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If you can't beat them... join them

Encouraging point-of-care ultrasound to diagnose patients and train new healthcare professionals

Medical schools are including an ultrasound application and formal teaching in their curriculum; emergency medicine and critical care physicians have embraced the use of hand held ultrasound probes that offer the advantage to 'see' immediate information regarding the patient.



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At the beginning of each academic year, first-year medical students at U.S. medical schools participate in a medical school tradition that kicks off their medical career — the white coat ceremony. After listening to inspirational speeches, students don their new white coats and receive a stethoscope at a special ceremony attended by family, friends and faculty members.

This time-honoured tradition is changing with the current digital age:

“First-year medical students at Mount Sinai School of Medicine will be the first in New York to be introduced to a digital-age ultrasound device that can visualise inside the body, and fit directly into the pockets of their brand new white coats (Imaging Technology News 2012).

This visualisation tool is a handheld ultrasound device and is roughly the size of a smartphone. The device houses innovative technology that provides an immediate, noninvasive method to make visual information from inside the body.

The objective of this step is to demonstrate that handheld imaging technology can contribute to medical education at all levels of instruction and learning. A secondary goal is to prepare these future doctors to use US in their diagnostic pathways.”

During this day a few years ago now, students, parents and faculty were thus introduced to the handheld ultrasound device, instead of just a stethoscope, thought to be a real step forward. Or not?

Six years later, in 2018, this is happening all across the U.S. Probably a quarter to a third of medical schools are including an US application and formal

US exposure/teaching in their first year curriculum. Again, is this a good thing or not?

Well, as always, a little history may help: at the turn of the last century, x-radiation was still considered dangerous, likely cancer-causing and if at all possible to be avoided. Ultrasound (US) was touted as safe, easy to use, easy to transport to the bedside and the equipment was relatively cheap. Relative meant relevant to Computerised Tomography (CT) which used x-ray and computers and cost around \$300-500 thousand for a top of the line machine, and Magnetic Resonance Imaging (MRI), which used much safer magnetic fields and no ionizing radiation but cost 2 to 3 times that amount. Neither modality could be transported to the bedside either.

“NOW, STUDENTS, PARENTS AND FACULTY ARE INTRODUCED TO THE HANDHELD ULTRASOUND DEVICE, INSTEAD OF A STETHOSCOPE”

Also, to a much greater extent than in the USA, in the rest of the (western) world the availability of CT in the 70's and 80's and MR in the 80's and 90's was strongly regulated by variants of Certificates of Need (CON) issued, piecemeal and very slowly, by the government of most European countries. This is to this day reflected in the number of CT/MR scanners per 100,000 populations being much less in countries outside the USA.

This state of affairs allowed US use, but also expertise with, to flourish, with concomitant loss of

radiology's purview of same. The 'turf battles' with Obstetrics and Cardiology, to a lesser degree with Urology, were thus lost by radiology during those decades.

The next development, in the early 2000's, mostly the increasing imaging volumes, but also the shift from inpatient to outpatient imaging drove the next change. It led to, first of all, scheduling issues (wait lists) for CT and MR and then to a slowly increasing realisation that US could be a cheaper and effective first line modality as an adjunct to the classic physical exam. Thus was born the notion of point-of-care US (POCUS).

What is "Point-of-Care Ultrasound" (POCUS)?

Point-of-care ultrasound refers to the practice of (trained medical) professionals using US to diagnose problems wherever a patient is physically present, is being treated, whether that's in a hospital emergency department (ED), an ambulance, any health care facility (Schepper, Blickman 2016) or even in a remote village.

Further, it can refer to the use of portable US at a patient's bedside for diagnostic (eg symptom or sign-based examination) and therapeutic (eg image-guidance) purposes.

More recently, emergency medicine and critical care physicians have embraced its use. It offers the advantage to 'see' immediate information regarding the patient through dynamic imaging and the ability to integrate that information into the clinical picture. This allows providers to make decisions about patient care in real time.

The advent of affordable handheld devices with quality images, lead to improving patient diagnosis, enhance patient satisfaction and safety, shorten length of stay, and thus lead to increasing provider satisfaction.

For example, in patients complaining of dyspnoea, for which there is not a clear imaging diagnosis otherwise of, for instance COPD, CHF, pulmonary embolism, or pneumonia, a focused cardiac US can rapidly differentiate between right and left ventricular dysfunction, presence or absence of a

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pericardial effusion, or possibly even an arrhythmia. Pulmonary US has been shown to somewhat reliably suggest Kerley B lines (indicating interstitial oedema), show a focal consolidation, and/or illustrate a pleural effusion.

POCUS also is a teaching tool that can enhance exam skills. Medical students can learn the anatomy: either on each other or on cadavers in the anatomy lab, while clinicians can confirm physical exam findings and also teach housestaff or medical students as they palpate the liver or percuss the chest.

Performing a procedure such as a paracentesis or placing a central line under US guidance is now considered standard of care, many centres even have organised ‘vascular access’ teams centred around POCUS experience. It is well established that ultrasound guidance leads to safer and more expedient line/tube placement even when compared to clinicians skilled in traditional landmark techniques.

It is, though, also important to know the limitations of POCUS.

It is not a replacement for taking a good history or doing first rate physical examination. It is most reliable when answering binary questions (eg in FAST: ascites or pleural effusion present or not; cardiac failure: pericardial effusion present or not) unless in the hands of imaging trained providers.

Indeed, it is a skill to be acquired and honed, and it requires specialised training. And therein lies the rub: who can perform, who can interpret, ie, who is credentialed to perform these examinations, and, in the U.S. very important: who can bill for these examinations?

At this point in time, each speciality board in the U.S. has specified that each practitioner is to be able to perform and interpret these limited examinations. In most ED’s that means these ED practitioners have completed a training module or (mini) fellowship. This training can be in-house or at dedicated training sites. This will then govern hospital credentialing of these providers. They will then render a report in the medical record, but cannot as a rule bill for these examinations.

There is also a great variety as to where these images are stored (centrally or in the radiology archive). This is important so that other services can review these images, because if not they may be unnecessarily repeated.

Similar variety exists as to who can/will bill for the study. Mostly ED, vascular teams cannot, at present OB can. Often the former are then referred for a formal study in the imaging department, who then can bill for this study.

As can be seen from this communication giving US capabilities in any form can be seen as threatening to imaging. But I contend the opposite: the more we actively encourage medical students and residents to see the utility of US, they may well use it themselves but also might become fascinated by imaging in general. Thus maybe seek a career in imaging!

Also, working with other specialists and actively work with them, teach them how the US can help and how it can be done correctly and effectively will have a two-fold outcome: these colleagues will appreciate the team work with imaging but also realise what parts of an US examination might be better left to imaging department trained US imagers.

Most important though, like with any ‘turf battle’ we might encounter as imagers, if we are not there in person, at the ‘table’ when imaging discussions take place, but also when the patient needs the US exam, we may miss out all together as a speciality: ‘if imaging is not at the table, imaging will end up as the main course (a commodity!)’

In conclusion then, we should encourage the giving of US probes, hand held screens to medical students. It may well be a win-win situation! ■

KEY POINTS



- ✓ Medical schools are including an US application and formal US exposure/teaching in their first year curriculum
- ✓ Point-of-care ultrasound refers to the practice of trained professionals using ultrasound to diagnose problems wherever a patient is physically present and being treated
- ✓ The advent of affordable handheld devices with quality images, lead to improving patient diagnosis, enhance patient satisfaction and safety, shorten length of stay, and thus lead to increasing provider satisfaction.



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