

Document for submission to the Board of Studies:

DM in Cardiothoracic and Vascular Anesthesia

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Aims and objectives

Super-specialty oriented Goals:

The goals of 3-year DM degree course in Cardiothoracic and Vascular Anesthesiology would be to educate and train a doctor, who is already a qualified MD/DNBE in ANAESTHESIOLOGY, and who after satisfactory completion of training will:

1. Practice independently the art and science of Cardiothoracic and Vascular Anesthesiology and perioperative care effectively and ethically, supported by scientific knowledge and skill base.
2. Undertake responsibilities in cardiothoracic and vascular surgical operation suites, postoperative intensive care units, and in working areas of other allied specialties like Cardiology and Cardiac Radiology of patients requiring perioperative or peri-procedural care.
3. Continue to demonstrate keen interest in continuous professional development and will be well-informed about the recent advances in the Cardiothoracic and Vascular Anesthesia super-specialty.
4. Function as a dedicated, motivated teacher who is keen to train or to share his knowledge and skills with a colleague or junior or any learner.
5. Identify the health requirements of the community and society, and fulfill professional commitments ethically and will remain compliant with the objectives of national health policies.
6. Have acquired spirit of scientific inquiry and will be oriented to the principles of research methodology and epidemiology

Super-specialty oriented objectives:

The objectives laid out to reach the goals of the DM program in Cardiothoracic and Vascular anesthesia may be categorized as follows:

1. Knowledge (Cognitive domain)
2. Skills (psychomotor domain)
3. Attitude, communication abilities, human values and ethical practice

A candidate registered for the DM program should achieve these objectives by the completion of training program. Thus at the completion of training the candidate must be able to:

Knowledge:

- Demonstrate understanding of the basic sciences relevant to Cardiothoracic and Vascular Anesthesia
- Reveal comprehension of the anaesthetic management of common and uncommon surgical conditions related to cardiac, thoracic and vascular diseases, in patients

belonging to all age groups, with a thorough knowledge of the etiology, pathophysiology and surgical treatment of the disease state.

- Describe theory, of the underlying etiology, mechanism and management of critical conditions requiring cardio-pulmonary-cerebral resuscitation.
- Demonstrate understanding of principles, pathophysiology, components, conduct, and complications of cardiopulmonary bypass and cardiac assist devices.
- Show understanding of the principles, pathophysiology and complications of major vascular surgery.
- Assimilate and practice principles of critical care in postoperative cardiac, thoracic and vascular surgical intensive care units and cardiology care units.
- Recognize the disease conditions beyond the area of his/ her competence and follow appropriate referral mechanism prior to subjecting the patients to anesthesia.
- Advices regarding the anaesthetic management of cardiac, thoracic and vascular surgical cases and conduct this management effectively.
- Update himself/ herself regularly by self-study, and by attending CMEs, workshops, conferences, and seminars relevant to the specialty.
- Teach and guide his team colleagues, students, and paramedical staff.
- Reveal understanding of medicolegal aspects of cardiothoracic and vascular anesthesia.
- Demonstrate knowledge of administrative aspects of Cardiothoracic and vascular operation suite complex.
- Undertake audit, use information technology media, and conduct research, both clinical and biomedical, with publishing the work and presenting at various scientific events.

Skills:

- Evaluate patients scheduled for cardiac, thoracic and vascular surgery in the preoperative period by taking relevant history, examining the patient, ordering relevant investigations, and interpreting them to obtain additional information about surgical condition and or the associate medical condition, which necessitates modifications of the proposed anaesthetic management.
- Administer appropriate anesthesia to the cardiac, thoracic and vascular surgical procedures independently.
- Perform invasive procedures necessary for optimal patient care during the perioperative period.
- Provide basic and advanced cardiac life support.
- Demonstrate intensive care skills necessary for management of patients in postoperative cardiac, thoracic and vascular surgical intensive care units and cardiology care units.
- Shoulder responsibility of patient monitoring in perioperative period.

Attitude, communication abilities, human values and ethical practice:

- Adapt ethical principles, professional honesty and integrity in all aspects of cardiothoracic and vascular anesthesia practice.

