SLO6 - Point of Care Ultrasound Competence Entrustment Scale

Guidance for Education and Training

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The following document is to guide trainees and supervisors regarding requirements towards achieving the entrustment scale levels as according to the 2021 RCEM curriculum.

To become fully competent (Entrustment Scale 4) in the procedural and diagnostic ultrasound scans, learners should adopt a stepwise and continuous process for acquisition, progression, and maintenance of skills and knowledge. This would also include ongoing Continuous Professional Development to ensure continued safe practice, and adequate supervision of others.

Ongoing work-based assessments including CbD, Mini-CEX and DoPS alongside reflections can be used to demonstrate competence, completely replacing the previous triggered assessment model. This guide recommends what learners would need to know and demonstrate per Entrustment Scale stage.

The Entrustment Scale Format

1	Direct supervisor observation/involvement, able to provide immediate direction/ assistance
2a	Supervisor on the 'shop-floor' (e.g. ED, theatres, AMU, ICU), monitoring at regular intervals
2b	Supervisor within hospital for queries, able to provide prompt direction or assistance and trainee knows reliably when to ask for help
3	Supervisor 'on call' from home for queries, able to provide directions via phone and able to attend the bedside if required to provide direct supervision
4	Would be able to manage with no supervisor involvement (all trainees practice with a consultant taking overall clinical responsibility)

Assessments can be carried out during patient encounters or simulation-based teaching. See **Appendix 1** for suggested evidence and timeline.

General Physics/Artefacts/Settings/Probe manipulation & language, and Governance & Administration (**See separate document**) are crucial generic competences in ultrasound to demonstrate a safe practice, and is recommended to be reviewed and assessed alongside all the specific procedural and diagnostic scans.

Generic Behaviours

With every scan competence there is a set 'behaviours' that are expected to be demonstrated by the operator. These have not been explicitly replicated in every decision aid tool, but is recommended to be followed in each instance. Expected behaviours are listed below.

Practice

- Introduces self to the patient
- Offers pain relief
- Offers chaperone
- Aware of confidentiality
- Ensures supervisor presence appropriate to the stage of training
- Knows when to ask for help
- Awareness of own limitations and limitations of ultrasound as the appropriate investigation
- Uses diagnostic findings alongside clinical assessment to make a management plan with supervisor

Safety

- Ensures transducers are cleaned before and after use
- Enters patient details into the ultrasound machine
- Identifies self as operator to the patient and saved into the machine
- Saves and labels images
- Understands the importance of ergonomics when scanning and sets up equipment appropriately
- Communicates the results to patients appropriately, explaining if further imaging and investigations is required as well as referral to a specialist
- Documents a clear and concise report in the patient record (using a standardised form, if possible, as per local policy)

Personal accountability

- Maintains logbook of scans performed with appropriate reflection
- Compares own ultrasound findings to other imaging
- At least 1 scan/2 weeks (entrustment 1), 1 scan/week (entrustment 4)
- Recognises and acts on abnormal findings appropriately and proportionally
- Understands when to request further imaging and investigations, and refer
- Engages in regular image review with supervisor to improve competence

Entrustment scale guidance for Ultrasound-Guided procedures

When performing any invasive procedures, trainees should demonstrate the following behaviours to ensure that procedures are performed in a safe manner with patients fully informed of the risks and benefits.

Infection control
All operators must ensure that ultrasound machines are cleaned before and after use by the appropriate cleaning agent recommended (usually a non-alcohol based).

Aseptic techniques should be performed using transducer covers if there is a risk of contact with blood or bodily fluid.

Patient consent
Patients are required to give appropriate consent for procedures if able to do so, written consents might need to be used if/when required, all based local policy. Use of local checklists is recommended.

Further learning and competency maintenance
Once learners have been assessed as competent (Entrustment Scale 4), demonstrating ongoing continuing professional development is vital to maintain skills and knowledge. Intermittent direct and retrospective review of scans with trainers alongside self-audit of performance and reflection is encouraged. Continued log of scans is also recommended, **Appendix 1** includes indicative numbers of logged scans.

Supervision and training of others would be encouraged as a part of maintaining competency.

