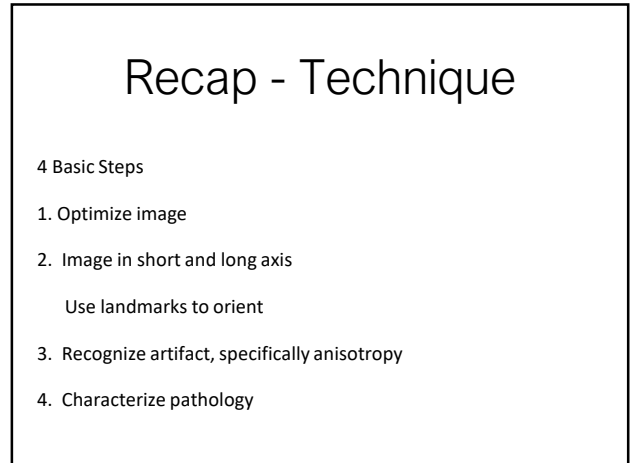
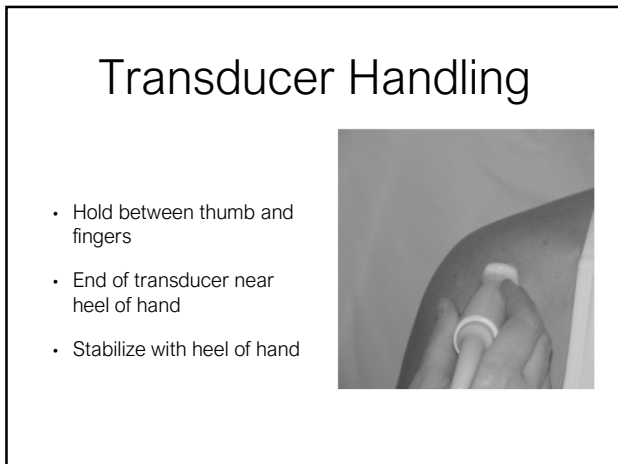


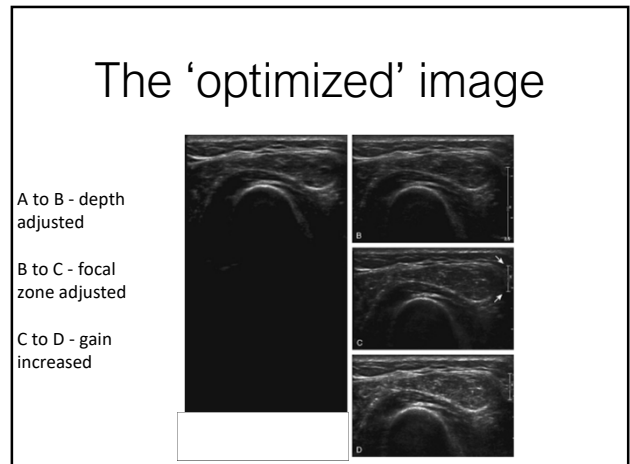
1



2



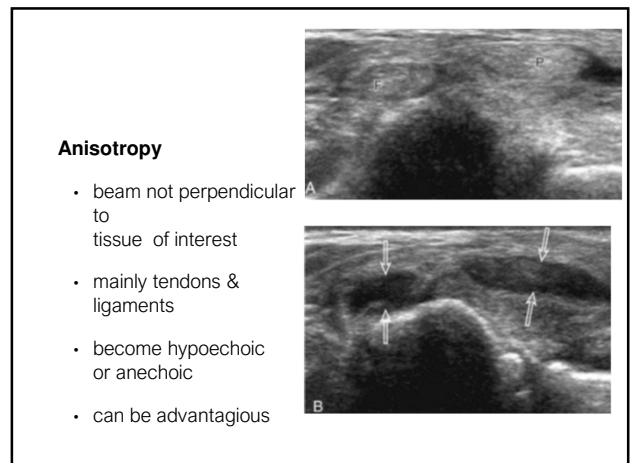
3



4



5



6

Shadowing

- beam reflected, absorbed, or refracted
- can extend deep to bone, calcification, foreign body
- requirement for cholelithiasis dx

