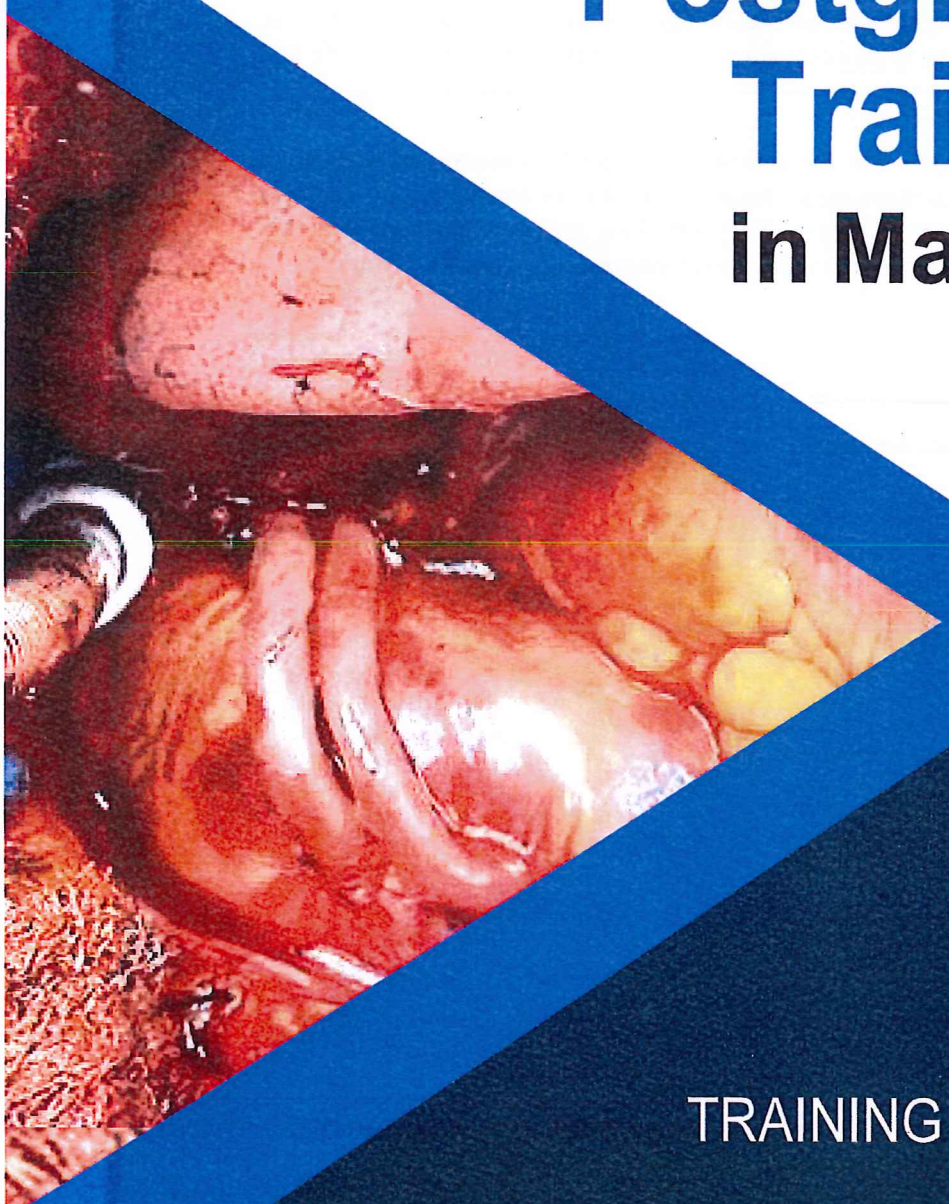
Cardiothoracic Surgery Postgraduate Training in Malaysia



TRAINING CURRICULUM

VERSION 1, 2022

Foreword by the Director General of Health

Training in surgical specialities, including Cardiothoracic Surgery, has evolved from informal apprentice-style learning of variable quality and duration to the more structured training of fixed duration with assured quality through regular work-based and yearly assessments end-of-training exit examinations. Such structured training has enabled cardiothoracic surgeons to be trained in a shorter time while ensuring consistency in acquiring the necessary skills and competencies.

The national curriculum in Cardiothoracic Surgery is an essential resource for both trainers and trainees in cardiothoracic surgery and healthcare regulators, as it sets the standards that all training programs in the speciality should meet and will ensure that we produce safe and competent cardiothoracic surgeons.

I want to thank and congratulate the Cardiothoracic fraternity, notably the Malaysian Association of Thoracic and Cardiovascular Surgery, for the enormous work put into producing this vital document. The Ministry of Health fully supports and endorses this document which will ensure standards in training cardiothoracic surgeons in the country.

Tan Sri Dato' Seri Dr Noor Hisham Abdullah
Director-General of Health

COPYRIGHT

Published by:
Malaysian Association for Thoracic and Cardiovascular Surgery (MATCVS)
Unit 1.6, Level 1, Enterprise 3B, Technology Park Malaysia, Jalan Inovasi 1, Lebuhraya Puchong-Sungai Besi, 57100 Bukit Jalil, Kuala Lumpur
secretariat@matcvs.org.my

First Publication, 2022

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Cardiothoracic Surgery Postgraduate Training in Malaysia : TRAINING CURRICULUM.
– VERSION 1, 2022.
Mode of access: Internet
eISBN 978-629-96653-0-4
1. Medical education--Curricula--Malaysia.
2. Emergency physicians--Training of--Malaysia.
3. Emergency medicine--Malaysia.
4. Heart--Surgery.
5. Electronic books.
610.7155

Table of Contents

ACKNOWLEDGEMENTS

The Malaysian Association for Thoracic and Cardiovascular Surgery (MATCVS) would like to express their thanks to the following:

1. Steering group of the National Postgraduate Medical Curriculum Project.
2. Professor Dr. Simon Frostick and Mr. David Pitts for the overall design of the curriculum templates, consultation and coaching for writing groups.
3. Medical Education and Research Development Unit (MERDU), Faculty of Medicine, Universiti Malaya.

PREFACE

The National Postgraduate Medical Curriculum (NPMC) for Cardiothoracic Surgery is the culmination of a collaboration between all Cardiothoracic Surgeons who are practicing in the Ministry of Health Malaysia, (MOH), Ministry of Higher Education (MOHE), Institut Jantung Negara and the private sector. It provides a structured and unified curriculum for the training of Cardiothoracic Surgeons throughout the country aligned with the national strategy for healthcare. This standardisation of Cardiothoracic Surgery specialist training for Malaysia will drive forward high quality, effective and safe patient care. All Cardiothoracic Surgery training programmes in Malaysia should conform to the minimum requirements described in this document and subsequent editions when they become available.

Every care has been taken to ensure that the information in this document was accurate at the time of publication. It is anticipated that the curriculum will be reviewed and revised at regular intervals, in keeping with advancements in surgical practice. Content may not be reproduced without permission from the authors.

National Curriculum Writing Group

Chair

Assoc Prof. Dr. Sivakumar Krishnasamy
Consultant Cardiothoracic Surgeon,
Faculty of Medicine, Universiti Malaya (UM)

Members

Dato' Dr Basheer Ahamed bin Abdul Kareem
Head of Cardiothoracic Surgical Services, Ministry of Health,
Senior Consultant Cardiothoracic Surgeon and President MATCVS

Dato' Seri Dr Jeffrey Jeswant Dillon
Senior Consultant Cardiothoracic Surgeon, Institut Jantung Negara
Vice President MATCVS

Prof. Dr. John Chan Kok Meng
Senior Consultant Cardiothoracic Surgeon, CVSKL Hospital
Honorary Secretary MATCVS

Dr Sivakumar Sivalingam
Senior Consultant Cardiothoracic Surgeon,
Deputy Head of Department of Cardiothoracic Surgery, Institut Jantung Negara
Honorary Treasurer MATCVS

Dato' Dr Mohd Hamzah Kamarulzaman
Senior Consultant Cardiothoracic Surgeon, Thompson Hospital Kota Damansara
Program Director Cardiothoracic Surgery Parallel Pathway Fellowship Program

Contributors

Tan Sri Dato' Dr Yahya Awang
Senior Consultant Cardiothoracic Surgeon,
CVSKL

Prof Dato' Dr Mohamed Ezani Md Taib
Senior Consultant Cardiothoracic Surgeon,
Director for Surgical Training and Education,
Institut Jantung Negara

Dato' Dr Venugopal Balchand
Senior Consultant Cardiothoracic Surgeon,
Pantai Hospital, Kuala Lumpur

Prof Dr Raja Amin Raja Mokhtar
Senior Consultant Cardiothoracic Surgeon,
Head of Cardiothoracic Division Universiti Malaya

Prof Dr Alwi Mohamed Yunus
Senior Consultant Cardiothoracic Surgeon,
Head of Department of Cardiothoracic Surgery,
Institut Jantung Negara

Dr Paneer Selvam Krishnamoorthy
Senior Consultant Cardiothoracic Surgeon,
Institut Jantung Negara

Dato' Dr Mohamad Arif Muhammad Nor
Senior Consultant Cardiothoracic Surgeon,
Head of Department of Cardiothoracic Surgery,
Hospital Serdang

Dr Jong Yuan Hsun
Senior Consultant Cardiothoracic Surgeon,
Head of Department of Cardiothoracic
Surgery, Pusat Jantung Sarawak

Prof Dato' Sri Dr Mohd Ramzisham Abdul
Rahman
Senior Consultant Cardiothoracic Surgeon,
University Kebangsaan Malaysia

Dr Abu Yamin b. Khamis
Senior Consultant Cardiothoracic Surgeon,
Hospital Pulau Pinang

Dr Abdul Muiz Jasid
Senior Consultant Cardiothoracic Surgeon,
Hospital Serdang

Dr Siti Laura Mazalan
Senior Consultant Cardiothoracic Surgeon,
Hospital Serdang

Dr Khairul Anuar Abdul Aziz
Consultant Cardiothoracic Surgeon,
Institut Jantung Negara

Advisors

Prof Dato' Dr Adeeba Kamarulzaman
Chair of National Postgraduate Medical Curriculum Project,
Senior Consultant Infectious Disease, Universiti Malaya

Prof Dr April Camilla Roslani
Senior Consultant Colorectal and General Surgeon,
Dean of Faculty of Medicine, Universiti Malaya

Prof Dr Jamunarani Vadivelu
Head of Medical Education and Research Development Unit (MERDU),
Faculty of Medicine, Universiti Malaya

Assoc. Prof Dr Vinod Pallath
Medical Education and Research Development Unit (MERDU),
Faculty of Medicine, Universiti Malaya

OVERVIEW

Introduction

Cardiothoracic surgeons in Malaysia manage surgically-related conditions affecting the heart, lungs, mediastinum , chest wall and major blood vessels across patients of all age groups . All conditions may present acutely or electively requiring prompt assessment, detailed evaluation including imaging, after which expert surgical management is usually required together with close perioperative monitoring and treatment in the cardiothoracic intensive care unit, nursing patients back to health.

Furthermore, cardiothoracic surgeons provide primary care in chest trauma patients and perform hybrid procedures in collaboration with interventional cardiologists and vascular surgeons. With such a demanding job scope and responsibilities, it is essential for cardiothoracic surgeons to be fully equipped with a wide range of skills and competencies in all clinical areas including perfusion services and intensive care. As the primary care provider for patients, they are expected to provide leadership in the operating theatre involving multidisciplinary medical and paramedic officers. The scope of the specialty also goes beyond anatomical boundaries involving joint surgical efforts with other teams, for example, in management of advanced renal tumours and retrosternal goitre.

Recent advances in the specialty involving complex surgical techniques, subspecialties and newer technology has ensured better patient outcomes but requires better teaching methods and learning efforts by both trainers and trainees. Trainers will therefore need equal access to training opportunities and experience which need to be carefully planned by fraternity members who are ultimately responsible to ensure quality training for future cardiothoracic surgeons providing care for patients.

Any training programme in this specialty must also address the need for trainees to acquire the non-technical skills required in the performance of their daily tasks. These include leadership, research and audit capabilities, soft skills, teamwork, problem solving acumen and the awareness of cost benefit issues with the aim of delivering effective, healthcare in a patient-centred approach. The specialty is associated with a high pressure working environment and elevated stress levels, mandating that only highly suitable trainees should be recruited after a careful evaluation and selection process.

Size of specialty

There are 82 registered Cardiothoracic surgeons on the Malaysian National Specialist Register, of which 13 are in the Ministry of Health, 21 in other government institutions and 48 in private practice.

There are several ways to determine the number of specialists needed in the country. Many developed countries use the number of specialists to population ratio to determine the number of specialists required. This is referred to as the needs-based approach model. This method produces a result of a large shortage of specialists in all the surgical specialties in the country, including in Cardiothoracic Surgery. However, this measure may not be so appropriate for a developing country like Malaysia, particularly for surgical specialties as the limiting factor is in the provision of the infrastructure, resources and supporting specialties and services. A cardiothoracic surgeon, for example, would need an operating theatre, perfusion and other equipment, intensive care unit equipped for advanced cardiac care, supporting specialists such as cardiac anaesthetists, and other supporting staff such as perfusionists, nurses and technicians, to perform any heart or aorta surgery.

A more appropriate measure of the number of Cardiothoracic specialists needed in Malaysia uses a demand-based model where the following are determined:

1. The number of specialists needed to staff the existing Cardiothoracic centres in the country.
2. The workload in each of the cardiothoracic centres for elective and urgent surgery.
3. The waiting list for elective surgery in the respective centres.
4. Planned retirement or resignations of specialists.
5. Population growth and disease prevalence in each region.
6. Presence of a cardiothoracic centre within 200 km of each region (or less in more densely populated regions).

At a minimum, there should be at least two Cardiothoracic Surgeons per cardiac operating theatre in each cardiothoracic centre providing cardiothoracic surgery. There should also be at least two cardiac anaesthetists and two perfusionists per cardiac operating theatre in each cardiothoracic centre. This is to allow optimal use of the operating theatre and other facilities, and to allow the cardiothoracic service to continue when one specialist is away. Each Cardiothoracic Surgeon should aim to perform between 3-4 open heart surgery cases per week (150-200 open heart surgery cases a year). Centres with surgeons performing more than 200 open heart cases a year may need additional Cardiothoracic Surgeons in that centre. The waiting list for elective non-cancer surgery should be no more than 3 months while the waiting list for cancer surgery should be no more than 2 weeks from the completion of staging investigations. Centres with waiting lists longer than this may need more cardiothoracic surgeons or an improvement in the infrastructure at the centre.

The retirement age in the Ministry of Health and Universities is 55-60 years. Many specialists also resign from public service to go into private practice before this age. To account for this, there should be at least an additional 10% in the number of specialists.

There is increasing use of non-surgical treatment for conditions traditionally treated by cardiothoracic surgery. This is apparent in the more developed countries such as the United Kingdom where there has been a consistent reduction in the number of Coronary Artery Bypass Grafting, Aortic Valve and Mitral Valve surgery over the last 5 years. Between 2014 and 2019, there has been a reduction of 3,007 cardiothoracic surgical operations performed in the U.K., a reduction of 17.8%. This is likely due to the increasing use of interventions performed by cardiologists such as percutaneous coronary interventions and transcatheter aortic and mitral valve interventions. As Malaysia progresses, it is likely that treatment of cardiothoracic conditions in the country will mirror that in the more developed countries; there is likely to be reduced demand for cardiothoracic surgical interventions in the next 5 years. This has to be factored into workforce planning projections.

Access to timely safe, essential, and life-saving surgery is important and should be available in as many parts of the country as possible. Patients should be able to reach a cardiothoracic facility within 3 hours for the treatment of emergencies such as an aortic dissection. In Peninsular Malaysia, there is a Cardiothoracic Centre within 200 km of each major geographical region. However, the population is significant in Ipoh (828,000) and in Perak (2.4 million) which does not have a Cardiothoracic Centre. A Cardiothoracic Centre in Ipoh should be considered. The northern region of Sarawak and the eastern part of Sabah are not served by a Cardiothoracic centre within 200 km. A cardiothoracic centre in Miri and one in Sandakan should be considered.

Based on all of these considerations and using a demand based model, it is estimated that an additional 40 cardiothoracic surgeons are needed in the next 5 years up to 2027 [1]. If the additional new cardiothoracic centres are approved and built, then an additional 46 cardiothoracic surgeons are needed. To optimise training resources and for best use of the medical workforce, it is important that the infrastructure and supporting services must also be available. With proper planning, adequate numbers of specialists can be trained to staff any planned increase in infrastructure such

as new hospitals providing cardiothoracic surgery, or the expansion of existing cardiothoracic centres. It is important that plans for new additional centres or expansions of existing centres are confirmed before training numbers are increased so that there is optimum usage of the medical workforce and not an excess of specialists in Cardiothoracic Surgery, as has happened with medical schools producing too many doctors in recent years.

References:

1. MATCVS. Cardiothoracic Surgery Workforce Planning Report 2022.
2. Supply and needs based requirement projections of Malaysian human resources for health using system dynamics approach 2016 – 2030 (doctor, dentist, pharmacist, nurse, assistant medical officer). Planning Division, Ministry of Health Malaysia, 30.10.2020.

Unique features

Cardiothoracic surgery is one of the youngest surgical specialties providing a fulfilling career involving direct patient care in acute critical situations which usually have lifechanging impacts on patients and families. It is a robust specialty that encompasses the preoperative, operative, and postoperative management of patients with a broad spectrum of diseases, across all age groups, including those who may require nonoperative, elective, or emergency complex surgical treatment. Disease spectrums are diverse ranging from complex congenital heart malformations, huge mediastinal tumours to high risk aortic arch conditions. The specialty requires quick thinking, decision making, careful planning with good surgical strategy for each unique clinical problem, but in a special way also requires the cardiothoracic surgeon to be flexible in strategies and able to adapt and change approach instantly depending on the intraoperative situation faced .

The specialty is also home to one of the most pioneering advances in medicine achieved in the 20th century, the heart lung machine which remains an epitome of the successful collaboration amongst courageous surgeons, scientists and engineers. The machine is truly an impressive feat of technology that integrates engineering principles of fluid flow, pressure gradients and heat transfer in one life saving device. It has revolutionised the specialty and with the advancement of surgical techniques has changed lives of millions of patients around the world.

Cardiothoracic surgeons therefore must be competent and highly skilled in diagnosis as well as the treatment and management of complex surgical problems including operative intervention in a highly pressurised environment. They must also be prepared to endure many years of rigorous training and be prepared for lifelong commitment towards their patients and training of their juniors. As leaders of the operating team encompassing other professionals and highly trained paramedic officers, good leadership, interpersonal skills, teamwork, judgement and stable temperament are also mandatory to the specialty and is expected to be nurtured during training. Lastly, they are also expected to be good team players among colleagues, the bearers of good news and comrades of bereaved families.

Almost every cardiothoracic surgical manoeuvre and procedure has a potential lethal or dangerous complication attached to it but amazingly the specialty has developed so well that complex adult and paediatric congenital heart surgery are routinely performed today in many centres globally with minimal morbidity and mortality rates . It is arguably one of most heavily audited specialties in the history of medicine enabling it to be driven and guided by high quality research and trials. Many surgical societies and health systems globally display their outcome data in the public domain in addition to scientific meetings, in the interest of achieving excellence and transparency, while ensuring good surgical care and outcomes for their patients.

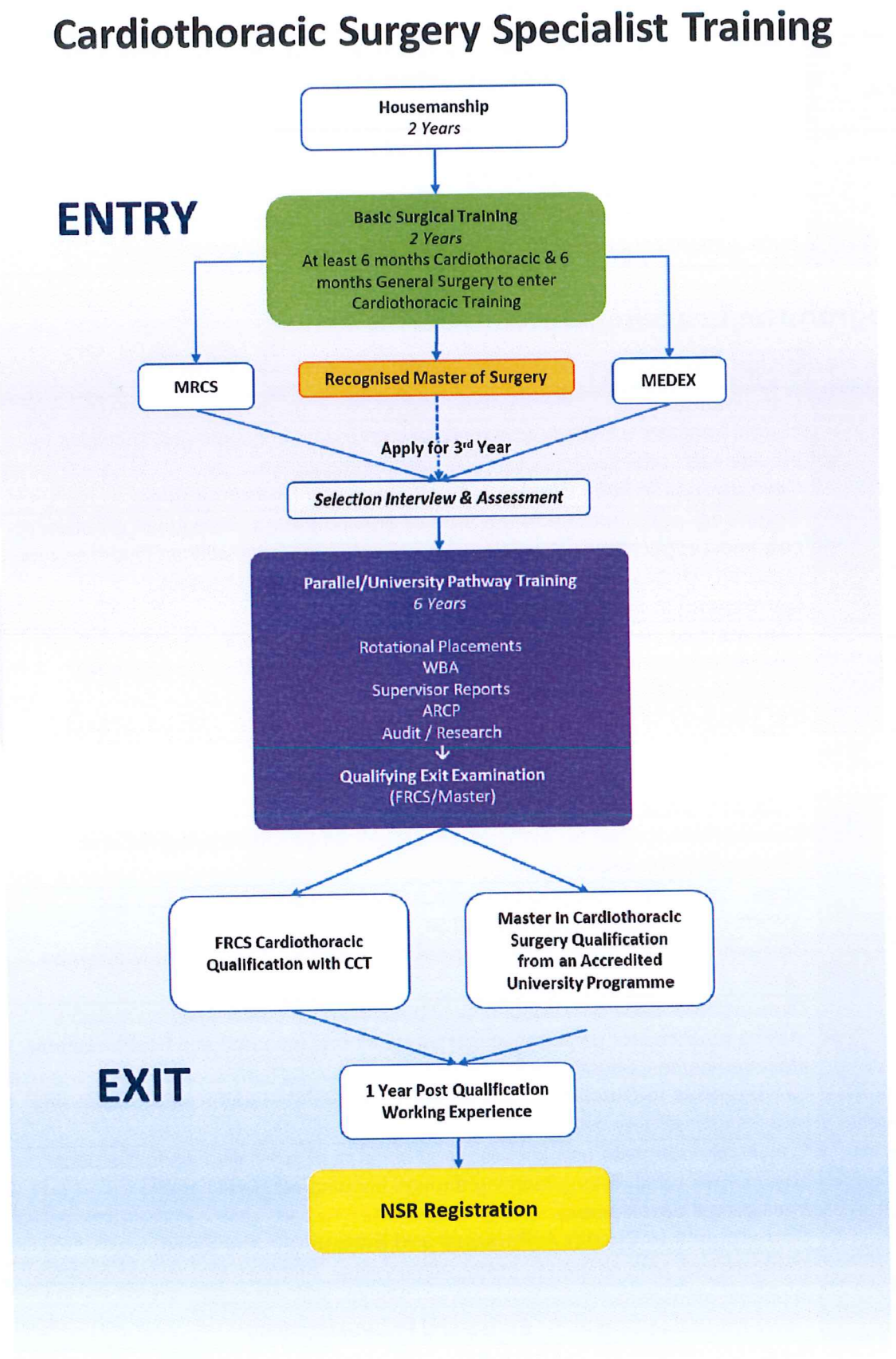
Purpose

Since the first open heart surgery was performed in Malaysia in 1975, training in this specialty has primarily been based on an apprentice style approach with no official structured and coordinated training programme in place. Population growth and increasing demands for high quality cardiothoracic surgical services in the country subsequently prompted the setting up of structured training programme. The creation of the Parallel Pathway Training in Cardiothoracic Surgery in Malaysia in 2016 was achieved through the monumental efforts of senior members of the fraternity of the Malaysian Association for Thoracic and Cardiovascular Surgeons (MATCVS), with the support of the Ministry of Health Malaysia, Institut Jantung Negara, Universiti Malaya, Academy of Medicine of Malaysia (AMM), and the Royal College of Surgeons of Edinburgh. Training through the parallel pathway mirrors the United Kingdom Intercollegiate Surgical Curriculum for Cardiothoracic Surgery with quality assurance provided by the Royal College of Surgeons of Edinburgh. The exit examination prior to completion of training is a prerequisite to obtain Fellowship of the Royal College of Surgeons of Edinburgh in Cardiothoracic Surgery, a recognised qualification in the National Specialist Register.

While the Cardiothoracic Surgery Parallel Pathway Training programme is up and running, local universities are also embarking on initiatives to set up their own training programmes in the specialty. This is very much welcomed, however, it is absolutely crucial that standards of training are maintained in all training programs at all times in order to ensure competent cardiothoracic surgeons are trained well to provide safe and effective care for patients.

This National Curriculum for Training in Cardiothoracic Surgery document sets the standards for specialist training in cardiothoracic surgery in Malaysia. It is intended to be generic and applicable to all training programs in the future. It will be an important resource for both trainees and trainers, and all other stakeholders, the Ministry of Health, Malaysian Medical Council, Malaysian Qualifications Agency, Universities and other training providers and regulators.

Training Overview



Programme Educational Objectives (PEO)

The programme aims to produce specialist cardiothoracic surgeons who:

PEO 1	Deliver effective, person-centred and value-based care by applying evidence informed medical knowledge and clinical skills to problem solve, manage and coordinate care
PEO 2	Demonstrate ethical conduct, professionalism, and commitment towards personal development and lifelong learning.
PEO 3	Be leaders in the field and contribute to education, research and the promotion and improvement of health in the local, national and international settings.

Programme Learning Outcomes (PLO)

There are eight learning outcomes for the programme. These are shown below.

PLO 1	**Demonstrate** a comprehensive and systematic approach to solve complex and current healthcare issues using medical knowledge, concepts and principles to provide safe, effective and evidence-based patient care. **Corresponds to MQF Cluster 1: Knowledge and Understanding**
PLO 2	**Contribute substantially to the area of specialisation** through the **creation** of new knowledge/ theories/ solutions/ practice through originality and independent research, which satisfies peer reviews and international standards. **Correspond to MQF Cluster 2: Cognitive Skills**
PLO 3	**Demonstrate** competency in practical and technical skills in relevant areas of specialisation and continually develop new skills and techniques to resolve emerging problems in Cardiothoracic Surgery. **Corresponds to MQF Cluster 3: Functional Work Skills – Practical Skills**
PLO 4	**Communicate** effectively, ethically and professionally with all stakeholders including patients, peers, members of the care team and the community at large in Cardiothoracic Surgery. **Corresponds to Cluster 3: Functional Work Skills – Interpersonal and Communication Skills**
PLO 5	**Apply** existing technological tools effectively to enhance patient care and undertake research to improve practice. **Corresponds to Cluster 3: Functional Work Skills – Digital and Numeracy Skills**
PLO 6	**Demonstrate** leadership, autonomy and advocacy in contributing to decision-making practices for patient management, training, research and health systems improvement in Cardiothoracic Surgery. **Corresponds to Cluster 3: Functional Work Skills – Leadership, Autonomy and Responsibility Skills**
PLO 7	Continually **integrate** new knowledge in the area of specialisation for personal advancement and lifelong learning through ongoing academic and/or professional development. **Corresponds to Cluster 4: Personal and Entrepreneurial Skills**
PLO 8	**Demonstrate** commitment to professional values, attitudes and ethical conduct in patient management and research in Cardiothoracic Surgery. **Corresponds to Cluster 5: Ethics and Professionalism**

Key Stage Points

The Cardiothoracic Surgery Specialty Programme is a minimum of 6 years in duration and a maximum of 10 years, and training is divided into three stages:

Core Phase of training (Years 1 & 2)
The core phase of training will consist of an indicative period of two years. The purpose of this stage is to acquire and develop experience and competence in the generality of cardiothoracic surgery.

Intermediate Phase of training (Years 3 & 4)
Continuing the focus on gaining experience and competence in the generality of cardiothoracic surgery, trainees may be starting to develop subspecialty interests and undertaking modules relevant to this.

Final Phase of training (Years 5 & 6)
The final phase of training will consist of an indicative period of two years. By the end of this phase trainees will have been successful in the exit examination.

The details of each stage is provided in the syllabus section of this document.

SELECTION AND RECRUITMENT

Entry Requirements

To enter speciality training in cardiothoracic surgery, a trainee must demonstrate the appropriate academic qualifications, clinical experience, commitment, and dedication to the field. This section outlines the requirements and application process for a trainee to enrol in cardiothoracic surgery training. The mandatory requirements and desirable attributes are detailed.

Trainees who are eligible to enter Cardiothoracic Surgical Speciality Training may select either the Local University Programme or Parallel Pathway.

As training posts are limited, just satisfying the entry criteria does not guarantee entry onto the training programme. Trainees should present a training portfolio (see Portfolio in the Assessment Section).

This document is a record of training and supports the demonstration of fulfilment of the requirements to enter the programme.

Formal programme registration (University/ Parallel pathway), will begin on acceptance into the training programme.

Entry Requirements for the Training Pathways

The table below summarises the entry requirements for University and Parallel Pathway training programmes.