Peripheral IV access

	Skills	Knowledge
1	Prepares the equipment required. Positions patient appropriately. Appropriate transducer choice (linear). Appropriate pre-set choice. Correct transducer orientation.	Completion of RCEM ultrasound guided IV access e-learning module. Normal anatomy, and sonographic representation of structures (femoral vein, artery, nerve, fascia layers, muscles). Use of local documentation required for patient notes. Awareness of absolute and relative contraindications.
2a	Can dynamically identify sonographic representation of structures during the procedure (veins, arteries). Optimises image having vessel in centre of screen.	Consider other options first for an urgent clinical need such as external jugular/intraosseous access.
2b	Can dynamically identify sonographic representation of structures during the procedure both in- and out- of plane. Select the appropriate needle entry point.	Understands the relationship between cannula length, depth of vessel and angle of approach required to successfully perform procedure. Plan for when a standard length cannula is likely to fail when depth >1.5cm.
3		Awareness of alternative devices (long lines, mid lines) required if standard length is not suitable.
4	Competent to perform. Supervises others to perform the procedure safely, effectively, and efficiently.	

Central IV access

	Skills	Knowledge
1	Prepares the equipment required. Positions patient appropriately. Appropriate transducer choice. Appropriate pre-set choice. Correct transducer orientation.	Completion of RCEM ultrasound guided IV access e-learning module. Normal anatomy, and sonographic representation of structures (internal jugular/femoral vein, artery, nerve).* Pharmacology of different local anaesthetic agents, and appropriate dosage. Absolute and relative contraindications.
2a	Can dynamically identify sonographic representation of structures during the procedure (femoral/internal jugular vein, arteries).	Aware of potential complications of procedure and how to manage them. Including haematoma formation and inadvertent arterial puncture. Can manage local anaesthetic toxicity.
2b	Can dynamically identify sonographic representation of structures during the procedure (particularly vein and artery) both in- and out- of plane. Selects an appropriate needle entry point.	Can confirm successful cannulation of vessel via direct visualisation of needle in vessel, aspiration of blood and wire in vessel prior to dilation. Organises chest x-ray.
3	Perform the whole procedure in a timely fashion.	How to transduce the central line.
4	Supervises others to perform the procedure safely, effectively, and efficiently.	

*Subclavian anatomy is also relevant if performed in local centre.

Fascia Iliaca Compartment Block

	Skills	Knowledge
1	Prepares the equipment required. Positions patient appropriately. Appropriate transducer choice. Appropriate pre-set choice. Correct transducer orientation. Orientates the patient, US machine and operator in a single optimal 'line of sight' in order to maximise first pass success.	Completion of RCEM Fascia iliaca compartment block (FICB) e-learning module. Can identify normal surface anatomy, and sonographic representation of structures (femoral vein, artery, nerve, fascial layers, muscles). Approach for either fascia iliaca plane block or femoral nerve block. Understands pharmacology of different local anaesthetic agents, analgesic adjuncts and appropriate dosage. Absolute and relative contraindications to the procedure. Understands the difference between in-plane and out-of plane needle visualisation techniques. Use of local FICB proforma.
2a	Can dynamically identify sonoanatomy during the procedure (femoral vein, artery, nerve, 2 fascial layers and muscles). Can manipulate transducer and needle position to visualise needle tip at all times during the procedure	Understands that FICB is ideally performed using an in-plane needle visualisation technique Awareness of appropriate monitoring requirements post FICB. (recommended monitoring for 30 minutes, every 5 minutes)
2b	Recognises and corrects needle tip position if the administration of local anaesthetic agent is not within the myofascial compartment.	Can identify and manage local anaesthetic systemic toxicity. Can identify/ manage complications of procedure such as haematoma formation, inadvertent vessel puncture and perineural infiltration
3	Confidently administers the local anaesthetic agent within the correct myofascial compartment. Perform the procedure within a timely manner (suggest less than 15 minutes).	Two main approaches are possible with FICB (*infra-inguinal and supra-inguinal).

4	Can confidently perform either FICB approaches. Supervises others to perform the procedure safely, effectively, and efficiently.	Appreciates the difference between fascia Iliaca compartment block (FICB), femoral nerve block, and pericapsular nerve group block (PENG).

*Infra-inguinal and supra-inguinal approaches can be used depending on local training and guidance.

Entrustment scale Guidance for Bedside Diagnostic Ultrasound Studies

Focused assessment for free fluid (FAFF)/Focused assessment with sonography in trauma (FAST/eFAST)

Expected Views Obtained:

Abdominal Views

- Right Upper Quadrant View
- Left Upper Quadrant View
- Suprapubic/ Pelvic view (longitudinal and transverse)
- Subxiphoid view

Thoracic Views

- Single Anterior Pleural view bilaterally for lung sliding, 2D and M-mode
- Single lower lateral, costophrenic angle view bilaterally for free fluid above the diaphragm.

