POCUS is the future of the physical exam

Mr. Hocus

- 49 year old man with no known pmh who p/w R>L LE swelling and erythema. Notes fevers and difficulty ambulating x 5 days

- Diagnosed with RLE cellulitis with sepsis, admitted to medicine.
  - ED Resident: “Obviously there’s probably more going on here”

Intern:
- Do you think he has a DVT and/or PE?
What is POCUS

How to use POCUS

Back to Mr. Hocus

Intern: Should we worry about urinary obstruction?

Renal POCUS
LIVE DEMO

What does a positive finding look like?

Hydronephrosis

Accuracy of hydronephrosis (in renal colic)
- Sensitivity 80%
- Specificity 77%


Back to Mr. Hocus

- Received 3L IVF in ED
- Lactate downtrended to 2.7
- Continued tachycardia to 110s
- Increasingly SOB, O2 89% on RA
- How can we get a better sense of his volume status?
Intern:
• I’m a little concerned about Mr H’s respiratory status with IVF resuscitation

Comprehensive Volume Status
- IVC vs IJ
- Pulmonary Edema
- Pleural Effusion
- +/- LV Function

IVC POCUS

LIVE DEMO
Mr. Hocus

IVC - Evidence

Two meta-analyses

- Cardiovascular Ultrasound, Aug '16
  - 21 studies, 1400 cases
  - IVC diameter to CVP ~ 0.76-0.91
  - IVC collapsibility to CVP ~ 0.66-0.93

- Acta Radiologica, Aug '16
  - 37 studies, 2800 cases
  - IVC to CVP ~ 0.44-0.68

JVP by Ultrasound

LIVE DEMO
Mr. Hocus

JVP - Evidence
- Ann Emerg Med '04
  - IJ height to BNP CC ~ 0.67
  - 100% sensitive/specific (only 8 patients)
- J Crit Care '12
  - IJ height
    - Hypervolemic pts ROC 0.73
    - Hypovolemic pts ROC 0.83
- Int J Clin Exp Med '15
  - IJ height to CVP CC ~ 0.66
- Med J Malaysia '15
  - IJ height to CVP CC ~ 0.64

Pulmonary Edema

LIVE DEMO
Mr. Hocus

Pulmonary Edema - Evidence

- Ultrasound as good or better than CXR for pulm edema
- Rapid diagnosis & Dynamic monitoring
- *Academic Emerg Med*, 2014 (systematic review)

94% sensitive, 92% specific for Acute cardiogenic pulmonary edema

Pleural Effusion

LIVE DEMO
Mr. Hocus

Pleural Effusion - Evidence

- Ultrasound highly sensitive for pleural effusion - better than CXR, equal to CT
- JAAC, '00
- > 90% sensitive for decompensated heart failure

Intern:
- Why did he get so overloaded so fast?
Gross LV function – Evidence
- Chest, 2009
- Intensivists in Hennepin County Med Center (Univ of Minnesota)
- 2hrs didactic + 4hrs hands-on training in LV function
- Within 2hrs of formal echo, intensivists did “bedside echo”
- Intensivist dx’d normal vs. mild-mod reduced vs. severely reduced LV fxn

Accuracy 82%

Two similar studies of EM physicians showed 84-86% accuracy

Pericardial Effusion – Evidence
- Annals of Emergency Medicine, 2001
- Emergency physicians at USC
- 1hr didactic + 4hrs hands-on training in ultrasound for peric eff
- 515 ED patients c high-risk for peric effusion (>20% had effusion)
- EM physicians performed cardiac scans and interpreted them
- Single cardiologist provided final read
- 93% technically adequate

96% sensitivity/98% specificity
Mr Hocus... resolution

- Fast
- Avoided formal tests
- Early involvement of appropriate consult services
- Helpful going forward

Why POCUS... really?

- Allows earlier diagnosis and treatment
- Avoids tests/reduces radiation exposure
- Reduces length of stay
- Reduces cost of stay
- Increases patient satisfaction (hands-on)

What is the scope of HM POCUS?

- Pleural effusion
- Pulmonary edema
- Pericardial effusion
- Ascites
- Aortic aneurysm
- Organomegaly
- IVC
- DVT
- IV systolic function
- Pericardial effusion
- Chamber size
- Hydronephrosis
- Pulmonary edema
- Pneumonia
- Pneumothorax
“The larger issue now is to decide whether we believe that building competency in ultrasound among generalist physicians – in this case hospitalists – will enhance patient safety, quality, and value. Personally, I do.”

- BW 2012

The future of physical exam

A generation of physicians will need to be trained to view this technology as an extension of their senses, just as many generations have viewed the stethoscope. That development will require the medical education community to embrace and incorporate the technology throughout the curriculum.

Solomon. Point-of-Care US in Medical Education. NEJM 2014

Major Challenges

- Training
- Credentialing and Privileging
- Hardware
- Research

Questions?

Credit: University of South Carolina  Point of Care US
How to learn more...

Email us:
- Trevor.Jensen@ucsf.edu
- Nima.Afshar@ucsf.edu

Self learning
- Nilam Soni. Point of Care Ultrasound
- Mallin & Dawson. Intro to Bedside Ultrasound

Take Hospitalist or critical care-targeted POCUS courses
- SHM
- ACP
- SUSME

EM or ICU colleagues