

Focused Acute Medicine Ultrasound (FAMUS)

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Abstract

Point of care ultrasound (POCUS) has seen steady growth in its use and applications in aiding clinicians in the management of acutely unwell patients. Focused Acute Medicine Ultrasound (FAMUS) is the standard created specifically for Acute Medicine physicians and is endorsed by the Society for Acute Medicine and recognised by the Acute Internal Medicine (AIM) training committee as a specialist skill.

In this document we present a curriculum mapping exercise which utilises a 'knowledge, skills and behaviours' framework and incorporates the GMC's 'Good Medical Practice' (GMP) domains. We believe this will provide a standard for consideration of integrating focused ultrasound in AIM training programmes, with the aim of ultimately incorporating FAMUS as a core skill for all AIM trainees.

Keywords

Point of care ultrasound, Focused Acute Medicine Ultrasound, Curriculum



Curriculum Mapping Exercise



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1. Introduction

The following document contains a detailed curriculum for the Focused Acute Medicine Ultrasound (FAMUS) pathway.

The aim of this exercise is to produce a comprehensive guide for supervisors and candidates to use during the credentialing process of FAMUS. It

will outline the key knowledge, skills and behaviours that are required in each domain for successful accreditation, and how these will be assessed.

The curriculum is divided into two non-clinical domains (physics of ultrasound & machine set-up, clinical governance) and the three clinical domains (thoracic, abdominal and vascular ultrasound). Each chapter will list the theoretical knowledge and practical skill required to attain competence in the domain. In the case of the clinical domains, a list of core pathology will be provided for which the candidate should aim to be proficient in identifying for successful accreditation. These will be mapped to the relevant assessment tools used in accrediting for FAMUS.

The following key will be used to denote each assessment tool:

Assessment tool	Key
E-Learning ('ICE-BLU' module on e-learning for health)	E
FAMUS course	C
Supervised/ Mentored practice	S
Assessment of completion of training (ACT)	A

FAMUS has been designed to be taught and used in line with the professional values and behaviours that underpin the GMC's Good Medical Practice (GMP) guidance. Each curriculum item has been mapped to its relevant GMP domain using the following key:

Domains of Good Medical Practice	
Domain	Descriptors
1	Knowledge, skills and performance
2	Safety and quality
3	Communication, partnership and teamwork
4	Maintaining trust

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2.1 Physics of ultrasound & machine set-up

	Knowledge	Assessment	GMP
1	Properties of sound wave: amplitude, frequency, wavelength, propagation velocity	E, C	1
2	Frequency range of sound waves used in diagnostic imaging	E, C	1
3	Speed of sound in different media	E, C	1
4	Behaviour of sound waves at interfaces between media	E, C	1
5	Generation of ultrasound waves: the piezo-electric effect	E, C	1
6	Design of the ultrasound transducer	E, C	1
7	Structure of the ultrasound beam	E, C	1
8	Principles of attenuation, scattering and reverberation	E, C	1
9	Understands B-mode and M-mode and their uses	E, C	1
10	Understands the principles of the Doppler effect and colour doppler	E, C	1
	Skills	Assessment	
1	Cleans probe & machine adequately before & after scan	S, A	1, 2
2	Selects appropriate ultrasound transducer	E, C, S, A	1, 2
3	Chooses appropriate pre-made settings for selected scan	C, S, A	1, 2
4	Uses conductive gel to aid transmission of ultrasound waves	E, C, S, A	1, 2
5	Correctly adjusts depth, gain and focus position	E, C, S, A	1, 2
6	Identifies common artefacts	E, C, S, A	1, 2
7	Uses colour Doppler to identify blood vessels	E, C, S	1, 2
	Behaviours	Assessment	
1	Shows awareness of key components. Handles probes with care	S, A	1, 2
2	Aware of battery lifetime and keeps machine charged when not using	S	1, 2

2.2 Image acquisition, patient safety & clinical governance

	Knowledge	Assessment	GMP
1	Understands probe orientation & movements in relation to screen	E, C, S	1, 2

