FELLOWSHIP OF CLINICAL CARDIOLOGY

Training Program and curriculum

Iraqi Board for Medical Specializations

Non Interventional Cardiology Fellowship Training Curriculum

OVERVIEW OF THE SPECIALTY

Cardiology is a branch of internal medicine concerned with prevention, investigation and therapy of, and research into, diseases involving the cardiovascular system. Cardiovascular disease remains the leading cause of death within our society.

Cardiologists are perceived, by the public, as important members of the medical profession, who can effectively treat heart disease and return patients to active lives. They are also perceived as advocates for healthy lifestyles, including diet and physical activity. One perhaps unfortunate consequence is that there is a broad public perception that cardiology can now cure all cardiovascular problems and there is some complacency about heart disease within the population.

DURATION:

3 years (after completing two years of internal medicine core training)

Total Five Years Training Program

CURRICULUM GOALS:

The main goals of training for a clinical (non interventional) cardiologist are to ensure that they develop the essential knowledge, skills, and professional behaviors required to manage patients with cardiovascular diseases and contribute to the field of cardiology. Below are the key goals:

1. Clinical Competence

The clinical cardiologist must be able to accurately diagnose and manage a wide range of cardiovascular conditions, including coronary artery disease, heart failure, arrhythmias, valvular heart disease, and congenital heart disease. In addition to provide high-quality, patient-centered care that involves comprehensive assessment, treatment planning, follow-up, and prevention strategies.

The clinical cardiologist must be proficient in managing both acute cardiovascular emergencies (e.g., myocardial infarction, acute heart failure, arrhythmias) and chronic conditions (e.g., hypertension, heart failure).

2. Diagnostic and Procedural Proficiency

Master non-invasive diagnostic techniques, including echocardiography, ECG, stress testing, and imaging modalities (e.g., CT, MRI).

Gain understanding and exposure in invasive procedures such as coronary angiography, percutaneous coronary interventions (PCI), pacemaker/ICD implantation, electrophysiology studies, and catheter-based ablations.

Understand the role of advanced technologies and devices (e.g., LVAD, heart transplantation, cardiac resynchronization therapy) in modern cardiology.

3. Critical Thinking and Decision Making

Apply the latest research, clinical guidelines, and best practices to patient care, ensuring a sound rationale for all diagnostic and therapeutic decisions.

Approach complex cases with a holistic, multidisciplinary perspective, considering both clinical and psychosocial factors in decision-making.

Skillfully assess the risks of cardiovascular events, including the use of biomarkers, imaging, and family history, to guide treatment and prevention strategies.

4. Professionalism and Communication

Establish rapport with patients, ensuring clear communication, empathy, and respect for patient preferences and values.

Work effectively as part of a multidisciplinary team, communicating clearly with other specialists (e.g., surgeons, radiologists, intensivists) to provide the best care for patients. Adhere to high standards of professional ethics, ensuring patient confidentiality, informed consent, and professionalism in all interactions.

5. Lifelong Learning and Scholarship

Stay up-to-date with emerging cardiovascular knowledge, technologies, and treatment protocols by reading current literature, attending conferences, and participating in continuing medical education (CME).

Contribute to the advancement of cardiology through research, clinical trials, or quality improvement projects. Continuously reflect on personal and professional development to identify areas for improvement and ensure high standards of care.

6. Preventive Cardiology

Identify and manage cardiovascular risk factors such as hypertension, diabetes, dyslipidemia, smoking, and obesity through both medical interventions and lifestyle changes. Promote strategies for preventing cardiovascular diseases (e.g., screening programs) and reduce recurrence in patients with established disease through evidence-based interventions. Advocate for public health measures that reduce the burden of cardiovascular diseases, including lifestyle initiatives, community education, and policy advocacy.

7. Leadership and Teaching

Provide education and mentorship to medical students, residents, and junior fellows, fostering the next generation of cardiologists.

Assume leadership roles in clinical settings, research teams, and professional societies, advocating for improved patient care and advancing the field of cardiology.

CURRICULUM OVERVIEW AND LEARNING OBJECTIVES

This curriculum outlines the broad concepts, related learning objectives and the associated theoretical knowledge, clinical skills, attitudes and behaviours required and commonly utilised by cardiologists.

1. Basic Principles in Cardiology

Apply clinical skills to diagnose and manage heart conditions and diseases

Knowledge Skills

- describe the following for common heart conditions and diseases:
- pathogenesis
- pathophysiology
- natural history
- epidemiology
- clinical presentations
- prognosis
- describe the following features of invasive and noninvasive investigations used in the assessment of heart conditions and diseases:
- indications
- limitations
- risks
- benefits
- predictive values
- explain the pharmacology of drugs used in various treatments.
- elicit a history
- perform an examination
- select and interpret appropriate investigations
- identify indications for further investigation and intervention
- select drug therapy, treatments and interventions for individual patients
- explain diagnoses, implications, and management strategies to patients and their families.

Teaching and Learning Opportunities

- emergency department (ED)
- coronary care unit (CCU)
- intensive care unit (ICU)

2. Research

Identify research principles and undertake research projects **Knowledge Skills**

- discuss categories of clinical research studies including:
- randomised controlled trial
- observational study

• meta-analysis
• registry
• case reports
• explain basic statistical analyses applied to clinical research studies, and levels of evidence applied to clinical trials
• describe the concept of absolute versus relative risks
• explain statistical methodologies as they apply to risk assessment • critically evaluate research studies
• outline possible approaches to studying a clinical question and design a research study. • critically review published research through department journal club and presentations
• participate in clinical research projects during training period.

Teaching and Learning Opportunities
• department journal meetings and presentations
• department research meetings

3. Basic and Advanced Life Support

Perform and supervise the resuscitation of patients
Knowledge Skills
• describe current guidelines on resuscitation
• describe the principles of cardiopulmonary resuscitation
• describe the cardiac and non-cardiac causes of cardiac arrest • explain the theoretical basis of cardiopulmonary resuscitation.
• supervise pre-hospital care
• initiate and perform Basic Life Support
• initiate and perform Advanced Life Support
• initiate and perform cardiac defibrillation
• perform and supervise resuscitation of patients suffering from cardiac arrests and the critically ill.

Teaching and Learning Opportunities
• accident and emergency department
• inpatient emergencies
• operating theatre and recovery room
• advanced life support course

4. Presentations and Manifestations of Cardiovascular Disease

Assess and treat patients presenting with acute breathlessness
Knowledge Skills
• describe causes of acute breathlessness
• describe the management of cardiac and noncardiac diseases presenting with breathlessness
• describe the role of assisted ventilation (invasive and non-invasive) in compromised patients
• describe the indications for and methods of assisted ventilation, e.g. continuous/bi-level positive airway pressure (CPAP/BiPAP).
• manage urgent clinical presentations of breathlessness, including:
• acute pulmonary oedema
• major pulmonary thromboembolism

• respiratory failure
• interpret cardiac causes of breathlessness in an acute setting (e.g. intensive care) • recommend and initiate assisted ventilation in compromised patients (e.g. CPAP).

Teaching and Learning Opportunities

• ED
• CCU
• ICU

Assess and treat patients with

Assess and treat patients presenting with chronic breathlessness

Knowledge Skills

• describe respiratory and cardiac causes of chronic breathlessness
• identify treatment methods for pulmonary disease
• recognise exertional breathlessness as an angina equivalent
• describe management options for chronic breathlessness.
• diagnose and manage patients with chronic breathlessness
• refer for lung function tests, such as:
• spirometry
• diffusing capacity of the lung for carbon monoxide (DLCO)
• flow velocity measurements
• interpret the results of these tests.

Teaching and Learning Opportunities

• cardiac ward
• inpatient consultations
• ambulatory care

Assess and treat patients presenting with chest pain

Knowledge Skills

• explain the causes of chest pain
• identify the importance of individual risk factor profiles
• discuss the impact of chronic pain syndromes.
• take a history and conduct a clinical examination • select and interpret appropriate investigations • formulate a differential diagnosis.

Teaching and Learning Opportunities

• ED
• inpatient consultations
• on-call after hours
• CCU

Assess and treat patients with acute heart failure

Knowledge Skills

• describe the aetiology, pathophysiology, diagnosis, and management of acute heart failure
• describe the pharmacology of drugs currently used in the treatment of heart failure
• identify complications of pharmacological treatment in patients with heart failure
• recognise the role of non-invasive and invasive ventilation
• describe indications for referral for intra-aortic balloon pump and percutaneous revascularisation • describe indications for referral for surgical interventions, including valve surgery, cardiac transplantation and assist devices.
• select drug therapy and interventions for individual patients with acute heart failure
• manage patients requiring non-invasive ventilator support.
•
•
•

Teaching and Learning Opportunities

• cardiac ward
• CCU ICU
inpatient consultations ambulatory
care chronic heart failure

Knowledge Skills

• describe the aetiology, pathophysiology, diagnosis, and management of chronic heart failure
• describe the natural history and clinical presentation of patients with heart failure • describe the pharmacology of drugs currently used in the treatment of heart failure
• describe the indications for referral for surgical interventions, including:
• valve surgery
• cardiac transplantation
• assist devices
• describe the role of non-pharmacological treatment including exercise for heart failure
• identify complications of pharmacological treatment in patients with heart failure • describe the indications for an implantable cardioverter-defibrillator (ICD)
• explain the role of biventricular pacing and resynchronisation therapy.
• select drug therapy and interventions for individual patients with heart failure.

Teaching and Learning Opportunities

• cardiac ward
• inpatient consultation
• ambulatory care

Assess and treat patients with pre-syncope and syncope

Knowledge Skills

• identify causes of syncope and pre-syncope
• differentiate between cardiological and non-cardiological causes of syncope
• describe autonomic causes of hypotension
• outline a risk profile of a patient with syncope
• recognise life threatening cardiac causes of syncope
• conduct an examination, including carotid sinus massage
• explain the medical management of postural hypotension
• describe indications for cardiac pacing and use of ICDs.
• Holter monitoring
• tilt table testing
• implantable electrocardiogram (ECG) monitoring devices
• assessment for implantable cardioverter-defibrillator (ICD)
• develop a management plan for syncopal patients
• insert temporary cardiac pacing systems
• investigate and manage patients with resuscitated sudden death.
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•

Assess and treat patients with

Teaching and Learning Opportunities
• ED
• inpatient consultations
• ambulatory care

Assess patients presenting with cardiovascular manifestations of sleep disorders
Knowledge Skills
• describe the physiology of sleep
• identify types of sleep apnoea
• describe the cardiovascular manifestations of sleep apnoea explain how sleep disorders affect cardiovascular diseases.
select and refer for appropriate investigations refer for specialist assessment and treatment where required.

Teaching and Learning Opportunities
• ambulatory care

Assess and treat patients with stable angina
Knowledge Skills
• describe the pathogenesis of atheroma and the importance of risk factors
• describe the natural history, pathophysiology, and presentations of coronary artery disease
• describe the pharmacology of drugs currently used in the treatment of stable angina
• identify the indications for further investigation and intervention
• describe the role of revascularisation procedures, including angioplasty and coronary artery bypass surgery.
• diagnose angina and differentiate from chronic non-cardiac pain
• explain risks and benefits of an intervention on a patient
• select and initiate appropriate treatment options
• identify and manage risk factors for further coronary heart disease.

Teaching and Learning Opportunities
• ambulatory care

Assess and treat patients who are critically ill with haemodynamic disturbances
Knowledge Skills
• describe the pathogenesis, presentation, and natural history of critical illness due to haemodynamic disturbance
• explain the medical management of a shocked patient
• describe the indications and complications of intra-aortic balloon pump counterpulsation
• describe the indications for ventricular assist devices
• explain the indications for and haemodynamic consequences of positive pressure ventilation
• describe the indications for urgent surgical and coronary intervention. • assess, manage, and give advice on the critically ill patient
•
•
•

• 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
• septic shock
• select and use investigations appropriately to assess haemodynamics including:
• echocardiography
• pulmonary artery catheterisation
• haemodynamic measurements
• define the indications and limitations of inotropic drugs
• perform urgent pericardiocentesis

Teaching and Learning Opportunities

inpatient emergencies
operating theatre and recovery room
ED

•
•
•

Assess and treat patients with
acute coronary syndromes

Knowledge Skills

- describe the pathophysiology of acute coronary syndromes, including plaque rupture
- describe the diagnosis and management of acute coronary syndromes
- describe the pharmacology of drugs currently used in the treatment of acute and post-coronary syndromes
- describe the indications, interpretation, and management of:
- haemodynamic monitoring
- left ventricular assist devices
- intra-aortic balloon pumps • describe the indications for:
- thrombolysis
- drug therapy
- urgent angioplasty
- select and manage cardiovascular medications
- initiate and perform cardiopulmonary resuscitation and life support • assess individual patient risk and prioritise patients for urgent intervention
- manage the clinical and administrative aspects of a CCU.
- recognise when to refer patients for angiography
- manage complications such as arrhythmias, heart failure and shock
- identify CCU protocols.

Teaching and Learning Opportunities

- ED
- CCU
- on-call after hours
- intra-aortic balloon pump insertion

Assess and treat patients with, or at risk from endocarditis

Knowledge Skills

- describe the pathogenesis, presentation, and natural history of infective endocarditis
- identify common pathogens associated with endocarditis
- describe the indications and limitations of investigations used in the diagnosis and management of endocarditis, including:
- transthoracic echocardiography
- transoesophageal echocardiography
- explain the possible complications of endocarditis
- describe the indications for, and timing of surgical intervention
- recognise current guidelines for endocarditis prophylaxis
- explain the investigation and management of device related infection • explain the investigation and management of prosthetic valve endocarditis.
- diagnose, investigate, treat and monitor patients with endocarditis
- integrate information and advice from clinical microbiologists and cardiac surgeons
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Assess and treat patients with
• manage patients with native and prosthetic valve endocarditis.

Teaching and Learning Opportunities
• ED
• inpatient consultations multidisciplinary meetings cardiac murmurs and valvular heart disease

Knowledge Skills
• describe the pathological processes that are responsible for valvular heart disease
• describe the natural history of valve disorders
• explain the indications for surgical intervention including valve repair
• identify different types of prosthetic valves available for clinical use
• recognise anticoagulation regimes for patients with valve disease and prostheses
• explain the role of percutaneous intervention in valvular heart disease.
• conduct an examination to accurately diagnose valve lesion
• interpret physical signs with reference to severity of valve heart disease
• perform and interpret a transthoracic ECG

Teaching and Learning Opportunities
• inpatient consultations
• ambulatory care
• cardiac catheter laboratory
• echocardiography lab

Assess and treat patients with arrhythmias

Knowledge Skills
• describe the following features of arrhythmias:
• aetiology
• pathogenesis
• natural history
• presentations
• clinical signs
• prognosis
• management options
• identify normal electrophysiology of the heart and the basis of arrhythmogenesis • describe the pharmacology of drugs currently used in the treatment of arrhythmias
• describe the indications for, and management properties of:
• temporary pacemakers
• single chamber permanent pacemakers
• dual chamber permanent pacemakers
• electrophysiological studies • radiofrequency ablation • ICDs.
• select drug therapy and interventions for patients with arrhythmias
• select patients for cardioversion
• perform cardioversion

Assess and treat patients with
• interpret and evaluate results from ECG • insert temporary cardiac pacing systems.

Teaching and Learning Opportunities
• inpatient consultations
• ambulatory care
• cardioversion procedures
• cardiac catheter laboratory

cardiomyopathy

Knowledge Skills
• describe the pathogenesis, natural history and prognosis of cardiomyopathy
• identify different types of cardiomyopathy
• describe genetic basis for cardiomyopathies, including hypertrophic cardiomyopathy
• select and interpret appropriate investigations, including:
• echocardiography
• magnetic resonance imaging (MRI)
• exercise testing
• cardiac catheterisation and angiography
• EP studies
• describe the cardiac complications of viral infections, including HIV
• discuss the role of family screening
• explain the role of the following in the management of patients with cardiomyopathies:
• screening
• medical therapy
• ICDs
• pacemakers
• CRT/resynchronisation therapy
• catheter based treatment
• surgical based treatments
• explain the indications for cardiac transplantation
• explain the implications of having a cardiomyopathy on lifestyle activities (e.g. participation in competitive sport).
• manage patients with genetic basis for cardiomyopathy, including:
• counselling family members
• advising when genetic testing is indicated.

Teaching and Learning Opportunities
• inpatient consultations
• ambulatory care

Assess and treat patients with cardiac tumours

Assess and treat patients with

Knowledge Skills

- describe the pathology, presentation and natural history of cardiac tumours • explain the indications and timing of surgical intervention for specific tumours.
- select and interpret appropriate investigations, including computed tomography (CT) and cardiac MRI
- perform and interpret transthoracic ECG
- recognise the appearance of common cardiac tumours
- interpret results of investigations to form a differential diagnosis.

Teaching and Learning Opportunities

- inpatient consultations
- specialty clinic
- multidisciplinary meetings

pericardial disease

Knowledge Skills

- describe the pathogenesis, natural history, and prognosis of pericardial diseases
- describe modes of presentation of pericardial disease
- identify the haemodynamics of constrictive pericarditis and tamponade
- explain the indications for investigation in patients with pericardial disease
- explain the medical and surgical management of patients with pericardial disease.
- select and interpret appropriate investigations, including echocardiography and right heart catheterisation
- recognise indications for pericardiocentesis
- recognise and manage cardiac tamponade • recognise and manage pericardial constriction.

Teaching and Learning Opportunities

- ED
- inpatient consultations
- ambulatory care
- perform pericardiocentesis

Assess patients with cardiovascular disease prior to non-cardiac surgery

Knowledge Skills

- describe the effects of common anaesthetic agents upon cardiovascular function
- describe the issues for patients with devices, such as pacemakers and ICDs, undergoing non cardiac surgery
- identify pre-operative relevant cardiac investigations
- describe indications for and principles of antibiotic prophylaxis against infective endocarditis
- explain the need for cardiac follow-up after surgery

Assess and treat patients with
• identify pre-operative cardiovascular pharmacological interventions in patients undergoing noncardiac surgery.
• assess patients with cardiac disease prior to non cardiac surgery, including risk assessment of:
• anaesthesia
• surgery
• advise on the ways to minimise the risk of non-cardiac surgery
• provide valid and useful risk assessment advice to patients, anaesthetists, and surgeons.

Teaching and Learning Opportunities
• inpatient consultations
• operating theatre and recovery room
• pre-operative assessment clinics

5. Congenital and Inherited Heart Disease

Diagnose and manage patients with inherited heart disease
Knowledge Skills
• describe the fundamentals of human inheritance
• recognise the principles of molecular genetics and genetic testing
• describe the genetics of common inherited heart diseases
• identify the molecular pathophysiology of common inherited heart diseases
• describe the clinical presentations, natural history, and screening for common inherited heart diseases, including:
• channelopathies and/or inherited rhythm disturbances
• cardiomyopathies
• connective tissues diseases (e.g. Marfan syndrome)

• identify features of the following inherited conditions:
• Brugada syndrome
• long QT syndrome
• channelopathies • cardiomyopathies.
• elicit and document a detailed family and clinical history to develop a pedigree for disease
• perform a specific systemic physical examination, including the detection of non-cardiac features • interpret the results of genetic tests
• manage patients with congenital heart disease, including post-surgery
• counsel individuals at risk of inherited heart disease.

Teaching and Learning Opportunities
• inpatient consultations
• ambulatory care

Diagnose and manage patients with common forms of congenital heart disease
Knowledge Skills
• describe the fundamentals of embryology of the heart
• describe the following features of common congenital heart diseases:
• epidemiology
• natural history
• clinical presentations
• recognise the principles of molecular genetics and genetic testing
• explain the role of screening for common congenital heart diseases in at-risk individuals
• explain management principles of common congenital heart disease
• describe the management options for cyanotic and non-cyanotic congenital heart disease
• explain the role of endocarditis prophylaxis
• describe the natural history of common and rare congenital conditions with and without previous cardiac surgery
• discuss the physical and psychological problems that may arise in adults with congenital heart disease.
• elicit and document a detailed family and clinical history to develop a pedigree for disease
• perform a specific systemic physical examination, including the detection of non-cardiac features • interpret the results of genetic tests
• assess common congenital heart conditions using echocardiography
• perform an ECG and interpret the results
• liaise with specialists in congenital heart disease and paediatric cardiologists
• manage adolescents and adults with complex congenital heart disease.

Teaching and Learning Opportunities
• inpatient consultations
• private rooms
• multidisciplinary meetings
• ambulatory care
• adult congenital heart disease clinic

6. Conditions Affecting the Circulation

Assess and treat patients with hypertension

Knowledge Skills

• describe the causes of hypertension
• describe the role of non-pharmacological treatments
• describe the pharmacology of drugs currently used in the treatment of hypertension • discuss management options for a patient with resistant hypertension
• explain protocols and management plans for hypertension.
• assess a patient with hypertension for end organ damage
• investigate a patient for secondary hypertension
• interpret appropriate biochemical investigations and imaging modalities
• interpret ambulatory blood pressure recordings • manage patients with hypertensive emergencies.

Teaching and Learning Opportunities

• inpatient consultations
• ambulatory care

Assess and treat patients with pulmonary hypertension

Knowledge Skills

• describe the following features of pulmonary hypertension, including primary and secondary pulmonary hypertension:
• causes
• epidemiology
• natural history
• symptoms and signs
• current acute and chronic medical management
• explain the role of heart-lung transplantation
• describe indications for pulmonary angiography and referral for consideration of pulmonary endarterectomy.
• select drug therapy and interventions for patients with pulmonary hypertension.

Teaching and Learning Opportunities

• inpatient consultations
• ambulatory care
• cardiac catheter laboratory
• CCU

Assess and treat patients with acute and chronic thromboembolic disease

Knowledge Skills

• describe the pathophysiology and epidemiology of pro-coagulant disorders
• describe causes and predisposing factors for thromboembolic disease
• describe the risk profile of a patient for thromboembolic disease
• explain the consequences of thromboembolic disease, including pulmonary embolism

• explain the medical management of thromboembolic disease
• discuss the management of recurrent thromboembolic disease
• explain the condition of chronic thromboembolic pulmonary hypertension.
• select and interpret appropriate investigations including:
• duplex scans
• lung ventilation/perfusion (VQ) scans
• CT pulmonary angiography
• ECG
• cardiac MRI
• develop a management plan for a patient with acute thromboembolic disease
• develop a management plan for a patient with chronic thromboembolic disease
• manage a haemodynamically compromised patient with pulmonary embolism.

Teaching and Learning Opportunities
• ED
• inpatient consultations
• ambulatory care
• cardiac catheter laboratory

Assess and treat patients with diseases of the aorta
• describe the pathogenesis, presentation and natural history of aortic aneurysms including aortic dissection
• explain familial disease of the aorta, including common genetic mutations
• describe bicuspid aortic valve and associated aortic diseases
• describe the natural history of corrected and uncorrected coarctation
• explain medical therapy options for diseases of the aorta
• define the indications and limitations of anti-hypertensive drugs
• describe the indications for percutaneous and surgical intervention, including open repair and stent procedures
• discuss the need for, and approaches to, long term follow-up of patients with aortic disease.
• select and interpret appropriate non-invasive imaging, including:
• echocardiography
• CT
• MRI
• assess, manage, and give advice on patients with acute aortic dissection.

Teaching and Learning Opportunities
• ED
• inpatient consultations
• ambulatory care

Assess and treat patients with systemic vascular disease
Knowledge Skills
• describe the pathophysiology of arterial and venous disease • describe the clinical presentation of aortic aneurysm and dissection
• describe the natural history and clinical presentations of:
• cerebrovascular disease

• renovascular disease
• peripheral vascular disease
• identify clinical manifestations of acute and chronic venous disease
• explain management techniques for vascular disease, including stenting
• describe heritable acquired connective tissue diseases, including their potential effects on the heart and circulation (e.g. systemic lupus erythematosus).
• conduct an examination of peripheral vasculature
• examine the musculoskeletal system to detect connective tissue disorders
• assess and manage vascular trauma, and identify when to refer to a vascular surgeon • interpret the results of:
• Doppler ultrasound imaging and flow studies • peripheral angiography investigations
• CT and MRI angiograms.

Teaching and Learning Opportunities

• inpatient consultations
• ambulatory care
• observation of vascular surgery procedures and stenting

Assess and treat patients with lipid abnormalities

Knowledge Skills

• recognise normal and abnormal lipid biochemistry
• describe the epidemiology and pathophysiology of lipid disorders
• describe the common genetic abnormalities affecting lipid metabolism
• explain methods to investigate and manage patients with lipid disorders
• describe the pharmacology of drugs currently used in the treatment of lipid disorders
• discuss current evidence for pharmacological intervention in both primary and secondary prevention.
• interpret lipid test results
• select and prescribe lipid lowering medications
• explain the management of lipid disorders to patients
• explain basic principles of a healthy lifestyle and diet to patients.

Teaching and Learning Opportunities

• inpatient consultations
• specialist lipid clinic
• ambulatory care

7. At Risk Individuals and Groups

Assess and treat heart disease in patients who are pregnant or planning pregnancy

Knowledge Skills

• describe the physiological changes during pregnancy and the post-partum period and their impact on cardiovascular disease
• describe the implications of anticoagulation during pregnancy
• explain the implications and risks of cardiac disorders on pregnancy
• explain the implications and risks of pregnancy on cardiac disorders
• describe the issues involved in valvular surgery
• explain the risks for the fetus of congenital heart disease in mothers
• discuss principles of medical and interventional management of mothers with heart disease

• discuss prescribing problems encountered during pregnancy
• describe appropriate investigations for a pregnant woman with cardiac disease.
• assess a cardiac patient's risk of becoming pregnant
• provide pre-pregnancy counselling and refer for contraceptive advice
• manage patients with hypertension and heart disease throughout pregnancy, delivery, and the postnatal period
• explain the importance of a multidisciplinary approach in treating patients with cardiac disease during the anti-partum, delivery, and post-partum periods.

Teaching and Learning Opportunities
• inpatient consultations
• specialty clinic
• multidisciplinary meetings
• ambulatory care

Assess and manage heart disease in elderly patients and patients with comorbidity
Knowledge Skills
• describe the epidemiology of heart disease in elderly people
• identify the clinical presentations of heart disease in elderly people
• explain the interaction of heart disease with multisystem diseases, including renal impairment • describe the considerations required in drug treatment for elderly people
• describe the indications for cardiac surgery in elderly people.
• conduct an appropriate examination in an elderly person, factoring in limited mobility • discuss management strategies with the patient, family members and carers
• lead and contribute to a multidisciplinary health care team.

Teaching and Learning Opportunities
• inpatient consultations
• ambulatory care
• ED assessments

Assess and treat patients with risk factors for atherosclerotic vascular disease
Knowledge Skills
• describe the epidemiology of ischaemic heart disease
• describe the investigation and management options for patients with:
• systemic hypertension (both primary and secondary)
• lipid disorders
• diabetes
• history of smoking
• family history of cardiovascular disease
• describe the impact of "metabolic syndrome" upon vascular health
• calculate a patient's absolute risk of cardiovascular disease on the basis of standard risk factors.
• assess the prevalence of coronary heart disease in the community
• manage risk factors for individual patients
• explain basic principles of a healthy lifestyle and diet to patients.

Teaching and Learning Opportunities
• cardiac ward
• inpatient consultations
• ambulatory care

8. Electrocardiography and Holter Monitoring

Knowledge Skills
• describe the indications and reporting methods for the following investigations:
• ECG (including high resolution)
• ambulatory ECG
• loop event recordings • ST segment monitoring.
• explain correct electrode placement for rest and exercise ECGs and ambulatory ECGs
• supervise, analyse, and monitor ECG recordings
• interpret and communicate results to referring physicians.

9. Exercise Testing

Knowledge Skills
• describe the indications the indications and reporting methods for exercise testing
• describe the physiology of exercise, including cardiovascular and respiratory physiology
• identify causes of false positive and false negative exercise ECG tests • explain the significance of haemodynamic responses during exercise
• discuss the effect of drug therapy upon exercise testing.
• supervise and analyse exercise ECG tests
• interpret the results of exercise tests • perform cardiopulmonary resuscitation.

10. Echocardiography

Knowledge Skills
• recognise normal and abnormal cardiac anatomy including common congenital lesions, physiology, haemodynamics, and their abnormalities relevant to echocardiography
• describe the indications, techniques, limitations and complications of echocardiographic modalities including:
• transthoracic echocardiography
• transoesophageal echocardiography
• stress echocardiography
• describe the practical and technical aspects and complications of these tests
• describe the indications, techniques, limitations and complications of other non-invasive cardiac imaging modalities including:
• nuclear cardiology
• cardiac MRI
• cardiac CT

• explain physical principles behind ultrasound image formation, Doppler imaging and flow velocity measurement
• safely perform and interpret: transthoracic and transoesophageal echocardiographic examinations
• apply the following modalities:
• 2D imaging
• pulsed wave Doppler
• continuous wave Doppler
• colour flow imaging
• M-mode
• produce an echocardiography report
• discuss the echocardiographic findings with sonographers, patients and consultants
• select and use appropriate probe, machine and image settings to obtain and optimise image quality
• recognise the presence of artefacts and how to differentiate from true pathology
• perform and interpret agitated saline contrast echocardiography to assess intra-cardiac shunts and right ventricular function • observe or participate in:
• transoesophageal echocardiography
• exercise stress echocardiography
• pharmacologic stress echocardiography

11. Multimodality cardiac imaging

Knowledge Skills

• explain the physics and hazards of ionizing radiation to patients and staff
• describe the physics of commonly used medical radioisotopes including nuclear cardiology
• explain the principles and practical implementation of protective measures to limit exposure to ionizing radiation for patients and staff
• discuss important aspects of cardiac radiology.
• measure radiation exposure
• describe the radionuclides and radiopharmaceuticals used in nuclear cardiology
• describe the physics of commonly used medical radioisotopes
• describe the principles of operation of the gamma camera and methods of computerised image acquisition and processing
• describe the indicators for undertaking radionuclide imagery for investigating the heart at rest and with exercise
• identify different types of stress testing
• discuss the importance of radiation protection
• describe the equipment used for nuclear cardiology imaging.
• interpret results of nuclear investigations
• identify principles of cardiac CT and MRI
• recognise normal CT and MRI findings of the heart
• recognise major abnormal CT and MRI findings of the heart
• describe the limitations of imaging technology including spatial and temporal resolution
• describe the indications and contraindications for the use of CT and MRI • recognise the role and limitations of CT coronary imaging

• discuss the importance of radiation protection.
• review and discuss cardiac CT and MRI
• identify important sources of error in image interpretation

Teaching and Learning Opportunities
• cardiac catheter suite
• radiology laboratory
• nuclear medicine laboratory

12. Electrophysiology (EP) and Pacing

Knowledge Skills
• describe the normal and abnormal electrophysiology of the heart, including fundamental cellular electrophysiology
• describe electrophysiology and cardiac anatomy relevant to pacing
• explain the pharmacology of drugs affecting cardiac electrophysiology
• describe the indications for and complications of cardiac electrophysiology studies, including ablation procedures
• explain the principles of action of cardiac pacemakers, including biventricular pacemakers and ICDs
• describe the indications for and complications of implantation of temporary and permanent cardiac pacemakers and ICDs
• describe the electrophysiological complications of pacemakers and common forms of pacemaker dysfunction
• describe the principles of pacemaker interrogation and programming
• discuss the importance of radiation protection
• recognise properties of different pacing systems used.
• safely obtain central venous access and place temporary transvenous pacing wire in right ventricle
• participate in decision making concerning referral for electrophysiology and ablation procedures
• observe the performance of electrophysiology and ablation procedures
• participate in the testing and follow-up of ICD implants
• insert temporary pacing systems
• observe and participate in the implantation of permanent pacemakers
• monitor, interrogate and program pacemakers
• recognise and manage complications of a pacing system.

Teaching and Learning Opportunities
• inpatient consultations
• operating theatre
• pacing clinic
• ambulatory care
• cardiac catheter laboratory

13. Cardiac Catheterisation and Angiography

Knowledge Skills

- recognise normal and abnormal coronary anatomy
- recognise normal and abnormal peripheral vascular anatomy
- recognise common congenital abnormalities of the heart
- describe pericardial anatomy and disease states
- describe the indications for cardiac catheterization and coronary angiography
- recognise normal and abnormal haemodynamics of right and left heart
- describe the pharmacology of drugs and agents used in cardiac catheter laboratory
- explain the complications and adverse events, including relative risks
- discuss patient safety procedures
- explain the principles of radiography and radiation safety
- describe indications, procedures, and limitations of percutaneous interventions
- assess patients before the procedure
- manage common complications arising during and after catheterisation and angiography
- interpret the results of angiography and manage patients including referral for PCI or cardiac surgery
- observe and assist with percutaneous coronary interventions

14. Cardiac Surgery

Knowledge Skills

- describe the nature of cardiac surgery, the management of patients before, during and after cardiac surgery
- explain the principles of patient management in cardiac surgery
- explain the indications for surgery
- discuss the collaboration between cardiologists and cardiac surgeons required to effectively manage patients
- explain the theoretical basis underpinning major types of cardiac surgery for valvular and coronary heart disease and their selection in individual patients • describe post-operative surgical care including:
- the management of ventilated patients
- management of hemodynamic instability
- arrhythmia management • post-operative emergencies.
- refer patients to cardiac surgeons for coronary or valvular heart disease
- evaluate the risks and likely benefits of cardiac surgery for individual patients and explain these to patients
- prepare patients for cardiac surgery, including evaluation of comorbidities and pre-operative cardiac investigations
- assess the patient, and their imaging studies, pre-operatively
- participate in immediate and long-term postoperative management of patients.

15. Ambulatory Care

Knowledge Skills

- identify and describe the clinical features of all cardiovascular diseases
- explain the clinical indications for cardiovascular pharmacological treatment
- recognise the indications, roles, and pathways of non-invasive and invasive cardiovascular investigation.
- assess and manage patients presenting with a spectrum of symptoms and clinical presentations
- formulate a diagnostic pathway which is clinically and cost efficient
- identify the pharmacological treatment of cardiovascular diseases, particularly with multiple drugs
- explain the implications of illness and its implications to patients and their family members.

TRAINING PROGRAM

Year 1: Core Cardiology Training

Key Rotations & Responsibilities:

1. **General Cardiology (Inpatient & Outpatient) - 6 Months**

• Clinical Exposure: Cardiovascular disease management (e.g., CAD, hypertension, heart failure, arrhythmias) in both inpatient and outpatient settings.

2. **Cardiac Intensive Care Unit (CCU) - 6 Months**

- Clinical Exposure: Management of critically ill cardiovascular patients (e.g., acute MI, shock, arrhythmias, and post-surgical recovery).

Academic & Didactic Activities:

- Weekly Cardiovascular Grand Rounds
- Journal Club participation
- Monthly case discussions and clinical teaching rounds.

Year 2: Advanced Training

Key Rotations & Responsibilities:

1. **Echocardiography and Stress Test Lab - 6 Months**

- Clinical Exposure: Basic and advanced Echocardiography including transthoracal, transoesophageal, stress and contrast Echo studies.

2. **Cardiovascular Imaging - 3 Months**

- Clinical Exposure: Multimodality cardiac imaging including CT, MRI and nuclear imaging.

3. **Heart Failure & Transplantation Clinic – 3 Months**

    - Clinical Exposure: Management of chronic heart failure, advanced therapies (LVAD, cardiac transplantation), and understanding of end-stage heart failure.

Academic & Didactic Activities:

- Weekly subspecialty-specific case presentations.
- Research participation in clinical trials, registries, or retrospective studies.
- Ongoing participation in journal clubs and didactic sessions with a focus on evidence-based medicine and guidelines.

Year 3: Advanced Expertise & Leadership Development

Key Rotations & Responsibilities:

1. **Interventional Cardiology – 2 Months**
    - Clinical Exposure: Angiography, angioplasty, stenting, coronary interventions, and vascular procedures.
2. **Electrophysiology (EP) – 2 Months**
    - Clinical Exposure: Cardiac pacing and Interrogation of different cardiac devices, invasive electrophysiology procedures, catheter ablation, and device implantation.
3. **Preventive Cardiology and Cardiac Oncology – 2 Months**
    - Clinical Exposure: Outpatient management of risk factors (e.g., hypertension, diabetes, hyperlipidemia) and promotion of cardiovascular health. Management and Follow up of cancer patients undergoing different therapy modalities.
4. **Adult Congenital Heart Disease Clinic – 2 Months**
    - Clinical Exposure: Diagnose and manage patients with inherited and congenital heart diseases.
5. **Structural and Valvular Heart Disease Clinic – 2 Months**

• Clinical Exposure: Management and care of patients with structural and valvular heart diseases, exposure to different interventional and surgical therapy options.

6. **Consultation Service – 2 Months**

• Clinical Exposure: Inpatient cardiac consultations and interdisciplinary management of complex patients (including preoperative risk assessment).

Academic & Didactic Activities:

- Attend regional and national cardiology conferences, workshops, and symposia.
- Mentoring junior fellows and residents, overseeing case discussions, and assuming teaching roles in cardiology rounds and conferences.
- Present research findings at national and international cardiology meetings.
- Final preparation for board exams and certification in cardiology.
- Participation in multidisciplinary meetings, including tumor board, advanced heart failure rounds, and structural heart disease conferences.

PROCEDURAL COMPETENCY AND LOGBOOK