



**BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE**

**Faculty of Medical Sciences
DM - Cardiology
New Syllabus**



**Bharati Vidyapeeth Deemed to be University,
Pune**

Faculty of Medical Sciences

**Curriculum for DM Cardiology
As per Guidelines of
Medical Council of India**

**Bharati Vidyapeeth
(Deemed to be University)
Medical College, Pune**

Department of Cardiology

DM (Cardiology)

Bharati Vidyapeeth Deemed to be University. Medical College, Pune

Department of Cardiology

Name of Programme: Post Doctoral (DM) in Cardiology

Programme Outcomes:

Programme outcome desired through the Post Doctoral training in Cardiology is to produce competent Cardiologist through comprehensive training in non-invasive & invasive Cardiology. Post DM Cardiology, this Super Specialists should be able to function as confident Cardiologists with appropriate knowledge, skills & temperament to diagnose & treat all cardiac diseases, while being adequately assured to carry out training, teaching & research in the field of Cardiology.

Programme Specific Outcomes:

The course is designed to train Post Graduates (MD) in Internal Medicine & in Paediatrics in areas of Cardiology like :-

Cognitive Domain

- Clinical Cardiology
- Coronary Care
- Paediatric Cardiology
- Electrophysiology
- Non Invasive Diagnostic procedures
- Invasive diagnostic procedures
- Invasive therapeutic procedures
- Research activities including publication
- Teaching & training methodology as relevant to Cardiology

At the end of course the student should be able to carry out the following :-

- Diagnose cardiovascular diseases based on clinical methods.
- Interpret relevant laboratory, radiological & cardio logical investigations for the purpose of diagnosis.

- Arrive at a treatment plan/s based on 1 & 2 and discuss the pros & cons with the patient and his family.
- Be able to carry out efficient management of all types of cardiovascular emergencies after quickly assessing the patient & synthesizing available clinical & investigational information. To keep abreast of the current knowledge & recent advances in the field by self learning &/or participating in Continuing Medical Education programmes.
- Deliver preventive & rehabilitative care.
- Organize & manage administrative responsibilities for routine day to day work as well as emergent/urgent situations.
- Understand the functional principles of various biomedical equipments used in invasive & non invasive cardiology.
- Carry out research & publications in the field.
- Teach the medical & other paramedical students/staff and develop learning resource material for them.

Skills :-

Non-invasive Techniques

The candidate is given adequate training during the course so that he she will be able to perform & interpret various non invasive techniques including:

- Electrocardiography.
- Stress testing – ECG tread mill test, stress echocardiography & nuclear stress tests.
- Holter monitoring for arrhythmias & ischemic disorders
- Echocardiography – M-mode, Two dimensional, Doppler, Color flow imaging, Trans-Esophageal Echocardiography & echo directed hemodynamic studies.

Invasive Cardiology

The candidate is given adequate training so that he/she will be able to :-

- Perform temporary pacemaker insertion, pericardiocentesis, central venous line insertions.

- Assist in various interventions including valvuloplasty, coronary & congenital interventions.
- Perform cardiac catheterization & to calculate & interpret various hemodynamic parameters.
- Right & left heart catheterization & coronary angiography procedures in adults & children.
- Electrophysiology: To interpret electrophysiological data & assist in electrophysiology procedures, permanent pacemaker implantation, AICD implantation.

Affective Domain :-

Students should be able to

- Adopt ethical practices in dealing with patients, colleagues, subordinates, superiors & health care workers.
- Promote cordial interpersonal relation.
- Perform as a team.
- Learn to be a leader when the need arises.
- Learn to order investigations & prescribe drugs rationally
- Be aware of ethical issues in human and animal research.
- Take rational decision in the face of ethical dilemmas in cardiac diseases.
- Demonstrate sympathy & humane approach towards patients & their families & exhibit interpersonal behavior in accordance with social norms & expectations.

Programme Structure :-

The DM Cardiology course centers around “Autonomous & Self directed” learning. Post Doctoral students seek knowledge & skills on their own initiative by self study & participation in academic/ practical activity of the department. The following organized experiences are provided to the students :-

1. Case presentation & case management in OPD & Indoor wards: The PG students present cases daily on clinical rounds to the faculty members of the department. The students are provided facilities to

manage cases of higher and greater complexity by allowing them graded responsibility as the course progresses.

2. PG lectures, Seminars, Symposia, Panel Discussions & Grand Rounds of suitable topics: These are held once a week. Topics of common interest to PGs are covered in the program. Each PG student should present minimum 6 seminars every year.
3. Journal Clubs: These are held once a week. Each PG student should present minimum 6 journal clubs every year.
4. Clinico-Pathological Correlation meetings are held monthly with Pathology department
5. Medical Audit / Fatality case discussions. PG student is expected to analyze & discuss the cases allotted to him/her
6. Intramural and extramural training programs. Interdepartmental meetings are organized with Cardiovascular Thoracic Surgery and Pathology departments as required. PG students actively participate in the meetings & discuss the cases or topics allotted. Participation in conferences, workshops, field visits, camps, etc.
7. Preparation and presentation of a dissertation: Every PG student is required to carry out the research work under the supervision of his guide in the field of Cardiology. The thesis work can be carried out by student jointly with other departments & the faculty from other departments can be opted as co-guides.
8. Departmental Clinical work: PG students are allowed to perform procedures under supervision and /or delegated authority depending on the experience and proficiency gained. The Heads of Units and other consultants and guides are in-charge of the supervision and delegation of authority and responsibility to work. The PG student are also involved in various clinical research work being undertaken in the department by the faculty members. Each student is required to participate in at least one research project every year.
9. Intradepartmental postings Every PG student will be posted by rotation in different sections of the Cardiology Department like Outpatient departments, Cardiology wards, Intensive Cardiac Care Unit, Stress test unit, Echocardiography lab and Cardiac Catheterisation Lab. A record of the observations made & lessons learnt are maintained by the students.

10. Teaching experience: The PG students participate in all aspects of teaching, specially practicals, demonstration & tutorials. During their tenure, they work under faculty members on rotation basis as per the allotment of the teaching schedule. The candidate is regularly involved in teaching of undergraduate medical, paramedical, & nursing students as well as Internal Medicine, Pediatrics postgraduate students. Their teaching skill is assessed & forms part of the internal assessment.
11. Community Cardiology The training of PG students involves learning experience “Derived from” or “Targeted to” the needs of the community. It is therefore necessary to expose the students to community based activities.

Throughout the course of training the emphasis is on acquiring knowledge, skill and attitudes through first hand experiences as far as possible. The emphasis is on self learning rather than on didactic lectures.

The entire period is ‘in service’ training, with programme based on the concept of ‘learn as you work’ principle.

ORGANIZATION OF COURSE:

Admission to the course is through NEET Super Speciality.

Number of students: each year students are enrolled maintaining a teacher/students ratio of at least 1:1, as per University & MCI guidelines.

Eligibility: M.D. or D.N.B. (Medicine or Pediatrics)

Duration of course is 3 completed years including the period of examination.

Attendance: All the candidates joining the PG training program work as Full Time Residents during the period of training. It is desirable that candidates should have 100% attendance to enable this objective to be achieved. However a minimum of at least 80% attendance and achievement of satisfactory standards in both theoretical and clinical Cardiology is required before they are allowed to appear for the University examination.

Leave: Residents are entitled to 30 days leave in the first year and 36 days each in the second and third years of residency.

Postings/Rotations

There will be structured training program. The students are expected to learn in phasic manner starting with basic care progressing to advanced care management

1st Year – Outpatient, Inpatient care (which includes Ward duty, ICCU duty and attending referral calls on emergency). Training in Stress test/Holter monitoring, Literature search and plan for dissertation.

