THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY

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SYLLABUS & REGULATIONS

OF

D.M. CARDIAC ANAESTHESIA

ACADEMIC YEAR 2025 SESSION ONWARDS

THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY, CHENNAI
SYLLABUS
OF
D.M. CARDIAC-ANAESTHESIOLOGY

BASIC CURRICULUM

Basic sciences include Anatomy, Physiology, Pharmacology, Physics, Biochemistry, Coagulation, Cardiopulmonary Bypass (CPB) – Pharmacokinetics during CPB, monitoring, diagnostic techniques involving cardiology - diagnostic and therapeutic therapy.

Special consideration	—	Cardiopulmonary bypass
	—	Drugs related to anaesthesia of CPB
Pulmonary life-Support	—	Advanced cardiac life support

Operative Observations

- Operative DIRECT CARE (Conduct of anaesthesia)
- Post-operative care and pain relief
- Examinations — Basic Sciences

(Theory and Practical) Clinical Practice of Anaesthesia & Allied Sciences inducting Recent advances.

GENERAL

- History of Anaesthesia for Thoracic & Cardiovascular surgery
- Natural History of Cardiac & Pulmonary diseases - Demography
- Diagnosis, Preoperative evaluation & Preparation for surgery

Detailed Syllabus

I. BASIC SCIENCES

ANATOMY	Cardiac :	Embryology, development and Anatomy of heart, pulmonary and vascular anatomy, coronary artery anatomy
PHYSIOLOGY	Cardiac :	Cellular Physiology, Haemo-dynamics, Autonomic nervous system, Cardiac functions, Blood Physiology, Coagulation action potential, Cardiac arrhythmia
	Pulmonary :	Open & Closed chest ventilation. Ventilation/perfusion mismatch. Pulmonary airway mechanics, one lung ventilation. Thoracotomy and pulmonary physiology. Renal, Hepatic, CNS, Endocrine System, metabolic effects of surgery. Endocrines response to anaesthesia and surgery
PATHO-PHYSIOLOGY :		Heart Failure, Congenital defects, COPD, Cardio pulmonary reserves, acquired cardiac & pulmonary diseases. Vascular pathology. Immunological response, metabolic response during CPB
PHARMACOLOGY :		Total circulatory arrest, PharmacoKinetics & Pharmacodynamics of Anaesthetic and Vasoactive drugs, Biochemical reactions, applied concepts. Drugs related to anaesthesia practice, Cardiovascular drugs, Current antibiotics for ICU use, bronchodilator,. Antiarrhythmic drugs, nitric oxide.

PHYSICS :	Basic concepts, Analysing, measuring & monitoring devices, electronics, computing of patients data. Laser in cardiac surgery, robotic technique, Minimally Invasive Cardiac Surgery. Equipment: Computer application, Maintenance monitoring techniques, Equipment in OT, Equipment for transport of patients, ICU equipment

II. CLINICAL SCIENCES

Anaesthesia for Cardio-thoracic & Vascular Surgery, diagnostic procedures in adults & Paediatric age groups.

Anaesthesia for - Cardiac Surgery: For closed & Open heart surgery, Robotic and Minimally Invasive Cardiac Surgery

Vascular Surgery: Aortic surgery, carotid artery surgery.

PAEDIATRIC	:	Basic haemodynamics, palliative procedures, Pre-operative preparations & special care in monitoring, Fluid balance & airway management
	-	Anaesthesia for neonatal complex cardiac surgery
	-	Anaesthesia management for re-surgery
	-	Paediatric diagnostic procedures in Cath Lab & echocardiography
	-	Invasive therapeutic techniques like ASD devices, stent in major vessels, coil embolization, Valvotomy, Valve in Valve Implantation.
ADULT	:	Anaesthesia for ischemic heart disease, valvular heart disease, vascular disease, adult congenital heart surgery, Pericardial.

