MUSC Internal Medicine Bedside Ultrasound Curriculum

Overall objectives:

1. Understand the basic physics of ultrasound technology
2. Appreciate the clinical role for bedside ultrasound
3. Differentiate between types of ultrasound transducers and select correct transducer for particular bedside applications
4. Visualize the normal sonographic appearance of solid organs, soft tissues and vascular structures
5. Recognize abnormalities in the solid appearance of solid organs, soft tissues and vascular structures that can acutely change clinical management
6. Appreciate current literature supporting ultrasound education for IM Residency Programs

Useful resources:

http://emergencyultrasoundteaching.com/ - Dr. Geoff Hayden’s website containing lots of great videos, articles, images, cases, and links to other great resources

http://learn-us.vanderbilitem.com/ - ER based – lots of great videos

http://www.susme.org/learning-modules/ - USC School of Medicine website that has physics lectures, etc

http://www.critcaresono.com/ -- tutorials, images, practice clips


1. Knobology Learning Objectives – Ultrasound basics

1. Understand orientation of ultrasound probe to the patient
2. Understand orientation of ultrasound probe to the ultrasound screen
3. Identify the appropriate ultrasound probes for various bedside applications: cardiac imaging, pleural imaging, soft tissue imaging, central line placement, and paracentesis
4. Understand how to take and annotate ultrasound images
5. Understand basic ultrasound physics
6. Understand basic ultrasound language (ie hypoechoic, anechoic, hyperechoic)
7. Recognize common ultrasound artifacts – acoustic shadowing, mirror image
2. Pulmonary Ultrasound Learning Objectives

A. Recognize the normal appearance of visceral and parietal pleura using 2D and M-mode imaging
   1. Identify ribs, rib shadowing, intercostal space and pleural line
   2. Identify A lines
   3. Identify lung sliding with respiration
   4. Use M-mode to identify normal lung pattern (“seashore sign”)
   5. Appreciate the anatomical relationship of lung, diaphragm and liver/spleen and be able to point out all structures

B. Recognize common lung abnormalities
   1. Identify B lines
   2. Assess for pleural effusion
   3. Assess for pneumothorax
   4. Assess for consolidation

C. Identify Deep Vein Thrombosis

Resources:

Moore, C. Point-of-Care Ultrasonography. NEJM. February 24, 2011.

http://emergencyultrasoundteaching.com/narrated_lectures.html - Physics and Knobology lecture

http://www.susme.org/learning-modules/learning-modules/


http://www.sonosite.com/education/learning-center/58/1425 - how to US for pneumothorax

3. **Cardiac Ultrasound Learning Objectives**
   1. Obtain 4 views of the heart: parasternal long axis, parasternal short axis, apical 4 chamber, subxyphoid 4 chamber
   2. Identify left atrium, mitral valve, left ventricle, aortic valve, aorta, right ventricle, right atrium in each view
   3. Obtain qualitative assessment of global LV function (be able to determine <30% vs normal)
   4. Obtain qualitative assessment of chamber size and overload

Resources:

https://www.stanford.edu/group/ccm_echocardio/cgi-bin mediawiki/index.php/Main_Page

http://emergencyultrasoundteaching.com/ - Cardiac Ultrasound

www.sonosite.com/education/learning-center - Cardiac Ultrasound

Arntfield, R. Point of Care Cardiac Ultrasound Applications in the Emergency Department and Intensive Care Unit – a Review. Current Cardiology Reviews, 2012 (8) 2.

4. **Soft Tissue Ultrasound Learning Objectives**
   a. Identify the appearance of normal soft tissue
   b. Recognize the ultrasound appearance of cellulitis
   c. Differentiate between cellulitis and abscess

Resources:


http://www.sonoguide.com/abscess.html

http://emergencyultrasoundteaching.com/narrated_lectures.html -- Soft tissue lecture

5. **Procedural Ultrasound Learning Objectives**
   1. Identify internal jugular vein and common carotid artery
   2. Appreciate the differences between arteries and veins by ultrasound
   3. Verify central venous line placement
   4. Utilize ultrasound for peripheral venous access
5. Identify ascites
6. Appropriately mark site for paracentesis

Resources:

http://emergencyultrasoundteaching.com/narrated_lectures.html - Venous access lecture


www.sonosite.com – several videos on central venous line placement, US guided paracentesis

6. Hypotensive patient/Volume Assessment – Learning Objectives

1. Identify the IVC
2. Identify the junction of the right atrium and IVC
3. Measure the diameter of the IVC 2cm from IVC/right atrial junction
4. Assess for IVC collapse with respiration or “sniff test”
5. Correlate IVC diameter with estimated RA pressure
6. Obtain qualitative assessment of global LV function (be able to determine <30% vs normal)
7. Obtain qualitative assessment of chamber size and overload

Resources:


Byrne, M. Ultrasound in the Critically Ill. Ultrasound Clin 6 (2011) 235-259


http://emergencyultrasoundteaching.com/narrated_lectures.html - hypotensive patient and volume assessment lectures


http://learn-us.vanderbiltem.com/ - hypotensive patient
7. Literature Supporting Ultrasound Education for IM Residency Programs