2nd Year – Outpatient and Inpatient Care Training in Echocardiography and Catheterisation laboratory. Allied postings–Cardiovascular and Thoracic Surgery, Vascular Interventional Radiology, Nuclear medicine.

3rd Year – Outpatient and Inpatient Care, Echocardiography and Cath Lab postings. Research projects finalization and preparing dissertation. Extramural rotation Extramural rotations or elective rotations for a maximum period of 2 months will be possible during end of the 2nd year of training. The candidates can undertake up to 2 months elective rotation at parent or other institutions in the country centers approved by the Department.

There is a continuous interaction between the Cardiology Department and the allied departments to ensure that the students achieve these skills during their peripheral postings Research work. The candidates are required to submit a thesis during the course of DM programme. A subject for dissertation is allotted to the P.G. within the first 6 months after joining. The emphasis on dissertation work is on review of literature, maintaining a record of references, preparation of a plan of study, documentation of aims, planning the methodology, collection, documentation and analysis of data, comparison of data obtained with others in literature, drawing conclusions and writing a summary. The subject of dissertation is preferably prospective. Analysis of less than 25 cases is not permitted unless it is a rare disease. Progress on dissertation is reviewed every semester and feedback given to the candidates. The candidates make at least three formal presentations to the department i) protocol ii) midcourse progress and iii) final report. The thesis is submitted to the university 6 months before the final examination. 4 copies of completed dissertation after appropriate certifications by the guide and co-guide are submitted at the end of the 2½ years (There are, therefore, 2 complete years after submission of protocol and the final dissertation). At least 24 months are

spent in the research project undertaken. ii. Two papers (pertaining to the thesis or other wise) for publication in Indexed journal before appearing for the final DM exam. iii. The candidate attends continuing education symposia, workshops, and conferences including meeting of the Cardiological Society of India, workshops on Echocardiography, Electrophysiology, Cardiac Catheterisation etc.

Log book. The post graduate students maintain a Record Book (Log Book) of the work carried out by them & training program undergone during the period of training including details of procedures carried out independently or assisted by the candidate. The log book is checked by the faculty members imparting the training.

Development of attitude is a very important part of management of cardiac patients. It is the constant endeavour of the faculty to develop desirable attitudes in the PG trainees during the course by personal examples, interaction and group discussion. Constant watch is maintained during their work in the wards to ensure that this objective is being met. Although there is no formal evaluation of attitude, some aspects of this domain are covered during the formative evaluation.

Evaluation shall consist of Formative and Summative assessment.

A. Formative Ward work Case presentation PG lecture Journal Club
General assessment of attitude Internal assessment

B. Summative Thesis Final examination

A. Formative assessment.

The purpose of continuous course assessment is mainly

1. To ensure the habits of regularity, punctuality and disciplined working amongst PG students.
2. To give periodic feedback regarding their performance during the medical course & to enable them to take corrective steps to enhance their learning in various areas mentioned. eg. Patient care, research, teaching, administration etc.
3. To monitor attainment of clinical and technical skills to ensure adequacy of training.

4. To make it available to the internal examiner at the time of final examination to discount the possibility of a single adverse performance influencing the pass or fail situation of the candidate. This would give an idea of the continued performance of the candidate during the three years of training to the external examiners, so that candidates who have otherwise been rated as satisfactory in their internal evaluation can be given more chances in the final examinations to more questions and overcome the adverse effects of doing badly in any one case.

Formative evaluation is carried out over following activities of the P.G. resident.

(See Annexure)

- Ward work.
- Case presentation
- P.G. Lecture
- Journal club
- General assessment of affective function attitude by medical & paramedical staff.
- Internal Assessment Candidates can appear for theory examination only after being certified on the basis of internal assessment. However, internal evaluation marks cannot directly be used for influencing the outcome of the summative assessment. It can not be used to fail a candidate who has otherwise done well in the final examination or to pass a candidate who has done consistently bad in summative assessment.

Continuous assessment will be done on an ongoing basis using a logbook covering day to day performance of the candidate.

Summative assessment

Summative assessment consists of two parts: 1. Evaluation of thesis/dissertation prepared by the candidates 2. Final examination

1. Thesis/dissertation. All candidates on admission are allotted one of the department faculty who have fulfilled the requirement to be guides for purposes of

guiding Dissertation/thesis. The topic for dissertation is finalized and discussed in the departmental faculty meeting and allotted to the individual candidates before the completion of 3 months after admission. The purpose of dissertation is to develop in the candidate the ability to perform an independent study keeping the principles and research methodology in mind. The candidate, therefore, works on the prospective problem either within the department or in collaboration with other departments. There is continuous monitoring of the dissertation work by the guides and co-guides and by the other department staff throughout the course. The candidate presents the progress of the dissertation to the faculty on the completion of 1 ½ years for monitoring and feed back. The completed dissertation is submitted no later than 6 months before final examination. The dissertation is evaluated independently by the internal examiners and two external examiners under the following heading :

- 1) Approved 2) Not approved

In all cases the approval is given before 3 months of the date of appearing for the examination and this is essential before the candidate is allowed to appear for the written examination.

1.Final Examination Eligibility The candidate should have 1.Attendance of minimum 80% percentage 2.Satisfactory internal assessment 3.Approval of dissertation submitted

Candidates can appear for theory examination only after being certified on the basis of internal assessment.

- A. Theory examination
- B. Practical examination

(above as per directions of University)

Syllabus :-

2.1: BASIC SCIENCES RELATED TO CARDIOLOGY

2.1.1: CARDIAC ANATOMY

The cardiac anatomy with special emphasis on development of heart and blood vessels, foetal circulation and its changes in post natal life; coronary circulation; venous drainage of heart ; the heart and pericardium and its relation to neighbouring structures; anatomy of cardiac chambers and valves; arteries and veins; histology of heart and blood vessels. Functional anatomy of the heart, orientation of the heart within the Thorax, Methods used to study cardiac anatomy, correlative anatomy, New developments and future challenges, Quantum computing, Ultrastructure of the heart, Cardiac Embryology and Histology.

2.1.2: CARDIAC PHYSIOLOGY

Cardiac Physiology will cover all the physiological changes in the heart during its normal function with special reference to cardiac cycle; myocardial contractility; pressure changes in the cardiac chambers; cardiac output; factors controlling blood flow; regulation of cardiac function; cardiac reflexes; coronary blood flow; exercise physiology; physiology of blood pressure regulation; normal influence on cardiovascular system; preload; after-load; assessment of ventricular function; regulation of cardiac contraction; action potentials; the cellular basis of cardiac contraction, Integration of the cardiovascular system the response to dynamic exercise, etc.

2.1.3. CARDIAC MOLECULAR BIOLOGY

Principles of molecular biology including Gene Structure, Expression and regulation; Recombinant DNA Technology; PCR Techniques, Molecular basis for cellular growth, Molecular and cellular biology of the normal, hypertrophied and failing heart including cardiac growth and hypertrophy, Molecular and Cellular biology of the blood vessels including endothelial cell vascular smooth muscle interactions, atherosclerosis etc, The Human Genome and its future implications for cardiology including bioethical implications and genetic counselling, Cardiovascular Tissue modification by genetic approaches including Gene Transfer etc, Molecular Development of the heart including anomalies.

2.1.4 CARDIAC BIOCHEMISTRY

All aspects of normal and abnormal patterns of cardiac biochemistry including cardiac enzymes; lipid profile, cardiac metabolism, electrolytes and their effect on cardiac function etc.

