ORDINANCE No. V (143)

ORDINANCE RELATING TO DM (Cardiology) COURSE AND SYLLABUS

CHAPTER-1

1. This ordinance may be called the "ordinance relating to DM cardiology course and syllabus"
2. It shall come into force with immediate effect.

CHAPTER-2

SELECTION PROCEDURE AND ELIGIBILITY

1. Students for Broad Super Speciality medical courses shall be selected strictly on the basis of their academic merit.
2. For determining the academic merit, the university shall follow the criterion of: merit as determined by the competitive test conducted by a competent authority
3. The minimum percentage of marks for eligibility for admission to Super Speciality medical courses shall be as per the guidelines issued by apex regulatory body and Central and state government
4. The eligibility for the DM cardiology course shall be strictly as per the NMC rules and regulations

CHAPTER-3 CURRICULUM

SUBHARTI MEDICAL COLLEGE, MEERUT

DM Cardiology

(Programme code – MM-)

Year of Implementation: 2023 – 24

ORDINANCE

DEPARTMENT OF CARDIOLOGY

SUBHARTI MEDICAL COLLEGE

SWAMI VIVEKANAND SUBHARTI UNIVERSITY

MEERUT (U.P.) 250005

PROGRAMME GOAL

The goal of course is to produce a competent cardiologist who:

• Recognizes the health needs of patients and carries out professional obligations in keeping the principles of National Health policy and professional ethics

• Has acquired the competencies pertaining to neurology that are required to be practiced in the community and at all levels of health care system has acquired skills in effectively communicating with the patients, family and the community

• Is aware of the contemporary advances and developments in medical sciences Acquires a spirit of scientific enquiry and is oriented to principles of research methodology

• Has acquired skills in educating medical and paramedical professionals

PROGRAMME OBJECTIVES At the end of the Postgraduate training in the discipline concerned the student shall be able to

• Recognize the importance of Cardiology in the context of the health needs of the community and national priorities in the health sector.

• Practice Cardiology ethically and in step with the principles of primary health care. • Demonstrate sufficient understanding of the basic sciences relevant to Cardiology.

• Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive, and promotive measures/strategies.

• Diagnose and manage majority of conditions in the specialty of Cardiology on the basis of clinical assessment, and appropriately selected and conducted investigations.

• Plan and advice measures for the prevention and rehabilitation of patients suffering from disease and disability related to the specialty of Cardiology.

• Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned situation.

• Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectation.

• Play the assigned role in the implementation of National Health Programme, effectively and responsibly.

• Organize and supervise the Cardiological Health Care services demonstrating adequate managerial skills in the clinic/hospital in the field situation.

• Develop skills as a self-directed learner, recognize continuing educational needs: select and use appropriate learning resources.

• Demonstrate competence in basic concepts of research methodology and epidemiology and be able to critically analyze relevant published research literature.

• Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.

• Function as an effective leader of a health team engaged in health care, research or training.

• Take detailed history, perform full physical examination and make a clinical diagnosis.

• Perform and interpret relevant investigations (Imaging and Laboratory).

• Perform and interpret important diagnostic procedures.

• Diagnose cardiovascular illnesses based on the analysis of history, physical examination and investigative work up;

• Plan and deliver comprehensive treatment for illness using principles of rational drug therapy.

• Plan and advice measures for the prevention of cardiovascular disease

• Plan rehabilitation of adults suffering from chronic illness, and those with special needs • Manage cardiological emergencies efficiently;

• Demonstrate skills in documentation of case details, and of morbidity and mortality data relevant to the assigned situation;

• Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities;

• Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities.

• Develop skills as a self- directed learner, recognize continuing educational needs; use appropriate learning resources, and critically analyze published literature in order to practice evidence-based medicine

• Demonstrate competence in basic concepts of research methodology and epidemiology;

• Facilitate learning on MD residents, medical/nursing students, practicing physicians, paramedical health workers and other providers as a teachertrainer

• Play and assigned role in the implementation of national health programs, effectively and responsibly; • Organize and supervise the desired managerial and leadership skills;

• Function as a productive member of a team engaged in health care, research and education.

NATIONAL OBJECTIVES

• Should be able to work in any hospital in India with minimum of facilities and should be able to diagnose and treat cardiac disease swiftly and efficiently both on an elective and emergency basis.

• Should be able to start a Cardiac Unit with effective functioning with minimum inputs.

Should be able to work effectively in National Programme for the Prevention or Eradication of Heart Diseases.

ELIGIBILITY CRITERIA FOR ADMISSIONS TO THE PROGRAMME

(A) DM Cardiology Course: 1. Any medical graduate with MD/DNB in General Medicine or Paediatrics qualification , who has qualified the Entrance Examination conducted by NMC and fulfill the eligibility criteria for admission to Super Specialty courses at various NMC accredited Medical Colleges in India is eligible to participate in the Centralized counseling for allocation of DM Cardiology seats purely on merit cum choice basis.

