

HONG KONG COLLEGE OF RADIOLOGISTS

Higher Subspecialty Training in Cardiovascular Imaging

[This document should be read in conjunction with the *Guidelines on Higher Specialist Training (Radiology)*]

1. INTRODUCTION

- 1.1 Noninvasive imaging is playing an increasingly important role in the investigation of cardiac and vascular diseases. Management of patients with cardiovascular diseases can now be planned without resorting to more invasive means of investigation.
- 1.2 Cardiac patients are frequently unstable and can deteriorate rapidly. This requires well-planned imaging strategies to obtain the essential information within the patient's tolerance and readiness to recognize and treat any emergencies.
- 1.3 It is a category A subspecialty.

2. OBJECTIVES

- 2.1 Trainees are expected to have basic knowledge of relevant embryology, anatomy, physiology and pathology as related to cardiovascular disorders from their basic and intermediate training.
- 2.2 Knowledge of the pharmacological effects of commonly use drugs is essential (e.g. adenosine, dobutamine, beta-blockers, calcium channel blockers, contrast media and sedatives). Prompt recognition of side effects and ability to treat these are essential before the trainee can administer these drugs to the patients.
- 2.3 Trainees are required to possess a formal certification in resuscitation (e.g. ACLS or equivalent) when starting their training so that they are fully competent in intermediate and advanced life-support.
- 2.4 Skills on haemodynamic and ECG monitoring are essential for safe conduction of examinations like stress CMR.
- 2.5 Trainees are expected to have the knowledge and technique to do post-processing of coronary artery CTA and cardiac MR images on workstations so to illustrate the findings and quantify volumes and flows.
- 2.6 Trainees should be able to advise clinicians on the appropriate use of various imaging techniques for the investigation of cardiovascular diseases and be able to communicate the findings in an effective way.

2.7 Effective and safe supervision of examinations would be achieved through graded supervision from the trainer/co-trainer.

3. TRAINING REQUIREMENTS

3.1 TRAINING CENTRE REQUIREMENTS

3.1.1 The following clinical specialties should be available in the training centre: cardiology and paediatric cardiology. Mechanisms of patient referral and continuation of patient care should be in place with a cardiothoracic surgery and vascular surgery unit if these are not available in the centre itself.

3.1.2 Coronary Care Unit and Intensive Care Unit should be present.

3.1.3 Multi-detector CT scanner with ECG gating, MR scanner with cardiac MR capability, digital subtraction angiographic equipment, nuclear cardiology service, echocardiogram facilities and cardiac catheterization units should be present.

3.1.4 Some cardiac imaging techniques and studies are not commonly performed in daily clinical practice but are of emerging importance and of diagnostic value in certain clinical situations. Trainees are encouraged to observe these procedures in training centres with relevant experience and expertise in place. The cases they observed are preferable to be documented in the logbook as appendix for record of training. These include but are not limited to:

- MR techniques including ECV measurement, 4D Flow and MRA of coronary arteries;
- Congenital heart diseases, e.g. pre-operative assessment, post-operative follow-up and adult congenital heart diseases. Trainee is suggested to read under supervision or observe at least 10 cases for 6-month CV training or 5 cases for 3-month CV training, and document in the logbook the key imaging findings and diagnosis of the cases they read or observed.
- PET imaging for myocardial ischemia and viability
- CT myocardial perfusion
- CT-FFR

3.1.5 Arrangement should be made for trainees to be rotated to echocardiogram units and cardiac catheterization units to obtain the relevant experience as stipulated in the requirement. Trainees are expected to communicate with the cardiologist doing the examination before and during the procedure to have understanding of patient's condition, treatment plan, the procedure details and imaging findings. Hands-on practice of these procedures under supervision by cardiologists is encouraged, but not essential. Trainee has to document in the logbook the key imaging findings and diagnosis of the patients observed.

3.1.6 Regular case conference, grand rounds, clinico-radiological meetings or surgical conference should be in place, frequency as stipulated in the Guidelines on Higher Specialist Training (Radiology) for Higher Specialist Training.

3.2 TRAINER REQUIREMENT

As specified in the Guidelines on Higher Specialist Training (Radiology).

The trainer should have training and remain competent in resuscitation procedures.

3.3 DURATION OF TRAINING

Due to its vast scope and complexity, 6 months of training is desirable; 3 months of training is acceptable.

