MonashHealth

Training & Accreditation in Physician Performed Ultrasound

CHEST (PLEURAL EFFUSION)

Purpose of Document

This document describes the process for credentialing Respiratory physicians within Monash Health (MH) to perform

- Chest sonography for Pleural Effusion

Background

Physician performed Point of Care ultrasound (PoCUS) has become an accepted part of clinical management. The immediacy and availability of bedside ultrasound in a variety of clinical contexts means that patient management decisions can be more informed and made earlier. Physician performed chest ultrasound enables expedited management of patients with suspected pleural effusion and facilitates sonographic guidance of pleural aspirations/drainages for Respiratory Unit patients in clinic or ward.

Patients presenting with potential pleural effusions are common in both general and respiratory medicine, with pleural fluid aspiration and chest tube insertion being among the most frequently performed medical procedures. Thoracic ultrasound has been shown to be superior to both chest radiography and clinical examination in the detection of pleural fluid (Eibenberger 1994, Diacon 2003). Ultrasound-guided pleural aspiration and drain insertion have high success and low adverse event rates (O'Moore 1987). With correct training, Respiratory physician performed thoracic ultrasound has been shown to be safe and effective in the diagnosis and intervention of pleural effusion (Rahman 2011).

The Australasian Society for Ultrasound in Medicine (ASUM) supports the devolution of diagnostic ultrasound to the clinical specialties only where the necessary regulatory environment and infrastructure exist for the supervision of training in the medical and surgical specialties. ASUM states that the training of clinicians in medical ultrasound should be adequately funded and planned with a defined curriculum, standards and scope of practice that appropriately reflects the role of clinical diagnostic ultrasound within a defined specialty (ASUM, 2008). In this context, a PoCUS training and credentialing program was established in 2011 to support the use of ultrasound by clinicians in Monash Health.

MonashHealth

This document describes the training of chest ultrasound and supports learning in pleural drainage. On-going credentialing is provided in the performance of chest ultrasound only. Responsibility for all interventional procedures remains with the relevant Department Head. All ultrasound examinations are to be sent to Monash Imaging PACS for training and quality audit purposes. A physician ultrasound worksheet is to be completed for every examination. The clinician performing the scan will also record their findings and name clearly in the patient history.

Objectives

At the end of this module, the Respiratory Physician will be able to:

- Identify the sonographic anatomy of the chest, including lung, diaphragm and heart
- Optimise the ultrasound image to provide visualisation of the chest and lung
- Use different sonographic windows to insonate the chest
- Understand appearances of lung (air), rib and other artefacts
- Make the diagnosis of pleural effusion, consolidation, empyema and other pleural pathology
- Perform accurate volume measurements on pleural effusions (if required)
- Perform accurate fluid depth and skin depth measurements on pleural effusions
- Utilise ultrasound guidance for pleural aspiration and drainage procedures (separately credentialed by Respiratory Unit)
- Perform an ultrasound examination for Chest as documented in Appendix 1

Training

This document describes:

- A 3 stage process for accrediting Respiratory Physicians to perform CHEST scans

    1. Initial Training
    2. Skill Development / Electronic Log Book / MH Accreditation
    3. Ongoing Audit / Maintaining Skill

- A method for auditing log book and ongoing accreditation (image assessment)
- A direct practical competency evaluation the skills necessary to obtain and interpret ultrasound images for a Chest examination

MonashHealth

Prerequisites

To commence this module, the Respiratory Physician must have:

(a) completed an ASUM approved external ultrasound course covering Chest (pleural/lung)

b) completed ASUM approved ultrasound Physics online course or equivalent

(c) have their qualifications and suitability approved by Director/Unit Head of Respiratory Medicine before commencing

STAGE 1 - Initial Program Induction & Training

Initial training induction will be conducted by a PoCUS program Sonographer involving group or individual sessions in the clinic/ward covering:

(a) Optimisation of the Respiratory Unit ultrasound system

(b) Orientation to the MH Chest procedure

(c) Assisted Chest scanning of minimum 5 patients (one-to-one skills training)

Further personally guided learning will include:

(d) Viewing teaching tool of optimum image series, sonographic appearances of key chest pathology and ultrasound pitfalls

(e) Reading list of suggested journal articles and online tools

STAGE 2- Skill Development / Clincian eLogbook/ Accreditation

This stage requires the completion of a logbook which documents the completion of:

25 CHEST examinations

- An entry is only valid if the Physician is the person performing the examination
- Respiratory Physician is to record a minimum of 1 representative image per side examined

MonashHealth

- Logbook will include 5 positive cases for pleural effusion
- Multiple entries of same patient at same episode of care by is not acceptable
- Physician worksheet with patient ID label & US findings will be scan/emailed to pocusprogram@monashhealth.org
- Images will be sent to the Diagnostic Imaging server for upload to PACS (automatically by wi-fi)
- This process produces an electronic logbook for physicians and allows a process for auditing and ongoing feedback
- Physician will be provided with support and further training as required
- Feedback on image quality and diagnostic accuracy will be provided regularly during this stage
- Practical competency assessment will be conducted at the completion of logbook requirements
- **If Physician wishes to obtain an ASUM CCPU also, competency assessments can be conducted concurrently with Monash Health credentialing requirements and electronic logbook made available for submission. Note ASUM requires 5 pleurocentesis procedures to be included.**

QUALITY AUDITING & eLOGBOOKS

Regular auditing will be conducted and data maintained by PoCUS program sonographer. Quality audit reports will be provided to Directors of Ultrasound and Respiratory Unit. Examinations will be qualitatively assessed using a simple system assessing technical adequacy and diagnostic accuracy of examination, with reference to correlative imaging, surgical or clinical findings where available.

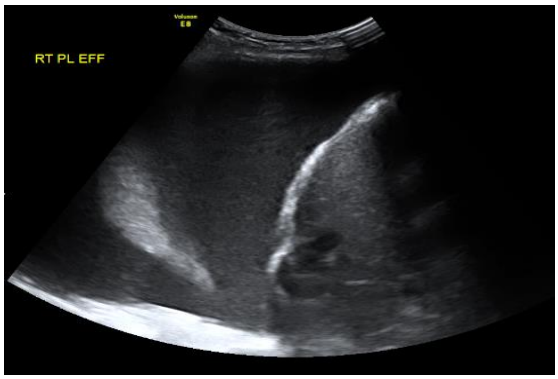
Audit results and comments for clinician feedback will be provided in personal elogbooks maintained for clinicians (see Chest US Audit Criteria). Examinations will be audited until a physician achieves MH credentialing. Thereafter, random audit of a minimum 5 examinations will be conducted yearly to ensure maintenance of skill and quality.

eLOGBOOK QUALITY AUDIT FEEDBACK	
3	**good scan, accurate diagnosis & technical quality**
2	**technical errors, but no misdiagnosis**
1	**false negative**
0	**false positive**

MonashHealth

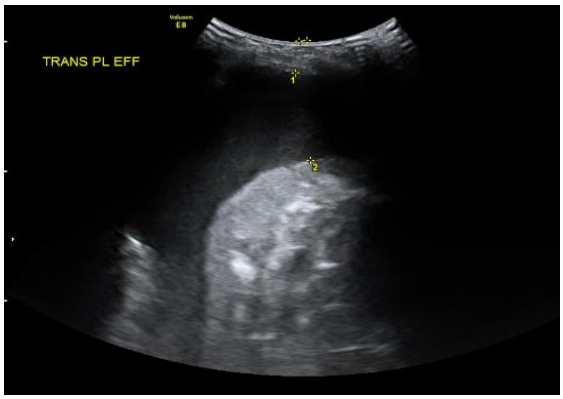
CHEST (PLEURAL) QUALITY AUDIT CRITERIA:

RIGHT or LEFT CHEST CORONAL/ LONGITUDINAL VIEW



- Coronal/longitudinal plane view in posterior axillary line
- Curvilinear array transducer on CHEST or LUNG preset
- Anatomy to include diaphragm, liver/spleen, lung curtain, chest wall & pleural space without rib shadowing obscuring pleural space
- Depth - adequate if no portion of pleural space & diaphragm cut-off OR deepest portion within the superficial half of the image field
- Gain/TGC - adequate to demonstrate pleural fluid without over-gain obscuring pleural space OR under-gain making liver/spleen appear anechoic
- Focal Zone - adequate if +/- 5cm mid image field
- Label - RT CHEST or LT CHEST

