MEDICAL EXPERTISE LISTS

Investigations List

This is a comprehensive list of investigations that an Emergency Medicine trainee will be expected to encounter during the training program. The purpose of this list is to provide guidance to trainees, trainers and assessors about:

a. *which investigations* are considered by ACEM to be part of emergency medical expertise; and

b. regarding the use of these investigations, *what level of competence is expected* at each stage of training.

With regard to a trainee learning to use investigations, the following learning outcomes describe what they will learn to do:

1. The trainee will be able to perform rational test selection after completing a patient's clinical assessment (part of diagnostic reasoning).

2. The trainee will be able to demonstrate an appropriate level of mastery during training with regard to the description and analysis of investigation results (this means to identify and describe relevant imaging findings or patterns, to evaluate results, and to list possible causes for a result).

3. The trainee will be able to incorporate investigation results in order to refine a patient's differential diagnosis and management plan (which includes acting on time critical investigation results, again part of diagnostic reasoning).

This document provides more detail for the second learning outcome (above). The learning outcomes for the other processes are covered elsewhere in the *ACEM Curriculum Framework*.

A Mastery Key has been created and a mastery level has been assigned to each stage of training for each investigation. It is expected that as a trainee progresses, each successive Mastery Level builds on the previous levels. Please note:

- The Levels of Mastery assigned to each investigation are matched to the top level descriptors in the Medical Expertise domain. This means a trainee can independently assess/manage the following types of patient presentations at the end of the following stages:
  - End PT: Common low acuity low complexity presentations (or initiate resuscitation).
  - End AT Stage 1: Common high acuity low complexity presentations OR common low acuity high complexity presentations.
  - End AT Stage 2: High acuity high complexity presentations.
  - End AT Stage 3: Any emergency presentations.

- The Levels of Mastery are minimum levels of competence.
  - All trainees should have achieved the assigned level of mastery by that stage of training.
  - It is acknowledged that levels may change (become higher OR lower) if the trainee trains in specific types of EDs- e.g. paediatric only, rural, trauma centre, etc. The trainee should access learning resources to ensure that they achieve the assigned levels of mastery by the end of training regardless of where they have trained.

- Some investigations are within the scope of Emergency Medicine, but it is not essential to be able to describe and analyse the actual results or images. These investigations have been assigned lower levels of mastery, but trainees should note that they are still expected to be able to incorporate a formal results report into their diagnostic reasoning, as specified elsewhere in the *ACEM Curriculum Framework*.

- As a trainee attains increased experience and mastery, they will convert from preferentially using cognitive analytical skills to more perceptual skills. It is not always possible to attain the highest Mastery Level during training. It is expected that further experience after training will allow the FACEM to continue to progress to the highest level.

- There are learning outcomes that describe teaching and supervision skills in other domains within the *ACEM Curriculum Framework*. The subject matter of what a trainee should supervise/teach should match Mastery Level 4.

Mastery Levels

Code	Mastery Level	Description
1	The trainee will have theoretical **knowledge** of investigations.	The trainee will be able to: • describe indications for using these investigations • describe the theoretical accuracy of these investigations using knowledge of statistics • describe how the investigation is performed, incorporating their knowledge of the basic sciences • incorporate the formal report of this investigation's result into their patient care, including if the formal report is provided by another specialist
2	The trainee will be able to describe and analyse investigations **under direct supervision**.	The trainee will demonstrate a reasonable degree of accuracy in describing and analysing the investigation in critical cases; this accuracy is increased through their supervisor. The trainee will frequently supplement their knowledge of the investigation with the use of references and the experiences of their supervisor.
h3	The trainee will be able to **independently** describe and analyse investigations.	The trainee will demonstrate a reasonable degree of accuracy in describing and analysing the investigation in all cases, which is confirmed through limited supervision. The trainee will supplement their knowledge of the investigation with the use of references and/or assistance from their colleagues.
4	The trainee will be able to **proficiently** describe and analyse investigations.	The trainee will demonstrate a high degree of accuracy in describing and analysing the investigation in all cases. The trainee will sometimes need to supplement their knowledge of the investigation with the use of references and/or assistance from their colleagues.
5	The trainee will be able to **expertly** describe and analyse investigations.	The trainee will demonstrate an expert degree of accuracy in describing and analysing the investigation in all cases. The trainee will not need to supplement their knowledge of the investigation.