Entry Requirement	University Pathway	Parallel Pathway	Evidence
CORE REQUIREMENTS			
MBBS or other medical qualification recognised* by MMC	**Mandatory**	**Mandatory**	Original certificate
Local and international applicants with unrecognised primary qualifications are expected to fulfil the MMC requirements registration. Please contact the MMC for further information.			
Registration with MMC (Temporary or Full Registration)	**Mandatory**	**Mandatory**	Current certificate of registration
Basic Life Support certification	**Mandatory**	**Mandatory**	Original certificate/ Proof of qualification
Passed Entry examination (MRCS, MedEx or equivalent)	**Mandatory**	**Mandatory**	Proof of qualification

Entry Requirement	University Pathway	Parallel Pathway	Evidence
Portfolio of Clinical Experience	**Mandatory:** 2 years post Housemanship (6 months general surgery and 6 months of cardiothoracic surgery)	**Mandatory** 2 years post Housemanship (6 months general surgery and 6 months of cardiothoracic surgery)	Supervisors reports from previous training and portfolio. Both pathways must have fulfilled the entry Essential Learning Activities (ELA)** (see section ELA below and associated Workplace Based Assessment (WBA)) ***The HO/MO logbooks may help demonstrate evidence of ELAs.***
ACLS/ ATLS/CALS is desirable	**Desirable**	**Desirable**	Original certificate

Entry Requirement	Local University Programme	Parallel Pathway	Evidence
Other Qualifications/ Certifications (attendance at courses, workshops or conferences relevant to IM)	**Desirable**	**Desirable**	Original certificate of attendance
Proceedings (publications, posters or oral presentations)	**Desirable**	**Desirable**	Meeting abstract, proof or publications
	OTHERS		
Overseas applicants*	**Mandatory:** In addition to the requirements for local applicants, overseas candidates must have achieved an acceptable level in an English language assessment. **Desirable:** IELTS: 7 Some universities require a clinical attachment to determine suitability prior to acceptance.	Not applicable	

*** International applicants with unrecognised primary qualifications are expected to have passed the EPR (Examination for Professional Registration) for MMC registration.**

Entry Essential Learning Activities (Entry ELAs)

Entry ELAs are clinical activities that prospective trainees should be able to perform in a trustworthy manner by the time they enter postgraduate training in Cardiothoracic Surgery. They indicate the knowledge, skills and attitudes that the trainees need to be aware of when carrying out the tasks and responsibilities. They also serve as learning opportunities for prospective trainees when they are tasked to undertake the activities and then receive feedback regarding their performance.

There are three Entry ELAs for Cardiothoracic Surgery:

ELA 1	Basic Suturing
ELA 1	Insertion of Chest tube
ELA 3	Taking Informed Consent

Application Process University/Parallel Pathway

The application process differs between scholarship holders, (***Hadiah Latihan Persekutuan, HLP***), private and self-funded trainees. The HLP entitles MOH doctors to take paid study leave and covers the university tuition fees. Intake to the programme is once a year.

HLP trainees	Private / self-funded trainees
Trainees will either receive a full or partial scholarship. They will be registered through the Central Registry and will be rotated according to the rotation scheme.	International or private / self-funded trainees will also be registered through the Central Registry. However, their university of choice will be responsible for their training.

Eligible trainees applying for a scholarship should apply through the MOH Postgraduate Training Management Division.

Trainees will be registered through the Central Registry and given a trainee number. Trainees must apply at https://online.mohe.gov.my before the closing date of the HLP applications.

The selection committee will review and screen applicants for suitability for admission. The same committee will review any evidence for the recognition of previous training.

The successful applicant will be informed via email, (usually within 3 months). The prospective trainee will also be assigned a host training centre. While training centre preferences may be expressed, the final placements will be determined by the Cardiothoracic Surgery Training Committee.

Interview

Subject to the training committee, a formal interview will be held to determine the candidate's suitability for the programme, especially private/ international candidates. Universities may hold an interview if needed. The Cardiothoracic Surgical Training Committee appoints the interview panel and the decision made by the panel is final.

The successful candidates are chosen from those who have met the following criteria :

1. Passed the MRCS A&B – membership of the Royal College of Surgeons (an intercollegiate exam conducted by any one of the four UK Royal College of Surgeons).
2. Have successfully completed a minimum of 2 years in various surgical departments of which a minimum of 6 months should be in General Surgery and 6 months in Cardiothoracic Surgery.
3. Attended an interview by a panel of interviewers comprising of consultant cardiothoracic surgeons and members of the Malaysian Association for Thoracic and Cardiovascular Surgery(MATCVS), and or College of surgeons/Academy of Medicine Malaysia as well as representatives from the Ministry of Health, Universities and Royal College of Surgeons Edinburgh.

Decisions made with regards to the selection of trainees are final. Requests on feedback of performance may be directed to the selection committee. Any appeals should be directed to the Board of studies or equivalent.

Orientation Process/ Induction process

Induction/Orientation process for the Fellowship in Cardiothoracic Surgery Royal College of Surgeons of Edinburgh Parallel Pathway Program

The Induction/Orientation Programme is conducted for candidates who have been accepted into the Fellowship in Cardiothoracic Surgery of the Royal College of Surgeons of Edinburgh.

As the start of the training programme commences in July, the induction program is usually held in April or May of that year.

In attendance are usually the President and Honorary Secretary of the MATCVS, Training Programme Director and Council Members of MATCVS, representatives from Ministry of Health, Institut Jantung Negara and Universities. Other members of the MATCVS or Heads of Departments of the various training institutions will also be invited.

The Programme Director will give an overview of the training programme based on the curriculum.

The Honorary Secretary will provide a briefing on the Educational contract which will be signed by candidates.

On reporting for work at their respective training institutions, the candidates will undergo another round of orientation as per institutional practice. This should include:

- Legal requirements (for example, Health and Safety training)
- Regulatory requirements of training (rules and regulations of program)
- Introduction to terms and conditions of training (Leave entitlement, expense claims, etc.)
- Basic introduction to the training centre
- A guided tour of the training centre
- Completion of government and administrative requirements (Tax forms, employment issues, Credentialing and Privileging in the training centre)
- Payroll details
- Introductions to key members of staff
- Specific job-role training expectations
  - Clinical
  - Academic; Research, Education

As advanced surgical training programmes may involve multiple clinical and academic facilities, orientation may take place over a number of days. Time should be allocated for the orientation process and planned in advance by members of the training faculty.

QUALITY ASSURANCE AND ACCREDITATION

Statutory Bodies

Malaysian Medical Council

Medical Education Committee

The Medical Education Committee (MEC) of the Malaysian Medical Council (MMC) was formed under the provisions of Regulation 22 of the Medical (Amendment 2012) Act 1971. The MEC recognises specialties, specialty training institutions and programmes, as well as the qualifications awarded.[1]

Evaluation Committee for Specialist Medical Qualifications

The Evaluation Committee for Specialist Medical Qualifications, (ECSMQ), of the MMC, assisted by Specialty Sub-Committees, (SSCs), reviews applications by applicants to be recognised as specialists.[2]

National Specialist Register

The National Specialist Register, (NSR), is a database of specialist medical practitioners in Malaysia, formed by the MMC. Following the enforcement of the Medical Regulations 2017 of the Medical Act 1971, (Amendment 2012), in July 2017, all doctors wishing to practise as specialists in Malaysia must be registered with the NSR. Applications are reviewed by the ECSMQ.[2]

Malaysian Qualifications Agency

The Malaysian Qualifications Agency (MQA) was formed in 2007 by the merging of the National Accreditation Board (LAN) and the Quality Assurance Division of the Ministry of Higher Education (QAD). It is governed by the Malaysian Qualifications Agency Act 2007. The MQA is in place to quality assure higher education institutions and programmes, benchmarked against the Malaysian Qualifications Framework (MQF).[3]

Recognition of New Specialties

Proposals for new specialties, defined as those not in existence prior to 1 July 2017, must be submitted to the MEC for review, and they will make the recommendation to MMC for provisional approval.[1] Strong justification must be provided, including the rationale, relevance, demand, capacity for training, and absence of overlap with existing specialties.

Following provisional approval, the MEC will form a Specialty Education Sub-Committee to develop the specialty specific standards, propose training competencies, and recognise training centres. Cardiothoracic Surgery is a recognised specialty.

Accreditation of Programmes

MMC recognises training programmes on the recommendation of MEC. Accreditation of programmes is benchmarked against the Malaysian Standards for Specialist Training of the MMC (see the Section: Compliance and Mapping). Programmes with degrees awarded by Malaysian institutions of higher education must also be accredited by MQA, based on the MQF.

Re-Accreditation of Programmes

Programmes must apply to MMC, (and MQA, if run by institutes of higher education), for re-accreditation every five years, or as determined by the accrediting body.

Quality Assurance of Programmes

Quality assurance is the process by which meeting and maintaining the desired level performance is ensured. It is a continuous process, and occurs at multiple levels, through many activities. These activities culminate in the curriculum review, which takes place every five years. Curricula are reviewed for compliance to standards, relevance and currency, taking input from all stakeholders.

In Cardiothoracic Surgery, review of curricula occurs at an institutional and national level. Each institution must satisfy its own internal quality assurance processes. National reviews are conducted by the Conjoint Specialty Committee for Cardiothoracic Surgery (CCCST), to ensure the alignment and standardisation of all programmes.

Figure 1: Accreditation and Quality Assurance of Cardiothoracic Surgery Programmes

<table>
<tr><th colspan="3">Accreditation</th><th>Quality Assurance</th></tr>
<tr><th colspan="3">MMC</th><th>MQA (MQF)</th></tr>
<tr><td colspan="2">MEC (National Standards)</td><td colspan="2">Joint PG Committee</td></tr>
<tr><td colspan="3">National Curriculum - CS</td><td>Curriculum Review</td></tr>
<tr><td>Institutional QA</td><td colspan="2">CCCST</td><td>Institutional QA</td></tr>
<tr><td colspan="4">Programmes</td></tr>
</table>

Accreditation of Individuals

Trainers

Trainers must be recognised specialists on the National Specialist Register. Trainers must be appointed by the institution offering the programme, based on the requirements of the curriculum, (see the Section: Contributors).

Trainees

Trainees must be credentialed and privileged to perform clinical activities in their training centres. They will need to provide evidence of a recognised undergraduate medical qualification, full registration with MMC, and acceptance into the training programme. Some hospitals may also require a letter of good standing from the MMC. Referees will be required to provide testimony of trainees' performance and character.

Specialists

Trainees who successfully exit training must apply to the NSR to be recognised as specialists, at a minimum of one year after the successful completion of the programme. During this interim period, they may be privileged to function as a specialist by their hospital.

Specialists registered in the NSR must renew their registration every five years, or as determined by NSR. Specialists must also renew credentialing and privileging rights at their workplace, at the intervals determined by their hospitals.

External Experience

Trainees may occasionally undertake part of their surgical training outside of Malaysia. Any such training experience requires review by the Conjoint Specialty Committee to determine its relevance within the Malaysian training programme.

External Qualifications

External qualifications are those conferred by overseas awarding bodies. Qualifications may be entry or exit level. Training for these qualifications may have taken place in, or outside of Malaysia.

Any training and qualifications at entry level, outside of those stated in this document, require review by the Conjoint Specialty Committee, and approval at institutional level.

Training and qualifications at exit level must be reviewed by the ECSMQ, to determine if criteria for registration in the NSR have been met.

References:

[1]Specialty Education Committee of the Malaysian Medical Council (2020). Guidelines for the Recognition of New and Existing Specialties by the Malaysian Medical Council. Updated 26 February 2020.

https://mmc.gov.my/wp-content/uploads/2020/03/26-Feb-2020-Guidelines-For-The-Recognition-Of-A-New-Existing-Medical-Specialty-By-Malaysian-Medical-Council-Approved-by-Council-on-16-July-2019.pdf

[2]https://www.nsr.org.my/About-NSR.html

[3]https://www.mqa.gov.my/pv4/profil_MQA.cfm

CONTRIBUTORS

Administration and Governance

Ministry of Health (MOH) - Parallel Pathway

The Postgraduate Medical Specialist and Subspecialisation (PGMSS) Unit, Medical Development Division, manages the Parallel pathway, Ministry of Health. At the state level, the State Representative, (or appointed representatives), will liaise with the hospital's Head of Department and Hospital Coordinators on training related matters.

The roles of overarching bodies are detailed further in the following sections:

Ministry of Higher Education, Malaysia

The Ministry of Higher Education (MOHE), is the ministry of the Government of Malaysia responsible for the quality of education, policies, quality, training and research at a higher education level. All Malaysian universities are under the governance of MOHE.

The Medical Development Division MOH, (*Bahagian Perkembangan Perubatan KKM*), is a department that is responsible for the management of training programmes in the MOH

Malaysian Medical Council (MMC)

The Malaysian Medical Council, (MMC), is the regulatory body under which all practising doctors in Malaysia are accountable under the Medical Act 1971. The MMC is responsible for the standards and evaluation of training, and the maintenance of the National Specialist Registry, (NSR), of the country. The MMC supports MQA in setting standards and ensuring quality in medical training nationally.

Malaysian Qualifications Agency (MQA)

The Malaysian Qualifications Agency is a statutory body that accredits the academic programmes provided by post-secondary and higher educational institutions. MQA accredits and continuously monitors the standards of local education programmes.

Public Services Department of Malaysia (PSD)

The Public Services Department of Malaysia, (PSD) / *Jabatan Perkhidmatan Awam*, (JPA), is a government department that plans develops and manages human resources for the civil service.

As the main employer of government doctors in Malaysia, the PSD is the source of funding for salaries and allowances for most of the trainees in Internal Medicine.

Academy of Medicine of Malaysia (AMM)

The Academy of Medicine of Malaysia, (AMM), is a professional organisation that seeks to maintain the highest standard of professional and ethical practice of medical care. The AMM advocates and provides direction on issues related to Specialist Medical Education and training. It also serves as an authority and resource to the government and public in matters related to specialist practice and currently administers the National Specialist Registry.

University Cardiothoracic Surgery Programme

Cardiothoracic surgery programme in each university will be governed by the Dean and the Deputy Dean for postgraduate studies. Each university's Department of Cardiothoracic Surgery runs and administrates the programme. The Training Programme Director /coordinator is the key and primary

person who liaises with the trainees and Mentors, Posting Trainers, Trainers and represents the university at the Conjoint Board level together with the Head of Department.

The University Senate is the main administrative body within each university and is ultimately responsible for the university's training programme. The Deans' Council oversees and addresses any issues at the National Universities Conjoint Board level.

Roles at Departmental Level

The roles and responsibilities of staff at the department level is illustrated below:

Hospital Management

Training is an integral part of hospital practice, and the hospital management should foster and facilitate an environment that is favourable and supportive of training. This task may include:

- credentialing and privileging of trainees
- providing conducive learning opportunities in the form of training facilities/equipment
- supportive policies
- medication availability
- teaching
- fair practices of time monitoring include leave and remuneration for clinical duties
- performed by trainees

Head of Department

The Head of Department, in recognised training centres is overall in charge of the daily operations of the department. The HOD should appoint a training lead and establish an institution training committee to oversee all aspects of training. Issues encountered may be escalated to the Dean/Deputy Dean of the University, or the Cluster/State Representative of MOH hospitals should they warrant greater attention.

Supervisors

The supervisors must be qualified cardiothoracic surgeons with experience in teaching, training and assessing, and working with a team of clinical and administrative staff to ensure that the curriculum is delivered and runs effectively.

A named Mentor will be allocated to each trainee at the beginning of training. The Mentor is responsible for supporting and monitoring the learning of their trainees and addressing any training related issues.

Supervision is fundamental to the education process and an integral part of the training programme. Supervision is a dynamic process where trainees are encouraged to engage in their learning and development by identifying learning needs and planning strategies to address them.

The two significant aspects of the supervision role are:

- To provide an objective evaluation of trainee's performance using appropriate methods of assessment, and
- To establish a relationship that will help the trainee to self-actualise and become motivated as self-directed learners.

It is the responsibility of supervisors to:

- Oversee the clinical, educational, research and management development of the trainee over the entire programme.
- Provide recommendations and guidance on training and professional development.
- Provide feedback on the performance and conduct of trainees.
- Assist the trainee in monitoring their progress and preparation for assessment.
- Support trainees in difficulty within their capability, including escalating to the TPD when
- Necessary.
- Meet regularly with trainees at the beginning of the year and prior to progress reviews, or
- more frequently as required, e.g. mid-year, particularly if any challenges need to be addressed).
- Complete a progress review for evaluation by the Training Committee.

Trainers

Formal guidance and training are the responsibility of all Trainers. The Trainer is a qualified Cardiothoracic Surgeon. At the start of each posting, trainees will be allocated to a trainer who will establish the main posting objectives. These objectives may evolve as the posting progresses and should be fulfilled by the end of the posting. The Lead trainer can allocate other trainers to help in supervising or training. The lead trainer must also identify and guide trainees to the learning opportunities within that posting and complete a Posting Trainer's Report, (with feedback from other trainers), at the end of the attachment. This is a vital component of the portfolio on which progress will be determined at the Progress Review.

All Posting Trainers are responsible for:

- Supervision and ensuring trainees are competent and safe practitioners
- Having a good understanding of the programme of Internal Medicine training and be
- committed to facilitate learning by the trainee
- Performing workplace-based assessments, (WBA), and providing useful constructive
- feedback to promote the development
- Assisting the trainee in setting targets and monitoring their progress throughout the posting
- Facilitate learning opportunities as available during postings
- Providing feedback to the allocated Mentor based on performance during the posting
- Enabling trainees to satisfy the requirements of the programme
- Being a good role model and continuing to upgrade their skills in relevant areas
- The criteria to qualify as a trainer includes the following:
  - NSR registration in Cardiothoracic Surgery
  - Appointed and recognised as a trainer by Conjoint Board of Cardiothoracic Surgery
  - Working in a hospital accredited for training
  - Undergone Training of Trainers, (ToT) (see section Training of Trainers)
  - Committed to training, including supervising and coaching

Programme Directors

The Training Programme Director, (TPD)/ Hospital Coordinator (HC)/ University Program Coordinator is appointed by the Head of Department in each training centre. The TPD/HC/UC is responsible for:

1. Administrative, operational and management aspects of Cardiothoracic Surgery training within an institution.
2. Representing the Department of Cardiothoracic Surgery at postgraduate meetings.
3. Overseeing research component progress and assessments.
4. Chairing the Cardiothoracic Surgery Postgraduate Programme subcommittee at the respective training centres.
5. Receiving feedback on any problems encountered by trainees or Mentors/Posting.

Examiners - Selection & Training

Examiners are required to conduct the examinations and the assessment of the candidates' performance. Examiners will have direct access to the examination contents and will need to be available for all of the relevant exams.

Minimum Criteria for Examiners

1. Is an actively practising consultant cardiothoracic surgeon with NSR
2. Has completed a recognised examiner training course
3. Has observed two **FULL** sessions of the relevant examination
4. Has officially appointed by the relevant statutory body

Assessors

Assessors - Selection and Training

Assessors are required to evaluate the conduct of examinations. This would include an assessment of examiner performance, candidate feedback, and handling of examination materials. Assessors do not directly assess examination content, which is the task of the external examiner. Nevertheless, the external examiner may perform some of the tasks of the assessor where applicable.

Minimum Criteria for Assessor

1. Is an actively practising consultant surgeon, or within three years of retirement, who has a recognised general surgical qualification
2. Has completed a recognised assessor training course
3. Has been an examiner for the relevant surgical examination for at least 5 years
4. Is officially appointed by the relevant statutory body

SYLLABUS

Syllabus Overview and Objectives of the Curriculum

Cardiothoracic Surgery is the specialty of medicine that deals with the diagnosis, evaluation and surgical management of diseases of the heart, lungs, oesophagus and chest. Cardiothoracic surgeons undertake the surgical treatment of a wide range of serious conditions, and cardiothoracic operations tend to be major and often complex procedures. Many of these operations require support utilising advanced forms of technology, such as cardiopulmonary bypass, invasive monitoring and minimally invasive equipment. Because of the serious nature of the conditions and the scale of the operations, many cardiothoracic patients require care on the intensive therapy unit, and cardiothoracic surgeons are also proficient in this aspect of their patients' care.

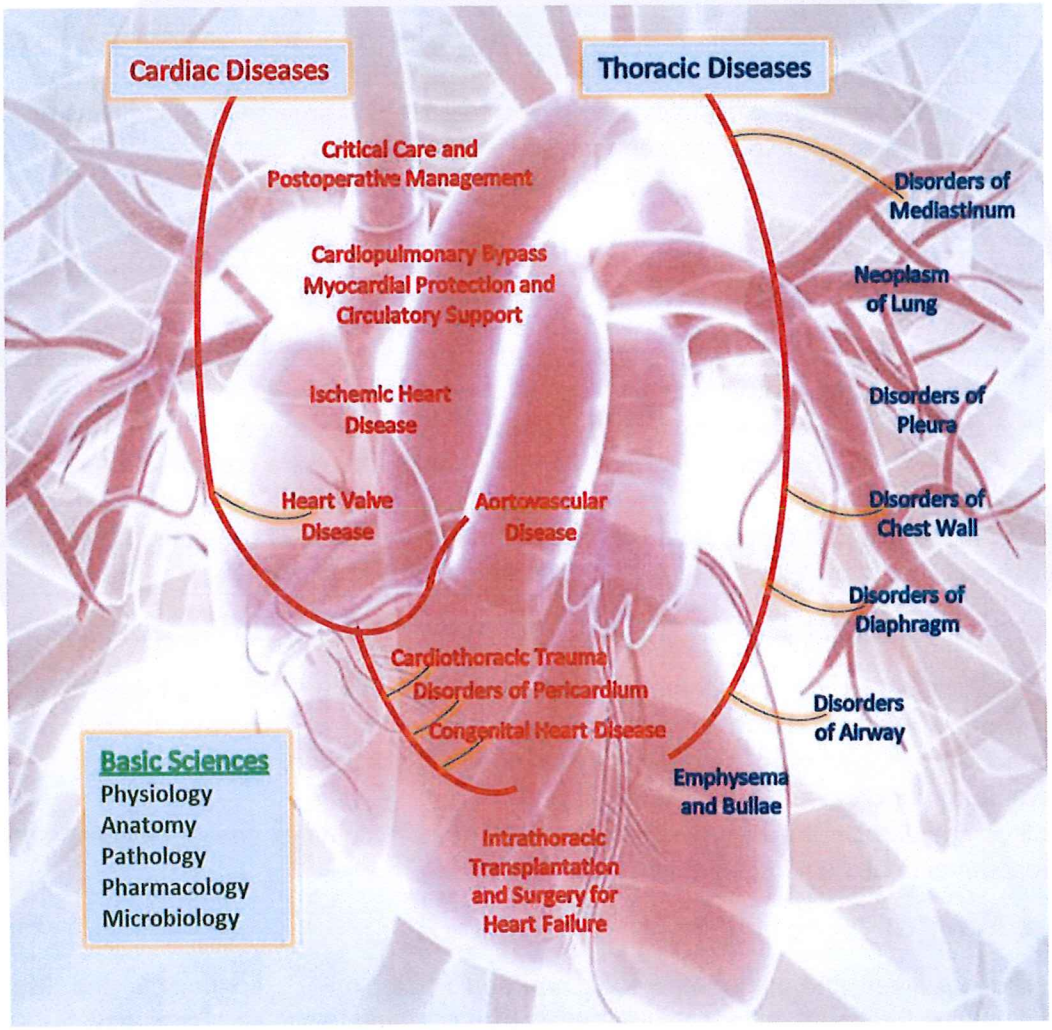


Figure 2: illustrates the various domains in the Cardiothoracic Surgery training programme, showing the main practice areas and the basic sciences.

Cardiothoracic surgeons generally work closely with their colleagues in Cardiology, Respiratory Medicine, Oncological Medicine, Anaesthesia and Intensive Care. They also have close professional relationships with other non-medical staff such as perfusionists, intensive care staff and operating department personnel.

Whilst many cardiothoracic surgeons develop proficiency in the broad range of the specialty, some focus and develop expertise in more complex areas of special interest. These include:

- Cardiac surgery
- Thoracic surgery
- Surgery of the aorta
- Transplantation and heart failure surgery
- Congenital surgery in children
- Congenital surgery in adults

The Purposes of Training

The purpose of the training programme is to produce trained cardiothoracic surgeons, who will have the clinical knowledge, surgical expertise and the professional skills necessary for a consultant to practice in Malaysia. Knowledge, Skills, Competence and Performance Level are core to the programme and these include:

- Competence in the management of patients presenting with a range of symptoms and elective conditions as specified in the core syllabus for the specialty of cardiothoracic surgery.
- Competence to manage an additional range of elective and emergency conditions by virtue of appropriate training and assessment opportunities obtained during training.
- Professional competences as specified in the syllabus.

Congenital Heart Disease

The assessment and management of adults and children with congenital heart disease to include:

- Competence in the operative management of common uncomplicated congenital conditions (e.g. PDA, atrial and ventricular septal defects, coarctation, shunts and PA banding).
- Exposure to, and experience in more complex operative procedures (e.g. valve surgery, Tetralogy of Fallot, pulmonary atresia, Fontan procedures, extra cardiac conduits, AV canal defects).
- Full competence in the operative management of more complex cases, including secondary procedures to be developed in the post completion of training period.

Surgery for Heart Failure and Intrathoracic Transplantation

- The assessment and management of a patient with heart failure including the selection criteria for various treatment options.
- Operative management of heart failure including transplantation, revascularisation, ventricular reverse remodelling and mitral valve surgery.
- Full competence in the operative management of more complex cases, including secondary procedures to be developed in the post training period.

Aortic Surgery

- The assessment and diagnosis of common aortic pathologies , aneurysms and dissections and various treatment options that are available according to site and pathology.
- Focused training post completion of cardiothoracic training for endovascular procedures, aortic arch surgeries, descending thoracic aorta and thoraco abdominal aorta surgeries.

Thoracic Surgery

- General thoracic surgery competence as required by the training programme.
- Focused thoracic surgery training in the field of VATS, Robotic surgery and Complex thoracic surgery resection and reconstruction for airway, chest wall and complex lung cancer surgery.

Syllabus Scope and Standards

The areas of practice in cardiothoracic surgery are:

1. Critical Care and Postoperative Management
2. Cardiopulmonary Bypass, Myocardial Protection and Circulatory Support
3. Ischaemic Heart Disease
4. Heart Valve Disease
5. Aorto-vascular Disease
6. Intrathoracic Transplantation and Surgery for Heart Failure
7. Congenital Heart Disease
8. Cardiothoracic Trauma
9. Thoracic Surgery – General
10. Neoplasms of the Lung
11. Disorders of the Pleura
12. Disorders of the Chest wall
13. Disorders of the Diaphragm
14. Emphysema and Bullae
15. Disorders of the Pericardium
16. Disorders of the Mediastinum

Disorders of the Airway

The specific requirements of each of these areas of practice is explained in depth in each topic within the syllabus.

Key Topics

1. Critical Care and Postoperative Management

The management of critically ill cardiothoracic surgical patients in the pre and post operative periods.

2. Cardiopulmonary Bypass, Myocardial Protection and Circulatory Support

The management of a patient undergoing cardiopulmonary bypass:

- The management of myocardial protection during cardiac surgery
- The management of a patient requiring circulatory support

3. Ischaemic Heart Disease

The assessment and management of patients with coronary heart disease, including elective and emergency presentations. To include competence in both primary and secondary procedures, and where appropriate to include off-pump and on-pump strategies and arterial revascularisation.

The preliminary assessment and initial management of patients with complications of myocardial infarction, including mitral regurgitation, ventricular aneurysm and septal defects. To include operative management in appropriate situations. Full competence in the operative management of complex cases to be developed in the post training period.

4. Heart Valve Disease

The assessment and management of patients with valvular heart disease, including both isolated and combined aortic and mitral valve disease.

The assessment and management of patients with combined coronary and valvular heart disease, including operative management.

Full competence in the operative management of complex cases including mitral valve repair and secondary procedures to be developed in the post cardiothoracic training period.

5. Aortovascular Disease

The preliminary assessment and initial management of patients with acute dissection of the ascending aorta. To include operative management in appropriate situations.

Full competence in the operative management of complex cases to be developed in the post cardiothoracic training period

6. Cardiothoracic Trauma

The assessment and management of patients with minor and major cardiothoracic trauma. To include operative management in appropriate situations.

Full competence in the operative management of complex cases including great vessel injury to be developed in the post cardiothoracic training period

7. General Management of a Patient Undergoing Thoracic Surgery

Patient selection and determination of suitability for major thoracic surgery and the pre and postoperative management of a thoracic surgical patient.

The assessment and management of a patient by bronchoscopy including foreign body retrieval.

The assessment and management of a patient by mediastinal exploration.

Competence in performing appropriate thoracic incisions.

8. Neoplasms of the Lung

The assessment and management of lung cancer, including the scientific basis of staging systems and techniques used in the determination of stage and fitness for surgery

An understanding of the role of surgical treatment in the multidisciplinary management of lung cancer and other intrathoracic malignant diseases, including an appreciation of the principles of other treatment modalities and their outcomes

9. Disorders of the Pleura

The assessment and management of patients with pleural disease; including pneumothorax and empyema, and including both VATS and open strategies

10. Disorders of the Chest Wall

The assessment and management of patients with chest wall abnormalities, infections and tumours.

11. Disorders of the Diaphragm

The assessment and management of patients' disorders of the diaphragm, including trauma to the diaphragm.

12. Emphysema and Bullae

The assessment and management of patients with emphysematous and bullous lung disease; including surgical management if appropriate and utilising both VATS and open strategies.

Full competence in the operative management of complex cases, including lung reduction surgery, to be developed in the post cardiothoracic training period.

13. Disorders of the Pericardium

The assessment and management of patients with disorders of the pericardium and pericardial cavity; including surgical management if appropriate and utilising both VATS and open strategies.

