists in achieving the recommended level of training.
- How to assess whether an individual has achieved this recommended level of training.
- What form of verification is desirable for that individual to assert that he or she has achieved a suitable level of training.
- Quality assurance and maintenance of skills and knowledge.

Training recommendations

Levels of expertise

Level I: Rapid cardiac assessment (analogous to FAST [Focused Abdominal Sonography in Trauma] in patients with trauma).

Level II: Comprehensive cardiac and haemodynamic examination.

Level III: Echocardiography at units with established reputations in echo research and training (role is to provide support for Level II, clinically and in research and education).

Level II

Suitable level of training: It is recognised that access to echocardiography exposure can be a problem, especially in smaller centres and in the absence of support from other craft groups. A solo-operator intensivist may need to perform an echocardiogram outside usual working hours, with major management decisions relying on the echocardiographic findings. A high standard of training is necessary to ensure that the relevant information can be obtained and interpreted accurately. The Committee's aim is to provide a framework and possibly an information network to help interested intensivists achieve a recognised level of training in performing and interpreting intensive care echocardiography.

Syllabus:

- Ultrasound principles.
- Cardiac anatomy and physiology (self education — workshops, University of Melbourne Diploma, and textbooks).
- Performed studies (use of logbook and oversight by experienced echocardiographer). Recommended number of studies: transthoracic, 150; and transoesophageal, 75.
- Interpreted studies (in addition to those performed). Recommended number of studies: 300.

Assessment: Single-day review using multiple clips (actual patient cases).

Duration of course: Variable, but it is expected that about 18 months would be necessary to achieve the recommended number of studies.

Assistance with training:

- Provision of syllabus.
- Advice as to where to access resource material and courses.
- Echo centres that are more established (Level III) to provide oversight and clinical experience where possible.
- Level III centres to provide "reporting" workshops to enable trainees to achieve the requisite number of interpreted studies.

Achieving required level of training:

- Logbook of studies (a specified number should be submitted as video clips for review).
- End-of-course assessment.

Verification of suitable level of training (credentialling)

It is important that the achievement of the practitioner in reaching the above standard of training is acknowledged. We recommend the creation of a *Certificate of Critical Care Echocardiography*.

This could be under the auspices of ANZICS alone, in combination with the Joint Faculty of Intensive Care Medicine, or with the Australasian Society for Ultrasound in Medicine.

* ***Members of the Committee:*** Andrew Hilton, Konstantin Yastrebov, John Evans, Chris Joyce, Colin Royse, Karl Donovan and Anthony McLean (Chairman). ANZICS = Australian and New Zealand Intensive Care Society.

to multiple training courses, organised by ultrasound companies, individual echo-specialised ICUs and universities. An increasing number of intensivists also attend courses in other countries. Most of these courses have limitations, such as brief duration (2–4 days), limited hands-on experience for beginners, and good theoretical but limited practical exposure. Very few provide comprehensive training that includes teaching and experience in both transthoracic and transoesophageal echocardiography, on hundreds of patients, in addition to theoretical education that relates directly to actual experience. This situation needs to be rectified if patients in ICUs in both our countries are to benefit from echocardiography performed by a qualified and competent clinician and at an optimal time, to allow appropriate therapy to be instituted rapidly.

Levels of echocardiographic expertise

What constitutes an echocardiographic examination differs according to the medical craft group or particular clinical setting. The standard study recommended, and usually performed in the cardiology outpatient setting, includes M-mode and two-dimensional (2-D) assessment of cardiac structures with a standard colour, pulse wave and continuous wave Doppler examination. In specialty clinics, this may well be extended to include three-dimensional and tissue Doppler imaging, while in the emergency department a basic 2-D examination may suffice during resuscitation. What, therefore, is relevant to the ICU setting? In many situations a basic examination, similar to that performed in the emergency department, may suffice, particularly "after hours", when the emphasis is on resuscitation and patient survival. Ruling out cardiac tamponade, estimating left

ventricular contraction, and assessing intravascular volume fall into this category. A full study, directed towards a more complete evaluation and diagnosis, can then be performed during regular working hours, when higher-level expertise is available. Assessment of a full range of haemodynamic parameters, including diastolic function, left atrial pressure and left ventricular outflow obstruction, may be available only in selected, highly developed, research-oriented ICUs.

Whatever the level of examination undertaken, it is essential that the operator is sufficiently skilled to perform a proper and appropriate examination. This leads to the questions: what is a suitable level of training, and how should it be assessed? To counter the uncertainty experienced by intensivists and trainee intensivists, ANZICS set up the Committee on Echocardiography Training and Certification for Intensivists to examine the issues. The Committee included a broad representation of clinicians experienced in echo, from a range of echo-training backgrounds and, where possible, from a wide geographical spread. The Committee's recommendations, which have been circulated binationally, are summarised in Table 1.

Three levels of expertise are recommended. Level I allows for the simpler introduction of the basic use of echocardiography in assessment and management of the critically ill patient, whereas Level II focuses on comprehensive echocardiographic assessment and requires considerable training. The summary describes the proposed Level II program. The Committee's intention was to support training without being exclusive — in no way did it intend to exclude clinicians who wish to pursue alternative echocardiographic training programs. Level III designates support units, which are crucial in providing support and direction for practitioners seeking to gain Level II expertise.

The guidelines do not elaborate on Level I training, as this process is already being developed, with courses accessible to emergency physicians and intensivists. In particular, emergency physicians are expressing considerable interest in extending the use of their ultrasound machines from FAST to RACE. Similar to training in FAST, 1-day workshops with a strong emphasis on hands-on learning and a goal-directed examination are undertaken. These may be undertaken in association with the Australasian Society for Ultrasound in Medicine (ASUM), which has developed considerable expertise in running modular courses in combination with various societies and colleges, providing a Certificate in Clinician Performed Ultrasound (CCPU) in emergency medicine, obstetrics and gynaecology, and surgery. Alternatively, single centres may provide such training, such as the RACE course developed at Nepean Hospital, New South Wales. The training in these courses is oriented towards a rapid and basic assessment of the heart by ultrasound, examining left and right ventricular sizes and contraction, identifying pericardial tamponade, and measuring diameter of the inferior vena cava as a guide to right ventricular preload.[8,9] Doppler is not included, as this requires a major upgrading in skills, and carries with it the responsibility for correct interpretation, and the very real risks of misdiagnosis.

The future

Following many months of intense discussion and debate, the Committee agreed on the recommendations outlined in Box 1 and forwarded them via ANZICS to the Australian and New Zealand intensive care community, to provide a framework for the future. The Committee recognises that many aspects require further development, and that, even when general consensus is obtained, the organisational and logistical challenges are considerable. Delaying this process does a disservice to our junior colleagues, and, importantly, any loss of impetus now will make it more difficult to resurrect the process in the future. This is undesirable when any local or international intensive care conference nowadays includes a heavy component of echocardiography in presentations on haemodynamic instability or cardiac function.

The time has come to act. However, the foremost principle is that training and credentialling in critical care echocardiography remain the responsibility and prerogative of the intensive care community.

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