2. Admission to 3 years post MD , DMCardiology course is only through Entrance Examination conducted by NMC and Centralized Merit Based Counseling conducted by NMC as per prescribed guidelines.

Duration of Course: 3 Years Every candidate admitted to the training programme shall pursue a regular course of study (on whole time basis) in the concerned recognized institution under the guidance of recognized post graduate teacher for assigned period of the course.

TEACHING AND TRAINING ACTIVITIES The fundamental components of the teaching programme should include:

1. Case presentations & discussion- once a week

2. Seminar – Once a week

3. Journal club- Once a week

4. Grand round presentation (by rotation departments and subspecialties)- once a week

5. Faculty lecture teaching- once a month

6. Clinical Audit-Once a Month

7. A poster and have one oral presentation at least once during their training period in a recognized conference.

8. One Session on Graphics i.e ECGs, X-Rays, CT, CMR, PET, Nuclear Cardiology, Hemodynamic Tracings, Basic EP Tracings, Pacemaker Surveillance and Trouble Shooting.

The rounds should include bedside sessions, file rounds & documentation of case history and examination, progress notes, round discussions, investigations and management plan) interesting and difficult case unit discussions. The training program would focus on knowledge, skills and attitudes (behavior), all essential components of education. It is being divided into theoretical, clinical and practical in all aspects of the delivery of the rehabilitative care, including methodology of research and teaching. Theoretical: The theoretical knowledge would be imparted to the candidates through discussions, journal clubs, symposia and seminars. The students are exposed to recent advances through discussions in journal clubs. These are considered necessary in view of an inadequate exposure to the subject in the undergraduate curriculum.

Symposia: Trainees would be required to present a minimum of 20 topics based on the curriculum in a period of three years to the combined class of teachers and students. A free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation.

Clinical: The trainee would be attached to a faculty member to be able to pick up methods of history taking, examination, prescription writing and management in rehabilitation practice. Bedside: The trainee would work up cases, learn management of cases by discussion with faculty of the department.

Journal Clubs: This would be a weekly academic exercise. A list of suggested Journals is given towards the end of this document. The candidate would summarize and discuss the scientific article critically. A faculty member will suggest the article and moderate the discussion, with participation by other faculty members and resident doctors. The contributions made by the article in furtherance of the scientific knowledge and limitations, if any, will be highlighted.

Research: The student would carry out the research project and write a thesis/ dissertation in accordance with NMC guidelines. He/ she would also be given exposure to partake in the research projects going on in the departments to learn their planning, methodology and execution so as to learn various aspects of research.

SYLLABUS

Fundamentals of Cardiovascular Disease • Global Burden of Cardiovascular Disease, • Heart Disease in Varied Populations, • Economics and Cardiovascular Disease, • Clinical Decision-Making in Cardiology, • Measurement and Improvement of Quality of Cardiovascular Care, • The Principles of Drug Therapy. Molecular Biology The Cardiovascular History and Physical Examination The Electrocardiogram Choice of imaging technique Cardiac Ultra sound Cardiovascular Magnetic Resonance Cardiovascular Computed Tomography Nuclear Cardiology Evaluation of the Patient • The History and Physical Examination: • An Evidence-Based Approach, • Electrocardiography • Exercise Stress Testing, Echocardiography, • Genetics of Myocardial Disease, Genetics of Myocardial Disease, • The Chest Radiograph in Cardiovascular Disease, • Nuclear Cardiology, • Cardiovascular Magnetic Resonance, • Computed Tomography of the Heart, • Cardiac Catheterization, • Coronary Angiography and • Intravascular Ultrasound Imaging. Preventive Cardiology • The Vascular Biology of Atherosclerosis, • Risk Factors for Atherothrombotic Disease, • Systemic Hypertension: Mechanisms and Diagnosis, • Systemic Hypertension: • Therapy • Lipoprotein Disorders and Cardiovascular Disease, • The Metabolic Syndrome, Diabetes Mellitus, and Atherosclerotic Vascular Disease, • Nutrition and Cardiovascular Disease, • Primary and Secondary Prevention of Coronary Heart Disease, • Comprehensive Rehabilitation of Patients with Cardiovascular Disease, • Complementary and Alternative Approaches to Management.

BASIC SCIENCES RELATED TO CARDIOLOGY CARDIAC ANATOMY The cardiac anatomy with special emphasis • 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; 12 • 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.

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 ofventricular function; regulation of cardiac contraction; action potentials; the cellular basis of cardiac contraction, Integration of the cardiovascular system the response to dynamic exercise, etc.

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 bilology of the normal, hypertrohied 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.

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.

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.

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 diasease- • Cyanotic and acyanotic; atherosclerosis; • Coronary artery disease; • Cardiac involvement in other systemic diseases and storage disorders etc.

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.

CLINICAL CARDIOLOGY INCLUDING PEDIATRIC CARDIOLOGY .