2.1.5 CARDIAC PHARMACOLOGY

All the drugs used in the treatment of cardiac disorders inclusive of antianginal agents like beta-blocking agents, nitrates and calcium channel blockers, antifailure agents like diuretics, Angiotensin-Converting Enzyme (ACE) Inhibitors, Angiotensin-II Receptor Blocking Drugs (ARBs) and aldosterone antagonism, Digitalis, Acute Inotropes and inotropic Dilators, Antihypertensive Drugs, Antiarrhythmic Drugs, Antithrombotic agents like Platelet Inhibitors, Anticoagulants and Fibrinolytics, Lipid-Lowering and Atherosclerotic Drugs , choice of drugs, which drug for which disease?, Adverse Cardiovascular Drug Interactions and Complications.

2.1.6 CARDIAC PATHOLOGY

All pathological changes in various cardiac diseases with special reference to clinical correlation included. Special emphasis on pathological changes in the pulmonary vascular system in various cardiac disorders; pathogenesis and pathology of rheumatic fever and rheumatic heart disease; cardiomyopathies dilated, hypertrophic and obliterative / restrictive; congenital heart disease-cyanotic and acyanotic; atherosclerosis; coronary artery disease; cardiac involvement in other systemic diseases and storage disorders etc.

2.1.7 CARDIAC MICROBIOLOGY

The various microbiological aspects of cardiac diseases including rheumatic fever, infective endocarditis, myocarditis are included. Cardiac Molecular Biology has been included under a separate head.

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO BASIC SCIENCES AS RELATED TO CARDIOLOGY.

2.2 CLINICAL CARDIOLOGY INCLUDING PEDIATRIC CARDIOLOGY.

2.2.1 GENERAL EVALUATION OF THE PATIENT

The History, Physical Examination and Cardiac Auscultation including elements of accurate history taking, symptoms associated with cardiovascular disease, The physical examination of adults, children, infants and neonates, syndromes associated with congenital heart disease, measurement of arterial blood pressure, venous pulse, examination of the retina, inspection and palpation of the precordium, cardiac auscultation.

2.2.2 HEART FAILURE

Pathophysiology and diagnosis of Heart Failure, Diagnosis and management of heart failure, Cardiac transplantation and mechanical ventricular support.

2.2.3 RHYTHM AND CONDUCTION DISTURBANCES

Mechanisms of cardiac arrhythmias and conduction disturbances, Recognition, clinical assesment and management of arrhthmias and conduction disturbances, antiarrhythmic drugs, etc

2.2.4 SYNCOPE, SUDDEN DEATH AND CARDIO-PULMONARY RESUSCITATION

Diagnosis and management of syncope, sudden cardiac death, Cardiopulmonary Resuscitation and the subsequent management of the patient etc.

2.2.5 CORONARY HEART DISEASE

Atherogenesis and its determinants, Pathology of coronary atherosclerosis, Coronary blood flow and myocardial ischemia, Dyslipidemia, other risk factors, and the prevention of coronary heart disease, Non atherosclerotic coronary heart disease, Diagnosis and management of patients with chronic ischemic heart disease, Diagnosis and management of patients with unstable angina, Diagnosis and management of patients with acute myocardial infarction, The electrocardiogram in Acute myocardial infarction, Thrombogenesis, antithrombotic and thrombolytic therapy, rehabilitation of the patient with coronary heart disease etc.

2.2.6 SYSTEMIC ARTERIAL HYPERTENSION

Hypertension, epidemiology, pathophysiology, diagnosis and treatment.

2.2.7 PULMONARY HYPERTENSION AND PULMONARY DISEASE

Pulmonary hypertension, Pulmonary embolism, Chronic Cor pulmonale etc.

2.2.8 VALVULAR HEART DISEASE

Acute rheumatic fever, Aortic valve disease, Mitral valve disease, Mitral valve prolapse syndrome, tricuspid valve, pulmonic valve and multivalvular disease, Clinical performance of prosthetic heart valves, Antithrombotic therapy for valvular heart disease etc.

2.2.9 CONGENITAL HEART DISEASE

Cardiovascular disease due to genetic abnormalities, the pathology, pathophysiology, recognition and treatment of congenital heart diseases, Congenital heart disease in adults etc.

2.2.10 CARDIOMYOPATHY AND SPECIFIC HEART MUSCLE DISEASES

Classification of cardiomyopathies, Dilated cardiomyopathy, hypertrophic cardiomyopathy, Restrictive, obliterative and infiltrative cardiomyopathies, Myocarditis and specific cardiomyopathies endocrine disease and alcohol, AIDS and the cardiovascular system, Effect of noncardiac drugs, electricity, poisons and radiation and the heart etc.

2.2.11 PERICARDIAL DISEASES AND ENDOCARDITIS

Diseases of the pericardium, Infective endocarditis

2.2.12 THE HEART, ANESTHESIA, AND SURGERY

Perioperative evaluation and management of patients with known or suspected cardiovascular disease who undergo noncardiac surgery, Anesthesia and the patient with cardiovascular disease, etc.

2.2.13 MISCELLANEOUS DISEASES AND CONDITIONS

The connective tissue diseases and the cardiovascular system, Neoplastic heart disease, Diabetes and cardiovascular disease, traumatic heart disease, effects of mood and anxiety disorders on the cardiovascular system, Heart disease and pregnancy, The heart and obesity, the heart and kidney disease, exercise and the

cardiovascular system, Acute hemodynamics conditioning training the athlete's heart and sudden death, Cardiovascular aging in health and therapeutic considerations in older patients with cardiovascular diseases, women and coronary artery disease etc.

2.2.14 TROPICAL CARDIOLOGY

Conditions which are specifically found in the tropics like rheumatic heart disease, Endomyocardial Fibrosis, Eosinophilic Heart Disease, Aortoarteritis etc.

2.2.15 DISEASES OF THE GREAT VESSELS AND PERIPHERAL VESSELS

Diagnosis and treatment of diseases of the aorta, Cerebrovascular disease and neurologic manifestations of heart disease, diagnosis and management of diseases of the peripheral arteries and veins, surgical treatment of peripheral vascular diseases, etc.

2.3 DIAGNOSTIC AND INTERVENTIONAL CARDIOLOGY INCLUDING CARDIAC INSTRUMENTATION

2.3.1 DIAGNOSTIC CARDIOLOGY

The resting Electrocardiogram, The Chest roentgenogram and cardiac fluoroscopy, The Echocardiogram, ECG Exercise Testing, Cardiac Catheterization, Coronary Arteriography, Coronary Blood Flow and Pressure Measurements, Cardiac Ventriculography, Pulmonary Angiography, Angiography of the Aorta and Peripheral Vessels, Nuclear Cardiology, Computed tomography of the Heart, Magnetic resonance Imaging of the heart, Magnetic Resonance imaging of the Vascular System, Positron Emission Tomography for the noninvasive study and quantification of blood flow and metabolism in human cardiac disease, long-term continuous electrocardiographic recordings, Signal Averaging techniques and measurement of Late Potentials, Techniques of Electrophysiologic evaluation of Brady and tachyarrhythmias, Coronary Intravascular Ultrasound Imaging endomyocardial biopsy etc.

2.3.2 INTERVENTIONAL CARDIOLOGY

Percutaneous Coronary Interventions, Coronary Angioplasty, Atherectomy, Atheroablation and Thrombectomy, Coronary Stenting, Balloon Valvuloplasty,

Peripheral Intervention, Pediatric interventions, Intraaortic Balloon Counterpulsation and other Circulatory Assist Devices, Interventional Electrophysiology, Cardiac pacemakers, implantable devices for heart failure and for the treatment of cardiac arrhythmias etc.