14. Disorders of the Mediastinum

The assessment and management of patients with mediastinal tumours and masses; including surgical management if appropriate and utilising both VATS and open strategies.

15. Disorders of the Airway

The assessment and management of patients with disorders of the major airways. Including operative management in suitable cases.

Full competence in the operative management of complex cases, including tracheal resection, to be developed in the post cardiothoracic training period.

16. Congenital Heart Disease

The assessment and evaluation of common congenital heart condition. Further training in the field of congenital heart disease will be done in the post cardiothoracic training period.

17. Intrathoracic Transplantation and Surgery for Heart Failure

The assessment criteria and the management of a transplant patient in general. The common immunosuppressors. Full competence in this field will be done in the post cardiothoracic training period.

Cardiothoracic Surgical Training Modules Overview

The purpose of cardiothoracic surgical training is to allow the trainee to develop the skills necessary for independent cardiothoracic practice. These will include skills in general cardiothoracic surgery and in emergency cardiothoracic surgery. They will also be an introduction to some of the specialist areas of Cardiothoracic Surgery.

Core Phase of training (Years 1 & 2)

The core phase of training will consist of an indicative period of two years. The purpose of this stage is **to acquire and develop experience and competence in the generality of cardiothoracic surgery. Further attachments to other specialities like cardiology , respiratory medicine, anaesthesia, critical care and general surgery are encouraged for all trainees. The previous experience of the trainee will be taken into consideration.**

Intermediate Phase of training (Years 3 & 4)

The intermediate phase of training will consist of an indicative period of two years. Whilst the emphasis remains on gaining experience and competence in the generality of cardiothoracic surgery, trainees may be starting to develop subspecialty interests and undertaking modules relevant to this. The curriculum for each of the modules is defined (see the syllabus section). Aims and levels of competence to be attained within each module by the end of this stage are identified.

Final Phase of training (Years 5 & 6)

The final phase of training will consist of an indicative period of two years. By the end of this phase trainees will have been successful in the exit examination. Trainees will have developed sufficient experience and competence in the generality of cardiothoracic surgery to be eligible for the award of completion of training certificate. They may be provided with the opportunity to develop an area of special interest during this period through the selection of appropriate sub speciality in Cardiothoracic Surgery. The curriculum for each of the subspeciality is defined (see syllabus). Aims and levels of competence to be attained within each module by the end of this stage are identified.

The curriculum is flexible and can accommodate the needs of trainees following an academic pathway. This is achieved by having individualised learning agreements. Academic trainees will be expected to demonstrate that they have achieved all the essential requirements for the completion of training in Cardiothoracic Surgery, but may choose not to undertake any optional additional training in the final stage. It is however acknowledged that academic trainees will need longer training pathways to achieve the essential competencies. (Refer to the syllabus section).

Training modules

Training Modules	
1. Critical Care and Postoperative Management	11. Disorders of the Pleura
2. Cardiopulmonary Bypass	12. Disorders of the Chest Wall
3. Myocardial protection	13. Disorders of the Diaphragm
4. Circulatory support	14. Emphysema and Bullae
5. Ischaemic Heart Disease	15. Disorders of the Pericardium
6. Heart Valve Disease	16. Disorders of the Mediastinum
7. Aorto-vascular Disease	17. Disorders of the Airway
8. Cardiothoracic Trauma	18. Congenital Heart Disease
9. General Management of a Patient Undergoing Thoracic Surgery	19. Intrathoracic transplantation and surgery for heart failure
10. Neoplasms of the Lung	

Depth of knowledge levels

Level	Description
1	Knows of
2	Knows basic concepts
3	Knows generally
4	Knows specifically and broadly

Standards for clinical and technical skills

Level	Description
1	Has observed
2	Can do with assistance
3	Can do whole but may need assistance
4	Competent to do without assistance,

Module 1

Module 1	Critical Care and Post-operative Management	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Critical Care and Post-operative Management						
Subcategory	None						
Objective	To be able to manage a post-surgical patient on the critical care, high dependency and post operative wards. To work as part of a multi-professional, multidisciplinary team in the management of a patient requiring complex critical care.						
Knowledge	**BASIC KNOWLEDGE**						
	Physiology - Haemodynamics: physiology and measurement - Cardiac arrhythmias - Haemostasis, thrombosis and bleeding - Acid base balance - Pulmonary physiology, ventilation and gas exchange - Metabolic response to trauma and surgery - GIT, renal and hepatic physiology - Nutrition - Temperature regulation	4	4	4	4	4	4
	Anatomy - Heart, pericardium and great vessels - Mediastinum, thoracic inlet and neck - Tracheobronchial tree and lungs - Chest wall and diaphragm	4	4	4	4	4	4
	Pathology - Inflammation and wound healing - Myocardial infarction and complications - Endocarditis - Pericarditis - Systemic Inflammatory Response Syndrome - Bronchopulmonary infection - ARDS	4	4	4	4	4	4
	Pharmacology - Drugs used in the treatment of hypertension, heart failure and angina - Inotropes, vasodilators and vasoconstrictors - Anti-arrhythmic drugs - Haemostatic drugs - Antiplatelet, anticoagulant and thrombolytic drugs - Analgesics - Antibiotics - Anaesthetic agents, local and general	4	4	4	4	4	4

Module 1	Critical Care and Post-operative Management	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	Microbiology - Organisms involved in cardiorespiratory infection - Antimicrobial treatment and policies	4	4	4	4	4	4
	CLINICAL KNOWLEDGE - Cardiopulmonary resuscitation - Management of cardiac surgical patient - Management of thoracic surgical patient - Treatment of cardiac arrhythmia - Management of complications of surgery - Blood transfusion and blood products - Wound infection and sternal disruption - Neuropsychological consequences of surgery and critical care	3	3	4	4	4	4
Clinical Skills	**HISTORY AND EXAMINATION**						
	- History and examination of the postoperative and critically ill patient	4	4	4	4	4	4
	DATA INTERPRETATION						
	- Analysis and interpretation of post operative and critical care charts and documentation - Routine haematology and biochemical investigations - ECG	4	4	4	4	4	4
	- Chest radiograph and	3	3	4	4	4	4
	- Echocardiography including TOE	3	3	3	3	3	3
	PATIENT MANAGEMENT						
	General management of surgical patient - Management of fluid balance and circulating volume - Pain control - Wound management - Management of surgical drains - Antimicrobial policy and prescribing - Management of post-operative haemorrhage - Cardiopulmonary resuscitation (ALS) - Management of complications of surgery - Blood transfusion and blood products - Wound infection and sternal disruption	3	3	4	4	4	4
	Recognition, evaluation and treatment of haemodynamic abnormalities - Evaluation and interpretation of haemodynamic data - Practical use of inotropes and vasoactive drugs - Use of intra-aortic balloon pump	3	3	4	4	4	4

Module 1	Critical Care and Post-operative Management	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	Recognition, evaluation and treatment of cardiac arrhythmias - Interpretation of ECG - Use of anti-arrhythmic drugs - Use of defibrillator - Understanding and use of cardiac pacing	3	3	4	4	4	4
	Recognition, evaluation and treatment of ventilatory abnormalities (level as indicated) - Interpretation of blood gas results - Airway management	3	3	4	4	4	4
	- Understanding of ventilatory techniques and methods - Understanding of anaesthetic drugs and methods	2	2	3	3	3	3
	Recognition, evaluation and treatment of multiorgan dysfunction (level as indicated) - Renal dysfunction and support - GIT dysfunction, feeding and nutrition - Recognition and evaluation of cerebral and neuropsychological problems	2	2	3	3	3	3
Technical Skills and Procedures	**PRACTICAL SKILLS** (level as indicated)						
	- Arterial cannulation - Central venous cannulation	4	4	4	4	4	4
	- IABP insertion - IABP timing and management	2	3	4	4	4	4
	- Tracheostomy	1	1	2	2	3	4
	- Fibreoptic bronchoscopy	2	2	3	3	4	4
	- Chest aspiration - Chest drain insertion - Chest drain management	4	4	4	4	4	4
	- Establish an airway - Internal cardiac massage	2	2	3	3	4	4
	OPERATIVE MANAGEMENT - Re-exploration for bleeding or tamponade	2	2	3	3	4	4

Module 2

Module 2	Cardiopulmonary Bypass	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support						
Subcategory	Cardiopulmonary Bypass						
Objective	To manage with supervision the clinical and technical aspects of a cardiopulmonary bypass.						
Knowledge	**BASIC KNOWLEDGE**						
	Physiology - Haemodynamics: physiology and measurement - Cardiac arrhythmias - Haemostasis, thrombosis and bleeding - Acid base balance - Pulmonary physiology, ventilation and gas exchange - Metabolic response to trauma and surgery - GIT, renal and hepatic physiology - Nutrition - Temperature regulation	3	3	4	4	4	4
	Anatomy - Heart, pericardium and great vessels - Mediastinum, thoracic inlet and neck - Chest wall and diaphragm - Femoral triangle and peripheral vascular system	3	3	4	4	4	4
	Pathology - Inflammation and wound healing - Systemic Inflammatory Response Syndrome - ARDS	3	3	4	4	4	4
	Pharmacology - Drugs used in the treatment of hypertension, heart failure and angina - Inotropes, vasodilators and vasoconstrictors - Anti-arrhythmic drugs - Haemostatic drugs - Antiplatelet, anticoagulant and thrombolytic drugs 3 Analgesics - Antibiotics - Anaesthetic agents, local and general	3	3	4	4	4	4
	Microbiology - Organisms involved in cardiorespiratory infection - Antimicrobial treatment and policies	3	3	4	4	4	4
	SPECIFIC KNOWLEDGE						
	- Principles and practice of CPB - Relevant equipment and technology and its application - Monitoring during CPB	3	3	4	4	4	4

	- Inflammatory and pathophysiological response to bypass - Pulsatile and non-pulsatile flow - Effect of CPB on pharmacokinetics - Priming fluids and haemodilution - Acid base balance - pH and alpha stat - Neuropsychological consequences of CPB - Cell salvage and blood conservation						
Clinical Skills	**N/A**						
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Median sternotomy open and close	3	3	4	4	4	4
	- Cannulation and institution of cardiopulmonary bypass - Safe conduct of CPB - problem solving and troubleshooting	2	3	3	3	4	4
	- Weaning from bypass and decannulation	2	3	4	4	4	4
	- Femoral cannulation and decannulation	2	2	4	4	4	4
	- Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation	1	1	2	2	3	4
	- Relevant cannulation techniques and appropriate delivery of cardioplegia	2	2	3	3	4	4

Module 3

Module 3	Myocardial Protection	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support						
Subcategory	Myocardial Protection						
Objective	To manage the clinical and technical aspects of a cardiopulmonary bypass, myocardial protection and circulatory support.						
Knowledge	**BASIC KNOWLEDGE**						
	- Myocardial cellular physiology - Myocardial function and dysfunction - Haemodynamics and arrhythmias - Coronary arterial and venous anatomy	3	3	4	4	4	4
	SPECIFIC KNOWLEDGE						
	- Scientific foundations of myocardial preservation - Principles and practice of myocardial preservation - Cardioplegia solutions and delivery modes. - Non-cardioplegic techniques of preservation	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT**						
	- Myocardial management throughout the peri-operative period	2	2	4	4	4	4
	- Ability to adapt preservation technique to clinical situation	2	2	3	3	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Median sternotomy open and close	3	3	4	4	4	4
	- Cannulation and institution of cardiopulmonary bypass - Safe conduct of CPB - problem solving and troubleshooting	2	3	3	3	4	4
	- Weaning from bypass and decannulation	2	3	4	4	4	4
	- Femoral cannulation and decannulation	2	2	3	4	4	4
	- Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation	1	1	2	2	3	4
	- Relevant cannulation techniques and appropriate delivery of cardioplegia	1	2	3	3	4	4

Module 4

Module 4	Circulatory Support	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support						
Subcategory	Circulatory Support						
Objective	To manage the clinical and technical aspects of cardiopulmonary bypass, myocardial protection and circulatory support.						
Knowledge	**BASIC KNOWLEDGE**						
	- Haemodynamics: physiology and measurement - Cardiac arrhythmias - Haemostasis, thrombosis and bleeding - Anatomy of the femoral triangle and peripheral vascular system - Inotropes, vasodilators and vasoconstrictors - Anti-arrhythmic drugs - Haemostatic drugs - Antiplatelet, anticoagulant and thrombolytic drugs	3	3	4	4	4	4
	SPECIFIC KNOWLEDGE						
	- Mechanical circulatory support in the preoperative, peri-operative and post-operative periods - Intra-aortic balloon pump - indications for use, patient selection and complications - Physiology of the balloon pump	3	3	4	4	4	4
	- Understanding of relevant equipment and technology - Ventricular assist devices, indications for use, patient selection and complications	2	2	3	3	4	4
Clinical Skills	**PATIENT MANAGEMENT**						
	- Patient selection for mechanical circulatory support	2	2	4	4	4	4
	- Insertion and positioning of the intra-aortic balloon pump - Management of the balloon pump including timing and trouble shooting	3	3	4	4	4	4
	- Care of the patient with intra-aortic balloon pump, including recognition and management of complications	2	2	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Median sternotomy open and close	3	3	4	4	4	4
	- Cannulation and institution of cardiopulmonary bypass - Safe conduct of CPB - problem solving and troubleshooting	2	3	3	4	4	4
	- Weaning from bypass and decannulation	2	3	4	4	4	4
	- Femoral cannulation and decannulation	2	2	3	4	4	4
	- Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation	1	1	2	2	3	4
	- Relevant cannulation techniques and appropriate delivery of cardioplegia	1	2	3	3	4	4

Module 5

Module 5	Ischaemic Heart Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Ischaemic Heart Disease						
Subcategory	None						
Objective	To evaluate and manage with appropriate supervision the surgical aspects of a patient with ischaemic heart disease including the complications of ischaemic heart disease.						
Knowledge	**BASIC KNOWLEDGE**						
	Physiology - Myocardial cellular physiology - Haemodynamics; physiology and measurement - Electrophysiology, including conduction disorders - Haemostasis, thrombosis and bleeding - Acid base balance - Pulmonary physiology, ventilation and gas exchange - Metabolic response to trauma - Vascular biology and reactivity	3	3	4	4	4	4
	Anatomy - Heart, pericardium and great vessels - Coronary anatomy and variants - Coronary angiography - Anatomy of the peripheral vascular system and vascular conduits	3	3	4	4	4	4
	Pathology - Inflammation and wound healing - Atheroma, medial necrosis and arteritis - Intimal hyperplasia and graft atherosclerosis - Myocardial infarction and complications - Systemic Inflammatory Response Syndrome	3	3	4	4	4	4
	Pharmacology - Drugs used in the treatment of hypertension, heart failure and angina 3 Anti-arrhythmic drugs - Haemostatic drugs - Antiplatelet, anticoagulant and thrombolytic drugs - Analgesics - Antibiotics - Anaesthetic agents, local and general	3	3	4	4	4	4
	Microbiology - Organisms involved in cardiorespiratory infection - Organisms involved in wound infection - Antibiotic usage and prophylaxis - Antisepsis	3	3	4	4	4	4

Module 5	Ischaemic Heart Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	CLINICAL KNOWLEDGE						
	General - Diagnosis, investigation and treatment of heart disease - Risk assessment and stratification - Cardiopulmonary resuscitation - Cardiac arrhythmias - Complications of surgery - Renal dysfunction - Multiorgan failure - Cardiac rehabilitation - Blood transfusion and blood products - Wound infection and sternal disruption Specific - Diagnosis investigation and assessment of IHD - Operative treatment - Off pump and on pump surgery - Results of surgery, survival, graft patency, recurrence - Arterial revascularisation - Redo coronary artery surgery - Role of PCI and non-operative treatment - Management of cardiovascular risk factors - Complications of myocardial infarction and ischaemic heart disease - VSD, mitral regurgitation, aneurysm.	3	3	4	4	4	4
Clinical Skills	**HISTORY AND EXAMINATION**						
	- Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment	4	4	4	4	4	4
	DATA INTERPRETATION - Routine haematology and biochemical investigations - Interpretation of haemodynamic data	4	4	4	4	4	4
	- Chest radiograph - ECG including exercise ECG - Coronary Angiography - Cardiac Catheterisation data	3	3	4	4	4	4
	- Echocardiography including 2D, Doppler and TOE and stress echo - Nuclear cardiology	2	2	4	4	4	4
	PATIENT MANAGEMENT						
	- Cardiopulmonary resuscitation	4	4	4	4	4	4
	- Diagnosis and treatment of cardiac arrhythmias - Management of post cardiac surgical patient - Management of complications of surgery - Cardiac rehabilitation - Blood transfusion and blood products	3	3	4	4	4	4

Module 5	Ischaemic Heart Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	- Wound infection and sternal disruption	2	2	4	4	4	4
Technical Skills and Procedures	- Saphenous vein harvest	4	4	4	4	4	4
	- Mammary artery/radial artery harvest - Preparation for and management of cardiopulmonary bypass - Proximal coronary anastamosis	2	3	3	5	4	4
	- Distal coronary anastamosis - Principles for establishment of safe conditions for off pump surgery	1	2	2	2	3	4
	- Isolated, first time coronary artery surgery (may include both off pump and on pump options and arterial revascularisation strategies)	1	1	2	3	3	4
	- Repeat coronary artery surgery	1	1	1	1	2	3
	- Complications of ischaemic heart disease including post infarction VSD, mitral regurgitation and left ventricular aneurysm	1	1	1	1	2	2

Module 6

Module 6	Heart Valve Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Heart Valve Disease						
Subcategory	None						
Objective	To evaluate and manage a patient with both uncomplicated and complicated heart valve disease, including operative management.						
Knowledge	**BASIC KNOWLEDGE**						
	Physiology - Cardiovascular physiology including valve physiology and haemodynamics - Electrophysiology, including conduction disorders - Haemostasis, thrombosis and bleeding - Acid base balance - Pulmonary physiology, ventilation and gas exchange - Metabolic response to trauma	3	3	4	4	4	4
	Anatomy - Cardiac chambers and valves, pericardium and great vessels - Anatomy of the conduction system	3	3	4	4	4	4
	Pathology - Pathophysiology of valve incompetence and stenosis. - Consequences of valve disease on cardiac function and morphology - Pathophysiology of mixed valve disease and combined valve pathology (e.g. aortic and mitral) - Combined valvular and ischaemic heart disease - Atrial fibrillation and other arrhythmias	3	3	4	4	4	4
	Pharmacology - Drugs used in the treatment of hypertension, heart failure and angina 3 Anti-arrhythmic drugs - Haemostatic drugs - Antiplatelet, anticoagulant and thrombolytic drugs - Analgesics - Antibiotics - Anaesthetic agents, local and general	3	3	4	4	4	4
	Microbiology - Organisms involved in cardio respiratory infection - Organisms involved in wound infection - Antibiotic usage and prophylaxis - Antisepsis - Endocarditis and prosthetic valve endocarditis	3	3	4	4	4	4

Module 6	Heart Valve Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	CLINICAL KNOWLEDGE						
	General knowledge - Cardiopulmonary resuscitation - Care of the cardiac surgical patient - Complications of surgery - Risk assessment and stratification - Management of cardiovascular risk factors	3	3	4	4	4	4
	Specific Knowledge - Diagnosis investigation and assessment of valvular heart disease - Timing of surgical intervention in valve disease - Indications for operative management including: Valve replacement/repair (mechanical, biological stented and stentless grafts, homografts and autografts) - Valve design: materials, configuration and biomechanics. - Results of surgery – survival, valve thrombosis, endocarditis, bleeding. - Interpretation of survival and follow up data - Cardiac performance and long term functional status - Surgery for conduction problems - Surgical treatment of arrhythmias	3	3	4	4	4	4
Clinical Skills	**HISTORY AND EXAMINATION**						
	- Cardiovascular system and general history and examination including drug history, identification of co morbidity and risk assessment	4	4	4	4	4	4
	DATA INTERPRETATION						
	- Routine haematology and biochemical investigations - Interpretation of haemodynamic data	4	4	4	4	4	4
	- Chest radiograph - ECG interpretation including exercise ECG - Coronary angiography, cardiac catheterisation data including left and right heart data - Echocardiography (thoracic and transoesophageal) including 2D, Doppler and stress echo	3	3	4	4	4	4
	- Nuclear cardiology	2	2	3	3	4	4
	PATIENT MANAGEMENT						
	- Cardiopulmonary resuscitation	4	4	4	4	4	4
	- Diagnosis and treatment of cardiac arrhythmias - Management of post cardiac surgical patient - Management of complications of surgery - Cardiac rehabilitation - Blood transfusion and blood products	3	3	4	4	4	4

Module 6	Heart Valve Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	- Wound infection and sternal disruption Non operative management of endocarditis	2	2	4	4	4	4
	- Valve selection - Anticoagulation management including complications	3	3	4	4	4	4
Technical Skills and Procedures	- Isolated, uncomplicated aortic valve replacement (stented biological or mechanical)	1	1	2	3	3	4
	- Isolated mitral valve replacement - Tricuspid valve surgery	1	1	2	3	3	4
	- Combined valve and graft surgery - Mitral valve repair	1	1	2	2	3	3
	- Strategies for managing a small aortic root - Alternative surgical approaches to valve surgery including thoracotomy, transseptal approaches, and minimal access surgery	1	1	1	1	2	2
	- Aortic root surgery - Redo Valve surgery - Valve surgery for endocarditis	1	1	1	1	2	2
	- Techniques for surgical ablation of arrhythmias	1	1	2	2	3	4

Module 7

Module 7	Heart Valve Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Aortovascular Disease						
Subcategory	None						
Objective	To evaluate and manage uncomplicated surgical aspects of a patient with aortovascular disease, including operative management where appropriate and up to the defined competence level. This level of competence is that required of a consultant cardiothoracic surgeon and is defined in the list of key conditions. It is expected that full competence in all aspects of aortovascular surgery would only be obtained in the post CCT period by those with a sub speciality interest.						
Knowledge	**BASIC KNOWLEDGE**						
	Physiology - Vascular biology and reactivity - Haemodynamics; physiology and measurement - Rheology and arterial pressure regulation - Haemostasis, thrombosis and bleeding - Physiology of transfusion therapy - Principles of surgical infectious disease - Acid base balance - Metabolic response to trauma - Pathophysiology and of hypothermia including the effects upon - Haemoglobin, metabolic rate and pH with their management	3	3	4	4	4	4
	Anatomy - Heart, pericardium and great vessels - Anatomy of the peripheral vascular system - Blood supply of the spinal cord	3	3	4	4	4	4
	Pathology - Inflammation and wound healing - Atheroma, medial necrosis and arthritis - Inherited disorders of vascular biology - Systemic Inflammatory Response Syndrome	3	3	4	4	4	4
	Pharmacology - Drugs used in the treatment of hypertension, heart failure and angina 3 Anti-arrhythmic drugs - Haemostatic drugs - Antiplatelet, anticoagulant and thrombolytic drugs - Anti-emetics - Analgesics - Antibiotics - Anaesthetic agents, local and general	3	3	4	4	4	4
	Microbiology - Organisms involved in cardiorespiratory infection - Organisms involved in wound infection - Antibiotic usage and prophylaxis - Antisepsis	3	3	4	4	4	4

Module 7	Heart Valve Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	CLINICAL KNOWLEDGE						
	General knowledge - Risk assessment - Cardiopulmonary resuscitation - Cardiac arrhythmias - Complications of surgery - Renal dysfunction - Multiorgan failure - Blood transfusion and blood products - Wound infection and sternal disruption	3	3	4	4	4	4
	Specific knowledge - Natural history of aortic disease - Diagnosis, investigation and assessment of aortic disease - Knowledge of operative treatment including spinal cord and cerebral preservation strategies - Type A dissection - Type B dissection - Traumatic aortic rupture - Thoraco-abdominal aneurysm - Results of surgery – survival, complication rates - Non-surgical management including the role of endovascular stenting - Management of cardiovascular and non-cardiovascular risk factors	3	3	4	4	4	4
Clinical Skills	**HISTORY AND EXAMINATION**						
	- Cardiovascular system and general history and examination including assessment of preoperative complications, drug history, identification of co-morbidity and risk assessment	4	4	4	4	4	4
	DATA INTERPRETATION						
	- Routine haematology and biochemical investigations - Interpretation of haemodynamic data	4	4	4	4	4	4
	- Chest radiograph - ECG including exercise ECG - Coronary Angiography - Aortography - Cardiac Catheterisation data - Echocardiography including 2D, doppler and TOE and stress echo	3	3	4	4	4	4
	- CT scanning - MRI scanning	2	2	4	4	4	4
	PATIENT MANAGEMENT						
	- Cardiopulmonary resuscitation	4	4	4	4	4	4

Module 7	Heart Valve Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	- Diagnosis and treatment of cardiac arrhythmias - Management of post cardiac surgical patient - Management of complications of surgery - Cardiac rehabilitation - Blood transfusion and blood products	3	3	4	4	4	4
	- Wound infection and sternal disruption	2	2	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Preparation for and management of cardiopulmonary bypass, including alternative, non-bypass strategies for descending aortic surgery	1	1	1	2	2	4
	- Organ protection strategies including HCA, - RCP and SACP	1	1	1	1	2	2
	- Femoral cannulation	1	2	3	3	4	4
	- Axillary cannulation	1	1	1	2	3	3
	- Surgery for acute ascending aortic dissection - Complex aortic surgery including arch surgery, descending aortic and thoracoabdominal aortic surgery	1	1	1	1	1	2
	- Aortic root replacement for chronic aortic root disease	1	1	1	1	1	2

Module 8

Module 8	Cardiothoracic Trauma	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Cardiothoracic Trauma						
Subcategory	None						
Objective	To evaluate and manage, including surgical management where appropriate, and as part of a multidisciplinary team, a patient with thoracic trauma. Competence in the operative management of thoracic trauma is required of all CCT holders in cardiothoracic surgery. All trainees should maintain their ATLS certification and senior trainees are encouraged to become ATLS instructors.						
Knowledge	**BASIC KNOWLEDGE**						
	- Anatomy of the lungs, heart, chest wall, diaphragm and oesophagus - Anatomy of the larynx, trachea and bronchial tree - Physiology of breathing and its control - Physiology of the heart and circulation	4	4	4	4	4	4
	GENERAL TRAUMA MANAGEMENT						
	- Principles of trauma management (as defined by ATLS) - Principles of emergency resuscitation following cardiac arrest	4	4	4	4	4	4
	SPECIFIC KNOWLEDGE						
	- The mechanism and patterns of injury associated with blunt, penetrating, blast and deceleration injuries to the chest - The post-ATLS, definitive care of blunt, penetrating and deceleration injuries to the chest - The indications and use of appropriate investigations in thoracic trauma management - Pain relief in chest trauma, including epidural anaesthesia - Indications for immediate, urgent and delayed thoracotomy in trauma	3	3	4	4	4	4
Clinical Skills	**GENERAL TRAUMA MANAGEMENT (ATLS)**						
	- Assessment and management of airway, breathing and circulation - Maintenance of an adequate airway and respiratory support - Protection of the cervical spine - Circulatory resuscitation - Establishment of appropriate monitoring - Assessment and management of pain & anxiety	4	4	4	4	4	4

Module 8	Cardiothoracic Trauma	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	CARDIOTHORACIC TRAUMA MANAGEMENT						
	- Examination and assessment of the of the chest, including respiratory cardiovascular and circulatory systems - Recognition and management of immediately life threatening situations: obstructed airway, tension pneumothorax, massive haemothorax, open chest wound, flail chest and cardiac tamponade	4	4	4	4	4	4
	- Recognition and management of potentially life threatening situations: lung contusion, bronchial rupture, blunt cardiac injury, intrathoracic bleeding, oesophageal injury, simple pneumothorax and major vascular injury - Recognition of potentially life threatening penetrating injuries to the chest and abdomen - Interpretation of chest x-ray, ECG, arterial blood gases and echocardiography - Detection and treatment of cardiac arrhythmias	3	3	4	4	4	4
	- Management of the widened mediastinum including appropriate investigations and multidisciplinary consultation	2	2	4	4	4	4
Technical Skills and Procedures	**PRACTICAL SKILLS**						
	- Establish an emergency airway (surgical and non-surgical) - Establish adequate venous access and monitoring.	1	2	2	3	4	4
	- Insertion and management of thoracic drains	4	4	4	4	4	4
	OPERATIVE MANAGEMENT OF THORACIC TRAUMA						
	- Postero-lateral, thoracotomy, antero lateral thoracotomy and thoraco-laparotomy	2	2	3	3	4	4
	- Bilateral Anterior Thoracotomy - Repair of cardiac injuries	1	2	2	3	3	3
	- Median sternotomy and closure	3	3	4	4	4	4
	- Repair of pulmonary and bronchial injuries	1	1	2	3	3	3
	- Management of the complications of chest trauma including retained haemothorax and empyema	1	1	2	2	3	3
	- Repair of oesophageal injuries - Treatment of aortic transection	1	1	1	1	1	2

