

**Certificate in Clinician Performed Ultrasound
(CCPU)
Syllabus

Lung**

Disclaimer and Copyright: Content within this curriculum was accurate at the time of publication. This curriculum is subject to Australian copyright law. Apart from any use as permitted by law, no part of this curriculum may be copied, adapted, reproduced or distributed without written permission from The Australasian Society for Ultrasound in Medicine (ASUM). All enquires to be directed to education@asum.com.au.

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 Applied Physics in Ultrasound unit.

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.

Course Objectives

On completing this course learners should be able to demonstrate:

- 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

Course 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.
- 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.

Training

- Recognised through attendance at an ASUM accredited Lung course. (Please see the website for accredited providers)
- Evidence of the satisfactory completion of training course is required for unit award.

Teaching Methodologies for the Lung courses

All courses 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 two (2) hours of teaching time, of which at least one (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 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 to ensure the required learning objectives are met.

Assessments

- Two (2) formative assessments of clinical skills, specifically related to the assessment of the lung
- One (1) summative assessment of clinical skills, specifically related to the assessment of the lung

All assessments are to be performed under the supervision of the Primary Clinical Supervisor using the competence assessment form supplied at the end of this document.

Please refer to section 8 of the [CCPU Regulations](#) for information regarding timing and exclusion of these assessments in the logbook.

Logbook Requirements

- Twenty-five (25) lung scans, including at least five (5) positives (demonstrating the above pathology)
- A maximum of 50% paediatric cases (14 years and under) may be included in the logbook. Record in the column provided.
- All scans must be clinically indicated
- All cases must be compared with gold standard findings (such as comprehensive imaging, pathological findings or if these are unavailable then clinical course)
- All logbook cases must be signed off by a suitably qualified supervisor (see section 6 of the [CCPU Regulations](#))
- At the discretion of the ASUM CCPU Certification Board candidates may be allowed an alternative mechanism to meet this practical requirement

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

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

Prepare patient

Position
Informed

Competent	Prompted	Fail

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 & limitations
Lung
Diaphragm
Liver and spleen

Heart

--	--	--

Images & explains normal artefacts

Lung (pleural) sliding

Scatter

Lung curtain

A lines

B lines

Lung pulse

Competent	Prompted	Fail

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: _____

Agreed actions for development _____

Examiner Signature: _____ Candidate Signature: _____

Examiner Name: _____ Candidate Name: _____

Date: _____