2.3.3 CARDIAC INSTRUMENTATION

Principles of cardiac instrumentation, pressure recording, ECG Machines, Cardiac Monitors, Defibrillators, Cath-Lab Equipment, EP Lab Equipment, Gamma Camera, CT Scan, MRI Equipment, PET Scans, Echocardiography including Stress Echo, Colour Doppler and

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO CLINICAL CARDIOLOGY INCLUDING PEDIATRIC CARDIOLOGY.

THE CLINICAL EXAMINATION WOULD BE ENTIRELY DEVOTED TO CLINICAL CARDIOLOGY INCLUDING PEDIATRICS ON THE ABOVE SYLLABUS AND WOULD INCLUDE ONE LONG CASE OF 100 MARKS AND TWO SHORT CASES OF 50 MARKS EACH, TOTALLING TO 200 MARKS

TEE, Pacemakers temporary and Permanent, ICDs, Triple Chamber Devices, radiofrequency ablation equipment, programmed stimulators, IABP, Holter and Signal Averaging and ABP machines, Treadmill equipments, Hemodynamic recorders, oximeters, Computers and image processing in Cardiology etc.

2.4 RECENT ADVANCES IN CARDIOLOGY, CARDIAC EPIDEMIOLOGY, PREVENTIVE CARDIOLOGY INCLUDING RELATED CARDIAC SURGERY

2.4.1: Atherosclerosis and Prevention: Epidemiology of Cardiovascular Diseases, Risk factors for atherosclerotic diseases, assessment of cardiac risk, Special Problems in the prevention of cardiovascular disease; (a) Diabetes mellitus type 2; (b) Menopausal women; (c) Non-traditional risk factors for coronary disease, Special problems in hyperlipidemia therapy; (a) Child with hypercholesterolemia; (b) Transplant patient; (c) Hypercholesterolemia in the elderly; (d) Elevated lipoprotein.

2.4.2: Non Cardiac Vascular Disease: Special problems in Vascular Disease; (a) Compromise of an internal thoracic artery to coronary artery graft by subclavian artery disease; localised lymphedema

2.4.3: Ischemic Heart Disease: Special Diagnostic issues in Ischemic Heart Disease:

- (a) The patient with chest pain, a positive stress test and normal coronary arteries;
- (b) The patient with coronary artery disease and acute and chronic heart failure

2.4.4: Stable Coronary Syndromes: Special problems in myocardial ischemia; (a) management of variant angina breakthrough; (b) management of the non-revascularization patient with severe angina; (c) treatment of silent ischemia; (d) treatment of microvascular angina; (e) Viagra, sexual activity and the cardiac patient.

2.4.5: Acute Coronary Syndromes: Special problems in Acute Myocardial Infarction; (a) right ventricular infarction (b) acute myocardial infarction and normal coronary arteries; (c) non perfused acute myocardial infarction after thrombolytic therapy.

2.4.6: Non Pharmacological treatment of Ischemic Heart Disease: Special problems in non pharmacologic therapy: (a) unprotected left main coronary angioplasty; (b) chronic total occlusion; (c) saphenous vein graft interventions; (d) percutaneous intervention of cardiac allograft vasculopathy; (e) In-stent restenosis.

2.4.7: Hypertension: Management issues in difficult hypertension like (a) Hypertension and ethnicity; (b) hypertension in pregnancy preeclampsia; (c) perioperative hypertension; (d)

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO DIAGNOSTIC AND INTERVENTIONAL CARDIOLOGY INCLUDING CARDIAC INSTRUMENTATION. ambulatory blood pressure monitoring; (e) diabetes and hypertension; (f) resistant hypertension; (g) hypertension in the context of acute myocardial infarction or coronary interventions; (h) concomitant therapy in hypertension.

2.4.8: Cardiac Arrhythmias: Special problems in cardiac pacing like (a) pacemaker syndrome; (b) temporary cardiac pacing; (c) diagnostic and surgical procedures in pacemaker patients; (d) pacemaker lead extraction; (e) biventricular pacing for congestive heart failure. Special problems in supraventricular arrhythmias like (a) Syncope in PSVT; (b) paroxysmal and perioperative atrial fibrillation; (c) cycle length alternation in supraventricular tachycardia; (d) atrial flutter; (e) atrial fibrillation and anticoagulants. Special problems in ventricular arrhythmias like; (a) problems of implanted defibrillators; (b) syncope in a patient; (c) palpitations and VT in a young woman.

2.4.9: Heart Failure and Cardiomyopathy: Special problems in chronic heart failure like; (a) mechanisms of exercise intolerance and exercise testing; (b) cardiac cachexia; (c) anemia, renal dysfunction and depression in heart failure; (d) disease management programs. Special problems in myocarditis and cardiomyopathy like (a) peripartum cardiomyopathy; (b) HIV myocarditis and cardiomyopathy; (c) Adriamycin induced cardiomyopathy; (d) Tachycardiomyopathy; (e) Diabetic Cardiomyopathy.

2.4.10: Valvular Heart Disease: Special problems in valvular heart diseases like; (a) new onset atrial fibrillation in asymptomatic mitral stenosis; (b) mitral stenosis and pregnancy; (c) low gradient, low output aortic stenosis; (d) mild to moderate aortic stenosis in patients undergoing bypass surgery; Special problems in surgical treatment of valvular diseases: (a) perivalvular leaks; (b) pregnancy and anticoagulation; (c) postoperative management of valvular dysfunction in valvular surgical treatment.

2.4.11: Congenital Heart Disease: Special problems in Adult Congenital heart diseases: (a) pregnancy in a woman with Eisenmenger syndrome; (b) thromboembolism after Fontan procedure; (c) late systemic RV failure in patients with TGA.

2.4.12: Special problems for the Cardiology Consultant.

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SUGGESTED READING

A. Books

- 1 Heart Disease: A Text Book of Cardiovascular Medicine. Vol I&II Eugene Braunwald. W.B. Saunders Company.
- 2 Hurst's The Heart Vol I&II Robert C Schlant, R Wayne Alexander McGraw-Hill Inc.
- 3 Feigenbaum's Echocardiography. Harvey Feigenbaum; William Armstrong Lippincott Williams & Wilkins.
- 4 Clinical Definition Of Congenital Heart Diseases. Joseph K Perloff. W.B. Saunders Company.
- 5 Interventional Cardiac Catheterization Handbook . Morton J. Kern. Mosby-Year Book Inc.
- 6 Introduction to Electrocardiography. Leo Schamroth. Blackwell Sciences.
- 7 Chou's Electrocardiography in Clinical Practice: Adult and Pediatric. Borys Surawicz; Timothy Knilans. W.B. Saunders Company.
- 8 The ECG in Emergency Decision Making. Hein J. J. Wellens; Mary Boudreau Conover. W.B. Saunders Company.
9. Moss and Adams Heart Disease in Infants, Children and Adolescents. George C. Emmanouilides, Thomas A Rimonschneider, Hugh D. Allen, Howard P. Gutgesell. Williams and Wilkins.
10. Cardiac Surgery Vol.I&II. Kirklin J.W.Barratt-Boyes. Churchill Livingstone.
- 11 Text Book of Valvular Heart Disease. Joseph S Alpert, James S Dalen. Lippincott Williams & Wilkins.
- 12 Heart Failure: A Companion to Braunwald's Heart Disease, Douglas L. Mann. W.B. Saunders Company.
- 13 Cardiac Pacemakers Step by Step: An Illustrated Guide. S. Serge Barold; Roland Stroobandt. Futura Publishing Co.
- 14 Cardiac Electrophysiology – From Cell To Bedside. Zipes and Jalife. W.B. Saunders Company.

