ULTRASOUND TO TEACH CLINICAL MEDICINE

J. Christian Fox, MD, RDMS, FAIUM
Professor of Clinical Emergency Medicine
Assistant Dean, Student Affairs
Director of Instructional Ultrasound
University of California, Irvine School of Medicine
“The technology in this area is rapidly evolving and an ultrasound might one day be among the contents of the white coat pocket.”
Thyroid exam: Palpating the neck to feel the thyroid gland can help diagnose thyroid disease. A nodule can indicate thyroid cancer. Without thorough training, people often feel too high on the neck or place their fingers at an angle that precludes feeling a nodule.

For more precision, ultrasound can directly visualize the various lobes of the thyroid and detect much smaller tumors than fingers could ever palpate. We can differentiate a solid possibly malignant tumor from a benign fluid filled cyst.

Neck veins: Because the jugular veins in the neck go directly to the heart, they can indicate cardio-vascular problems. Seeing the neck veins and discerning their pulses takes a practiced eye, good patient positioning, good light and patience. Once it’s seen, the pulse level can be measured and abnormalities identified that can diagnose cardiac conditions such as tricuspid incompetence and complete heart block.

Additionally, one can directly measure the central venous pressure by measuring the point at which the internal jugular vein tapers off down to the manubrium of the sternum. In obese patients or patients with short necks, attempting to visualize the neck veins is simply not possible without ultrasound. Another marker of central venous pressure is the IVC and whether it collapses during inspiration.

Lung: Percussing (tapping) on the chest and sounding out the lung’s boundaries are useful for detecting fluid or pneumonia, particularly in areas without access to radiology equipment and blood testing.

More accurately, ultrasound can diagnose a host of lung pathology such as pneumothorax, pulmonary edema, pneumonia, pleural effusion, and confirmation of endotracheal tube placement.
YEAR THREE REQUIRED CLERKSHIPS: CLINICAL INTEGRATION OF ULTRASOUND

- General Surgery
  - Post-OP wound
  - Vascular access
  - Hemodynamics

- Trauma

- Internal Medicine
  - Pulmonary edema
  - Pleural effusion
  - Pericardial effusion
  - Pneumonia
  - Renal failure
  - Cardiac output
  - CVP
  - Paracentesis
  - Pericardiocentesis
  - Thoracentesis
  - Lumbar puncture

- Geriatric Medicine
  - AAA
  - Carotid intima-media
  - Biliary
  - Prostate
  - Post void residual
  - DVT
  - Thyroid

- Family Medicine
  - Biliary ultrasound
  - Joint effusion
  - First trimester
  - Post-void residual
  - DVT
  - Cardiac contractility
  - Carotid intima-medial
  - Musculoskeletal
  - Thyroid

- Pediatrics
  - HCM screening
  - Abdominal pain
  - Foreign body
  - Joint effusion
  - Pelvic ultrasound
  - Lumbar puncture

- Obstetrics/Gynecology
  - PID vs TOA
  - Biophysical profile
  - Endometrium
  - Ovarian
  - Vascular access
  - Cardiac
  - IVC
  - Renal
  - Thyroid

www.ultrasound.uci.edu
• Cardiac: Endocarditis, pericardial effusions, valvular disorders, cardiomyopathies, pacemaker issues

• Pulmonary: Pneumonia, pleural effusion, empyema, pneumothorax, pulmonary edema

• ID: Cellulitis vs abscess, amoebic abscess

• GI: Cholecystitis, small bowel obstruction, diverticulitis

• Procedural guidance: para, thora, vascular access

• GU: hydronephrosis, acute urinary retention (PVR, foley catheter troubleshooting)
• Unexplained hypotension: Cardiac, IVC, DVT
• Trauma: Pneumothorax, FAST exam
• ID: Cellulitis vs abscess vs. seroma
• GI: Ascending cholangitis, appendicitis, diverticular abscess,
• Procedural guidance: paracentesis, thoracentesis, vascular access
• GU: hydronephrosis, acute urinary retention (PVR, foley catheter troubleshooting)
• Anesthesiology: TEE, vascular access, ET tube confirmation
• Rapid Ultrasound in Shock (Pump, Tank, Pipes)
  • Cardiac
  • Volume status
  • Lung
  • DVT
  • Aorta
• Procedural
• Bladder
• Biophysical profile
• Endovaginal adnexal assessment
• First trimester complications of pregnancy
FOURTH YEAR

- Primary Care
- Ophthalmology
- Orthopedics/Sports medicine
- Vascular surgery
- Urology
- Otolaryngology
- Radiology
- SICU/MICU/CCU
- Cardiology
- Anesthesiology
- Pediatrics

www.ultrasound.uci.edu
• Year 1: Understand instrument, obtain windows of ALL major organ systems, differentiate tissue types

• Year 2: Identify pathology on actual and simulated patients

• Year 3: Fully integrated use on core clerkships during rounds and in clinic

• Year 4: Tailored skills toward specialty selection
KEY REASONS TO TEACH ULTRASOUND TO MEDICAL STUDENTS

• Builds on knowledge of anatomy, physiology, and pathology by making it all clinically relevant

• Empowers medical students by extending their knowledge past the skin line

• Engages them in the doctor-patient relationship

• Picks up where Stanford 25 stops