# A "Sound" Approach

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Ultrasonography is no longer limited to radiology suites and echocardiography laboratories. Portable ultrasound machines are now widely available in intensive care units, general medical floors, and many ambulatory clinics; trainees are even beginning to store handheld devices in their white coats alongside Advanced Cardiovascular Life Support cards, penlights, and stethoscopes. Not surprisingly, internal medicine residents are eager to learn more about medical ultrasound.[1,2] Although the technology has already arrived, our knowledge of how to train internal medicine physicians and ensure safe and proper use of this powerful tool is lagging. Point-of-care ultrasound has great potential to improve patient outcomes and should be integrated into internal medicine training programs. However, integration of this technology should not be done in a haphazard fashion. Just as we have moved beyond the apprenticeship model of see-one, do-one, teach-one for procedural training in medicine, we must approach ultrasound education with a structured and rigorous curricular approach.[3–6]

As with any diagnostic tool, the risks of inadequate training and assessment are potentially catastrophic. While missing trivial mitral regurgitation on the bedside echocardiogram of a hemodynamically stable patient may not have dire consequences, a false-negative finding in the setting of a hypotensive patient with a pneumothorax or pericardial effusion is unacceptable. In addition, excessive reliance on new technology could detract from fundamental physical examination skills[7]; an ultrasound examination is not always necessary to diagnose common conditions or certain life-threatening conditions that require immediate treatment. Internists must be able to detect tracheal deviation and a pulsus paradoxus on clinical examination, even if a portable ultrasound is within reach. Another concern with the increased use of bedside ultrasound is the likely increase in detection of "incidentalomas." The impact these incidental findings have on further testing and medical costs has not yet, to our knowledge, been explored.

While there are limited data regarding ultrasound training for internal medicine trainees, other specialties and subspecialties within internal medicine have described key components of competency.[8,9] There is evidence that emergency medicine physicians are able to obtain key diagnostic and procedural ultrasound skills with limited training.[10] Some research suggests that internal medicine physicians can similarly obtain key skills for focused ultrasonography with short training sessions.[11,12]

In this issue of the *Journal of Graduate Medical Education,* Skalski and colleagues[13] report their experience training internal medicine residents in point-of-care ultrasound of the aorta and kidneys. The authors should be applauded for taking a rigorous approach to training and assessing the effect of a focused curriculum. Following limited, simulation-based training, 84% of internal medicine residents were able to obtain high-quality images of the abdominal aorta and kidney of a standardized patient, compared with only 16% before training. In addition, self-reported confidence increased markedly following the training session, with the vast majority of residents feeling somewhat or extremely confident in identifying the aorta and kidney with ultrasound, and reporting that they will use ultrasound more in the future.

Although it is encouraging that residents quickly gained competence in successfully obtaining images of the normal abdominal aorta and normal kidney, the implications of this study are not clear. While, on the surface, increased confidence may seem to be a positive result, we know too well that confidence is not equivalent to competence.[2,14] In fact, this confidence in a select skill, in a normal model, may place residents at risk for false reassurance and overuse of ultrasound. One must also question what the most important and appropriate uses of point-of-care ultrasound are in the hands of an internist. Although the aorta and kidney are relatively easy organs to identify with ultrasound and are relevant to many conditions we treat, is it necessary for internal medicine physicians to image these organs? Perhaps initially, we should focus on the evaluation of pleural effusions, ascites, and targets for vascular access because it is clear that ultrasound-guided procedures improve patient outcomes.[3,15,16] Algorithms for acute onset dyspnea to rule out a pneumothorax or a rapid echocardiogram in the setting of shock may be more appropriate for the general practitioner, and identifying an aortic aneurysm may be more suited for a trained radiologist.

It is clear that point-of-care ultrasound technology has arrived; it is now our responsibility to harness its power and train residents carefully. We must teach not only the

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technical aspects but also the appropriate use and potential pitfalls. As an initial step, internal medicine governing bodies must decide as a community what skills are necessary for the field so that competency guidelines can be clearly delineated. This will promote the creation of valid training methods and assessment tools. Once these fundamentals are established, we must train the trainers. If we are to expand our armamentarium as internists to include ultrasound, supervising faculty must become competent. When trainees arrive on the floor with their own portable ultrasound machines and their attending is not well versed in this technology, there is great potential for inappropriate use. We should learn from the emergency medicine physicians, who not only have clear guidelines for training, but also ensure continuous quality control with attending physicians overreading trainees' ultrasound studies and providing feedback. The literature offers many successful models for procedural training.[17,18] Some level of mastery learning should be required to ensure a high level of ultrasound skills before allowing trainees to make clinical decisions in real time. Finally, we do not know details about skill retention of point-of-care ultrasound skills for internists. Practicing clinicians will need to use these skills regularly in practice and/or be reassessed periodically to ensure that a high level of skill is maintained.

Although ultrasound is exciting and has changed our field tremendously, we must approach this technology carefully. The field is open for novel training methods and assessment tools. We have no doubt that ultrasound can lead to better care for our patients, but this requires a systematic approach with careful curricular development and continuous assessment.

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