2	Knows how to position patient for optimum image acquisition	E, C, S, A	1, 2
3	Understands indication for scan and appropriateness for POCUS vs formal scan	E, C, S, A	1, 2, 3
4	Knows local protocols for image storage	S, A	1, 2, 4
5	Understands relevance of data confidentiality act with regards to images produced	E, C, S, A	1, 2, 4
6	Aware of own limitations and when to seek expert help	E, C, S, A	1, 2, 3, 4
	Skills	Assessment	
1	Optimises image for best possible quality	C, S	1, 2
2	Knows how to freeze images for capture and acquire clips	S, A	1, 2
3	Knows how to label images	S, A	1, 2
4	Knows how to use measurement callipers	S, A	1, 2
5	Knows how to conclude scan and save acquired images	S, A	1, 2, 4
6	Anonymises data prior to exporting media to external storage device	S, A	1, 2, 4
7	Completes scan within appropriate timescale	S, A	1, 2
8	Able to report scans concisely and appropriately, making clear the limitations of point-of-care ultrasound	C, S, A	1, 2, 3, 4
	Behaviours	Assessment	
1	Gains consent when able to	C, S, A	1, 2, 3, 4
2	Maintains good communication with patient during scan and gives clear instructions	C, S, A	1, 2, 3, 4
3	Does not cause patient discomfort	C, S, A	1, 2, 4
4	Maintains patient's dignity	C, S, A	1, 2, 4

2.3 Thoracic ultrasound

	Knowledge	Assessment	GMP
1	Understands indications for thoracic ultrasound	C, S, A	1
2	Aware of other modalities of lung imaging and their respective benefits/risks compared to point-of-care ultrasound	C, S, A	1, 2, 4
3	Demonstrates knowledge of lung anatomy and their appearance on ultrasound	E, C, S, A	1, 3
4	Understands the BLUE protocol of lung US	C, S, A	1, 2

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5	Understands limitations & pitfalls of lung US	E, C, S, A	1, 2, 3, 4
Skills		Assessment	
Able to show/recognise the following:			
1	Normal appearances including 'Bat's wings', 'Lung sliding', 'seashore' signs and lung pulsation	E, C, S, A	1, 2
2	Normal lung bases & lung curtain sign	E, C, S, A	1, 2
3	A lines & B lines	E, C, S, A	1, 2
4	Absent lung sliding / stratosphere sign	E, C, S, A	1, 2
5	Understand the lung point in pneumothorax	E, C, S	1, 2
6	Consolidation signs: Shred sign, tissue-like sign, lung 'hepatisation'	C, S	1, 2
7	Pleural effusion signs: jellyfish sign, quad sign, sinusoid sign	E, C, S	1, 2
8	Able to mark suitable location for pleural fluid aspiration	C, S	1, 2, 3
Pathology		Assessment	
Has identified the following:			
1	Pleural effusions, including identifying 20 suitable for pleural aspiration	C, S	1, 2
2	Lung collapse and consolidation	C, S	1
3	Interstitial syndrome	C, S	1
4	Aware of the sonographic features of pneumothorax	E, C, S	1

2.4 Abdominal ultrasound

	Knowledge	Assessment	GMP
1	Understands indications for abdominal ultrasound	C, S, A	1
2	Aware of other modalities of abdominal imaging and their respective benefits/risks compared to point-of-care ultrasound	C, S, A	1, 2, 4
3	Demonstrates knowledge of abdominal anatomy and their appearance on ultrasound	C, S, A	1
4	Understands the different levels of echogenicity produced by abdominal organs ('PLISK')	C, S, A	1
Skills		Assessment	
Able to show/recognise the following:			
1	Liver & hemidiaphragm	C, S, A	1
2	Spleen & hemidiaphragm	C, S, A	1
3	Right kidney & Morrison's pouch	C, S, A	1
4	Left kidney & splenorenal recess	C, S, A	1