A. 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. B. HEART FAILURE • Pathophysiology and diagnosis of Heart Failure, • Diagnosis and management of heart failure, • Cardiac transplantation and mechanical ventricular support. C. RHYTHM AND CONDUCTION DISTURBANCES • Mechanisms of cardiac arrhythmias and conduction disturbances, • Recognition, • clinical assesment and management of arrhthmias and conduction disturbances, antiarrhythmic drugs, etc D. SYNCOPE, SUDDEN DEATH AND CARDIO-PULMONARY RESUSCITATION • Diagnosis and management of syncope, 16 • sudden cardiac death, • Cardiopulmonary Resuscitiation and the subsequent management of the patient etc. E. 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. • Congenital heart disease and other paediatric cardiac disorders. F. SYSTEMIC ARTERIAL HYPERTENSION • Hypertension, epidemiology, • pathophysiology, • diagnosis and treatment. G. PULMONARY HYPERTENSION AND PULMONARY DISEASE • Pulmonary

hypertension, 17 • Pulmonary embolism, • Chronic Cor pulmonale etc. H. VALVULAR HEART DISEASE • Acute rheumatic fever • Aortic valve disease, • Mitral valve disease, Mitral valve prolapse syndrome, • tricuspid valve, • pulmonic valve and multivalvular disaese, • Clinical performance of prosthetic heart valves, • Antitihrombotic therapy for valvular heart disease etc. • I. 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 .J. 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. 18 K. PERICARDIAL DISEASES AND ENDOCARDITIS • Diseases of the pericardium, • Infective endocarditis L. 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 M. 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 athelete's heart and sudden death, • Cardiovascular aging in health and therapeutic considerations in older patients with cardiovascular diseases, women and coronary artery disease • Cardiac trauma. • Tumors of hear • Geriatric heart disease. 19 • General Anaesthesia and non cardiac surgery in patients with heart disease • Sports and Heart Disease • Cardiac rehabilitation Psychological factors in heart disease Occupational and Regulatory Aspects of Heart Disease Non-cardiac Surgery in Cardiac Patients N. TROPICAL CARDIOLOGY Conditions which are specifically found in the tropics like • rheumatic heart disease, • Endomyocardial Fibrosis • , Eosinophilic Heart Disease, • Aortoarteritis etc. • O. 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. P. Cardiovascular Disease and Disorders of Other Organs • Endocrine Disorders and Cardiovascular Disease, • Hemostasis, • Thrombosis, 20 • Fibrinolysis, and Cardiovascular Disease, • Rheumatic Fever, Rheumatic Diseases and the Cardiovascular System, • The Patient with Cardiovascular Disease and Cancer, • Psychiatric Behavioral Aspects of Cardiovascular Disease, • Neurological Disorders and Cardiovascular Disease, • Interface Between Renal Disease and Cardiovascular Illness, Cardiovascular • Manifestations of Autonomic Disorders.

B. DIAGNOSTIC AND INTERVENTIONAL CARDIOLOGY INCLUDING CARDIAC INSTRUMENTATION AND 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, 21 • 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.

C **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. C 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, 22 • Echocardiography including Stress Echo, Colour Doppler and 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.

D .**RECENT ADVANCES IN CARDIOLOGY, CARDIAC EPIDEMIOLOGY, PREVENTIVE CARDIOLOGY INCLUDING RELATED CARDIAC SURGERY** A 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 23 Special problems in hyperlipidemia therapy (a) Child with hypercholesterolemia; (b) Transplant patient; (c) Hypercholesterolemia in the elderly; (d) Elevated lipoprotein. B Cardiac Vascular Disease Special problems in Vascular Disease; (a) Compromise of an internal thoracic artery to coronary artery graft by subclavian artery disease; localized lymph edema C 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 D 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. 24 E 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. F 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. G Hypertension Management issues in difficult hypertension like (a) Hypertension and ethnicity; (b) hypertension in pregnancy preeclampsia; (c) perioperative hypertension; (d) 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. 25 H 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 alternantion in supraventricular tachycardia; (d) atrial flutter; (e) atrial fibrillation and anticoagulants. Special problems in ventricular arrhthmias like; (a) problems of implanted defibrillators; (b) syncope in a patient; (c) palpitations and VT in a young woman. I 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 inn heart failure; (d) disease management programs. 26 Special problems in myocarditis and cardiomyopathy like (a) peripartum cardiomyopathy (b) HIV myocarditis and cardiomyopathy; (c) Adriamycin induced cardiomyopathy;

(d) Tachcardiomyopathy; (e) Diabetic Cardiomyopathy J 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 ouput aortic stenosis; (d) mild to moderate aortic stenosis in patients undergoing by pass 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. K 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. L Special problems for the Cardiology Consultant.

Community Cardiology : The training of PG students will involve learning experience "Derived from" or "Targeted to" the needs of the community. It shall therefore be necessary to expose the students to community based activities.

