Certificate in Clinician Performed Ultrasound

(CCPU)

Syllabus

Lung

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Lung Syllabus

Purpose:

This unit is designed to cover the theoretical and practical curriculum for lung ultrasound in the diagnosis of lung parenchymal disease.

Prerequisites:

Learners should have completed the ASUM Physics Image Optimisation unit or accredited equivalent.

Training:

Recognised either through attendance at an ASUM accredited Lung course or equivalent.

Assessments:

Learners are required to perform supervised ultrasound scans with documentation in a logbook.

Note: this unit does not cover procedural guidance such as pleural aspiration and intercostal catheter insertion. For these, candidates are referred to the *Pleural Effusion* CCPU unit.

Unit Objectives

On completing this unit, candidates will be able to understand the:

- Clinical roles of lung ultrasound
- Clinical context and limitations which apply to lung ultrasound and ultrasound of the chest.

Identify, distinguish, and demonstrate a practical understanding of:

- Patient positioning for lung scanning using ultrasound
- The ultrasound (US) techniques required for scanning the lungs
- Attaining proficiency in ultrasound image optimisation in order to enable
- appropriate diagnosis
- The normal surface anatomy and artifacts: chest wall, ribs and costal cartilages, visceral and parietal pleura, pleural space, lungs, diaphragm, liver, spleen, and heart.
- Pleural effusions and types of fluid collection
- Pneumothorax and other causes of absent lung sliding
- Pulmonary oedema and the differences between cardiogenic and inflammatory causes of oedema
- Pulmonary fibrosis
- Pulmonary consolidation
- Pleural fluid
- Paralysed hemidiaphragm

Unit Content

The course will cover image interpretation and clinical context of lung ultrasound, including:

- The approaches available to scan the lungs, including their limitations and the overriding principle that enough lung surface must be scanned to sufficiently rule in/rule out the disease in question.

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- Ultrasound artifacts and equipment settings to optimize visualisation of the relevant lung artifacts including the role that certain controls (such as tissue harmonic imaging and compounding / multibeam) have in obscuring some of the US features of lung disease.
- Identifying and differentiating:
- Normal thorax, pleural and lung anatomy, movement and appearance on ultrasound.
- Pleural effusions and types of fluid collection
- B lines
- Pleural fluid (B mode and M mode) and giving qualitative estimates of the amount of pleural fluid as well as the echogenicity / nature of the fluid.
- Pneumothorax and its mimics including absent lung sliding, the lung point and absence of B lines, and use of M-mode.
- Pulmonary oedema and the differences between cardiogenic and inflammatory causes of oedema.
- Pulmonary fibrosis
- Pulmonary consolidation
- Paralysed hemidiaphragm
- B-pattern (formerly known as ‘lung rockets’ or ‘lung comets’)
- Consolidation, abscess, air bronchograms, contusion, infarction
- Pleural thickening
- Understanding the role of lung ultrasound in the:
- Arrested patient
- Breathless patient
- Shocked patient
- Febrile patient
- Understand the role of Lung ultrasound in critical illness and its integration into ALS protocols

Limitations and Pitfalls

The course will help students to understand the limitations of ultrasound of the lung.

Teaching Methodologies

All units accredited toward the CCPU will be conducted in the following manner:

- A pre-test shall be conducted at the commencement of the course which focuses the delegates on the main learning points.
- An appropriately qualified clinician will be involved in both the development and the teaching of the course and will be present for at least part of the course itself.
- Each course shall comprise at least 2 hours of teaching time, of which at least 1 hour shall be practical teaching, and another hour interpreting images of normal and pathological lung US findings and/or ultrasound phantoms. Stated times do not include the physics, artefacts and basic image optimization which should be provided if delegates are new to ultrasound. Time does not include teaching of practical procedures covered under the CCPU Pleural effusion unit.
- The lectures presented should cover substantially the same material as the notes printed in this curriculum document.
- Learners will receive handout materials for presentations
- The live scanning sessions for this unit shall include normal patient models and patients with appropriate pathologies (maximal candidate: tutor / machine ratio of 5:1). Models will include

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normal subjects and patients with B lines. Other pathology should be demonstrated at a practical 'image interpretation' session in which candidates must interpret images of the relevant pathology.

- An appropriately qualified clinician will be involved the development and delivery of the course (they do not need to be present for the full duration of the course).
- A post-test will be conducted at the end of the course as formative assessment.

