Specialty Training Requirements (STR)

Name of Specialty:	Cardiothoracic Surgery
Chair of RAC:	Prof John Tam
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Contents

Note : In addition to the training requirements stated in this STR, residents must comply with any other regulatory requirements or practice-based requirements mandated by the healthcare institutions or place of practice.

Scope of Cardiothoracic Surgery

Cardiac Surgery is concerned with acquired and congenital diseases of the heart, great vessels and their branches. These include ischaemic and valvular heart diseases, as well as great vessel disease.

Thoracic Surgery is concerned with acquired and congenital diseases of the lung, airway, mediastinum, chest wall, pleura and diaphragm. These include both benign and malignant conditions within the chest.

Purpose of the Residency Programme

Cardiothoracic Surgery Residency comprises cardio-thoracic training that follows after Surgery-in-General Residency. This programme offers broad-based comprehensive training in the diagnosis, medical and surgical management of cardiac and thoracic conditions, as well as exposure to clinical research. Upon completion, residents become specialists accredited in cardiothoracic surgery to serve national healthcare needs.

Admission Requirements

At the point of application for this residency programme,

a) Applicants must be employed by employers endorsed by Ministry of Health (MOH); and
b) Residents who wish to switch to this residency programme must have waited at least one year between resignation from his / her previous residency programme and application for this residency programme.

At the point of entry to this residency programme, residents must have fulfilled the following requirements:

a) Hold a local medical degree or a primary medical qualification registrable under the Medical Registration Act (Second Schedule);
b) Have completed Post-Graduate Year 1 (PGY1);
c) Have a valid Conditional or Full Registration with Singapore Medical Council; and
d) Completed Surgery-In-General residency programme.

Selection Procedures

Applicants must apply for the programme through the annual residency intake matching exercise conducted by MOH Holdings (MOHH).

Continuity plan: Selection should be conducted via a virtual platform in the event of a protracted outbreak whereby face-to-face on-site meeting is disallowed and cross institution movement is restricted.

Less Than Full Time Training

Less than full time training is not allowed. Exceptions may be granted by Specialist Accreditation Board (SAB) on a case-by-case basis.

Non-traditional Training Route

The programme should only consider the application for mid-stream entry to residency training by an International Medical Graduates (IMG) if he / she meets the following criteria:

a) He / she is an existing resident or specialist trainee in the United States, Australia, New Zealand, Canada, United Kingdom and Hong Kong, or in other centres / countries where training may be recognised by the SAB; and

b) His / her years of training are assessed to be equivalent to local training by Joint Committee on Specialist Training (JCST) and / or SAB.

Applicants may enter residency training at the appropriate year of training as determined by the Programme Director (PD) and RAC. The latest point of entry into residency for these applicants is Year 1 of the senior residency phase.

Separation

The PD must verify residency training for all residents within 30 days from the point of notification for residents' separation / exit, including residents who did not complete the programme.

Duration of Specialty Training

The training duration must be 48 months, comprising 12 months of Cardiothoracic Surgery Junior Residency and 36 months of Cardiothoracic Surgery Senior Residency.

Maximum candidature: All residents must complete the training requirements, requisite examinations and obtain their exit certification from JCST not more than 36 months beyond the usual length of their training programme. The total candidature for Cardiothoracic Surgery is 24 months Surgery-in-General residency + 48 months Cardiothoracic Surgery residency + 36 months candidature.

Nomenclature: Because residents continue with CTS residency after the 2-year SIG residency, residents in first year of CTS residency are denoted as R3, residents in second year of CTS residency as R4, etc.

"Make-up" Training

"Make-up" training must be arranged when residents

- Exceed days of allowable leave of absence / duration away from training or
- Fail to make satisfactory progress in training.

The duration of make-up training should be decided by the Joint Coordinating Committee (JCC)[1] and should depend on the duration away from training and / or the time deemed necessary for remediation in areas of deficiency. The JCC should review residents' progress at the end of the "make-up" training period and decide if further training is needed.

