

Teaching Whole Body Point-of-Care Ultrasound

Advancing the Skills of Tomorrow's Anesthesiologists

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POINT-OF-CARE (POC) ultrasound is the real-time application of ultrasound on various anatomic parts or body organs for diagnostic or procedural purposes. It is performed with stand-alone, usually portable, ultrasound devices that are easy to bring to the patient's side or even carry by hand or inside one's pocket. In this issue of *ANESTHESIOLOGY*, Ramsingh *et al.*¹ from the University of California-Irvine assessed a POC ultrasound training curriculum for anesthesiology residents and found it an effective educational tool and of potential clinical benefit for the perioperative surgical home.

The authors developed a didactic curriculum (which complied with the Accreditation Council for Graduate Medical Education core competencies requirements) to evaluate the cardiac function and hemodynamics, the lungs and abdomen, the position of the endotracheal tube, and the diameter of the optic nerve sheath. The education activities included didactic lectures, practice sessions on human models or simulation devices, short clinical scenarios, and pre- and posttraining testing. The aims of the study were to explore whether such a curriculum would improve residents' training and clinical care. The residents were overall satisfied, improved their knowledge, and found the activity relevant to their future practice. The transferability to clinical management was tested with residents who performed POC ultrasound examinations upon request in the operating rooms, pre- or postanesthesia areas, intensive care units, or other locations. Their findings, when verified by an attending, assisted the primary anesthesia team with new, primarily cardiovascular and pulmonary diagnoses that prompted them to change management in 76% of the cases.

The primary strength of the current study is the carefully designed and executed education module, which involved ultrasound-naïve anesthesiology residents. But, as is the case for simulation-based curricula, the hands-on practice and testing were on healthy human models or simulators, not



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on actual patients of varying body habitus or pathology. However, the authors were able to compensate for this by testing the clinical application of the residents' new cognitive and dexterity skills on real patients. It should be pointed out that this compensation was partial because any new findings detected by the resident had to be in agreement with the evaluation of the supervising attending faculty. Therefore, it remains unclear how many diagnostic or decision errors were made by the residents.

Simulation programs are useful for the acquisition of knowledge and the teaching of technical skills in ultrasound-naïve learners.²⁻⁸ The comprehensive POC ultrasound curriculum presented by Ramsingh *et al.* is clearly innovative and with foresight. The study may provide another set of tools for anesthesiologists

who will be practicing in a future perioperative surgical home and functioning as true *perioperative physicians*. The evaluation of patients may be expedited if performed in a single setting and by a single provider, and will be quite invaluable, if it uncovers or verifies the most critical clinical diagnoses, mainly within the cardiovascular and pulmonary systems. Such practice has the potential to increase the hospital appeal of the anesthesiology practice/group/department and may even have revenue potential for the POC ultrasound practicing anesthesia care team. However, the information on the long-lasting impact of such ultrasound simulation programs is lacking. First of all, the various ultrasound curricula have not found their place in the American Board of Anesthesiology content outline as a distinct topic. Although ultrasound is neither unique nor reserved for use in cardiac anesthesia or intensive care, nowadays the practice of noncardiac anesthesia does not routinely incorporate the use of ultrasound. In many anesthesiology teaching centers, an anesthesiology resident's first encounter with clinical ultrasound is probably in the cardiac operating room or the regional anesthesia/block suite, but not in the general operating room, the preadmission clinic,

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Corresponding article on page 670.

Accepted for publication May 25, 2015. From the Department of Anesthesiology, Weill Cornell Medical College, New York, New York.

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or in postoperative care areas, that is, practice areas associated with a future “surgical home.” We also lack data on whether an anesthesiology resident who was exposed to an ultrasound simulation program will have any advantage, clinical or professional, over a colleague without such an experience.

The practice of POC ultrasound may be challenging because few of us, even among those who consider themselves experts in transesophageal echocardiography, are formally trained in surface ultrasound. The most frequent reason for this unfamiliarity is the lack of time for practice or of role models and experts to learn from and consult with. Recommendations for the practice of focused ultrasound have been published recently, and they address applications, techniques, potential benefits, clinical integration, education, and certification principles in adults and pediatric patients.⁹ A formal training program should allocate time, the means or tools, and the structured activities that will be necessary to ensure that the trainee’s future performance will be reliable. There should be practice-venue privileges and medicolegal support, for the POC ultrasound physician, in case the diagnosis is wrong and the false positives or false negatives lead to wrong interventions or under diagnosis, respectively. For the same reason, digital archiving should be in place for quality assurance of the activities.

Where do we go from here and how should we be using the findings by Ramsingh *et al.*? It is possible that ultrasound imaging may become the *stethoscope of the future*. All of us who are involved in education of future physicians should incorporate the teaching of the foundations and applications of surface ultrasound in our residency programs. We should devote time and effort to include expanded teaching on many of the ultrasound-targeted body areas. The acquisition and maintenance of knowledge requires a “live” curriculum that should be revisited each year and revised as needed. At the same time, we should strive to include basic transesophageal echocardiography in the residency curriculum because guidelines on the scope of its practice are published and an examination and certification process are in place.¹⁰

Last but not least, we should keep in mind that the ability to see things on our own (instead of routinely waiting for another practitioner’s interpretation and diagnosis) is very attractive to a fast-paced, young (and not so young) generation of trainees and practicing clinicians. An incipient danger when teaching such “visual” approaches to diagnosis is to treat the image without considering the underlying pathology.

Competing Interests

The author is not supported by, nor maintains any financial interest in, any commercial activity that may be associated with the topic of this article.

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