Internal Medicine PoCUS Curriculum Overview

Year 1

Core knowledge and skills

1. Principles of PoCUS
2. Basic ultrasound physics
3. Basic knobology (machine operation)
4. Fundamentals of image acquisition and optimization
5. PoCUS for procedures
    a. Central lines
    b. Paracentesis
    c. Thoracentesis
    d. Lumbar puncture
6. Clinical PoCUS
    a. Identify height of the JVP
    b. Introduction to scanning the IVC
    c. Introduction to scanning the pleura and lungs
    d. introduction to cardiac scanning

Curriculum Objectives

At the end of the R1 first year residents will be able to:
1. identify the scope of PoCUS and how it differs from diagnostic radiology
2. identify PoCUS applications of interest to internal medicine
3. identify how to safely apply PoCUS to patient care
4. relate basic ultrasound physics to image acquisition
5. utilize knobs to optimize image quality
6. efficiently produce reliable images
7. save and archive images
8. identify free fluid in the abdomen and chest using PoCUS
9. optimize procedural quality, success and safety with the use of PoCUS
10. identify the height of the JVP with PoCUS
11. identify IVC diameter and collapsibility index with PoCUS
12. identify pleural pathology with thoracic PoCUS
13. identify interstitial and airspace disease with thoracic PoCUS
14. identify the 4 basic cardiac views
15. apply PoCUS in the assessment of volume status
16. apply PoCUS in the assessment of dyspnea NYD
17. apply PoCUS in the assessment of hypotension/shock NYD

In order to meet the objectives above, the first year resident will be familiar with:

I. Fundamentals of PoCUS, physics and machine operation

1. Principles of PoCUS
    a. PoCUS is a limited rather than comprehensive exam focussed on a specific question

   b. PoCUS is NOT a stand alone investigation
   c. PoCUS must be interpreted within the clinical context
2. Safe use of PoCUS
   a. Practice within your skill set and avoid exam creep
   b. Do NOT apply PoCUS clinically until you have acquired competency in image acquisition, interpretation and clinical integration
   c. clearly understand the pitfalls associated with any given application
3. Basic ultrasound physics
   a. piezoelectric effect
   b. pulse echo principle
   c. beam focus
   d. relationship between frequency and penetration
   e. factors related to beam attenuation
   f. factors related to reflectivity of an object
   g. relationship between the angle of incidence and angle of reflection
   h. specular vs non-specular reflectors
   i. basic US artifacts
4. Basic knobology
   a. transducer selection
   b. preset Selection
   c. creation of a new exam
   d. gain
   e. depth
   f. focus
   g. frequency
   h. freeze
   i. modes: B-mode, M-mode, doppler
   j. saving a clip and still image
   k. retrieving images
5. Image acquisition and optimization
   a. optimize patient positioning
   b. proper handling of transducer
   c. transducer and image orientation
   d. conventional imaging planes
   e. external and internal landmarks
   f. sono-friendly windows and avoiding obstacles
   g. optimizing beam angles
   h. controlled and systematic movements of transducer

II. Clinical applications

1. Appearance of free fluid in abdomen and chest
   a. local anatomy
   b. characteristics of free fluid that differentiates it from contained collections
   c. mimics of free fluid
   d. appearance of abdomen and chest in absence of free fluid
2. Optimal location for performing para/thoracentesis
   a. largest pocket
   b. location of important structures
   c. pitfalls
3. CVC insertion

    a. planning for procedure
    b. direct needle and wire visualization
    c. confirming placement
    d. pitfalls
4. Identify the height of the JVP
    a. appropriate transducer and preset
    b. external and internal landmarks
    c. anatomy of anterior neck
    d. affect of patient position
    e. pitfalls of scanning and interpreting the IJ/JVP
    f. clinical application
5. IVC
    a. appropriate transducer and preset
    b. external and internal landmarks
    c. liver as a window
    d. anatomy of local structures
    e. location of assessment
    f. significance of IVC maximum diameter and collapsibility index
    g. pitfalls of scanning and interpreting the IVC
    h. clinical application
6. Lungs
    a. appropriate transducer and preset
    b. external and internal landmarks
    c. scanning protocols
    d. clinically relevant artifacts
    e. sonographic appearance and artifacts associated with pleura and lung parenchyma
    f. significance A lines, B lines and pleural movement
    g. pitfalls of scanning and interpreting lungs
    h. clinical application

III. Problem based applications

1. PoCUS for assessment of volume status
2. PoCUS for diagnosis and management of dyspnea
3. PoCUS for diagnosis and management of hypotension/shock
4. Protocols for accurate and efficient PoCUS exams
5. Pitfalls of PoCUS for clinical application