

**Certificate in Clinician Performed Ultrasound
(CCPU)
Syllabus**

**Rapid Cardiac Echocardiography
(RCE)**

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.

Rapid Cardiac Echocardiography (RCE) Syllabus

Purpose

This unit is designed to cover the theoretical and practical curriculum for Rapid Cardiac Echocardiography. The Rapid Cardiac Echocardiography unit aligns with the College of Intensive Care Medicine's Focused Cardiac Ultrasound requirement in the Intensive Care syllabus (CICM FCU). The FCU will be a mandatory requirement for CICM trainees in order to obtain their Fellowship of CICM. Doctors who complete the CICM FCU requirement or any critical care doctor who obtains RCE via the ASUM pathway will be considered by CICM and ASUM to have equivalent qualifications. To be awarded the RCE CCPU by ASUM, doctors will need to complete the other CCPU requirements such current ASUM financial membership and successful completion of the online physics module. The RCA will no longer be offered by ASUM. However, doctors with RCA already awarded will be considered to have satisfied RCE/FCU criteria.'

Prerequisites

Learners should have completed the Applied Physics in Ultrasound unit.

Course Objectives

On completing this course learners should be able to demonstrate:

- Perform safe and accurate basic echocardiographic examinations,
- Demonstrate proficient image acquisition and optimization, utilising all standard views.
- Recognise normal cardiac anatomy, physiology and the anatomical relationship of the heart to surrounding organs and structures.
- Identify major cardiovascular pathology, particularly the more common life threatening cardiovascular abnormalities.
- Integrate echo into advanced life support protocols.
- Recognize the limitations of the course and situations when a referral for a second opinion is indicated.

Course Content

The course will present learners with the following material:

General & Technical Knowledge:

- Ultrasound Physics
- Common artefacts
- The ultrasound machine and Instrumentation
- Probe and preset selection
- Image optimisation – adjusting depth, frequency, gain, TGC
- Freeze, scroll, measure, label,
- Save images and measurements, echo loop acquisition

Basic Critical Care Echocardiography:

- Applications and limitations of transthoracic echocardiography in the critically ill patient
- Principles of 2D Echo Examination
- Acoustic Windows
- Imaging Planes
- Normal 2D Echocardiographic Anatomy
- Parasternal, apical and subcostal views
- Normal 2D Echocardiographic Measurements

Cardiac Anatomy & Physiology:

- Left Heart Assessment
 - Left ventricle chamber size, wall thickness & contraction
 - M-mode and its limitations
 - Left atrium – size
 - Mitral valve normal 2D echo anatomy
 - Aortic valve normal 2D echo anatomy
 - Aortic root
- Right Heart Assessment
 - Right Ventricle chamber size, wall thickness & contraction
 - Interventricular septum – position, shape & movement
 - Right Atrium – size
 - Tricuspid valve normal 2D echo anatomy
 - TAPSE
- Pericardium
 - Pericardial contour
 - Pericardial effusions
- Inferior Vena Cava
 - Size and shape: AP diameter
 - Respiratory variation (collapsibility/ distensibility)
- Other structures
 - Lung
 - Pleural effusion
 - Liver
 - Stomach

Major Critical Pathology:

Assessment of Volume Status and recognition of hypovolaemia:

- LV and RV chamber size and contraction
- LA and RA size

- Measurement of IVC size and respiratory variation

Recognition of LV systolic failure:

- LV size including chamber dimensions and wall thickness
- Assessment of global LV contraction
- Basic assessment of segmental LV contraction
- Assessment of ejection fraction

Recognition of RV systolic failure, acute and chronic cor pulmonale/pulmonary hypertension:

- RV size, shape and wall thickness
- Assessment of global RV contraction
- Use of tricuspid annular peak systolic excursion (TAPSE)
- Position, shape and movement of interventricular septum

Identification of Pericardial Effusion and Tamponade:

- Understanding of tamponade physiology
- Identification and quantification of pericardial effusion
- Differentiating pericardial and pleural effusions
- Recognising 2D signs of tamponade, including diastolic collapse of the RV free wall and RA wall, and inferior cava size and collapsibility.

Other Pathology:

- Thoracic aortic dissection and aneurysm
- Aortic root and ascending aorta diameter
- Abnormal aortic valve morphology and movement
- Pericardial effusion
- Pleural effusion
- Differentiation from pericardial effusion

Limitations and Pitfalls:

The curriculum does not cover:

- Assessment of LV diastolic function
- Evaluation of valvular function
- Assessment of LV filling pressures
- Calculation of cardiac output
- Calculation of pulmonary artery pressures
- Assessment of constrictive pericarditis

