Ultrasound in Undergraduate Medical Education: Talking Points

What is your school’s structure?
- Traditional course-based didactics versus integrated/organ-system-based
- What is your affiliation with the medical school?
  - Is there a department of Emergency Medicine at the medical school?
  - Is there a required EM clerkship?
  - Is EM active in teaching other topics/subjects already?
- What are the logistics of student didactics and clinical rotations?
  - Didactics centralized or spread out, mainly large- or small-group formats; clerkships centralized or geographically separated
- Will there be “curricular reform” at your school anytime soon?
- What are unique considerations/focuses of your school/program?

What is your goal?
- Complementary teaching of complex anatomic relationships (ie, rotator cuff, cardiac)
- Complementary teaching of physical exam (ie, aortic or thyroid palpation, GU exam, cardiac auscultation)
- Integration of anatomy, physiology, pathology, and medical decision-making (ie, ACEP core applications with an added emphasis on anatomy/physiology)
- “Stanford 25” physical exam skills list: bedside ultrasound is #25, and teaching of at least 15 of the other 24 can be augmented using ultrasound
- Help students explore and reinforce concepts covered in anatomy and physiology and pathology, enhancing learning by using multiple modalities (gross dissection, textbooks, physical exam, and ultrasound)

Challenges frequently faced:
- No place in an already crowded curriculum
- Students will not develop physical exam skills
- What to do when you find pathology in students
- Just more technology between the doctor and patient
- Lack of proven educational value of ultrasound
- Faculty too inadequately trained in ultrasound to teach
- Inadequate resources to invest in a new curriculum (machines, models, etc)

Evidence base of ultrasound in medical education:
- Mainly descriptions of curriculum and experience
- Paucity of research-based outcomes
  - Plethora of positive student feedback
  - Significant face validity
- Does integrating ultrasound into undergraduate medical education:
  - Improve student scores on anatomy and physiology exams?
  - Increase the likelihood that they will use it to reach more accurate, timely, and cost-effective diagnoses and guide high-risk, invasive procedures?
  - Which question is more important, and what is our goal...
Why not just teach during residency?

- Nearly all specialties are using bedside ultrasound already, and its use is constantly expanding. This is (or is becoming) a core skill for physicians.
- Rather than teaching fundamentals, during residency you should concentrate more on pathology and time-sensitive information that directly guides clinical management.

Strategy:

- Look for small windows where ultrasound can be integrated
- Areas where course and clerkship directors are most receptive
- Integrate with gross anatomy, physiology, and physical exam
- Start small, do a good job, then expand
- Don’t try to teach everything all at once
- Longitudinal integration is much more effective, and enhances learning and long-term retention
- Keep student:faculty ratio low (ideally 5:1 or less)
- Gather student feedback to drive further opportunities
- Students can drive the process! MS-1 and MS-2 comments:
  - “I feel it has been the most practical clinical training I have had thus far in medical school.”
  - “This is what keeps me motivated while doing the basic science courses. I would love to have more opportunity to use this to reinforce my anatomy while getting hands-on use with equipment I will be using later in my career.”
- Find allies within the medical school to champion its integration
  - *Must* have faculty from multiple specialties at your institution; also consider multiple facilities, if feasible
  - Advantages of junior versus senior faculty
  - Medical school dean (bring your ultrasound machine and medical student!)
  - Grand rounds speakers – ultrasound topics
  - Take advantage of the simulation center
  - Consider involvement of other health professionals (PA, NP, techs)
  - Many of these “allies” will also become your instructors

Teaching formats and considerations:

- Mandatory versus elective student participation
  - Can you handle the entire class at once?
  - Consider beginning with elective participation to gather experience, instructors, educational curriculum, feedback (students and faculty) – and you can limit the number of participants
- Didactic classroom lectures versus web-based learning modules
- Mandatory hands-on laboratory sessions; open ultrasound practice sessions
- Interest groups (EM, radiology, and surgery easily integrate)
Resources (machines, models, and instructors):
✓ machine: purchase; borrow from ED, clinics, sim center, radiology, vendors
✓ models: medical students, phantoms, paid models, simulators
✓ instructors:
  o specialists: EM, radiology, cardiology, OBGYN, surgeons, critical care
  o residents: EM or radiology (esp during their U/S rotations)
  o peer-to-peer: interested MS-2 students volunteer for extra training, then serve as assistant instructors
  o medical school faculty: train them as instructors (quid pro quo)

“Sell it to the dean”
✓ Admissions: an ultrasound program can separate your school from the competition
✓ Student satisfaction: all deans want students to be happy with their education
✓ Grants: education, quality, patient safety, best practices, rural areas
✓ Potential for CME courses: source of revenue, build referral base, offer courses to alumni, etc.
✓ Patents and Licenses: ultrasound technology, teaching materials, simulation, phantoms
✓ Donors: ultrasound is very attractive to donors

Resources:
- ACEP guidelines (mainly for MS-4 EM U/S electives)
- SUSME
- WINFOCUS
- www.sonoguide.com

Closing thoughts:
✓ If ultrasound is integrated in a longitudinal manner, then it can become more than just a teaching tool, but also a clinical tool that can be integrated into daily practice.
✓ Ultrasound has applications across almost all specialties – it is a core clinical skill for physicians.
✓ Exposing medical students early and longitudinally to ultrasound builds a widespread foundation of knowledge in ultrasound, and allows residency training to focus on applications that directly affect patient care, cost, and safety.
✓ Medical schools are realizing that they need to teach ultrasound, or be left behind.

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