5	Bladder & comment on approximate size/volume	C, S, A	1
6	Recognise hydronephrosis and grade it as mild/moderate/severe	C, S	1
7	Identify appropriate site for tap/drain of ascites	C, S	1, 2
Pathology		Assessment	
Has seen and diagnosed the following:			
1	Abdominal free fluid	C, S	1
2	Bladder distension	C, S	1
3	Hydronephrosis	C, S	1

2.5 'Rule-in' DVT scan (3-point lower limb DVT scan)

	Knowledge	Assessment	GMP
1	Understands concept of a 'rule-in' DVT scan vs a 'rule-out' departmental scan.	C, S, A	1
2	Demonstrates anatomical knowledge of peripheral vessels and their appearance on ultrasound	C, S, A	1
3	Understands the theory behind performing the 3-point lower limb scan and the anatomical structures found within each point.	C, S, A	1
Skills		Assessment	
Able to show/recognise the following:			
1	The CFA, CFV & SFJ in the groin crease (i.e. 'Mickey Mouse sign')	C, S, A	1
2	The SFV in the mid-thigh level and recognises anatomical variants	C, S, A	1
3	The popliteal trifurcation	C, S, A	1
4	The POPA and POPV at the knee crease and recognises anatomical variants	C, S	1
5	Able to instruct patient to change position to optimise views	C, S, A	1
6	Demonstrates appropriate compression technique at the 3 designated points	C, S, A	1
7	Shows ability to perform sequential vein compression in between the designated points to increase sensitivity	C, S, A	1
Pathology		Assessment	
Has seen and diagnosed the following:			
1	Deep vein thrombosis	C, S	1

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2.6 Peripheral vascular cannulation

	Knowledge	Assessment	GMP
1	Understands the indications for ultrasound-guided peripheral vascular cannulation	C, S	1
3	Knows the sonographic differences between arteries and veins	C, S	1, 2
4	Selects suitable probe and anatomical sites for cannulation	C, S	1, 2
5	Understands the theory behind 'in-plane' and 'out-of-plane' techniques and their relevant advantages & disadvantages	C, S	1, 2, 3
6	Understands the rationale for using real-time visualisation of needle-tip	C, S	1, 2, 4
Skills		Assessment	
Able to:			
1	Demonstrate competence using 'in-plane' technique	C, S	1
2	Demonstrate competence using 'out-of-plane' technique	C, S	1
3	Visualise a needle-tip in real-time whilst advancing	C, S	1
4	Able to troubleshoot and modify technique to proceed with cannulation	C, S	1, 2
5	If using Seldinger technique, able to demonstrate wire in required vessel	C, S	1
6	Use local anaesthetic safely and adequately if suitable	C, S	1, 2, 4
7	Secure vascular cannulas with appropriate dressings	C, S	1, 2

2.7 Extended skills & pathology recognition

It is recognised that some individuals may encounter pathology outside the 'core' FAMUS curriculum and with time may gain experience in diagnostic techniques that lie beyond the scope of FAMUS.

Furthermore, the use of POCUS has other practical applications outside of FAMUS which clinicians may wish to become competent in.

The following is a list of pathology which one may encounter and wish to record in their logbooks for reflection. If any of these pathologies are encountered please consider alternative forms of imaging or requesting a departmental scan.

Thoracic pathology
Empyema/complex effusions
Air bronchograms
Rib fracture
Abdominal pathology
CBD dilatation
Pneumobilia
Cholecystitis
Abdominal visceral abscesses (e.g Liver & spleen abscesses)
Pyelonephritis
Polycystic kidneys
Abdominal aortic aneurysm
Enlarged prostate

A list of other practical clinical skills has been provided which the clinician may wish to pursue with appropriate supervision and accreditation, but also fall outside the current remit of FAMUS:

Other ultrasound-guided skills
Central line insertion
Chest drain insertion
Arterial line insertion
Ascitic drain insertion

3. Maintaining competence

Once accredited, candidates must demonstrate ongoing regular ultrasound practice in order to maintain the skills learned during accreditation. Details of the requirements for maintaining accreditation are available on the FAMUS website.