RIGHT or LEFT CHEST TRANSVERSE VIEW (optional if effusion present +/- marking)



- Transverse plane view in right posterior axillary line
- Curvilinear array transducer on CHEST or LUNG preset
- Anatomy to include chest wall, lung & pleural space without rib shadowing obscuring pleural space
- Depth - adequate if no portion of pleural space is cut-off OR deepest portion within the superficial half of the image field
- Gain/TGC - adequate to demonstrate pleural fluid & potential septations without over-gain obscuring pleural fluid OR under-gain making anatomy appear anechoic
- Focal Zone - adequate if +/- 5cm mid image field
- Measurements – skin depth & fluid depth (if required)
- Label - RT CHEST or LT CHEST

MonashHealth

ACCREDITATION

Once logbook requirements (25 minimum scan numbers and 5 positive cases) are completed, a brief practical competency assessment will be conducted by program Sonographer to achieve Monash Health credentialing. Assessments for concurrent ASUM CCPU credentials can also be completed at this time.

Alternative Accreditation Pathways

In certain select situations, alternative accreditation pathways may be considered for approval eg. ASUM CCPU, DDU or other credentialed holders from external institutions. This process would involve Monash Health PoCUS program induction, practical competency assessment & the completion of a minimum of five quality reviewed scans, to be reviewed & considered for approval.

STAGE 3: Ongoing Skills Maintenance

After completing the MH Accreditation process, the Respiratory physician is able to perform CHEST (PLEURAL) scans within MH. In order to maintain MH credentials they are required to:

1. Perform and log a minimum of 10 scans annually (no required number of positives)
2. Undertake 3 hours of ultrasound education annually, including a one hour refresher session to receive ongoing tuition through review of their own logged cases, audit results and practical scanning with Sonographer educator
3. Continue to document PoCUS scans with appropriate archived images uploaded to PACS, document US findings in patient history and scan/email worksheet to PoCUS program for ALL examinations performed within Monash Health

MonashHealth

CHEST (PLEURAL) Training & Evaluation

System Set-up

- Turns machine on, enter patient UR, surname & Dr initials
- Selects correct transducer
- Select correct exam preset

Transducer Positioning

- Orientates transducer and correlates with image
- Demonstrates the ability to manipulate the transducer to achieve the required images (sliding, rocking, rotating, heel-toe)

Image optimization

- Gain
- TGC
- Depth
- Focal zone
- Frequency

Image interpretation

- Identification of diaphragm, liver, kidney, spleen, stomach, bowel, lung, rib
- Identification of potential spaces for fluid (peritoneum, pericardium or pleural space)
- Recognition of the presence of fluid in peritoneum, pericardium or pleural space
- Differentiation between simple pleural fluid and complex fluid/blood
- Identification of collapse/consolidation
- Identification of lung artefacts & features including air curtain, pleural line, A & B-lines

Recognition of artefacts and how to modify image accordingly:

- Increased attenuation of ultrasound beam due to patient habitus
- Patient movement or respiration
- Shadowing from ribs
- Artefacts from air filled lung

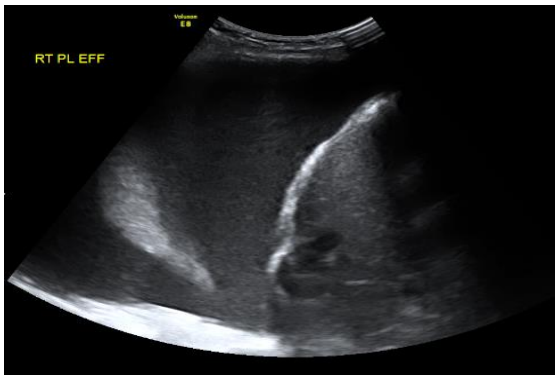
Integration of results to management of the patient

- Recognise the limitations of a scan and be able to explain these to patient/carer
- Recognise patients requiring formal imaging assessment
- Refer to Monash policy documents regarding clinical decision making and procedural guidance based on US findings

