Credentialling Workbook for Focused Echo in Life Support (FELS)

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Introduction

The Focused Echo in Life Support (FELS) is an ultrasound examination designed for use in the cardiac arrest/peri arrest scenario. It is not a formal echo and it is recognised that in many patients, not all views will be of good quality. In addition, some echocardiographic windows may be inaccessible due to other factors such as contemporaneous procedures (e.g. CPR).

It aims to obtain the following information:

- Detection of pericardial effusion
- Assessment of left ventricular (LV) size and systolic function
- Assessment of right ventricular (RV) size and systolic function
- Gross estimate of fluid status (may require integration with other imaging e.g. lung/IVC)

The findings are then integrated with other clinical information, to consider causes of haemodynamic instability, for example hypovolemia, cardiogenic shock, tamponade, massive pulmonary embolism. Notably this examination is not comprehensive and does not evaluate valves, spectral doppler or diastolic function. It should not be used in lieu of comprehensive echocardiography, where clinically indicated.

The basic pathway to competency follows a structure of: theory and introductory phase, supervised practice, experience and exit assessment of competence, the details of which can be found in this booklet.

The credentialing process requires candidates to:

- Complete an appropriate instructional educational program
- Perform and record a requisite number of supervised and logged emergency department ultrasounds
    - A minimum of 25 accurate examinations must be performed
    - At least 50% of these examinations must be clinically indicated
    - At least five should be performed in in critical situations (ie shock/periarrest/cardiac arrest)
    - At least five examinations should be performed under the direct supervision of a sonologist credentialled in FELS, or a cardiac sonographer
    - There should be a minimum of two formative assessments completed
- Evidence of review of clinical images/loops from a further 25 cases should be provided. The cases that demonstrate the required pathology are available on the ACEM Ultrasound resources page.
- Of the minimum 50 FELS examinations (25 performed and 25 reviewed), there must be at least 2 cases each of pericardiac effusion, right heart failure/ massive pulmonary embolism, hypovolaemia or distributive shock and left ventricular failure.
- Pass a summative assessment
- Once credentialed, meet ongoing maintenance requirements
    - At least three hours of ultrasound training per year
    - Perform or supervise a minimum of 25 FELS examinations per two-year cycle and maintain a logbook to prove this for audit purpose

Credentialling in Focused Echocardiography in Life Support (FELS)

Unit Completion form

1. Personal Details

Family name:

Given names:

Email Address:

2. Educational Program

☐Introduction to ED POCUS course certificate

☐USS physics course certificate

☐FELS theory course certificate

☐FELS practical course component met, and certificate provided

3. Experience phase

☐ I have used a logbook and the scans have been reviewed by a credentialled scanner/supervisor

☐ My logbook contains: 25 accurate FELS scans, including scans used for assessments

☐ 50% of these scans are clinically indicated

☐ 5 of the scans were performed in critical care situations (ie. Shock/peri arrest/ cardiac arrest)

☐ I have provided evidence of review of clinical images/loops from a further 25 cases

☐ Of the minimum 50 scans, there are at least 2 cases each of pericardial effusion, right heart failure/ massive pulmonary embolism, hypovolaemia or distributive shock

☐ The above requirements are clearly labelled and identifiable within my logbook.

4. Demonstration of Competence

☐ I have completed 2 formative assessments and 1 summative assessment

☐ Assessments are not completed on the same date

☐ All assessments are signed by both my supervisor and me.

5. Maintenance Requirement

☐ I acknowledge that to maintain these credentials I will undertake at least three hours of ultrasound training per year

☐ I acknowledge that to maintain these credentials I must perform or supervise a minimum of 25 RCE examinations per two-year cycle and maintain a logbook to prove this for audit purposes

Instructional Educational Program for RCE

1. **Basic Ultrasound Knowledge:** A formal course should include education on the Physics of Ultrasound and Instrumentation. Online Ultrasound Courses that provide this basic knowledge include the Australasian College for Emergency Medicine (ACEM) Ultrasound Course modules. Anyone can access these modules by creating an ACEM login. The Introduction to POCUS and Physics course can be found at Course: Ultrasound (acem.org.au) or https://elearning.acem.org.au/course/view.php?id=951
    a. **Physics:** Piezoelectric effect; Wave characteristics – cycle, frequency, period, wavelength, amplitude; Echogenicity; Image resolution; Attenuation; Doppler effect; Impedance; Artefacts; Bio-effects
    b. **Instrumentation**: Transducer types and selection; Transducer manipulation; Image labelling; Focu; Gain; Time gain compensation; Orientation; Scan planes; Image measurement; Infection control; Machine care and maintenance