3.4 DUTY SESSIONS

The trainee is expected to participate in the following duty sessions as relevant to cardiovascular imaging:

- Plain film reporting – 1 session per week, with most films being from cardiac clinic, cardiac surgery clinic and/or vascular clinic.
- Ultrasound – 1 session per week, with significant workload from vascular (body and peripheral) Doppler studies
- CT – 2 sessions per week, one should comprise of cardiac cases and the other one vascular cases, or a balanced mix of the 2 group of patients in each session
- MR – 1 session per week, comprising mostly of cardiac MR and body/peripheral MRA cases
- Rotation to echocardiogram and cardiac catheterization units – 1-2 sessions per month to acquire the necessary exposure
- Attachment to nuclear medicine and PET units
- Attachment to angiographic suites for body/peripheral angiogram cases
- Attachment to outpatient clinics and operating theatre sessions are encouraged

3.5 MINIMUM NUMBER OF EXAMINATIONS REQUIRED

3.5.1 The number of examinations to be performed and reported by a trainee in a 6-month period are:

Examination/Procedure	RIS Coding	Requirement	Remarks
Plain films			
Plain CXR reporting	1301	200	Most films should be from a cardiac clinic, cardiac surgery clinic and/or vascular clinic
Ultrasound			
Doppler upper limb or lower limb veins or arteries	3306, 3308, 3307, 3309, 3310	40	Including both vein and artery cases

Examination/Procedure	RIS Coding	Requirement	Remarks
Doppler renal arteries (native and grafts)	3312, 3313	20	
Echocardiogram	3319	40	Observe
CT			
Coronary calcium score	4213	Some experience	It is not routinely performed in many centers
Coronary angiogram	4214, 4403, 4404	100	Native coronary arteries or grafts
ECG gated CT of thorax	4212	10	For structural heart disease, pericardium, pulmonary veins, coronary veins, etc. Including at least 5 cases for planning or follow-up of structural heart interventions including percutaneous valvular repair/replacement, LAA occlusion, etc
Heart function	4215, 4403, 4404	Some experience	MR is the preferred examination
CT pulmonary angiogram	4201, 4202	20	No specific code for CTA, only enter relevant examinations. Including at least 10 cases for planning or follow-up of patients for TEVAR, EVAR or BEVAR
CT aortic angiogram	4201, 4202, 4203, 4204, 4205, 4206, 4211, 4212, 4403, 4404	70	
MR			
CMR for structure	8503, 8504	20	
Flow analysis of aorta/pulmonary artery/vein flow	8611	10	
Cardiac function and regional wall motion study	8505, 8507, 8508	50	
Cardiac perfusion study	8509, 8510	50	
Myocardial viability study	8511	50	
Myocardial mapping (T1, T2, T2*)	8612	30	
Dobutamine stress MR for ischemia/viability	8507, 8508	Some experience	
MRA aorta and main branches (arch, thoracic and abdominal)	8521, 8522, 8523, 8524, 8526, 8599	40	Including some cases of MR pulmonary angiogram

Examination/Procedure	RIS Coding	Requirement	Remarks
MRA/CTA Peripheral vessels			
MRA/V peripheral vessels, CTA peripheral vessels	8525, 8526, 4301, 4302, 4303, 4304, 4403, 4404, 4417	10	
Nuclear Medicine			
Cardiac stress MUGA Myocardial infarct imaging Myocardial perfusion Lung ventilation/perfusion	9100, 9110, 9120, 9130 - 9151 9810, 9820, 9821, 9822	40	
Coronary angiography and interventions			
Coronary angiography; L/R heart catheterization	6115, 6116, 6121, 6122, 6123, 6131, 6220	20	Observe
Coronary angioplasty/stent placement, other PCI	6117, 6118, 6124, 6125, 6126	20	Observe
Intervention for structural heart diseases including percutaneous valvular repair/replacement, LAA occlusion, etc.	NA	Some experience	Observe
Body Angiography and interventions			
Aortogram/Body angiogram Peripheral angiogram Pulmonary angiogram	6102, 6103, 6104, 6108, 6109, 6110, 6111, 6112, 6114, 6132, 6133, 6134, 6203	20	Assist or perform under supervision
Aortic interventions including stenting, TEVAR, EVAR, BEVAR	6303.TA, 6312.AS, 6313	Some experience	Observe

3.6 CLINICAL RADIOLOGICAL CONFERENCES AND OTHER MEETINGS

Please refer to the Guidelines on Higher Specialist Training (Radiology).

3.7 PRESENTATIONS AND PUBLICATIONS

Please refer to the Guidelines on Higher Specialist Training (Radiology).

*Last version endorsed by HKAM Council Meeting on 20 October 2016 and effective from 1 July 2017
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