MonashHealth

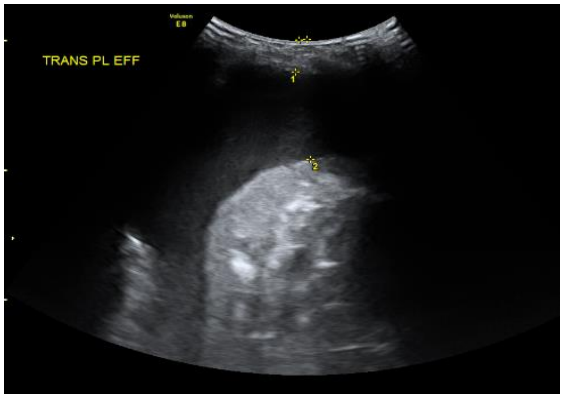
REQUIRED IMAGES

RIGHT or LEFT CHEST CORONAL/ LONGITUDINAL VIEW



- Coronal/longitudinal plane view in posterior axillary line
- Anatomy to include diaphragm, liver/spleen, lung curtain, chest wall & pleural space without excessive rib shadowing
- Label - RT CHEST or LT CHEST

RIGHT or LEFT CHEST TRANSVERSE VIEW (optional if effusion present +/- marking)



- Transverse plane view in right posterior axillary line
- Curvilinear array transducer on CHEST or LUNG preset
- Anatomy to include chest wall, lung & pleural space in rib interspace
- Measurements – skin depth & fluid depth (if required)
- Label - RT CHEST or LT CHEST

MonashHealth

Practical Competency Assessment for Accreditation

CHEST (PLEURAL) Ultrasound

Physician name:

Hospital:

Date:

Sonographer Educator:

Evaluation

Completion examination in ≤ 10 minutes

Satisfactory or Non-satisfactory only

Any score of 0 = Non-satisfactory

Scores 1 or 2 = Satisfactory (PASS)

2 levels PASS scores for feedback & areas for improvement

Patient consent & examination explained	**0** Incomplete or misinformation	**1** Explanation complete but brief	**2** Full explanation with indications & limitations
Patient ID entry	**0** Unable to complete task	**1** Accurate but not familiar with machine	**2** Accurate & confident data input
Selection of transducer & scan presets	**0** Incorrect or unable to select transducer/ settings	**1** Correct but some hesitancy in use of equipment	**2** Correct & confident use of equipment
Scan image optimisation	**0** Suboptimal image quality	**1** Optimizes image but hesitant use of machine	**2** Optimizes image with confidence
Demonstration of right & left chest anatomy	**0** Incomplete or inaccurate demonstration of chest anatomy	**1** Mostly demonstrated but some hesitancy in chest anatomy	**2** Confident & systematic demonstration chest anatomy
Interpretation of chest/ pleural pathology	**0** Misinterpretation of ultrasound appearances	**1** Correct but some hesitancy in interpreting appearances	**2** Correct and confident interpretation of appearances
Measurement of pleural effusion (if required)	**0** Incomplete or inaccurate measurement	**1** Mostly demonstrated but minor error	**2** Accurate measurements obtained
Documentation of examination	**0** Inappropriate images recorded	**1** Inconsistency in image quality recorded	**2** Consistent & appropriate images recorded
Recognition of image artefacts & limitations	**0** Unable to recognise artefacts or limitations of scan	**1** Hesitancy in recognition of artefacts or limitations	**2** Confident recognition of image artefacts & limitations of scan

MonashHealth

References:

Rahman N, Singanayagam A, Davies H, et al. Diagnostic accuracy, safety and utilisation of respiratory physician-delivered thoracic ultrasound. Thorax (2010); 65:449-453

Eibenberger K, Dock W, Ammann M, et al. Quantification of pleural effusions: sonography versus radiography. Radiology 1994;191:681-4.

Diacon A, Brutsche M, Soler M. Accuracy of pleural puncture sites: a prospective comparison of clinical examination with ultrasound. Chest 2003;123:436-41.

O'Moore P, Mueller P, Simeone J, et al. Sonographic guidance in diagnostic and therapeutic interventions in the pleural space. AJR Am J Roentgenol (1987);149:1-5

Australian Society of Ultrasound in Medicine (ASUM) Policy B8 Statement on the Use of Ultrasound by Medical Practitioners 2008; Crows Nest, NSW.

Australian Society of Ultrasound in Medicine (ASUM) CCPU Syllabus Pleural Effusion 2017; Crows Nest, NSW.

Australian Society of Ultrasound in Medicine (ASUM) CCPU Syllabus Lung 2017; Crows Nest, NSW.