2. **FELS Theory:** A formal course should instruct on normal anatomy, views obtained, possible findings, clinical algorithms and integration, limitations/pitfalls and reporting. ACEM also provides RCE learning modules Course: Ultrasound (acem.org.au) or https://elearning.acem.org.au/course/view.php?id=951
    a. **Anatomy:** Cardiac chambers, cardiac valves, pericardium, great vessels, lung
    b. **Echocardiography practice**: Parasternal long axis, Parasternal short axis, Apical 4 and 5 chamber, subcostal long and short axis, inferior vena cava.
    c. **Findings:** Pericardial effusion and tamponade; left ventricular size and systolic function; right ventricular size and systolic function; estimation of volume status; limitations/pitfalls; reporting
    d. **Integration into clinical practice and algorithms:** Haemodynamically unstable patient; cardiac arrest; provision of a simple report form for use in the peri-arrest/arrest setting which states the limited nature of the exam and what clinical questions have and have not been answered. This is to avoid confusion with the information that would be obtained by a comprehensive echocardiogram. =

3. **FELS Practical ultrasound sessions.** It is essential that practical ultrasound sessions include:
    a. Demonstration of correct application protocol for emergency indication.
    b. Minimum time – four hours
    c. Maximum student:instructor ratio – 5:1
    d. Live ultrasound models for scanning sessions, preferably including both normal subjects and patients with demonstrable pathology. Patients or professional-grade simulators are preferable for abnormal anatomy. However, they may not always be readily available. In such cases, ultrasound cineloops showing the same pathology may be substituted.

FELS

Focused Echo in Life Support is a limited ultrasound that aims to answer the following questions:

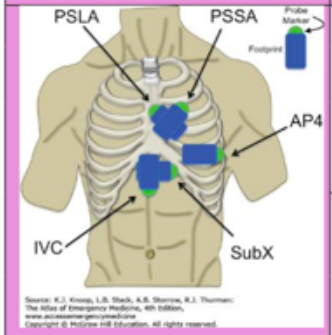
1. Is the heart beating?
2. Is there a pericardial effusion? (are there signs of tamponade?)
3. Is the LV hyperdynamic or is LV function grossly reduced?
4. Are there signs of RV strain?
5. Is the IVC size reduced and is it collapsing?

Patient details

Indication		**Pulse**	**BP**	**RR**	**Sats**

Examination Findings

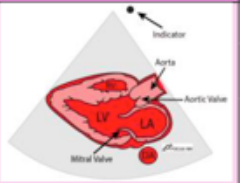
Probe Position



Preparation

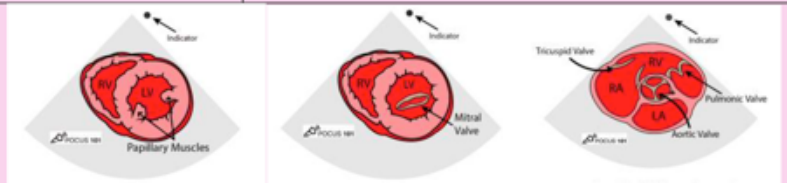
1. **Patient data** entry, label images
2. **Probe**: phased array, marker to left
3. **Pre-set**: cardiac
4. **Position:** supine (unwell), left lateral decubitus; head/shoulder up 30-45 degrees lights dim if possible
5. **Image optimisation:** depth, Res/Gen/Pen, gain, TGC

Views, Notes & Findings



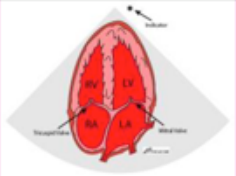
1. Parasternal Long Axis (PLAX)

Probe marker points to right shoulder, 2-4th ICS
Visual assessment of size: RV = aortic root = LA
Look at LV size and function (hyperdynamic, reduced)
Check pericardium for effusion



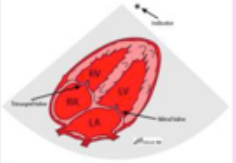
2. Parasternal Short Axis (PSSAX)

Marker to left shoulder & fan/tilt
Visual assessment of LV & RV size and function. Look for IVS bowing (D-shape)



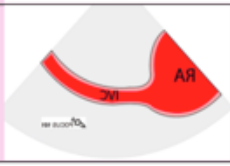
3. Apical Four Chamber (A4C)

Visual assessment of LV and RV size and function
RV to LV ratio <0.6-1
Is there RV strain – septal bowing, apical wink
Is there a pericardial effusion or tamponade (collapse of RA and RV during filling)



4. Subcostal/Subxiphoid

Visual assessment of LV and RV size and function
Is there a pericardial effusion or signs of tamponade?