INVESTIGATIONS	MASTERY LEVELS **1:** knowledge; **2:** under direct supervision **3:** independent; **4:** proficient; **5:** expert			
	END PT	**END AT 1**	**END AT 2**	**END AT 3**
12 lead ECG patterns or patterns on ECG rhythm strip				
ECG: screening in asymptomatic adult patient *Recognition of a normal adult ECG, artefact, paced rhythm and lead misplacement*	3	4	5	5
ECG: screening in asymptomatic paediatric patient *Recognition of a normal paediatric ECG*	1	2	3	4
ECG: identification of obvious cause of chest pain/SOB *e.g. localised ST segment elevation or depression indicative of acute ischaemia*	3	4	5	5
ECG: identification of other cause of chest pain/SOB *e.g. ischemia related syndromes (Wellen's Syndrome), pathological Q waves, atypical ischaemic patterns, left or right ventricular hypertrophy, PR depression, acute right ventricular strain, ischaemia mimics*	2	3	4	5
ECG: identification of obvious cause of syncope/palpitations *e.g. cardiac arrest rhythms, ventricular tachycardia or atrial tachyarrhythmia, prolonged QT interval*	3	4	5	5
ECG: identification of other cause of syncope/palpitations *e.g. 1st, 2nd or 3rd degree heart block, bundle branch blocks, fascicular blocks, Brugada syndromes, pacemaker problems-issues*	2	3	4	4
ECG: identification of non-obvious cause of syncope/palpitations *e.g. re-entry pathways, different types of VT*	2	2	3	4
ECG: identification of life-threatening electrolyte or toxicology abnormalities *e.g. hypekalemia, tricyclic anti-depressant*	3	3	4	5
ECG: identification of other medical problems *e.g. temperature, calcium, digoxin*	2	3	4	4
Bedside functional investigations				
Spirometry/ Peak Flow Meter measurement	3	3	4	4
pH testing of eye tears	2	3	4	5
Other functional investigations				
Formal respiratory function test	2	2	3	3
Cardiac exercise stress test	1	1	2	2
Cardiotocography (CTG)	1	1	2	2
Nerve conduction studies	1	1	2	2
Plain radiology images				
CXR (all views)	3	3	4	4
Cervical Spine	3	3	4	4

INVESTIGATIONS	MASTERY LEVELS **1:** knowledge; **2:** under direct supervision **3:** independent; **4:** proficient; **5:** expert			
	END PT	**END AT 1**	**END AT 2**	**END AT 3**
Pelvis	3	3	4	4
AXR (all views)	3	3	4	4
Paediatric CXR/AXR/Cervical Spine/ Pelvis	2	2	3	4
Extremities – long bones, clavicle, scapula, patella	2	3	4	4
Extremities – small bones	2	2	4	4
Paediatric extremities	2	2	3	4
Thoracolumbar Spine	2	2	4	4
OPG	2	3	4	4
Facial (all other views)	1	2	3	4
Soft tissue neck	1	2	3	4
Other plain radiology films *e.g. skeletal survey, skull, bowel series*	1	1	2	2
CT images				
CT head (plain): life-threatening cause of abnormal neurology *e.g. Haemorrhage, mass effect, skull fracture*	2	3	4	5
CT head (+/- contrast): other acutely important findings *e.g. Mass lesion, hydrocephalus, pneumocephalus, radiological signs of increased intracranial pressure*	2	2	3	4
CT face and orbits *e.g. Fracture or orbital entrapment*	1	2	3	4
CT thorax (+/- contrast) – acutely important findings *e.g. Fracture, pneumothorax, haemothorax, infiltrative process, effusion or consolidation, major vessel aneurysm, dissection, rupture or occlusion*	1	2	3	4
CT Spine *e.g. Identification of fracture or disc prolapse*	1	2	3	3
CT kidneys, ureters, bladder *e.g. identification of calculus, signs of obstruction, AAA*	2	3	4	4
CT abdomen/pelvis *e.g. Identification of organ perforation/laceration, mass lesion, inflammatory process, major vessel dissection or rupture*	1	2	3	3
CT other bones (neck of femur, foot, ankle) *e.g. Identification of fracture or mass lesion, or disrupted anatomy*	1	2	3	3
CT Aortogram, CTPA *e.g. Identification of massive pulmonary embolus or obvious aortic dissection*	1	2	3	4
Images obtained by another FACEM credentialed to perform ED sonography				
Cardiac Arrest Echocardiogram	1	2	3	4