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

Schedule of posting Ward & ICCU's Duties :12 months • Duties should include diagnostic case workup and day to day management of common cases (angina, myocardial infarction, rheumatic heart disease, hypertension, congestive heart failure, congenital heart disease,). • The resident should acquire the expertise / knowledge to diagnose and manage the cardiac emergencies (acute myocardial infarction and its complications, LVF, common arrhythmias, cardiogenic shock, pericardial tamponade etc)

Cardiac Emergency posting : 6 months • The resident should learn prompt diagnosis and management of cardiac emergencies. • He/she should fortify the skills of hemodynamic monitoring in emergency situations and should learn procedures like arterial line insertion, temporary venous pacing, central line insertion, pericardiocentesis, intra aortic balloon pump insertion, swan ganz catheter insertion etc.

Cath Lab posting : 8 months • The resident should acquaint himself with the pre, peri and post procedural management of patients to be taken up for intervention in a cath lab. • He/she should assist and perform procedures like coronary angiography, percutaneous coronary angioplasty, balloon valvoloplasty, cardiac catheterization of congenital heart disease patients, temporary pacemaker, permanent pacemaker, • Electrophysiological diagnosis and management of arrhythmias, • AICD, Bi-ventricular pacemaker, IABP insertion etc.

Non-invasive lab posting : 8 months • The resident should learn the principles and fundamentals of echocardiography. • He should be able to perform echo-cardiograms of adults, adolescents and infants under direct supervision. He should observe transesophageal echo's and should also master the skills of performing and interpreting stress tests and holter monitoring.

Cardiac surgery posting : 2 months • Mandatory Posting with certificate of satisfactory attendance from the CTVS Dept Head. • The resident should learned pre operative preparation and management of post operative

recovery patients. • He/She should have seen CABG, valve replacement, congenital heart disease surgery and aortic surgery.

Practical: • History, examination and writing of records: • History taking should include the background information, presenting complaints and the history of present illness, history of previous illness, family history, social and occupational history and treatment history. • Detailed physical examination should include general physical and CVS examination • Skills in writing up notes, maintaining problem-oriented medical records (POMR), progress notes, and presentation of cases during ward rounds, planning investigation and making a treatment plan should be taught. • The resident should fortify the skills of hemodynamic monitoring in emergency situations and should learn procedures like arterial line insertion, temporary venous pacing, central line insertion, pericardiocentesis, intra aortic balloon pump insertion, swan ganz catheter insertion etc. • The resident should assist and perform procedures like coronary angiography, percutaneous coronary angioplasty, balloon valvoloplasty, cardiac catheterization of congenital heart disease patients, temporary pacemaker, permanent pacemaker, Electrophysiological diagnosis and management of arrhythmias, AICD, Bi-ventricular pacemaker, IABP insertion etc. • Ability to perform echo-cardiograms of adults, adolescents and infants under direct supervision. He should observe transesophageal echo's and should also should also master the skills of performing and interpreting stress tests and holter monitoring. • Simulation based training should be given particularly in Transesophageal Echocardiography, Some Complex Structural Interventions and Coronary Interventions, CRTs, and TAVRs.

Biostatistics, Research Methodology and Clinical Epidemiology Ethics Medico legal aspects relevant to the discipline Health Policy issues as may be applicable to the discipline Job Responsibilities Outdoor Patient (OPD) Responsibilities • The working of the residents in the OPD should be fully supervised. • They should evaluate each patient and write the observations on the OPD card with date and signature. • Investigations should be ordered as and when necessary using prescribed forms • Residents should discuss all the cases with the consultant and formulate a management plan. • Patient requiring admission according to resident's assessment should be shown to the consultant on duty. • Patient requiring immediate medical attention should be sent to the casualty services with details of the clinical problem clearly written on the card. • Patient should be clearly explained as to the nature of the illness, the treatment advice and the investigations to be done. • Resident should specify the date and time when the patient has to return for follow up. In-Patient Responsibilities Each resident should be responsible and accountable for all the patients admitted under his care.

In-Patient Responsibilities The following are the general guidelines for the functioning of the residents in the ward: • Detailed work up of the case and case sheet maintenance: • He/She should record a proper history and document the various symptoms. • Perform a proper patient examination using standard methodology. • He should develop skills to ensure patient comfort/consent for examination. • Based on the above evaluation he/she should be able to formulate a differential diagnosis and prepare a management plan. • Should develop skills for recording of medical notes, investigations and be able to properly document the consultant round notes. • To organize his/her investigations and ensure collection of reports. • Bedside procedures for therapeutic or diagnostic purpose. • Presentation of a precise and comprehensive overview of the patient in clinical rounds to facilitate discussion with senior residents and consultants • To evaluate the patient twice daily (and more frequently if necessary) and maintain a progress report in the case file. • To establish rapport with the patient for communication regarding the nature of illness and further plan management.) • To write instructions about patient's treatment clearly in the instruction book along with time, date and the bed number with legible signature of the resident. • All treatment alterations should be done by the residents with the advice of the