15 Text book of Cardiovascular Medicine. Eric J Topol. Lippincott Williams & Wilkins.

16 Clinical Pediatric Arrhythmias. Gillete and Garson. W.B. Saunders Company.

17 Pathology of Congenital Heart Diseases. Anton.E.Beeker, Robert H Anderson. Butterworths.

18 Echocardiography Manual. Jae K Oh, Jamil Tajik. Lippincott Williams & Wilkins.

19 Stress Testing : Principles And Practice. Mervin H Ellested.

20. Oxford University Press Co 20 Text book of Interventional Cardiology. Eric J Topol. W.B. Saunders Company.

B. Journals

1. Indian Heart Journal

2. Journal of American College of Cardiology

3. Circulation

4. Heart

5. European Heart Journal

6. NEJM

7. BMJ

8. Journal of Thoracic and Cardiovascular Cardiology



**BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE**

**Faculty of Medical Sciences
DM - Cardiology
Old Syllabus**

**Bharati Vidyapeeth
(Deemed to be University)
Medical College, Pune**

Department of Cardiology

DM (Cardiology)

Bharati Vidyapeeth Deemed to be University. Medical College, Pune

Department of Cardiology

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- Be able to carry out efficient management of all types of cardiovascular emergencies after quickly assessing the patient & synthesizing available clinical & investigational information. To keep abreast of the current knowledge & recent advances in the field by self learning &/or participating in Continuing Medical Education programmes.
- Deliver preventive & rehabilitative care.
- Organize & manage administrative responsibilities for routine day to day work as well as emergent/urgent situations.
- Understand the functional principles of various biomedical equipments used in invasive & non invasive cardiology.
- Carry out research & publications in the field.
- Teach the medical & other paramedical students/staff and develop learning resource material for them.

Skills :-

Non-invasive Techniques

The candidate is given adequate training during the course so that he she will be able to perform & interpret various non invasive techniques including:

- Electrocardiography.
- Stress testing – ECG tread mill test, stress echocardiography & nuclear stress tests.
- Holter monitoring for arrhythmias & ischemic disorders
- Echocardiography – M-mode, Two dimensional, Doppler, Color flow imaging, Trans-Esophageal Echocardiography & echo directed hemodynamic studies.

Invasive Cardiology

The candidate is given adequate training so that he/she will be able to :-

- Perform temporary pacemaker insertion, pericardiocentesis, central venous line insertions.

- Assist in various interventions including valvuloplasty, coronary & congenital interventions.
- Perform cardiac catheterization & to calculate & interpret various hemodynamic parameters.
- Right & left heart catheterization & coronary angiography procedures in adults & children.
- Electrophysiology: To interpret electrophysiological data & assist in electrophysiology procedures, permanent pacemaker implantation, AICD implantation.

Affective Domain :-

Students should be able to

- Adopt ethical practices in dealing with patients, colleagues, subordinates, superiors & health care workers.
- Promote cordial interpersonal relation.
- Perform as a team.
- Learn to be a leader when the need arises.
- Learn to order investigations & prescribe drugs rationally
- Be aware of ethical issues in human and animal research.
- Take rational decision in the face of ethical dilemmas in cardiac diseases.
- Demonstrate sympathy & humane approach towards patients & their families & exhibit interpersonal behavior in accordance with social norms & expectations.

Programme Structure :-

The DM Cardiology course centers around “Autonomous & Self directed” learning. Post Doctoral students seek knowledge & skills on their own initiative by self study & participation in academic/ practical activity of the department. The following organized experiences are provided to the students :-

1. Case presentation & case management in OPD & Indoor wards: The PG students present cases daily on clinical rounds to the faculty members of the department. The students are provided facilities to

manage cases of higher and greater complexity by allowing them graded responsibility as the course progresses.

2. PG lectures, Seminars, Symposia, Panel Discussions & Grand Rounds of suitable topics: These are held once a week. Topics of common interest to PGs are covered in the program. Each PG student should present minimum 6 seminars every year.
3. Journal Clubs: These are held once a week. Each PG student should present minimum 6 journal clubs every year.
4. Clinico-Pathological Correlation meetings are held monthly with Pathology department
5. Medical Audit / Fatality case discussions. PG student is expected to analyze & discuss the cases allotted to him/her
6. Intramural and extramural training programs. Interdepartmental meetings are organized with Cardiovascular Thoracic Surgery and Pathology departments as required. PG students actively participate in the meetings & discuss the cases or topics allotted. Participation in conferences, workshops, field visits, camps, etc.
7. Preparation and presentation of a dissertation: Every PG student is required to carry out the research work under the supervision of his guide in the field of Cardiology. The thesis work can be carried out by student jointly with other departments & the faculty from other departments can be opted as co-guides.
8. Departmental Clinical work: PG students are allowed to perform procedures under supervision and /or delegated authority depending on the experience and proficiency gained. The Heads of Units and other consultants and guides are in-charge of the supervision and delegation of authority and responsibility to work. The PG student are also involved in various clinical research work being undertaken in the department by the faculty members. Each student is required to participate in at least one research project every year.
9. Intradepartmental postings Every PG student will be posted by rotation in different sections of the Cardiology Department like Outpatient departments, Cardiology wards, Intensive Cardiac Care Unit, Stress test unit, Echocardiography lab and Cardiac Catheterisation Lab. A record of the observations made & lessons learnt are maintained by the students.

10. Teaching experience: The PG students participate in all aspects of teaching, specially practicals, demonstration & tutorials. During their tenure, they work under faculty members on rotation basis as per the allotment of the teaching schedule. The candidate is regularly involved in teaching of undergraduate medical, paramedical, & nursing students as well as Internal Medicine, Pediatrics postgraduate students. Their teaching skill is assessed & forms part of the internal assessment.
11. Community Cardiology The training of PG students involves learning experience “Derived from” or “Targeted to” the needs of the community. It is therefore necessary to expose the students to community based activities.

Throughout the course of training the emphasis is on acquiring knowledge, skill and attitudes through first hand experiences as far as possible. The emphasis is on self learning rather than on didactic lectures.

The entire period is ‘in service’ training, with programme based on the concept of ‘learn as you work’ principle.

ORGANIZATION OF COURSE:

Admission to the course is through NEET Super Speciality.

Number of students: each year students are enrolled maintaining a teacher/students ratio of at least 1:1, as per University & MCI guidelines.

Eligibility: M.D. or D.N.B. (Medicine or Pediatrics)

Duration of course is 3 completed years including the period of examination.

Attendance: All the candidates joining the PG training program work as Full Time Residents during the period of training. It is desirable that candidates should have 100% attendance to enable this objective to be achieved. However a minimum of at least 80% attendance and achievement of satisfactory standards in both theoretical and clinical Cardiology is required before they are allowed to appear for the University examination.

Leave: Residents are entitled to 30 days leave in the first year and 36 days each in the second and third years of residency.

Postings/Rotations

There will be structured training program. The students are expected to learn in phasic manner starting with basic care progressing to advanced care management

1st Year – Outpatient, Inpatient care (which includes Ward duty, ICCU duty and attending referral calls on emergency). Training in Stress test/Holter monitoring, Literature search and plan for dissertation.

2nd Year – Outpatient and Inpatient Care Training in Echocardiography and Catheterisation laboratory. Allied postings–Cardiovascular and Thoracic Surgery, Vascular Interventional Radiology, Nuclear medicine.

3rd Year – Outpatient and Inpatient Care, Echocardiography and Cath Lab postings. Research projects finalization and preparing dissertation. Extramural rotation Extramural rotations or elective rotations for a maximum period of 2 months will be possible during end of the 2nd year of training. The candidates can undertake up to 2 months elective rotation at parent or other institutions in the country centers approved by the Department.