Any shortfall in core training requirements must be made up by the stipulated training year and / or before completion of residency training.

Learning Outcomes: Entrustable Professional Activities (EPAs)

Residents must achieve level 4 of the following EPAs by the end of residency training:

	Title
EPA 1	Managing Surgical Outpatient Clinics
EPA 2	Managing Ward Rounds
EPA 3	Managing Emergency Calls
EPA 6	Managing Multi-Disciplinary Care

Residents must achieve level 4/3 (please refer to table in section C.R10) of the following EPAs by the end of residency training:

	Title
EPA 4	Managing a Thoracic Operating List
EPA 5	Managing a Cardiac Operating List

Learning Outcomes: Core Competencies, Sub-competencies and Milestones

The programme must integrate the following competencies into the curriculum, and structure the curriculum to support resident attainment of these competencies in the local context.

Residents must demonstrate the following core competencies:

1) Patient care and Procedural Skills

Residents must demonstrate the ability to:

- Gather essential and accurate information about the patient
- Counsel patients and family members
- Make informed diagnostic and therapeutic decisions

[1] *The JCC is established for Integrated Programmes (IPs) to oversee resident selection, training curriculum, and faculty and resident evaluations.*

- Prescribe and perform essential medical procedures
- Provide effective, compassionate and appropriate health management, maintenance, and prevention guidance

Residents must demonstrate proficiency in:

- Identification of the clinical problem(s)
- Formulation and implementation of care that is patient-centric and medically necessary
- Performance of common cardiovascular and thoracic procedures and surgeries
- Stabilisation and / or initial management of patients with severe, complex illnesses and injuries
- Application of current scientific evidence in the diagnosis and treatment of cardiovascular and thoracic disease
- Appropriate counselling and education of patients and their families about specific cardiovascular and thoracic problems

2) Medical Knowledge

Residents must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioural sciences, as well as the application of this knowledge to patient care.

Residents must acquire an understanding of the basic sciences, including the anatomy and physiology of the cardiovascular and respiratory system and clinical epidemiology, and be up to date on the evaluation and management of cardiovascular and thoracic disorders. Residents must demonstrate the ability to apply this knowledge to the care of individual patients.

3) System-based Practice

Residents must demonstrate the ability to:

- Work effectively in various health care delivery settings and systems relevant to their clinical specialty
- Coordinate patient care within the health care system relevant to their clinical specialty
- Incorporate considerations of cost awareness and risk/benefit analysis in patient care
- Advocate for quality patient care and optimal patient care systems

- Work in inter-professional teams to enhance patient safety and improve patient care quality. This includes effective transitions of patient care and structured patient hand-off processes.
- Participate in identifying systems errors and in implementing potential systems solutions

Residents must be aware of the health care system in Singapore, understand their role within the system, and use available resources to optimize care of the cardiothoracic patient.

4) Practice-based Learning and Improvement

Residents must demonstrate a commitment to lifelong learning.

Resident must demonstrate the ability to:

- Investigate and evaluate patient care practices
- Appraise and assimilate scientific evidence
- Improve the practice of medicine
- Identify and perform appropriate learning activities based on learning needs

Residents must demonstrate the ability to:

- Improve cardiovascular and thoracic patient care practices by the critical evaluation of current practice patterns and by the appraisal and assimilation of scientific evidence
- Critically analyse practice experience, identify areas for improvement, and set learning goals
- Improve practice based on newly acquired clinical information
- Locate, appraise and assimilate scientific studies from the cardiovascular and thoracic literature applicable to patient management
- Incorporate performance feedback from faculty to improve practice
- Be competent in using information technology and on-line resources, to optimize learning
- Engage in scholarly activity as a means of improving practice
- Complete a clinical/basic science research, and a quality improvement (QI) project

5) Professionalism

Residents must demonstrate a commitment to professionalism and adherence to ethical principles including the Singapore Medical Council's Ethical Code and Ethical Guidelines (ECEG).