concerned consultants and senior residents of the unit. Admission day Following guidelines should be observed by the resident during admission day. • Resident should work up the patient in detail and be ready with the preliminary necessary investigations reports for the evening discussion with the consultant on duty • After the evening round the resident should make changes in the treatment and plan out the investigations for the next day in advance. Doctor on Duty • Duty days for each Resident should be allotted according to the duty roster. • The resident on duty for the day should know about all sick patients in the wards and relevant problems of all other patients, so that he could face an emergency situation effectively • In the morning, detailed over (written and verbal) should be given to the next resident on duty. This practice should be rigidly observed. • If a patient is critically ill, discussion about management should be done with the consultant at any time. • The doctor on duty should be available in the ward through out the duty hours. Care of Sick Patients • Care of sick patients in the ward should have precedence over all other routine work for the doctor on duty. • Patients in critical condition should be meticulously monitored and records maintained • If patient merits ICU care then it must be discussed with the senior residents and consultants for transfer to ICU. Discharge of the Patient • Patient should be informed about his/her discharge one day in advance and discharge cards should be prepared 1 day prior to the planned discharge. 33 • The discharge card should include the salient points in history and examination, complete diagnosis, important management decisions, hospital course and procedures done during hospital stay and the final advice to the patient. • Residents should check the particulars of the discharge card and counter sign it. • Patient should be briefed regarding the date, time and location of OPD for the follow up visit In Case of Death • In case it is anticipated that a particular patient is in a serious condition, relatives should be informed about the critical condition of the patient beforehand. • Residents should be expected to develop appropriate skills for breaking bad news and bereavements. • Follow up death summary should be written in the file and face sheet notes must be filled up and the sister in charge should be requested to send the body to the mortuary with respect and dignity from where the patient's relatives can be handed over the body. • In case of a medico legal case, death certificate has to be prepared in triplicate and the body handed over to the mortuary and the local police authorities should be informed. • Autopsy should be attempted for all patients who have died in the hospital especially if the patient died of an undiagnosed illness

Bedside Procedures

The following guidelines should be observed strictly: • Be aware of the indications and contraindications for the procedure and record it in the case sheet. Rule out contraindications like low platelet count, prolonged prothrombin time, etc. • Plan the procedure during routine working hours, unless it is an emergency. Explain the procedure with its complications to the patient and his/her relative and obtain written informed consent on a proper form. Perform the procedure under strict aseptic precautions using standard techniques. Emergency tray should be ready during the procedure. • Make a brief note on the case sheet with the date, time, nature of the procedure and immediate complications, if any. • Monitor the patient and watch for complications(s).

Medico-Legal Responsibilities • All the residents are given education regarding medico-legal responsibilities at the time of admission in a short workshop. • They must be aware of the formalities and steps involved in making the correct death certificates, mortuary slips, medico-legal entries, requisition for autopsy etc. • They should be fully aware of the ethical angle of their responsibilities and should learn how to take legally valid consent for different hospital procedures & therapies. • They should ensure confidentiality at every stage. • The Candidate should be trained in some Medico-Legal Aspects regarding patient management like how to obtain informed consent, how to approach litigations and what problems can occur on the unexpected death of patients. • They should also be trained in laws especially with regards to Medico-Legal Cases and Transplantation laws. The student would be given adequate training during the course so that he/she will be able to perform and interpret various non-invasive and invasive techniques as outlined below:

Non – invasive

1. Electrocardiography

2. Stress ECG

3. Ambulatory ECG

4. Echocardiography – M-mode, Two dimensional, Doppler, Colour flow imaging, Transoesophageal echocardiography and stress echocardiography.

5. Ambulatory BP monitoring.

Invasive

1. To perform temporary pacemaker insertion and pericardiocentesis.

2. To perform left and right heart catheterization, to calculate and interpret various hemodynamic parameters.

3. To assist in various interventions including Valvuloplasty, coronary and congenital interventions.

4. To interpret electrophysiological data and assist in electrophysiology procedures, permanent pacemaker implantation and AICD implantation

Minimum No. of Procedures for competency

1.Trans thoracic Echocardiography …..…….. 400

2.Transoesophageal Echocardiography.……. 25

3.Stress ECG… ……... 100

4.Temporary Pacemaker ….…….. 20

5. Ambulatory ECG's analysed ……..… 50

6. Permanent pacemaker Implantation's assisted …..…… 5

7.Cardiovascular Catheterization….. ……..... 100

8.Percutaneous Cardiovascular Intervention's assisted …...10

Affective Domain • To adopt ethical practices in dealing with patients, colleagues, subordinates superiors and health care workers. • To promote cordial interpersonal relation • To perform as a team • To learn to be a leader when the need arises. • To learn to order investigations and prescribe drugs rationally. • To be aware of ethical issues in human and animal research. • Take rationale decision in the face of ethical dilemmas in cardiac diseases. • Demonstrate sympathy & Humane approach towards patients & their families & exhibit interpersonal behaviour in accordance with social norms & expectations. Attitude & Values Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectation.

Competencies • Possess complete Clinical Diagnostic Skills for the recognition of common heart diseases. • Possess a complete knowledge of all the commonly used Non-Invasive Cardiac Diagnostic Tests like Electrocardiography, Cardiac Roentgenology, Exercise Stress Testing, Dynamic Cardiography,

Echocardiography etc. • Acquire skills in the performance and interpretation of commonly used Invasive Cardiac procedures like Diagnostic Cardiac Catheterization and Angiography and Cardiac Interventions • Able to apply sound clinical judgement and rational cost effective investigations for the diagnosis and management of Cardiac Cases in the OPD, Wards, Emergency Room and Intensive Care unit. • Possess some understanding of the recent advances in the subject of Cardiology and all its allied specialities and working knowledge of the sophisticated and routine equipments, consumables used in Cardiology. • Possess knowledge of research work in the field of Cardiology in both the Clinical and experimental field with the ability to usefully analyse data. • Be able to teach undergraduate students MBBS as well as Post Graduate Students MD Med or Pediatrics Clinical as well as investigative Cardiology. • Be able to perform Clinical and Investigative studies and to present in Seminars etc. • Have the ability to organise specific teaching and training programmes for para medical staff, associated professionals and patient education programmes. Should be able to develop good communication skills and give consultations to all other departments of the Resuscitation skills •

At the time of joining the residency programme, the resuscitation skills should be demonstrated to the residents and practical training provided at various work stations. • • Residents should be fully competent in providing basic and advanced cardiac life support. • • They should be fully aware of all advanced cardiac support algorithms and be aware of the use of common resuscitative drugs and equipment like defibrillators and external cardiac pacemakers. • The resident should be able to lead a cardiac arrest management team.. •

The Candidate has to attend the ACLS course conducted by the AHA and should get certified in ACLS.

THESIS PROTOCOL & THESIS

The candidates are required to submit a thesis 6 months before the end of three years of training as per the rules and regulations ofNMC.

THESIS PROTOCOL & THESIS

The candidates are required to submit the thesis before 6 months of final year .Guidelines for Submission of Thesis Protocol & Thesis by candidates Research shall form an integral part of the education programme of all candidates registered for DM. The Basic aim of requiring the candidates to write a thesis protocol & thesis/dissertation is to familiarize him/her with research methodology. The members of the faculty guiding the thesis/dissertation work for the candidate shall ensure that the subject matter selected for the thesis/dissertation is feasible, economical and original. The protocol for a research proposal (including thesis) is a study plan, designed to describe the background, research question, aim and objectives, and detailed methodology of the study. In other words, the protocol is the ‘operating manual’ to refer to while conducting a particular study. The candidate should refer to the NMC Guidelines for preparation and submission of Thesis Protocol before the writing phase commences. The minimum writing requirements are that the language should be clear, concise, precise and consistent without excessive adjectives or adverbs and long sentences. There should not be any redundancy in the presentation. The development or preparation of the Thesis Protocol by the candidate will help her/him in understanding the ongoing activities in the proposed area of research. Further it helps in creating practical exposure to research and hence it bridges the connectivity between clinical practice and biomedical research. Such research exposure will be helpful in improving problem solving capacity, getting updated with ongoing research and implementing these findings in clinical practice.

Guidelines for protocol

The thesis protocol should be restricted to the following word limits.

• Title : 120 characters (with spacing) page

• Synopsis [structured] : 250-300 •

Introduction : 300-500

• Review of literature : 800-1000

• Aim and Objectives : Up to 200

• Material and Methods : 1200-1600 • 10-25 References [ICMJE style]

It is mandatory to have ethics committee approval before initiation of the research work. The researcher should submit an appropriate application to the ethics committee in the prescribed format of the ethics committee concerned.

Guidelines for Thesis

1. The proposed study must be approved by the institutional ethics committee

2. The thesis should be restricted to the size of 80 pages (maximum). This includes the text, figures, references, annexures, and certificates etc. It should be printed on both sides of the paper; and every page has to be numbered. Do not leave any page blank. To achieve this, following points may be kept in view:

a. The thesis should be typed in 1.5 space using Times New Roman/Arial/ Garamond size 12 font, 1" margins should be left on all four sides. Major sections viz., Introduction, Review of Literature, Aim & Objectives, Material and Methods, Results, Discussion, References, and Appendices should start from a new page. Study proforma (Case record form), informed consent form, and patient information sheet may be printed in single space.

b. Only contemporary and relevant literature may be reviewed. Restrict the introduction to 2 pages, Review of literature to 10-12 pages, and Discussion to 8-10 pages.

c. The techniques may not be described in detail unless any modification/innovations of the standard techniques are used and reference(s) may be given.

d. Illustrative material may be restricted. It should be printed on paper only. There is no need to paste photographs separately.

3. Since most of the difficulties faced by the residents relate to the work in clinical subject or clinically-oriented laboratory subjects, the following steps are suggested:

a. The number of cases should be such that adequate material, judged from the hospital attendance/records, will be available and the candidate will be able to collect case material within the period of data collection, i.e., around 6-12 months so that he/she is in a position to complete the work within the stipulated time.

b. The aim and objectives of the study should be well defined.

c. As far as possible, only clinical/laboratory data of investigations of patients or such other material easily accessible in the existing facilities should be used for the study.

d. Technical assistance, wherever necessary, may be provided by the department concerned. The resident of one specialty taking up some problem related to some other specialty should have some basic knowledge about the subject and he/she should be able to perform the investigations independently, wherever some specialized laboratory investigations are required a co-guide may be co-opted from the concerned investigative department, the quantum of laboratory work to be carried out by the candidate should be decided by the guide & co-guide by mutual consultation.

4. The clinical residents are not ordinarily expected to undertake experimental work or clinical work involving new techniques, not hitherto perfected OR the use of chemicals or radioisotopes not readily available. They should; however, be free to enlarge the scope of their studies or undertake experimental work on their own initiative but all such studies should be feasible within the existing facilities.

5. The residents should be able to freely use the surgical pathology/autopsy data if it is restricted to diagnosis only, if however, detailed historic data are required the resident will have to study the cases himself with the help of the guide/co-guide. The same will apply in case of clinical data.

6. Statistical methods used for analysis should be described specifically for each objective, and name of the statistical program used mentioned.

• Title- A good title should be brief, clear, and focus on the central theme of the topic; it should avoid abbreviations. The Title should effectively summarize the proposed research and should contain the PICO elements.

• Introduction- It should be focused on the research question and should be directly relevant to the objectives of your study.

• Review of Literature - The Review should include a description of the most relevant and recent studies published on the subject.

• Aim and Objectives - The 'Aim' refers to what would be broadly achieved by this study or how this study would address a bigger question / issue. The 'Objectives' of the research stem from the research question formulated and should at least include participants, intervention, evaluation, design.

• Material and Methods- This section should include the following 10 elements: Study setting (area), Study duration; Study design (descriptive, case-control, cohort, diagnostic accuracy, experimental (randomized/nonrandomized)); Study sample (inclusion/exclusion criteria, method of selection), Intervention, if any, Data collection, Outcome measures (primary and secondary), Sample size, Data management and Statistical analysis, and Ethical issues (Ethical clearance, Informed consent, trial registration).

• Results- Results should be organized in readily identifiable sections having correct analysis of data and presented in appropriate charts, tables, graphs and diagram etc.

• Discussion–It should start by summarizing the results for primary and secondary objectives in text form (without giving data). This should be followed by a comparison of your results on the outcome variables (both primary and secondary) with those of earlier research studies.

• Summary and Conclusion- This should be a précis of the findings of the thesis, arranged in four paragraphs: (a) background and objectives; (b) methods; (c) results; and (d) conclusions. The conclusions should strictly pertain to the findings of the thesis and not outside its domain.

• References- Relevant References should be cited in the text of the protocol (in superscripts). • Appendices - The tools used for data collection such as questionnaire, interview schedules, observation checklists, informed consent form (ICF), and participant information sheet (PIS) should be attached as appendices. Attach the master chart.

Attendance (paper/ poster presentation) in conferences/workshops: • Minimum 1 for 3 year

Publication of papers (in peer reviewed journals):1

.**LOG BOOK** A candidate shall maintain a log book of operations (assisted / performed) during the training period, certified by the concerned post graduate teacher / Head of the department / senior consultant. This log book shall be made available to the board of examiners for their perusal at the time of the final examination. The log book should show evidence that the before mentioned subjects were covered (with dates and the name of teacher(s) The candidate will maintain the record of all academic activities undertaken by him/her in log book .

1. Personal profile of the candidate

2. Educational qualification/Professional data

3. Record of case histories

4. Procedures learnt

5. Record of case Demonstration/Presentations

6. Every candidate, at the time of practical examination, will be required to produce performance record (log book) containing details of the work done by him/her during the entire period of training as per requirements of the log book. It should be duly certified by the supervisor as work done by the candidate and countersigned by the administrative Head of the Institution.

7. In the absence of production of log book, the result will not be declared.

Leave Rules As per the notifications from NMC from time to time

ASSESSMENT

Formative assessment includes various formal and informal assessment procedures by which evaluation of student's learning, comprehension, and academic progress is done by the teachers/ faculty to improve student attainment. Formative assessment test (FAT) is called as "Formative "as it informs the in process teaching and learning modifications. FAT is an integral part of the effective teaching .The goal of the FAT is to collect information which can be used to improve the student learning process. **Formative assessment** is essentially positive in intent, directed towards promoting learning; it is therefore part of teaching. Validity and usefulness are paramount in formative assessment and should take precedence over concerns for reliability.

The assessment scheme consists of Three Parts which has to be essentially completed by the candidates. The scheme includes:-

Part I:- Conduction of theory examination

Part-II :- Feedback session on the theory performance

Part-III :- Work place based clinical assessment Scheme of Formative assessment

After Theory Examination, Candidate has to appear for Clinical Assessment. The performance of the resident during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student

1. Personal attributes: • Behavior and Emotional Stability: Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach. • Motivation and Initiative: Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending. • Honesty and Integrity: Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution. • Interpersonal Skills and Leadership Quality: Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

2. Clinical Work: • Availability: Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave. • Diligence: Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management. • Academic ability: Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.

• Clinical Performance: Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing bed side procedures and handling emergencies. 3. Academic Activity: Performance during presentation at Journal club/ Seminar/ Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.

Summative assessment

FINAL EXAMINATION The summative assessment of competence will be done in the form of Final Examination leading to the award of the degree of DM cardiology.. An eligible candidate who has qualified the theory exam is permitted to appear in the practical examiation.

Theory Examination

1. The theory examination comprises of four papers, maximum marks 100 each.

2. There are 10 short notes of 10 marks each, in each of the papers. The number of short notes and their respective marks weightage may vary in some subjects/some papers.

3. Maximum time permitted is 3 hours.

4. Candidate must score at least 50% in the aggregate of four papers to qualify the theory examination.

5. Candidates who have qualified the theory examination are permitted to take up the practical examination.

6. The paper wise distribution of the Theory Examination shall be as follows:

Paper I: • Basic sciences applied to the specialty (including Applied Anatomy, Physiology, Pathology and Embryology) • Research Methodology

Paper II: Clinical Cardiology(Clinical non-invasive and invasive diagnostic techniques, Therapeutics)

Paper III ???????

Paper IV• Recent advances (Imaging , Devices , Innovations, Therapeutics etc) , Cardiac Epidemiology, Prevent Cardiology and related Cardiac Surgery

Practical Examination: 1. Maximum Marks: 300.

The Clinical and Viva-Voce Examinations could be conducted in the following way

A. Four Clinical Cases or Case Scenarios: Each 50 Marks=200

B. Ward Rounds : Minimum 4 Cases of 10 Marks each=40 C.

Non-Invasive Cardiology Station : ECG, CXR, TMT, Holter, ECHO, TEE, Stress Echo, CT, CMR, Nuclear Scans, PET, etc.=20 Marks

D. Invasive Cardiology Station: Display of Angiograms, Interventions, Structural, Coronary, Pacing EP etc = 20 Marks.

E. Viva-Voce: 20 Marks

Total = 300 Marks

. 4. Candidate must obtain a minimum of 50% marks in the Clinical Examination (including Viva) to qualify for the Practical Examination.

Result Declaration --- The result will be declared by the university as per its rules and regulations.

RECOMMENDED TEXT BOOKS AND JOURNALS

• Braunwald E. Zipes D. Libby P.: Heart Disease : A Text Book of Cardiovascular Medicine:

• Fuster V.: Hurst's The Heart

• Topol E. Comprehensive Cardiovascular Medicine

• Crawford MH. DiMarco JP. Paulus WJ: Cardiology 2nd Edition

• Baim DS. GrossmanW: Grossman's Cardiac Catheterization, Angiography and Intervention: 6th Edition 2000 or Later.

• Feigenbaum H. Echocardiography: 6th Edition 2000 or Later.

• Otto: Text book of Echocardiography: 2nd Edition. • Perloff J: The Clinical Recognition of Congenital Heart Diseases: 4th Edition.

• Nadas AS. Pediatric Cardiology; 4th Indian Edition;

• Garson A. The Science and Practice of Pediatric Cardiology: 2nd Edition

• Moss and Adams: Heart Disease in Infants, Children and Adolescents: 6th Edition

• Anderson RH: Pediatric Cardiology: 2nd Edition.

• Constant J. Bedside Cardiology: 5th Edition

• Marriot HJL: Practical Electrocardiography: 7th Edition.

• Opie LH. Drugs for the Heart 5th Edition

• Topol E. Text Book of Interventional Cardiology 4th Edition.

JOURNALS

• Indian Heart Journal

• Journal of the Association of Physicians of India.

• Journal of the Indian Medical Association.

American Heart Journal

• Journal of the American College of Cardiology.

• American Journal of Cardiology.

• New England Journal of Medicine.

• British Medical Journal

• The Lancet

• The Heart (Formerly called the British Heart Journal)

International Journal of Cardiology.

• American Journal of Medicine.

• Journal of the American Medical Association.

• European Heart Journal.

• Circulation

• Circulation Research

• Cardiology Clinics of North America.

• Medical Clinics of North America.

• Journal of Clinical Ultrasound

- Catheterization, Cardiovascular Diagnosis.
- PACE
- Indian Journal of Echocardiography
- Current Problems in Cardiology