7

Refractile shadowing

- at edge of some structures
- foreign body or torn tendon

8

Increased Through Transmission

- occurs when imaging fluid or soft tissue tumors
- deeper soft tissue appears hyperechoic
- also called "posterior acoustic enhancement"

9

10

11

Consequential Questions
of Clinical Medicine

12

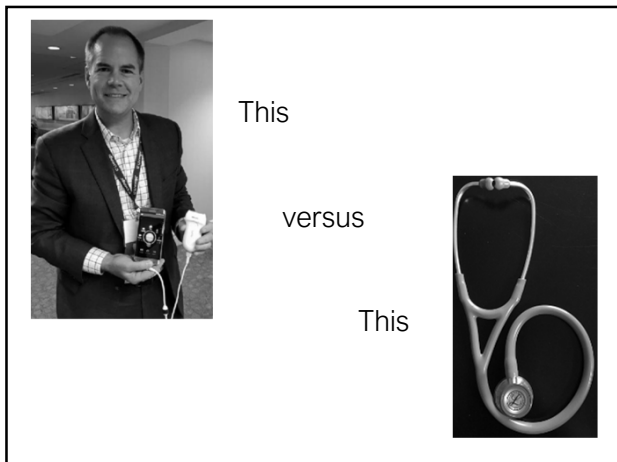
- Asthma/COPD exacerbation
- Pneumonia
- Cardiogenic pulmonary edema
- Pulmonary embolism

13

The Dyspnea Dilemma and Volume Status

Fast, Heart, Lung and IVC

14



15

Efficacy

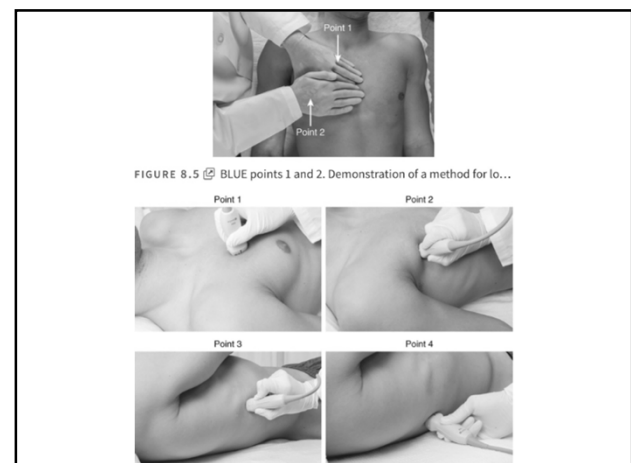
	LUS	Chest X-ray
Interstitial Syndrome	94%	46%
Consolidation	100%	38%
Effusion	100%	65%
Pneumothorax	88%	52%

16

Blue Protocol

- 4 point hemithorax exam
- Examines a total of 8 interspaces
- 90% accuracy diagnosing respiratory failure

17



18

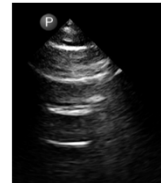
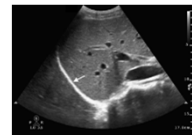
First - Lung

- Air is enemy of ultrasound
 - no transmission
- That's why gel or water immersion is used

19

Lung

- Fortunately, just as diaphragm is a strong reflector of ultrasound (mirror image artifact)
 - so is pleura
- In fact, lung ultrasound is more properly referred to as pleural ultrasound



20

Pleura

- Together, parietal and visceral pleura provides bright echogenic shadow and potential of multiple, equally-spaced echogenic reverberating shadows deep into the lung.