- Deliver anesthesia care in all need of the specialty, irrespective of the social status, caste, creed or religion of the patient.
- Develop communication abilities in explaining the various options available in the anaesthetic management, critical care, pain management, and to obtain true informed consent from patient.
- Provide leadership in the operating suite and get best out of the team work in a congenial working atmosphere.
- Apply high moral and ethical standards while carrying out human and animal research.
- Be humble and accept the limitations in his knowledge and skill and to ask for help from colleagues when needed
- Respect patient's rights and privileges including right to information and right to seek a second opinion.

Competence expected at end of training:

A clearly-defined and modular clinical training program will be followed by the Cardiothoracic and vascular anesthesia division. It has been designed to provide the candidate a comprehensive clinical and academic training in different aspects of Cardiothoracic and Vascular Anesthesia. The primary objective of Cardiac anesthesia modules – an essential part of Cardiac anesthesia residency training - is to prepare a resident to follow the role of an independent consultant physician. Such a consultant should feel comfortable functioning as a specialist in Cardiothoracic and Vascular anesthesia at secondary and tertiary care hospitals in India. The operating room and intensive care unit is where most clinical training occurs. In addition to the clinical training, academic components of training process are focused toward transforming the trainee into a mature consultant.

Syllabus: Theoretical knowledge to be acquired at 18 months of training (Part I examination) and at 36 months training (Part II examination)

PART I

APPLIED ANATOMY:

- Basic and correlative cardiac, thoracic and vascular anatomy
- Embryological development of heart great vessels, lung, esophagus and other thoracic structures

APPLIED PHYSIOLOGY

- Cardiac cycle, cardiac output, blood pressure and blood volume, cardiac contractility, preload, afterload, cardiac failure, coronary circulation, autonomic control of heart and vasculature
- Pulmonary circulation, acid-base balance, physiological function of lung, pulmonary function tests,
- Physiology during extracorporeal circulation, assisted circulation and hypothermia
- Body water, oxygen transport, shock
- Perioperative physiology of liver, kidney, brain, and hematology

PHYSICS

- Gas laws; compressed gases; medical gas cylinders, laminar flow;
- Fluid dynamics
- Physics of anaesthetic apparatus; principles of anaesthetic agent vaporization,
- Physics related to mechanical ventilators
- Principles of ultrasound

APPLIED PHARMACOLOGY

- Basic and correlative pharmacology of drugs acting on heart, lung, vasculature and other vital organs
- Pharmacological principles: Pharmacokinetics, pharmacodynamics, drug distribution, biodisposition, elimination, pharmacological actions and adverse reactions
- Cardiac glycosides, antihypertensives, vasopressors, diuretics, beta-blockers, calcium channel blockers, inotropic agents, antiarrhythmic agents, drugs for coronary artery diseases
- Inhalational and intravenous anaesthetic drugs, drugs acting on neuromuscular transmission, analgesics, sedatives and hypnotics, premedicants

- Drugs acting on tracheobronchial tree, pulmonary parenchyma and pulmonary circulation

APPLIED PATHOLOGY AND PATHOPHYSIOLOGY

- Congenital heart diseases: Cyanotic and acyanotic heart diseases, intracardiac shunts, patent ductus arteriosus, Fontan circulation, anomalous venous connections, anomalies of pulmonary vasculature, anomalies of great vessels
- Rheumatic heart diseases, valvular heart diseases, coronary artery diseases, myocardial infarction, myocarditis, cardiomyopathies, pericarditis, infective endocarditis, hypertensive heart disease, pulmonary embolism, cardiac tumors
- Diseases of vascular system: Aortic aneurysms, aortic dissection, coarctation of aorta, vascular pseudoaneurysms, peripheral vascular diseases, carotid artery diseases, renal artery stenosis
- Thoracic injuries, thoracic tumors, diseases of tracheobronchial tree, COPD, restrictive lung diseases, pulmonary infections, pulmonary tuberculosis, thymectomy, benign and malignant diseases of esophagus, reflux esophagitis
- Clinical laboratory tests