	Skills	Knowledge
1	Positions patient appropriately Appropriate transducer choice Appropriate pre-set choice Correct transducer orientation	Completion of RCEM eFAST e-learning module Standard e-FAST windows (RUQ, LUQ, pelvic, subcostal cardiac, pleural)
2a	Chooses appropriate transducer for abdominal or pleural imaging. Able to change transducer as required Orientates the patient, US machine and operator in a single optimal 'line of sight'. Able to demonstrate transducer movements (sliding, fanning, rocking and rotation) to obtain views required.	Image optimisation using depth and gain **Abdominal Views** Able to describe and recognise key FAFF/eFAST views (RUQ, LUQ, pelvis, subxiphoid cardiac and pleural views). Recognises the appearance of free fluid. **Lung Views for EFAST** Able to identify and demonstrate Normal Lung appearances and artefacts:

		● Identifies normal lung- pleura and lung sliding ● M-mode appearance of normal lung ● Artefacts- A-lines, comet tails
2b	Able to obtain FAFF/FAST views, ensuring to fan transducer through structures rather than looking at a single image. **RUQ view:** Can obtain view above and below diaphragm Morrison's Pouch Caudal tip of the liver **LUQ view** Can obtain view above and below diaphragm Can identify spleen, kidney and diaphragm **Pelvic view** Can demonstrate transverse and longitudinal views and centre structures on screen **Subcostal View** Is able to obtain 4 chamber subcostal views and identify Left and Right ventricles. **Lung Views for EFAST** Can obtain two anterior pleural views (1 on each side) and 2 lower lateral costophrenic angle views above diaphragm) Able to optimise image. Able to eliminate rib shadows by rotating transducer/sliding into rib space. Able to more consistently identify pathology (i.e free fluid/absent lung sliding) or able to detect abnormal and seek advice/consultation.	**Abdominal Views** Able to demonstrate where free fluid would accumulate and high-yield areas (eg. caudal tip of the liver, perisplenic and pelvic adnexae) Understands limits of FAFF/eFAST and aware of common false positives (eg. cystic structures appearing like free fluid, physiological free fluid in PoD in females, etc). Appreciation of the different appearance of organised/clotted blood compared to anechoic free fluid. **Lung Views for EFAST** Understands physics of normal artefacts and why helpful when interpreting images. Able to describe and recognise relevant artefacts (eg. mirror image/reverberation/ring-down artefact). Good recognition of normal lung appearance. Can identify or describe findings suggestive of pneumothorax: ● Loss of pleural sliding ● Barcode sign on M-mode Can identify fluid above the diaphragm representing effusion or haemothorax.
3	Competently performs a FAFF/eFAST scan in a timely manner and consistently interprets findings/detect pathology. Able to troubleshoot and perform basic image optimisation with minimal direction/prompting. **Lung Views for EFAST** Views as per 2b	**Abdominal Views** Appreciation of pitfalls and common errors with FAFF/eFAST and is able to describe and how to avoid. Can describe or identify lung pathology in trauma: **Lung Views for EFAST** Pneumothorax: As per 2b

	Able to identify spine on lower lateral views and where spine sign would be found.	Effusion- spine sign, sinusoidal sign, visualise floating lung. Understands physics of loss of mirror image artefact in effusion/haemothorax
4	Able to independently perform and interpret a complete FAFF/eFAST scan in a timely manner without interfering with the resuscitation and other priorities. Demonstrates good fanning through structures and can identify normal anatomy whilst doing this (RUQ: IVC anterior to kidney and gallbladder most anterior) Can identify Pelvic anatomy in males and females. Able to perform scan in conjunction with the primary survey (i.e. POCUS-enhanced primary survey) and repeat scan where appropriate (eg. sudden change in patient condition). Able to act on incidental findings (eg. cysts, malignant lesions) appropriately- seeks expert opinion where appropriate. Able to troubleshoot machine/optimise image in a systematic fashion without prompting.	Sound knowledge of all relevant sonoanatomy, artefacts and image optimisation techniques. Basic knowledge of evidence behind FAFF/eFAST. Able to describe or identify lung point in pneumothorax. Can identify or demonstrate lung pulse in normal lungs. Understands limitations of FAFF/eFAST and own practice and when further imaging/consultation may be required.