21

Pleura

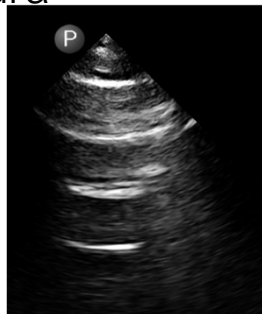
- When seen, underlying lung will be normal on X-ray and CT.
- Does not exclude asthma or COPD



22

Pleura

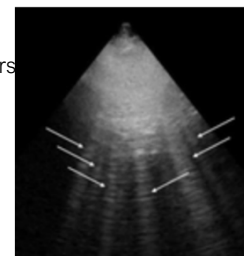
- These parallel, repetitive reflections are called 'A' lines.
- Only one is needed to signify normal lung.



23

Pleura

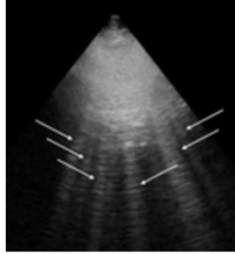
- So what is abnormal?
- Fluid distending the inter-lobular septae - interlobular syndrome
 - Consolidation
 - Effusion
- All can be detected



24

Pleura - interstitial syndrome

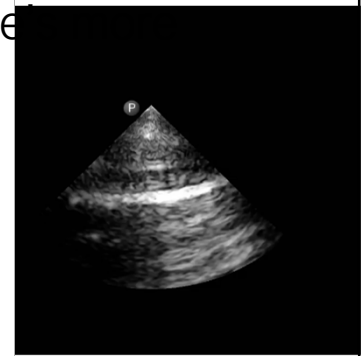
- 3 or more 'rockets' are called 'B' lines and signify inter-lobular fluid distension
- One side, questionably pneumonia
- Two sides, pulmonary edema



25

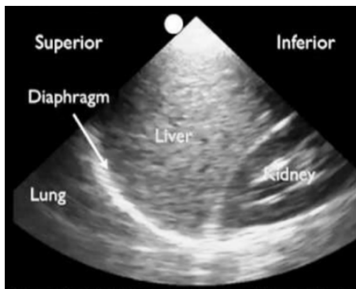
There

- Pleural shifting or "ants marching"
- 100% exclusion of pneumothorax



26

Effusion/Atelectasis



27

Effusion/Atelectasis

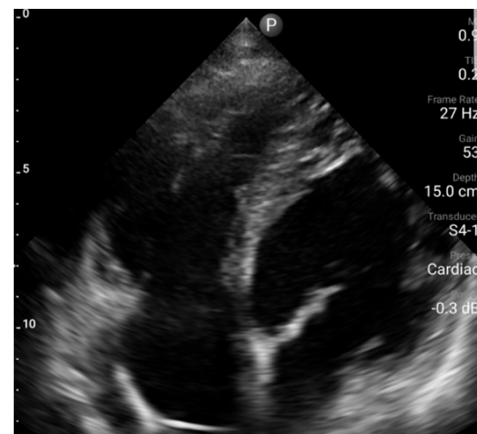


28

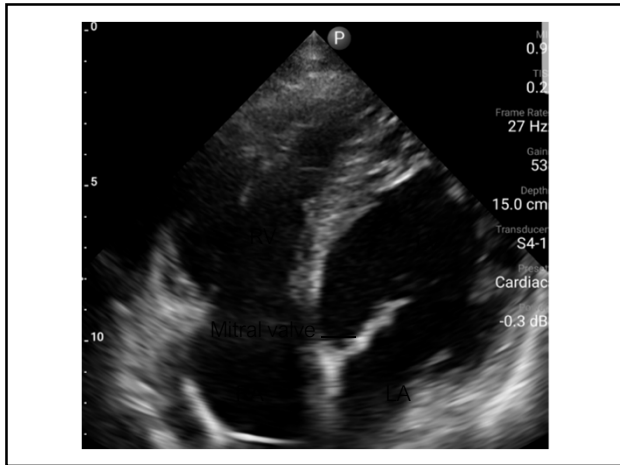
What's Left

- Cardiac Contractility
 - Hyperdynamic
 - Normal
 - Reduced
 - Severely reduced
- Ejection Fraction
 - Greater or Lesser than 40%
- Volume Status