Residents must:

- Demonstrate professional conduct and accountability
- Demonstrate humanism and cultural proficiency

- Maintain emotional, physical and mental health, and pursue continual personal and professional growth
- Demonstrate an understanding of medical ethics and law

Residents must:

- Be dedicated to provide competent, compassionate and appropriate medical care to patients
- Be an advocate for the care and well-being of patients, and endeavour to ensure that patients suffer no harm
- Provide access to and treat patients without prejudice of race, religion, creed, social standing, disability or financial status
- Maintain the highest standards of moral integrity and intellectual honesty
- Treat patients with honesty, dignity, respect and consideration, upholding their right to be adequately informed and their right to self-determination
- Keep confidential all medical information about patients
- Regard all fellow professionals as colleagues, treat them with dignity and accord them respect

6) Interpersonal and Communication Skills

Residents must demonstrate ability to:

- Effectively exchange information with patients, their families and professional associates.
- Create and sustain a therapeutic relationship with patients and families
- Work effectively as a member or leader of a health care team
- Maintain accurate medical records

Residents must demonstrate the ability to:

- Accurately elicit and synthesize information obtained from patients, families and colleagues
- Demonstrate an awareness of both verbal and non-verbal cues in communication
- Conduct patient consultations effectively, conveying information and explanations accurately and in a manner that is respectful, empathetic and honest
- Demonstrate the ability to deal with difficult situations e.g. breaking bad news, dealing with distraught or verbally abusive patients or relatives

Other Competency: Teaching and Supervisory Skills

Residents must demonstrate ability to:

- Teach others
- Supervise others
- Facilitate the learning of nursing staff, more junior residents, and medical students.

Residents must be role models, teachers and leaders to junior doctors, other healthcare trainees and medical students. They must demonstrate:

- Proficiency in teaching and presentation during small/large group teaching activities
- Ability to give constructive and effective feedback to promote a positive learning environment
- Effective facilitating skills in running competency related workshops for junior residents

Learning Outcomes: Others

Residents must attend Medical Ethics, Professionalism and Health Law course conducted by Singapore Medical Association (SMA) and Geriatric Medicine Modular Course by Academy of Medicine Singapore (AMS).

Curriculum

The curriculum and detailed syllabus relevant for local practice must be made available in the Residency Programme Handbook and given to the residents at the start of residency.

The PD must provide clear goals and objectives for each component of clinical experience.

Learning Methods and Approaches: Scheduled Didactic and Classroom Sessions

The Programme must schedule, and residents must attend the following didactic sessions:

Didactic Session	**Frequency**	**Minimum Attendance Required**
Case based discussion / Morbidity and mortality conferences	At least 4 per month	70%
Multidisciplinary conferences / Grand rounds	At least 4 per month	70%
Didactic lectures	At least 4 per month	70%

In the event of a protracted outbreak whereby face-to-face on-site meeting is disallowed and cross institution movement is restricted, teachings should be done via virtual platforms.

Learning Methods and Approaches: Clinical Experiences

Residents must complete the following rotations:

Rotation	**Minimum duration (Months)**
Thoracic Surgery	12
Cardiac Surgery	12
Congenital Cardiac Surgery	6

Residents are encouraged to spend at least 3 months, and accrue experience in one of the following rotations:

- Cardiac Catheterization
- Echocardiography
- Vascular Surgery
- Bronchoscopy
- Electrophysiology
- Interventional radiology
- Echocardiography
- Interventional Cardiology
- Vascular Surgery
- Respiratory & Critical Care Medicine
- Adult Cardiac
- Thoracic Surgery
- Congenital Cardiac Surgery

The CTS residency programme is a National Residency Integrated Programme (IP) and residents must undergo rotations in both sponsoring institutions (NUHS and SHS).

In the event of a protracted outbreak whereby cross institution movement is restricted that leads to difficulty in residents completing all compulsory rotations, the Programme should take guidance from MOH on cross-campus movements at the time, and examine individual residents' progress, so as to best adjust each resident's rotations for their completion of necessary training.