Focused Assessment for Abdominal Aortic Aneurysm (AAA)

	Skills	Knowledge
1	Positions patient appropriately Appropriate transducer choice Appropriate pre-set choice Correct transducer orientation	Completion of RCEM Assessment of abdominal aorta e-learning module Awareness of basic ultrasound machine functions, transducers and knobology (depth, gain, focus) Anatomy of abdominal aorta and its branches Knows indications for scan
2a	Identifies landmark of vertebral body and posterior shadow Differentiates IVC and aorta Identifies abdominal aorta and uses callipers to measure outer wall to outer wall (3 transverse and 1 longitudinal measurement of AA, 1 measurement of iliac arteries)	Image optimisation using depth and gain. Knows anatomical characteristics of AA and IVC and able to differentiate them Values for aneurysmal abdominal aorta (>3cm) and iliac arteries (>1.5cm). Aware of aortic dissection and its potential sonographic appearance (intimal flap).
2b	Obtains transverse and longitudinal of aorta. Able to displace bowel gas with steady pressure.	Types of AAA- Fusiform/ saccular and able to recognise them. Variety of IVC appearances due to filling. Comments appropriately on distension and collapsibility with respiration. Aware of pitfalls in measurement (eg. measuring true lumen only in presence of intramural thrombus)
3	Able to evaluate AA in full length until bifurcation (in two planes). Identifies coeliac axis (where possible) and superior mesenteric artery (SMA).	Able to recognise common artefacts- eg. edge artefact, post-cystic enhancement, ring-down artefact from bowel gas. AA can be tortuous and the importance of scanning in two planes.

	Optimises image with appropriate changes to depth/gain/focus as per patient body habitus. Ensures scanning perpendicular to aorta (avoid oblique slice) before measuring in transverse. Able to troubleshoot and perform basic image optimisation with minimal direction/prompting.	Understands AAA rupture cannot be reliably assessed with PoCUS (i.e. tendency to bleed into retroperitoneal space) and further evaluation required with CT. If unable to visualise AA in entirety, discuss appropriately for CT.
4	Able to independently perform focused abdominal aorta scans in a timely fashion. Able to adjust the transducer position to scan AA from alternative (“rescue”) windows if needed (eg. from RUQ coronal) Able to troubleshoot machine/optimise image in a systematic fashion without prompting.	Understands the limitations of PoCUS AAA scan Has basic knowledge of the use of colour/spectral Doppler to help differentiate between venous and arterial flow.

AA - Abdominal aorta; IVC - Inferior Vena cava; SMA - Superior Mesenteric artery; RUQ - Right Upper Quadrant;

Echo in Life Support

Bedside echo can be used as an adjunct to determine a reversible cause of cardiac arrest. During the ten second pulse check window, echo may yield useful information to the team treating the patient and identify the following signs:

Is there evidence of cardiac activity?
Is there a pericardial effusion?
Is there evidence of RV strain?

Cardiac Views

Required: Subcostal with 1 other view. In the context of a cardiac arrest, acceptable cardiac views may be modified once the clinical question is answered.

Parasternal Long axis view
Parasternal short axis view
Papillary muscles view (recommended)
Mitral valve view
Aortic Valve view
Four chamber apical view
Subcostal

	Skills	Knowledge
1	Appropriate transducer choice Appropriate pre-set choice Positions transducer correctly Correct transducer orientation Able to obtain subcostal cardiac view	Completion of RCEM Echo in cardiac arrest e-learning module Aware of the four cardiac windows Can accurately identify LA/LV/RA/RV and IVC Indications to performing echo during cardiac arrest - reversible pathology Describes key pathologies Able to correctly identify presence or absence of cardiac motion Identifies pericardial space Can describe sonographic appearances of pericardial fluid
2a	Able to obtain subcostal and one other view Able to obtain subcostal view without interruption to CPR. Saves patient details or enters emergency details. Identifies self as sonographer	Able to correctly identify presence or absence of cardiac motion Able to detect evidence of a pericardial effusion Able to identify features of RV strain- dilated RV. Aware this can occur during prolonged resuscitation efforts and that this is not a sole pathognomic feature of massive PE. Able to comment on IVC diameter and collapsibility
2b	Sets up depth appropriately for window attempted Appropriate timing of scan Perform echo during ten second pulse check window and review images when CPR recommended. Takes video loop of window achieved and reviews images when CPR re-started Communicates findings to team leader and team.	Able to correctly identify presence or absence of cardiac motion. Able to detect evidence of a pericardial effusion and comment appropriately on size. Can identify or describe the appearance of a clot in transit in the IVC/RA/RV
3	Interprets findings correctly	Comments if LV walls touching and LV cavity obliterated during systole found in hypovolaemic patients. Analyses effect of pericardial effusion on RV/RA

