Introduction to Point-of-care Ultrasound

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Disclosures

- Consulting: Novartis, ScPharmaceuticals
- Research Grants: NIH

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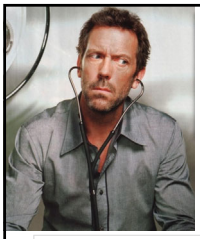

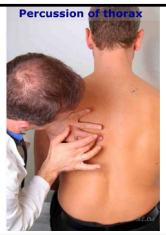

Overview

1. Introduction to POC ultrasound
2. Point-of-care echocardiography
3. Lung ultrasound

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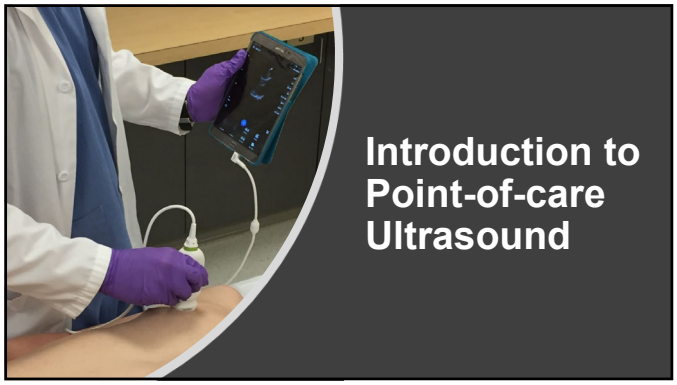

Introduction to Point-of-care Ultrasound

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Terminology

- Point-of-care ultrasonography
- Bedside ultrasound
- Emergency ultrasound
- Clinician performed ultrasound

- Handheld ultrasound
- Pocket ultrasound

- Focused cardiac ultrasound
- Focused echocardiography

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POC ultrasound: What is it?

CURRENT CONCEPTS

Point-of-Care Ultrasonography

Christopher L. Moore, M.D., and Joshua A. Copel, M.D.

The NEW ENGLAND JOURNAL *of* MEDICINE

Ultrasonography:
- brought to the patient
- performed & interpreted by provider in real time
- focused clinical questions

Moore C. NEJM 2011

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In good company…

Table 1. Selected Applications of Point-of-Care Ultrasonography, According to Medical Specialty.*

Specialty	Ultrasound Applications
Anesthesia	Guidance for vascular access, regional anesthesia, intraoperative monitoring of fluid status and cardiac function
Cardiology	Echocardiography, intracardiac assessment
Critical care medicine	Procedural guidance, pulmonary assessment, focused echocardiography
Dermatology	Assessment of skin lesions and tumors
Emergency medicine	FAST, focused emergency assessment, procedural guidance
Endocrinology and endocrine surgery	Assessment of thyroid and parathyroid, procedural guidance
General surgery	Ultrasonography of the breast, procedural guidance, intraoperative assessment
Gynecology	Assessment of cervix, uterus, and adnexa; procedural guidance
Obstetrics and maternal–fetal medicine	Assessment of pregnancy, detection of fetal abnormalities, procedural guidance
Neonatology	Cranial and pulmonary assessments
Nephrology	Vascular access for dialysis
Neurology	Transcranial Doppler, peripheral-nerve evaluation
Ophthalmology	Corneal and retinal assessment
Orthopedic surgery	Musculoskeletal applications
Otolaryngology	Assessment of thyroid, parathyroid, and neck masses; procedural guidance
Pediatrics	Assessment of bladder, procedural guidance
Pulmonary medicine	Transthoracic pulmonary assessment, endobronchial assessment, procedural guidance
Radiology and interventional radiology	Ultrasonography taken to the patient with interpretation at the bedside; procedural guidance
Rheumatology	Monitoring of synovitis, procedural guidance
Trauma surgery	FAST, procedural guidance
Urology	Renal, bladder, and prostate assessment; procedural guidance
Vascular surgery	Carotid, arterial, and venous assessment; procedural assessment

Moore C. NEJM 2011

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Why use POC ultrasound?

Life saving

Improved diagnostic accuracy

Time saving

Expedited care

Goal: Better clinical outcomes

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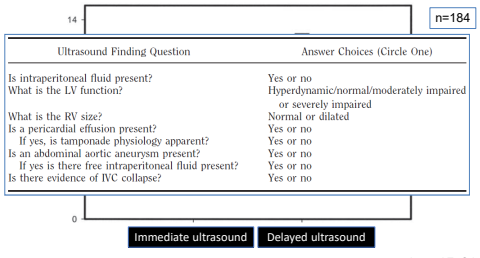
More rapid diagnosis in hypotensive, non-trauma ED patients



Ultrasound Finding Question	Answer Choices (Circle One)
Is intraperitoneal fluid present?	Yes or no
What is the LV function?	Hyperdynamic/normal/moderately impaired or severely impaired
What is the RV size?	Normal or dilated
Is a pericardial effusion present?	Yes or no
If yes, is tamponade physiology apparent?	Yes or no
Is an abdominal aortic aneurysm present?	Yes or no
If yes is there free intraperitoneal fluid present?	Yes or no
Is there evidence of IVC collapse?	Yes or no

Jones AE. Crit Care Med 2004

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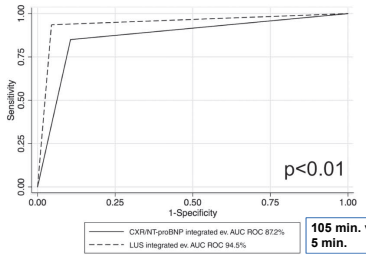
RCT: Lung ultrasound superior to CXR/NT-proBNP in AHF diagnosis



n=518

LUS: 8 zones

105 min. vs. 5 min.

Pivetta E. Eur J Heart Fail 2019

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Quality aspects

- Training
- Documentation:
  - Images
  - Report
- Continuous quality improvement

ACEP Policy Statement. Emergency Ultrasound Guidelines 2016

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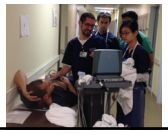
POC ultrasound training

Medical students	Residents & Fellows	Midlevel Providers	Faculty
• Anatomy • Physical exam course • ED ultrasound elective	• Ultrasound rotation (1 month) • ED rotations • Ultrasound fellowship (1-2 years)	• Ultrasound course • Hands-on training in ED	• Residency • Fellowship • Ultrasound course • Hands-on training in ED • CME



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Which ultrasound machine?

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Question

You are called to evaluate a 65 y/o male with h/o HTN, CAD and colon cancer who was just admitted from the Emergency Department to the ICU for presumed sepsis. On arrival in the ICU his vital signs are:

T 99F, HR 110, BP 90/60 mmHg, SpO2 96% RA

Point-of-care echocardiography may aid in the rapid bedside identification of:

a) A pericardial effusion
b) Right ventricular dilation
c) The degree of aortic stenosis
d) Both a) and b) are correct

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Take home points: Point-of-care ultrasound

Point-of-care cardiopulmonary ultrasound is useful diagnostic tool which can:

- Improve diagnostic accuracy
- Expedite patient care (not only in the ED)

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Free Online Resources

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