Learning Methods and Approaches: Scholarly/Teaching Activities

Residents must complete the following scholarly activities:

	Name of activity	**Brief description: nature of activity, minimum number to be achieved, when it is attempted**
1.	Research Project	To complete 1 research project and have manuscript ready for submission to a peer-reviewed journal before end of residency

2.	Quality Improvement Project	To complete 1 PDSA cycle of a QI Project and be certified by a QI committee before end of residency

In the event of a protracted outbreak whereby face-to-face on-site meeting is disallowed and cross institution movement is restricted, scholarly activities and teachings should be done via virtual platforms.

Learning Methods and Approaches: Documentation of Learning

From R3 intake in July 2026 onwards, residents must fulfil the minimum number of cases / procedures in Cardiac and Thoracic clinical and / or operative experience listed below:

Sub-Specialty	Procedure	Performed	Assisted	Observed
Adult Cardiac	Sternotomy	30		
	Sternal Closure	30		
	Cannulation	20		
	Decannulation	20		
Coronary Artery Bypass Grafting	Open Vein Harvest	5		
	Endoscopic Vein Harvest	35		
	Radial Artery Harvest	5		
	Internal Mammary Artery Harvest	20		
	Proximal Aorto-Coronary Anastomosis	30		
	Distal Aorto-Coronary Anastomosis	15		
	Full Coronary Artery Bypass Grafting (CABG)	5		
Valvular Heart Disease	Mitral Valve Repair / Replacement		20	
	Aortic Valve Repair / Replacement		20	
Arrhythmia Surgery	MAZE procedure			5
Aortic / Vascular surgery	Repair of Type A aortic dissection			5
	Femoral artery cutdown and repair	5	5	
Mechanical Assist	Intra-aortic balloon pump insertion	10		

	Extracorporeal membrane oxygenation	5	5	
	Ventricular assist device			5
Congenital Cardiac	Patent Ductus Arteriosus (PDA) ligation		5	
	Atrial septal defect repair		10	
	Ventricular septal defect repair			5
Thoracic surgery access	Video-Assisted Thoracoscopic Surgery (VATS) or open thoracotomy incision	20		
Lung surgery	Wedge resection or bullectomy	10		
	Segmentectomy or sub-lobar resection or lobectomy		20	
	Pulmonary vein dissection/ligation	3	5	
	Pulmonary artery dissection/ligation	3	5	
	Bronchial dissection/ligation	3	5	
Mediastinal surgery	Mediastinal lymph node dissection	3	5	
	Thymectomy or mediastinal tumour resection		5	
	Mediastinotomy/Chamberlain biopsy or Mediastinoscopy		5	
	Pericardial window creation		3	
Pleural surgery	Pleurectomy/pleurodesis/pleural biopsy	5		
	Decortication	5		
Chest wall surgery	Rib fixation	3	5	
	Chest wall resection and reconstruction		5	
Miscellaneous thoracic procedures	Flexible or rigid bronchoscopy	3		
	Ultrasound guided chest tube insertion	3		

Summative Assessments

	Summative assessments	
	Clinical, patient-facing, psychomotor skills etc.	Cognitive, written etc.
R6	**JSF Examination in CTS** 1. Clinical 2. Viva	**JSF Examination in CTS** 1. SBA Paper
R5	NIL	NIL
R4	NIL	NIL
R3	NIL	NIL
R2	Not applicable	
R1		

S/N	**Learning outcomes**	**Summative assessment components**		
		MCQ	Clinical	Oral / Viva
1	EPA 1: Managing Surgical Outpatient Clinics	✓	✓	✓
2	EPA 2: Managing Ward Rounds	✓	✓	✓
3	EPA 3: Managing Emergency Calls	✓	✓	✓
4	EPA 4: Managing a Thoracic Operating List		✓	✓
5	EPA 5: Managing a Cardiac Operating List		✓	✓
6	EPA 6: Managing Multi-Disciplinary Care	✓	✓	✓