

HONG KONG COLLEGE OF RADIOLOGISTS

Higher Training (Radiology)

Subspecialty Training in Cardiovascular Imaging

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

1. INTRODUCTION

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.

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.

It is a category A subspecialty.

2. OBJECTIVES

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.

Knowledge of the pharmacological effects of commonly use drugs is essential (eg. Adenosine, dobutamine, beta-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.

Trainees are required to possess a formal certification in resuscitation (eg. ACLS or equivalent) when starting their training so that they are fully competent in intermediate and advanced life-support.

Skills on haemodynamic and ECG monitoring are essential for safe conduction of examinations like stress CMR.

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.

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

3. TRAINING REQUIREMENTS

TRAINING CENTER REQUIREMENTS

The following clinical specialties should be available in the training center: 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 center itself.

Coronary Care Unit and Intensive Care Unit should be present.

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.

Rotation to nuclear medicine units and PET/PET-CT units for experience are recommended.

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.

Regular case conference, grand rounds, clinico-radiological meetings or surgical conference should be in place.

TRAINER REQUIREMENT

A subspecialty trainer should fulfill the criteria laid down by the Hong Kong College of Radiologists in the 'General guidelines on Higher Training (Radiology)'. A trainer should be spending majority of his or her time in the specialty of cardiovascular radiology and is primarily responsible for training of the trainee. The trainer should have training and remain competent in resuscitation procedures.

DURATION OF TRAINING

Due to its vast scope and complexity, 6-month training should be considered as the minimum.

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 a cardiac 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 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
- Attachment to outpatient clinics and operating theatre sessions are encouraged

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 and/or vascular clinic
Ultrasound			
Doppler upper limb or lower limb veins	3306, 3309	30	
Doppler peripheral arteries (including AVF for dialysis, pseudoaneurysms)	3307, 3310	10	
Doppler renal arteries (native and grafts)	3312, 3313	20	
Echocardiogram	3319, 3320	40	Observe
CT			
Coronary calcium score	4213	50	
Coronary angiogram	4214, 4403, 4404.02	70	Native coronary arteries or grafts
ECG gated CT of thorax	4212	10	For structural heart disease, pericardium, pulmonary veins, coronary veins
Heart function	4215, 4403, 4404.02	5	MR is the preferred examination
CT pulmonary angiogram	4201, 4202	20	No specific code for CTA, only enter relevant examinations
CT aortic angiogram	4201, 4202, 4203, 4203, 4205, 4206, 4211, 4212, 4403, 4404.01, 4404.02	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	Including rest function and some exposure to dobutamine stress studies for ischaemia and viability
Cardiac perfusion study	8509, 8510	50	
Myocardial viability study	8511	50	
Coronary MRA	8512	Some exposure	
MRA aorta and main branches (arch, thoracic and abdominal)	8521, 8522, 8523, 8524, 8599	40	Includes at least 5 cases of MR pulmonary angiogram
MRA/CTA Peripheral vessels			
MRA/V peripheral vessels, CTA peripheral vessels	8525, 4301, 4302, 4303, 4304, 4403, 4404, 4417	20	
Nuclear Medicine			
MUGA	9110	20	
Myocardial perfusion	9130, 9130.01, 9131, 9131.01, 9132, 9132.01, 9133, 9133.01, 9135, 9135.01, 9140, 9141, 9143, 9150, 9150.01	15	
Lung ventilation/perfusion	9810, 9820, 9821, 9822	5	
PET/PET-CT			
Myocardial viability and perfusion studies		Some exposure	
Coronary angiography and interventions			
Coronary angiography; L/R heart catheterization	6115, 6121, 6122, 6123, 6131, 6220	20	Observe
Coronary angioplasty/stent placement, other PCI	6117, 6118, 6124, 6125, 6126	20	Observe
Body Angiography and interventions			
Aortogram/Body angiogram	6102, 6103, 6108, 6109, 6110, 6111, 6112, 6114	20	Assist or perform under supervision
Peripheral angiogram	6104, 6132, 6134	Some exposure	
Pulmonary angiogram	6203	Some exposure	

CLINICAL RADIOLOGICAL CONFERENCES AND OTHER MEETINGS

Regular case conference, grand rounds or pre-surgical meetings should be part of the training curriculum. Trainees are expected to chair these meetings or present cases for discussion.

PRESENTATIONS AND PUBLICATIONS

Please refer to the General Guidelines in Higher Training.