Lung Ultrasound

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What probe?

• Any!
• Curvilinear (abdominal) probe works well for everything.
• Linear probe good for anterior chest but not postero-lateral.
• Phased array (echo) probe will do all areas but not as good as curvilinear.
Where to put it
Where to put it
Where to put it
The Image
QuickTime™ and a Microsoft Video 1 decompressor are needed to see this picture.
B lines
B lines

• Diffuse, bilateral and widespread:
  – Pulmonary oedema
  – Pulmonary fibrosis

• Focal:
  – Pneumonia
  – Fibrosis (spared areas, non homogenous)
Pneumothorax
Consolidation
Pleural Effusion
QuickTime™ and a Microsoft Video 1 decompressor are needed to see this picture.
Is it useful in real life?
• Physical examination and CXR have a poor diagnostic accuracy in acute respiratory failure (approx 75%).

• A quick, simple lung ultrasound protocol has a diagnostic accuracy of 90.5%.
The BLUE protocol
Relevance of Lung Ultrasound in the Diagnosis of Acute Respiratory Failure*  
The BLUE Protocol  

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**Background:** This study assesses the potential of lung ultrasonography to diagnose acute respiratory failure.  

**Methods:** This observational study was conducted in university-affiliated teaching-hospital ICUs. We performed ultrasonography on consecutive patients admitted to the ICU with acute respiratory failure, comparing lung ultrasonography results on initial presentation with the final diagnosis by the ICU team. Uncertain diagnoses and rare causes (frequency < 2%) were excluded. We included 260 dyspneic patients with a definite diagnosis. Three items were assessed: artifacts (horizontal A lines or vertical B lines indicating interstitial syndrome), lung sliding, and alveolar consolidation and/or pleural effusion. Combined with venous analysis, these items were grouped to assess ultrasound profiles.  

**Results:** Predominant A lines plus lung sliding indicated asthma (n = 34) or COPD (n = 49) with 89% sensitivity and 97% specificity. Multiple anterior diffuse B lines with lung sliding indicated pulmonary edema (n = 64) with 97% sensitivity and 95% specificity. A normal anterior profile plus deep venous thrombosis indicated pulmonary embolism (n = 21) with 81% sensitivity and 99% specificity. Anterior absent lung sliding plus A lines plus lung point indicated pneumothorax (n = 9) with 81% sensitivity and 100% specificity. Anterior alveolar consolidations, anterior diffuse B lines with abolished lung sliding, anterior asymmetric interstitial patterns, posterior consolidations or effusions without anterior diffuse B lines indicated pneumonia (n = 83) with 89% sensitivity and 94% specificity. The use of these profiles would have provided correct diagnoses in 90.5% of cases.  

**Conclusions:** Lung ultrasound can help the clinician make a rapid diagnosis in patients with acute respiratory failure, thus meeting the priority objective of saving time.  

*(CHEST 2008; 134:117–125)*

**Keywords:** chest ultrasonography; COPD; ICU; interstitial syndrome; lung, ultrasound diagnosis; pneumothorax; pulmonary edema; respiratory failure

**Abbreviations:** BLUE = Bedside Lung Ultrasound in Emergency; PLAPS = posterolateral alveolar and/or pleural syndrome
STEP 1
Examine upper and lower BLUE points for lung sliding

STEP 2
Look for anterior A or B-lines

Bilateral B-lines

PULMONARY EMBOLISM

Bilateral A-lines

Venous US

PNEUMONIA

Unilateral B-lines or consolidation

B-lines

Lung point

PROBABLE PNEUMOTHORAX

A-lines

No lung point

STEP 3
Examine PLAPS-point

Consolidation

PNEUMONIA

No consolidation

COPD or ASTHMA
Thank you!