Module 9

Module 9	General Management of a Patient Undergoing Thoracic Surgery	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	General Management of a Patient Undergoing Thoracic Surgery						
Subcategory	None						
Objective	To be fully competent in the evaluation and management of a patient undergoing thoracic surgery. The knowledge and clinical skills are common to all thoracic surgical conditions, and should be read in conjunction with the curriculum for specific surgical conditions.						
Knowledge	**BASIC KNOWLEDGE**						
	Physiology - Pulmonary physiology, ventilation and gas exchange - Haemostasis, thrombosis and bleeding - Acid base balance - Metabolic response to trauma - Digestive, renal and hepatic physiology - Nutrition	3	3	4	4	4	4
	Anatomy - Tracheobronchial tree and lungs - Thoracic inlet, neck and mediastinum - Chest wall and diaphragm	3	3	4	4	4	4
	Pathology - Inflammation and wound healing - Bronchopulmonary infections - ARDS - Emphysema - Pulmonary fibrosis - Pulmonary manifestations of systemic disease - Systemic manifestations of pulmonary disease - Benign and malignant tumours of trachea, bronchus and lung parenchyma - Malignant and benign tumours of the pleura and chest wall, mediastinum and thyroid	3	3	4	4	4	4
	Pharmacology - Bronchodilators - H2 antagonists and proton pump inhibitors - Haemostatic drugs - Analgesics - Antibiotics - Anaesthetic agents, local and general	3	3	4	4	4	4
	Microbiology - Organisms involved in respiratory infection including TB - Organisms involved in wound infection - Antibiotic usage and prophylaxis - Antisepsis - Management of intra pleural sepsis	3	3	4	4	4	4
	CLINICAL KNOWLEDGE						
	Thoracic Incisions - Types of incisions and appropriate use, including lateral, anterior, muscle sparing and video-assisted approaches.	3	3	4	4	4	4

Module 9	General Management of a Patient Undergoing Thoracic Surgery	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	Sternotomy - Difficult access and improving exposure. 3 Early and late complications of thoracic incisions - Analgesia including pharmacology, effectiveness, side effects and use in combination regimens - Post-operative analgesia, including epidural, - PCAS and paravertebral catheter techniques	3	3	4	4	4	4
	Bronchoscopy - The role of rigid and flexible bronchoscopy in the investigation of airway and pulmonary disease. - The anaesthetic, airway and ventilatory management during rigid and flexible bronchoscopy	3	3	4	4	4	4
	Mediastinal exploration - Endoscopic, radiological and surgical approaches used to evaluate and diagnose mediastinal disease of benign, infective, primary and malignant aetiology. 3 Equipment for mediastinal exploration 3 Relevant imaging techniques, and influence on surgical approach	3	3	4	4	4	4
Clinical Skills	**HISTORY AND EXAMINATION**						
	- System specific and general history and examination, including drug history, identification of comorbidity and functional status.	4	4	4	4	4	4
	DATA INTERPRETATION						
	- Routine haematology and biochemical investigations - Blood gases	4	4	4	4	4	4
	- Chest radiograph and ECG	3	3	4	4	4	4
	- CT, including contrast enhanced CT - Interpretation of imaging of the mediastinum. - MRI and PET	2	2	3	3	4	4
	- Respiratory function tests	3	3	4	4	4	4
	- Ventilation/perfusion scan	2	2	3	3	4	4
	PATIENT MANAGEMENT						
	- Cardiopulmonary resuscitation	4	4	4	4	4	4
	- Risk assessment, stratification and management - Management of patients making an uncomplicated or complicated recovery from thoracic operations. - Post-operative management of pain control, respiratory failure, sputum retention, haemodynamic instability and low urine output. - Treatment of cardiac arrhythmias - Pain control	3	3	4	4	4	4
	- Wound infection and disruption	2	2	3	3	4	4
	- Blood transfusion and blood products	3	3	4	4	4	4
	- Physiotherapy and rehabilitation	2	2	4	4	4	4
	- Palliative care	2	2	2	2	3	3

Module 9	General Management of a Patient Undergoing Thoracic Surgery	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Technical Skills and Procedures	**PRACTICAL SKILLS**						
	- Tracheostomy	1	1	2	2	3	4
	- Fibreoptic bronchoscopy	1	2	3	3	3	4
	- Chest aspiration - Chest drain insertion	4	4	4	4	4	4
	- Chest drain management	3	3	4	4	4	4
	OPERATIVE MANAGEMENT						
	Incisions - Correct positioning of patient for thoracic surgery - Perform and repair thoracic incisions, including lateral, anterior, muscle sparing and VATS incisions. - Perform and close sternotomy incision	2	3	4	4	4	4
	- Difficult access and improving exposure	2	2	3	3	4	4
	OPERATIVE MANAGEMENT						
	Bronchoscopy - Diagnostic bronchoscopy including biopsy - rigid - and flexible. - Equipment, instrumentation and preparation - Perform rigid and flexible bronchoscopy	2	3	4	4	4	4
	- Airway and ventilatory management	2	2	3	3	4	4
	- Recognise normal and abnormal anatomy.	2	2	3	3	4	4
	- Identify common pathologies and the surgical relevance of the findings - Take appropriate specimens for bacteriology, cytology and histology - Management of moderate bleeding and other common complications	2	2	3	3	4	4
	- To appropriately supervise the care of patients recovering from bronchoscopy	3	3	4	4	4	4
	- Post-operative bronchoscopy: indications and procedure	2	2	3	4	4	4
	- Tracheostomy and minitracheostomy	1	1	2	2	3	4
	Mediastinal Exploration - Surgical evaluation of the mediastinum using cervical, anterior and VATS approaches	1	2	3	4	4	4

Module 10

Module 10	Neoplasms of the Lung	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Neoplasms of the Lung						
Subcategory	None						
Objective	To fully assess and manage a patient with a neoplasm of the lung, including operative management where appropriate and including complicated situations. Appreciation of the multidisciplinary, multimodality approach to the management of the condition.						
Knowledge	**GENERAL KNOWLEDGE** As for thoracic surgery - general						
	SPECIFIC KNOWLEDGE						
	- Benign and malignant tumours of trachea, - bronchus and lung parenchyma - Epidemiology, presentation, diagnosis, staging (pre-operative, intraoperative and pathological) and treatment of lung cancer and lung metastases - Neoadjuvant and adjuvant treatment of lung cancer - Results of treating thoracic malignancy by surgery, medical or oncological techniques, including multimodality management - Survival, recurrence rates and relapse patterns after surgical treatment and the investigation and management of relapse - Knowledge of palliative care techniques. - Treatment of post-operative complications of pulmonary resection such as empyema and broncho-pleural fistula - Role of repeat surgery in recurrent and second primary malignancies of the lung - Medical and surgical options to deal with recurrent or problematic complications of pulmonary resection	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT** As for thoracic surgery - general						
	- Clinical history and examination	4	4	4	4	4	4
	- Interpretation of laboratory, physiological and imaging techniques - Patient selection with assessment of function and risk	3	3	4	4	4	4
	- Interpretation of endoscopic findings	2	2	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Bronchoscopic assessment including biopsy	2	3	3	4	4	4
	- Endoscopic and surgical techniques of lung biopsy - Mediastinal assessment and biopsy - Intraoperative diagnosis and staging	1	2	3	3	4	4
	- Endoscopic management of tumours using laser and stenting	1	1	2	2	3	3

Module 10	Neoplasms of the Lung	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	- Surgery for benign and malignant conditions of the lungs - Segmentectomy and lobectomy for benign and malignant disease	1	2	3	3	4	4
	- Redo operations for lung metastases - Advanced resections for lung cancer, including sleeve lobectomy, pneumonectomy and extended resections involving chest wall and diaphragm - Management of post-operative complications such as empyema and broncho-pleural fistula	1	1	2	2	3	3

Module I I

Module 11	Disorders of the Pleura	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Disorders of the Pleura						
Subcategory	None						
Objective	To fully evaluate and manage surgical conditions of the pleura and the pleural space, including complicated situations.						
Knowledge	**GENERAL KNOWLEDGE** As for thoracic surgery - general						
	SPECIFIC KNOWLEDGE						
	- Anatomy and physiology of the pleura - Inflammatory, infective and malignant disease of the visceral and parietal pleura - Pneumothorax - Pleural effusion - Empyema - Mesothelioma - Haemothorax - Chylothorax - Conditions of adjacent organs that affect the pleura - Medical and surgical management of pleural disease, including radiological, open and VATS techniques - Techniques to deal with failures of primary treatment - Advanced techniques for pleural space obliteration such as thoracoplasty and soft tissue transfer	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT** As for thoracic surgery - general						
	- Interpretation of imaging of the pleura - Management of patients making uncomplicated and complicated recovery from pleural interventions	3	3	4	4	4	4
	- Chest drains: insertion, management, removal and treatment of complications	4	4	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Open procedures for non-complex pleural problems	1	2	3	3	4	4
	- VATS procedures for non- complex pleural problems	2	3	4	4	4	4
	- Open and VATS procedures for empyema, including techniques for decortication	1	1	2	2	3	3
	- Open and VATS procedures in complex cases - Advanced techniques of pleural space obliteration, with appropriate specialist assistance	1	1	1	2	2	3

Module 12

Module 12	Disorders of the Chest Wall	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Disorders of the Chest Wall						
Subcategory	None						
Objective	To assess and manage a patient with abnormality or disease affecting the chest wall, including surgical management where appropriate, and including complex cases.						
Knowledge	**GENERAL KNOWLEDGE** As for thoracic surgery - general						
	SPECIFIC KNOWLEDGE						
	- Anatomy of the chest wall - Congenital, inflammatory, infective and neoplastic conditions that can affect the components of the chest wall - Clinical, laboratory and imaging techniques used in the evaluation of chest wall pathology - Techniques used in the diagnosis of chest wall disease, including aspiration and core biopsy, and incision and excision biopsy - Pectus deformities: aetiology, physiological and psychological consequences. Surgical options for correction - Techniques used to resect the sternum and chest wall, physiological and cosmetic sequelae - Prosthetic materials used in chest wall surgery - The role of repeat surgery to deal with recurrent conditions and the complications of previous surgery - Techniques of complex chest wall reconstruction involving thoracoplasty or soft tissue reconstruction	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT** As for thoracic surgery - general						
	- Clinical history and examination	4	4	4	4	4	4
	- Interpretation of laboratory, physiological and imaging techniques - Patient selection with assessment of function and risk	3	3	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Chest wall biopsy and choice of appropriate technique	2	3	4	4	4	4
	- Open and excision biopsy and resection of the chest wall for benign and malignant conditions	2	2	3	3	4	4
	- Chest wall resection in combination with resection of the underlying lung	1	1	2	2	3	3
	- Selection and insertion of prosthetic materials, and selection of cases in which such materials are required	1	2	3	3	4	4
	- Pectus correction, by both open and minimally-invasive techniques, including postoperative care and complications - Surgery for the complications of chest wall resection, and repeat surgery to resect recurrent chest wall conditions - Complex chest wall reconstruction	1	1	2	2	3	3

Module 13

Module 13	Disorders of the Diaphragm	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Disorders of the Diaphragm						
Subcategory	None						
Objective	To assess and manage a patient with disease or abnormality of the diaphragm, including surgical management where appropriate, and with appropriate supervision.						
Knowledge	**GENERAL KNOWLEDGE** As for thoracic surgery - general						
	SPECIFIC KNOWLEDGE						
	- Anatomy and physiology of the diaphragm. - Pathology of the diaphragm - Clinical, physiological and imaging techniques in the assessment of diaphragmatic abnormalities - Physiological consequences of diaphragmatic herniation or paresis - Surgical techniques used to biopsy and resect diaphragmatic tumours - Situations in which replacement of the diaphragm is required, the materials used and their value and limitations - Complications of diaphragmatic resection and their management - Techniques used to electrically pace the diaphragm, and the conditions in which such treatment is appropriate	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT** As for thoracic surgery - general						
	Specific Skills - Clinical history and examination	4	4	4	4	4	4
	- Interpretation of laboratory, physiological and imaging techniques - Patient selection with assessment of function and risk - Management of patients making an uncomplicated or complicated recovery from diaphragmatic resection	3	3	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Resection and repair of the diaphragm and adjacent structures - Complications of diaphragmatic resection - Management of diaphragmatic trauma	1	1	2	2	3	3

Module 14

Module 14	Emphysema and Bullae	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Emphysema and Bullae						
Subcategory	None						
Objective	To fully assess and manage a patient with emphysema and bullae, including surgical management where appropriate, and including complicated cases.						
Knowledge	**GENERAL KNOWLEDGE** As for thoracic surgery - general						
	SPECIFIC KNOWLEDGE						
	- Aetiology, pathology and physiology of chronic obstructive airways disease (COPD) - Epidemiology and public health issues - Smoking cessation measures - Clinical, laboratory, physiological and imaging techniques - Medical and surgical management of COPD and its complications - Selection criteria and pre-operative preparation - Surgical techniques used in the treatment of emphysema and bullae and the results of surgical treatment including relevant clinical trials - Lung volume reduction surgery: techniques, complications and management of complications - Experimental and developmental techniques in lung volume reduction surgery	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT** As for thoracic surgery - general						
	- Clinical history and examination	3	3	4	4	4	4
	- Interpretation of laboratory, physiological and imaging techniques - Patient selection with assessment of function and risk - Post-operative management of patients making an uncomplicated recovery from surgery for emphysema or the complications of such diseases - Management of patients following lung volume reduction surgery	4	4	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Procedures to deal with secondary pneumothorax and bullae by open techniques - Procedures to deal with secondary pneumothorax and bullae by VATS techniques	1	2	3	4	4	4
	- Lung volume reduction surgery using open and VATS techniques	1	1	2	2	3	4

Module 15

Module 15	Disorders of the Pericardium	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Disorders of the Pericardium						
Subcategory	None						
Objective	To fully assess and manage a patient with disease of the pericardium or pericardial space, including surgical management where appropriate, and including complicated cases.						
Knowledge	**GENERAL KNOWLEDGE** As for thoracic surgery - general						
	SPECIFIC KNOWLEDGE						
	- Anatomy of the pericardium - Pathology of the pericardium - Pathophysiological consequences of pericardial constriction and tamponade - Clinical, echocardiographic and imaging techniques used to detect pericardial disease and assess its consequences - Techniques for pericardial drainage using guided needle aspiration - Surgical drainage by sub-xiphoid, thoracotomy or VATS approaches - Surgical techniques for pericardiectomy - Materials used for pericardial replacement, their value and limitations and the situations in which used - Post-operative complications following resection of the pericardium and its prosthetic replacement	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT** As for thoracic surgery - general						
	- Clinical history and examination - Interpretation of laboratory, physiological and imaging techniques, including echocardiography	4	4	4	4	4	4
	- Recognition and assessment of pericardial tamponade and constriction - Techniques for pericardial drainage using guided needle aspiration - Recognition of pericardial herniation and cardiac strangulation - Patient selection with assessment of function and risk	3	3	3	3	4	4
	- Management of patients making an uncomplicated or complicated recovery from pericardial surgery	3	3	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Non-complex pericardial fenestration procedures	2	3	4	4	4	4
	- Pericardial fenestration in complex cases - Pericardiectomy for relief of constriction - Resection of the pericardium and replacement with prosthetic materials - Competence in dealing with the complications of pericardial resection and replacement	1	1	2	2	3	3

Module 16

Module 16	Disorders of the Mediastinum	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Disorders of the Mediastinum						
Subcategory	None						
Objective	To fully assess and manage a patient with benign and malignant disease of the mediastinum, including surgical management where appropriate, and including complicated cases.						
Knowledge	**GENERAL KNOWLEDGE** As for thoracic surgery - general						
	SPECIFIC KNOWLEDGE						
	- Anatomy of the mediastinum - Congenital, benign, infective and malignant (primary and secondary) conditions of the mediastinum - Systemic conditions associated with the mediastinum - Clinical, laboratory, electromyographic and imaging techniques used in the diagnosis and assessment of patients with mediastinal disease - Myasthenia gravis: medical, surgical and peri-operative management - Staging of thymoma and grading of myasthenia - Benign and malignant conditions, which do not require surgical biopsy or resection - Oncological treatment of malignant diseases of the mediastinum, including multidisciplinary care - Surgical techniques for the treatment of myasthenia gravis, mediastinal cysts and tumours, complications and results - Retrosternal goitre and its management	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT** As for thoracic surgery - general						
	- Clinical history and examination	4	4	4	4	4	4
	- Interpretation of laboratory, physiological and imaging techniques - Patient selection with assessment of function and risk - Post-operative management of patients including recognition and management of post-operative complications	3	3	4	4	4	4
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Biopsy of mediastinal masses using appropriate techniques	2	3	4	4	4	4
	- Excision of the thymus - Isolated resection of mediastinal cysts and tumours	2	2	3	4	4	4
	- Resection of mediastinal cysts and tumours, including extended resections involving adjacent structures	1	1	2	2	3	4

Module 17

Module 17	Disorders of the Airway	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Disorders of the Airway						
Subcategory	None						
Objective	To assess and manage a patient with disease of the major airways, including surgical management where appropriate, and including complicated cases.						
Knowledge	**GENERAL KNOWLEDGE** As for thoracic surgery - general						
	SPECIFIC KNOWLEDGE						
	- Anatomy of the larynx, trachea and bronchus. - Physiology of the normal airway. - Pathophysiology of disease and its effects on lung function - Endoscopic appearances in health and disease. - Congenital, inflammatory, infective, benign and neoplastic diseases of the airways - Symptoms, signs of airway disease - Clinical, physiological and imaging tests undertaken to diagnose and assess airway disease - Techniques for surgical resection of the trachea. - Bronchoplastic procedures and the limitations of these techniques - Medical and oncological treatments available to deal with airway diseases - Endoscopic techniques used to deal with benign and malignant conditions, including disobliteration and stenting - Presentation, investigation and management of anastamotic complications following airway surgery - Presentation, evaluation and treatment of fistulae in the aerodigestive tract, due to benign, malignant and iatrogenic causes - Role of open and endoscopic procedures in dealing with problems	3	3	4	4	4	4
Clinical Skills	**PATIENT MANAGEMENT** As for thoracic surgery - general						
	- Clinical history and examination	4	4	4	4	4	4
	- Interpretation of laboratory, physiological and imaging techniques - Recognition, diagnosis and assessment of airway obstruction - Patient selection with assessment of function and risk - Post-operative care of patients making an uncomplicated recovery from major airway surgery - Post-operative care of patients making a complicated recovery from airway surgery	3	3	4	4	4	4

Module 17	Disorders of the Airway	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Endoscopic assessment of a patient with airways disease	2	2	3	3	4	4
	- Sleeve resection of the trachea for simple benign conditions - Sleeve resection of the main bronchi, including lobectomy where appropriate, for malignant disease - Techniques for the relief of major airways obstruction including stenting	1	1	1	1	2	2
	- Airway resection for tumours and complex benign conditions and techniques for airway reconstruction, anastomosis and laryngeal release - Repeat resections for recurrence and the complications of prior resection. - Management of fistulae in the aerodigestive tract by surgical and endoscopic techniques	1	1	1	1	2	3

Module 18

Module 18	Congenital Heart Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Congenital Heart Disease						
Subcategory	None						
Objective	To be able to evaluate and manage, with appropriate supervision, some of the aspects of children and adults with heart disease, including operative management where appropriate. This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general cardiothoracic training or as an introduction to further advanced training in this area.						
Knowledge	**BASIC KNOWLEDGE**						
	Physiology - Relevant general physiology of childhood - Foetal circulation and circulatory changes at birth - Haemodynamics; physiology and measurement including shunt calculations - Physiology of pulmonary vasculature - Myocardial cellular physiology in immature myocardium - Electrophysiology, including conduction disorders	2	2	3	3	4	4
	- Haemostasis, thrombosis and bleeding - Acid base balance - Pulmonary physiology, ventilation and gas exchange - Metabolic response to trauma - Vascular biology and reactivity - Physiology of Cardiopulmonary Bypass including low flow and circulatory arrest. - Ph and alpha stat CPB management	3	3	3	3	4	4
	Anatomy - Embryology of the heart	2	2	3	3	3	3
	- Anatomy of the heart, pericardium and great vessels - Pulmonary anatomy - Coronary anatomy and variants - Anatomy of the peripheral vascular system and vascular conduits including aortopulmonary shunts	3	3	3	3	4	4
	- Sequential cardiac analysis and terminology of cardiac malformations	2	2	3	3	3	3
	Pathology - - Inflammation and wound healing - Systemic Inflammatory Response Syndrome - Effect of growth and pregnancy	3	3	3	3	3	3
	Pharmacology - Drugs used in the treatment of congenital heart disease	2	2	3	3	4	4

Module 18	Congenital Heart Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	- Inotropes - Anti-arrhythmic drugs - Haemostatic drugs - Antiplatelet, anticoagulant and thrombolytic drugs - Analgesics - Antibiotics - Anaesthetic agents, local and general - Hypotensive agents (systemic and pulmonary).	3	3	3	3	4	4
	Microbiology - Organisms involved in cardiorespiratory infection - Organisms involved in wound infection - Antibiotic usage and prophylaxis - Antisepsis	3	3	3	3	4	4
	CLINICAL KNOWLEDGE						
	General - Diagnosis, investigation and treatment of congenital heart disease - Results of surgery - survival, common complications and management. - Late complications of surgery for congenital heart disease - Role of interventional cardiology. - Role of mechanical assist (IABP, VAD and - ECMO) - Indications for referral for transplantation - Risk assessment and stratification - Cardiac rehabilitation	2	2	3	3	4	4
	- Cardiopulmonary resuscitation - Cardiac arrhythmias - Renal dysfunction - Multiorgan failure - Blood transfusion and blood products - Wound infection and sternal disruption - Types of cardiac prosthesis and indications for use	3	3	3	3	4	4
	Specific Knowledge - The anatomy, pathophysiology natural history and management of the following conditions or procedures	3	3	4	4	4	4
	- Patent ductus arteriosus - Atrial septal defect - Ventricular septal defect - Coarctation - PA banding and shunts	2	2	3	3	3	3

Module 18	Congenital Heart Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	- Transposition of the great arteries / switch procedure - Tetralogy of Fallot/Pulmonary atresia plus VSD - Fontan procedure - Rastelli procedure - Hypoplastic left heart - Norwood procedure - Truncus arteriosus - Double outlet right ventricle - Pulmonary atresia plus VSD and MAPCAs - Pulmonary atresia and intact septum - Interrupted aortic arch	1	1	2	2	3	3
	- Single ventricle - Partial and complete atrioventricular septal defects - Aortic valve disease including Ross procedure - Mitral valve disease - Tricuspid valve disease including Ebstiens abnormality - Extra cardiac conduits - Total anomalous pulmonary venous drainage - Extra Corporeal Membrane Oxygenation - Transplantation	2	2	3	3	3	3
Clinical Skills	**HISTORY AND EXAMINATION**						
	- Cardiovascular system and general history and examination of child or adult with congenital heart disease	2	2	3	3	4	4
	DATA INTERPRETATION						
	- Routine haematology and biochemical investigations - Chest radiograph and ECG	3	3	4	4	4	4
	- Cardiac catheterisation data including interpretation of haemodynamic data, shunt and resistance calculations - Echocardiography in congenital heart disease, including 2D, doppler and TOE	2	2	3	3	4	4
	PATIENT MANAGEMENT						
	- Principles of paediatric intensive care - Management of adults and children following congenital heart surgery - Management of complications of surgery - Cardiopulmonary resuscitation	2	2	2	2	3	3
	- Diagnosis and treatment of cardiac arrhythmias - Wound infection and sternal disruption	3	3	3	3	4	4
	- Blood transfusion and blood products	3	3	4	4	4	4

Module 18	Congenital Heart Disease	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	- Sternotomy - open and close - Thoracotomy - open and close	2	2	3	3	4	4
	- Preparation for and management of cardiopulmonary bypass including partial bypass	2	2	2	2	3	4
	- Approaches for ECMO, cannulation and management	1	1	2	2	3	4
	Surgical management of the following common uncomplicated conditions: (level 1 - a higher level of operative competence is not required during this module) - Patent ductus arteriosus - Atrial septal defect - Ventricular septal defect - Coarctation - PA banding and shunts	1	1	2	2	3	3

Module 19

Module 19	Intrathoracic transplantation and surgery for heart failure	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Category	Intrathoracic transplantation and surgery for heart failure						
Subcategory	None						
Objective	To be able to evaluate and manage patients with heart failure, including operative management where appropriate. This module is intended to be completed by the trainee who has developed a specific interest in this subspecialty, with a view to becoming a specialist transplant/heart failure surgeon.						
Knowledge	**GENERAL KNOWLEDGE**						
	Pathophysiology - Haemodynamics of heart failure - Molecular mechanisms underlying heart failure - Mechanisms and outcomes of respiratory failure - Causes of cardiac failure - Causes of respiratory failure	3	3	3	3	4	4
	Immunology - Major and minor histocompatability antigen systems - Mechanisms of immune activation and pathological consequences for transplanted organs	3	3	3	3	4	4
	Pharmacology - Modes of action of commonly used drugs in heart failure:	3	3	3	3	4	4
	CLINICAL KNOWLEDGE						
	- Indications for, contraindications to and assessment for heart transplantation. - Indications for, contraindications to and assessment for lung and heart/lung transplantation - Indications for ECMO - Indications for VAD - Criteria for brain stem death, management of the brain-dead donor, criteria for matching donor and recipient - Management of patients after intrathoracic organ transplantation, including complications - Results of heart transplantation, lung transplantation and non-transplant interventions for heart failure	3	3	3	3	4	4
	- Resynchronisation therapy: techniques and indications	2	2	2	2	3	3
Clinical Skills	**HISTORY AND EXAMINATION**						
	- Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment	4	4	4	4	4	4

Module 19	Intrathoracic transplantation and surgery for heart failure	Standards for depth of knowledge, clinical and technical skills					
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	DATA INTERPRETATION						
	- Routine haematology and biochemical investigations - Interpretation of haemodynamic data - Chest radiograph	4	4	4	4	4	4
	- ECG including exercise ECG - Coronary angiography - Cardiac catheterisation data	3	3	3	3	4	4
	- Echocardiography including 2D, Doppler and TOE and stress echo	2	2	2	2	4	4
	- MR assessment of ventricular function and viability	2	2	2	2	3	3
	- Nuclear cardiology	2	2	2	2	2	2
	PATIENT MANAGEMENT						
	- Cardiopulmonary resuscitation - Diagnosis and treatment of cardiac arrhythmias - Management of post cardiac surgical patient - Blood transfusion and blood products	4	4	4	4	4	4
	- Management of brain-dead donor - Management of complications of surgery - Cardiac rehabilitation - Wound infection and sternal disruption	3	3	3	3	4	4
	- Management of rejection	2	2	2	2	3	3
	- Diagnosis and treatment of cardiac arrhythmias	3	3	3	3	3	3
Technical Skills and Procedures	**OPERATIVE MANAGEMENT**						
	Transplantation - Transverse myocardial biopsy	1	1	2	3	4	4
	- Donor Retrieval - Ex-vivo donor organ management	1	2	2	2	3	4
	- Implantation of heart	1	1	1	1	2	3
	- Implantation of lung - Implantation of heart/lung block	1	1	1	1	2	3
	Surgery for heart failure - Surgical revascularisation for ischaemic cardiomyopathy	1	1	2	2	3	4
	- Ventricular reverse remodelling surgery - Mitral valve repair for cardiac failure	1	1	1	1	2	3
	- Cannulation for ECMO	1	2	2	3	3	4
	- Implantation of epicardial electrodes for - resynchronisation therapy	1	1	1	2	3	4
	- Implantation of extracorporeal VAD - Implantation of intracorporeal VAD	1	1	1	1	2	3

Syllabus Attitude and Values

	Professional Behaviour and Leadership	Assessment technique
Category	**Good Clinical Care**, to include: • History taking • Physical examination • Time management and decision making • Clinical reasoning • Therapeutics and safe prescribing • Patient as a focus of clinical care • Patient safety • Infection control	
Objective	To achieve an excellent level of care for the individual patient • To elicit a relevant focused history • To perform focused, relevant and accurate clinical examination To formulate a diagnostic and therapeutic plan for a patient based upon the clinic findings • To prioritise the diagnostic and therapeutic plan • To communicate a diagnostic and therapeutic plan appropriately To produce timely, complete and legible clinical records to include case-note records, handover notes, and operation notes To prescribe, review and monitor appropriate therapeutic interventions relevant to clinical practice including non–medication based therapeutic and preventative indications To prioritise and organise clinical and clerical duties in order to optimise patient care To make appropriate clinical and clerical decisions in order to optimise the effectiveness of the clinical team resource. To prioritise the patient's agenda encompassing their beliefs, concerns expectations and needs To prioritise and maximise patient safety: • To understand that patient safety depends on a. The effective and efficient organisation of care b. Health care staff working well together c. Safe systems, individual competency and safe practice. d. To understand the risks of treatments and to discuss these honestly and openly with patients • To utilise systematic ways of assessing and minimising risk • To ensure that all staff are aware of risks and work together to minimise risk To manage and control infection in patients, including: • Controlling the risk of cross-infection • Appropriately managing infection in individual patients • Working appropriately within the wider community to manage the risk posed by communicable diseases	Mini CEX, CBD, Mini PAT, Exit Examination in Cardiothoracic Surgery
Knowledge	**Patient assessment** • Knows likely causes and risk factors for conditions relevant to mode of presentation	

