

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

**Basic Echocardiography in Life Support**

## Basic Echocardiography in Life Support (BELS) Syllabus

### Purpose:

This unit is designed to cover the theoretical and practical curriculum for Basic Echocardiography in Life Support.

### Prerequisites:

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

### Training:

Recognised either through attendance at an ASUM accredited Basic Echocardiography in Life Support course or equivalent.

### Assessments:

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

### Unit Objectives

On completing this unit learners should be able to understand:

- Normal heart and IVC appearance, including IVC collapsibility, pericardial fluid and chamber collapse
- Learners will be able to identify and discuss:
  - Sonographic signs of tamponade
  - Sonographic signs of cardiogenic shock
  - Sonographic signs of massive pulmonary embolism
  - Sonographic signs of sepsis and hypovolemia
  - The role of echo in cardiac arrest and its integration into ALS protocols
- Learners will be able to demonstrate the ability to interpret ultrasound in the following settings:
  - Echocardiography in the shocked or arrested patient
  - Fluid volume estimate in the shocked patient
- Learners will be able to demonstrate the following skills:
- 2-dimensional (B mode) Image acquisition:
  - Imaging the heart in parasternal long, parasternal short, apical 4 chamber and subcostal views.
  - Imaging IVC in longitudinal and transverse planes and assess IVC size and collapsibility
- Image interpretation:
  - Qualitative assessment of IVC, LV/RV size, LV contractility and volume status
  - Recognition of cardinal ultrasound findings in shock / arrest.
- Clinical correlation:
  - Integration of clinical picture and BELS findings
  - The role of BELS in guiding ongoing resuscitation

### Unit Content

The unit will present learners with the following material:

- The course will present basic normal heart, IVC and pericardium anatomy. It will also address IVC collapsibility, pericardial fluid and pericardial chamber collapse.
- The course will present the sonographic signs of:
  - Tamponade
  - Cardiogenic Shock
  - Massive pulmonary embolism
  - Sepsis and hypovolemia
- The course will present the appropriate techniques, physical principles and safety including:
  - Appropriate transducers, artifacts, windows, standard images, image optimisation in the context of a shocked patient
  - Imaging the heart in parasternal long, parasternal short, apical 4 chamber and subcostal views.
  - Imaging IVC in longitudinal and transverse planes and assess IVC collapsibility
  - Qualitative assessment of LV contractility
  - Appropriate integration of ultrasound in the setting of shock and cardiac arrest
  - Course faculty must include a member with experience in leading patient resuscitation teams during cardiac arrest / peri-arrest setting.

### Limitations and Pitfalls

Understand the limitations of ultrasound of heart and IVC in general, and BELS In particular, in the resuscitation and stabilisation of the shocked / arrested patient. Specific limitations of BELS include:

- Time: unlike a formal echocardiogram, the BELS exam is specifically a brief, time-limited exam.
- Technology: 2-dimensional (B mode) only. No use is made of M-mode or Doppler imaging, and there is little time to perform quantitative measurements.
- Role: resuscitation only. BELS is unable to rule out more subtle pathology such as valve disease or segmental wall motion abnormalities.

### 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 learners on the main learning points.
- Each course shall comprise least 6 hours of teaching time of which at least 4 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 course 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 that includes this unit 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, Cardiologist, DMU or AMS or sonographer registered by 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.
- Candidates are encouraged to demonstrate that they can obtain suitable images using both sector (cardiac) and curvilinear (abdominal) probes, if available, for both formative and summative assessments.
- Logbook requirements need to be completed, and logbooks need to be submitted within two years of completing a course.

### **Formative Assessments**

- 2 formative assessments (directly supervised 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).

### **Logbook Requirements**

- Complete 25 examinations; at least 5 examinations need to be in the setting of cardiac arrest or haemodynamic compromise.
- Review at least a further 25 examinations (may be performed by another operator or from an image bank).
- The total of 50 cases must include at least 2 cases of each of the following:
  - Tamponade,
  - Massive PE,
  - Left ventricular systolic failure,
  - Hypovolemia or distributive shock.
- All cases must be compared with gold standard findings (such as comprehensive imaging, pathological findings or if these are unavailable then clinical course)
- All cases are to be reviewed and signed off by a suitably qualified supervisor (DDU, Cardiologist, DMU or AMS or sonographer registered by NZ MRTB in the relevant field, CCPU in the relevant field or other qualification as approved by the CCPU Board).

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. during CPR), 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.

- Parasternal long axis
- Parasternal short axis at midpapillary level (+/- at mitral level and apex)
- Apical 4 chamber
- Subcostal long axis (+ subcostal short axis if not obtained from parasternal view)
- IVC long axis (+ IVC short axis if longitudinal views from lateral window).

*During CPR usually only a single window will be used such as subcostal (or less commonly a parasternal window). In these cases candidates must demonstrate they can obtain images without interfering with ongoing resuscitation.*

**ASUM CCPU Competence Assessment Form  
Basic Echo in Life Support 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

	<b>Competent</b>	<b>Prompted</b>	<b>Fail</b>
<b>Prepare patient</b>			
Position			
Informed			
<b>Prepare Environment</b>			
Lights dimmed if possible			
<b>Probe &amp; Preset Selection</b>			
Can change transducer			
Selects appropriate transducer			
Selects appropriate preset			
<b>Data Entry</b>			
Enter patient details			
<b>Image Acquisition</b>			
<i>NB - Candidates are encouraged to demonstrate that they can obtain suitable images using both sector (cardiac) and curvilinear (abdominal) probes, if available.</i>			
<i>Images heart from the following windows:</i>			
subcostal			
Parasternal long and short axes			
Apical 4 chamber			
IVC			
Optimisation (depth, frequency, focus, gain)			
<i>Identifies:</i>			
Pericardial space			
Right ventricle			
Left ventricle			
Right atrium			
Left atrium			
IVC			
<i>Without prompting, poses and answers the following questions:</i>			
Is the heart beating?			
Is there a pericardial effusion (and if so, are there signs of tamponade?)			
Is the LV hyperdynamic?			
Is LV function grossly reduced?			
Are there signs of RV Strain (elevated RV pressure)?			
Is IVC reduced and collapsing?			
Is IVC distended with reduced collapsibility?			

**Artefacts**

Identifies & explains the basis of common artefacts

Competent	Prompted	Fail

**Record Keeping**

Labels & stores appropriate images

Documents any pathology identified

Completes report

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: \_\_\_\_\_