There is a continuous interaction between the Cardiology Department and the allied departments to ensure that the students achieve these skills during their peripheral postings Research work. The candidates are required to submit a thesis during the course of DM programme. A subject for dissertation is allotted to the P.G. within the first 6 months after joining. The emphasis on dissertation work is on review of literature, maintaining a record of references, preparation of a plan of study, documentation of aims, planning the methodology, collection, documentation and analysis of data, comparison of data obtained with others in literature, drawing conclusions and writing a summary. The subject of dissertation is preferably prospective. Analysis of less than 25 cases is not permitted unless it is a rare disease. Progress on dissertation is reviewed every semester and feedback given to the candidates. The candidates make at least three formal presentations to the department i) protocol ii) midcourse progress and iii) final report. The thesis is submitted to the university 6 months before the final examination. 4 copies of completed dissertation after appropriate certifications by the guide and co-guide are submitted at the end of the 2½ years (There are, therefore, 2 complete years after submission of protocol and the final dissertation). At least 24 months are

spent in the research project undertaken. ii. Two papers (pertaining to the thesis or other wise) for publication in Indexed journal before appearing for the final DM exam. iii. The candidate attends continuing education symposia, workshops, and conferences including meeting of the Cardiological Society of India, workshops on Echocardiography, Electrophysiology, Cardiac Catheterisation etc.

Log book. The post graduate students maintain a Record Book (Log Book) of the work carried out by them & training program undergone during the period of training including details of procedures carried out independently or assisted by the candidate. The log book is checked by the faculty members imparting the training.

Development of attitude is a very important part of management of cardiac patients. It is the constant endeavour of the faculty to develop desirable attitudes in the PG trainees during the course by personal examples, interaction and group discussion. Constant watch is maintained during their work in the wards to ensure that this objective is being met. Although there is no formal evaluation of attitude, some aspects of this domain are covered during the formative evaluation.

Evaluation shall consist of Formative and Summative assessment.

A. Formative	Ward work	Case presentation	PG lecture	Journal Club
General assessment of attitude		Internal assessment		

B. Summative	Thesis	Final examination
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A. Formative assessment.

The purpose of continuous course assessment is mainly

1. To ensure the habits of regularity, punctuality and disciplined working amongst PG students.
2. To give periodic feedback regarding their performance during the medical course & to enable them to take corrective steps to enhance their learning in various areas mentioned. eg. Patient care, research, teaching, administration etc.
3. To monitor attainment of clinical and technical skills to ensure adequacy of training.

4. To make it available to the internal examiner at the time of final examination to discount the possibility of a single adverse performance influencing the pass or fail situation of the candidate. This would give an idea of the continued performance of the candidate during the three years of training to the external examiners, so that candidates who have otherwise been rated as satisfactory in their internal evaluation can be given more chances in the final examinations to more questions and overcome the adverse effects of doing badly in any one case.

Formative evaluation is carried out over following activities of the P.G. resident.

(See Annexure)

- Ward work.
- Case presentation
- P.G. Lecture
- Journal club
- General assessment of affective function attitude by medical & paramedical staff.
- Internal Assessment Candidates can appear for theory examination only after being certified on the basis of internal assessment. However, internal evaluation marks cannot directly be used for influencing the outcome of the summative assessment. It can not be used to fail a candidate who has otherwise done well in the final examination or to pass a candidate who has done consistently bad in summative assessment.

Continuous assessment will be done on an ongoing basis using a logbook covering day to day performance of the candidate.

Summative assessment

Summative assessment consists of two parts: 1. Evaluation of thesis/dissertation prepared by the candidates 2. Final examination

1. Thesis/dissertation. All candidates on admission are allotted one of the department faculty who have fulfilled the requirement to be guides for purposes of

guiding Dissertation/thesis. The topic for dissertation is finalized and discussed in the departmental faculty meeting and allotted to the individual candidates before the completion of 3 months after admission. The purpose of dissertation is to develop in the candidate the ability to perform an independent study keeping the principles and research methodology in mind. The candidate, therefore, works on the prospective problem either within the department or in collaboration with other departments. There is continuous monitoring of the dissertation work by the guides and co-guides and by the other department staff throughout the course. The candidate presents the progress of the dissertation to the faculty on the completion of 1 ½ years for monitoring and feed back. The completed dissertation is submitted no later than 6 months before final examination. The dissertation is evaluated independently by the internal examiners and two external examiners under the following heading :

- 1) Approved 2) Not approved

In all cases the approval is given before 3 months of the date of appearing for the examination and this is essential before the candidate is allowed to appear for the written examination.

1.Final Examination Eligibility The candidate should have 1.Attendance of minimum 80% percentage 2.Satisfactory internal assessment 3.Approval of dissertation submitted

Candidates can appear for theory examination only after being certified on the basis of internal assessment.

- A. Theory examination
- B. Practical examination

(above as per directions of University)

Syllabus :-

2.1: BASIC SCIENCES RELATED TO CARDIOLOGY

2.1.1: CARDIAC ANATOMY

The cardiac anatomy with special emphasis on development of heart and blood vessels, foetal circulation and its changes in post natal life; coronary circulation; venous drainage of heart ; the heart and pericardium and its relation to neighbouring structures; anatomy of cardiac chambers and valves; arteries and veins; histology of heart and blood vessels. Functional anatomy of the heart, orientation of the heart within the Thorax, Methods used to study cardiac anatomy, correlative anatomy, New developments and future challenges, Quantum computing, Ultrastructure of the heart, Cardiac Embryology and Histology.

2.1.2: CARDIAC PHYSIOLOGY

Cardiac Physiology will cover all the physiological changes in the heart during its normal function with special reference to cardiac cycle; myocardial contractility; pressure changes in the cardiac chambers; cardiac output; factors controlling blood flow; regulation of cardiac function; cardiac reflexes; coronary blood flow; exercise physiology; physiology of blood pressure regulation; normal influence on cardiovascular system; preload; after-load; assessment of ventricular function; regulation of cardiac contraction; action potentials; the cellular basis of cardiac contraction, Integration of the cardiovascular system the response to dynamic exercise, etc.

2.1.3. CARDIAC MOLECULAR BIOLOGY

Principles of molecular biology including Gene Structure, Expression and regulation; Recombinant DNA Technology; PCR Techniques, Molecular basis for cellular growth, Molecular and cellular biology of the normal, hypertrophied and failing heart including cardiac growth and hypertrophy, Molecular and Cellular biology of the blood vessels including endothelial cell vascular smooth muscle interactions, atherosclerosis etc, The Human Genome and its future implications for cardiology including bioethical implications and genetic counselling, Cardiovascular Tissue modification by genetic approaches including Gene Transfer etc, Molecular Development of the heart including anomalies.

2.1.4 CARDIAC BIOCHEMISTRY

All aspects of normal and abnormal patterns of cardiac biochemistry including cardiac enzymes; lipid profile, cardiac metabolism, electrolytes and their effect on cardiac function etc.

2.1.5 CARDIAC PHARMACOLOGY

All the drugs used in the treatment of cardiac disorders inclusive of antianginal agents like beta-blocking agents, nitrates and calcium channel blockers, antifailure agents like diuretics, Angiotensin-Converting Enzyme (ACE) Inhibitors, Angiotensin-II Receptor Blocking Drugs (ARBs) and aldosterone antagonism, Digitalis, Acute Inotropes and inotropic Dilators, Antihypertensive Drugs, Antiarrhythmic Drugs, Antithrombotic agents like Platelet Inhibitors, Anticoagulants and Fibrinolytics, Lipid-Lowering and Atherosclerotic Drugs , choice of drugs, which drug for which disease?, Adverse Cardiovascular Drug Interactions and Complications.