	• Understands the basis for clinical signs and the relevance of positive and negative physical signs • Recognises constraints and limitations of physical examination • Recognises if the role of a chaperone is appropriate or required **Clinical reasoning** • Interpret history and clinical signs to generate hypothesis within context of clinical likelihood • Understands the psychological component of disease and illness presentation • Test, refine and verify hypotheses • Develop problem list and action plan • Recognise how to use expert advice, clinical guidelines and algorithms • Recognise and appropriately respond to sources of information accessed by patients • Recognises the need to determine the best value and most effective treatment both for the individual patient and for a patient cohort **Record keeping** • Understands local and national guidelines for the standards of clinical record keeping in all circumstances, including handover • Understanding the importance of high quality and adequate clinical record keeping and relevance to patient safety and to litigation • Understand the primacy for confidentiality **Time management** • Understand that effective organisation is key to time management • Understand that some tasks are more urgent and/or more important than others • Understand the need to prioritise work according to urgency and importance • Maintains focus on individual patient needs whilst balancing multiple competing pressures • Outline techniques for improving time management **Patient safety** • Outline the features of a safe working environment • Outline the hazards of medical equipment in common use • Understand principles of risk assessment and management • Understanding the components of safe working practice in the personal, clinical and organisational settings • Outline local procedures and protocols for optimal practice e.g. GI bleed protocol, safe prescribing • Understands the investigation of significant events, serious untoward incidents and near misses **Infection control** • Understand the principles of infection control • Understands the principles of preventing infection in high risk groups	

	• Understand the role of the Notification of diseases in Malaysia	
Skills	**Patient assessment** • Takes a history from a patient with appropriate use of standardised questionnaires and with appropriate input from other parties including family members, carers and other health professionals • Performs an examination relevant to the presentation and risk factors that is valid, targeted and time efficient and which actively elicits important clinical findings • Give adequate time for patients and carers to express their beliefs ideas, concerns and expectations • Respond to questions honestly and seek advice if unable to answer • Develop a self-management plan with the patient • Encourage patients to voice their preferences and personal choices about their care **Clinical reasoning** • Interpret clinical features, their reliability and relevance to clinical scenarios including the recognition of the breadth of presentation of common disorders • Incorporates an understanding of the psychological and social elements of clinical scenarios into decision making through a robust process of clinical reasoning • Recognise critical illness and respond with due urgency • Generate plausible hypothesis(es) following patient assessment • Construct a concise and applicable problem list using available information • Construct an appropriate management plan in conjunction with the patient, carers and other members of the clinical team, and communicate this effectively to the patient, parents and carers where relevant **Record keeping** • Producing legible, timely and comprehensive clinical notes relevant to the setting Formulating and implementing care plans appropriate to the clinical situation, in collaboration with members of an interdisciplinary team, incorporating assessment, investigation, treatment and continuing care • Presenting well documented assessments and recommendations in written and/or verbal form **Time management** • Identifies clinical and clerical tasks requiring attention or predicted to arise • Group together tasks when this will be the most effective way of working • Organise, prioritise and manage both team members and workload effectively and flexibly **Patient safety** • Recognise and practise within limits of own professional competence • Recognise when a patient is not responding to treatment, reassess the situation, and encourage others to do so • Ensure the correct and safe use of medical equipment	

	• Improve patients and colleagues understanding of the side effects and contraindications of therapeutic intervention • Sensitively counsel a colleague following a significant untoward event, or near incident, to encourage improvement in practice of individual and unit • Recognise and respond to the manifestations of a patient's deterioration or lack of improvement (symptoms, signs, observations, and laboratory results) and support other members of the team to act similarly **Infection control** • Recognise the potential for infection within patients under care • Counsel patients on matters of infection risk, transmission and control • Actively engage in local infection control procedures • Prescribe antibiotics according to local guidelines and work with microbiological services where appropriate • Recognise potential for cross-infection in clinical settings • Practice aseptic technique whenever relevant	
Behaviour	• Shows respect and behaves in accordance with good medical practice by Malaysian Medical Council • Ensures that patient assessment, whilst clinically appropriate considers social, cultural and religious boundaries • Support patient self-management • Recognise the duty of the medical professional to act as patient advocate • Ability to work flexibly and deal with tasks in an effective and efficient fashion • Remain calm in stressful or high pressure situations and adopt a timely, rational approach • Show willingness to discuss intelligibly with a patient the notion and difficulties of prediction of future events, and benefit/risk balance of therapeutic intervention • Show willingness to adapt and adjust approaches according to the beliefs and preferences of the patient and/or carers • Be willing to facilitate patient choice • Demonstrate the ability to identify one's own biases and inconsistencies in clinical reasoning • Continue to maintain a high level of safety awareness and consciousness • Encourage feedback from all members of the team on safety issues • Reports serious untoward incidents and near misses and co-operates with the investigation of the same • Show willingness to take action when concerns are raised about performance of members of the healthcare team, and act appropriately when these concerns are voiced to you by others • Continue to be aware of one's own limitations, and operate within them • Encourage all staff, patients and relatives to observe infection control principles • Recognise the risk of personal ill-health as a risk to patients and colleagues in addition to its effect on performance	

Examples and descriptors for Core Surgical Training	**Patient assessment** • Obtains, records and presents accurate clinical history and physical examination relevant to the clinical presentation, including an indication of patient's views • Uses and interprets findings adjuncts to basic examination appropriately e.g. internal examination, blood pressure measurement, pulse oximetry, peak flow • Responds honestly and promptly to patient questions • Knows when to refer for senior help • Is respectful to patients by introducing self clearly to patients and indicates own place in team • Checks that patient is comfortable and willing to be seen • Informs patients about elements of examination and any procedures that the patient will undergo **Clinical reasoning** • In a straightforward clinical case develops a provisional diagnosis and a differential diagnosis on the basis of the clinical evidence, institutes an appropriate investigative and therapeutic plan, seeks appropriate support from others and takes account of the patient's wishes **Record keeping** • Is able to format notes in a logical way and writes legibly • Able to write timely, comprehensive, informative letters to patients and to GPs **Time management** • Works systematically through tasks and attempts to prioritise • Discusses the relative importance of tasks with more senior colleagues • Understands importance of communicating progress with other team members **Patient safety** • Participates in clinical governance processes • Respects and follows local protocols and guidelines • Takes direction from the team members on patient safety • Discusses risks of treatments with patients and is able to help patients make decisions about their treatment • Ensures the safe use of equipment • Acts promptly when patient condition deteriorates • Always escalates concerns promptly **Infection control** • Performs simple clinical procedures whilst maintaining full aseptic precautions • Follows local infection control protocols • Explains infection control protocols to students and to patients and their relatives • Aware of the risks of nosocomial infections.	
Examples and descriptors for Completion of Training	**Patient assessment** • Undertakes patient assessment (including history and examination) under difficult circumstances. Examples include: ▪ limited time available (Emergency situations, Outpatients, ward referral) ▪ Severely ill patients ▪ Angry or distressed patients or relatives	

	• Uses and interprets findings adjuncts to basic examination appropriately e.g. electrocardiography, spirometry, ankle brachial pressure index • Recognises and deals with complex situations of communication, accommodates disparate needs and develops strategies to cope • Is sensitive to patients' cultural concerns and norms • Is able to explain diagnoses and medical procedures in ways that enable patients understand and make decisions about their own health care **Clinical reasoning** • In a complex case, develops a provisional diagnosis and a differential diagnosis on the basis of the clinical evidence, institutes an appropriate investigative and therapeutic plan, seeks appropriate support from others and takes account of the patient's wishes **Record keeping** • Produces comprehensive, focused and informative records which summarise complex cases accurately **Time management** • Organises, prioritises and manages daily work efficiently and effectively • Works with, guides, supervises and supports junior colleagues • Starting to lead and direct the clinical team in effective fashion **Patient safety** • Leads team discussion on risk assessment, risk management, clinical incidents • Works to make organisational changes that will reduce risk and improve safety • Promotes patients' safety to more junior colleagues • Recognises and reports untoward or significant events • Undertakes a root cause analysis • Shows support for junior colleagues who are involved in untoward events **Infection control** • Performs complex clinical procedures whilst maintaining full aseptic precautions • Manages complex cases effectively in collaboration with infection control specialists	

	Professional Behaviour and Leadership	Assessment technique
Category	**Being a good communicator** To include: • Communication with patients • Breaking bad news • Communication with colleagues	
Objective	**Communication with patients** • To establish a doctor/patient relationship characterised by understanding, trust, respect, empathy and confidentiality • To communicate effectively by listening to patients, asking for and respecting their views about their health and responding to their concerns and preferences • To cooperate effectively with healthcare professionals involved in patient care. • To provide appropriate and timely information to patients and their families **Breaking bad news** • To deliver bad news according to the needs of individual patients **Communication with Colleagues** • To recognise and accept the responsibilities and role of the doctor in relation to other healthcare professionals. • To communicate succinctly and effectively with other professionals as appropriate • To present a clinical case in a clear, succinct and systematic manner	PBA, DOPS, *Mini CEX, Mini PAT and CBD*
Knowledge	**Communication with patients** • Understands questioning and listening techniques • Understanding that poor communication is a cause of complaints/ litigation **Breaking bad news** In delivering bad news understand that: • The delivery of bad news affects the relationship with the patient • Patient have different responses to bad news • Bad news is confidential but the patient may wish to be accompanied • Once the news is given, patients are unlikely to take in anything else • Breaking bad news can be extremely stressful for both parties • It is important to prepare for breaking bad news **Communication and working with colleagues** Understand the importance of working with colleagues, in particular: • The roles played by all members of a multi-disciplinary team • The features of good team dynamics • The principles of effective interprofessional collaboration • The principles of confidentiality	

Skills	**Communication with patients** • Establish a rapport with the patient and any relevant others (e.g. carers) • Listen actively and question sensitively to guide the patient and to clarify information • Identify and manage communication barriers, tailoring language to the individual patient and others and using interpreters when indicated • Deliver information compassionately, being alert to and managing their and your emotional response (anxiety, antipathy etc.) • Use, and refer patients to appropriate written and other evidence based information sources • Check the patient's understanding, ensuring that all their concerns/questions have been covered • Make accurate contemporaneous records of the discussion • Manage follow-up effectively and safely utilising a variety of methods (e.g. phone call, email, letter) • Provide brief advice on health and self-care e.g. use of alcohol and drugs. • Ensure appropriate referral and communications with other healthcare professional resulting from the consultation are made accurately and in a timely manner **Breaking bad news** • Demonstrate to others good practice in breaking bad news • Recognises the impact of the bad news on the patient, carer, supporters, staff members and self • Act with empathy, honesty and sensitivity avoiding undue optimism or pessimism **Communication with colleagues** • Communicate with colleagues accurately, clearly and promptly • Utilise the expertise of the whole multidisciplinary team • Participate in, and co-ordinate, an effective hospital at night or hospital out of hours team • Communicate effectively with administrative bodies and support organisations • Prevent and resolve conflict and enhance collaboration	
Behaviour	**Communication with patients** • Approach the situation with courtesy, empathy, compassion and professionalism • Demonstrate and inclusive and patient centred approach with respect for the diversity of values in patients, carers and colleagues **Breaking bad news** • Behave with respect, honest and empathy when breaking bad news • Respect the different ways people react to bad news **Communication with colleagues**	

	• Be aware of the importance of, and take part in, multi-disciplinary teamwork, including adoption of a leadership role • Foster an environment that supports open and transparent communication between team members • Ensure confidentiality is maintained during communication with the team • Be prepared to accept additional duties in situations of unavoidable and unpredictable absence of colleagues • Act appropriately on any concerns about own or colleagues' health e.g. use of alcohol and/or other drugs	
Examples and descriptors for Core Surgical Training	• Conducts a simple consultation with due empathy and sensitivity and writes accurate records thereof • Recognises when bad news must be imparted • Able to break bad news in planned settings following preparatory discussion with seniors • Accepts their role in the healthcare team and communicates appropriately with all relevant members thereof	
Completion of training	• Shows mastery of patient communication in all situations, anticipating and managing any difficulties which may occur • Able to break bad news in both unexpected and planned settings • Fully recognises the role of, and communicates appropriately with, all relevant team members • Predicts and manages conflict between members of the healthcare team • Beginning to take leadership role as appropriate, fully respecting the skills, responsibilities and viewpoints of all team members	

	Professional Behaviour and Leadership	Assessment technique
Category	**Teaching and Training**	
Objective	• To teach to a variety of different audiences in a variety of different ways • To assess the quality of the teaching • To train a variety of different trainees in a variety of different ways • To plan and deliver a training programme with appropriate assessments	Mini PAT, Portfolio *assessment at ARCP*
Knowledge	• Understand relevant educational theory and principles relevant to medical education • Understand the structure of an effective appraisal interview • Understand the roles to the bodies involved in medical education • Understand learning methods and effective learning objectives and outcomes • Differentiate between appraisal, assessment and performance review • Differentiate between formative and summative assessment • Understand the role, types and use of workplace-based assessments • Understand the appropriate course of action to assist a trainee in difficulty	
Skills	• Critically evaluate relevant educational literature • Vary teaching format and stimulus, appropriate to situation and subject • Provide effective feedback and promote reflection • Conduct developmental conversations as appropriate e.g.: appraisal, supervision, mentoring • Deliver effective lecture, presentation, small group and bed side teaching sessions • Participate in patient education • Lead departmental teaching programmes including journal clubs • Recognise the trainee in difficulty and take appropriate action • Be able to identify and plan learning activities in the workplace	
Behaviour	• In discharging educational duties respect the dignity and safety of patients at all times • Recognise the importance of the role of the physician as an educator • Balances the needs of service delivery with education • Demonstrate willingness to teach trainees and other health workers • Demonstrates consideration for learners • Acts to endure equality of opportunity for students, trainees, staff and professional colleagues • Encourage discussions with colleagues in clinical settings to share understanding • Maintains honesty, empathy and objectivity during appraisal and assessments	
Examples and descriptors for Core Surgical Training	• Prepares appropriate materials to support teaching episodes • Seeks and interprets simple feedback following teaching • Supervises a medical student, nurse or colleague through a simple procedure • Plans, develops and delivers small group teaching to medical students, nurses or colleagues	

	Professional Behaviour and Leadership	Assessment technique
Category	**Keeping up to date and understanding how to analyse information** Including • Ethical research • Evidence and guidelines • Audit • *Personal development*	
Objective	• To understand the results of research as they relate to medical practise • To participate in medical research. • To use current best evidence in making decisions about the care of patients • To construct evidence based guidelines and protocols • To complete an audit of clinical practice • Actively seek opportunities for personal development • To participate in continuous professional development activities	
Knowledge	• Understands Good Clinical Practice guidance on good practice in research • Understands the principles of research governance • Understands research methodology including qualitative, quantitative, bio-statistical and epidemiological research methods • Understands the application of statistics as applied to medical practice • Outline sources of research funding • Understands the principles of critical appraisal • Understands levels of evidence and quality of evidence • Understands guideline development together with their roles and limitations • Understands the different methods of obtaining data for audit • Understands the role of audit in improving patient care and risk management • Understands the audit cycle • Understands the working and uses of national and local databases used for audit such as specialty data collection systems, cancer registries, etc. • To demonstrate knowledge of the importance of best practice, transparency and consistency	
Skills	• Develops critical appraisal skills and applies these when reading literature • Devises a simple plan to test a hypothesis • Demonstrates the ability to write a scientific paper • Obtains appropriate ethical research approval • Uses literature databases • Contribute to the construction, review and updating of local (and national) guidelines of good practice using the principles of evidence based medicine • Designs, implements and completes audit cycles	

	• Contribute to local and national audit projects as appropriate • To use a reflective approach to practice with an ability to learn from previous experience • To use assessment, appraisal, complaints and other feedback to discuss and develop an understanding of own development needs	
Behaviour	• Follows guidelines on ethical conduct in research and consent for research • Keep up to date with national and international reviews and guidelines of practice • Aims for best clinical practice at all times, responding to evidence based medicine while recognising the occasional need to practise outside clinical guidelines • Recognise the need for audit in clinical practice to promote standard setting and quality assurance • To be prepared to accept responsibility • Show commitment to continuing professional development	
Examples and descriptors for Core Surgical Training	• Defines ethical research and demonstrates awareness of GCP guidelines • Differentiates audit and research and understands the different types of research approach e.g. qualitative and quantitative • Knows how to use literature databases • Demonstrates good presentation and writing skills • Participates in departmental or other local journal clubs • Critically reviews an article to identify the level of evidence • Attends departmental audit meetings • Contributes data to a local or national audit • Identifies a problem and develops standards for a local audit • Describes the audit cycle and take an audit through the first steps • Seeks feedback on performance from clinical supervisor/mentor/patients/carers/service users	
Completion of training	• Demonstrates critical appraisal skills in relation to the published literature • Demonstrates the ability to apply for appropriate ethical research approval • Demonstrates knowledge of research organisation and funding sources • Demonstrates the ability to write a scientific paper • Leads in a departmental or other local journal club • Contributes to the development of local or national clinical guidelines or protocols • Organise or lead a departmental audit meeting • Lead a complete clinical audit cycle including development of conclusions, the changes needed for improvement, implementation of findings and re-audit to assess the effectiveness of the changes • Seeks opportunities to visit other departments and learn from other professionals	
Sub-category:	**Manager** including • Self-Awareness and self-management • Team-working	

	• Leadership • Principles of quality and safety improvement • Management	
Objective	**Self-awareness and self-management** • To recognise and articulate one's own values and principles, appreciating how these may differ from those of others • To identify one's own strengths, limitations and the impact of their behaviour • To identify their own emotions and prejudices and understand how these can affect their judgement and behaviour • To obtain, value and act on feedback from a variety of sources • To manage the impact of emotions on behaviour and actions • To be reliable in fulfilling responsibilities and commitments to a consistently high standard • To ensure that plans and actions are flexible, and take into account the needs and requirements of others • To plan workload and activities to fulfil work requirements and commitments with regard to their own personal health	Mini PAT and CBD
	Team working • To identify opportunities where working with others can bring added benefits • To work well in a variety of different teams and team settings by listening to others, sharing information, seeking the views of others, empathising with others, communicating well, gaining trust, respecting roles and expertise of others, encouraging others, managing differences of opinion, adopting a team approach	Mini PAT, CBD and Portfolio assessment during ARCP
	Leadership • To develop the leadership skills necessary to lead teams effectively. These include the identification of contexts for change. • Application of knowledge and evidence to produce an evidence based challenge to systems and processes • Making decisions by integrating values with evidence • Evaluating the impact of change and taking corrective action where necessary	Mini PAT, CBD and Portfolio assessment during ARCP
	Principles of quality and safety improvement • To recognise the desirability of monitoring performance, learning from mistakes and adopting a no blame culture in order to ensure high standards of care and optimise patient safety • To critically evaluate services • To identify where services can be improved. • To support and facilitate innovative service improvement	Mini PAT, CBD and Portfolio assessment during ARCP
	Management and healthcare culture • To organise a task where several competing priorities may be involved • To actively contribute to plans which achieve service goals • To manage resources effectively and safely	

	• To manage people effectively and safely • To manage the performance of themselves and others • To understand the structure of the Malaysian Health Service and the management of local healthcare systems in order to be able to participate fully in managing healthcare provision	
Knowledge	**Self-awareness and self-management** • Demonstrate knowledge of the ways in which individual behaviours impact on others • Demonstrate knowledge of personality types, group dynamics, learning styles, leadership styles • Demonstrate knowledge of methods of obtaining feedback from others • Demonstrate knowledge of tools and techniques for managing stress • Demonstrate knowledge of the role and responsibility of occupational health and other support networks • Demonstrate knowledge of the limitations of self-professional competence **Team working** • Outline the components of effective collaboration and team working • Demonstrate knowledge of specific techniques and methods that facilitate effective and empathetic communication • Demonstrate knowledge of techniques to facilitate and resolve conflict • Describe the roles and responsibilities of members of the multidisciplinary team • Outline factors adversely affecting a doctor's and team performance and methods to rectify these. • Demonstrate knowledge of different leadership styles service change, barriers to change, qualitative methods to gather the experience of patients and carers **Quality and safety improvement** • Understand the elements of clinical governance and its relevance to clinical care • Understands significant event reporting systems relevant to surgery • Understands the importance of evidence-based practice in relation to clinical effectiveness. • Understand risks associated with the surgery including mechanisms to reduce risk • Outline the use of patient early warning systems to detect clinical deterioration • Keep abreast of national patient safety initiatives. • Understand quality improvement methodologies including feedback from patients, public and staff. • Understand the role of audit, research, guidelines and standard setting in improving quality of care. • Understand methodology of creating solutions for service improvement • Understand the implications of change	
Skills	**Self-awareness and self-management** • Demonstrate the ability to maintain and routinely practice critical self-awareness, including able to discuss strengths	

	and weaknesses with supervisor, recognising external influences and changing behaviour accordingly • Demonstrate the ability to show awareness of and sensitivity to the way in which cultural and religious beliefs affect approaches and decisions, and to respond respectfully • Demonstrate the ability to recognise the manifestations of stress on self and others and know where and when to look for support • Demonstrate ability to balance personal and professional roles and responsibilities and prioritise tasks, having realistic expectations of what can be completed by self and others **Team working** • Preparation of patient lists with clarification of problems and ongoing care plan • Detailed hand over between shifts and areas of care • Communicate effectively in the resolution of conflict, providing feedback • Develop effective working relationships with colleagues within the multidisciplinary team • Demonstrate leadership and management in the following areas: o Education and training of junior colleagues and other members of the team o Deteriorating performance of colleagues (e.g. stress, fatigue) o Effective handover of care between shifts and teams • Lead and participate in interdisciplinary team meetings • Provide appropriate supervision to less experienced colleagues • Timely preparation of tasks which need to be completed to a deadline **Leadership** • Identify trends, future options and strategy relevant to surgery • Compare and benchmark healthcare services • Use a broad range of scientific and policy publications relating to delivering healthcare services • Prepare for meetings by reading agendas, understanding minutes, action points and background research on agenda items • Work collegiately and collaboratively with a wide range of people outside the immediate clinical setting • Evaluate outcomes and re-assess the solutions through research, audit and quality assurance activities • Understand the wider impact of implementing change in healthcare provision and the potential for opportunity costs **Quality and safety improvement** • Adopt strategies to reduce risk e.g. Safe surgery • Contribute to quality improvement processes e.g. o Audit of personal and departmental performance o Errors / discrepancy meetings o Critical incident and near miss reporting o Unit morbidity and mortality meetings o Local and national databases	

	○ Maintenance of a personal portfolio of information and evidence • Creatively question existing practise in order to improve service and propose solutions **Management and healthcare structures** • Manage time and resources effectively • Utilise and implement protocols and guidelines • Participate in managerial meetings • Take an active role in promoting the best use of healthcare resources • Work with stakeholders to create and sustain a patient-centred service • Employ new technologies appropriately, including information technology • Conduct an assessment of the community needs for specific health improvement measures	
Behaviour	**Self-awareness and self-management** • To adopt a patient-focused approach to decisions that acknowledges the right, values and strengths of patients and the public • To recognise and show respect for diversity and differences in others • To be conscientious, able to manage time and delegate • To recognise personal health as an important issue **Team working** • Encourage an open environment to foster and explore concerns and issues about the functioning and safety of team working • Recognise limits of own professional competence and only practise within these. • Recognise and respect the skills and expertise of others • Recognise and respect the request for a second opinion • Recognise the importance of induction for new members of a team • Recognise the importance of prompt and accurate information sharing with the Primary Care team following hospital discharge **Leadership** • Demonstrate compliance with national guidelines that influence healthcare provision • Articulate strategic ideas and use effective influencing skills • Understand issues and potential solutions before acting • Appreciate the importance of involving the public and communities in developing health services • Participate in decision making processes beyond the immediate clinical care setting • Demonstrate commitment to implementing proven improvements in clinical practice and services • Obtain the evidence base before declaring effectiveness of changes **Quality and safety improvement** • Participate in safety improvement strategies such as critical incident reporting	

	• Develop reflection in order to achieve insight into own professional practice • Demonstrates personal commitment to improve own performance in the light of feedback and assessment • Engage with an open no blame culture. Respond positively to the outcomes of audit and quality improvement • Co-operate with changes necessary to improve service quality and safety **Management and healthcare Structures** • Recognise the importance of the equitable allocation of healthcare resources • Recognise the role of doctors as active participants in healthcare systems • Respond appropriately to health service objectives and targets and take part in the development of services • Recognise the role of patients and carers as active participants in healthcare systems and service planning • Show willingness to improve managerial skills (e.g. management courses) and engage in management of the service	
Examples and descriptors for Core Surgical Training	**Self-awareness and self-management** • Obtains 360° feedback as part of an assessment • Participates in peer learning and explores leadership styles and preferences • Timely completion of written clinical notes • Through feedback discusses and reflects on how a personally emotional situation affected communication with another person • Learns from a session on time management **Team working** • Works well within the multidisciplinary team and recognises when assistance is required from the relevant team member • Invites and encourages feedback from patients • Demonstrates awareness of own contribution to patient safety within a team and is able to outline the roles of other team members • Keeps records up-to-date, legible and relevant to the safe progress of the patient • Hands over care in a precise, timely and effective manner • Supervises the process of finalising and submitting operating lists to the theatre suite **Leadership** • Complies with clinical governance requirements of organisation • Presents information to clinical and service managers (e.g. audit) • Contributes to discussions relating to relevant issues e.g. workload, cover arrangements using clear and concise evidence and information **Quality and safety improvement** • Understands that clinical governance is the overarching framework that unites a range of quality improvement activities • Participates in local governance processes	

	• Maintains personal portfolio • Engages in clinical audit • Questions current systems and processes **Management and healthcare Structures** • Participates in audit to improve a clinical service • Works within corporate governance structures • Demonstrates the ability to manage others by teaching and mentoring juniors, medical students and others, delegating work effectively • Highlights areas of potential waste	
Completion of training	**Self-awareness and self-management** • Participates in case conferences as part of multidisciplinary and multi-agency team • Responds to service pressures in a responsible and considered way • Liaises with colleagues in the planning and implementation of work rotas **Team working** • Discusses problems within a team and provides an analysis and plan for change • Works well in a variety of different teams • Shows the leadership skills necessary to lead the multidisciplinary team • Beginning to lead multidisciplinary team meetings o Promotes contribution from all team members • Fosters an atmosphere of collaboration o Ensures that team functioning is maintained at all times. • Recognises need for optimal team dynamics • Promotes conflict resolution • Recognises situations in which others are better equipped to lead or where delegation is appropriate **Management / Leadership** • Shadows healthcare managers • Attends multi-agency conference • Uses and interprets departments performance data and information to debate services • Participates in clinical committee structures within an organisation **Quality and safety improvement** • Able to define key elements of clinical governance • Demonstrates personal and service performance • Designs audit protocols and completes audit cycle • Identifies areas for improvement and initiates improvement projects • Supports and participates in the implementation of change • Leads in review of patient safety issue • Understands change management **Management and healthcare Structure** • Can describe in outline the roles of primary care, including general practice, public health, community, mental health, secondary and tertiary care services within healthcare	

	• Participates fully in clinical coding arrangements and other relevant local activities • Participate in team and clinical directorate meetings including discussions around service development • Discuss the most recent guidance from the relevant health regulatory agencies in relation to the surgical specialty • Describe the local structure for health services and how they relate to regional or devolved administration structures • Discusses funding allocation processes from central government in outline and how that might impact on the local health organisation	

	Professional Behaviour and Leadership	Assessment technique
Sub-category	**Promoting good health**	
Objective	• To demonstrate an understanding of the determinants of health and public policy in relation to individual patients • To promote supporting people with long term conditions to self-care • To develop the ability to work with individuals and communities to reduce levels of ill health and to remove inequalities in healthcare provision • To promote self-care	Exit examination in Cardiothoracic Surgery, CBD, Mini PAT ,
Knowledge	• Understand guidance documents relevant to the support of self-care • Recognises the agencies that can provide care and support out with the hospital • Understand the factors which influence the incidence and prevalence of common conditions including psychological, biological, social, cultural and economic factors • Understand the screening programmes currently available within Malaysia. • Understand the possible positive and negative implications of health promotion activities • Demonstrate knowledge of the determinants of health worldwide and strategies to influence policy relating to health issues • Outline the major causes of global morbidity and mortality and effective, affordable interventions to reduce these	
Skills	• Adapts assessment and management accordingly to the patient's social circumstances • Assesses patient's ability to access various services in the health and social system and offers appropriate assistance • Ensures appropriate equipment and devices are discussed and where appropriate puts the patient in touch with the relevant agency • Facilitating access to appropriate training and skills to develop the patients confidence and competence to self-care • Identifies opportunities to promote change in lifestyle and to prevent ill health • Counsels patients appropriately on the benefits and risks of screening and health promotion activities	
Behaviour	• Recognises the impact of long term conditions on the patient, family and friends • Put patients in touch with the relevant agency including the voluntary sector from where they can access support or equipment relevant to their care • Show willingness to maintain a close working relationship with other members of the multidisciplinary team, primary and community care. • Recognise and respect the role of family, friends and carers in the management of the patient with a long term condition	

	• Encourage screening to facilitate early intervention where appropriate	
Examples and descriptors for Core Surgical Training	• Understands that "quality of life" is an important goal of care and that this may have different meanings for each patient • Promotes patient self-care and independence • Helps the patient to develop an active understanding of their condition and how they can be involved in self-management • Discusses with patients those factors which could influence their health	
Completion of training	• Demonstrates awareness of the management of long term conditions • Develops management plans in partnership with the patient that are pertinent to the patient's long term condition • Engages with relevant external agencies to promote improving patient care • Support small groups in a simple health promotion activity • Discuss with small groups the factors that have an influence on their health and describe steps they can undertake to address these • Provide information to an individual about a screening programme offering specific guidance in relation to their personal health and circumstances concerning the factors that would affect the risks and benefits of screening to them as an individual.	

