INTRODUCTION

Mission of Cardiovascular Departement

1) To promote research in the field of cardiovascular medicine.

2) To provide postgraduate candidates with medical degree that enables them to start a professional career as a specialist in cardiovascular medicine.

3) To offer services to patients attending Cairo university hospitals who are suffering from cardiovascular problems.

4) To provide continued medical education including clinical and basic training to interested cardiologist.

5) To collaborate with other medical professions concerned with different aspects of cardiovascular medicine.

Cairo University
Faculty of Medicine
Department of Cardiovascular Medicine

Cardiovascular Program for Doctorate Degree

Program Coordinators: Prof. Dr. Hossam Kandil, Dr. Azza Farrag

I. Program Aims:

The educational process in Cardiovascular Medicine aims to produce physicians who:

• Can address all aspects of the healthcare needs of patients and their families

• Have acquired and developed leadership and team working skills, especially with other healthcare professionals, to deliver patient centred care

• Maintain the highest standards appropriate in their professional field and show themselves able to respond constructively to assessments and appraisals of professional competence and performance

• Are aware of current thinking about ethical and legal issues

• Are able to act as safe independent practitioners whilst recognising the limitation of their own expertise and are able to recognise their obligation to seek assistance of colleagues where appropriate.

• Are aware of the procedures, and able to take appropriate action, when things go wrong, both in their own practice and in that of others

• Will be honest and objective when assessing the performance of those they have supervised and trained

• Manage time and resources to the benefit of themselves, their patients and colleagues

• Can take advantage of Information Technology to enhance all aspects of patient care

• Can develop management plans for the "whole patient" and maintain a knowledge in other areas of medicine which impinge on the specialty of cardiovascular medicine

• Understand that more effective communication between cardiologists and their patients can lead to more effective treatment and care

• Apply appropriate knowledge and skill in the diagnosis and management of patients with cardiovascular disorders

• Establish a differential diagnosis for patients presenting with different cardiovascular problems by the appropriate use of the clinical history examination and investigations

• Are competent to perform the core investigations and procedures required in cardiovascular medicine

• Develop clinical practice which is based on an analysis of relevant clinical trials and to have an understanding of other research methodologies

• Are able to apply the knowledge of biological and behavioural sciences in clinical practice

• Are able to identify and take responsibility for their own educational needs and the attainment of these needs.

• Have developed the skills of an effective teacher.

II. Intended learning outcomes of course (ILOs)

1. Knowledge and understanding: Candidate should;

a. Develop both generic and specialty specific attributes necessary to practice independently as a consultant in cardiovascular medicine.

b. Identify common and rare cardiovascular problems

c. Understand basic pathology of different cardiovascular disorders.

d. Identify cardiovascular disorders in various systemic diseases.

e. Understand concepts of noninvasive cardiovascular diagnostic tools (e.g., ECG, CXR, echocardiography,radionuclide imaging, cardiac catheterization,…)

f. Describe different management modalities for common and rare cardiovascular problems: life style modification, pharmacological, percutanous, and surgical management

2. Intellectual skills: Candidate should;

a. Interpret the results of different investigations related to cardiovascular diseases.

b. Set up clinical decision making according to cultural and individual needs.

c. Offer treatment plans for common and rare cardiovascular problems.

3. Professional and practical skills:

a. Collection of clinical data specially the art of history taking.

b. examination and identification of signs of common and rare cardiovascular disorders.

c. Interpreting surface ECG – CXR within the context of clinical evaluation.

d. Performing and interpretation of transthoracic echocardiographic study of common and rare cardiovascular diseases.

e. Interpretation of results of cardiac catheterization for different acquired and congenital cardiovascular diseases.

f. Iinterpretation of results electrophysiologic studies.

g. Offering proper medical treatment for common and rare cardiovascular disorsders.

h. Management of all cardiovascular emergencies properly.

4. **General and transferable skills: Candidates should;**

a. Communicate with the patients to gain their confidence.

b. Communicate with other health care providers.

c. Appreciate team working.

d. Understand different scientific methodologies and have critical reading abilities

e. Achieve Computer skills necessary to make use of medical data bases and used to internet for communication.

f. Able to write scientific article and doctorate thesis under basics of scientific research.

III. Academic standards.

1. Academic reference standers: The academic standers of anatomy program is adopted and accredited by the departmental council
2. **External References for Standards:**

1. Core curriculum for the general cardiologists prepared by the education committee of the European Society of Cardiology

2. Curriculum and syllabus for Interventional Cardiology subspecialty training in Europe. EuroInterv.2006;2:31-36

3. The 2007 Curriculum in Cardiology: an overview for trainees and trainers. Br J Cardio. 2007;14:286-288

4. Updated reports and statements of the American College of Cardiology/American Heart Association Task Force on Clinical Competence in different domains of Cardiovascular Medicine. (www.my.americanheart.org)

5. Core Cardiology Training Symposium (COCATS)Guidelines for Training in Adult Cardiovascular Medicine. J Am Coll Cardiol 1995; 25: 1-34

- **Program admission (pre-course) requirements**

According to bylaws of the faculty of medicine Cairo University:

- Students should have MSc.
- Students showed fulfill preliminary courses on the following subjects: medical statistics – English language – Computer skills.

IV. Program Structure and contents.

- Program duration: Two years.
- Program structure: Total Credit hours 260 credit hour

- **Compulsory courses; two academic year (30 weeks each)**
  - Cardiovascular medicine course
- **Scientific activities**
- **Residency training program Part 3**
  "Advanced cardiovascular medicine" for two years
- **Medical Doctorate Thesis**

***** Curriculum, credit hours, and ILO's for each of these subjects are discussed fully in the core curriculum of the correesponding Departement.

I. Resident Training Program

- All students should complete the basic and the special part of the resident training program in order to acquire the needed credit hours. This is achievable via attending: outpatient clinics, inpatient ward, cardiology critical care unit, the noninvasive cardiovascular Lab. as well as the cardiac catheterization lab.

- Experiential learning opportunities:

1. Every patient seen, on the ward or in out-patients, provides a learning opportunity, which will be enhanced by following the patient through the course of their illness. Patients seen should provide the basis for critical reading around clinical problems.

2. Every time a trainee observes another doctor, senior staff or fellow trainee, seeing a patient or their relatives there is an opportunity for learning.

3. Ward-based learning including ward rounds. Ward rounds, including those post-take, should be led by a senior staff and include feed-back on clinical and decision making skills.

4. Supervised consultations in outpatient clinics. Trainees should have the opportunity to assess both new and follow-up patients and discuss each case with the supervisor so as to allow feedback on diagnostic skills and gain the ability to plan investigations.

5. Trainees need to learn to make increasingly independent decisions on diagnosis, investigations and treatment consistent with their level of experience and competence and with maintaining patient safety. These decisions should be reviewed with their supervising senior staff.

6. There are many situations where clinical problems are discussed with clinicians in other disciplines, such as cardiac surgical multidisciplinary meetings. These provide excellent opportunities for observation of clinical reasoning.

II. Scientific Activity:

- Staff round: 4 rounds every week
- The Departement Conference: once weekly
- Journal club (presenting scientific articles): once weekly

- Mortality and morbidity conference: once weekly
- Congenital club: once weekly
- Postgraduate lectures: once weekly
- Echocardiograohy revision session: once weekly
- ECG and EP conference: once weekly
- Cardiac catheterization revision session: once weekly
- Scientific meetings arranged by the Department**.**
- Scientific meetings arranged by other Departements or Universities.
- Attendance of discussion of thesis.

- Echo conference covers the full range of cardiology topics as applied to echocardiography. This is accomplished via didactic presentations given by the echo faculty and by the interactive review of echocardiograms. Emphasis is placed on echo interpretation, understanding Doppler techniques and Doppler hemodynamics, limitations of echo, and quality assurance. Transesophageal and stress echo techniques and potential complications are also discussed. Attendance is required for all non-invasive fellows.

- Clinical Cardiology Grand Rounds provides a forum for Cardiology faculty members, as well as invited guest speakers, to provide updates and reviews of major topics in cardiology. All presentations are clinically oriented and start with a case presentation. Attendance is required for all fellows.

- EP Conference is conducted by the EP faculty and covers all areas of cardiac electrophysiology. Emphasis is placed on intracardiac electrocardiograms, pacemaker troubleshooting, and device interrogation/management. Attendance is required for all fellows.

- ECG Conference is a weekly conference that focuses on preparation for the ECG portion of the cardiology boards. Several ECGs are reviewed in an interactive forum each session. Attendance is required for all fellows.

- Cath Conference is designed to allow instruction in the techniques of cardiac catheterization and angiography and to provide a forum to discuss clinical management issues related to patients referred for cardiac catheterization. Cath

Lab quality assurance will also be addressed. The Cardiothoracic Surgery members are invited to attend the conference and greatly enhance the discussion by expanding upon surgical issues and offering opinions from the surgical standpoint. Attendance is required for all cath fellows.

- Journal Club is held every week. It provides a forum for residents and faculty members to interact in a less formal setting. The main goal of journal club is to help fellows learn to critically assess the literature and to facilitate the practice of evidence-based medicine. The articles reviewed usually cover emerging or controversial topics in cardiology. All candidates are expected to attend.

III. Doctorate Thesis

All Doctorate-degree students should prepare a thesis in the field of Cardiovascular Medicine. The Department and the Ethical committees must approve the protocol of the research. The thesis should include a review part and a research part. The Thesis is supervised by one or more senior staff members from the Cardiovascular department and may include other specialties according to the nature of the research. The thesis should be evaluated and approved by a committee of three professors including one of the supervisors and an external professor.

V. Evaluation

According to the bylaws of the residency program continuous assessment is carried by professors during the program. A logbook will be prepared for each student and will document all his/her activities. The head of the department should allow the students to undergo the final examination when they complete their training program and collect the credit hours needed for scientific activity .

Cardiovascular Exam

- Written exams (short or multiple choice questions)
  - Paper one (Clinical Cardiology multiple choice questions)
  - Paper two (Clinical Cardiology short questions)
  - Paper three (Commentary)
- Oral examination

- Practical (image interpretation) examination
- Clinical examination (including one long plus short cases)
- Elective courses exam (written, oral, clinical)

Cairo University

Faculty of Medicine

Department of Cardiovascular

Cardiovascular Course for Master Degree

- **Program on which the course is given :** Master Degree in Cardiovascular Medicine
- **Department offering the program:** The Cardiovascular Department
- **Major or minor element of program :** Second Part .
- **Department offering the course:** Cardiovascular Department
- **Academic year :**2012 –2013
- **Course coordinators：** Prof. Dr. Azza Farrag

I. Contents

1. Chest Pain

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients with chest pain.	Define the causes of chest pain. Define the indications, limitations, risks and predictive value of non-invasive and invasive investigations.	Be able to take a relevant history and perform a reliable and appropriate examination. Be able to select and use investigations appropriately.	Appreciate the importance of the history in evaluating chest pain. Take a non-judgemental and non-stereotyping approach to patients. Appreciate the anxiety and concerns of patients and relatives with chest pain. Appreciate the contribution non-medical and non-cardiological disciplines have to play in the treatment of patients with chest pain. Understand the associated psychological factors of patients with chest pain.

2. Stabe Angina

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients with stable angina.	Define the pathogenesis of atheroma and the importance of risk factors. Define the natural history, pathophysiology, and presentations of coronary artery disease. Define the pharmacology of drugs currently used in the treatment of stable angina. Define the indications, limitations, risks and predictive value of non-invasive and invasive investigations. Define which patients should be investigated further and referred for intervention.	Be able to diagnose angina accurately. Be able to take a relevant history and perform a reliable and appropriate examination. Be able to select and use investigations appropriately. Be able to present the risks and benefits of an intervention to a patient in a way that they understand.	Recognise the role of cardiac nurse specialists and cardiac rehabilitation. Appreciate the interaction of symptoms with the patient's life style. Appreciate the concerns and anxiety of patients and relatives with coronary heart disease. Advise patients regarding life style and long-term risk factor management. Educate patients and relatives. Discuss sexual issues including impotence and use of drugs, with the patient and their partner in a sensitive manner.

3. Acute Coronary Syndrome

Objectives	Knowledge	Skills	Attitudes
To be able to carry out specialist assessment and treatment of patients presenting with acute coronary syndromes and myocardial infarction	Define the pathogenesis of acute coronary syndromes and the importance of risk factors. Define the natural history, pathophysiology, and acute presentations of coronary artery disease. Define the pharmacology of drugs currently used in the treatment of acute coronary syndromes. Define the indications, limitations, risks and predictive value of non-invasive and invasive investigations. Define which patients should be investigated further and referred for intervention.	Be able to diagnose acute coronary syndromes and myocardial infarction accurately. Be able to take a relevant history and perform a reliable and appropriate examination. Be able to select and use investigations appropriately Be able to present the risks and benefits of an intervention to a patient in a way that they understand.	Recognise the role of cardiac nurse specialists and cardiac rehabilitation. Appreciate the interaction of symptoms with the patient's life style including occupation and leisure. Appreciate the concerns and anxiety of patients and relatives with coronary heart disease. Advise patients regarding life style and long-term risk factor management. Educate patients and relatives. Discuss sexual issues including impotence and use of drugs, with the patient and their partner in a sensitive manner.

4. Heart Failure

Objectives	Knowledge	Skills	Attitudes
To be able to carry out specialist assessment and treatment of patients with heart failure. Trainees are encouraged to attend specialist heart failure clinics at some time during the training period	Define the aetiology, pathophysiology, diagnosis and management of heart failure. Define the natural history and clinical presentation of patients with heart failure. Define the pharmacology of drugs used to treat heart failure. Define the indications for referral for surgical interventions (including valve surgery, cardiac transplantation and assist devices.	Be able to take a relevant history and perform an appropriate examination. Be able to select and use investigations appropriately. Be able to select appropriate drug therapy for individual patients with heart failure.	Emphasise the importance of lifestyle, exercise and weight loss. Appreciate the importance of rehabilitation. Develop and sustain supportive relationships with patients with chronic heart failure.

5. Cardiomyopathy

Objective	Knowledge	Skills	Attitudes
To be able to carry out specialist assessment and treatment of patients with cardiomyopathy.	Define the different types of cardiomyopathy Define the pathogenesis, natural history and prognosis of the cardiomyopathies. Define the genetic basis for cardiomyopathies especially hypertrophic cardiomyopathy. Define the role of screening. Define the role of medical therapy, implantable cardioverter defibrillators, catheter based and surgical based treatments of the cardiomyopathies. Define the indications for transplantation.	Be able to take a relevant history and perform an appropriate examination. Be able to select and use investigations appropriately. • Echocardiography • MRI • Exercise testing • Determination of oxygen consumption.	Appreciate the emotional difficulties encountered by patients and families with cardiomyopathy. Offer advice and support to patient and relatives. Educate patients and their families.

6. Valvular Heart Diseases

Objectives	Knowledge	Skills	Attitudes
To be able to carry out specialist assessment and treatment of patients with cardiac murmurs.	Define the pathological processes that are responsible for valvular heart disease. Define the natural history of valve disorders. Define the indications, limitations, risks and predictive value of non-invasive and invasive investigations Define the indications for surgical intervention. Define the different types of prosthetic valves available for clinical use Define the anticoagulation regimes appropriate for patients with valve disease and valve prostheses. Define which patients need regular follow up. Define endocarditis prophylaxis protocols.	Be able to take a relevant history and perform an appropriate examination. Be able to select and use investigations appropriately. Be able to perform an echocardiogram.	Be able to discuss the advantages and disadvantages of medical versus surgical management in a way that patients can understand. Be able to discuss the advantages and disadvantages of different valve prostheses with patients. Appreciate the importance of educating patients about endocarditis prophylaxis and the natural history of valvular heart disease.

7. Syncope & Presyncope

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients with pre-syncope and syncope.	Define the causes of syncope and pre-syncope. Define the indications, limitations, risks and predictive value of non-invasive and invasive investigations. Define the indications for tilt table testing. Define the current recommendations concerning fitness to drive in patients with pre-syncope and syncope.	Be able to take a relevant history and perform an appropriate examination including carotid sinus massage and tilt table tests. Be able to select and use investigations appropriately. Develop a management plan for syncopal patients.	Appreciate the importance of other specialists such as ENT and neurologists. Appreciate the importance of the history from relatives and witnesses. Appreciate problems specific to the elderly and address their social and medical needs. Appreciate the impact of syncope on patients' lifestyle. See 3.5 Heart rhythm training (core)

8. Arrythmias

8.A. arrythmias: General

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients with arrhythmias.	Define the: • Genetics, pathogenesis, natural history and prognosis of arrhythmias. • methods of presentation of arrhythmias, their aetiology, recognition and management. • normal electrophysiology of the heart and the basis of arrhythmogenesis. • pharmacology of drugs currently used in the treatment of arrhythmias including thromboprophylaxis • indications for temporary and permanent pacemakers • indications for electrophysiological studies and the use of radio-frequency ablation • indications for implantable cardioverter defibrillators and cardiac resynchronisation therapy • current recommendations concerning fitness to drive.	Be able to take a relevant history, including family history, and perform an appropriate examination. Be able to select and use investigations appropriately. Be able to select appropriate drugs.	Appreciate the anxiety patients suffer with arrhythmias and with some methods of management e.g. ICD See Generic curriculum on Management of chronic Disease See 3.5Heart rhythm training (core)

8.B. arrythmias: Basics

Objectives	Knowledge	Skills	Attitude
To understand the principles underlying the main causes of cardiac arrhythmias at cellular and tissue level. Familiarity with the use of the surface ECG for arrhythmia management. To understand the classification of clinical arrhythmias based on their site of origin within the heart. A knowledge of the pathophysiology of atrial fibrillation, atrial tachycardia and flutter, junctional tachycardias (including AV nodal tachycardia and the Wolff-Parkinson- White syndrome),	Of reentrant, automatic and triggered arrhythmia mechanisms. An understanding of the differences between anatomic and functional reentry, including spiral wave generation. Of the pathophysiology of atrial fibrillation, atrial tachycardia and flutter, junctional tachycardias (including AV nodal tachycardia and the Wolff-Parkinson-White syndrome), ischaemic and nonischaemic VT Of distinguishing between the principle mechanisms of arrhythmias from the characteristics of the 12-lead surface ECG, and their response to certain manoeuvres such as vagotonic actions and drug administration. Of the causes of wide-complex tachycardias and morphological schemes for the diagnosis of VT. Of the use the surface ECG to assess the likely location of a critical tissue sustaining an arrhythmia, e.g. an accessory AV connection in the WPW syndrome. Of the ECG in Long QT and Brugada syndromes and right ventricular dysplasia (ARVD)/ cardiomyopathy (ARVC). Of the understanding of invasive electrophysiological studies (EPS) and their clinical indications. To have observed and understood invasive EPSs and radiofrequency ablations	History taking and appropriate examination in patients with or at risk of cardiac arrhythmias. Obtaining an adequate ECG record during an arrhythmia using available technologies. Demonstrate a systematic approach to interpretation of surface ECGs during arrhythmias. Demonstrate appropriate use of vagal manoeuvres and drugs for arrhythmias. Demonstrate familiarity with ECG schema for localising accessory pathways in WPW syndrome. An appreciation of the relevance and limitations of basic arrhythmia mechanisms in terms of clinical arrhythmia management. To be able to describe abnormal electrical activity in terms of the 3-D structure of the human heart in situ	Take a sensible, Professional attitude to the management of patients with arrhythmias, using non-invasive techniques and treatments appropriately, and conserving resources. To educate patients as to the treatment options open to them, to empower them to take their own decisions as to their preferred treatment strategy. To appreciate the psychological impact of the patient's illness on the patient and their family, and manage it sensitively.

8.C. arrythmias: cardiac pacing

Objectives	Knowledge	Skills	Attitude
To understand the basic principles of pacing including electrical parameters and the engineering involved. To understand pacemaker lead characteristics. To understand the published guidelines for implantation of pacemakers and clinical indications To understand the implantation procedure and the cardiac and thoracic anatomy To master safe sterile technique for all procedures. To have detailed knowledge of the programming of pacemakers following implantation including troubleshooting	Know the principles of pacing and the engineering of pacemakers and of pacing leads. Understand medico-legal issues concerning consent and provision of information Of the cardiac conduction system and its disease processes Of the cardiac and thoracic anatomy, especially in respect of venous access including the cephalic vein approach Of the indications and guidelines for correct pacemaker prescription including pacing mode Of the safe implantation of pacemakers including the operating environment and antibiotic usage Of management of complications of pacemaker implantation including pneumohaemothorax, lead perforation, lead fracture Of the management of lead problems – when to extract and when not to Of programming issues specifically related to leads Of modern pacing systems and of troubleshooting Of rate modulated pacing and sensor technology Of driving restrictions	Skills in correct patient selection for and safe implantation of single and dual chamber pacemakers via the cephalic and subclavian approaches. Intravascular catheter manipulation and surgical skills in opening manipulating and closing wounds Managing complications eg cardiac tamponade The insertion and care of temporary pacing wires Detailed and safe approach to cephalic subclavian or internal jugular venous access Competent programming of pacemakers and troubleshooting including the programming of sensors and newer sensors and newer anti-atrial tachycardia algorithms	Correct attitude to a surgical approach – appreciating sterility and antibiotic usage To foster a team approach to pacing including a close relationship with cardiac physiologists. Committed to audit of long term outcomes including infection and lead complications To develop a critical attitude towards a safe pacing programme in the hospital and to support patients in their community with adequate pacing follow-up To educate patients as to the treatment options open to them and to explain treatment strategies To work closely with other health care professionals as necessary: Cardiac physiologists, Cardiologists, Infection control Care of the elderly, Neurologists To appreciate the psychological impact of the patient's illness on the patient and their family, and manage it sensitively.

8.D. arrythmias: AICD

Objectives	Knowledge	Skills	Attitude
Understand the principles and guidelines for ICDs. To carry out specialist investigation and treatment of patients who may benefit from ICD implantation. To understand the implantation procedure, the cardiac and thoracic anatomy and safe sterile technique for procedures. To be able to implant single and dual chamber ICDs, and recognise and treat complications which may occur. To be able to program ICDs, provide zones for VT of various rates, algorithms for discrimination of VT and SVT, appropriate use of anti-tachycardia pacing algorithms, and appropriate shock therapy. To be able to "troubleshoot" ICD problems, including recognition of; drug-device interactions, appropriate and inappropriate shocks, device and lead complications, and problems that may require specialist intervention such as ablation (for both supraventricular and ventricular arrhythmias)	Of the cardiac and thoracic anatomy, especially in respect of venous access. Of national and international guidelines for ICD implantation, and their evidence base Of medico-legal issues concerning consent and provision of information. Up-to-date knowledge of recent clinical trials in ICD therapy. The effects of antiarrhythmic drugs on defibrillation and pacing thresholds. Of the proarrhythmic effects of antiarrhythmic drugs and their effect on left ventricular function Of how to manage complications of ICD implantation and problems during long-term follow-up Of the indications for VT ablation, AV nodal ablation, and atrial tachycardia / atrial fibrillation ablation in patients with ICDs Of the current recommendations	Select and investigate patients appropriately for ICD implantation (including whether revascularisation is required). Explain the procedure possible complications, and possible effects on the patient's lifestyle to the patient and relatives. Assess the anaesthetic/ sedation needs for the implantation. Assess whether a single, dual or triple chamber (i.e. biventricular) device is best suited to the patient. Perform the implant procedure competently with an acceptably low complication rate Perform appropriate tests of pacing, sensing and defibrillation safely and thoroughly during the implant Be able to program the device appropriately Perform post-implant assessment of the patient Perform routine followup of ICD patients.	Appreciate the importance of informed consent, and the need to explain lifestyle issues and driving restrictions to the patient Correct attitude to a surgical approach – appreciating sterility and antibiotic usage Appreciate the importance of team-working with nursing, technical, radiographic, anaesthetic and (if appropriate) industry staff Appropriate self-confidence and recognition of limitations Committed to audit of long term outcomes To educate patients as to the treatment options open to them and to explain treatment strategies. To work closely with other health care professionals as necessary: Cardiac physiologists, Cardiologists, Infection control, Care of the elderly, Neurologists, Appreciate the anxiety that patients suffer with an ICD To appreciate the psychological impact of the patient's arrhythmia illness on the patient and their family, and manage it

8.E. arrythmias: AF

Objectives	Knowledge	Skills	Behaviours and Attitudes
• To be able to carry out specialist assessment and treatment of patients with AF	• Epidemiology and prognosis • Pathophysiology • Classification • Diagnosis, clinical features and impact on quality of life • Associated conditions • Diagnostic procedures: - Minimum evaluation - Additional Investigation • Embolic complications • Management: - anticoagulant therapy - rhythm vs. rate control - conversion to sinus rhythm - prevention of recurrences - control of ventricular rate - pacemaker-defibrillator therapy - catheter ablation - surgery	• Take a relevant history and perform an appropriate clinical examination • Perform or interpret: ECG, echocardiogram, transesophageal echocardiogram, prolonged ECG monitoring exercise testing ▪ Develop appropriate anti-thrombotic strategies ▪ Select patients appropriately for cardioversion ▪ Perform rhythm or rate control therapy • Select and refer patients for - electrophysiological studies - atrial catheter ablation - RFA or surgical ablation - pacemaker and defibrillator implantation	• Appreciate the anxiety patients suffer with AF and with some methods of management, e.g. catheter ablation and pacing • Recognise the importance of coexisting structural heart diseases for the outcome and management of AF • Appreciate the limitations and potential risk of antiarrhythmic drug therapy of AF • Appreciate the importance of anticoagulant therapy • Appreciate the palliative nature and potential adverse effects of non-pharmacological therapies • Appreciate newer methods for treating Atrial Fibrillation and how to refer patients for specialist treatment when appropriate, such as transvenous or surgical ablation.

9. Pericardial Diseases

Objectives	Knowledge	Skills	Attitudes
To be able to carry out specialist assessment and treatment of patients with pericardial disease.	Define the pathogenesis, natural history and prognosis of pericardial diseases. Define the modes of presentation of pericardial disease.	Be able to take a relevant history and perform an appropriate examination. Be able to select and use investigations appropriately. Be able to undertake pericardiocentesis in appropriately selected patients (see 3.7).	Be aware of important but uncommon conditions.

10. Risk factor for cardiovascular diseases

Objectives	Knowledge	Skills	Attitudes
To be able to carry out specialist assessment and treatment of patients with risk factors for vascular disease.	Define how to investigate and manage patients with systemic hypertension (both primary and secondary), lipid disorders, diabetes, smoking and family history of cardiovascular disease. Define how to calculate an individual patient's absolute risk of cardiovascular disease on the basis of standard risk factors. Define the difference between relative and absolute risk. Define the epidemiology of ischaemic heart disease.	Be able to assess the prevalence of coronary heart disease in the community in which you work. Be able to manage risk factors appropriately for individual patients.	Appreciate the importance of risk factor management Appreciate racial and regional variation in cardiovascular risk factor distribution. Emphasize the central role of patient education. Offer advice and support to family members with familial disease. Make active efforts to encourage patients to adopt a healthier lifestyle with specific emphasis on risk factors. Appreciate the importance of other specialists such as dieticians, diabetologists and nurse specialists.

11. Hypertension

Objectives	Knowledge	Skills	Attitudes
To be able to carry out specialist assessment and treatment of patients with hypertension Trainees are encouraged to attend specialist hypertension clinics during the training period	Define how to investigate and manage patients with systemic hypertension (both primary and secondary) Define the causes of hypertension Define how to assess patients with hypertension for end organ damage Define how to investigate a patient for secondary hypertension Define the pharmacology of drugs currently used in the treatment of hypertension Define how to manage a patient with resistant hypertension	Be familiar with protocols and management plans for hypertension Be able to manage patients with hypertensive emergencies Interpretation of appropriate biochemical investigations and imaging modalities in the diagnosis and assessment of hypertension.	Appreciate the racial variation in hypertension and the varying response to pharmacological treatment Make active efforts to encourage patients to adopt a healthier lifestyle with specific emphasis on risk factors Support general practitioners with the long term management of patients with risk factors for coronary heart disease.

12. Lipid Management

Objective	Knowledge	Skills	Attitudes
To be able to carry out specialist assessment and treatment of patients with lipid abnormalities Trainees are encouraged to attend specialist lipid clinics during the training period	Define how to investigate and manage patients with lipid disorders Define the pharmacology of drugs currently used in the treatment of lipid disorders. Define the current evidence for pharmacological intervention in both primary and secondary prevention.	Be able to interpret lipid results relevant to individual patients.	Make active efforts to encourage patients to adopt a healthier lifestyle with specific emphasis on risk factors Appreciate the importance of other specialists such as dieticians, diabetologists and nurse specialists

13. Congenital Heart Disease

Objectives	Knowledge	Skills	Attitude
To be able to carry out, under supervision, specialist assessment and treatment of adolescent and adult patients with congenital heart disease.	Define the anatomy of the heart and great vessels and have a basic understanding of cardiac embryology and development. Define simple and complex congenital defects and the important aspects of their management. Define the natural history of simple and complex congenital conditions. Have an understanding of genetics and prenatal diagnosis. Know that congenital cardiac lesions and previous surgery may be associated with specific arrhythmias. Understand that arrhythmia is the commonest emergency in patients with AACHD. Know that pulmonary hypertension complicating congenital heart disease increases the risk of iatrogenic complications. Define when to seek specialist advice.	Be able to take a relevant history and perform an appropriate examination. Be able to select and use investigations appropriately Be able to manage acutely presenting AACHD patients with arrhythmias. Be able to recognise the arrhythmias that are peculiar to some forms of CHD and require specialist advice. Be able to manage patients with congenital heart disease under supervision and liaise with specialists in congenital heart disease.	Appreciate the importance of genetic counselling. Understand the importance of referring patients for a specialist opinion. Have appropriate self-confidence and recognition of limitations. Appreciate the social and emotional difficulties encountered by patients with congenital heart disease

14. Infective Endocarditis

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients with endocarditis or who are at risk of endocarditis.	Define the pathogenesis, presentation and natural history of endocarditis. Define the common pathogens involved. Define how to diagnosis, investigate, treat and monitoring patients with endocarditis. Define the indications and limitations of echocardiography and other investigations in the diagnosis and management of endocarditis. Define the possible complications of endocarditis. Define the indications for surgical intervention. Define the current guidelines for endocarditis prophylaxis.	Be able to take a relevant history and perform an appropriate examination. Be able to select and use investigations appropriately. Be able to manage patients with endocarditis. Be able to integrate information and advice from microbiologists and cardiac surgeons.	Emphasise the Importance of lifelong antibiotic prophylaxis. Appreciate the importance of patient education. Consult with Microbiologists and Cardiac Surgeons

15. Rheumatic Fever

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients with rheumatic activity	Define the pathogenesis, presentation and natural history of rheumatic activity Define the pathogen involved. Define how to diagnosis, investigate, treat and monitoring patients with rheumatic activity Define the indications and limitations of echocardiography and other investigations in the diagnosis and management of rheumatic activity Define the possible complications of rheumatic activity Define the current guidelines for rheumatic activity prophylaxis.	Be able to take a relevant history and perform an appropriate examination. Be able to select and use investigations appropriately. Be able to manage patients with rheumatic activity To have propre differential diagnosis for rheumatic activity	Emphasise the Importance of Antibiotic prophylaxis. Appreciate the importance of patient education. Consult with other specialites for differential diagnisis.

16. Diseases of the Aorta

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients who have diseases of the aorta.	Define the pathogenesis, presentation and natural history of aortic dissection and aortic aneurysms. Define the indications, limitations and benefits of non-invasive and invasive investigations used in the assessment of aortic diseases. Define the medical therapy of diseases of the aorta. Define the indications for surgical intervention.	Be able to take a relevant history and perform an appropriate examination. Be able to select appropriately non-invasive imaging. Be able to assess manage and give advice on patients with acute aortic dissection. Define the indications and limitations of anti-hypertensive drugs.	Appreciate the importance of cooperation with cardiac surgeons. Recognise the urgency of management required of patients with aortic dissection

17. Cardiac Tumours

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients who cardiac tumours.	Define the pathology, presentation and natural history of cardiac tumours. Define the indications, limitations and benefits of investigations used in the assessment of cardiac tumours.	Be able to take a relevant history and perform an appropriate examination. Be able to select and use appropriate investigations. Be able to perform an echocardiogram.	The importance of cooperation with cardiac surgeons.

18. Cardiac Rehabilitation

(mandatory assessment methods 4 and 6)

Objectives	Knowledge	Skills	Attitude
To be able to provide rehabilitation to patients with cardio-vascular disease. Specifically: • Post myocardial infarction • Angina • Post cardiac surgery • Heart failure Trainees are encouraged to spend a period of time working with a cardiac rehabilitation team.	Define the principles of cardiac rehabilitation and exercise training. Define the use of rehabilitation for secondary prevention.	Be an active member of a multi-disciplinary rehabilitation team. Be able to anticipate and address patient concerns regarding work, exercise and sex. Be able to discuss sensitive issues, such as sex, in an understanding manner.	Appreciate the importance of rehabilitation for return to work, driving and sex Appreciate the importance of patient education. Appreciate the interplay of physiological and psychological aspects of heart disease. Appreciate the role of other professionals including nurse specialists, physiotherapists, dieticians and general practitioners in cardiac rehabilitation.

19. Evaluation for noncardiac surgery

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment of patients with cardiovascular disease prior to non-cardiac surgery.	Define how to assess risk prior to non-cardiac surgery for patients with cardiac disease and give advice and management plans accordingly. Define how to optimise a patient's condition in order to minimize the risk of non-cardiac surgery.	Be able to assess risk of anaesthesia and surgery for individual patients. Be able to select and use investigations appropriately Be able to give valid and useful advice to patients, anaesthetists and surgeons.	Be able to discuss suitability for non-cardiac surgery and the risks involved with anaesthetist, surgeons, patients and relatives.

20. Care of patients after cardiac surgery

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and referral for patients requiring cardiac surgery.	Define how to assess and investigate cardiac and non-cardiac factors prior to cardiac surgery. Define the general and specific risks and benefits of cardiac surgical interventions for coronary, valvular and congenital heart disease.	Be able to assess patient's symptoms and clinical signs in conjunction with results of specialist investigations to make appropriate surgical referrals. Investigate and optimise general medical conditions pre-operatively.	Liaise and discuss with cardiac surgeons directly. Appreciate the concerns and pressure on cardiac surgeons and anaesthetists. Appreciate surgical concerns relating to neurological, respiratory and renal complications. Have a multi-disciplinary approach to pre-operative assessment. Involve other specialists if indicated. Appreciate the technical potential and limitations of surgery

21. Management of critically ill patients with hemodynamic disturbances

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of patients who are critically ill with haemodynamic disturbances.	Define the pathogenesis, presentation and natural history of critical illnesses. Define the indications and complications of intra-aortic balloon pump counter-pulsation. Define when to consider patients for ventricular assist devices. Define indications for and haemodynamic consequences of positive pressure ventilation.	Be able to assess manage and give advice on the critically ill patient. Specifically be able to recognise and manage acute conditions including: • pulmonary embolism • acute pericarditis • myocarditis • cardiac tamponade • aortic dissection • cardiac rupture • cardiogenic shock • post infarction ventricular septal defect and mitral regurgitation • circulatory collapse. Be able to select and use investigations appropriately to assess haemodynamics. • Echocardiography • Pulmonary artery catheterisation and wedge pressure. Define the indications and limitations of inotropic drugs. Be able to undertake pericardiocentesis	The importance of cooperation with anaesthetists/ intensivists and other specialties. Awareness of legal/ ethical issues surrounding care, nutrition and ventilation of the unconscious patient. Have sufficient communication skills to sensitively discuss problems of the critically ill with relatives. Be able to break bad news.

22. Heart disease in pregnancy

Objectives	Knowledge	Skills	Attitude
1. To understand the principles, and importance, of appropriate assessment, counselling and treatment of women with heart disease who are or who are planning to become pregnant	To describe how pregnancy, delivery and the post partum period may affect cardiac function in normal women and in those with pre-existing or incident cardiac disease erstand that heart disease is the ; cause of maternal death in the Define the risks of pregnancy for the mother and fetus for different cardiac disorders. The risks of recurrence of congenital heart disease in the fetus of mothers with congenital heart disease. The prescribing problems encountered during pregnancy The implications of anticoagulation during pregnancy. Understand that women with heart disease require specialist multidisciplinary pre-conception counselling, antenatal and puerperal care	Can take a relevant history and perform an appropriate examination Can assess cardiac patients' risk of becoming pregnant. To be able to refer appropriately women with heart disease who are or who are planning to become pregnant	Appreciate the increased anxiety experienced by pregnant women with cardiac disease. To recognize the need for referral to, and the role of, specialist cardiologists in the management of women preconception, during pregnancy and post partum To recognize the role of multidisciplinary care of women with heart disease and in particular liaison with obstetricians, midwives, haematologists, obstetric anaesthetists and intensivists.

23. Basic and advanced life support

Objectives	Knowledge	Skills	Attitude
To be able to carry out and supervise resuscitation of patients.	Define current guidelines on Resuscitation Define the principles of cardiopulmonary resuscitation. Define the cardiac and non-cardiac causes of cardiac arrest.	Be able to supervise pre-hospital care Be proficient in Basic life support Be proficient in Advanced life support Must have undertaken ALS course Be able to effectively perform and supervise resuscitation of patients suffering from cardiac arrests and the critically ill.	Be able to support relatives. Be able to break bad news in a sympathetic manner. Appreciate legal and ethical considerations of resuscitation. Familiarity with the legal and ethical issues associated with "do not attempt resuscitation" orders.

24. Radiation use and safety

Objectives	Knowledge	Skills	Attitudes
Be able to use radiation equipment appropriately and safely for the diagnosis, assessment and treatment of patients with cardiac disease	Define the physics and hazards of ionising radiation to patients and staff. Define the current statutory requirements concerning the medical use of ionising radiation. Know how to operate the equipment involved in the use of ionising radiation. Define the factors that affect radiation exposure to both patients and staff. Know the important aspects of cardioradiology.	Be able to operate radiation equipment safely and effectively. Has successfully completed a period of practical supervised training in the use of radiation equipment.	Appreciate the risks and benefits to patients and staff of using ionising radiation.

25. Pulmonary Hypertension

Objectives	Knowledge	Skills	Behaviours and Attitudes
To be able to diagnose pulmonary arterial hypertension (PAH) To be able to provide optimal management of patients with PAH To be able to distinguish between the different causes of pulmonary hypertension	Definition and functional classification of pulmonary hypertension Epidemiology of PAH (incidence, prevalence, aetiology, genetics, high-risk groups) Pathology and pathophysiology of PAH Aetiology Clinical features of PAH Diagnostic criteria of PAH Prognostic markers Management of PAH (medical, surgical and interventional including balloon atrial septostomy, indications, contraindications and possible adverse effects)	Take a relevant history and perform an appropriate clinical examination Recognise clinical signs consistent with PAH Differentiate between primary, secondary pulmonary hypertension and other diseases with similar symptoms Perform and interpret adequate medical assessment (using laboratory analyses including arterial blood gases; pulmonary function test, ECG, Echocardiography, cardiopulmonary stress-testing, ventilation-perfusion lung scan, spiral CT, magnetic resonance imaging, cardiac catheterisation and pulmonary angiography, lung biopsy) Prescribe adequate medical or invasive (surgical, interventional) management Evaluate clinical and haemodynamic prognostic markers	Establish cooperation with family physicians and other health care professionals for early recognition of primary pulmonary hypertension; Make collaborative efforts with other medical specialists (family medicine, thoracic surgery, invasive cardiology, imaging) for differential diagnosis of pulmonary hypertension and timely referral to surgical treatment; Maintain long-term involvement of patients and their family members in supportive activities for healthy life-style adherence and treatment compliance Appreciate the increased risk of PAH in other medical conditions, such as scleroderma

26. Heart and systemic disorders

Objectives	Knowledge	Skills	Attitude
To be able to carry out specialist assessment and treatment of cardiovascular diseases in patients with 1. Renal disease 2. Endocrinal diseases 3. Blood diseases 5. Hepatic diseases 6. Neurological diseases 7. Connective tissue disorders 8. Pulmonary diseases 9. Psychatric disorders	To know prevelance and pattern of cardiovascular affection in these disorders To know the essential diagnostic criteria for common systemic disorders To know pattern and mechanisms of other system affection in patients with cardiovascular diseases To define disorders known to involve both vardiac and other systems To know natural history and prognosis in these patients To define drug interaction that may occur in these patients	Be able to take a relevant history and perform an appropriate examination. Be able to select and use investigations appropriately. Be able to manage patients with these disorders To have predetermined lists of differential diagnosis for different cardiac symptoms and signs	To recognize the need for referral to, and the role of, specialist cardiologists in the management of these patients To recognize the role of multidisciplinary care of these patients

B. Core procedures and investigations

1. Basic Investigations

Objectives	Knowledge	Skills	Attitudes
Be able to perform competently and/or select appropriately and interpret correctly the following investigations for the diagnosis and assessment of patients with cardiac disease. Electrocardiograms Ambulatory ECG Exercise Testing CXR	Define the indications for, and be able to report and interpret the results of: Electrocardiograms (including high resolution) Ambulatory ECG Exercise testing CXR Define the physiology of exercise	Be able to supervise and analyse exercise tests.	Appreciate the limitations of non-invasive investigations Appreciate the sensitivity, specificity and predictive accuracy of exercise tests

2. Echocardiography

Objective	Knowledge	Skills	Attitudes
To understand the role of echocardiography in the management of patients with cardiac disease and to be able to satisfactorily carry out, interpret and report transthoracic echocardiography for the diagnosis and assessment of adult patients.	BASIC PRINCIPLES Ethics and sensitivities of patient care. Principles of ultrasound imaging, spectral and colour flow Doppler. Indications for echocardiography. Basic instrumentation and scanning.	Can use basic instrumentation and can care for machine appropriately. Can use appropriate echo probes, machines and software to obtain standard views and measurements, can optimise controls. Can use colour flow in at least two planes for all valves and can obtain pulsed Doppler. Can recognise normal variants.	Interacts appropriately with patients.
	LEFT VENTRICLE Coronary anatomy and correlation with 2D views of left ventricle , wall motion and segmentation of left ventricle. Measurements global systolic function. Doppler mitral valve filling patterns. Complications of myocardial infarction. Features of dilated, and hypertrophic cardiomyopathy, athletic heart, hypertensive heart disease.	Can differentiate normal from abnormal LV systolic function. Can recognise and describe large wall motion abnormalities. Can obtain measures of systolic function & can differentiate diastolic filling patterns. Can detect and recognise complications after myocardial infarction. Can recognise features associated with hypertrophic cardiomyopathy.	Appreciate the limitations of echocardiography. Demonstrate ability to work with and where appropriate educate cardiac physiologists.
	MITRAL VALVE DISEASE Normal anatomy of the mitral valve, and the subvalvar apparatus and their relationship with LV function Causes of mitral stenosis and regurgitation	Can recognise rheumatic disease, mitral prolapse, functional mitral regurgitation Can assess mitral stenosis and can assess severity of regurgitation.	
	AORTIC VALVE DISEASE and AORTA Causes of aortic valve disease and causes of aortic disease Methods of assessment of aortic stenosis and	Can recognise bicuspid, rheumatic, and degenerative disease Can measure CW from multiple sites Can derive peak & mean gradients using	

Basic criteria for surgery to understand reasons for making measurements Echocardiographic signs of aortic dissection. RIGHT HEART	Can assess the grade of aortic regurgitation Can recognise aortic dilatation	
Causes of tricuspid and pulmonary valve disease, RV dysfunction and pulmonary hypertension The imaging features of pulmonary hypertension The estimation of pulmonary pressures	Recognises right ventricular dilatation Can estimate PA systolic pressure	
REPLACEMENT HEART VALVES Types of valve replacement and criteria of normality Signs of failure and indications for TOE	Can recognise broad types of replacement valve Can diagnose severe paraprosthetic regurgitation Can recognise prosthetic obstruction	
INFECTIVE ENDOCARDITIS Duke criteria for diagnosing endocarditis Echocardiographic features of endocarditis Criteria for TOE	Can recognise typical vegetations Can recognise an abscess	
INTRACARDIAC MASSES Types of mass found in the heart Differentiation of normal from abnormal, features of a mxyoma and differentiation of an atrial mass	Can recognise a LA myxoma	
PERICARDIAL DISEASE Anatomy of normal pericardium Features of tamponade, pericardial constriction and restrictive cardiomyopathy. ADVANCED ECHOCARDIOGRAPHY	Can differentiate a pleural and pericardial effusion Can recognise the features of tamponade Can judge the route for pericardiocentesis	
Indications for and limitations of transoesophageal echocardiography Indications for and limitations of stress echocardiography.	Has seen at leas[25]f each type of advanced study.	

3. Nuclear Cardiology

Objectives	Knowledge	Skills	Attitudes
Define the indications for nuclear cardiology investigations. Attend stress, imaging, and reporting sessions. Understand the clinical significance and limitations of the results of nuclear cardiology investigations.	Define the indications for MPS and ERNV. Understand the importance of radiation protection. Define the methods of stress used in MPS. Have a sound knowledge of the radiopharmaceuticals and protocols used in MPS and ERNV. Be familiar with the equipment and techniques used in nuclear cardiology imaging. Understand the clinical value of MPS and ERNV in different clinical settings.	Be able to understand the results of MPS and ERNV studies and integrate them with those of other investigations in clinical practice.	Appreciate the strengths and limitations of nuclear cardiology investigations in routine clinical practice. Understand the roles of the various health-care professionals involved in nuclear cardiology and be able to interact with them.

4. Cardiac Magnetic Resonance

Objectives	Knowledge	Skills	Attitudes
A basic understanding of the role of CMR and its capabilities, including the indications for its use. A basic understanding of how the procedures are carried out, in particular the safety issues. A basic understanding of image analysis, post-processing and interpretation of images and data with emphasis on patient management.	The indications and contra-indications to CMR The basics of CMR safety The basics of CMR image acquisition The basics of CMR imaging protocols (anatomical imaging and functional imaging) The basics of CMR image processing The limitations of CMR	Plan and supervise the pre and post investigation management of CMR patients. Interpret clinical information and the results of other investigations to decide what information must be acquired by CMR. Interpret images from basic CMR sequences Interpret CMR reports and their application to clinical management	Be aware of the limitations of non-invasive imaging Appreciate the importance of understanding cardiac anatomy in 3-dimensions Have an appropriate threshold for seeking expert advice Appreciate the importance of providing detailed information about the procedure and its potential complications to patients. Appreciate the importance of team work with radiologists, radiographers, anaesthetists and technical staff

5. Cardiac CT

Objectives	Knowledge	Skills	Attitude
A basic understanding of the role of CT and its capabilities, including the indications for its use. A basic understanding of how the procedures are carried out, in particular the safety issues. A basic understanding of image analysis, postprocessing and interpretation of images and data with emphasis on patient management.	The indications and contraindications to CT The basics of CT image acquisition The basics of CT imaging protocols The limitations of CT	Plan and supervise the pre and post investigation management of CT patients. Interpret clinical information and the results of other investigations to decide what information must be acquired by CT. Interpret images from basic CT Interpret CT reports and their application to clinical management	Be aware of the limitations of noninvasive imaging Appreciate the importance of understanding cardiac anatomy in 3-dimensions Have an appropriate threshold for seeking expert advice Appreciate the importance of providing detailed information about the procedure and its potential complications to patients. Appreciate the importance of team work with radiologists, radiographers, anaesthetists and technical staff

6. Essential procedures carried in the Cardiology ICU

Objectives	Knowledge	Skills	Attitude
The trainee will be proficient at carrying out the following procedures: 1. Insertion of central venous line 2. Insertion of arterial line 3. Insertion of temporary pacemaker lead 4. Pericardiocentesis 5. Endotracheal intubation 6. Withdrwal of blood	For each procedure, the candidate should know: - anatomical landmarks - needed kits and instrumrnts - indications - preprocedural preparations - postprocedural follow up and instructions - possible complications; how to avoid and how to manage	Be able to undertake These procedures safely and efficienly.	- Interact appropriatly with the patient and relatives. - Interact appropriatly with the assisting staff

cultures.			

7. Heart Rhythm Training

Objectives	Knowledge	Skills	Attitudes
To have an understanding of the mechanisms, diagnosis and treatment of arrhythmias. To be competent in DC cardioversion. To be competent to undertake cardiac pacing.	BASIC PRINCIPLES An understanding of the mechanisms of arrhythmias. A thorough understanding of the 12-lead surface ECG during brady- and tachyarrhythmias To have an understanding of the therapeutics of antiarrhythmic drugs, and their hazards. SPECIFIC PATIENT GROUPS To know the principles of risk assessment in patients with arrhythmias undergoing cardiac and other surgery, and during pregnancy, and with structural heart disease. BRADYCARDIA AND PACING Investigation of patients with blackouts/ T-LOC Indications for temporary and permanent pacing. An understanding of pacemaker programming INVASIVE ELECTROPHYSIOLOGY Basic understanding of the use and application of invasive electrophysiology studies. ICDs and CRT An understanding of the use of ICDs An understanding of the role of devices in heart failure CARDIOVERSION Understanding the mechanisms of cardioversion. Understanding of the indications for cardioversion.	To be competent in the acute management of arrhythmias, and have an understanding of which patients require further investigation. To be competent in the management of arrhythmias in post cardiac and non-cardiac surgical patients, pregnant patients and patients with structural heart disease. Use of external pacing systems. Implantation of temporary pacemakers. Implantation of permanent pacemakers, both single and dual chamber Experience of 20 invasive electrophysiological studies for common arrhythmias, usually involving curative catheter ablation during the same study. Experience of at least five ICD implants and five CRT procedures. To be competent in elective and emergency DC cardioversion	Appreciate the anxiety often suffered by patients and their relatives. Appreciate the limitations of drug therapy in the treatment of arrhythmias. Have appropriate self-confidence and recognition of limitations. Appreciate the importance of radiation protection.

8. Cardiac Catheterization

8.I. Diagnostic cardiac catheterization

Objectives	**Knowledge**	**Skills**	**Attitude**
To have in-depth understanding and full explanations for the most frequently encountered types of diagnostic cardiac procedures	A thorough understanding of all of the following: - Contrast media - Right heart catheterization, - Left heart catheterization - Coronary artery cath - Catheterization for congenital heart disease - Role of IVUS - Role of FFR measurments - EMB For each item, candidate should know: - preprocedural preparation - indications -hemodynamic principles - angiographic techniques - findings in different disorders - limitations & pitfalls - complications - procedural medications - vascular access - equipment selection - triage and monitoring	Trainees should have observed different diagnostic cardiac catheterization procedures Writing a detailed report Interpretation of results: angiograms – hemodynamics, oxymeter, FFR, IVUS images Periprocedural monitirung and triage Sheath removal	- Interact appropriatly with the patient and relatives. - Appropriate self confidence and recognition of limitations. - The importance of team working with non-medical staff during invasive procedures. - Appreciate the importance of radiation protection.

8.II. Percutanous cardiac interventions

Objectives	**Knowledge**	**Skills**	**Attitude**
To have in-depth understanding and full explanations for the most frequently encountered types of percutanous cardiac interventions	A thorough understanding of PCI- related issues: - PTCA & stenting - thrombectomy - atherectomy - interventional pharmacology - high risk PCI - IABP A thorough understanding of other percutanous cardiac interventions-related issues: - balloon mitral valvuloplasty - balloon aortic valvuloplasty - balloon pulm. valvuloplasty - transseptal access For each of the above item, candidate should know: - preprocedural preparation - indications - angiographic techniques - limitations & pitfalls - complications - procedural medications - equipment selection - triage and monitoring	Trainees should have observed different percutanous cardiac interventions Writing a detailed report Periprocedural monitirung and triage	- Interact appropriatly with the patient and relatives. - Appropriate self confidence and recognition of limitations. - The importance of team working with cardiac surgeons - The importance of team working with non-medical staff during invasive procedures. - Appreciate the importance of radiation protection.

8.III. Peripheral angiography

Objectives	**Knowledge**	**Skills**	**Attitude**
To have in-depth understanding and full explanations for the most frequently encountered types of peripheral angiographic procedures	A thorough understanding of angiogrphic anatomy of the following: - Aortic Arch - Head and Neck - Upper Extremity, - Thoracic Aorta - Abdominal Aorta - Lower Extremities - Pelvis For each item, candidate should know: - preprocedural preparation - indications - angiographic techniques - findings in different disorders - limitations & pitfalls - complications - procedural medications - vascular access - equipment selection - triage and monitoring	Trainees should have observed different diagnostic peripheral angiographic procedures Writing a detailed report Interpretation of results: angiograms – hemodynamics Periprocedural monitirung and triage	- Interact appropriatly with the patient and relatives. - Appropriate self confidence and recognition of limitations. - The importance of team working with vascular surgeons, neurologists, nephrologists, and radiologists. - The importance of team working with non-medical staff during invasive procedures. - Appreciate the importance of radiation protection.

8.IV. Peripheral interventions

Objectives	**Knowledge**	**Skills**	**Attitude**
To have in-depth understanding and full explanations for the most frequently encountered types of percutanous peripheral interventions	A thorough understanding of peripheral intervention - related issues: - stenting - thrombectomy - embolization - interventional pharmacology For each procedure, candidate should know: - preprocedural preparation - indications - angiographic techniques - limitations & pitfalls - complications - procedural medications - equipment selection - triage and monitoring	Trainees should have observed different percutanous peripheral interventions Writing a detailed report Periprocedural monitirung and triage	- Interact appropriatly with the patient and relatives. - Appropriate self confidence and recognition of limitations. - The importance of team working with vascular surgeons, neurologists, nephrologists, and radiologists. - The importance of team working with non-medical staff during invasive procedures. - Appreciate the importance of radiation protection.

II. Student assessment methods:

1- Attendance Criteria: The minimum acceptable is 75%.

2-Assessment Tools: written exam., oral exam., diagnostic tools exam., clinical exam.(long and short case).

3-Continuous assessment is carried by professors during the course, staff rounds and seminars. Based on activity booklet.

III. List of references

I. Recommended Textbooks:

- Braunwald's Heart Disease
- Hurst : The Heart.
- Opie: Heart Physiology from cell to circulation
- Zipes: Cardiac electrophysiology: from cell to bedside
- Feigenbaum: Echocardiography
- Perloff: congenital heart disease in adults
- Moss and adam's heart diseases in infants, children, and adolescents
- Topol: Textbook of Cardiovascular Medicine
- Marriot: Electrocardiography
- Josephson: clinical cardiac electrophysiology
- Otto: The practice of echocardiography
- Kaplan: Clinical hypertension
- Grossman's: Cardiac catheterization, angiography, and intervention
- Oxford Handbook of Clinical Medicine
- The Merck Manual
- The Washington manual of medical theraputics

II. International Guidelines

- ACC/AHA guidelines (www. Myamericanherat.org)
- European Society of Cardiology Guidelines (http://www.escardio.org/knowledge/guidelines)

III. Recommended high impact journals

- Circulation
- Journal of American College of Cardiology
- New England Journal of Medicine
- Heart
- European Heart Journal

IV. Web sites (including the Departement website; heartj.com)

IV. Facilities required for teaching and learning:

Basic materials:

Overhead projections, slides, computer presentation, used during teaching.

Suggested materials:

CD-ROM containing topics and presentation in cardiovascular medicine

Course coordinators **Head of the Department**

Prof. Dr. Azza Farrag Prof. Dr. Hossam Kandil