29



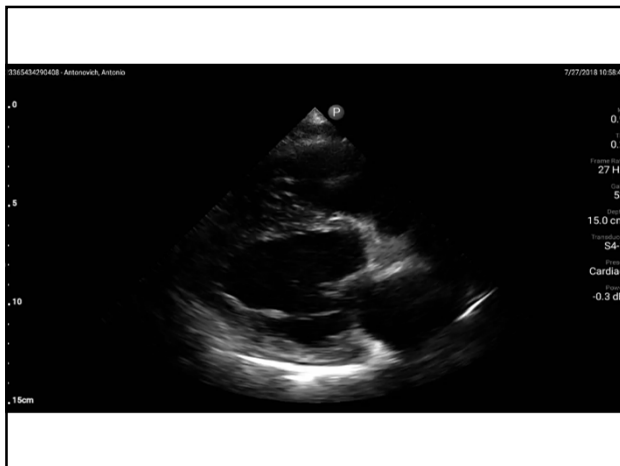
30



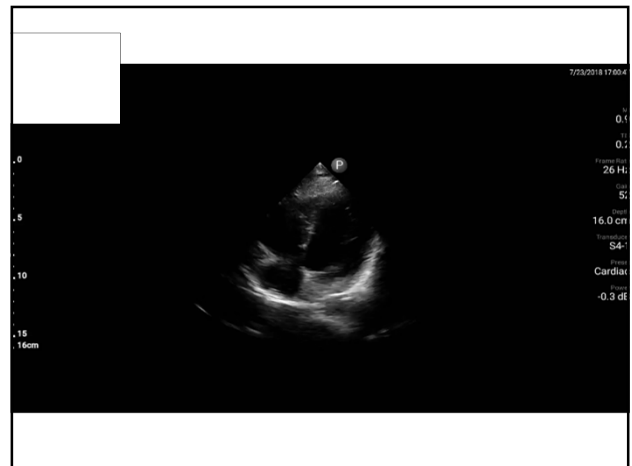
31



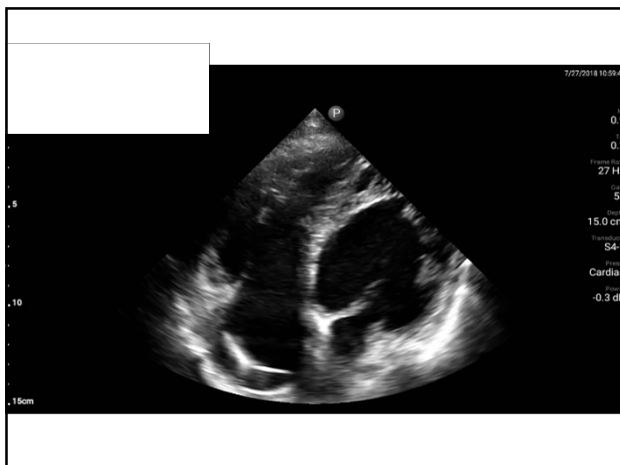
32



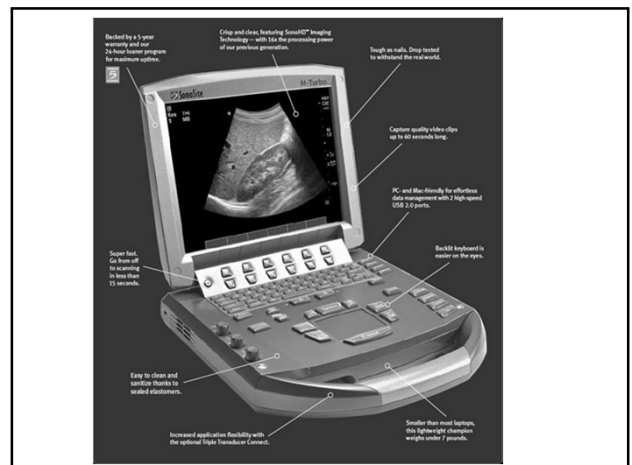
33



34



35



36