	Professional Behaviour and Leadership	Assessment technique
Sub-category:	**Probity and Ethics** To include • Acting with integrity • Medical Error • Medical ethics and confidentiality • Medical consent • Legal framework for medical practise	
Objective	• To uphold personal, professional ethics and values, taking into account the values of the organisation and the culture and beliefs of individuals • To communicate openly, honestly and inclusively • To act as a positive role model in all aspects of communication • To take appropriate action where ethics and values are compromised • To recognise and respond the causes of medical error • To respond appropriately to complaints • To know, understand and apply appropriately the principles, guidance and laws regarding medical ethics and confidentiality as they apply to surgery. • To understand the necessity of obtaining valid consent from the patient and how to obtain • To understand the legal framework within which healthcare is provided in Malaysia • To recognise, analyse and know how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations • Understand ethical obligations to patients and colleagues • To appreciate an obligation to be aware of personal good health	Mini PAT and CBD, PBA, DOPS, Exit examination in Cardiothoracic Surgery
Knowledge	• Understand local complaints procedure • Recognise factors likely to lead to complaints • Understands the differences between system and individual errors • Outline the principles of an effective apology • Knows and understand the professional, legal and ethical codes of the Malaysian Medical Council and any other codes to which the physician is bound. Understands of the principles of medical ethics • Understands the principles of confidentiality • Understands the Data Protection Act • Understands the principles of Information **Governance** • Understands the legal framework for patient consent in relation to medical practice • Recognises the factors influencing ethical decision making including religion, personal and moral beliefs, cultural practices	

	• Understands the standards of practice defined by the MMC when deciding to withhold or withdraw life-prolonging treatment • Understands the Malaysian legal framework and MMC guidelines for taking and using informed consent for invasive procedures including issues of patient incapacity	
Skills	• To recognise, analyse and know how to deal with unprofessional behaviours in clinical practice taking into account local and national regulations • To create open and non-discriminatory professional working relationships with colleagues awareness of the need to prevent bullying and harassment • Contribute to processes whereby complaints are reviewed and learned from • Explains comprehensibly to the patient the events leading up to a medical error or serious untoward incident, and sources of support for patients and their relatives • Deliver an appropriate apology and explanation relating to error • Use and share information with the highest regard for confidentiality both within the team and in relation to patients • Counsel patients, family, carers and advocates tactfully and effectively when making decisions about resuscitation status, and withholding or withdrawing treatment • Present all information to patients (and carers) in a format they understand, checking understanding and allowing time for reflection on the decision to give consent • Provide a balanced view of all care options. • Applies the relevant legislation that relates to the health care system in order to guide one's clinical practice including reporting to the Coroner's Officer, the Police or the proper officer of the local authority in relevant circumstances. Ability to prepare appropriate medical legal statements for submission to the Coroner's Court, Fatal Accident Inquiry and other legal proceedings • Be prepared to present such material in Court	
Behaviour	• To demonstrate acceptance of professional regulation • To promote professional attitudes and values • To demonstrate probity and the willingness to be truthful and to admit errors • Adopt behaviours likely to prevent causes for complaints • Deals appropriately with concerned or dissatisfied patients or relatives • Recognise the impact of complaints and medical error on staff, patients, and the health service • Contribute to a fair and transparent culture around complaints and errors • Recognise the rights of patients to make a complaint • Identify sources of help and support for patients and yourself when a complaint is made about yourself or a colleague • Show willingness to seek advice of peers, legal bodies, and the MMC in the event of ethical dilemmas over disclosure and confidentiality	

	• Share patient information as appropriate, and taking into account the wishes of the patient. • Show willingness to seek the opinion of others when making decisions about resuscitation status, and withholding or withdrawing treatment. • Seeks and uses consent from patients for procedures that they are competent to perform while respecting the patient's autonomy • Respecting personal, moral or religious beliefs • Not exceeding the scope of authority given by the patient • Not withholding relevant information • Seeks a second opinion, senior opinion, and legal advice in difficult situations of consent or capacity • Show willingness to seek advice from the employer, appropriate legal bodies (including defence societies), and the MMC on medico-legal matters	
Examples and descriptors for Core Surgical Training	• Reports and rectifies an error if it occurs • Participates in significant event audits • Participates in ethics discussions and forums. Apologises to patient for any failure as soon as an error is recognised • Understands and describes the local complaints procedure • Recognises need for honesty in management of complaints • Learns from errors • Respect patients' confidentiality and their autonomy • Understand the Data Protection Act • Consult appropriately, including the patient, before sharing patient information • Participate in decisions about resuscitation status, withholding or withdrawing treatment • Obtains consent for interventions that they are competent to undertake • Knows the limits of their own professional capabilities	

LEARNING OPPORTUNITIES

Workplace

Opportunities for advance Cardiothoracic Surgical training rotations are available in the following institutions:

1. Ministry of Health hospitals
2. National Heart Institute (IJN)
3. University hospitals
4. Private hospitals/institutions

Institutions must fulfil the requirements of an advance cardiothoracic surgical training centre, and be credentialed by the Conjoint Committee for Cardiothoracic Surgery Training (CCCST). Training centres must have a minimum of 1 trainer and carry out a minimum of 100 cases per year (combined cardiac and thoracic cases). This should provide sufficient learning opportunities for trainees to fulfil their training targets, including but not limited to; a minimum number of surgical procedures, available infrastructures for teaching and learning, and an adequate number of trained teaching staff. Training posts must be recognised by the Conjoint Committee for Cardiothoracic Surgery Training (CCCST), may be self-funded, awarded a scholarship, or employed by the institution concerned. Employment may be on contract or with tenure. Training centres must ensure that trainees have adequate medical indemnity and health insurance.

A typical day in the life of a surgical trainee would begin with a morning ward round in the Cardiac Intensive Care Unit (CICU) where post op patients are reviewed, and this will be followed by ward rounds to review stable post-op and pre-op patients with their respective trainer (consultant). This would be followed by discussions with a trainer regarding patient care plans. Subsequently, trainees would be expected to assist in, or perform surgical procedures in the presence of a trainer; or to review outpatients in clinic, discussing their progress and care with a trainer. There should be a minimum of 2 hours of contact time per day. A trainer to trainee ratio of 1:1 is ideal, and should not consistently exceed 1:2.

Formal teaching of trainees in terms of classes should be held in group training sessions in the form of weekly journal reviews, mortality and morbidity discussions as well as multidisciplinary team meetings.

On call duties may vary depending on the year of training. For example, Year 1 till year 4 trainees may be expected to be the first point of patient contact on behalf of the on-call team, for emergency department referrals, in patient referrals and CICU management as the first line doctor. Year 5 to 6 trainees may be expected to review all in- patient and emergency department referrals, taking on the responsibility of initial decision making, and formulating management plans that are to be discussed with the specialist/ consultant on call.

Rotations

The duration of training programme is 6 years minimum with a maximum of 10 years.

Trainees must be trained in Cardiothoracic Surgery in General with rotations among the recognised training centres in Ministry of Health, IJN and University Hospitals and accredited centres abroad. Trainees are expected to fulfil their operative logbook and essential learning activities requirements as stated in the syllabi and also spend a minimum of 6 months to 2 years in an accredited centre. Optional rotations like paediatric cardiac surgery (6 months) and vascular surgery (6 months) are encouraged.

Teaching Programme

Institutions wishing to take on surgical trainees into advanced training, must provide evidence of a teaching programme which provides the delivery of training that fulfils the syllabus requirements.

A teaching programme should include the details on the frequency and the person(s) responsible for delivery of the teaching. Each trainee is required to have a minimum of two hours of reserved contact teaching time per week throughout the course of the programme. This can be in the operating room during a case, ward rounds or even in the clinic, where a learning activity is carried out with the trainee. The contact time may be carried out in a group or between individuals with a maximum trainer to trainee ratio of 1:3. The training institution should provide a schedule that details the specific teaching topic and this has to be consistent across all the training centres nationwide. At the end of the rotation for that particular year the trainee should have satisfied the requirements needed to progress to the following year.

All teaching activities can be in the form of formal or informal teaching. Formal teaching includes lectures, tutorials and wet labs. These are delivered through a series of intensive courses and other relevant courses. Informal learning, can be further categorised into work place practical and self-directed learning. In work place, clinical practice will include clinic, ward work, ward rounds, operating theatre, on-call and clinical meetings. All these teaching and learning methods will involve a supervisor to mentor the candidates.

Skills acquisition

Trainees are expected to acquire technical and non-technical skills. Both internal and external courses and workshops provide the opportunity for skills learning. However, the assessment of skills and performance improvement must take place in the workplace. Trainees should therefore have opportunities to enhance these skills in the workplace e.g., performing procedures under supervision, clinic consultations with patients, conducting a ward round, performing on-call duties, presenting at audit or research meetings etc., and they will be assessed at regular intervals.

Online Resources

Trainees, regardless of the location of their placements, should be able to access the following materials online:

- Electronic portfolio, including logbook
- Synchronous and asynchronous online learning opportunities, such as tutorials, videos, and interactive sessions
- Library resources - including access to e-books, e-journals, databases, tracking services
- Multi-source feedback system
- Self-learning activities

Simulators

Simulation is an educational technique that allows trainees to perform skills in an environment which mimics real-life situations, but avoids or minimises putting patients at risk. Simulation systems can be classified as:

1. Low fidelity: e.g., simple synthetic bench-top models, (such as box trainers), simple animal models, simple role-play etc. Low fidelity models are often used for partial task training.
2. High fidelity: e.g., standardised patient & clinical scenarios, high-fidelity models, (live animals, human cadaveric), advanced virtual reality systems etc.

Simulation can be used for training as well as assessment, and can address technical and non-technical skills. Some of the larger primary training centres have dedicated simulation facilities.

Examples of simulation based training:

1. Coronary Anastomosis Simulation Kit – Industry supported
2. National Heart Institute Wet Lab and Dry Lab Sessions
3. University Malaya Wet Lab and Dry Lab Sessions
4. UiTM Wet Lab and Dry Lab Sessions
5. UKM Wet Lab and Dry Lab Sessions

External opportunities

Learning opportunities outside of local training centres may be provided by the following:

1. Malaysian Association for Thoracic and Cardiovascular Surgery and its local and international collaborators
2. Other professional bodies, (societies, special interest groups, associations etc.)
3. Medical Devices Industry

Learning opportunities in any of these settings must contribute towards the advancement of cardiothoracic surgical training. These courses may be completed at any time before or during the course of training.

Trainees would be expected to source funding for these courses. Sponsored trainees may be allowed to claim the course fees and expenses at the discretion of the sponsor. For example, some sponsors may allow trainees to claim expenses for one course per year, including travel expenses and course fees.

Courses

Courses that must have been undertaken by the end of Cardiothoracic Surgical Training:

Competence/Focus Area	Courses
Technical Skills	1. Basic Surgical Skills 2. Coronary anastomosis workshop 3. Heart valve surgery workshop
Professional Behaviours	1. Care of the Critically Ill Patient (CCrISP) 2. Cardiac Advance Life Support (CALS) 3. Basic Cardiac Life Support (BLS) 4. Advance Cardiac Life Support (ACLS)
Research Related Courses	1. Clinical Research Design 2. Statistical Methodology for Clinical Research 3. Good Clinical Practice 4. Scientific Writing
Academic and Scientific Meetings	1. MATCVS Annual Scientific Meeting 2. KL Review Course 3. Southeast Asia Thoracic Surgery Teaching Webinars 4. Birmingham Review Course (optional) 5. Regional FRCS Teaching Webinar (optional) 6. Weekly Trainees Journal Club

Placements

Applicants who are accepted into training will have their university and hospital placements set by the Board of Studies Postgraduate Cardiothoracic Surgery Programme. Trainees will be notified of their placements in writing by the Conjoint Board to which they have been allocated.

ASSESSMENTS

Introduction

The curriculum also identifies the tools that will be used to **assess competence and monitor progress.** Cardiothoracic training is now to be seen as competence based rather than determined solely by the number of years in training or by the numbers of procedures performed, as in the past. The competence levels are defined for each key stage. The programme is therefore now described in terms of **core, intermediate, and final** phases. On successful completion of the programme the Cardiothoracic Trainee will be able to demonstrate competence in all aspects of the management (including operative management) for most common Cardiothoracic disorders in Malaysia.

Overview of the Assessment System

The curriculum adopts the following definitions:

Assessment
A systematic procedure for measuring a trainee's progress or level of achievement, against defined criteria to make a judgement about a trainee.

Assessment system
An assessment system refers to an integrated set of assessments which is in place for the entire postgraduate training programme and which is blueprinted against and supports the approved curriculum.

Purpose of the Assessment system

The purpose of the assessment system is to:

- Determine whether trainees are meeting the standards of competence and performance specified at various stages in the curriculum for surgical training.
- Provide systematic and comprehensive feedback as part of the learning cycle.
- Determine whether trainees have acquired the common and specialty-based knowledge, clinical judgement, operative and technical skills, and generic professional behaviour and leadership skills required to practice at the level of completion of Cardiothoracic Training.
- Address all the domains of Good Medical Practice and conform to the principles laid down by the National Specialist Registration and Malaysian Medical Council.

Despite their original name of Assessment tools, these interactional opportunities were never intended to be used summatively. Collectively they are used as part of the Annual Review of Competence Progression (ARCP) which is a summative process. However individually the tools are designed to develop trainees and are formative assessment tools and can:

1. Trigger conversations between trainee and trainer
2. Enable observation and discussion of clinical practice
3. Record good practice and outline areas for development of knowledge, skills, judgement and professional behaviour
4. Formulate action plans for development
5. Enable trainees to analyse pattern recognition

The tools are **not** intended to:

1. Score trainees
2. Summate progress globally
3. Predict future performance
4. Be completed without a face to face feedback conversation

These assessments can be divided into:

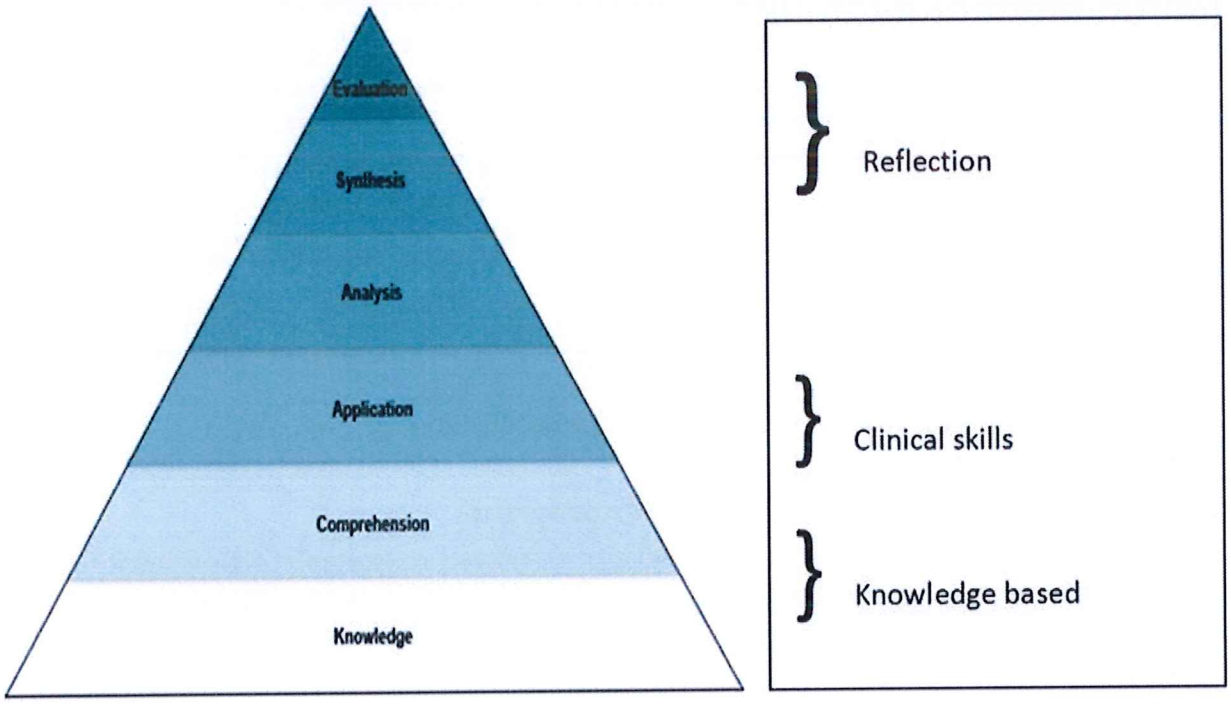
Observational tools

The purpose of the CEX, DOPS and PBA tools are to encourage trainee practice within a supported environment, followed by a developmental conversation (feedback), to identify elements of good practice and areas for development. Such development should be discussed in terms of follow up actions that will extend the trainee's technical proficiency and clinical skills.

Discussion tools

The CBD can record any conversation which reviews a trainee's practice or thoughts about practice. From an office based, time protected tutorial to the short conversation that happens in the theatre coffee room, or even the corridor, a CBD allows trainers to explore the thinking of their trainees, and to share understanding and professional thinking. CBDs focus on knowledge and understanding and occur at different levels of Bloom's taxonomy (see figure below). CBDs that look at information are addressing the knowledge base of the trainee. An example may be asking trainees for the classification of shock. A trainer could take the discussion beyond the classification to look at how that knowledge relates to the understanding of the patient's condition and the symptoms manifested by the patient. Application relates to the use of knowledge and understanding in practice and the trainee may be asked to consider the possible treatment options for that patient. Analysis and synthesis are higher order levels of the thinking or cognitive function, and CBDs that look at a situation reflectively, to break it down and consider what elements helped or hindered patient care, can be invaluable to trainees in reviewing and making sense of their experiences and in extending their critical thinking. At the evaluation level, trainees may well be engaging in discussions that relate to service improvement and changes in practice at a group level rather than an individual one.

Blooms Taxonomy



Insight tools

The Multi Source Feedback (MSF) tool collects subjective views of trainees from a specified range of colleagues (consultants, specialty doctors, senior nurses and other Health care providers.) The benefit of the MSF lies in the conversation between trainer and trainee to review and discuss the overview of the collated comments. The Multi Source Feedback tool (previously known as Mini PAT), is used to provide a 360 degree range of feedback across a spectrum of professional domains which are closely related to the duties of a good doctor. Trainees fill in their self-rating form and request a range of people anonymously for their ratings. When the data is collated the Educational Supervisor will meet with the trainee to discuss the feedback provided.

Practicalities

As a trainer, one is under the pressure of training several trainees at differing levels of competence and therefore with different training needs. The constraints of managing a service as well as training require a smarter use of time, rather than both trainees and trainers working longer hours. A single educational opportunity whether in an operating theatre, on call, or in a clinic can be developed into a targeted learning opportunity for not only an individual but potentially several trainees.

Although the trainer may facilitate the discussion, the recording of the case is undertaken by the trainee. Each discussion concludes with an action plan which tasks the trainee with further development.

Methods of Assessments

Formative assessments (for learning, of progress)

Formative assessments provide a useful "in-training" measurement of the trainee's development, and highlight areas for improvement, (learning the right things to the right standard). Individual assessments in isolation do not generally impede a trainee's progress, and cannot be used to make a summative decision. Nevertheless, numerous cumulative poor assessments may warrant the consideration for an extension within a programme. Trainees will be expected to review their progress with academic supervisors at six-monthly intervals to identify areas of improvement.

The following tools are used for formative assessments. Many of these are associated with the Essential Learning Activities (ELAs) :

- Workplace-based assessments (see the relevant sections within this document)
- Logbooks (see the relevant sections within this document)
- Portfolios (see the relevant sections within this document)
- Supervisor report

Summative assessments (of learning, for progress)

Summative assessments are used as indicators of mandated competency achievement for the successful completion of different phases of training. A trainee who fails any of these assessments will need to be extended in the programme, or may even fail to complete the programme. The following tools are used:

- Examinations (Summative assessment)
- Thesis proposal and defence
- Thesis submission and defence

The individual components of the assessment system are:

- ***Workplace based assessments*** covering knowledge, clinical judgement, technical skills and professional behaviour and attitudes together with the ***surgical logbook of procedures*** to support the assessment of operative skills
- ***Examinations*** held towards the end of specialist training
- The ***learning agreement*** and the ***assigned educational supervisors' report***
- An ***annual review of competence progression (ARCP)***

Validity, Reliability and Practicability

In order to be included in the assessment system, the assessments methods selected have to meet the following criteria:

Valid - To ensure face validity, the workplace based assessments comprise direct observations of workplace tasks. The complexity of the tasks increases in line with progression through the training programme.

The objectives of validation are:

1. To improve the assessment process
2. Provide evidence for internal or external audit
3. To improve the quality of assessment methods, process and tools
4. Provide feedback to both assessors and trainees
5. Increase confidence in the process
6. Determination of any differences or interpretations that may occur
7. To check that policies and procedures are followed
8. To determine availability of resources

Reliable - In order to increase reliability, there will be multiple measures of outcomes. Assessments make use of several observers' judgements, multiple assessment methods (triangulation), and take place frequently. The planned systematic and permanent programme of assessor training for trainers and Assigned Educational Supervisors (AESs), helps to attain the maximum reliability of placement reports.

Reliability is the degree which the assessment produces stable and consistent results (reproducibility), which reflect the trainees' training. Reliability is increased by:

1. increasing sampling episodes, (e.g., greater frequency, sufficient questions, multiple examiner panels, adequate coverage of the syllabus)
2. consistent assessment environment, (e.g., purpose-built examination wards, consistent timings, standardised patients etc.)
3. ensure trainee familiarity of the assessment methods, (e.g., briefings, mock examinations etc.)
4. training of assessors, (trainers, examiners); e.g., training workshops, calibration exercises etc.
5. objective measurement of reliability, (e.g., Cronbach's alpha, examiner marking analyses; mean, standard deviation, inter-marker variability, use of the range of marks), where applicable
6. regular item analysis to identify ambiguous or poor questions, (e.g., examination vetting)

Feedback on reliability can be given by trainers and examiners, external examiners, the examination board and candidates themselves.

Feasible - The practicality of the assessments in the training and working environment has been taken into account. The assessment should not add a significant amount of time to the workplace task being assessed and assessors should be able to complete the scoring and feedback part of the assessment in 5-10 minutes.

The trainer-trainee ratio of 1:3 should ensure the practicability of assessment tool implementation. Considerations should include; the burden of the number of hours to complete each assessment tool and time for both the trainer and trainee. The composition of the Board of Studies Postgraduate Cardiothoracic Surgery Programme ensures constant feedback on the feasibility of delivering the assessment methods proposed, with regard to human resources, training opportunities, facilities, logistics and funding.

Cost-effectiveness – The only significant additional costs should be any extra time taken for assessments and feedback and the induction of new Assigned Educational Supervisors. The most substantial extra time investment will be in the regular appraisal process for units that did not previously have such a system.

Opportunities for feedback – All the assessments, both those for learning and of learning, include a feedback element.

Impact on learning - The workplace based assessments are all designed to include immediate feedback as part of the process. ***Appraisals (DOPS) with the AES are required as per the clinical placement,*** are built into the training system. The formal examinations all provide limited feedback as part of the summative process. The assessment process therefore has a continuous developmental impact on learning. The emphasis given to reflective practice within the portfolio also impacts directly on learning.

Validation of Formative Assessments

	Validity Inference			
Tools	**Scoring**	**Generalisation**	**Extrapolation**	**Implications/ decision**
Mini-CEX or DOCE			Moderate to high authenticity, as encounters involve real patients.	
CbD	Validated tool	Single rater per assessment Multiple assessments	Validated tool High authenticity as the trainee's clinical judgement, decision-making and application of medical knowledge is tested for patients under their direct care.	The method is particularly designed to test higher order thinking and synthesis as it allows assessors to explore deeper understanding of how trainees compile, prioritise and apply knowledge.
Quality improvement review	5-point Likert scale across 10 items	Single rater per assessment Multiple assessments	High authenticity as assessment is of a real quality improvement review.	Self-reflection on areas for improvement.
DOPS	Observed technical skills are rated as satisfactory or unsatisfactory	Single rater per assessment Multiple assessments	Low authenticity as skills are assessed in isolation.	More appropriate to Basic Surgical Training, although may still be applicable in assessing more advanced skills, such as endoscopy. Satisfactory performance allows trainees to perform complete procedures, which are assessed by PBAs.
PBA	Validated tool	Validated tool Single rater per assessment Multiple assessments	Validated tool High authenticity as procedure is performed on a real patient. Satisfactory performance indicates trainee is competent to perform the procedure independently.	Trainees should show progression, and eventually achieve 'satisfactory' standards across all items in all index procedures.
Presentation skills	5-point Likert scale across 7 items. Raters are senior trainers.	Single rater per assessment Multiple assessments	High authenticity. Reflects perceptions of effective presentation skills.	Self-reflection on areas for improvement.
NoTSS	Validated tool	Validated tool Single rater per assessment Multiple assessments	Validated tool High authenticity as used in real operating room interactions.	Trainees should consistently achieve 'satisfactory' standards across all domains assessed, over multiple assessments. Remedial action needed for poor performance.

	Validity Inference			
Tools	**Scoring**	**Generalisation**	**Extrapolation**	**Implications/ decision**
Multisource feedback	5-point Likert scale across 3 domains (20 items). Raters: Supervisors, trainers, peers, nursing staff, other healthcare workers	Single rater per assessment Multiple assessments	Reflects interactions and perceptions of performance in the workplace, at multiple levels.	Self-reflection on areas for improvement.

The Assessment Framework

The specialty specific syllabi specify the knowledge, skills and performance required for different stages of training and is underpinned by patient safety. The professional behaviour and leadership skills syllabus specifies the standards for patient safety; communication, partnership and team-working and maintaining trust.

Nature of Assessment

Assessments can be categorised as for or of learning, although there is a link between the two.

Assessment for Learning - Is primarily aimed at aiding learning through constructive feedback that identifies areas for development. Alternative terms are Formative or Low-stakes assessment. Lower reliability is acceptable for individual assessments as they can and should be repeated frequently. This increases their reliability and helps to document progress. Such assessments are ideally undertaken in the workplace.

Assessments for learning are used in the curriculum as part of a developmental or ongoing teaching and learning process and **mainly comprise of workplace-based assessments**. They provide the trainee with educational feedback from skilled clinicians that should result in reflection on practice and an improvement in the quality of care. Assessments are collated in the learning portfolio and are regularly reviewed during each placement, providing evidence for the judgement of the Assigned Educational Supervisors' (AES) reports to the Programme Director and the ARCP. Assessments for learning therefore contribute to summative judgements of the trainee's progress.

Assessment of Learning - Is primarily aimed at determining the level of competence to permit progression training or certification. Such assessments are undertaken infrequently (e.g. examinations), and must have high reliability as they often form the basis of decisions. Alternative terms are Summative or High-stakes assessment.

Assessments of learning in the curriculum are focused on the waypoints in the specialty syllabi. For the most part these comprise of **the examinations, structured AES's end of placement reports and some courses,** which taken in the round, cover the important elements of the syllabus and ensure that no there are no gaps in achievement. They are collated at the ARCP panel, which determines progress or otherwise.

The balance between the two assessment approaches principally relates to the relationship between competence and performance. Competence (can do) is necessary but not sufficient for performance (does), and as trainees' experience increases so performance-based assessment in the workplace becomes more important.

Assessment Tools

Learning Agreements

Each trainee will be assigned an Educational supervisor and a series of trainers/rotational supervisors throughout the programme. The rotational learning agreement is a document that details the objectives of a training placement, and the goals the trainee intends to achieve, within a specified period, as guided by the curriculum. The learning agreement should be signed by the responsible trainer/rotational supervisor within the training centre, as well as the trainee, before the training period starts. It encourages trainees to take responsibility for their own learning process, and to take the initiative to discover the best methods of learning.

The goals and objectives documented in the learning agreement are to help trainees gain a better understanding of their own strengths and limitations, obtain a better appreciation of the values and attitudes that would be obtained from a particular setting, and develop an increased commitment to the learning process.

The learning agreement is a structured [written] document, that is personalised during the learning agreement meeting between the trainer and the trainee. It outlines the tangible objectives for the placement. They should include:

- Learning objectives
- Resources for achieving learning objectives
- Timeline for achieving learning objectives
- Providing evidence that learning objectives have been met
- Stating how the evidence of the learning objectives would be validated

Learning agreements can be general or specific [rotational]. A general learning agreement identifies the overall expected competency attainment by the end of the programme, and is usually agreed upon by the trainee and Programme Director/Local Programme Administrator/Educational Supervisor. Trainees will also be expected to agree on specific goals and objectives for each placement with their trainer in that specific placement. Both overall and specific/rotational learning agreements should be matched to the curriculum.

Learning agreements should include expectations of achievements in the index procedures, (which are detailed in the syllabus). The index procedures were selected based on the transferability of skills required, and feasibility in terms of learning opportunities.

The learning agreement is discussed and agreed upon by the trainer and the trainee. It is then signed, and copies are kept by each party. The agreement is reviewed at six-monthly intervals, to allow better learning outcomes for the trainee and effective trainer and trainee feedback.