2.1.6 CARDIAC PATHOLOGY

All pathological changes in various cardiac diseases with special reference to clinical correlation included. Special emphasis on pathological changes in the pulmonary vascular system in various cardiac disorders; pathogenesis and pathology of rheumatic fever and rheumatic heart disease; cardiomyopathies dilated, hypertrophic and obliterative / restrictive; congenital heart disease-cyanotic and acyanotic; atherosclerosis; coronary artery disease; cardiac involvement in other systemic diseases and storage disorders etc.

2.1.7 CARDIAC MICROBIOLOGY

The various microbiological aspects of cardiac diseases including rheumatic fever, infective endocarditis, myocarditis are included. Cardiac Molecular Biology has been included under a separate head.

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO BASIC SCIENCES AS RELATED TO CARDIOLOGY.

2.2 CLINICAL CARDIOLOGY INCLUDING PEDIATRIC CARDIOLOGY.

2.2.1 GENERAL EVALUATION OF THE PATIENT

The History, Physical Examination and Cardiac Auscultation including elements of accurate history taking, symptoms associated with cardiovascular disease, The physical examination of adults, children, infants and neonates, syndromes associated with congenital heart disease, measurement of arterial blood pressure, venous pulse, examination of the retina, inspection and palpation of the precordium, cardiac auscultation.

2.2.2 HEART FAILURE

Pathophysiology and diagnosis of Heart Failure, Diagnosis and management of heart failure, Cardiac transplantation and mechanical ventricular support.

2.2.3 RHYTHM AND CONDUCTION DISTURBANCES

Mechanisms of cardiac arrhythmias and conduction disturbances, Recognition, clinical assesment and management of arrhthmias and conduction disturbances, antiarrhythmic drugs, etc

2.2.4 SYNCOPE, SUDDEN DEATH AND CARDIO-PULMONARY RESUSCITATION

Diagnosis and management of syncope, sudden cardiac death, Cardiopulmonary Resuscitation and the subsequent management of the patient etc.

2.2.5 CORONARY HEART DISEASE

Atherogenesis and its determinants, Pathology of coronary atherosclerosis, Coronary blood flow and myocardial ischemia, Dyslipidemia, other risk factors, and the prevention of coronary heart disease, Non atherosclerotic coronary heart disease, Diagnosis and management of patients with chronic ischemic heart disease, Diagnosis and management of patients with unstable angina, Diagnosis and management of patients with acute myocardial infarction, The electrocardiogram in Acute myocardial infarction, Thrombogenesis, antithrombotic and thrombolytic therapy, rehabilitation of the patient with coronary heart disease etc.

2.2.6 SYSTEMIC ARTERIAL HYPERTENSION

Hypertension, epidemiology, pathophysiology, diagnosis and treatment.

2.2.7 PULMONARY HYPERTENSION AND PULMONARY DISEASE

Pulmonary hypertension, Pulmonary embolism, Chronic Cor pulmonale etc.

2.2.8 VALVULAR HEART DISEASE

Acute rheumatic fever, Aortic valve disease, Mitral valve disease, Mitral valve prolapse syndrome, tricuspid valve, pulmonic valve and multivalvular disease, Clinical performance of prosthetic heart valves, Antithrombotic therapy for valvular heart disease etc.

2.2.9 CONGENITAL HEART DISEASE

Cardiovascular disease due to genetic abnormalities, the pathology, pathophysiology, recognition and treatment of congenital heart diseases, Congenital heart disease in adults etc.

2.2.10 CARDIOMYOPATHY AND SPECIFIC HEART MUSCLE DISEASES

Classification of cardiomyopathies, Dilated cardiomyopathy, hypertrophic cardiomyopathy, Restrictive, obliterative and infiltrative cardiomyopathies, Myocarditis and specific cardiomyopathies endocrine disease and alcohol, AIDS and the cardiovascular system, Effect of noncardiac drugs, electricity, poisons and radiation and the heart etc.

2.2.11 PERICARDIAL DISEASES AND ENDOCARDITIS

Diseases of the pericardium, Infective endocarditis

2.2.12 THE HEART, ANESTHESIA, AND SURGERY

Perioperative evaluation and management of patients with known or suspected cardiovascular disease who undergo noncardiac surgery, Anesthesia and the patient with cardiovascular disease, etc.

2.2.13 MISCELLANEOUS DISEASES AND CONDITIONS

The connective tissue diseases and the cardiovascular system, Neoplastic heart disease, Diabetes and cardiovascular disease, traumatic heart disease, effects of mood and anxiety disorders on the cardiovascular system, Heart disease and pregnancy, The heart and obesity, the heart and kidney disease, exercise and the

cardiovascular system, Acute hemodynamics conditioning training the athlete's heart and sudden death, Cardiovascular aging in health and therapeutic considerations in older patients with cardiovascular diseases, women and coronary artery disease etc.

2.2.14 TROPICAL CARDIOLOGY

Conditions which are specifically found in the tropics like rheumatic heart disease, Endomyocardial Fibrosis, Eosinophilic Heart Disease, Aortoarteritis etc.

2.2.15 DISEASES OF THE GREAT VESSELS AND PERIPHERAL VESSELS

Diagnosis and treatment of diseases of the aorta, Cerebrovascular disease and neurologic manifestations of heart disease, diagnosis and management of diseases of the peripheral arteries and veins, surgical treatment of peripheral vascular diseases, etc.

2.3 DIAGNOSTIC AND INTERVENTIONAL CARDIOLOGY INCLUDING CARDIAC INSTRUMENTATION

2.3.1 DIAGNOSTIC CARDIOLOGY

The resting Electrocardiogram, The Chest roentgenogram and cardiac fluoroscopy, The Echocardiogram, ECG Exercise Testing, Cardiac Catheterization, Coronary Arteriography, Coronary Blood Flow and Pressure Measurements, Cardiac Ventriculography, Pulmonary Angiography, Angiography of the Aorta and Peripheral Vessels, Nuclear Cardiology, Computed tomography of the Heart, Magnetic resonance Imaging of the heart, Magnetic Resonance imaging of the Vascular System, Positron Emission Tomography for the noninvasive study and quantification of blood flow and metabolism in human cardiac disease, long-term continuous electrocardiographic recordings, Signal Averaging techniques and measurement of Late Potentials, Techniques of Electrophysiologic evaluation of Brady and tachyarrhythmias, Coronary Intravascular Ultrasound Imaging endomyocardial biopsy etc.

2.3.2 INTERVENTIONAL CARDIOLOGY

Percutaneous Coronary Interventions, Coronary Angioplasty, Atherectomy, Atheroablation and Thrombectomy, Coronary Stenting, Balloon Valvuloplasty,

Peripheral Intervention, Pediatric interventions, Intraaortic Balloon Counterpulsation and other Circulatory Assist Devices, Interventional Electrophysiology, Cardiac pacemakers, implantable devices for heart failure and for the treatment of cardiac arrhythmias etc.

2.3.3 CARDIAC INSTRUMENTATION

Principles of cardiac instrumentation, pressure recording, ECG Machines, Cardiac Monitors, Defibrillators, Cath-Lab Equipment, EP Lab Equipment, Gamma Camera, CT Scan, MRI Equipment, PET Scans, Echocardiography including Stress Echo, Colour Doppler and

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO CLINICAL CARDIOLOGY INCLUDING PEDIATRIC CARDIOLOGY.

THE CLINICAL EXAMINATION WOULD BE ENTIRELY DEVOTED TO CLINICAL CARDIOLOGY INCLUDING PEDIATRICS ON THE ABOVE SYLLABUS AND WOULD INCLUDE ONE LONG CASE OF 100 MARKS AND TWO SHORT CASES OF 50 MARKS EACH, TOTALLING TO 200 MARKS

TEE, Pacemakers temporary and Permanent, ICDs, Triple Chamber Devices, radiofrequency ablation equipment, programmed stimulators, IABP, Holter and Signal Averaging and ABP machines, Treadmill equipments, Hemodynamic recorders, oximeters, Computers and image processing in Cardiology etc.