Assessment and Logbook

- Evidence of satisfactory completion of training sessions
- Evidence of assessment of competence (summative assessment) signed off by a suitably qualified assessor (DDU, Radiographer, DMU or AMS or sonographer registered with NZ MRTB in the relevant field, CCPU in the relevant field or other qualification as approved by the CCPU board). The original completed competence assessment form is to be sent to ASUM with the candidate's completed log book.
- Logbook requirements need to be completed, and logbooks need to be submitted within two years of completing a course.

Formative Assessments

- Two formative assessments, directly supervised by a suitably qualified assessor (see above) with suggestions and advice provided during the scan.

Summative Assessment

- Summative assessment is to be performed by a suitably qualified assessor (see above) using the competence assessment form supplied at the end of this document (or equivalent if deemed sufficient by ASUM at their discretion). The original completed assessment is to be sent to ASUM with the candidate's completed log book.

Logbook Requirements

- Evidence of completion of logbook signed off by a suitably qualified supervisor (DDU, Radiologist, DMU or AMS or sonographer registered with NZ MRTB in the relevant field, CCPU in the relevant field or other qualification as approved by the CCPU Board).
- 25 scans in total (including 3 directly supervised assessments as noted above).
- At least 50% clinically indicated
- At least 5 positive (demonstrating the above pathology)
- All cases must be compared with gold standard findings (such as comprehensive imaging, pathological findings or if these are unavailable then clinical course).
- At the discretion of the ASUM CCPU Certification Board candidates may be allowed an alternative mechanism to meet this practical requirement.
- Those cases that involve a procedural component must be signed off by a suitable assessor who performs those procedures themselves.

Minimal Imaging Sets

The following are proposed as minimal imaging sets for focused ultrasound examinations for the CCPU units. It is understood that in many cases more images should be recorded to fully demonstrate the abnormality. In some cases the patient's condition will not allow the full set to be obtained (e.g. in an unstable patient), in which case the clinician should record whatever images are obtainable during the time available to adequately answer the clinical question without allowing the

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ultrasound examination to interfere with ongoing medical treatment. If local protocols recommend more images for a particular examination then these should be adhered to.

- Representative cineloops of lung bilaterally. Generally anterior, lateral and posterior images are taken which should include the images of the costophrenic recesses
- Specific cineloops should be recorded at sites of symptoms (e.g. pain) or signs (e.g. crackles)

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ASUM CCPU Competence Assessment Form
Lung Ultrasound

Candidate: _____

Assessor: _____

Date: _____

Assessment type: Formative (feedback & teaching given during assessment for education) ☐

Summative (prompting allowed but teaching not given during assessment) ☐

To pass the summative assessment, the candidate must pass all components listed

	Competent	Prompted	Fail
Prepare patient			
Position			
Informed			
Prepare Environment			
Lights dimmed if possible			
Probe & Preset Selection			
Can change transducer			
Understands roles of the different transducers			
Selects appropriate preset			
Discusses & justifies choice of probe orientation			
Understands effect of filters (eg THI & multibeam / crossbeam) on lung imaging			
Data Entry			
Enter patient details			
Image Acquisition			
Optimisation (depth, freq, focus, gain)			
Images & explains normal structures			
Chest wall			
Ribs / costal cartilages			
Pleural space			
Pleural sliding			
Able to differentiate lung sliding & cardiac motion on left chest			
Able to use M mode & explain its role &			

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limitations			
Lung			
Diaphragm			
Liver and spleen			
Heart			

Images & explains normal artefacts

Lung (pleural) sliding			
Scatter			
Lung curtain			
A lines			
B lines			
Lung pulse			

Interprets images of pathology (using library images if necessary)

Pleural thickening			
Pleural fluid			
B-pattern (including differential)			
Consolidated lung (incl differential)			
Absent lung sliding			
Presence of lung point			

Record Keeping

Labels & stores appropriate images			
Documents any pathology identified			
Completes report			
Each view adequate / inadequate			
Documents focussed scan only			
Describe findings briefly			
Integrates ultrasound findings with clinical assessment and explains how the findings might change management			

Machine Maintenance

Cleans / disinfects ultrasound probe			
Stores machine and probes safely and correctly			

For Formative Assessment Only:

*Feedback of particularly good areas:*_____

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*Agreed actions for development*_____

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Examiner Signature:_____ Candidate Signature:_____

Examiner Name:_____ Candidate Name:_____

Date:_____

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