Training

- Recognised through attendance at an ASUM accredited RCE 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 RCE 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 learners on the main learning points
- Each course shall comprise at least eight (8) hours of teaching time of which at least five (5) hours shall be practical teaching. Stated times do not include the physics, artefacts and basic image optimization which should be provided if delegates are new to ultrasound
- Learners will receive reference material covering the unit curriculum.
- The lectures presented should cover substantially the same material as the ones printed in this curriculum document.
- An appropriately qualified clinician will be involved in both the development and delivery of the unit and course (they do not need to be present for the full duration of the course).
- The live scanning sessions for this unit shall include sufficient live patient models to ensure that each candidate has the opportunity to scan. Models will include normal subjects and patients with appropriate pathologies. If the latter are unavailable, there will be at least one image interpretation station with cineloops demonstrating the appropriate pathology.
- 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 rapid cardiac echocardiography ultrasound
- One (1) summative assessment of clinical skills, specifically related to the assessment of cardiac echocardiography ultrasound

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

- Thirty (30) RCE scans, including ten (10) 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

Please note: All assessments and logbooks are required to be completed by the Primary Clinical supervisor as outlined in the CCPU regulations.

ASUM CCPU Competence Assessment Form Rapid Cardiac Echocardiography (RCE)

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

	Competent	Prompted	Fail
Position			
Consent/Explanation			

Prepare Environment

Lights dimmed if possible			
---------------------------	--	--	--

Prepare Machine

Correct Position			
------------------	--	--	--

Probe & Preset Selection

Can change transducer			
Selects appropriate transducer			
Selects appropriate preset			

Data Entry

Enter patient details			
-----------------------	--	--	--

Image Optimisation

Appropriately adjusts machine to optimise image:

Depth			
Frequency (if required)			
Focus (if required)			
Gain / TGC			

Image Acquisition – Anatomy

Parasternal long axis view

Technique

Aligns on long axis			
---------------------	--	--	--

Identifies (and measures where appropriate*)

Left atrium*			
Mitral valve			
Anterior and posterior leaflets			
Chordae tendinae			
Papillary muscles			
Left ventricle* (end diastolic and systolic diameters)			
Aortic valve			
Aortic root*			
Interventricular septum*			

Right ventricle
Moderator band
Myocardium
Pericardium
Descending aorta
Lung

Parasternal short axis view

Technique

Aligns on short axis and scans from base to apex

Competent Prompted Fail

Identifies

Aortic valve
Pulmonary valve and trunk
Right ventricle
Tricuspid valve
Right atrium
Interatrial septum
Left atrium
Mitral valve leaflets
Papillary muscles
Left ventricle
Right ventricle
Aligns in correct orientation

Apical 4 & 5 chamber view

Technique

Can adjust from 4 to 5 chamber view

Identifies

Cardiac chambers
Cardiac valves
Inter ventricular and atrial septae

Subcostal view

Technique

Optimises view

Identifies

Liver
Stomach
Myocardium and septae
Pericardium and pericardial space
Cardiac chambers
Cardiac valves

Inferior vena cava

Technique

Attains longitudinal view
Attains transverse view
Measures appropriately

Normal Physiology

Describes normal LV size, function and assessment
Describes normal MV / TV appearance and function

	Describes normal AV appearance and function			
	Describes normal aortic root size			
	Describes normal RV size, function and assessment			
	Describes normal IVC size, appearance and respiratory variation			
Pathology				
	Describes changes consistent with hypovolaemia	Competent	Prompted	Fail
	Cardiac chambers			
	Interatrial septum			
	IVC			
	Describes changes consistent with RV systolic failure			
	RV size, shape, wall thickness			
	RV contractility incl. TAPSE			
	Interventricular septum			
	Describes changes consistent with LV systolic failure			
	LV size, wall thickness			
	Reduced ejection fraction and its assessment			
	Describes appearance of pericardial effusion			
	Identification and quantification			
	Differentiates pleural and pericardial effusions			
	Tamponade			
	Understands the physiology			
	Describes 2D Changes on echo (RV / RA / IVC)			
	Aortic root			
	Describes appearance of grossly dilated aortic root			
	Valve Dysfunction			
	Describes appearance of grossly abnormal valve function			
	Regurgitation			
	Stenosis			
Understands Limitations				
	NOT designed to assess for valve function			
	<i>Although gross dysfunction may be detected it may be missed</i>			
	NOT able to exclude dissection			
	NOT able to exclude pulmonary embolism			
	NOT designed to assess for regional wall motion abnormality			
	NOT designed to assess for diastolic dysfunction			
	NOT designed to give measurements of left or right-sided pressures			
Record Keeping				
	Stores / prints appropriate images			
	Writes appropriate report			
	<i>May use report proforma</i>			

Machine Maintenance

Cleans ultrasound probe appropriately
Stores machine & probes safely and correctly

Competent	Prompted	Fail

For Formative Assessment Only:

Feedback of particularly good areas: _____

Agreed actions for development _____

Examiner Signature: _____ Candidate Signature: _____

Examiner Name: _____ Candidate Name: _____

Date: _____