		Able to identify features of acute RV strain- D shaped LV, unfilled LV
4	Ability to obtain hybrid/ modified cardiac views from various different positions around the bedside that does not interfere with ongoing resuscitation Can keep transducer in place intra-arrest to monitor quality of CPR Able to identify if LVOT is being compressed due to malposition of CPR device if used. Achieved or working towards RCEM recommended indicative number of logged scans (10)	Able to correctly identify presence or absence of cardiac motion, both global and regional (post-ROSC). Progress to shock scan in the post- ROSC patient. Comments if LV function is depressed. Analyses effect of pericardial effusion on RV/RA and takes into account patient circumstances to determine if further management is required- thoracotomy/ pericardiocentesis. Can accurately identify pericardial effusion compared to pleural effusion. Can identify difference between pericardial effusion and pericardial fat pad Considers other causes of RV dilatation- chronic RV strain - cor pulmonale, COPD, RV infarct, prolonged resuscitation efforts. Awareness of alternate pathology that may be missed by limited transthoracic echocardiography e.g. acute valvular pathology, intra-cardiac shunts. Understands that TOE may be useful

Ultrasound assisted shock assessment

Bedside ultrasound can be a useful adjunct when assessing the shocked patient. There are a few described protocols that can help guide the clinician when performing a shock assessment. These include:

ACES
EGLS
RUSH protocol

ACES
6 views

1. One or more cardiac views
2. Inferior vena cava
3. Screen of abdominal aorta
4. Right flank view for pleural/peritoneal fluid
5. Left flank view for pleural/peritoneal fluid
6. Pelvic view for peritoneal fluid

RUSH exam

1. PLAX cardiac view
2. Apical 4 chamber view
3. IVC
4. Right flank view for pleural/peritoneal fluid
5. Left flank view for pleural/peritoneal fluid
6. Pelvic view for peritoneal fluid
7. Aortic screen
8. Pulmonary view right
9. Pulmonary view left

EGLS protocol

1. Is there a pneumothorax?
2. Is tamponade present?
3. Is the patient hypovolaemic?
4. If poor LV function is noted: is it the main cause for hypotension?
5. Are there signs of RV strain?

All cover the same key areas:

- Focussed Echo:
    - 1) Is the Left Ventricle severely impaired?
    - 2) Is the Right ventricle impaired or dilated?
    - 3) Is there evidence of hypovolaemia with a hyperdynamic LV?
    - 4) Is there a pericardial effusion causing cardiac tamponade?
- Assessment of fluid status:
    - Is there evidence of a low preload state? E.g. hypovolaemia
- Intraperitoneal haemorrhage
- IVC measurements
- Alveolar interstitial syndrome in the assessment of fluid status
- Assessment for pneumothorax

The shock assessment is an amalgamation of prior US skills mastered by trainees, with the clinician appropriately focussing their scan on the likely pathology given the presentation of the patient.

Trainees will need to demonstrate the following views:

Cardiac Views
Parasternal Long axis view
Parasternal short axis views: *
Papillary muscles view (Recommended View)
Mitral valve view
Aortic Valve view
Four chamber apical view
Subcostal view
Inferior Vena Cava
IVC Longitudinal
Abdominal Views
RUQ view
LUQ view
Longitudinal Pelvic view

Transverse Pelvic view
+/- Subcostal cardiac view if not already done
Assessment for presence of aortic aneurysm
Thoracic Views
Anterior pleural view left
Anterior pleural view right
Lower lateral thoracic left (diaphragm)
Lower lateral thoracic right (diaphragm)

*Not all views are required routinely.

<table>
<tr><th></th><th>Skills</th><th>Knowledge</th></tr>
<tr><td>1</td><td>Positions patient appropriately

Appropriate transducer choice

Appropriate pre-set choice

Correct transducer orientation

Able to obtain subcostal and one other cardiac view

Saves and labels images appropriately</td><td>Completion of RCEM Shock e-learning module

<table><tr><td>Cardiac
(To answer 4 main queries*)</td><td>Able to achieve 2 or more views.