APPLIED MICROBIOLOGY

- Pulmonary infections, infective endocarditis, infection following open-heart surgeries, lung surgery; nosocomial infection in the intensive care units
- Sepsis, clinical microbiological investigations, antimicrobials

CARDIOVASCULAR ENGINEERING

- Concept of flow, pressure gradient and its relationship to flow; heart as a pump, efficiency of heart valves, hemodynamic assessment
- Prosthetic valves, extracorporeal circulation, mechanical assist devices, intraaortic balloon pump,
- Material in cardiovascular application, biocompatibility

PERIOPERATIVE MONITORING

- Hemodynamic monitoring,
- Transesophageal echocardiography
- Coagulation monitoring,
- Respiratory system monitoring
- Neurological monitoring
- Monitoring of vital organs

VENTILATORY THERAPY

- Modes of ventilation
- Principles of ventilatory therapy

MEDICAL STATISTICS

- Basic terminology, study designs, statistical analysis, statistical tests

PART II

- Clinical features, diagnostic aspects, therapeutic strategies, principles of perioperative care, anaesthesia management and surgical principles in patients subjected to surgery involving chest wall, pleura, lung, tracheobronchial tree, esophagus, mediastinum, diaphragm, pericardium, heart, great vessels, peripheral vessels
- Postoperative intensive care of patients following Cardiothoracic and Vascular surgery: Vital organ care, homeostasis, management of surgical bleeding, ventilatory therapy, invasive and noninvasive monitoring, nutrition, management of postoperative infections, management of medical emergencies, transportation of critically ill patients, physiotherapy and nursing care
- Intensive care of patients admitted for nonsurgical or medical treatment
- Anaesthetic management of cases subjected to cardiac investigations and therapeutic procedures in cardiac catheter laboratories and radiology suites
- Training in echocardiography: Principles of ultrasound; knobology; evaluation of left ventricular systolic and diastolic function, valvular heart diseases, ischemic heart diseases, right heart and pulmonary arterial function, aortic diseases, prosthesis, hemodynamic assessment; evaluation of complex congenital heart diseases, postoperative evaluation for hemodynamic instability
- Recent advances in the Cardiothoracic and Vascular Anesthesia specialty

Recommendations of Textbooks and journals

Textbooks: A trainee is expected to gain the academic knowledge through standard textbooks related to the specialties like Anesthesia, Cardiac anesthesia, echocardiography, Critical care, Cardiothoracic & vascular surgery, and Cardiology.

Journals: A trainee is expected to upgrade his/ her academic knowledge through published article of various journals related to the Anesthesia, Cardiac anesthesia, echocardiography, Critical care, Cardiothoracic & vascular surgery, and Cardiology.

Curriculum implementation:

The Clinical training modules and their duration will be as follows:

Clinical module	Duration
Adult cardiac anesthesia	12 months
Thoracic and vascular anesthesia	3 months
Pediatric cardiac anesthesia	12 months
Postoperative adult cardiac surgical ICU	3 months
Postoperative pediatric cardiac surgical ICU	3 months
Cardiology (Interventional cardiology, Electrophysiology laboratory, CCU)	15 days
Cardiac Radiology (Cardiac MRI, CT Thorax, Aortic angiography, Multi-slice CT coronary angiography)	15 days
Perfusion (Adult and pediatric)	5 days
Advanced training in Cardiothoracic Vascular anesthesia (LVAD placement, Heart/ Lung transplantation, ECMO, Robotic surgery, port-access surgery, MIDCAB, thoracic trauma, Video-assisted thoracoscopy)	1 month
Research including biomedical technology	10 days
Posting for training in Transesophageal echocardiography	15 days

Minimum number of procedures expected to be undertaken annually by the residents:

PROCEDURES	MINIMUM NUMBER
Insertion of arterial cannula	100
Insertion of central venous cannula	100
Insertion pulmonary artery catheter	2-5
Endotracheal intubation	100
Placement of double lumen tube	2-5
Fibreoptic bronchoscopy	5-10
Epidural catheterization	2-5
Caudal blockade	2-5
Percutaneous tracheostomy	1-3
Transesophageal Echocardiographic examinations	50

Evaluation during 3-year training period

Theory examination part I = 200 marks

Theory examination part II = 200 marks

Practical examination part II = 400 marks

Internal evaluation = 200 marks

Practical examination part II (400 marks)

Long Case I = 100 marks

Short Case I = 50 marks

Short case II = 50 marks

Practical skills = 100 marks

Viva Voce = 100 marks

Internal evaluation:

Every academic activity of the candidate during the 3 years will be included in the modules.