- Electrophysiological & Arrhythmia surgery. Heart transplant, heart lung transplant, Ventricular Assist Devices

- Anaesthetic techniques for pulmonary surgery Diagnostic & elective. Emergency procedures for lung surgery. One – Lung Ventilation, Physiotherapy (gas exchange & airway dynamics)

- Anaesthesia during emergency, surgery and managing cath lab after cath lab complication

- Anaesthesia in patients for diagnostic & palliative procedures in Cardiology, Radiology cath LAB (outside operative rooms). Invasive cardiology procedure NORA – Non Operative Room Anaesthesia.

- Anaesthesia management of re-surgery

- Management for Post Operative ventilation care, prolonged ventilation, weaning, Control of Pain - its techniques & agents, used. Postoperative pain management

- Intra operative monitoring, PAC, Cardiac output coagulation monitoring

CARDIO-PULMONARY BYPASS

- Perfusion technology, principles, equipment, oxygenators, hemofiltration
- Hypothermia, techniques & protocols
- Myocardial Protection
- Haemodilution
- Anticoagulation, Pharmacology, monitoring methods
- Side-effects, complications & management
- Subsystem care - cerebral, Renal, Hepatic protection
    - Total circulatory arrest, left heart bypass
    - Anaesthesia management during CPB

- Pharmacokinetics & pharmacodynamics of drugs during CPB

INTENSIVE CARE MANAGEMENT

- Protocols for sub-system care, cerebral, Renal, Hepatic & others
- Ventilatory Care, weaning of Ventilatory support. Parenteral Nutrition, control of infection
- End stage renal failure, bedside dialysis techniques
- Postoperative management of single ventricular repair
- Hepatic failure
- ICU monitoring technique in postoperative pain management
- ICU Management, especially after neonatal surgery – ventilatory support in neonates, ECMO programme for neonates and children
- Intensive coronary care
- Cerebral monitoring

Biotechnology	:	Various mechanical & electronic equipment. Animal experiments, materials used for CPB techniques, VAD. IABP, Laser for TMR, Ecmo
Statistics	:	Statistical technique
Hospital Administration	:	Sterilization/Gas supply, equipment maintenance

Monitoring in Anaesthesia

Invasive & Non-Invasive monitoring techniques for Pre-peri & Post-operative periods in cardiothoracic centre :

- Understanding of basic concepts of monitoring
- Indications, cost effectiveness, complications
- Equipment usage & knowledge of accessories

Knowledge of the following monitoring —

Cardiac functions	:	ECG, ABP, Vent. Pressures, Calculation of cardiac output, resistance, Flow, Echo, Dopplers CAT, PET, NMR.
Pulmonary functions:		PFT, Spirometry, thromboelastography
Coagulation Profile	:	Heparin & Protamine regulation, ACT Thromboelastography.
Neuromuscular blockade	:	Recent advances in monitoring. BIS cerebral oximetry, evoked potential monitoring, CNS monitoring during CPB.

RECENT ADVANCES

Knowledge of recent developments in field of Cardio thoracic & Vascular surgery

- Cardiology - PTCA, Balloon embolectomy etc., Device, Volvotomy
- Heart - lung transplant - physiology, pharmacology (Anaesthetic consideration) - Donor – recipient selection
- Immunosuppression etc.
- Cardiac assisting devices - Artificial heart, IABP, LHAD
- Advanced Pulm. support - ECMO, H.F. Ventilation
- Blood substitutes
- Current advances and concepts in drugs, equipments, and monitoring methods

REGULATIONS

1. Preamble

DM (Cardiac Anesthesiology) course is designed to train candidates in the principles and practice of Cardiac Anesthesia to enable them to conduct anaesthesia and intensive care to cardiac patients and to function as faculty / consultant in Cardiac Anesthesia and Cardiac Thoracic, preoperative and postoperative intensive care

2. Admission Requirement

For admission to DM (Cardiac Anesthesiology) candidate is required to possess MD in anaesthesia from an institute/University recognized by the Medical Council of India.

3. Duration of Course

Three (3) academic years

4. Aims and Objectives of the Course

The aim of the course is to impart thorough and comprehensive training to the candidate in the various aspects of this specialty to enable him/her:

(a) To function as a faculty/consultant in the specialty

(b) To carry out and help in conducting applied research in the field of cardiac anesthesia

(c) To plan and set-up an independent cardiac anaesthesia unit catering to cardiothoracic vascular surgery and intensive cardiac care and cath lab.

