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COMPETENCE

In definition, the intensivist in charge of the case personally performs all aspects of the ultrasonography examination: image acquisition, image interpretation, and application of the results at point of care. This is very different from ultrasonography performed by the consultative service of radiology and cardiology, where the examination is delayed in its performance, and where the consultant is disassociated from the clinical reality of case. Learning ultrasonography at point of care, the intensivist uses ultrasonography as a modality that is uniquely suited to the demands of intensive care medicine: immediately available, relatively inexpensive, flexible, and with multipurpose applications.

Competence in key parts of critical care ultrasonography are summarized in the ACCP/SRLF Statement on Competence in Critical Care Ultrasonography [1]. This document lists the basic elements of the field that need to be mastered by the intensivist, and may be regarded as a minimum standard. This textbook reviews many other applications that are not listed in the Statement.

Competence in critical care ultrasonography requires mastery of image acquisition, image interpretation, and the cognitive elements of the field. Training in image acquisition may be accomplished initially on normal human subjects, but also requires scanning of patients under the direct supervision of a competent instructor. Training in image acquisition requires access to an

image set that includes a large number of abnormal findings. A cognitive base is mastered by study of relevant literature, lectures, or Internet-based information. Requirements for training relevant to the elements of the Competence Statement are summarized in the Statement on Training in Critical Care Ultrasonography that represents a multinational consensus on this subject.

At present, there is no national level certification process for critical care ultrasonography either in North America or any country in Europe. Competence is defined by local standards, so the intensivist has an important responsibility to seek out adequate training that focuses on achieving the standards defined in the Competence Statement. Some applications reviewed in this textbook are not mentioned in the Competence Statement, but have clinical utility. Competence in these is only assured by specific institutional standards. Critical care ultrasonography, once adopted by the active clinician, lends itself to an element of invention, local training effort, and adoption of techniques that are not initially widely used. One purpose of this textbook is to disseminate information on critical care ultrasonography that is not defined in the Competence Statement.

Machine Requirements

High-quality portable ultrasonography machines are widely available. Their cost is not prohibitive when compared to alternatives, such as computerized tomography (CT), and their operating costs are low. In addition, a team that uses ultrasonography as its primary imaging tool reduces utilization of other standard imaging methods [3]; this accrues cost savings, because more expensive imaging modalities are not used as often. Most recent generation machines have good image quality (with a few exceptions), so purchase decision should be predicated on other factors. Some key questions to consider include the following:

1. Is the machine durable? Can the machine be dropped, can the transducers be dropped, and is it impervious to fluid spills?
2. What is the service record of the company? Is the cost of the service contract included in the price of the machine, or is the machine a "loss leader" that requires an expensive service contract in addition? What is the turnaround time for service?
3. Is the machine easy to operate? What is the turn-on time? Is the control surface simple and easy to operate? Is there well-designed memory capability that uses a widely accepted video image format?
4. Is the machine truly portable? Can it be easily removed from the stand for situations that require a hand-carried device? What is the footprint of the stand?
5. Can the machine and probes be easily and safely cleaned with disinfecting fluids?

The intensive care unit (ICU) machine requires two probes. The linear vascular probe is high frequency, so that it has excellent resolution, but poor penetration. This makes it ideal