INVESTIGATIONS	MASTERY LEVELS **1:** knowledge; **2:** under direct supervision **3:** independent; **4:** proficient; **5:** expert			
	END PT	**END AT 1**	**END AT 2**	**END AT 3**
Identification of cardiac activity during resuscitation				
EFAST ultrasound *Identification of intraperitoneal free fluid, haemothorax, pneumothorax or cardiac tamponade*	1	2	3	4
AAA ultrasound *Identification and localisation of abdominal aortic aneurysm*	1	2	3	4
Chest ultrasound *Identification of plural/ pulmonary pathology*	1	1	2	3
First Trimester ultrasound *Presence or absence of intrauterine pregnancy*	1	1	2	2
Soft Tissue Ultrasound *Presence or absence of foreign body or abscess*	1	1	2	3
Images from nuclear medicine, MRI, or formal ultrasound investigations				
VQ scan	1	1	2	2
Bone Scan	1	1	2	2
Stress Thallium/Sestamibi scan	1	1	1	2
MRI Brain and spinal cord	1	1	2	2
MRI Bones	1	1	1	2
MRI Soft Tissues	1	1	1	2
Echocardiogram	1	1	2	2
Hepatobiliary ultrasound	1	1	2	2
Doppler for DVT	1	1	1	2
Doppler of carotid arteries	1	1	1	2
Ultrasound for ruptured tendons and joints	1	1	1	2
Pregnancy/gynae pelvic ultrasounds	1	1	2	2
Renal Ultrasound	1	1	2	2
Laboratory investigations *(analysis of numbers and performance of appropriate calculations, with access to normal ranges)*				
Blood Gas Analysis (arterial and venous)	2	3	4	4
Full Blood Count (Hb, MCV, WCC and diff, Plt)	3	4	4	4
Blood film, including malaria thick and thin films	3	3	4	4
Reticulocyte count, Bleeding time	3	3	4	4
INR, APTT, D-Dimer	3	3	4	4
Fibrinogen, Fibrinogen degradation products	2	3	4	4
Blood Glucose (bedside and formal)	3	4	5	5
Electrolytes, Urea, Creatinine	3	4	4	5
Creatinine Kinase	3	3	4	4

INVESTIGATIONS	MASTERY LEVELS **1:** knowledge; **2:** under direct supervision **3:** independent; **4:** proficient; **5:** expert			
	END PT	**END AT 1**	**END AT 2**	**END AT 3**
Calcium, Magnesium, Phosphate	3	4	4	4
Erythrocyte sedimentation rate and C-reactive protein	2	3	4	4
Cardiac enzymes	3	3	4	4
Quantitative bHCG	2	3	3	4
Serum osmolality	2	3	3	4
Serum Lactate	2	3	4	4
Liver Function Tests, Amylase, Lipase	3	3	4	4
Thyroid Function Tests, Iron studies, HbA1c, Drug Levels, Serum/RBC folate	2	3	3	3
Paracetamol levels	3	3	4	4
Other drug levels	2	2	4	4
Cholinesterase levels for toxicology monitoring	1	1	2	2
Urine Dipstick and bHCG	3	3	4	5
Urine osmolality, urinary sodium	1	2	3	4
Microbiology culture results	3	3	4	4
Microbiology specific antigen results (PCR), Malaria detection tests	2	3	4	4
Viral serology tests (EBV, CMV, Hepatitis, HIV, varicella)	2	3	3	4
Snake venom detection kit tests	1	1	3	3
Body fluid analysis (csf, joint, pleural, peritoneal)	2	3	3	4
Fasting lipids	2	2	2	2
Advanced inflammatory markers (Rh Factor, ANA, ANCA)	1	2	2	2
Parathyroid hormones, cortisol/ACTH/Synacthen test	1	2	2	2
Tests for inborn errors of metabolism (urine and serum)	1	1	1	1
Tumour markers	1	1	1	1
Histopathology	1	1	1	1
Cytology	1	1	1	1