Able to identify normal Echo anatomical structures and visual assessment of chamber sizes.</td></tr><tr><td>IVC</td><td>Identifies IVC longitudinal views.</td></tr><tr><td>Thoracic</td><td>2 anterior pleural views.

Can identify lung sliding.
and normal artefacts such as A-lines, comet tails.</td></tr><tr><td>Aorta</td><td>Can demonstrate single aortic transverse view</td></tr><tr><td>FAST</td><td>Can obtain 3 abdominal views (RUQ/LUQ/ Pelvic +/- subcostal if not already done).</td></tr></table></td></tr>
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<table>
<tr>
<td>2a</td>
<td>Saves best possible image</td>
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<tr><td>Cardiac
(To answer 4 main queries*)</td><td>Able to achieve 2 or more views (parasternal view + any other view).

Comments on LV wall motion and myocardial thickening (visual assessment)
1. Is there severe systolic impairment?
2. Is the LV hyperdynamic?

Can identify the presence of pericardial fluid. Is able to differentiate pericardial from pleural fluid.</td></tr>
<tr><td>IVC</td><td>Comments on IVC collapsibility appropriately.</td></tr>
<tr><td>Thoracic</td><td>Can describe or identify barcode or stratosphere signs on M-mode imaging.

Can identify or describe pleural effusion.

Can describe or identify the presence of B-lines.</td></tr>
<tr><td>Aorta</td><td>Can visualise most of the abdominal aorta in transverse slide view.</td></tr>
<tr><td>FAST</td><td>Can obtain 3 abdominal views (RUQ/LUQ/ Pelvic +/- subcostal if not already done)</td></tr>
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<td>2b</td>
<td>Appropriate speed of scan

Able to transition between transducers as required.</td>
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<tr><td>Cardiac
(To answer 4 main queries*)</td><td>Able to achieve 3 or more views (parasternal views and apical).

Able to comment on the Right ventricle size and its relationship to the Left Ventricle.
1) PLAX: ratio 1:1:1 of RVOT, AO and LA
2) PSAX: Circular LV, crescent RV
3) Apical 4 Chamber: RV ⅔</td></tr>
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<tr><td></td><td>size of LV and does not reach apex.</td></tr>
<tr><td>IVC</td><td>Comments on IVC collapsibility appropriately.</td></tr>
<tr><td>Thoracic</td><td>Comments on the presence of lung sliding and is able to describe or identify “lung pulse”.

Comments on the number of B-lines.

Can describe or identify the presence of a pleural effusion.

Clinically interprets findings.
1) Is there a Pneumothorax?
2) Is there evidence of interstitial syndrome?
3) Is a pleural effusion present?</td></tr>
<tr><td>Aorta</td><td>Can visualise all of the abdominal aorta in transverse slide view.</td></tr>
<tr><td>FAST</td><td>Can obtain 3 abdominal views (RUQ/LUQ/ Pelvic +/- subcostal if not already done).</td></tr>
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<td>3</td>
<td>Demonstrates techniques to improve image resolution when moving between body areas

Adjustment of depth, gain and focus per body area examined

Interprets findings correctly</td>
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<tr><td>Cardiac
(To answer 4 main questions*)</td><td>Able to demonstrate All 4 views: PSAX, PLAX, Apical 4 chamber, subcostal.

Can describe or identify echo features of cardiac tamponade including Right Ventricle diastolic collapse.

Is able to describe or identify features of acute right heart strain. (abnormal shape and size or visually impaired).</td></tr>
<tr><td>IVC</td><td>Comments on IVC collapsibility appropriately.

Can describe or demonstrate a plethoric/dilated IVC in the context of obstructive shock</td></tr>
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<tr><td></td><td>(Right heart strain, tamponade, tension pneumothorax).</td></tr>
<tr><td>Thoracic</td><td>Can describe or demonstrate US features in keeping with:

Congestive cardiac failure- pathological bilateral B-lines, bilateral pleural effusions.

Pleural effusion - spine sign, sinusoidal sign, visualise floating lung. Loss of mirror image artefact at the diaphragm.

Consolidation- shred sign, abnormal B-lines, hepatization.