5. Method of Selection

The selection of candidates for admission into DM in Cardiac Anesthesia is to be made in the form of an entrance examination conducted by National Medical Council, New Delhi.

6. Teaching Methods

During the period of training candidates follow an in-service residency programme. He / She works as senior resident and is given gradually increasing responsibility – for independently managing the simple cardiac operations and decision making in intensive care management, and its Cath Lab investigative procedure and various intensive monitoring.

The day to day work of the trainees will be supervised by the Head of the Department of Anaesthesia, till the new department of Cardiac Anaesthesia has formed, cardiac anesthesiology. The posting is so designed that the trainee gets posted in

various areas of the department like operation theatre, postoperative ICU, Intensive coronary care unit, cath. Lab, echo room. He or she will be observing invasive cardiology diagnostic and therapeutic procedures done in cath lab and emergency services. Beside this a programme for invasive monitoring demonstration,
seminars, workshops, journal club will also be organized.

7. Teaching Programme

The following teaching programme is prescribed for the course:
Teaching of MD, Anesthesia, by the DM student if available is part of the training.

Intensive Coronary Care Unit

During their posting in CCU for one month; the candidate is required to be attending the CCU rounds and learn coronary intensive care in addition to ventilatory care.

Pediatric Cardiology Intensive Care

For their two months posting in the pediatric intensive care unit, trainees will be participating in the teaching ward rounds and in addition their teaching programme in cardiology cath labs and echo room.

Cardiac Radiology

During their posting in Radiology, trainees are required to participate in cardiac radiology teaching programmes and also echo room training.

The trainee is made conversant with the technique of various invasive cardiac therapeutic and diagnostic procedures in adults, children and neonates, as well as CT scan and MRI scan also under the guidance of cardiac radiologist for one month. Cardiac radiological investigations are conducted every day and a special posting will be done for getting conversant with these products.

Cath Lab

A special posting for cath lab for handling the neonates and children undergoing investigative and therapeutic procedure and also for insertion of implants/pacemaker in adult patients. They will be learning current advances in cardiac imaging during their posting in the cath lab.

Period of Posting in Various Units

The trainee will be posted in different specialties and during of this posting will be as following :

Cardiac anaesthesia	Every year
CTVS, OT & ICU	5 months
Cath Lab	2 months
Echo lab	1 month
ICCU	1 month
Paediatric ICU & OT	2 months
Radiology	1 month

ASSESSMENT

Regular three internal assessments both in theory and clinical should be made for every candidate. Internal assessment will be made in day to day work of the trainee, which involve patient care, teaching, anesthesia management in the operation room, emergency service, bedside presentation and research.

RESEARCH

The trainee shall be required to undertake research and write papers under the guidance of a consultant. The candidate will have to submit a proposal/topic for the project work within six months of the joining of the course. The work period for the project will be 1 1⁄2 year to 2 years. Papers from the project should be accepted for publication in an indexed journal. Another article as first author should also be submitted for publication in an indexed journal before the candidate appears in the final DM. Cardiac Anesthesiology examination.

FINAL EXAMINATION

Eligibility

Candidates will be allowed to appear after three years of training.

Course Director: M.D. anaesthesia with minimum 8 years of teaching experience in the specialty, till the department of cardiac anaesthesiology develops. .

Theory Papers

There shall be the following theory papers to be written at the end of third year:

1. Paper – I Basic science as related to cardiac anaesthesia
2. Paper – II Clinical aspects of cardiac anaesthesia
3. Paper – III Clinical aspects of Pulmonary anaesthesia.
4. Paper – IV Recent advances in Cardiac & Pulmonary anaesthesia

Clinical / Practical and Viva Voice

One long case and two short cases will be given to the candidates and the discussion there on would last 30-40 min in each case. The candidates are also given ECG, X-rays for interpretation. Various equipment, used in OT, intensive care, drugs, fluids, catheter for invasive monitoring are also required to be interpreted and discussed during Viva.

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