Trainee Evaluation Form (Supervisor's Report)

1. A Trainee's performance must be regularly reviewed by the supervisor. The supervisor must conduct a performance assessment meeting with the trainee halfway through and at the end of each rotation to discuss the completed Trainee Evaluation report performance.
2. The meeting, where possible, should reflect a consensus view of the consultant surgeons/trainers within the unit. In order to obtain this information, it is advised that the supervisor meets with the other surgeons within the unit. The consensus view will also be used to assist the supervisor in completing the Trainee Evaluation Form. The form must be signed and dated by the Trainee, other relevant trainers and the surgical supervisor.
3. Signing the Trainee Evaluation Form confirms the Supervisor's report has been discussed but does not signify agreement by the Trainee with the assessment.

4. Completion of the Trainee Evaluation on the prescribed form must be completed and submitted for each Trainee in an accredited clinical training position as communicated by the Secretariat.
5. Areas of performance identified as being unsatisfactory in the report, will be discussed by the Supervisor and Trainee. An appropriate remedial plan will be developed and agreed to. The Supervisor is obliged to inform the Postgraduate Committee of any concerns regarding a Trainee as soon as possible.
6. A Trainee who is not assessed as satisfactory for a term may be placed on probation in accordance with training bodies policy.
7. Supervisor reports needs to be submitted at the end of each rotation.

Workplace Based Assessments

The purpose of workplace based assessment (WBA)

The primary purpose of WBA is for providing short loop feedback between trainers and their trainees – a formative assessment to support learning. They are designed to be ***mainly trainee driven*** but may be trainer initiated. The number of types and intensity of each type of WBA in any single assessment cycle will be initially determined by the Learning Agreement created at the beginning of a training placement, and should be regularly reviewed. The intensity may be altered to reflect progression and trainee need. For example, a trainee in difficulty would undertake more frequent assessments above an agreed baseline for all trainees. In that sense WBAs meet the criterion of being adaptive.

These are designed to:

Provide feedback to trainers and trainees as part of the learning cycle

The most important use of the workplace-based assessments is in ***providing trainees with formative feedback*** to inform and develop their practice. Each assessment is scored only for the purpose of providing meaningful feedback on one encounter. The assessments should be viewed as part of a process throughout training, enabling trainees to build on assessor feedback and chart their own progress. Trainees should complete more than the minimum number identified.

Provide formative guidance on practice

Surgical trainees can use different methods to assess themselves against important criteria (especially that of clinical reasoning and decision-making), as they learn and perform practical tasks. The methods also encourage dialogue between the trainee and assigned educational supervisor (AES) and other clinical/rotational supervisors.

Encompass the assessment of skills, knowledge, behaviour and attitudes during day-to-day surgical practice

Workplace-based assessment is trainee led; the trainee chooses the timing, the case and assessor under the guidance of the rotational supervisor via the rotational learning agreement. It is the trainee's responsibility to ensure the completion of the required number of the agreed types of assessments by the end of each placement.

Provide a reference point on which current levels of competence can be compared with those required at the end of a particular stage of training

The primary aim is for trainees to use assessments throughout their training programmes to demonstrate their learning and development. At the start of a level it would be normal for trainees to have some assessments which are less than satisfactory as their performance is not yet at the

standard for the completion of that level. In cases where assessments are less than satisfactory, trainees should repeat assessments as often as required to show progress.

Inform the (summative) assessment of the AES at the completion of each placement
Although the principal role of a workplace assessment is formative, the summary evidence will be used to inform the annual review process and will contribute to the decision made as to how well the trainee is progressing.

Contribute towards a body of evidence held in the learning portfolio and made available for the annual review of competence progression panel and planned educational reviews
At the end of a period of training, the trainee's entire portfolio will be reviewed. The accumulation of formative assessments will be one of a range of indicators that inform the decision as to satisfactory completion of training at the annual review of competence progression.

CBD Case Based Discussion

The CBD is designed to ***assess clinical judgement, decision-making and the application of medical knowledge*** in relation to patient care in cases for which the trainee has been directly responsible. The method is particularly designed to test higher order thinking and synthesis as it allows assessors to explore the deeper understanding of how trainees compile, prioritise and apply knowledge. The CBD is not focused on the trainees' ability to make a diagnosis nor is it a viva-style assessment.

The process is a ***structured, in-depth discussion between the trainee and assigned rotational supervisor about how a clinical case was managed by the trainee;*** talking through what occurred, considerations and reasons for actions. By using clinical cases that offer a challenge to the trainee rather than routine cases, the trainee is able to explain the complexities involved and the reasoning behind choices they made. It also enables the discussion of the ethical and legal frameworks of practice. It uses patient records as the basis for dialogue, for systematic assessment and structured feedback. As the actual record is the focus for the discussion, the assessor can also evaluate the quality of record keeping and the presentation of cases.

Most assessments ***take no longer than 15-20 minutes***. After completing the discussion and filling in the assessment form, the assigned rotational supervisor should provide immediate feedback to the trainee. Feedback would normally take about 5 minutes.

CEX Clinical Evaluation Exercise

The CEX is a method of ***assessing skills essential to the provision of good clinical care*** and to facilitate feedback. It assesses the trainees' ***clinical and professional skills*** on the ward, on ward rounds, in Accident and Emergency, or in outpatient clinics.

Trainees will be assessed on different clinical problems that they encounter from the curriculum in a range of clinical settings. Trainees are encouraged to choose a different assessor for each assessment but one of the assessors must be the current assigned rotational supervisor. Each assessor must have expertise in the clinical problem.

The assessment involves observing the trainee interact with a patient in a clinical encounter. The areas of competence covered include: ***history taking, physical examination, professionalism, clinical judgement, communication skills, organisation/efficiency and overall clinical care***. Most encounters should take between 15-20 minutes.

Assessors do not need to have prior knowledge of the trainee. The assessor's evaluation is recorded on a structured checklist that enables the assessor to provide developmental verbal feedback to the trainee immediately after the encounter. Feedback would normally take about 5 minutes.

PBA Procedure-based Assessments

PBAs assess trainees' ***technical, operative and professional skills*** in a range of specialty procedures or parts of procedures during routine surgical practice up to the level of CCT. PBAs provide a framework to assess practice and facilitate feedback in order to direct learning.

The assessment method uses two principal components:

1. A ***series of competencies*** within six domains. Most of the competencies are common to all procedures, but a relatively small number of competencies within certain domains are specific to a particular procedure.
2. A ***global assessment*** that is divided into four levels of overall global rating. The highest rating is the ability to perform the procedure to the standard expected of a specialist in practice in Malaysia (the level required for the Certificate of Completion of Training - CCT).

The assessment form is supported by a worksheet consisting of descriptors outlining desirable and undesirable behaviours. These assist the assessor in deciding whether or not the trainee has reached a satisfactory standard for CCT, on the occasion observed, or they require further development.

The procedures chosen should be representative of those that the trainee would normally carry out at that level and will be one of an indicative list of index procedures relevant to the specialty. The trainee generally chooses the timing and makes the arrangements with the assessor. Usually the assessor will be the trainee's assigned rotational supervisor, but it is anticipated that other surgical consultants will take on the assessment of certain procedures depending on the trainee's work pattern. Trainees are encouraged to request assessments on as many procedures as possible with a range of different assessors.

Assessors do not need to have prior knowledge of the trainee. The assessor will observe the trainee undertaking the agreed sections of the PBA in the normal course of workplace activity (usually scrubbed). Given the priority of patient care, the assessor must choose the appropriate level of supervision depending on the trainee's stage of training. Trainees will carry out the procedure, explaining what they intend to do throughout. The assessor will provide verbal prompts, if required, and intervene if patient safety is at risk.

DOPS Direct Observation of Procedural Skills in Surgery

DOPS is used to ***assess the trainees' technical, operative and professional skills*** in a range of basic diagnostic and interventional procedures, or parts of procedures, during routine surgical practice and facilitate developmental feedback. DOPS is used in simpler environments and procedures and can take place in wards or outpatient clinics as well as in the operating theatre.

The DOPS form can be used routinely every time the trainer supervises a trainee carrying out one of the specified procedures, with the aim of making the assessment part of routine surgical training practice. The procedures reflect the index procedures in each specialty syllabus in the initial stage, which are routinely carried out at the trainees' workplace.

The assessment involves an assessor observing the trainee perform a practical procedure within the workplace. Assessors do not need to have prior knowledge of the trainee. The assessor's evaluation is recorded on a structured checklist that enables the assessor to provide verbal developmental feedback to the trainee immediately afterwards. Trainees are encouraged to choose a different assessor for each assessment but one of the assessors must be the current assigned rotational supervisor. Most procedures take no longer than 15-20 minutes. The assessor will provide immediate feedback to the trainee after completing the observation and evaluation. Feedback would normally take about 5 minutes.

The DOPS form is scored for the purpose of providing feedback to the trainee. The overall rating on any one assessment can only be completed if the entire procedure is observed. A judgement will be made at completion of the placement as to the overall level of performance achieved in each of the assessed surgical procedures.

The following are example of skills that can be assessed by DOPS:

- Central venous line insertion
- Closure of median sternotomy
- Closure of thoracotomy
- Dissection of internal mammary artery
- Exposure and mobilisation of saphenous vein
- Harvesting of radial artery
- Incision and closure of thoracotomy or sternotomy (skin and subcutaneous tissue only)
- Incision of chest drain
- Median sternotomy
- Port placement and management during VATS
- Thoracotomy

Procedure/Surgical Logbook

The procedure/surgical logbook enables the trainee to record each surgical operative procedure undertaken. The logbook provides a record of the scope and volume of operative exposure and level of supervision required. It is seen as corroborative evidence of the experience of the trainee gained in carrying out surgical procedures when discussing progress during placements with the assigned rotational supervisor, and during the planned educational reviews and at the Annual Review of Competence Progression (ARCP), (see ARCP in the Documentation section below).The logbook conforms to the Data Protection Act.

The Observation of Teaching (optional workplace-based assessment)

The Observation of Teaching form provides formative feedback to trainees as part of the ongoing culture of reflective learning that workplace-based assessments seeks to develop. It is an optional tool to facilitate assessment of instances of teaching as and when they arise.

The form is intended for use in assessing any example of teaching by a trainee that is directly observed by the assessor. This must be in a formal situation where others are gathered specifically to learn from the speaker, but does not include bedside teaching or other occasions of teaching in the presence of a patient. Assessors may be any surgeon with suitable experience to review the teaching event, it is likely these will be consultants for trainees in higher specialty levels. As this form is optional, there is no minimum number of assessments required.

The Assessment of Audit (optional workplace-based assessment)

The Assessment of Audit reviews a trainee's competence in completing an audit. Like all Workplace-based assessments, it is intended to support reflective learning through structured feedback.

The assessment can be undertaken whenever an audit is presented or otherwise submitted for review. It is recommended that more than one assessor takes part in the assessment, and this may be any surgeon with experience appropriate to the process. Assessors do not need any prior knowledge of the trainee or their performance to date, or need to be the trainee's currently assigned Rotational Supervisor.

Verbal feedback should be given immediately after the assessment and should take no more than five minutes to provide. A summary of the feedback with any action points should be recorded on the Assessment of Audit form and uploaded into the trainee's portfolio.

MSF Peer Assessment Tool (360^0)

The MSF, also known as 360° or peer assessment, is a method of assessing professional competence within a team-working environment and providing developmental feedback to the trainee. Trainees should complete the MSF a minimum of once a year. The trainee's AES may request further assessments if there are areas of concern at any time during training. The MSF should be undertaken in the third month of the first four-month placement in a training year, in the fifth month of the first six-month placement in a training year or in the fifth month of a one-year placement. This allows time for raters to submit their online assessments and the generation of a trainee's personalised assessment chart for discussion with the AES before the end of the placement, and for a further MSF to be performed before the end of the training year, if required.

Surgical trainees work as part of a multi-professional team with other people who have complementary skills. Trainees are expected to understand the range of roles and expertise of team members in order to communicate effectively and achieve a high quality service for patients. MSF comprises a self-assessment, and assessments of a trainee's performance from a range of co-workers. It uses up to 12 raters with a minimum of 8. Raters are chosen by the trainee and will always include the assigned educational supervisor and a range of colleagues covering different grades and environments (e.g. ward, theatre, outpatients), but not patients.

Feedback is in the form of a peer assessment chart that enables the comparison of the self-assessment with the collated views received from co-workers for each of the 16 competencies including a global rating on a 3 point scale. The competencies map across to the standards of Good Medical Practice and to the core objectives of the curriculum.

The assigned educational supervisor will meet with the trainee to discuss the feedback on performance in the MSF. Trainees are not given access to individual assessments. The method enables serious concerns, such as those about a trainee's probity and health, to be flagged up in confidence to the assigned educational supervisor, enabling appropriate action to be taken. Assigned educational supervisors sign off the trainee's MSF assessment and make comments for the annual review. They can also recommend a repeat MSF.

Target Audience

- Recognised centres of training; Institution of higher learning; Ministry of Health
- Hospital; National Heart Institute (IJN), accredited private hospitals/institutions
- Assessors; Local and international assessors
- Examiners
- Trainers
- Trainees; Those enrolled in Masters/Doctorate of Cardiothoracic Surgery programme; individuals embarking on external examination (i.e., FRCS Cardiothoracic, or equivalent)

Blueprinting

Blueprinting of assessments is the identification of the required competencies, selection of the appropriate tool, and defining the rubrics. In relation to examinations, blueprinting ensures that the examinable components of the relevant syllabi are comprehensively assessed using the appropriate format, to the appropriate level.

Blueprinting to the examination syllabus is performed by the examination vetting committee, which usually comprises of senior consultants with significant experience in setting examination questions. The examination vetting committee is appointed by the relevant authority.

Examinations Syllabus

Examination

Examinations are held towards the end of specialist training. (Details in Assessment section)

Examiners

Examiner Recruitment

This is detailed in the section on Contributors.

Examiner Training

Examiners must have attended a recognised examiner training course. Examiner training courses must include the modules summarised in curriculum, which are delivered through a combination of interactive lectures, small group breakout sessions and simulations.

Examiner Training Modules in the Curriculum

Module	Content
Examination overview	1. History and development Aims, objectives and syllabus 2. Examination structure Marking arrangements 3. Requirements to pass
Characteristics of high-quality assessment	1. Utility 2. Validity 3. Reliability 4. Educational impact 5. Feasibility (practicability) 6. Acceptability
Principles of evaluating higher order thinking	1. Educational domains 2. Assessment tools 3. Mapping of Bloom's taxonomy to higher order thinking skills 4. Mapping of Miller's pyramid to psychomotor skills
Designing questions for scenario-based examinations	1. Crafting questions to test higher order thinking 2. Blueprinting 3. Rubrics
Equality and diversity	1. Protected characteristics 2. Unconscious bias
Examiner behaviour	1. Appropriate examiner behaviour 2. Avoiding and managing challenging examiner behaviours 3. Impact of good and bad examiner behaviours on candidates
Assessing the Academic Paper	1. Format of the examination 2. Critique of the structure 3. Critique of the content
Simulated viva voce	1. Assessing the candidate

Examiner briefing

Examiners should be briefed prior to the start of each set of examinations. It is recommended that examination briefing should include reminders regarding the examination format, marking, pass and fail criteria, as well as neutrality in assessing candidates. It is compulsory for all assessors/examiners to attend the full examination briefing.

Feedback

All the assessments in the curriculum, both those for learning and of learning, include a feedback element. Workplace based assessments are designed to include immediate feedback for learning as part of two-way dialogue towards improving practice. The formal examinations all provide limited feedback as part of the summative process. The rotational supervisor carries out the appraisals at the beginning, middle and end of each placement, using information contained in the portfolio on workplace based assessments and feedback from other trainers in the workplace. Assigned Educational Supervisors are able to provide further feedback to each of their trainees through the regular planned educational reviews.

Educational feedback:

- Enhances the validity of the assessment and ensures trainees receive constructive criticism on their performance
- Is given by skilled clinicians, thereby enhancing the learning process

Constructive formative feedback includes three elements:

- Outline of the strengths the trainee displays
- Suggestions for development
- Action plan for improvement

Feedback is complimented by the trainees reflection on their practice with the aim of improving the quality of care.

Workplace-based assessments will be utilised to ensure that the trainee achieves the required competency and level by the end of each academic year of training. In addition, it is advised that candidates be assessed repeatedly until the competency is satisfactorily achieved by the trainee. The recommended minimum requirement for each of the WBAs is recommended as shown in the table below.

Minimum WBAs required by Year

Year	CEX	CBD	DOPS	PBA
1	2	2	1	1
2	3	3	2	2
3	3	3	3	2
4	3	3	3	3
5	3	3	3	3
6	3	3	4	4

DOCUMENTATION

The Trainee's Portfolio

The primary purpose of the trainee's portfolio is to collate the evidence of the trainee's competence and fitness to practice. It serves as a record of evidence that the trainee is progressing and meeting the requirements of the curriculum.

Candidates are expected to possess and include the following documents in their portfolio. Documents will be verified at the beginning of each stage of training and at the regular six-monthly evaluations.

Statutory requirements

1. Copy of APC
2. Copy of medical indemnity certificate

Evidence of academic achievement

1. Workshop/conference/seminar attendance certificates
2. Poster presentations
3. Oral presentation abstracts
4. Published scientific paper(s)
5. Examination and thesis defence results

Evidence of clinical competence

1. End-of-posting evaluation forms
2. Clinical progress evaluation forms
3. Research progress evaluation forms
4. Verified log-book and level of operative experience
5. Procedure consolidation sheet
6. Completed case-based reports
7. Work-place based assessments and consolidation sheets

Annual Review of Competence Progression (ARCP)

Purpose of the ARCP

The ARCP is a formal process which scrutinises each surgical trainee's suitability to progress to the next stage of, or complete, the training programme. It follows on from the appraisal process and bases its recommendations on the evidence that has been gathered in the trainee's learning portfolio during the period between ARCP reviews. The ARCP records that the required curriculum competences and experience are being acquired, and at an appropriate rate. It also provides a coherent record of a trainee's progress. The ARCP is not in itself an assessment exercise of clinical or professional competence.

The ARCP should normally be undertaken on at least an annual basis for all trainees in surgical training. An ARCP panel may be convened more frequently if there is a need to deal with progression issues outside the normal schedule. The Board of Studies monitors the information documented in order to ensure the quality of training being delivered by the programme and/or its components.

Preparation for the ARCP The trainee's learning portfolio provides the evidence of progress. It is the trainee's responsibility to ensure that the documentary evidence is complete in good time for the ARCP. The Annual Review Checklist lists the components that should normally be completed in time for the panel meeting.

The ARCP Panel

Please note that during the time of the panel meeting, members of an ARCP panel will have access to the portfolios of the trainees they review. Panel members are likely to include the following:

- Chairman of the Board of Studies Postgraduate Cardiothoracic Surgery Programme
- Programme Directors
- International Board Members
- Assigned educational supervisors (including AESs who have not been directly responsible for the trainee's placements)
- Parallel Pathway Committee representative
- MATCVS representative
- University Board of Studies representative
- IJN representative
- Ministry of Health representative

ARCP Outcomes

1	Trainee is achieving progress and competencies at the expected rate
2	Development of specific competencies required – additional training time not required
3	Inadequate progress by the trainee – additional training time required
4	Released from training programme with or without specified competencies
5	Incomplete evidence presented – additional training time may be required
6	Gained all required competencies; will be recommended as having completed the training programme and for an award of a completion of training

DISCIPLINE AND SUPPORT

Overview

Discipline and support are normally guided by the rules and regulations of individual training universities or professional bodies.

The Underperforming Trainer

A trainer may underperform in the following areas:

1. Knowledge
2. Technical skills
3. Non-technical skills
4. Personal or professional conduct - including, but not limited to, discrimination, bullying, sexual harassment and harassment.

This may be identified from:

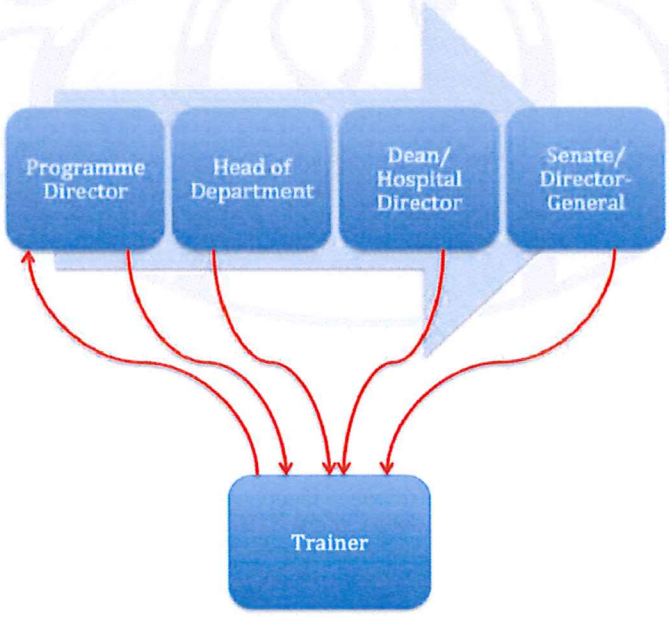
1. Feedback - from trainees and colleagues
2. Audit
3. Formal complaints

Reasons may be multi-factored, and can include heavy workloads, inadequate training and facilities, illness, social or financial constraints.

It is the programme director's responsibility to perform the following:

1. Initial investigation to confirm if there is a problem
2. Provide written constructive feedback to the trainer
3. Recommend remedial measures
4. Report to higher authorities
5. Review performance after remedial measures

The disciplinary workflow can be summarised as follows:



The Underperforming Trainee

Formative assessments may reveal trainees as underperforming in the following areas:

1. Knowledge
2. Technical skills
3. Non-technical skills
4. Personal or professional conduct

Reasons may be multi-factored, and can include heavy workloads, inadequate supervision, inadequate facilities, illness, social or financial constraints.

It is the programme director's responsibility to perform the following:

1. Initial exploration, to confirm if there is a problem
2. Provide written constructive feedback to trainee and trainer

The Trainee in Difficulty

A trainee who continues to underperform, (e.g., in three consecutive three-month postings with different trainers), or has a formal complaint brought against them, is considered to be in difficulty. This may refer to:

1. Trainees who are failing to make satisfactory progress overall or have specific training deficits
2. Trainees who may require transient additional support for reasons stated in the section above
3. Trainees with serious personal or professional conduct issues

It is the programme director's responsibility to initiate a formal enquiry. Formal enquiries should be conducted at the following levels, depending on severity of difficulty:

Level 1 - Division / Department level

Level 2 - Institutional level

Level 3 – Governing body level

Relevant stakeholders, (e.g., trainee, trainer, programme director, sponsors, employers etc.) should be notified of the enquiry results by the Chair of the respective enquiry panels.

LINKS TO OTHER CURRICULA

Introduction

This chapter serves to highlight how this training programme is reliant on the integration with other specialties and training programmes. For a more holistic approach to training in cardiothoracic surgery, links have been formed to facilitate transfer of knowledge and skills between the different stages and providers of healthcare services.

CURRICULUM (Training Programme)	Nature of Relationship	Cardiothoracic Surgery Expectation	Anticipated Problems	Strategies & Solutions
Undergraduate	Dependent	Knows common cardiothoracic conditions Able to take history and perform physical examination (basic)	Unable to influence quality of training especially overseas graduates	Establish clarity in curriculum
House Officer	Dependent	Manage simple inpatient care Able to perform basic surgical procedures (e.g. T&S, I&D)	Too many HO – not enough exposure to patient care	Open up more HO training centres
Medical Officer	Dependent	Able to perform simple general procedures i.e. chest tube insertion Manage in- and outpatients including emergencies	Lack of supervision Poor awareness of limitations Unclear of how to advance oneself to enter cardiothoracic training programme	Closer monitoring and guidance Make entry criteria clear in curriculum so future applicants will be aware of requirements and will know how to proceed
Rehabilitation Medicine	Service provider, interdependent	Provide services to improve patient function and recovery	Provide services to many disciplines Shortage of Rehab Physicians	Establish more Rehab hospitals around the country
Physiotherapy & Occupational Therapy	Service provider	Provide services to improve patient function and recovery including return to work	Busy department, may not be able to provide focused care	Increase numbers of therapists

CURRICULUM (Training Programme)	Nature of Relationship	Cardiothoracic Surgery Expectation	Anticipated Problems	Strategies & Solutions
Biomedical Imaging	Service provider, interdependent	Provide good, clear radiological images for diagnosis and planning Radiologist who is well-versed in cardiothoracic pathology and imaging modalities	Unable to influence quality of radiographers	Establish clarity in curriculum for radiographers
Anaesthesiology Intensivist	Service provider, interdependent	Provide perioperative anaesthesia care – include critical care and pain management	Provide services to many surgical disciplines	Increase numbers of Anaesthesiologists, services may also be improved with subspecialty training and training in regional anaesthesia (e.g. blocks)
Pathology	Service provider, interdependent	Provide fast and accurate histological diagnosis for most cardiothoracic conditions	Diagnostic accuracy is dependent on the experience and expertise of the pathologist who is reporting	Improve quality of training including communication with clinicians
Internal Medicine Cardiology Respiratory Medicine Paediatrics Nephrology Neurology Oncology Surgery General Surgery Vascular Surgery Orthopaedic Surgery Plastic Surgery	Service provider, interdependent Service provider Interdependent	Manage patient co-morbidities, especially crucial in peri-operative period Manage patient comorbidities especially crucial perioperative period	Busy specialty that is very subspecialised	Build rapport Cardiothoracic Surgery needs to familiarise self to manage the acute situations (e.g. high blood glucose, single high BP reading) while awaiting physician review. Centre should provide all relevant surgical specialty services in order to optimise perioperative care

CURRICULUM (Training Programme)	Nature of Relationship	Cardiothoracic Surgery Expectation	Anticipated Problems	Strategies & Solutions
Subspecialty Training	We provide training	Offering subspecialised services to patients and training to trainees	Insufficient trainers for some subspecialty training	Appreciation and support from administrators Respect from peers Provide good fellows/subspecialty trainees to train
Technological Development	Semi-dependent	Ease of use/user friendly Economically viable Readily available	Not user friendly Expensive Difficult to obtain	Device training Cost may decrease with volume or as technology advances. Healthcare budget planning Business friendly regulations (e.g. Medical Devices Act, Customs clearance)

Further information can be obtained from the following links:

Malaysian Association for Thoracic and Cardiovascular Society
http://www.matcvs.org.my

Malaysian Examinations Council (Majlis Peperiksaan Malaysia, MPM)
http://portal.mpm.edu.my/documents/10156/bd398004-27d1-4098-a292-a0cc74432d89

Malaysian Medical Council
https://mmc.gov.my

National Specialist Register
www.nsr.gov.my

Continuous Professional Development Electronic Portfolios
https://www.mycpd2.moh.gov.my www.cpd.specialist.gov.my

MMC-CPD Grading System Scoring Schedule
https://mmc.gov.my/wp-content/uploads/2020/06/MMC-CPD-Grading-system.pdf

EXIT CRITERIA

To be considered as having completed specialist training in Cardiothoracic Surgery, ALL of the following criteria must be fulfilled:

Evidence of Completion of Structured Training in Cardiothoracic Surgery; either a, b or c

a. Has completed a structured recognised higher postgraduate specialist cardiothoracic surgical training programme of not less than 6 years recognised by the Malaysian Medical Council and Ministry of Health Malaysia. This programme must be fully compliant to and fulfil all criteria listed in the National Cardiothoracic Surgery Training curriculum endorsed by the National Conjoint Committee for Postgraduate Medical Qualification in Cardiothoracic Surgery.

b. Candidates who have trained via other programmes can be considered after verification of their training to be equivalent to the criteria set by National Curriculum. Copy of programme's full curriculum will need to be submitted for verification and acceptance.

c. Combination of a recognised postgraduate qualification in General Surgery in the NSR **AND** successfully completed structured training in Cardiothoracic Surgery of not less than four (4) years in accredited centre(s) following the training criteria set by the National Curriculum.

Evidence of having **passed the exit examination** of the postgraduate cardiothoracic training programme recognised by the Malaysian Medical Council and Ministry of Health Malaysia, and obtained a recognised qualification in Cardiothoracic Surgery:

a. Fellowship of the Royal College of Surgeons of Edinburgh in Cardiothoracic Surgery (FRCS Ed Cardiothoracic)

b. Fellowship of the Royal College of Surgeons of Ireland in Cardiothoracic Surgery (FRCSI Cardiothoracic)

c. Fellowship of the Royal College of Physicians and Surgeons of Glasgow in Cardiothoracic Surgery (FRCS Glasg Cardiothoracic)

d. Fellowship of the Royal College of Surgeons of England in Cardiothoracic Surgery (FRCS Cardiothoracic)

e. Fellowship of the Royal Australasian College of Surgeons in Cardiothoracic Surgery (FRACS Cardiothoracic Surgery),

f. Fellowship of the Royal College of Physicians and Surgeons of Canada in Cardiac or Thoracic Surgery (FRCSC Cardiac or Thoracic Surgery)

g. American Board of Thoracic Surgery Certification (ABTS Board Certification)

h. Cardiothoracic Surgery final programme exit examination awarded by a local university recognised by the Malaysian Medical Council.

Exit Essential Learning Activities (Exit ELAs)

The Exit ELAs are clinical activities that a trainee should be able to perform independently by the time they graduate from the programme. There are 3 Exit ELAs for Cardiothoracic Surgery:

ELA-1	Coronary Artery Bypass Graft Surgery
ELA-2	Open Lobectomy
ELA-3	Aortic Valve Replacement

The Exit ELAs are assessed through formative (e.g., WBAs, logbook) and summative (final examinations) means. The details of the Exit ELAs can be found in Appendix 4 of this curriculum document.