Pneumothorax: Identify or describe a lung point.</td></tr>
<tr><td>Aorta</td><td>Can visualise all of the abdominal aorta in transverse slide view.</td></tr>
<tr><td>FAST</td><td>Can obtain 3 abdominal views (RUQ/LUQ/ Pelvic +/- subcostal if not already done)</td></tr>
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<td>4</td>
<td>Able to perform scans in a logical and timely manner.

Is able to integrate Pocus findings in context with clinical picture. Is aware of pitfalls and limitations.

CPD by peer assessment, teaching and further learning.

Achieved or demonstrating progress towards RCEM recommended indicative number of logged scans (25)</td>
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<table>
<tr><td>Cardiac
(To answer 4 main queries*)</td><td>Able to demonstrate All 4 views: PSAX, PLAX, Apical 4 chamber, subcostal.
Can describe or identify severe regional wall motion abnormality in the context of coronary artery disease.

Able to answer the 4 key clinical questions* by interpreting these views.
1) Left ventricle systolic function - is the LV severely impaired?
2) Is the Left ventricle hyperdynamic with a visually underfilled cavity.
3) Right ventricular strain: Is the RV enlarged, is there evidence of interventricular septal deformation on PSAX from a pressurised RV. Is there reduced RV systolic</td></tr>
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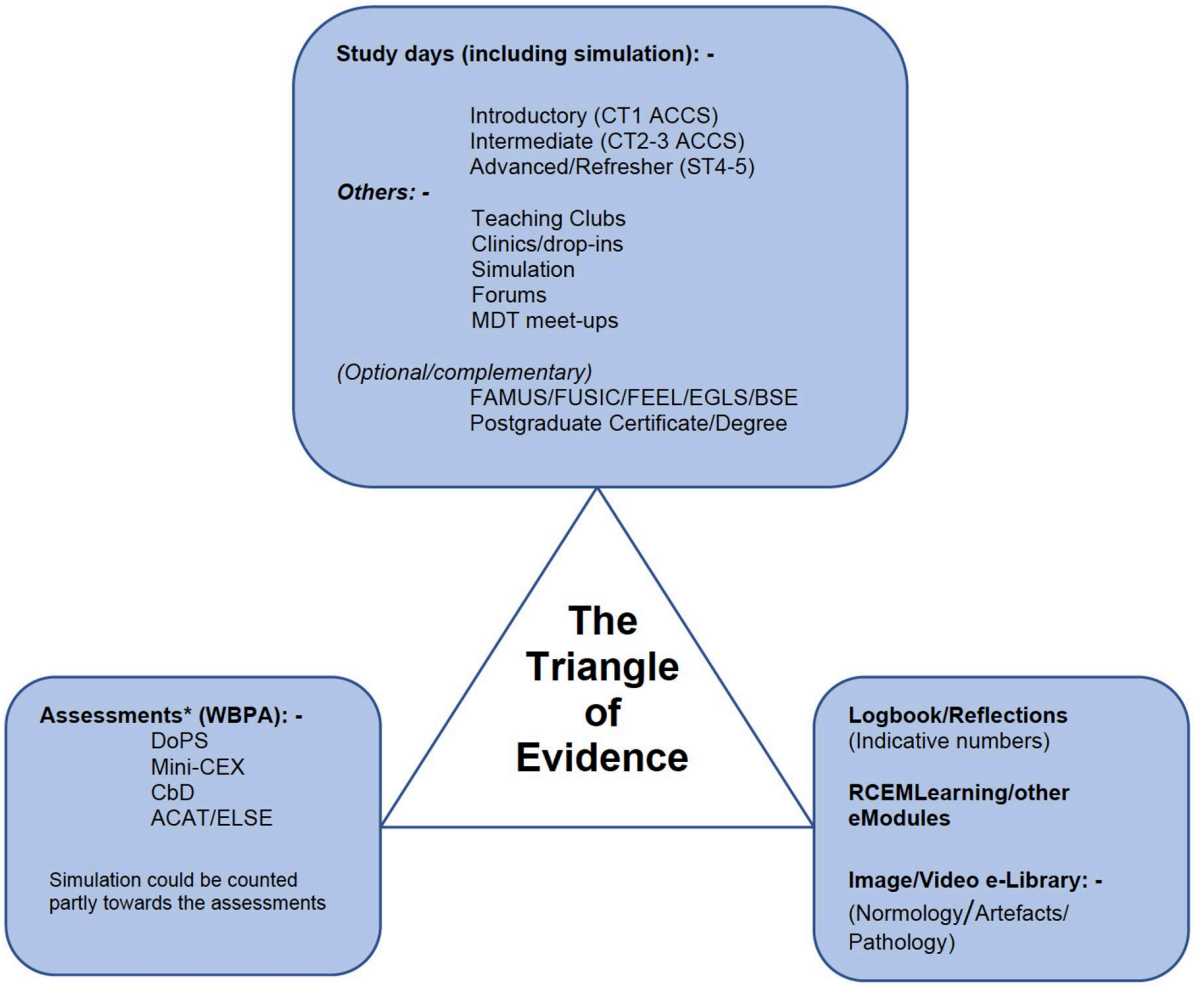
			function (Visual assessment)? 4) Is there pericardial fluid preventing normal RV filling, is there echo evidence of cardiac tamponade.
		IVC	Comments on IVC collapsibility appropriately. Is aware of the limitations of over interpreting IVC findings and other emerging evidence on how to assess volume status.
		Thoracic	Can describe or demonstrate US features in keeping with: Congestive cardiac failure- bilateral pathological B-lines, bilateral pleural effusions. Pleural effusion- spine sign, sinusoidal sign, visualise floating lung. Loss of mirror image artefact at the diaphragm. Consolidation- shred sign, abnormal B-lines, hepatization. Pneumothorax: Identify or describe a lung point.
		Aorta	Can visualise all of the abdominal aorta in transverse slide view.
		FAST	Can obtain 3 abdominal views (RUQ/LUQ/ Pelvic +/- subcostal if not already done).