The distribution of marks will be as follows:

50 marks per year for 3 years, which includes clinical performance and academic performance = 150 mark

Internal credit-based assessment in 3 years = 50 credit marks

Total marks: 200

Distribution of yearly marks for clinical and academic performance (50 marks/ year):

1. Clinical performance based on 20-point evaluation: 60% (30 marks)
2. Academic presentations: 40% (20 marks)

20-point clinical performance evaluation (6 monthly)

The clinical performance of every trainee resident will be evaluated by senior faculty members (Professors, Additional Professors and Associate Professors) from the division of cardiothoracic & vascular Anesthesia department on 6-monthly basis. About 20 clinical performance parameters have been included in a marks score chart. Each parameter will be assigned marks on a scale ranging from 1 to 5 as follows:

Poor performance = 1

Performance below average = 2

Average performance = 3

Performance above average = 4

Excellent performance = 5

Total marks awarded by faculty members in the panel will be averaged and translated to 30 credits/ year or 90 credits in 3 years. Program in-charge will maintain the clinical performance evaluation records of trainee residents.

The template for 20-point clinical performance chart will be as follows.

20-point clinical performance marks evaluation chart

Name of the faculty member:

Name of the trainee resident:

Year and month of evaluation:

EVALUATION PARAMETER	PERFORMANCE BASED MARKS POINTS
Efforts taken in assessing the patients during preoperative visits	
Anticipating problems and preparedness before conduct of anesthesia	
Sensitivity to patient's feelings and patient-communication skills during conduct of awake-perioperative procedures: for example arterial cannulation, awake fiberoptic intubation, etc	
Consciousness toward sterility precautions during performance of invasive procedures	
Systematic approach and giving tissue respect while performing invasive procedures	

Proficiency and skills in performing invasive procedures	
Spontaneity in actions during patient management	
Capacity to comprehend the seriousness of critical situation arising unexpectedly	
Appropriateness in reacting to the unexpected emergency situation	
Willingness to do technical jobs in emergency situation	
Capacity to make decisions regarding patient management in the absence of consultants	
Sincerity in attending patients during emergency duties	
Safety in patient management	
Integrity of character, honesty, trustworthiness	
Skills in communicating with faculty members	
Capacity for team work, maintaining cordial relations with colleagues and paramedical staff	
Capacity to work as a team leader during critical period, for example during the conduct of cardiopulmonary resuscitation, patient transportation	
Capability to manage elective cases independently during routine working hours (under consultant supervision)	
Punctuality	
Cost consciousness	
TOTAL MARKS	

Academic performance evaluation:

Marks will be obtained in following academic activities

1. Patient evaluation and management / Clinical case presentation
2. Evaluation of journal review/ Pro & Con/ Guidelines/ Meta-analysis presentations
3. Evaluation of Seminar/symposia

The evaluation of academic performance of a trainee resident will be done by faculty members from Cardiothoracic & vascular Anesthesia division attending the sessions. Every faculty member attending an academic presentation will award marks against various academic performance parameters as charted below. A trainee resident remaining absent during the scheduled hours of presentation will be awarded zero marks. All records will be maintained by the Program In-charge of Cardiothoracic and Vascular Anesthesia division.

The total marks will be averaged and translated into 20 marks/ year or 60 marks in 3 years.