2.4 RECENT ADVANCES IN CARDIOLOGY, CARDIAC EPIDEMIOLOGY, PREVENTIVE CARDIOLOGY INCLUDING RELATED CARDIAC SURGERY

2.4.1: Atherosclerosis and Prevention: Epidemiology of Cardiovascular Diseases, Risk factors for atherosclerotic diseases, assessment of cardiac risk, Special Problems in the prevention of cardiovascular disease; (a) Diabetes mellitus type 2; (b) Menopausal women; (c) Non-traditional risk factors for coronary disease, Special problems in hyperlipidemia therapy; (a) Child with hypercholesterolemia; (b) Transplant patient; (c) Hypercholesterolemia in the elderly; (d) Elevated lipoprotein.

2.4.2: Non Cardiac Vascular Disease: Special problems in Vascular Disease; (a) Compromise of an internal thoracic artery to coronary artery graft by subclavian artery disease; localised lymphedema

2.4.3: Ischemic Heart Disease: Special Diagnostic issues in Ischemic Heart Disease:

- (a) The patient with chest pain, a positive stress test and normal coronary arteries;
- (b) The patient with coronary artery disease and acute and chronic heart failure

2.4.4: Stable Coronary Syndromes: Special problems in myocardial ischemia; (a) management of variant angina breakthrough; (b) management of the non-revascularization patient with severe angina; (c) treatment of silent ischemia; (d) treatment of microvascular angina; (e) Viagra, sexual activity and the cardiac patient.

2.4.5: Acute Coronary Syndromes: Special problems in Acute Myocardial Infarction; (a) right ventricular infarction (b) acute myocardial infarction and normal coronary arteries; (c) non perfused acute myocardial infarction after thrombolytic therapy.

2.4.6: Non Pharmacological treatment of Ischemic Heart Disease: Special problems in non pharmacologic therapy: (a) unprotected left main coronary angioplasty; (b) chronic total occlusion; (c) saphenous vein graft interventions; (d) percutaneous intervention of cardiac allograft vasculopathy; (e) In-stent restenosis.

2.4.7: Hypertension: Management issues in difficult hypertension like (a) Hypertension and ethnicity; (b) hypertension in pregnancy preeclampsia; (c) perioperative hypertension; (d)

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO DIAGNOSTIC AND INTERVENTIONAL CARDIOLOGY INCLUDING CARDIAC INSTRUMENTATION. ambulatory blood pressure monitoring; (e) diabetes and hypertension; (f) resistant hypertension; (g) hypertension in the context of acute myocardial infarction or coronary interventions; (h) concomitant therapy in hypertension.

2.4.8: Cardiac Arrhythmias: Special problems in cardiac pacing like (a) pacemaker syndrome; (b) temporary cardiac pacing; (c) diagnostic and surgical procedures in pacemaker patients; (d) pacemaker lead extraction; (e) biventricular pacing for congestive heart failure. Special problems in supraventricular arrhythmias like (a) Syncope in PSVT; (b) paroxysmal and perioperative atrial fibrillation; (c) cycle length alternation in supraventricular tachycardia; (d) atrial flutter; (e) atrial fibrillation and anticoagulants. Special problems in ventricular arrhythmias like; (a) problems of implanted defibrillators; (b) syncope in a patient; (c) palpitations and VT in a young woman.

2.4.9: Heart Failure and Cardiomyopathy: Special problems in chronic heart failure like; (a) mechanisms of exercise intolerance and exercise testing; (b) cardiac cachexia; (c) anemia, renal dysfunction and depression in heart failure; (d) disease management programs. Special problems in myocarditis and cardiomyopathy like (a) peripartum cardiomyopathy; (b) HIV myocarditis and cardiomyopathy; (c) Adriamycin induced cardiomyopathy; (d) Tachycardiomyopathy; (e) Diabetic Cardiomyopathy.

2.4.10: Valvular Heart Disease: Special problems in valvular heart diseases like; (a) new onset atrial fibrillation in asymptomatic mitral stenosis; (b) mitral stenosis and pregnancy; (c) low gradient, low output aortic stenosis; (d) mild to moderate aortic stenosis in patients undergoing bypass surgery; Special problems in surgical treatment of valvular diseases: (a) perivalvular leaks; (b) pregnancy and anticoagulation; (c) postoperative management of valvular dysfunction in valvular surgical treatment.

2.4.11: Congenital Heart Disease: Special problems in Adult Congenital heart diseases: (a) pregnancy in a woman with Eisenmenger syndrome; (b) thromboembolism after Fontan procedure; (c) late systemic RV failure in patients with TGA.

2.4.12: Special problems for the Cardiology Consultant.

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO RECENT ADVANCES IN CARDIOLOGY, CARDIAC EPIDEMIOLOGY, PREVENTIVE CARDIOLOGY AND RELATED CARDIAC

SUGGESTED READING

A. Books

- 1 Heart Disease: A Text Book of Cardiovascular Medicine. Vol I&II Eugene Braunwald. W.B. Saunders Company.
- 2 Hurst's The Heart Vol I&II Robert C Schlant, R Wayne Alexander McGraw-Hill Inc.
- 3 Feigenbaum's Echocardiography. Harvey Feigenbaum; William Armstrong Lippincott Williams & Wilkins.
- 4 Clinical Definition Of Congenital Heart Diseases. Joseph K Perloff. W.B. Saunders Company.
- 5 Interventional Cardiac Catheterization Handbook . Morton J. Kern. Mosby-Year Book Inc.
- 6 Introduction to Electrocardiography. Leo Schamroth. Blackwell Sciences.
- 7 Chou's Electrocardiography in Clinical Practice: Adult and Pediatric. Borys Surawicz; Timothy Knilans. W.B. Saunders Company.
- 8 The ECG in Emergency Decision Making. Hein J. J. Wellens; Mary Boudreau Conover. W.B. Saunders Company.
9. Moss and Adams Heart Disease in Infants, Children and Adolescents. George C. Emmanouilides, Thomas A Rimonschneider, Hugh D. Allen, Howard P. Gutgesell. Williams and Wilkins.
10. Cardiac Surgery Vol.I&II. Kirklin J.W.Barratt-Boyes. Churchill Livingstone.
- 11 Text Book of Valvular Heart Disease. Joseph S Alpert, James S Dalen. Lippincott Williams & Wilkins.
- 12 Heart Failure: A Companion to Braunwald's Heart Disease, Douglas L. Mann. W.B. Saunders Company.
- 13 Cardiac Pacemakers Step by Step: An Illustrated Guide. S. Serge Barold; Roland Stroobandt. Futura Publishing Co.
- 14 Cardiac Electrophysiology – From Cell To Bedside. Zipes and Jalife. W.B. Saunders Company.

15 Text book of Cardiovascular Medicine. Eric J Topol. Lippincott Williams & Wilkins.

16 Clinical Pediatric Arrhythmias. Gillete and Garson. W.B. Saunders Company.

17 Pathology of Congenital Heart Diseases. Anton.E.Beeker, Robert H Anderson. Butterworths.

18 Echocardiography Manual. Jae K Oh, Jamil Tajik. Lippincott Williams & Wilkins.

19 Stress Testing : Principles And Practice. Mervin H Ellested.

20. Oxford University Press Co 20 Text book of Interventional Cardiology. Eric J Topol. W.B. Saunders Company.

B. Journals

1. Indian Heart Journal

2. Journal of American College of Cardiology

3. Circulation

4. Heart

5. European Heart Journal

6. NEJM

7. BMJ

8. Journal of Thoracic and Cardiovascular Cardiology