*Echo in the critically unwell patient, questions asked: 1) Is the Left Ventricle Systolic function severely impaired (by visual assessment) 2) Is there evidence that the right heart is under strain from pressure overload 3) Is there evidence of hypovolaemia 4) Is there a pericardial effusion causing tamponade

Appendix 1. Suggested Evidence and Timeline

The Triangle of Evidence

The new competence-based model requires quality and consistency of evidence for acquisition and maintenance of ultrasound competence. Trainees could also expand their skills and knowledge beyond the RCEM curriculum by working towards accreditation in variety of PoCUS courses, and/or completion of postgraduate certificate or degree.



Study Days and Timeline

In contrast to the previous one-off core ultrasound or level one courses, departments and training programmes are encouraged to change to and organise study days in a progressive manner. An example of how this could be implemented is shown below.

Study Days	**Introductory**	**Intermediate**	**Refresher/ Advanced**
Stage	**CT1 ACCS**	**CT2-3 ACCS**	**ST4-5**
Content	- Physics/Settings/ Safety/ Ergonomics -Clinical governance & administration -USG IV access & FICB -Focused assessment of AAA -eFAST/FAFF	-ELS, including focused basic TTE -LUS (DVT as an optional addition)	-Introductory & Intermediate refresher -Hypotension Protocol (DVT as an optional addition)

Trainees are encouraged to acquire competence in a stepwise fashion, aiming to be signed-off as entrustment scale 4 as shown below.

ACCS	**ST3-4**	**ST5**	**ST6**
Complete online modules	Continue relevant online learning or attend relevant course	Consolidate log book	Consider undertaking enhanced training
Commence bedside learning	Consolidate log book	Sign off 'Shock Protocol'	Consolidate logbook
Sign off: Vascular Access Fascia Iliaca Block	Sign off ELS AAA eFAST / FAFF	Sign off ELS AAA eFAST / FAFF (if not achieved by ST4)	Consider teaching / assisting with development colleagues and governance
Commence log book	Complete online pathology learning		
Aim 1 scan per 2 weeks minimum	Aim 1 scan per week	Aim 1 scan per week minimum	Aim 1 scan per week minimum

ACPs and other non-training grade clinical staff may want to tailor their ultrasound competence to what is available in their department/division/trust, including mentor/supervision availability, and their scope of practice.

Indicative Scan Numbers/Reflection Notes

As per the RCEM Point of Care Ultrasound (PoCUS) Curriculum 2021 Appendix 3 document previously published, there is an indicative number of cases and reflections per module. This is over the whole course of the emergency medicine training programme and is demonstrated in the following table.

Modality	Indicative number	Reflective Notes
AAA	25	5
eFAST / FAFF	25	5
ELS	10	5
Shock Assessment	25	5
Vascular Access	5	5
Fascia Iliaca Block	10	5

However, it is worth noting once again that the new competence-based model relies more on the **quality and consistency of evidence** rather than numbers.