Certificate of Completion of Training (CCT) (University/ Parallel Pathway)

CCT should be awarded by the individual training programme or body upon completion of the training as stipulated in section 1 and fulfilling all of the following conditions:

	Guidelines for Cardiothoracic Surgery
Clinical experience - evidence of the breath of clinical experience defined in the specialty syllabus	Applicants should have had exposure to both adult cardiac and thoracic surgery. They must be able to demonstrate that they are keeping their knowledge and skills up-to-date. They must also be able to demonstrate applicable knowledge and effective management of the following critical conditions: (1) aortic dissection, (2) stridor, (3) secondary pneumothorax /tension pneumothorax, (4) cardiac tamponade, (5) acute haemothorax, (6) low cardiac output following cardiac surgery, (7) endocarditis-native or prosthetic valve, (8) respiratory failure following thoracic surgery.
Operative experience and competence - consolidated evidence of the breadth of operative experience and competence defined in the specialty syllabus	There are indicative numeric requirements for the number of operations performed. This has been agreed as primary operator in at least 100 open heart surgeries comprising 75 CABGs, 25 valve procedures and 50 thoracic procedures with acceptable outcomes certified by supervisors
Research and Audit- evidence of having met the relevant requirements for research and scholarship. Broadly, this includes: The demonstration of evidence based practice. Understanding how to critically appraise literature and conduct literature searches and reviews. Understanding and applying basic research principles Evidence of an understanding of, and participation in clinical audit or service improvement activity as defined by the specialty	Applicants should have at least 1 publication in medical journal as first author and at least 1 clinical audit.

For NSR registration, all candidates must have completed post qualification supervised working experience in Cardiothoracic Surgery of not less than twelve (12) months in a recognised centre. The training curriculum requirement for NSR registration is in Appendix 2. These procedures should be over and above those performed during the University/ Parallel Pathway training.

The National Specialist Register NSR Certification Guidelines for Cardiothoracic Surgery is provided in Appendix 3.

COMPLIANCE AND MAPPING

Compliance and Mapping to Malaysian Medical Council Standards

In Malaysia, standards for postgraduate training of medical practitioners are set by the Malaysian Medical Council, (MMC), under its Medical Education Committee. Postgraduate programme compliance to these standards is vetted by the Specialty and Sub-Specialty Education Committees. Compliance to standards in the implementation of these programmes is monitored by the National Conjoint Board, Conjoint Specialty and Sub-Specialty Training Committees. The conduits for discussions between MMC and these committees are the Joint Committees on Postgraduate Medical Education and Training (see Section: Contributors).

The areas of the MMC standards can be mapped to the following components of this National Curriculum, as summarised in the table below.

Mapping to MMC standards[1]

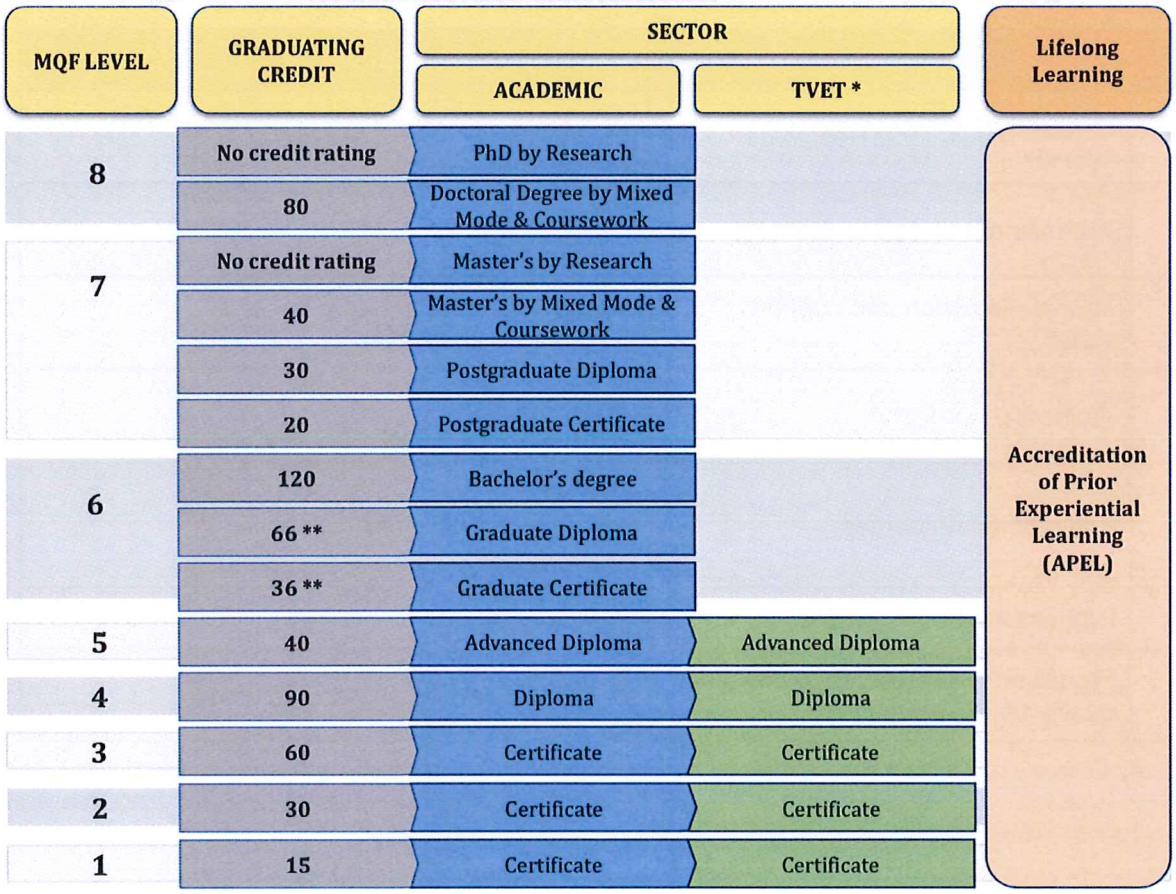
Area	Purpose & Scope	National Curriculum section(s)
1	Programme development and delivery	Overview Contributors
2	Assessment of trainee learning	Exit criteria Assessment
3	Trainee selection and support services	Selection and recruitment Discipline and support
4	Trainers	Contributors Discipline and support
5	Educational resources	Syllabus Learning opportunities Documentation
6	Programme management	Contributors
7	Programme monitoring, review and quality improvement	Quality assurance and accreditation

[1]*Specialty Education Committee of the Malaysian Medical Council. (2020). Malaysian Standards for Medical Specialist Training. Updated 26 February 2020. https://mmc.gov.my/wp-content/uploads/2020/03/26-Feb-2020-Malaysian-Standards-for-Medical-Specialist-Training-Approved-by-Council-18-June-2019.pdf*

Compliance and Mapping to Malaysian Qualifications Framework

The Malaysian Qualifications Agency, (MQA), was officially established in 2007, and developed the Malaysian Qualifications Framework, (MQF) as a basis for quality assurance and accreditation of Malaysian higher education programmes. Higher education programmes are assigned an MQF level according to their purpose, learning outcomes, credits, discipline, type of programme, minimum entry requirement and typical duration, as summarised in MQF Levels figure below. Clinical Master of Cardiothoracic Surgery programmes are currently designated as Level 7, similar to non-clinical Masters programmes. However, the duration and learning outcomes of the Clinical Masters programmes, in line with the National Curriculum, are more in keeping with Level 8 programmes. The MQF learning outcomes clusters are mapped against the National Curriculum in Table **Mapping to MQF Learning Outcome Clusters**[2] below.

MQF Levels[2]



* Technical and Vocational Education and Training ** Inclusive of 6 credits for U1 courses from general studies

[2]*Malaysian Qualifications Framework (MQF) 2nd Edition, updated 2 October 2019*

Mapping to MQF Learning Outcome Clusters[2]

MQF LO Cluster	National Curriculum section (s)
Knowledge and understanding	Exit criteria - Required courses - Essential Learning Activities Syllabus: - Knowledge syllabus: - Assessment
Cognitive skills	Exit criteria - Required courses - Essential Learning Activities Syllabus - Professional behaviours syllabus - Research syllabus Assessment Learning opportunities
Functional work skills	Exit criteria - Required courses - Essential Learning Activities Syllabus - Professional behaviours syllabus - Research syllabus Assessment Learning opportunities
Practical skills	Exit criteria - Required courses - Essential Learning Activities Syllabus: - Skills syllabus Assessment
Interpersonal skills	Exit criteria - Required courses Essential Learning Activities Syllabus - Professional behaviours syllabus - Research syllabus Assessment Learning opportunities
Communication skills	Exit criteria - Required courses - Essential Learning Activities Syllabus - Professional behaviours syllabus - Research syllabus Assessment Learning opportunities
Digital skills	Exit criteria - Required courses - Essential Learning Activities Syllabus - Research syllabus Assessment Learning opportunities

MQF LO Cluster	National Curriculum section (s)
Numeracy skills	Exit criteria - Required courses - Essential Learning Activities Syllabus - Research syllabus Assessment Learning opportunities
Leadership, autonomy and responsibility	Exit criteria - Required courses - Essential Learning Activities Assessment Learning opportunities
Personal and entrepreneurial skills	Exit criteria - Required courses - Essential Learning Activities Syllabus - Professional Behaviours Syllabus - Research syllabus Assessment Learning opportunities
Ethics and professionalism	Exit criteria - Required courses - Essential Learning Activities Syllabus - Professional Behaviours Syllabus - Research syllabus Assessment Learning opportunities

Compliance to Institutional Requirements

Individual institutions offering training programmes may have additional internal requirements which are not stated in this National Curriculum. Programme directors should ensure that these requirements are met.

APPENDICES

Appendix 1: Entry Essential Learning Activities

Entry Essential Learning Activity 1		
Activity	Basic Suturing	
Description	Assessment of Suturing Skills	
All items on the table below are examples, they do not constitute an exhaustive list in any aspect		
Cognitive Knowledge, Facts, Information	**Psychomotor** Do, Practical, Technical Skills	**Affective** Feel, attitudes & values, behaviours displaying underlying values or emotions
Able to describe the anatomy of the skin Discusses the various Types of wounds and their pathophysiology Able to discuss the various Types of sutures and needles and their uses, advantages and disadvantages of choices made Discusses the Principles of debridement Discusses and describe Wound healing on the basis of the pathophysiology, factors contributing to complications Describe the pharmacological role of local anaesthetic agents	Adheres to aseptic techniques from start to completion of procedure Performs cleaning and draping Demonstrates meticulous tissue handling using appropriate debridement technique while securing haemostasis Ensures proper suture placement knot tying techniques Applies appropriate dressing Able to perform basic local block anaesthesia	Ensures that patient is comfortable Discusses and describes the procedure to the patient and relatives Demonstrates empathy during the procedure Provides advise on the care of the wound and the use of any antimicrobials prescribed. Instructs the patient to return if there is a breakdown/infection of the wound. Knows when to ask for help should there be any problem
BEHAVIOURAL MARKERS		
Positive Things that should be done, correct techniques or practices, things a trainee might do right	**Negative** Things that should not be done, incorrect techniques or practices, things a trainee might do wrong	**Negative Passive** Things that may be forgotten or omitted that constitute incorrect or substandard care, things a trainee forget to do
Use of appropriate cleansing solutions and dressing materials Employed universal precautions of Aseptic technique Ensure appropriate local anaesthesia	Injected anaesthetic agent into blood vessel Employed poor soft tissue handling technique Selected the wrong suture material or needle Performed wrong suturing technique	Did not prescribe antibiotics / analgesics appropriately Initiated procedure immediately without allowing the local anaesthetic to take effect Placing sutures too close to each other
Assessment/Evidence		
Surgical Logbook Selection Interview Assessments – Non- interactive OSCE, Interactive OSCE		

Entry Essential Learning Activity 2		
Activity	Insertion of Chest tube	
Description		
All items on the table below are examples, they do not constitute an exhaustive list in any aspect		
Cognitive Knowledge, Facts, Information	**Psychomotor** Do, Practical, Technical Skills	**Affective** Feel, attitudes & values, behaviours displaying underlying values or emotions
Able to discuss the needs for a chest tube insertion Able to demonstrate the safety triangle on the patient Identifies the appropriate size of chest tube for the patient Describes how the underwater seal system works Describes the possible causes of pneumothorax Discusses the pathophysiology of pneumothorax Explains the complications that can occur if the pneumothorax is left untreated	Selects the relevant chest tube size for the presenting pathology Employs aseptic techniques for chest tube insertion Utilises appropriate technique for introduction of local anaesthesia Selects the appropriate skin blade to be used Performs incision using the skin blade over the safety triangle Performs muscle splitting technique using a large dissector above the rib till the pleura is breeched Anchor the chest drain with appropriate suturing technique	Ensures that patient is comfortable Discusses and describes the procedure to the patient and relatives Demonstrates empathy during the procedure Provides advise on the care of the chest tube and the use of any antimicrobials prescribed. Instructs the patient to return if there is a breakdown/infection of the wound on discharge. Knows when to ask for help should there be any problem
BEHAVIOURAL MARKERS		
Positive Things that should be done, correct techniques or practices, things a trainee might do right	**Negative** Things that should not be done, incorrect techniques or practices, things a trainee might do wrong	**Negative Passive** Things that may be forgotten or omitted that constitute incorrect or substandard care, things a trainee forget to do
Confirms pathology/ diagnosis using chest x ray Identifies safety triangle boundaries accurately Selects the correct size of chest tube for the relevant pathology Inserts the chest tube on the top of the rib Chest tube to be anchored well with appropriate size sutures Connects tube appropriately to under water seal bottle Able to check the water level at the underwater seal to be at the appropriate mark to facilitate drainage	Fails to look at chest x-ray Fails to identify the appropriate site that requires the chest tube Unable to identify the safety triangle boundaries Selects the wrong size of chest tube Failure to identify if the chest tube is not in the pleural space Failure to anchor chest drain properly Failure to identify if the chest tube has caused complications like injury to intercostal artery or lungs	Failure to obtain informed consent Failure to give local anaesthesia Did not check the underwater seal system and did not ensure the safe height of the water level Did not clamp the chest drain upon insertion into the pleural space
Assessment/Evidence		
Surgical Logbook Interactive OSCE during selection process		

Entry Essential Learning Activity 3		
Activity	Taking Informed Consent	
Description		
All items on the table below are examples, they do not constitute an exhaustive list in any aspect		
Cognitive Knowledge, Facts, Information	**Psychomotor** Do, Practical, Technical Skills	**Affective** Feel, attitudes & values, behaviours displaying underlying values or emotions
Discusses the relevant condition that the patient has Discusses the procedure that requires an informed consent Discusses the indication for the procedures, complications or implications that may result from the procedure Discusses alternative treatment or procedure if available Ascertain the legal age and clinical condition of the patient that can give informed consent and knows what other alternatives there are	Proper documentation of the whole process of consent taking in the patient's medical record Able to explain in simple terms regarding the procedure and its complications Illustrate with drawing or diagrams to facilitate visual understanding for patient and next of kin Discusses with the patient and next of kin their views and concerns	Ensures that patient is comfortable Demonstrates appropriate communication skills Demonstrates empathy towards patient and family during consent taking Is non-judgmental during consent taking Demonstrates cultural sensitivity when counselling Able to offer treatment options according to guidelines Acknowledges the limitation in explaining the procedure and seeks for help when needed
BEHAVIOURAL MARKERS		
Positive Things that should be done, correct techniques or practices, things a trainee might do right	**Negative** Things that should not be done, incorrect techniques or practices, things a trainee might do wrong	**Negative Passive** Things that may be forgotten or omitted that constitute incorrect or substandard care, things a trainee forget to do
Have good communication skills and use of simple language Make sure the patient understands the explanation given to them prior to giving their consent	Uses of medical jargon and unable to simplify the discussion Unable to clearly talk about the procedure and creates confusion for the patient and family Very self-involved and never gives a chance for the patient or family to talk Creates confusion in the consent taking by giving contradictory facts regarding the procedure or complications	Failure to explore the patient's ideas, concerns and expectations Taking consent for a procedure they have not done or seen
Assessment/Evidence		
PBAs and DOPS Clinical OSCE		

Appendix 2: Surgeries

Cardiac Surgeries

- Coronary Artery Bypass Grafting (CABG), either alone or in combination with another procedure such as valve / replacement
- Valve repair/ replacement either alone or in combination with CABG or any other cardiac procedure
- Other major cardiac surgical cases involving cardiopulmonary bypass (CPB), such as excision of atrial myxoma or pericardiectomy
- Any common congenital cardiac procedure (atrial septal defect (ASD), VSD closure, patent ductus arteriosus (PDA) ligation etc)

Thoracic Surgeries

- Anatomical lung resection (video assisted thoracoscopic surgery/open)
- Decortication
- Thoracotomy for trauma
- Chest wall resection and reconstruction
- Surgery of secondary pneumothorax (VATS/open)
- Mediastinal Mass management /resection
- Emergency pericardial drainage

Appendix 3: National Specialist Register NSR Certification Guidelines for Cardiothoracic Surgery

NSR Registration Procedures and Guidelines

Introduction

The Medical Act 1971 (Amendment) 2012 and Medical Regulations 2017 came into force on 1st July 2017. The amended Act provides that all doctors must be fully registered under this Act to practice as a specialist. The Malaysian Medical Council has established the National Specialist Register to keep the database of specialist medical practitioners in the country. Only medical practitioners on the Specialist Register can practice in the registered specialty.

The Regulatory requirements for entry in the Specialist Register are as follows:

Section 14A: Registered Medical Practitioner Practicing As Specialist

1. No person whose name has not been entered into the Register shall practice as a specialist in that specialty.
2. Any person who contravenes subsection (1) shall be subjected to disciplinary jurisdiction of the Council.

Section 14B: Person entitled to registration as a specialist

A person is entitled to be registered as a specialist under this Act if –

a. they has been fully registered under section 14;

b. they has attended specialised training in that specialty in a recognised training institution;

c. they holds a recognised specialist qualification; and

d. they has proven to the satisfaction of the MMC that he is fit and is of good character.

Section 14C: Registration as Specialist

1) The Council may consider the application made under subsection 18(1) and may require the applicant to produce information or documents in support of the application.

2) Where the Council decides to approve the application, the Council directs the Registrar to **enter the applicant's name in the Register**;

   a. The Council may refuse to register any such person as it thinks fit;

   b. Where the Council refuses to register the applicant under subsection (3), the Council shall immediately serve a notice of refusal to the applicant, together with reasons thereof

Evaluation Committee for Specialist Medical Qualifications (ECSMQ)

The Evaluation Committee for Specialist Medical Qualifications has been established by the Malaysian Medical Council to consider all applications for specialist registration. Specialty Subcommittees (SSCs) have been established for the respective specialties to assist the Evaluation Committee in their evaluation. Members of the Evaluation Committee for Cardiothoracic Surgery will be nominated by the Executive Council of MATCVS, through the Academy of Medicine of Malaysia, and the Head of Cardiothoracic Services of the Ministry of Health, through consultations with various stakeholders. All applications for registration shall be evaluated for consideration by the relevant SSCs which will then make recommendations to the Evaluation Committee. The Specialty Subcommittee (SSC) may stipulate any additional conditions, including training/work experience/interview, on the applicant if deemed necessary.

The function of the ECSMQ shall include:

- Considering applications for specialist registration
- Making recommendations to the Council, including such conditions and restriction as it deems necessary, for registration as a specialist under Section 14C of the Act.
- Requesting applicants to produce further information or documents where necessary to support the applications.

Procedures for Specialist Registration

Medical practitioners who seek to be registered with the NSR shall apply in the prescribed form accompanied with relevant certified documents to the NSR Secretariat and paid the registration fee to the MMC.

The onus is on the applicant to approach the relevant professional licensing authority to submit the relevant certificates and letter of good standing directly to the NSR Secretariat.

The applicant may request to be registered in a specialty that is recognised by the Council.

The NSR Secretariat shall validate all documents submitted by the applicants with the sources e.g., medical regulatory authority, universities, referees, etc., and is at liberty to make all the necessary inquiries with the said sources.

The NSR secretariat shall process all applications and those which are complete shall be forwarded to the respective SSCs.

Appendix 4: Exit Essential Learning Activities

Exit Essential Learning Activity 1		
Activity	Coronary Artery Bypass Graft Surgery	
Description		
All items on the table below are examples, they do not constitute an exhaustive list in any aspect		
Cognitive Knowledge, Facts, Information	**Psychomotor** Do, Practical, Technical Skills	**Affective** Feel, attitudes & values, behaviours displaying underlying values or emotions
Ability to diagnose coronary artery disease based on history, physical examination, ECG and cardiac biomarkers Able to identify risk factors for coronary artery disease Discusses pathophysiology of coronary artery disease and its complications Ability to order relevant investigation based on patient's risk stratification Ability to interpret echo, coronary angiogram findings Describes coronary artery anatomy and its variation Differentiates stable coronary artery disease and acute coronary syndrome Employs best mode of revascularisation strategy based on angiogram findings and patient profile in line with current guidelines and evidence Discusses the evidence for selecting the right conduit according to the patient's profile	Able to demonstrate conduit assessment Able to harvest conduits – Left internal mammary artery, Long saphenous vein and radial artery Handles tissues safely and appropriately Demonstrates safe practice for initiation of cardiopulmonary bypass Selects suitable target vessel for coronary artery bypass graft and doing the coronary arteriotomy safely Employs anastomosis technique using the appropriate suture and technique for distal and proximal anastomosis Able to wean off cardiopulmonary bypass safely	Able to explain the indication for the surgery to the patient Able to listen to patients concerns and thoughts Obtain an informed consent for Coronary Artery Bypass Graft Ability to work in a team Able to keep calm in moments of stress Must be aware of their own limitations and able to seek help when needed

Exit Essential Learning Activity 1		
BEHAVIOURAL MARKERS		
Positive Things that should be done, correct techniques or practices, things a trainee might do right	**Negative** Things that should not be done, incorrect techniques or practices, things a trainee might do wrong	**Negative Passive** Things that may be forgotten or omitted that constitute incorrect or substandard care, things a trainee forget to do
Able to identify the coronary artery that needs to be bypass based on angiogram findings Coronary arteriotomy is done to match the conduit size Ability to harvest conduit safely without damaging them Correct suture placements and distance during distal and proximal anastomosis	Wrong coronary artery vessel that is being bypassed Coronary arteriotomy not opened centrally and injuring the posterior wall Mismatch of conduit and coronary arteriotomy opening Handling the conduit roughly leading to damage of the conduits Did not call for help when in trouble Failure to anticipate a difficult case	Failure to obtain informed consent Failure to explain the procedures, limitations, possible outcomes to patient and family Failure to look at coronary angiogram prior to surgery
Assessment/Evidence		
Surgical Logbook PBAs, DOPS		

Exit Essential Learning Activity 2		
Activity	Open Lobectomy	
Description		
All items on the table below are examples, they do not constitute an exhaustive list in any aspect		
Cognitive Knowledge, Facts, Information	**Psychomotor** Do, Practical, Technical Skills	**Affective** Feel, attitudes & values, behaviours displaying underlying values or emotions
Able to take history and examine a patient with lung cancer Able to employ suitable diagnostic modality and investigation in a patient with a mass in the lung Able to interpret lung function test Able to calculate the remaining lung function following a lobectomy Discusses the staging and staging modalities for lung cancer and the treatment for each stage Able to interpret CT scan and PET CT scan and relate it to the stage of the disease Describes the anatomy of the pulmonary vasculature and airway Describes the anatomy of the mediastinal lymph nodes Describes the surgical approaches that are available for lobectomy	Able to perform posterolateral thoracotomy Dissects the pulmonary artery vessels safely Able to identify the vessels supplying the lobe that is required to be removed Able to identify the pulmonary vessels and bronchus of the lobe to be removed Selects the correct size stapler for the different type of tissues Utilises the stapler devices safely as required Able to perform systematic mediastinal lymph node dissection Able to perform closure of the thoracotomy successfully Able to deliver the appropriate local anaesthesia over the intercostal space and skin	Ability to explain the indication for the surgery to the patient with empathy Able to listen to concerns and thoughts of the patient Obtains an informed consent for the lobectomy Ability to work in a team Able to keep calm in moments of stress Must be aware of their own limitation and able to seek for help when needed
BEHAVIOURAL MARKERS		
Positive Things that should be done, correct techniques or practices, things a trainee might do right	**Negative** Things that should not be done, incorrect techniques or practices, things a trainee might do wrong	**Negative Passive** Things that may be forgotten or omitted that constitute incorrect or substandard care, things a trainee forget to do
Assesses the preoperative imaging prior to surgery Able to assess fitness for surgery using lung function test results and correlating it to relevant patient history Performs the surgery based on proper oncological principles Able to anticipate a difficult case and employ appropriate and relevant surgical plan Marking the correct surgical site on the patient	Failure to identify a difficult case in the pre-operative state Did not call for help when in trouble Did not perform the surgery based on proper oncological principles Unable to anticipate a difficult case and employ appropriate and relevant surgical plan Failure to recognise injury to the pulmonary artery during vessel dissection sufficiently early	Fails to mark the appropriate site for the surgery Does not explain the procedures and possible outcomes to the patient and family Does not take an informed consent Does not communicate effectively and discuss collaboratively with the anaesthetist during the surgical procedure

Exit Essential Learning Activity 2		
Recognises injury to the pulmonary artery during vessel dissection sufficiently early and institutes timely intervention Employs appropriate handling of the lung leading to lung parenchymal injury and subsequent air leak	Does not employ appropriate handling of the lung leading to lung parenchymal injury and subsequent air leak	
Assessment/Evidence		
Logbook DOPS, PBAs		

Exit Essential Learning Activity 3		
Activity	Aortic Valve Replacement	
Description		
All items on the table below are examples, they do not constitute an exhaustive list in any aspect		
Cognitive Knowledge, Facts, Information	**Psychomotor** Do, Practical, Technical Skills	**Affective** Feel, attitudes & values, behaviours displaying underlying values or emotions
Describes the anatomy of aortic valve and its surrounding related structures Discusses pathophysiology of aortic stenosis and aortic regurgitation Explains the clinical history and physical examination of aortic diseases Able to interpret echo findings and identify the problem of the valve and function of the heart Discusses the guidelines for the treatment of aortic valve disease Discusses alternate treatment methods if surgical replacement is not suitable, e.g. Percutaneous Aortic Valve Replacement Discusses the evidence behind the choice of treatment for the management of aortic valve disease Explains the complications of aortic valve replacement and its related management	Initiates cardiopulmonary bypass with Left ventricle vent Able to select the site for aortotomy Utilises techniques to deliver cardioplegia – direct or retrograde Able to remove native aortic valve and employ suitable methods of decalcification Employs appropriate suture placement technique for valve replacement Able to size the valve correctly Selects the appropriate valve, mechanical or bioprosthetic Able to orientate the selected valve accordingly during the placement Employs appropriate closure technique for the aortotomy Employs appropriate deairing techniques Able to wean off cardiopulmonary bypass safely	Explains the indication for the surgery to the patient with empathy Able to listen to patients concerns and thoughts Obtains an informed consent for Aortic Valve Replacement Ability to work in a team Able to keep calm in moments of stress Aware of their own limitations and able to call for help when needed
BEHAVIOURAL MARKERS		
Positive Things that should be done, correct techniques or practices, things a trainee might do right	**Negative** Things that should not be done, incorrect techniques or practices, things a trainee might do wrong	**Negative Passive** Things that may be forgotten or omitted that constitute incorrect or substandard care, things a trainee forget to do
Able to make decision for aortic valve replacement based on current guideline and evidence Able to identify potential problems related to the surgery and getting help early Performing aortotomy at the right site Performs complete decalcification of the aortic valve	Unable to make a decision on indication to address the aortic valve Unable to identify concomitant issues with the aortic valve like the presence of a dilated aortic root or coronary artery disease Performing aortotomy at the wrong site Performs incomplete decalcification of the aortic valve Failure to check the type of valve given during the surgery (e.g.	Failure to obtain consent Failure to de air the heart adequately Failure to check on the available valve sizes prior to surgery Failure to call for help when needed

Exit Essential Learning Activity 3		
Ensures to check that the correct type of valve is given during the surgery Able to identify concomitant procedures that needs to be performed if required	Using a mitral valve in aortic position) Inability to choose the correct valve size Unable to recognise a life threatening situation	
Assessment/Evidence		
DOPS CBD		

GLOSSARY

Term	Description
AMM	Academy of Medicine Malaysia
ARCP	Annual Review of Competence Progression
CBD	Case-Based Discussion
CCT	Certificate of Completion of Training
CSAMM	College of Surgeons, Academy of Medicine of Malaysia
ELA	Essential Learning Activities
ECSMQ	Evaluation Committee for Specialist Medical Qualifications
IELTS	International English Language Testing System
MedEx	Medical Specialist Pre-Entrance Examination
Mini-CEX	Mini-Clinical Evaluation Exercise
MMC	Malaysian Medical Council
MOH	Ministry of Health
MOHE	Ministry of Higher Education
NPMC	National Postgraduate Medical Curriculum
NSR	National Specialist Registry
OSCE	Objective Structured Clinical Examination
PEO	Programme Educational Objectives
PLO	Programme Learning Outcomes
PBA	Procedure Based Assessment
UKM	Universiti Kebangsaan Malaysia
UM	Universiti Malaya
WBA	Workplace-based assessments

e ISBN 978-629-96653-0-4