5. IVC

Rotate probe marker ~90 degrees to point to head
Gross inspection +/- measure size of IVC and respiratory variability. IVC size in children is roughly the size of the aorta. Max IVC diameter is 2cm.

Findings				**Notes**
PLAX view	Adequate	Limited	Not obtained	
PSSAX view	Adequate	Limited	Not obtained	
A4C view	Adequate	Limited	Not obtained	
Subxiphoid	Adequate	Limited	Not obtained	
IVC view	Adequate	Limited	Not obtained	
Cardiac activity	Organised	Disorganised	None	
LV Function	Hyperdynamic	Normal	Grossly reduced	
RV strain	<u>Size</u> Normal Dilated	<u>Movement</u> Hypokinesis McConnell sign Interventricular septal bowing		
Pericardial effusion	Present Absent	Large >2cm Moderate 1-2cm Small 0.5-1cm	<u>Tamponade?</u> IVC distended RA collapse RV collapse	
IVC	Distended with reduced collapsibility (<50%)	Normal size and collapsibility (>50%)	Reduced size and complete collapsibility	

Conclusions (Note: FELS findings must be consistent with clinical suspicion: integrate history, examination, investigations and USS findings).

Clinician	Signature	Date	Time	Credit: Ultrasound Village, POCUS 101

Logbook requirements

Patients must be informed that the ultrasound examination is being performed for credentialing purposes and verbal or written consent obtained.

Ultrasound examinations must be documented in an appropriately secure logbook. The entry should include:

- Clinical details
- Date and type of ultrasound examination performed
- Findings
- Candidate's interpretation of those findings
- The findings and interpretation should subsequently be compared to other clinical data and a notation made as to whether the scan findings were accurate.
- Where the scan was not supervised there should be confirmatory evidence of the accuracy of the examination (via additional studies or clear clinical evidence).
- All logbook scans should be either directly proctored, or the images reviewed at a later date by one of the trainee's supervisors.

We encourage you to perform as many of your logbook scans as possible with a credentialed clinician in order to gain feedback.

A logbook template can be found on the CED Credentialling page under "Credentialling Resources"

Assessments

For each modality, at least two directly supervised formative assessments must be completed prior to a final summative assessment. Assessments forms can be found on the next page or on the CED Ultrasound website.

The final summative assessments and credentialing process must be overseen by a clinician who is themselves credentialed in that modality. They will observe the candidate performing the ultrasound examination and will not give any feedback during this examination. This may be undertaken simultaneously as a Direct Observations of Procedural Skill (DOPS) assessment for FACEM Trainees.

Once the examination requirements are satisfied, the emergency medicine practitioner will be credentialed for the appropriate ultrasound module. The emergency medicine sonologist may then document the results of his/her ultrasound scans in the medical record and incorporate the results into clinical decisions. ACEM has a formal link with the Australasian Society for Ultrasound Medicine. ACEM accepts successful completion of the Certificate in Clinician Performed Ultrasound (CCPU) as appropriate demonstration of competence.

CED POCUS Competence Assessment Form

Basic/Focused Echo in Life Support

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			
Selects appropriate transducer			
Selects appropriate preset			
Data Entry			
Enter patient details			
Image Acquisition			
NB - Candidates are encouraged to demonstrate that they can obtain suitable images using both sector (cardiac) and curvilinear (abdominal) probes, if available.			
Images heart from the following windows:			
subcostal			
Parasternal long and short axes			
Apical 4 chamber			
IVC			
Optimisation (depth, frequency, focus, gain			
Identifies: Pericardial space			
Right ventricle			
Left ventricle			
Right atrium			
Left atrium			
IVC			
Without prompting, poses and answers the following questions:			
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	**Competent**	**Prompted**	**Fail**
Identifies & explains the basis of common artefacts			

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:

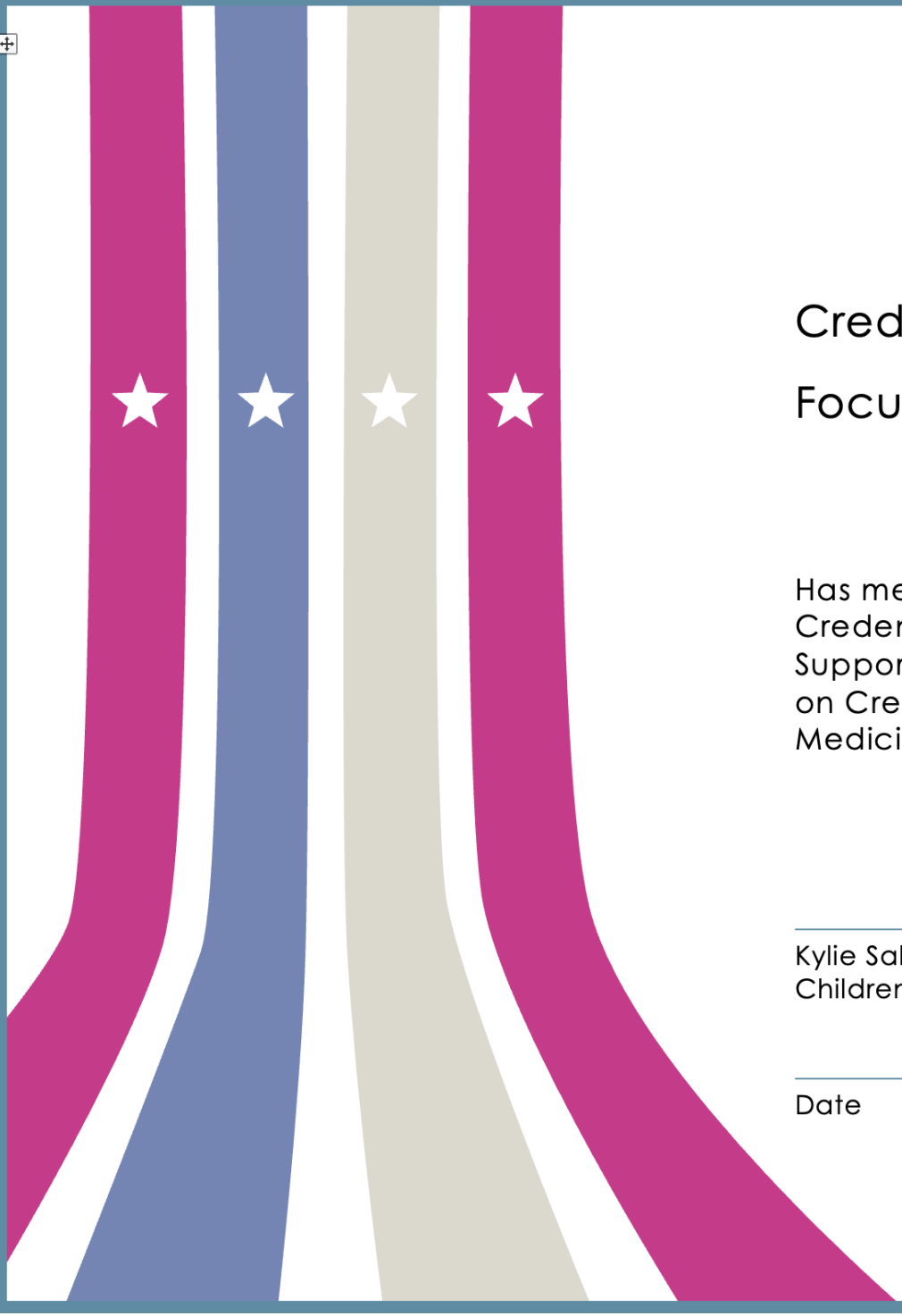
*Feedback of particularly good areas:*_____

*Agreed actions for development*_____

Examiner Signature:_____ Candidate Signature: _____

Examiner Name:_____ Candidate Name:_____

Date:_____



Credentialling Certificate in Focused Ultrasound

Has met the requirements for Credentialling in Focused Echo in Life Support as outlined in the ACEM Policy on Credentialling for Emergency Medicine Ultrasound (P733)

Kylie Salt (Clinical Lead in US, CED, Starship Children's Hospital, Auckland, NZ)

Date

Credentialling Maintenance

To maintain his/her credentials, the emergency medicine sonologist should undertake at least three hours of ultrasound training per year. This may include:

- 1:1 training with a qualified Sonographer Educator in ED (SEED);
- attending or presenting at an ultrasound webinar/workshop or conference;
- teaching on an accredited course;
- participation in ultrasound quality assurance and retrospective image review; and
- reading Ultrasound journals or textbooks.

For the RCE module, the emergency medicine sonologist must perform or supervise a minimum of 25 scans per two-year cycle. It is recommended these are logged in a logbook for audit purposes. An example logbook could contain the following columns:

- Date
- Case for 14 years and under?
- Supervised scan? (Did you supervise this scan, rather than personally perform?)
- Trainee's name (if supervised scan)
- Clinical Indication (indicate the symptoms or condition that substantiates the necessity for further investigation by an ultrasound scan)
- Positive?
- Interpretation and Clinical Findings
- Comparison with further imaging or clinical outcome