1. Patient evaluation and management / Clinical case presentation

Name of the student:

Name of the Faculty / Observer:

Date:

Sl. No.	Items of observation during Presentation	Poor 1	Below average 2	Average 3	Good 4	Very good 5
1	Completeness of history					
2	Accuracy of clinical signs					
3	Assessment of problem and investigational plan					
4	Anesthesia and perioperative care plan					
5	Ability to defend perioperative management					
5	Clarity of Presentation					

7	Knowledge of the current and past literature					
	Grand Total					

2. Evaluation of journal articles/ journal review/ Pro & Con/ Guidelines/ Meta-analysis/ Best evidence topics presentations

Name of the Student:

Name of the Faculty / Observer:

Date:

Sl. No.	Items of observation during Presentation	Poor 1	Below average 2	Average 3	Good 4	Very good 5
1	Extent of understanding of scope & objectives of the paper of the candidate					
2	To critically evaluate methods, analysis and interpretations of study					
3	Whether cross references have been consulted					
4	Whether other relevant publications consulted					
5	Ability to respond to questions on the paper / subject					
6	Ability to defend the paper					
7	Clarity of Presentation					
8	Audio – Visual aids used					
9	Ability to propose new research ideas based on study discussed					

	Total Score					
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3. Evaluation of Seminar/symposia

Name of the student:

Name of the Faculty / Observer:

Date:

Sl. No.	Items of observation during Presentation	Poor 1	Below average 2	Average 3	Good 4	Very good 5
1	Whether all relevant publications consulted					
2	Understanding of the subject					
3	Completeness of the preparation					
4	Clarity of presentation					
5	Current concepts coverage					
6	Ability to answer the questions					
7	Time scheduling					
8	Appropriate use of Audio – Visual aids					
9	Overall performance					
	Total Score					

Annual academic modules for Cardiothoracic & vascular Anesthesia department

Clinical case presentations: 4

Journal club: 3

Seminars & symposia: 2

Other Credit-based internal assessment (for research and publications):

These academic activities will be awarded 50 credit points. The distribution of these credit marks will be as follows:

1. Attending Biostatistics for senior residents: 5 credit marks
2. BMT posting for senior residents: 3 credit marks
3. Presenting at least one paper in national/ internal/ regional conferences related to Anesthesia specialty: 5 credit marks
4. At least one publication as the first author in international indexed journal: 5 credit marks
5. Additional paper presentation in international/ national / regional conference related to Anesthesiology specialty (Apart from mandatory presentation) = 5 credit marks
6. Winning award for paper presentation in international/ national / regional conference related to Anesthesiology specialty = 4 credit marks
7. Thesis project: Maximum 18 credit marks, which may be obtained as follows:

Study design:

- Prospective = 4
 - Randomized = 3
 - Blinded = 3
 - Project funded by external agency = 3, or by internal agency: 2
 - Published in an indexed journal (apart from 1 mandatory publication) = 5
8. Outstanding performance: 5 credit marks

Credit marks will be awarded for outstanding performance if the resident publishes an original article in a journal with impact factor 2 or more. The publication may be the mandatory publication or thesis or any extra publication.

LOG BOOK

Table 2: Academic activities attended

Name:

Admission Year:

Department:

Date	Type of activity Specify Seminar, Journal club, Presentation, teaching	Particulars

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LOG BOOK

Table 3: Academic presentations made by the students

Name:

Admission Year:

Department:

Date	Topic	Type of activity Specify Seminar, Journal club, Presentation, teaching

LOG BOOK

Table 4: Perioperative procedures performed

Name:

Admission Year:

College:

Date	Patient Name	ID No.	Procedure	Category O, A, PA, PI*

Key:

- O - Observed
- A - Assisted a more senior operator
- PA - Performed procedure under the direct supervision of a faculty member
- PI - Performed independently

FINAL INTERNAL ASSESSMENT MARKS SHEET FOR 3 YEARS

SL No.	MODULE	MARKS AWARDED	MAXIMUM MARKS
1	Clinical performance		90
2	Academic presentations		60
3.	BMT posting		3
4.	Attending Biostatistics		5
5.	Other academic achievements		42
Total			200

The above overall assessment sheet used along with the log book will form the basis for certifying satisfactory completion of course of study, in addition to the attendance requirement.

Student feedback:

Re-appraisal: