



**INSTITUTE  
OF MEDICINE**

ROYAL COLLEGE OF  
PHYSICIANS OF IRELAND

HIGHER SPECIALIST TRAINING IN

# CARDIOLOGY



**This curriculum of training in Cardiology was developed in 2010 and undergoes an annual review by Dr Ross Murphy and Dr Briain MacNeill, National Specialty Directors, Ann O’Shaughnessy, Head of Education, and by the Cardiology Training Committee. The curriculum is approved by the The Institute of Medicine.**

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## Introduction

Cardiology is a clinical speciality dealing with diseases of the heart and circulatory system. Pathological processes in the vascular tree can arise as a consequence of dysfunction in other systems; therefore, the pathological processes involved and the physical impact of these conditions together with their psychosocial effects require to be understood. Developments in Cardiology have led to circumstances where many cardiologists may wish to engage in a particular aspect of the subject as a sub-speciality, such as cardiac ultrasound, electrophysiology, adult congenital heart disease, or preventive cardiology, therefore, it is important that an interest in such topics is facilitated during training.

Besides these specialty specific elements, trainees in Cardiology must also acquire certain core competencies which are essential for good medical practice. These comprise the generic components of the curriculum.

## Aims

Upon satisfactory completion of specialist training in Cardiology, the doctor will be **competent** to undertake comprehensive medical practice in that specialty in a **professional** manner, unsupervised and independently and/or within a team, in keeping with the needs of the healthcare system.

**Competencies**, at a level consistent with practice in the specialty of Cardiology, will include the following:

- Patient care that is appropriate, effective and compassionate dealing with health problems and health promotion.
- Medical knowledge in the basic biomedical, behavioural and clinical sciences, medical ethics and medical jurisprudence and application of such knowledge in patient care.
- Interpersonal and communication skills that ensure effective information exchange with individual patients and their families and teamwork with other health professionals, the scientific community and the public.
- Appraisal and utilisation of new scientific knowledge to update and continuously improve clinical practice.
- The ability to function as a supervisor, trainer and teacher in relation to colleagues, medical students and other health professionals.
- Capability to be a scholar, contributing to development and research in the field of Cardiology.
- Professionalism.
- Knowledge of public health and health policy issues: awareness and responsiveness in the larger context of the health care system, including e.g. the organisation of health care, partnership with health care providers and managers, the practice of cost-effective health care, health economics and resource allocations.
- Ability to understand health care and identify and carry out system-based improvement of care.

## Professionalism

Being a good doctor is more than technical competence. It involves values – putting patients first, safeguarding their interests, being honest, communicating with care and personal attention, and being committed to lifelong learning and continuous improvement. Developing and maintaining values are important; however, it is only through putting values into action that doctors demonstrate the continuing trustworthiness with the public legitimately expect. According to the Medical Council, Good Professional Practice involves the following aspects:

- Effective communication
- Respect for autonomy and shared decision-making
- Maintaining confidentiality
- Honesty, openness and transparency (especially around mistakes, near-misses and errors)
- Raising concerns about patient safety
- Maintaining competence and assuring quality of medical practice

**Entry Requirements**

Applicants for Higher Specialist Training (HST) in Cardiology must have a certificate of completion in Basic Specialist Training (BST) in General Internal Medicine and obtained the MRCPI.

Those who do not hold a BST certificate and MRCPI must provide evidence of equivalency.

Entry on the training programme is at year 1. Deferrals are not allowed on entry to Higher Specialist Training.



## Duration & Organisation of Training

The six years of HST in Cardiology is intended to produce fully trained Cardiologists who will **follow one of two paths (Path 1 or Path 2). The decision as to which path to follow will be made after 4 years of Basic Cardiology, which all trainees will complete.**

The training period shall be so arranged that during basic training (i.e. first four years), trainees will be provided with the opportunity to gain experience in the minimum number of procedures as required:

**Path 1** will lead to certification in Cardiology (CSCST) with acknowledgement of additional training having been undertaken in a subspecialty of Cardiology.

**Path 2** will lead to Dual accreditation in Cardiology and General Internal Medicine, utilising the time allocated to subspecialty training during **Path 1** (above), to obtain the additional training needed for completion of the GIM curricular requirements.

The importance to the practising Cardiologist of an adequate training in General Medicine is acknowledged by the inclusion in the General Cardiology Curriculum of a mandatory year of GIM. It must also be recognised that Specialist Cardiologists, to a greater extent than most other Medical Specialists, need to develop certain additional highly technical skills and competencies. Their capacity to acquire such skills cannot be ascertained prior to entry into HST. As a result, trainees are not asked to decide from the outset which of the two training paths they will eventually follow

**All trainees are enrolled initially in General (Internal) Medicine as well as in Cardiology.**

Then, based on the results of assessments of progress made annually, and particularly on an assessment made during the latter part of basic training a decision is made prior to the commencement of a fifth year of training, enabling the General Internal Medicine CSCST option to be dropped. The 4<sup>th</sup> year assessment will be conducted as a further interview, with detailed reports from trainers during the first 3 years, assessing the trainee's suitability for Paths 1 or 2. The trainees own wishes in this regard will be considered. Following the interview a recommendation will be made by the Training Board to the trainee regarding further training.

**Any objection by the trainee to the recommendation made would be considered within the terms of the College's Appeals Process.**

Certification in Radiation Protection, Advanced Cardiac Life Support (ACLS) and the undertaking of courses in statistics and management shall take place during this period of training.

Attendance at clinics related to Grown up Congenital Heart Disease and Heart Disease in Pregnancy is required.

During the final two years of sub-specialty training in Cardiology a minimum exposure to procedures relating to the sub-speciality in question is required. Those proceeding to certification in Cardiology/General (Internal) Medicine will spend one further year of high intensity General (Internal) Medicine with a further year of advanced general Cardiology. Involvement in research is strongly recommended. It may be necessary to take additional years during which the trainee may complete a course of study leading to a further qualification (MD, PhD).

No time-scale of acquisition is offered, but failure to make progress towards meeting these important objectives **at an early stage** would cause concern about a SpR's suitability and ability to become independently capable as a specialist.

Trainees must spend the first 2 years of training in clinical posts in Ireland before undertaking any period of research or Out of Programme Clinical Experience (OCPE). The earlier years of training will usually be directed towards acquiring a broad general experience of Cardiology under appropriate supervision. An increase in the content of hands-on experience follows naturally, and, as confidence is gained and abilities are acquired, the trainee will be encouraged to assume a greater degree of responsibility and independence.

If an intended career path would require a trainee to develop further an interest in a sub-specialty within Cardiology (e.g. Stroke, falls etc.), this should be accommodated as far as possible within the training period, re-adjusting timetables and postings accordingly.

Trainees on HST programme in Cardiology are given a rotation of posts at the start of the programme. Each rotation will provide the trainee with experience in different hospitals so as to acquire the broad range of training required. A degree of flexibility to meet the individuals training needs is possible especially towards the end of the training programme following discussion with the NSDs.

Generic knowledge, skills and attitudes support competencies which are common to good medical practice in all the medical and related specialties. It is intended that all Specialist Registrars should fulfil those competencies during Higher Specialist Training. No time-scale of acquisition is offered, but failure to make progress towards meeting these important objectives **at an early stage** would cause concern about a Specialist Registrar's suitability and ability to become independently capable as a specialist.

## Training Programme

The training programme offered will provide opportunities to fulfil all the requirements of the curriculum of training for Cardiology programmes in both general hospitals and teaching hospitals. Each post within the programme will have a named trainer/educational supervisor and programmes will be under the direction of the National Specialty Director for Cardiology or, in the case of GIM, the Regional Specialty Advisor. Programmes will be as flexible as possible consistent with curricular requirements, for example to allow the trainee to develop a sub-specialty interest.

The experience gained through rotation around different departments is recognised as an essential part of HST. A Specialist Registrar may **not** remain in the same unit for longer than 2 years of clinical training; or with the same trainer for more than 1 year.

Where an essential element of the curriculum is missing from a programme, access to it should be arranged, by day release for example, or if necessary by secondment.

## Dual Specialty Training

GIM training is expected to be completed in the first 3 years of the programme. One of these years is a GIM specific year. During the other 2 years trainees must complete their GIM training as per the minimum requirements.

Each post must include general medicine on-call commitment for acute unscheduled/emergency care with attendance at relevant post-take rounds.

### Acute Medicine:

There must be evidence of direct supervision of the activity of the more junior members of the “on-take” team and a minimum of 10 (480 per year) new acute medical assessments and admissions during the 24-hour period are expected. In addition, the trainee will be expected to have ongoing care/responsibility for a proportion of the patients for the duration of the clinical inpatient journey as well as follow up post discharge. In this capacity you should develop skills in non-technical aspects of care including discharge planning and end of life care.

### Inpatient Responsibilities:

The trainee will have front line supervisory responsibilities for general medical inpatients. This will require supervising the activities (e.g. being available for advice) of the more junior members (SHO/Intern) of the clinical team at all times. In addition to personal ward rounds, a minimum of two ward rounds with the consultant each week is expected for educational experience. Ongoing responsibility for shared care of the team’s inpatients whilst in the ITU/HDU/CCU is also essential. If this is not possible in a particular hospital/training institution, then a period of secondment to the appropriate unit will be required.

### Outpatient Responsibilities:

The trainee is expected to have personal responsibilities for the assessment and review of general medicine outpatients with a minimum of at least one consultant led GIM clinic per week. The trainee should assess new patients; access to consultant opinion/supervision during the clinic is essential. In the event of clinics being predominantly subspecialty orientated, a trainee must attend other clinics to ensure comprehensive General Internal Medicine training.

### General Education in Training:

The trainee is expected to spend four hours per week, in formal general professional education for certification of training. In the types of experience noted below, time must be fairly distributed between GIM and the other specialty in dual training programmes. Review of all these activities will form part of the training record for each trainee.

All trainees are required to undergo training in management. This will take the form of day-to-day involvement in the administration of the team/firm and must include attendance at a management course during the training period.

Trainees are expected to be actively involved in audit throughout their training and should have experience of running the unit’s audit programme and presenting results of projects at audit meetings.

They should also regularly attend other activities, journal clubs, X-ray conferences, pathology meetings etc.

Trainees should be expected to show evidence of the development of effective communication skills. This can be assessed from taking part in formal case presentations or in giving lectures/seminars to other staff or research/audit presentations at unit meetings.

All trainees must have a current ACLS certificate throughout their HST.

**Procedures:**

During training the trainee should acquire those practical skills that are needed in the management of medical emergencies, particularly those occurring out of normal working hours. Some exposure to these skills may have occurred during the period of BST but experience must be consolidated, and competencies reviewed during HST. The procedures, with which the trainee must be familiar and show competencies in, either as essential to acquire, or as additional procedural skills i.e. desirable to acquire.

**Essential & Additional Experience:**

The trainee will be expected to have had experience of/be familiar with the management of a wide range of cases presenting to hospitals as part of an unselected acute medical emergency “take”. Whilst trainees will not need to be expert in all of these areas they will be expected to be able to plan and interpret the results of immediate investigations, initiate emergency therapy and triage cases to the appropriate specialist care. These emergency situations have been considered under each specialty section and are indicative of what should be covered but are not prescriptive. It should form the basis of regular discussions between the trainee and trainers as training progresses. The various clinical situations listed for experience have been divided into those, which are considered “essential” and others, which are “additional”.

## Assessment Process

The methods used to assess progress through training must be valid and reliable. The Curriculum has been re-written, describing the levels of competence which can be recognised. The assessment grade will be awarded on the basis of direct observation in the workplace by consultant supervisors. Time should be set aside for appraisal following the assessment e.g. of clinical presentations, case management, observation of procedures. As progress is being made, the lower levels of competence will be replaced progressively by those that are higher. Where the grade for an item is judged to be deficient for the stage of training, the assessment should be supported by a detailed note which can later be referred to at the Annual Evaluation Meeting.

The assessment of training may utilise the Mini-CEX, DOPS and Case Based Discussions (CBD) methods adapted for the purpose. These methods of assessment have been made available by HST for use at the discretion of the NSD and nominated trainer. They are offered as a means of providing the trainee with attested evidence of achievement in certain areas of the Curriculum e.g. competence in procedural skills, or in generic components. Assessment will also be supported by the trainee's portfolio of achievements and performance at relevant meetings, presentations, audit, in tests of knowledge, attendance at courses and educational events.

## **Generic Components**

**This chapter covers the generic components which are relevant to HST trainees of all specialties but with varying degrees of relevance and appropriateness, depending on the specialty.**

**As such, this chapter needs to be viewed as an appropriate guide of the level of knowledge and skills required from all HST trainees with differing application levels in practice.**

## Good Professional Practice

**Objective:** Trainees must appreciate that medical professionalism is a core element of being a good doctor and that good medical practice is based on a relationship of trust between the profession and society, in which doctors are expected to meet the highest standards of professional practice and behaviour.

**Medical Council Domains of Good Professional Practice:** Relating to Patients, Communication and Interpersonal Skills, Professionalism, Patient Safety and Quality of Patient Care.

### KNOWLEDGE

#### Effective Communication

- How to listen to patients and colleagues
- The principles of open disclosure
- Knowledge and understanding of valid consent
- Teamwork
- Continuity of care

#### Ethics

- Respect for autonomy and shared decision making
- How to enable patients to make their own decisions about their health care
- How to place the patient at the centre of care
- How to protect and properly use sensitive and private patient information in accordance with data protection legislation and how to maintain confidentiality
- The judicious sharing of information with other healthcare professionals where necessary for care following Medical Council Guidelines
- Maintaining competence and assuring quality of medical practice
- How to work within ethical and legal guideline when providing clinical care, carrying research and dealing with end of life issues

#### Honesty, openness and transparency (mistakes and near misses)

- Preventing and managing near misses and adverse events.
- When and how to report a near miss or adverse event
- Incident reporting; root cause and system analysis
- Understanding and learning from errors
- Understanding and managing clinical risk
- Managing complaints
- Following open disclosure practices
- Knowledge of national policy and National Guidelines on Open Disclosure

#### Raising concerns about patient safety

- Safe working practice, role of procedures and protocols in optimal practice
- The importance of standardising practice through the use of checklists, and being vigilant
- Safe healthcare systems and provision of a safe working environment
- Awareness of the multiple factors involved in failures
- Knowledge and understanding of Reason's Swiss cheese model
- Understanding how and why systems break down and why errors are made
- Health care errors and system failures
- Human and economic costs in system failures
- The important of informing a person of authority of systems or service structures that may lead to unsafe practices which may put patients, yourself or other colleagues at risk
- Awareness of the Irish Medical Councils policy on raising concerns about safety in the environment in which you work

**SKILLS**

- Effective communication with patients, families and colleagues
- Co-operation and collaboration with colleagues to achieve safe and effective quality patient care
- Being an effective team player
- Ethical and legal decision making skills
- Minimising errors during invasive procedures by developing and adhering to best-practice guidelines for safe surgery
- Minimising medication errors by practicing safe prescribing principles
- Ability to learn from errors and near misses to prevent future errors
- Managing errors and near-misses
- Using relevant information from complaints, incident reports, litigation and quality improvement reports in order to control risks
- Managing complaints
- Using the Open Disclosure Process Algorithm

**ASSESSMENT & LEARNING METHODS**

- Consultant feedback at annual assessment
- Workplace based assessment e.g. Mini-CEX, DOPS, CBD
- Educational supervisor's reports on observed performance (in the workplace): prioritisation of patient safety in practice
- RCPI HST Leadership in Clinical Practice
- RCPI Ethics programmes
- Medical Council Guide to Professional Conduct and Ethics
- Reflective learning around ethical dilemmas encountered in clinical practice
- Quality improvement methodology course - recommended



## Infection Control

**Objective:** To be able to appropriately manage infections and risk factors for infection at an institutional level, including the prevention of cross-infections and hospital acquired infection

**Medical Council Domains of Good Professional Practice:** Patient Safety and Quality of Patient Care; Management (including Self-Management).

### KNOWLEDGE

#### Within a consultation

- The principles of infection control as defined by the HIQA
- How to minimise the risk of cross-infection during a patient encounter by adhering to best practice guidelines available, including the 5 Moments for Hand Hygiene guidelines
- The principles of preventing infection in high risk groups e.g. managing antibiotic use to prevent *Clostridium difficile*
- Knowledge and understanding of the local antibiotic prescribing policy
- Awareness of infections of concern, e.g. MRSA, *Clostridium difficile*
- Best practice in isolation precautions
- When and how to notify relevant authorities in the case of notifiable infectious disease
- Understanding the increased risk of infection to patients in surgery or during an invasive procedure and adhering to guidelines for minimising infection in such cases
- The guidelines for needle-stick injury prevention and management

#### During an outbreak

- Guidelines for minimising infection in the wider community in cases of communicable diseases and how to seek expert opinion or guidance from infection control specialists where necessary
- Hospital policy/seeking guidance from occupational health professional regarding the need to stay off work/restrict duties when experiencing infections the onward transmission of which might impact on the health of others

### SKILLS

- Practicing aseptic techniques and hand hygiene
- Following local and national guidelines for infection control and management
- Prescribing antibiotics according to antibiotic guidelines
- Encouraging staff, patients and relatives to observe infection control principles
- Communicating effectively with patients regarding treatment and measures recommended to prevent re-infection or spread
- Collaborating with infection control colleagues to manage more complex or uncommon types of infection including those requiring isolation e.g. transplant cases, immunocompromised host
- In the case of infectious diseases requiring disclosure:
  - Working knowledge of those infections requiring notification
  - Undertaking notification promptly
  - Collaborating with external agencies regarding reporting, investigating and management of notifiable diseases
  - Enlisting / requiring patients' involvement in solving their health problems, providing information and education
  - Utilising and valuing contributions of health education and disease prevention and infection control to health in a community

**ASSESSMENT & LEARNING METHODS**

- Consultant feedback at annual assessment
- Workplace based assessment e.g. Mini-CEX, DOPS, CBD
- Educational supervisor's reports on observed performance (in the workplace): practicing aseptic techniques as appropriate to the case and setting, investigating and managing infection, prescribing antibiotics according to guidelines
- Completion of infection control induction in the workplace
- Personal Protective Equipment Training Course (In hospital)

## Self-Care and Maintaining Well-Being

### Objectives:

1. To ensure that trainees understand how their personal histories and current personal lives, as well as their values, attitudes, and biases affect their care of patients so that they can use their emotional responses in patient care to their patients' benefit
2. To ensure that trainees care for themselves physically and emotionally, and seek opportunities for enhancing their self-awareness and personal growth

**Medical Council Domains of Good Professional Practice:** Patient Safety and Quality of Patient Care, Relating to Patients, Communication and Interpersonal Skills, Collaboration and Teamwork, Management (including self-management).

### KNOWLEDGE

- Self-awareness including preferences and biases
- Personal psychological strengths and limitations
- Understand how personality characteristics, such as need for approval, judgemental tendencies, needs for perfection and control etc., affect relationships with patients and others
- Knowledge of core beliefs, ideals, and personal philosophies of life, and how these relate to own goals in medicine
- Know how family-of-origin, race, class, religion and gender issues have shaped own attitudes and abilities to discuss these issues with patients
- Understand the difference between feelings of sympathy and feelings of empathy
- Know the factors between a doctor and patient that enhance or interfere with abilities to experience and convey empathy
- Understanding of own attitudes toward uncertainty and risk taking and own need for reassurance
- How own relationships with certain patients can reflect attitudes toward paternalism, autonomy, benevolence, non-maleficence and justice
- Recognise own feelings in straightforward and complex patient-doctor interactions
- Recognising the symptoms of stress and burn out

### SKILLS

- Exhibiting empathy and showing consideration for all patients, their impairments and attitudes irrespective of cultural and other differences
- Ability to create boundaries with patients that allow for therapeutic alliance
- Challenge authority appropriately from a firm sense of own values and integrity and respond appropriately to situations that involve abuse, unethical behaviour and coercion
- Recognise own limits and seek appropriate support and consultation
- Work collaboratively and effectively with colleagues and other members of health care teams
- Manage effectively commitments to work and personal lives, taking the time to nurture important relationship and oneself
- Ability to recognise when falling behind and adjusting accordingly
- Demonstrating the ability to cope with changing circumstances, variable demand, being prepared to re-prioritise and ask for help
- Utilising a non-judgemental approach to patient's problem
- Recognise the warning signs of emotional ill-health in self and others and be able to ask for appropriate help
- Commitment to lifelong process of developing and fostering self-awareness, personal growth and well being
- Be open to receiving feedback from others as to how attitudes and behaviours are affecting their care of patients and their interactions with others
- Holding realistic expectations of own and of others' performance, time-conscious, punctual
- Valuing the breadth and depth of experience that can be accessed by associating with professional colleagues

**ASSESSMENT & LEARNING METHODS**

- On-going supervision
- RCPI Ethics programmes
- Wellness Matters Course
- RCPI HST Leadership in Clinical Practice course

## Communication in Clinical and Professional Setting

**Objective:** To demonstrate the ability to communicate effectively and sensitively with patients, their relatives, carers and with professional colleagues in different situations.

**Medical Council Domains of Good Professional Practice:** Relating to Patients; Communication and Interpersonal Skills.

### KNOWLEDGE

#### Within a consultation

- How to effectively listen and attend to patients
- How to structure an interview to obtain/convey information; identify concerns, expectations and priorities; promote understanding, reach conclusions; use appropriate language.
- How to empower the patient and encourage self-management

#### Difficult circumstances

- Understanding of potential areas for difficulty and awkward situations
- How to negotiate cultural, language barriers, dealing with sensory or psychological and/or intellectual impairments and how to deal with challenging or aggressive behaviour
- Knowing how and when to break bad news
- How to communicate essential information where difficulties exist, how to appropriately utilise the assistance of interpreters, chaperones, and relatives.
- How to deal with anger and frustration in self and others
- Selecting appropriate environment; seeking assistance, making and taking time

#### Dealing with professional colleagues and others

- How to communicate with doctors and other members of the healthcare team
- How to provide a concise, written, verbal, or electronic, problem-orientated statement of facts and opinions
- The legal context of status of records and reports, of data protection confidentiality
- Freedom of Information (FOI) issues
- Understanding of the importance of legible, accessible, records to continuity of care
- Knowing when urgent contact becomes necessary and the appropriate place for verbal, telephone, electronic, or written communication
- Recognition of roles and skills of other health professionals
- Awareness of own abilities/limitations and when to seek help or give assistance, advice to others; when to delegate responsibility and when to refer

#### Maintaining continuity of care

- Understanding the relevance of continuity of care to outcome, within and between phases of healthcare management
- The importance of completion of tasks and documentation, e.g. before handover to another team, department, specialty, including identifying outstanding issues and uncertainties
- Knowledge of the required attitudes, skills and behaviours which facilitate continuity of care including, being available and contactable, alerting others to avoid potential confusion or misunderstanding through communications failure

#### Giving explanations

- The importance of possessing the facts, and of recognising uncertainty and conflicting evidence on which decisions have to be based
- How to secure and retain attention avoiding distraction
- Understanding how adults receive information best, the relative value of the spoken, written, visual means of communication, use of reinforcement to assist retention
- Knowledge of the risks of information overload
- Tailoring the communication of information to the level of understanding of the recipient
- Strategies to achieve the level of understanding necessary to gain co-operation and partnership; compliance, informed choice, acceptance of opinion, advice, recommendation

**Responding to complaints**

- Value of hearing and dealing with complaints promptly; the appropriate level, the procedures (departmental and institutional); sources of advice, and assistance available
- The importance of obtaining and recording accurate and full information, seeking confirmation from multiple sources
- Knowledge of how to establish facts, identify issues and respond quickly and appropriately to a complaint received

**SKILLS**

- Ability to appropriately elicit facts, using a mix of open and closed-ended questions
- Using “active listening” techniques such as nodding and eye contact
- Giving information clearly, avoiding jargon, confirming understanding, ability to encourage co-operation, compliance; obtaining informed consent
- Showing consideration and respect for other’s culture, opinions, patient’s right to be informed and make choices
- Respecting another’s right to opinions and to accept or reject advice
- Valuing perspectives of others contributing to management decisions
- Conflict resolution
- Dealing with complaints
- Communicating decisions in a clear and thoughtful manner
- Presentation skills
- Maintaining (legible) records
- being available, contactable, time-conscious
- Setting realistic objectives, identifying and prioritising outstanding problems
- Using language, literature (e.g. leaflets) diagrams, educational aids and resources appropriately
- Establish facts, identify issues and respond quickly and appropriately to a complaint received
- Accepting responsibility, involving others, and consulting appropriately
- Obtaining informed consent
- Discussing informed consent
- Giving and receiving feedback

**ASSESSMENT & LEARNING METHODS**

- Mastering Communication course (Year 1)
- Consultant feedback at annual assessment
  - Workplace based assessment e.g. Mini-CEX, DOPS, CBD
  - Educational supervisor’s reports on observed performance (in the workplace): communication with others e.g. at handover. ward rounds, multidisciplinary team members
- Presentations
- RCPI Ethics programmes
- RCPI HST Leadership in Clinical Practice Course

## Leadership

**Objective:** To have the knowledge, skills and attitudes to act in a leadership role and work with colleagues to plan, deliver and develop services for improved patient care and service delivery.

**Medical Council Domains of Good Professional Practice:** Patient Safety and Quality of Patient Care; Communication and Interpersonal Skill; Collaboration and Teamwork; Management (including Self-Management); Scholarship.

### KNOWLEDGE

#### Personal qualities of leaders

- Knowledge of what leadership is in the context of the healthcare system appropriate to training level
- The importance of good communication in teams and the role of human interactions on effectiveness and patient safety

#### Working with others

- Awareness of own personal style and other styles and their impact on team performance
- The importance of good communication in teams and the role of human interactions on effectiveness and patient safety

#### Managing services

- The structure and function of Irish health care system
- Awareness of the challenges of managing in healthcare
  - Role of governance
  - Clinical directors
- Knowledge of planning and design of services
- Knowledge and understanding of the financing of the health service
  - Knowledge of how to prepare a budget
  - Defining value
  - Managing resources
- Knowledge and understanding of the importance of human factors in service delivery
  - How to manage staff training, development and education
- Managing performance
  - How to perform staff appraisal and deal effectively with poor staff performance
  - How to rewards and incentivise staff for quality and efficiency

#### Setting direction

- The external and internal drivers setting the context for change
- Knowledge of systems and resource management that guide service development
- How to make decisions using evidence-based medicine and performance measures
- How to evaluate the impact of change on health outcomes through ongoing service evaluation

**SKILLS**

- Effective communication with patients, families and colleagues
- Co-operation and collaboration with others; patients, service users, carers colleagues within and across systems
- Being an effective team player
- Ability to manage resources and people
- Managing performance and performance indicators

**Demonstrating personal qualities**

- Efficiently and effectively managing one-self and one's time especially when faced with challenging situations
- Continues personal and professional development through scholarship and further training and education where appropriate
- Acting with integrity and honesty with all people at all times
- Developing networks to expand knowledge and sphere of influence
- Building and maintaining key relationships
- Adapting style to work with different people and different situations
- Contributing to the planning and design of services

**ASSESSMENT & LEARNING METHODS**

- Mastering Communication course (Year 1)
- RCPI HST Leadership in Clinical Practice (Year 3 – 5)
- Consultant feedback at annual assessment
- Workplace based assessment e.g. Mini-CEX, DOPS, CBD
- Educational supervisor's reports on observed performance (in the workplace): on management and leadership skills
- Involvement in hospital committees where possible e.g. Division of Medicine, Drugs and Therapeutics, Infection Control etc.



## Quality Improvement

**Objective:** To demonstrate the ability to identify areas for improvement and implement basic quality improvement skills and knowledge to improve patient safety and quality in the healthcare system.

**Medical Council Domains of Good Professional Practice:** Patient Safety and Quality of Patient Care; Communication and Interpersonal Skills; Collaboration and Teamwork; Management; Relating to Patients; Professionalism

### KNOWLEDGE

#### Personal qualities of leaders

- The importance of prioritising the patient and patient safety in all clinical activities and interactions

#### Managing services

- Knowledge of systems design and the role of microsystems
- Understanding of human factors and culture on patient safety and quality

#### Improving services

- How to ensure patient safety by adopting and incorporating a patient safety culture
- How to critically evaluate where services can be improved by measuring performance, and acting to improve quality standards where possible
- How to encourage a culture of improvement and innovation

#### Setting direction

- How to create a 'burning platform' and motivate other healthcare professionals to work together within quality improvement
- Knowledge of the wider healthcare system direction and how that may impact local organisations

### SKILLS

- Improvement approach to all problems or issues
- Engaging colleagues, patients and the wider system to identify issues and implement improvements
- Use of quality improvement methodologies, tools and techniques within every day practice
- Ensuring patient safety by adopting and incorporating a patient safety culture
- Critically evaluating where services can be improved by measuring performance, and acting to raise standards where possible
- Encouraging a culture of improvement and innovation

#### Demonstrating personal qualities

- Encouraging contributions and involvement from others including patients, carers, members of the multidisciplinary team and the wider community
- Considering process and system design, contributing to the planning and design of services

### ASSESSMENT & LEARNING METHODS

- RCPI HST Leadership in Clinical Practice
- Consultant feedback at annual assessment
- Involvement in hospital committees where possible e.g. Division of Medicine, Drugs and Therapeutics, Infection Control etc.

## Scholarship

**Objective:** To develop skills in personal/professional development, teaching, educational supervision and research

**Medical Council Domains of Good Professional Practice:** Scholarship

### KNOWLEDGE

#### Teaching, educational supervision and assessment

- Principles of adult learning, teaching and learning methods available and strategies
- Educational principles directing assessment methods including, formative vs. summative methods
- The value of regular appraisal / assessment in informing training process
- How to set effective educational objectives and map benefits to learner
- Design and delivery of an effective teaching event, both small and large group
- Use of appropriate technology / materials

#### Research, methodology and critical evaluation

- Designing and resourcing a research project
- Research methodology, valid statistical analysis, writing and publishing papers
- Ethical considerations and obtaining ethical approval
- Reviewing literature, framing questions, designing a project capable of providing an answer
- How to write results and conclusions, writing and/or presenting a paper
- How to present data in a clear, honest and critical fashion

#### Audit

- Basis for developing evidence-based medicine, kinds of evidence, evaluation; methodologies of clinical trials
- Sources from which useful data for audit can be obtained, the methods of collection, handling data, the audit cycle
- Means of determining best practice, preparing protocols, guidelines, evaluating their performance
- The importance of re-audit

### SKILLS

- Bed-side undergraduate and post graduate teaching
- Developing and delivering lectures
- Carrying out research in an ethical and professional manner
- Performing an audit
- Presentation and writing skills – remaining impartial and objective
- Adequate preparation, timekeeping
- Using technology / materials

### ASSESSMENT & LEARNING METHODS

- An Introduction to Health Research (online)
- Performing audit course (online)
- Effective Teaching and Supervising Skills course (online) - recommended
- Educational Assessment Skills course - recommended
- Health Research Methods for Clinicians - recommended

## Management

**Objective:** To understand the organisation, regulation and structures of the health services, nationally and locally, and to be competent in the use and management of information on health and health services, to develop personal effectiveness and the skills applicable to the management of staff and activities within a healthcare team.

**Medical Council Domains of Good Professional Practice:** Management.

### KNOWLEDGE

#### Health service structure, management and organisation

- The administrative structure of the Irish Health Service, services provided in Ireland and their funding and how to engage with these for best results
- Department of Health, HSE and hospital management structures and systems
- The national regulatory bodies, health agencies and patient representative groups
- Understanding the need for business plans, annual hospital budgets, the relationship between the hospital and PCCC

#### The provision and use of information in order to regulate and improve service provision

- Methods of collecting, analysing and presenting information relevant to the health of a population and the apportionment of healthcare resources
- The common ways in which data is presented, knowing of the sources which can provide information relevant to national or to local services and publications available

#### Maintaining medical knowledge with a view to delivering effective clinical care

- Understanding the contribution that current, accurate knowledge can make to establishing clinical effectiveness, best practice and treatment protocols
- Knowledge of sources providing updates, literature reviews and digests

#### Delegation skills, empowerment and conflict management

- How to assess and develop personal effectiveness, improve negotiating, influencing and leadership skills
- How to manage time efficiently, deal with pressure and stress
- How to motivate others and operate within a multidisciplinary team

### SKILLS

- Chairing, organising and participating in effective meetings
- Managing risks
- Managing time
- Delegating tasks effectively
- Managing conflicts
- Exploring, directing and pursuing a project, negotiating through the relevant departments at an appropriate level
- Ability to achieve results through an understanding of the organisation and its operation
- Ability to seek / locate information in order to define an issue needing attention e.g. to provide data relevant to a proposal for change, establishing a priority, obtaining resources
- Ability to make use of information, use IT, undertake searches and obtain aggregated data, to critically evaluate proposals for change e.g. innovative treatments, new technologies
- Ability to adjust to change, apply management, negotiating skills to manage change
- Appropriately using management techniques and seeking to improve these skills and personal effectiveness

**ASSESSMENT & LEARNING METHODS**

- Mastering Communication course
- Performing audit course (online)
- RCPI HST Leadership in Clinical Practice
- Annual audit
- Consultant feedback on management and leadership skills
- Involvement in hospital committees

## Standards of Care

**Objective:** To be able to consistently and effectively assess and treat patients' problems

**Medical Council Domains of Good Professional Practice:** Patient Safety and Quality of Patient Care; Relating to Patients; Communication and Interpersonal Skills; Collaboration and Teamwork: Management (including Self-Management); Clinical Skills.

### KNOWLEDGE

#### Diagnosing Patients

- How to carry out appropriate history taking
- How to appropriately examine a patient
- How to make a differential diagnosis

#### Investigation, indications, risks, cost-effectiveness

- The pathophysiological basis of the investigation
- Understand the clinical significance of reference ranges, positive and negative predictive value and potential risks of inappropriate tests
- The procedures for commonly used investigations, common or/and serious risks
- Understanding of the sensitivity and specificity of results, artefacts, PPV and NPV
- Understanding significance, interpreting and explaining results of investigations
- Logical approach in choosing, sequencing and prioritising investigations

#### Treatment and management of disease

- Natural history of diseases
- Quality of life concepts
- How to accurately assess patient's needs, prescribe, arrange treatment, recognise and deal with reactions / side effects
- How to set realistic therapeutic goals, to utilise rehabilitation services, and use palliative care approach appropriately
- Recognising that illness (especially chronic and/or incapacity) has an impact on relationships and family, having financial as well as social effects e.g. driving

#### Disease prevention and health education

- Screening for disease: methods, advantages and limitations
- Health promotion and support agencies; means of providing sources of information for patients
- Risk factors, preventive measures, and change strategies applicable to smoking, alcohol, drug abuse, and lifestyle
- Disease notification; methods of collection and sources of data

#### Notes, records, correspondence

- Functions of medical records, their value as an accurate up-to-date commentary and source of data
- An understanding of the need and appropriate use of problem-orientated discharge notes, letters, more detailed case reports, concise out-patient reports and focused reviews
- Appreciating the importance of up-to-date, easily available, accurate information, and the need for communicating promptly e.g. with primary care

#### Prioritising, resourcing and decision taking

- How to prioritise demands, respond to patients' needs and sequence urgent tasks
- Establishing (clinical) priorities e.g. for investigations, intervention; how to set realistic goals; understanding the need to allocate sufficient time, knowing when to seek help
- Understanding the need to complete tasks, reach a conclusion, make a decision, and take action within allocated time
- Knowing how and when to conclude

**Handover**

- Know what are the essential requirements to run an effective handover meeting
  - Sufficient and accurate patients information
  - Adequate time
  - Clear roles and leadership
  - Adequate IT
- Know how to prioritise patient safety
  - Identify most clinically unstable patients
  - Use ISBAR (Identify, Situation, Background, Assessment, Recommendations)
  - Proper identification of tasks and follow-ups required
  - Contingency plans in place
- Know how to focus the team on actions
  - Tasks are prioritised
  - Plans for further care are put in place
  - Unstable patients are reviewed

**Relevance of professional bodies**

- Understanding the relevance to practice of standards of care set down by recognised professional bodies – the Medical Council, Medical Colleges and their Faculties, and the additional support available from professional organisations e.g. IMO, Medical Defence Organisations and from the various specialist and learned societies

**SKILLS**

- Taking and analysing a clinical history and performing a reliable and appropriate examination, arriving at a diagnosis and a differential diagnosis
- Liaising, discussing and negotiating effectively with those undertaking the investigation
- Selecting investigations carefully and appropriately, considering (patients') needs, risks, value and cost effectiveness
- Appropriately selecting treatment and management of disease
- Discussing, planning and delivering care appropriate to patient's needs and wishes
- Preventing disease using the appropriate channels and providing appropriate health education and promotion
- Collating evidence, summarising, recognising when objective has been met
- Screening
- Working effectively with others including
  - Effective listening
  - Ability to articulate and deliver instructions
  - Encourage questions and openness
  - Leadership skills
- Ability to prioritise
- Ability to delegate effectively
- Ability to advise on and promote lifestyle change, stopping smoking, control of alcohol intake, exercise and nutrition
- Ability to assess and explain risk, encourage positive behaviours e.g. immunisation and preventive measures
- Involve patients' in solving their health problems, by providing information and education
- Availing of support provided by voluntary agencies and patient support groups, as well as expert services e.g. detoxification / psychiatric services
- Act in accordance with, up to date standards on palliative care needs assessment
- Valuing contributions of health education and disease prevention to health in a community
- Compile accurate and appropriate detailed medical notes and care reports including the results of examinations, investigations, procedures performed, sufficient to provide an accurate, detailed account of the diagnostic and management process and outcome, providing concise, informative progress reports (both written and oral)
- Transfer information in an appropriate and timely manner

- Maintaining legible records in line with the Guide to Professional Conduct and Ethics for Registered Medical Practitioners in Ireland
- Actively engaging with professional/representative/specialist bodies

#### **ASSESSMENT & LEARNING METHODS**

- Consultant feedback
- Workplace based assessment e.g. Mini-CEX, DOPS, CBD
- Educational supervisor's reports on observed performance (in the workplace)
- Annual Audit
- Medical Council Guide to Professional Conduct and Ethics

## Dealing with & Managing Acutely Ill Patients in Appropriate Specialties

**Objectives:** To be able to assess and initiate management of patients presenting as emergencies, and to appropriately communicate the diagnosis and prognosis. Trainees should be able to recognise the critically ill and immediately assess and resuscitate if necessary, formulate a differential diagnosis, treat and/or refer as appropriate, elect relevant investigations and accurately interpret reports.

**Medical Council Domains of Good Professional Practice:** Patient Safety and Quality of Patient Care, Clinical Skills.

### KNOWLEDGE

#### Management of acutely ill patients with medical problems

- Presentation of potentially life-threatening problems
- Indications for urgent intervention, the additional information necessary to support action (e.g. results of investigations) and treatment protocols
- When to seek help, refer/transfer to another specialty
- ACLS protocols
- Ethical and legal principles relevant to resuscitation and DNAR in line with National Consent Policy
- How to manage acute medical intake, receive and refer patients appropriately, interact efficiently and effectively with other members of the medical team, accept/undertake responsibility appropriately
- Management of overdose
- How to anticipate / recognise, assess and manage life-threatening emergencies, recognise significantly abnormal physiology e.g. dysrhythmia and provide the means to correct e.g. defibrillation
- How to convey essential information quickly to relevant personnel: maintaining legible up-to-date records documenting results of investigations, making lists of problems dealt with or remaining, identifying areas of uncertainty; ensuring safe handover

#### Managing the deteriorating patient

- How to categorise a patients' severity of illness using Early Warning Scores (EWS) guidelines
- How to perform an early detection of patient deterioration
- How to use a structured communication tool (ISBAR)
- How to promote an early medical review, prompted by specific trigger points
- How to use a definitive escalation plan

#### Discharge planning

- Knowledge of patient pathways
- How to distinguish between illness and disease, disability and dependency
- Understanding the potential impact of illness and impairment on activities of daily living, family relationships, status, independence, awareness of quality of life issues
- Role and skills of other members of the healthcare team, how to devise and deliver a care package
- The support available from other agencies e.g. specialist nurses, social workers, community care
- Principles of shared care with the general practitioner service
- Awareness of the pressures/dynamics within a family, the economic factors delaying discharge but recognise the limit to benefit derived from in-patient care



**SKILLS**

- BLS/ACLS (or APLS for Paediatrics)
- Dealing with common medical emergencies
- Interpreting blood results, ECG/Rhythm strips, chest X-Ray, CT brain
- Giving clear instructions to both medical and hospital staff
- Ordering relevant follow up investigations
- Discharge planning, including complex discharge
- Knowledge of HIPE (Hospital In-Patient Enquiry)
- Multidisciplinary team working
- Communication skills
- Delivering early, regular and on-going consultation with family members (with the patient's permission) and primary care physicians
- Remaining calm, delegating appropriately, ensuring good communication
- Attempting to meet patients'/ relatives' needs and concerns, respecting their views and right to be informed in accordance with Medical Council Guidelines
- Establishing liaison with family and community care, primary care, communicate / report to agencies involved
- Demonstrating awareness of the wide ranging effects of illness and the need to bridge the gap between hospital and home
- Categorising a patients' severity of illness
- Performing an early detection of patient deterioration
- Use of structured communication tools (e.g. ISBAR)

**ASSESSMENT & LEARNING METHODS**

- ACLS course
- Record of on call experience
- Mini-CEX (acute setting)
- Case Based Discussion (CBD)
- Consultant feedback

## Therapeutics and Safe Prescribing

**Objective:** To progressively develop ability to prescribe, review and monitor appropriate therapeutic interventions relevant to clinical practice in specific specialities including non-pharmacological therapies and preventative care.

**Medical Council Domains of Good Professional Practice:** Patient Safety and Quality of Patient Care.

### KNOWLEDGE

- Pharmacology, therapeutics of treatments prescribed, choice of routes of administration, dosing schedules, compliance strategies; the objectives, risks and complications of treatment cost-effectiveness
- Indications, contraindications, side effects, drug interaction, dosage and route of administration of commonly used drugs
- Commonly prescribed medications
- Adverse drug reactions to commonly used drugs, including complementary medicines
- Identifying common prescribing hazards
- Identifying high risk medications
- Drugs requiring therapeutic drug monitoring and interpretation of results
- The effects of age, body size, organ dysfunction and concurrent illness or physiological state e.g. pregnancy on drug distribution and metabolism relevant to own practice
- Recognising the roles of regulatory agencies involved in drug use, monitoring and licensing e.g. IMB, and hospital formulary committees
- Procedure for monitoring, managing and reporting adverse drug reaction
- Effects of medications on patient activities including potential effects on a patient's fitness to drive
- The role of The National Medicines Information Centre (NMIC) in promoting safe and efficient use of medicine
- Differentiating drug allergy from drug side effects
- Know the difference between an early and late drug allergy, and drug side-effects
- Good Clinical Practice guidelines for seeing and managing patients who are on clinical research trials
- Best practice in the pharmacological management of cancer pain
- The management of constipation in adult patients receiving palliative care

### SKILLS

- Writing a prescription in line with guidelines
- Appropriately prescribing for the elderly, children and pregnant and breast feeding women
- Making appropriate dose adjustments following therapeutic drug monitoring, or physiological change (e.g. deteriorating renal function)
- Reviewing and revising patients' long term medications
- Anticipating and avoiding defined drug interactions, including complementary medicines
- Advising patients (and carers) about important interactions and adverse drug effects including effects on driving
- Providing comprehensible explanations to the patient, and carers when relevant, for the use of medicines
- Being open to advice and input from other health professionals on prescribing
- Participating in adverse drug event reporting
- Take and record an accurate drug allergy history and history of previous side effects

**ASSESSMENT & LEARNING METHODS**

- Consultant feedback
- Workplace based assessment e.g. Mini-CEX, DOPS, CBD
- Educational supervisor's reports on observed performance (in the workplace): prioritisation of patient safety in prescribing practice
- Guidance for health and social care providers - Principles of good practice in medication reconciliation (HIQA)

## General Internal Medicine Section

**Objective:** On completion of Higher Specialist Training the trainee will be able to identify and treat immediate life threatening causes of common medical presentations, form a differential diagnosis for non-life threatening cases and effectively manage the patient including further investigation and appropriate referral. They will have acquired a broad range of procedural and clinical skills to manage diverse presentations.

## Assessment and Learning Methods

Learning opportunities during HST are through:

- Self-Directed Learning
- Attendance at Study days
- Participation in In-house activities
- Unselected acute on call
- General Medicine outpatient clinics
- Department education sessions (black box, journal club, tutorials)
- Completion of Required courses
- Attendance at additional learning events such as recommended courses and masterclasses

Progress is assessed through:

- Case Based Discussion
- ePortfolio
- Annual assessment
- DOPS

## In the Acute setting

During the course of HST the trainee will encounter common acute presentations and demonstrate the following competencies:

- Recognising and assessing urgency
- Stabilising the patient
- Prioritising
  - Tasks
  - Investigations
- Managing co-existing morbidities
- Making appropriate referrals
- Decision making and appropriate delegation

The presentations listed in this section represent the most common acute presentations and conditions currently seen in Irish hospitals, accounting for over 95% of admissions. It is expected that HST trainees in general internal medicine will have a comprehensive knowledge of, and be able to provide a differential diagnosis for, these conditions.

## Presentations

1. Shortness of breath
2. Cough
3. Chest Pain
4. Blackout/ Collapse/ Dizziness
5. The frail older patient in the acute setting
6. Abdominal Pain
7. Fever
8. Alcohol and substance dependence or withdrawal
9. Falls and Decreased mobility
10. Weakness and Paralysis
11. Headache
12. Limb Pain and/or Swelling
13. Nausea and Vomiting
14. Seizure
15. Diarrhoea
16. Delirium/Acute confusion
17. Acute Psychological illness
18. Palpitations
19. Hepatitis or Jaundice
20. Gastrointestinal Bleeding
21. Haemoptysis
22. Rash
23. Acute Back Pain
24. Poisoning and Drug Overdose
25. Hyper-glycaemia

## Emergency management

Recognising and managing emergency cases including:

- Acute Coronary Syndrome
- Acute Kidney Injury
- Acute Respiratory Failure
- Acute Seizure
- Anaphylaxis / Angioedema
- Cardio-respiratory arrest
- Critical electrolyte abnormalities (calcium, sodium, potassium)
- Hypo- or Hyperglycaemia
- Sepsis and septic shock
- Stroke/ TIA
- The unconscious patient
- Unstable hypotensive patient

## Skills and Knowledge in the General Medicine Setting

On completion of HST the trainee should know life threatening causes, clinical feature, classifications, investigations and management, including indications for urgent referral, for common general medicine presentations. The following outlines commonly associated features, causes and/or routes of investigation for these presentations, both acutely and for ongoing case management, the trainee is expected to know and the competencies they are expected to demonstrate.

When a patient presents with a general medicine complaint the trainee should demonstrate an ability to:

- Assess their signs and symptoms; formulating a differential diagnosis
  - Take history as part of an investigation
  - Undertake primary assessment
  - Recognise and assess urgency
  - Undertake secondary assessment
- Initiate appropriate investigations
  - Interpret results for common investigations
- Initiate appropriate treatment, including stabilising the patient where necessary
- Manage co-existing morbidities
- Manage on-going cases including
  - confirming a diagnosis for those not requiring urgent referral
  - assessing response to initial treatment
  - recognising signs to escalate management when needed
- Appropriately refer based on:
  - Response to treatment
  - Local guidelines
  - Culture
  - Self-awareness of their own knowledge and ability
  - Services available
- Provide ongoing management of the case



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### Shortness of breath

When a patient presents with shortness of breath a trainee should demonstrate knowledge of the clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for common causes.

- Life threatening causes of breathlessness
  - Airway Obstruction
  - Acute severe asthma
  - Acute exacerbation of COPD
  - Pulmonary oedema
  - Tension pneumothorax
  - Acute presentations of Ischaemic heart disease
  - Acute severe left ventricular failure
  - Dysrhythmia
  - Pulmonary embolus
  - Cardiac tamponade
  - Metabolic acidosis

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### Cough

When a patient presents a cough a trainee should demonstrate knowledge of the clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Common causes of acute cough
  - Viral and Pertussis type cough
  - Acute bronchitis
  - Pneumonia
  - Tuberculosis
  - Lung cancer
  - Understand the relevance of subacute and chronic cough
  - Common causes (Asthma, Upper airway, GORD)
  - When to refer for assessment of lung cancer
  - Consideration of Interstitial lung disease

## Chest Pain

When a patient presents with chest pain a trainee should demonstrate knowledge of the clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for common causes.

- Life threatening causes of chest pain
  - Myocardial infarction
  - Dissecting aortic aneurysm
  - Pulmonary emboli
  - Tension pneumothorax
  - Oesophageal rupture
- Clinical features of:
  - Cardiac chest pain
  - Chest pain caused by respiratory disease and oesophageal rupture
  - Chest pain caused by gastrointestinal disease
  - Chest wall pain
  - Functional chest pain

## Blackout / Collapse / Dizziness

When a patient blacks out, collapses or presents with dizziness a trainee should demonstrate that they know the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Stroke
  - Cerebral infarction
  - Primary intracerebral haemorrhage
  - Subarachnoid haemorrhage
- Syncope
  - Cardiac causes (arrhythmia, cardiogenic shock)
  - Vasovagal syncope
  - Postural hypotension (e.g., drugs, neurocardiac, autonomic)
  - Localised vascular disease (posterior circulation)
  - Metabolic causes (e.g., hypoglycaemia)
- Seizures and epilepsy

### Management of the frail older patient in the acute setting

When a frail older patient presents a trainee should demonstrate knowledge of the appropriate approach to assessment, risk factors, appropriate investigations and necessary management, including indications for urgent referral, for this population.

- Understand the broad differential diagnosis and management of complex multi-morbid illness in older patients
- Approach to investigation and management of recurrent Falls
- Non-pharmacological and pharmacological management of behavioural complications of dementia
- Investigation of causes, non-pharmacological and pharmacological management of Delirium
- Polypharmacy and inappropriate prescribing in older patients (e.g. renal dose adjustment)
- Medical management of nursing home residents- identifying aspiration risk
- Palliative care and pain management in the acute setting
- Acute stroke thrombolysis delivery and criteria for referral for intravascular intervention
- Completion of NIHSS stroke scale

### Abdominal Pain

When a patient presents with abdominal pain a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Initial assessment of abdominal pain
- Differential Diagnosis:
  - Intra-abdominal
    - Gastrointestinal
    - Vascular (aneurysm, ischemia)
    - Urological
    - Gynaecological
  - Extraabdominal causes of pain
- Ability to identify and initiate management of life threatening conditions causes of abdominal pain
- Indications for surgical consultation and urgent referral
- Identifying constipation and urinary retention in older patients

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## **Fever**

When a patient presents with fever a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Recognize the symptoms and signs of sepsis
- Identify common causes of fever
  - Infection
  - Non-infectious including PE, Drugs, vasculitis,
- Delivery of initial management of septic patient
- Knowledge of the choice of empiric and infection targeted antibiotics

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## **Alcohol and substance dependence or withdrawal**

When a patient presents with dependence or withdrawal a trainee should demonstrate that they know the classifications and necessary management, including indications for referral.

- Recognition
- Psychosocial dysfunction
- Autonomic disturbances
- Stress and panic disorders
- Insomnia and sleep disturbance
- Understand the role of psychiatrist and referral to rehabilitation services

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## **Falls and Decreased mobility**

When a patient falls or presents with decreased mobility a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Common medical and social causes of falls in medical patients
- Complications of falls
  - Fractures including the neck of the femur
  - Intracranial injury
  - Rib fracture and pneumothorax
  - Loss of mobility and independence

---

### **Weakness and Paralysis**

When a patient presents with weakness or paralysis a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Stroke/ space occupying lesion
- Spinal cord injury
- Underlying neurological causes: e.g. multiple sclerosis, Guillain-Barre syndrome
- Infections and disease causing weakness

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### **Headache**

When a patient presents with headache a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Clinical classifications of headache
- Headache with altered neurological and focal signs
- Headache with features suggestive of raised intracranial pressure
- Headache with papilloedema
- Headache with fever
- Headache with extracranial signs
- Headache with no abnormal signs
- Drugs and toxins

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### **Limb Pain and/or Swelling**

When a patient presents with limb pain or swelling a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- As a result of injury
- As a result of an underlying medical condition
  - Undifferentiated inflammatory arthritis

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## Nausea and Vomiting

When a patient with nausea and vomiting a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Understanding of common causes
  - Abdominal
    - Acute Gastroenteritis
    - PUD
    - Pancreatitis
    - Acute hepatitis
    - Bowel obstruction
  - Central Causes (CNS)
  - Poisoning and Medications
- Management
  - Identification of underlying cause
  - Control of symptoms
  - Treating dehydration

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## Seizure

When a patient presents with seizures a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Causes
  - Unprovoked seizures/epilepsy
  - Seizures associated with metabolic, toxic and system illness
  - Cerebral hypoxia
  - Seizures associated with drugs and toxic substances
- Management
  - Emergency supportive treatment
  - Anticonvulsant treatment
  - Work up of first presentation with seizure
  - Understand driving implications for patients with seizures

## Diarrhoea

When a patient presents with diarrhoea a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Classification
  - Osmotic
  - Secretory
  - Exudative
- Causes
  - Infectious
  - Inflammatory
  - Ischemic
  - Malignant
- Complications
- Management
  - Acute management
  - Knowledge of appropriate investigations
  - Recognition of associated complications
  - Role of antibiotics
  - When to refer to gastroenterology.

## Delirium/Acute confusion

When a patient presents with delirium or acute confusion a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Clinical features of acute confused state- differentiating delirium, dementia, depression and psychosis
- Causes of delirium
- Use of screening instruments for delirium and/or cognitive impairment
- Clinical features of acute delirium
- Clinical features of acute functional psychosis
- Causes of confused state associated with alcohol abuse- delirium tremens, Wernicke's encephalopathy
- Drug induced/related confusion/delirium
- Bacterial meningitis, Viral encephalitis
- Subarachnoid haemorrhage/ subdural haematoma

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### Social issues

When a patient presents with social issues a trainee should demonstrate knowledge of the appropriate approach to assessment, risk factors, appropriate investigations and necessary management, including indications for urgent referral, for this population.

- Managing medical conditions with an uncooperative patient
- Identifying potential elder abuse
- Recognising substance abuse
- Basic principles of psychiatry
- Recognising an at risk patient

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### Palpitations

When a patient presents with palpitations a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Anxiety
- Exercise induced
- In relation to pre-existing conditions including
  - Thyroid disease
  - Anaemia
  - Fever
  - Dehydration
  - Low blood sugar
  - Low blood pressure
- Resulting from medications or toxins
- Hormonal changes
- After prior myocardial infarct
- Coronary artery disease
- Other heart problems including congestive heart failure, heart valve or heart muscle problems



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### **Hepatitis or Jaundice**

When a patient presents with hepatitis or jaundice a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Incubation and prodromal phase
- Virus-specific
- Toxic hepatitis
- Autoimmune
- Acute liver failure

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### **Gastrointestinal Bleeding**

When a patient presents with gastrointestinal bleeding a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Understanding of the initial assessment and stabilization of patients with GI bleeding
- Understanding of haemovigilance and blood transfusion protocols
- Upper gastrointestinal bleeding including
  - Peptic ulcer Disease
  - Gastritis
  - Esophageal varices
  - Mallory-Weiss tears
  - Gastrointestinal cancers
  - Inflammation of the gastrointestinal lining from ingested material
- Lower gastrointestinal bleeding including
  - Diverticular disease
  - Gastrointestinal cancers
  - Inflammatory bowel disease (IBD)
  - Infectious diarrhoea
  - Angiodysplasia
  - Polyps
  - Haemorrhoids and anal fissures

## Haemoptysis

When a patient presents with haemoptysis a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Recognition and Management of massive Haemoptysis
- Common causes of haemoptysis
  - Acute and chronic bronchitis
  - Tuberculosis
  - Lung cancer
  - Pneumonia
  - Bronchiectasis
  - Pulmonary Embolus
  - Alveolar Haemorrhage (vasculitis)

## Rash

When a patient presents with a rash a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Urticaria
- Anaphylaxis and Angio Oedema
- Erythroderma and exfoliation
- Psoriasis and seborrhoeic/contact dermatitis
- Purpura and vasculitis
- Blistering eruptions
- Infections and the skin

## Acute Back Pain

When a patient presents with acute back pain a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Non-specific acute back pain
- Causes of chronic low back pain
- Neurologic findings in back pain
- Identifying serious etiologies of back pain e.g.,
  - Cancer
  - Fracture
  - Infection
  - Cauda equina syndrome

## Poisoning and Drug Overdose

When a patient presents with poisoning or overdose a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Diagnostic clues in the assessment of overdoses
- Identification of toxic agent (paracetamol, SSRI, benzodiazepines, opiates, amphetamines, TCAD)
- Immediate management
- Mental health assessment and definitive care

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### **Hyper-glycaemia**

When a patient presents with hyper-glycaemia a trainee should demonstrate knowledge of the life threatening causes, clinical feature, classifications, appropriate investigations and necessary management, including indications for urgent referral, for the common causes.

- Symptoms of acute hyper-glycaemia
  - Recognition and Management of diabetic ketoacidosis
  - Recognition and management of Hyperosmolar non ketotic hyperglycemic states
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## Procedures

**Objectives:** To develop proficiency in common procedures required for general internal medicine.

### Knowledge and Skills

#### Abdominal paracentesis under ultrasound

#### ECG Interpretation

#### Emergency DC cardioversion

- Up to date ACLS training to cover:
  - Necessity of Synchronised Shock
  - Starting voltage
  - Safe use of Defibrillator

#### Emergency care of tracheostomy

- In cases of:
  - Cardiac arrest
  - Dealing with a compromised airway

#### Femoral venous lines with ultrasound guidance

- Ultrasound guided femoral venous line placement
- Anatomical markers for femoral veins
- Safe cannulation of vein
- Secure line in place/review position on X-ray

#### Intercostal drain under ultrasound

- Anatomical markings
- Insertion of intercostal tube (small bore seldinger)
- Connection to underwater seal and secure in place
- Assessment and management of drain
- Safe removal of the tube

#### Joint aspiration

- Sterile field
- Fluid analysis
- Injectable compounds

#### Lumbar puncture

- Anatomical markers
- Cannula selection
- Safe puncture including appropriate preparation
- Measurement of CSF pressure
- Removal of samples and interpretation of results
- Management of post lumbar puncture headache

#### Non-invasive Ventilation

- Principles of BIPAP and CPAP
- Monitoring and limitations
- Mask fitting
- Understanding of pressures

**Pleural and ascitic fluid aspiration under ultrasound**

- Safe approach and role of ultrasound guidance
- Puncture pleural / peritoneal space
- Withdrawal of fluid

## Specialty Section

## History Taking and Clinical Examination

**Objectives:** To obtain a history from the patient relevant to cardiovascular disorders:  
The patient's spontaneous account of symptoms

## Questions from the Cardiologist focHistory Taking and Clinical Examination

**Objectives:** To obtain a history from the patient relevant to cardiovascular disorders:

The patient's spontaneous account of symptoms

- Questions from the Cardiologist focused on the presence or absence of possible cardiovascular symptoms
- The past medical history
- Symptoms of any co-morbidities
- The social history
- Current and past drug therapy
- Clinical Examination

To complement the subjective findings from the clinical history, with the objective findings on clinical examination of the cardiovascular system.

To perform a general examination of the patient searching for evidence of co-existing illness, as well as manifestations of cardiovascular disease.

### KNOWLEDGE

- Describe the range of, and the meaning of, words used by patients to describe cardiovascular systems
- Recognise classical symptoms of cardiovascular disease, that patients with cardiac chest pain may not present with classical symptoms and to Recognise the characteristics of non-cardiac chest pain
- Recognise typical and atypical symptoms of cardiovascular disease
- Recognise cardiovascular risk factors from the patient's history
- Names and side effects of drugs used
- Symptoms and treatments of the co-morbidities often associated with cardiovascular disease.
- Recognise the features on general examination caused by cardiovascular disease
- The physiology and patho-physiology of the cardiac cycle and understand how normal heart sounds, abnormal heart sounds and systolic and diastolic murmurs are generated and how to best auscultate them
- Patho-physiology of the clinical signs of under perfusion and fluid retention
- Ankle-brachial index as a measure of peripheral arterial disease



**SKILLS**

- Examine the arterial pulse at different arteries for rate, rhythm and haemodynamic profile, and how to measure arterial blood pressure
- Examine the venous system and in particular to be able to clinically estimate the right atrial pressure
- Examine the precordial impulse
- Analyse and integrate the information obtained by taking a history from a patient to contribute to the development of an overall assessment
- Assess global cardiovascular risk
- Establish a relationship with the patient based on empathy and trust
- Allow the patient time to express his or her symptoms in their own words
- Sympathetically direct open-ended questions to the patient
- Take into account the importance of both co-morbidities and social circumstances in relation to cardiovascular disorders
- Examine the peripheral, arterial and venous systems.
- Examine the heart
- Make and record accurate observations about the clinical state of the patient with particular emphasis on the cardiovascular system.
- Use a stethoscope and blood pressure cuff to maximise the information to be gained about abnormalities of the heart and blood vessels.
- Obtain the ankle-brachial index as a sign of peripheral arterial disease
- Examine the patient with due regard for the patients dignity.
- Continually seek or correlate findings on examination with subsequent findings at echocardiography or surgery, thus emphasising lifelong learning.

**ASSESSMENT & LEARNING METHODS**

- Mini-CEX

## The Electrocardiogram: Standard ECG, Ambulatory ECG, Exercise ECG

**Objectives:** To select, perform and interpret each of the three non-invasive ECG techniques

### KNOWLEDGE

**Identify the indications and recognise the limitations of the following modalities**

#### ECG

- The physiology and anatomy of the conduction system.
- Cellular and molecular mechanisms involved in the electrical activity of the heart.
- Basic principles of ECG.
- Normal evolution of the electrical vectors during the cardiac cycle.
- Recognise the normal ECG, and explain how it is formed.
- ECG characteristics of atrial and ventricular hypertrophies, bundle branch blocks and other conduction blocks, tachycardias, bradycardias, acute and chronic myocardial ischemia, pericarditis and myocarditis, electrolyte abnormalities, preexcitation, QT abnormalities, pacemaker dysfunction.

#### Exercise ECG Testing

- Main indications, contraindications and limitations
- Evaluation of
  - ischemia
  - valvular diseases
  - hypertrophic cardiomyopathy
  - treatment response
  - functional capacity
  - inducible arrhythmias
- Criteria for stopping the testing
- Complications and their treatment

**SKILLS**

- Choose the appropriate techniques for specific clinical situations including a thorough understanding of the Bayesian approach.
- Choose techniques modalities and protocols in a clinical useful and cost-effective way, avoiding over- and underutilisation of tests
- Appropriate selection of ECG techniques necessary for the patients' management.
- Explain to patients and their family the implications of the results of the electrocardiogram.
- Perform and interpret ECG, ambulatory ECGs/loop recorder ECGs and exercise ECG testing in the clinical context
- Identify the normal and abnormal ECG, in particular:
  - arrhythmias
  - bundle branch blocks
  - hypertrophy
  - acute and chronic ischemia
  - QT abnormalities
  - pericarditis
  - electrolyte abnormalities
  - pacemaker dysfunctions
- Integrate data from different electrocardiographic techniques, as well as from other non-invasive and invasive techniques.
- Recognise strengths and weaknesses of ambulatory ECGs/loop recorder ECGs in a clinical situation.
- Cooperate with interventional cardiologists, electrophysiologists, anaesthetists, cardiac surgeons, as well as with other doctors involved in emergency medicine and intensive care.
- Recognise that the diagnosis and treatment of some arrhythmias need sometimes a multidisciplinary approach.
- Manage complications in a proper and timely way.

**ASSESSMENT & LEARNING METHOD**

- Record of ECGs performed and interpreted in logbook:
  - ECG
  - Ambulatory ECGs/loop recorder ECGs
  - Exercise ECG testing
- DOPs
  - Stress Test
  - Ambulatory ECGs
- In-house ECG's

## Non-Invasive Imaging – Echocardiography, CMR, Cardiac CT and Nuclear Techniques

**Objectives:** Appropriately select from the four imaging modalities of:

- Echocardiography;
- Cardiac Magnetic Resonance (CMR)
- Computed Tomography (CT)
- Nuclear Techniques

and then integrate the results into individual patient care.

### KNOWLEDGE

- Knowledge of indications and interpretation of ultrasound measurements for cardiac structure and function.

#### Echocardiography Techniques

- M-mode
- 2-dimensional (2D) mode
- Doppler imaging (blood flow and tissue)
- Contrast echocardiography
- Indications:
  - Evaluation of systolic and diastolic function (including ejection fraction) of the left ventricle
  - Regional wall motion abnormalities
  - LV mass
  - Chamber volumes and wall dimensions
  - Cardiomyopathies
  - Valvular morphology and function, including stenosis and regurgitation
  - Right ventricular function
  - Shunt lesions
  - Pericardial masses (tumours, thrombi, vegetations)
  - Congenital heart disease
  - Aortic disease
- Modalities
  - Transthoracic echo
  - Stress test
  - Contrast echocardiography
  - 3D echocardiography

#### Cardiovascular Magnetic Resonance (CMR) Techniques

- 2D mode
- Perfusion imaging
- Late enhancement
- Indication
  - Volumes
  - Ejection fraction
  - LV mass
  - Shunt
- Modalities
  - Cine-MR
  - MR angiography
  - T1 imaging

**Cardiac Computed Tomography Techniques**

- 2D
- 3D
- Indications
  - Calcium score
  - Coronary Artery Disease (CAD) (including grafts and stents)
- Modalities
  - Ultra-fast CT
  - Coronary angiogram

**Nuclear Imaging Techniques**

- Planar angiography
- SPECT
- Gated SPECT
- Gated blood pool SPECT
- PET
- Tracers
- Thallium
- Technetium-labelled tracers
- Fluorodeoxyglucose
- Indications
  - Myocardial perfusion
  - Viability
  - RV and LV volumes
  - Ejection fraction
  - Diastolic function
  - Phase analysis for cardiac asynchronic
  - Shunt
- Modalities
  - Rest metabolism
  - Stress protocols (exercise or pharmacological)
- Remain current with developments in the field of non-invasive imaging

**SKILLS**

- Appropriate selection of imaging techniques for specific clinical situations, including a thorough understanding of the Bayesian approach
- Choose imaging techniques, modalities and protocols in a clinically useful and cost-effective way, avoiding over and underutilisation of tests, keeping in mind radiation exposure, where appropriate
- Integrate data from different non-invasive techniques as well as from invasive imaging
- Stress testing
- Cooperate with interventional cardiologists, electrophysiologists, anaesthesiologists and other physicians involved in emergency medicine and intensive care, and with cardiac surgeons
- Explain to patients the implications of the results of the test
- Assess the side effects of contrast media and Recognise the risk of radiation to patient and personnel
- Recognise the risk of ionizing radiation for patient and personnel

**ASSESSMENT & LEARNING METHOD**

- ACLS
- DOPS:
  - Year 1 and 2: Transthoracic echo
  - Year 3 – 4 Transoesophageal echo
- Minimum of 6 months experience in an echo laboratory
- Document performance and interpretation of:
  - Transthoracic, transoesophageal and stress echocardiography
- ≥350 transthoracic echocardiograms
- Exposure to CT, CMR and nuclear sessions
  - Evaluate CT examinations in the clinical context
  - Evaluate cardiac nuclear examinations in the clinical context and with reference to other non-invasive and invasive approaches.
- CT, Nuclear to certify competence and knowledge
- Radiation Protection Course
- Study Day

## Invasive Imaging – Catheterisation and Angiography

**Objectives:** Coronary and left ventricular angiography: To be able to perform and interpret native coronary and surgical conduit angiograms and left ventricular angiograms

Cardiac catheterisation: To be able to perform and interpret right and left heart catheterisation.

### KNOWLEDGE

- Principles of fluoroscopic imaging, radiation physics and safety.
- Potential complications of cardiac catheterisation and angiography (including hypotension, heart failure, arrhythmias, ischemic neurologic damage, myocardial ischaemia, contrast reaction, cholesterol embolism, renal failure, vascular complications retroperitoneal bleeding, and cardiac tamponade).
- Radiological anatomy of the heart, aorta, large vessels and coronary arteries, as well as that of the femoral, radial and brachial arteries used for vascular access during catheterisation.
- Knowledge of catheterisation lab equipment (physiological monitoring, transducers, blood gas analysers, power injector).
- Pressure waveforms obtained during cardiac catheterisation.
- Routine collection of haemodynamic and oxymetric data, and how to calculate cardiac output, vascular resistances, valve areas, and AV shunts from measurements.
- Percutaneous and cut down techniques of catheterisation.
- Type of catheters used in coronary arteriography and cardiac catheterisation.
- Equipment and technique used of transseptal cardiac catheterisation, and its applications.
- When and how to perform cardiac pacing and pericardiocentesis, and the potential complications associated with its use.
- Basic principles and indications for intracoronary ultrasound, Doppler and pressure assessment.

### SKILLS

- Ordering, performing and interpreting invasive tests, by appropriately weighing up the risks and benefits of these procedures.
- Select the appropriate treatment modality (medical, percutaneous or surgical) based on the data generated by cardiac catheterisation, taking the clinical context into account.
- Obtain percutaneous arterial access (femoral, radial, brachial) and venous access and achieve haemostasis after catheterisation.
- Perform left heart catheterization including coronary angiography, ventriculography, and angiography of coronary bypass grafts
- Perform right heart catheterisation at the bedside including measurement of cardiac output, pressure measurement and oxymetry
- Proficiency in managing life-threatening arrhythmias and other emergency situations in the cath lab, including resuscitation and life support measures.
- Evaluate normal and pathological coronary angiograms. ventriculograms, aortograms, and pulmonary angiograms.
- Recognise the limitations and potential risk of invasive procedures and inform patients accordingly.
- Recognise the risks of ionizing radiation for the patient and clinical personnel.
- Consult and liaise with nurse and technician personnel and specialized physicians

**ASSESSMENT & LEARNING METHODS**

- DOPS
  - Year 5/6:
    - Transseptal cardiac catheterisation
    - Intracoronary ultrasound
- Documented experience:
  - Left heart catheterization including coronary angiography, ventriculography, and angiography of coronary bypass grafts
  - Right heart catheterisation at the bedside including measurement of cardiac output, pressure measurement and oxymetry
- Study Day



## Genetics

**Objectives:** To be able to perform general cardiological assessment and treatment of patients with inherited or familial cardiovascular disease.

### KNOWLEDGE

- Incidence and prevalence of inherited cardiovascular disorders in the local community.
- Knowledge of cardiac embryology and major gene families involved in cardiogenesis.
- Principles of Mendelian inheritance.
- Principles of polygenic cardiovascular diseases (such as hypertension, diabetes and dyslipidaemias)
- Knowledge of major monogenic cardiovascular diseases; hypertrophic cardiomyopathy, familial aortopathies such as the Marfan syndrome, Ehlers Danlos syndrome, and William's syndrome; familial dilated cardiomyopathies; familial channelopathies; familial disorders of septation; familial basis of conotruncal anomalies; trisomies in particular trisomy 21; familial dyslipidaemias in particular disorders of the low-density lipoprotein receptor.
- Familial basis of inherited cardiac tumours

### SKILLS

- Evaluate relevant family history and construct a family pedigree.
- Distinguish autosomal dominant, autosomal recessive, X-linked, and mitochondrial patterns of inheritance.
- Develop a systematic method of approaching a family with a potentially inherited cardiovascular disease.
- Counsel index cases, family members at risk on the probability of being affected by a genetic cardiovascular disorder.
- Adopt appropriate counselling skills to explain, educate and inform patients fully of the nature of their disease, the diagnostic tests used to make a diagnosis and the inherent strengths and weaknesses of such diagnostic tests in individuals at risk.
- Recognise problems with pedigree interpretation such as incomplete penetrance, variable expressivity, and age-related patterns of expressivity.
- Consult with clinical geneticists and medical professionals of other specialties on patients with genetic disorders

### ASSESSMENT & LEARNING METHODS

- Study day

## Clinical Pharmacology

**Objectives:** To master the theory and practice of state-of-the-art pharmacological treatment of cardiovascular disorders

### KNOWLEDGE

- Classification and mode of action of drugs (with emphasis on angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers, aldosterone antagonists, renin inhibitors, antiarrhythmic drugs, betablockers, calcium antagonists, diuretics, lipid-lowering drugs, antiplatelet agents, anticoagulants, inotropes, digitalis, nitrates, other vasodilating drugs, drugs with cardiac toxicity and other drugs with novel mechanisms like potassium channel blockers)
- Recognise for the drugs listed above:
  - Pharmacokinetics (absorption, bioavailability, distribution, biotransformation, excretion)
  - Pharmacodynamics
  - Pharmacogenetics
  - Indications.
  - Contraindications
  - Interactions
  - Adverse effects and toxicity.
- Perform and interpret diagnostic tests to assess drug efficacy and safety (laboratory tests, ECG and haemodynamic monitoring, Echo).
- Knowledge of randomised clinical trials and evidence-based medicine.

### SKILLS

- Take a relevant history of a patient's medication regime, including purchase of over the counter medicines. Identify and incorporate the importance of herbal remedies taken by patients.
- Assess the risks and benefits of prescribing an individualized drug treatment regimen for a given cardiovascular condition.
- Monitor the desired effects of a patient's drug therapy and also the side effects.
- Recognise and manage possible drug interactions (including treatments of concomitant diseases).
- Evaluate the design and results of published clinical trials.
- Incorporate the principles of evidence-based therapy and current guidelines into clinical practice.
- Communicate with patients and their family members to improve treatment compliance, and to ensure early recognition of possible adverse effects.
- Consider cost-effectiveness and feasibility of the prescribed treatment regimen

### ASSESSMENT AND LEARNING METHODS

- Study Day

## Cardiovascular Disease Prevention – Risk Factors, Assessment and Management

**Objectives:** To assess and treat patients with risk factors for cardiovascular disease. Evaluate how different prevention methods work. Describe cardiovascular disease and risk factors in the local community. Contribute to the global efforts in reducing Cardiovascular morbidity and mortality by communicating the prevention message to the public. Approach risk prevention in a holistic way, understanding the potentiation of cardiovascular risk by clustering of risk factors. Diagnose and treat different forms of arterial hypertension. Assess cardiac and other endorgan complications in patients with arterial hypertension. Diagnose and treat cardiovascular complications in the diabetic patient, appreciating the continuum ranging from impaired fasting glucose to insulin dependent diabetes and its complications.

### KNOWLEDGE

- Epidemiology of cardiovascular disease in the local community: incidence, prevalence, survival
- Risk factors and describe distribution and frequency of high-risk conditions in the local community
- Risk assessment in primary prevention, multifactorial risk interaction: risk scoring charts.
- Diet and nutrition in relation to cardiovascular risk management.
- Special treatment/prevention strategies for smoking, dyslipidaemia, diabetes mellitus, hypertension, physical inactivity, left ventricular hypertrophy (LVH), obesity, metabolic syndrome, psychosocial factors.
- Recognise that risk factors often cluster and require a comprehensive approach.
- Risk assessment in secondary prevention including drug therapy.
- Complications and consequences of specific risk factors.

### Hypertension

- Epidemiology aetiology and pathophysiology of Essential Hypertension.
- Complications and consequences of essential hypertension.
- Diagnosis and assessment of essential hypertension; - Blood pressure measurement, including ambulatory blood pressure monitoring
- Symptoms and signs of target organ damage
- Diagnostic procedures
- Management of essential hypertension.
- Secondary hypertension and recall its various causes
- Renovascular hypertension
- Bilateral renal parenchymal disease
- Hypertension induced by hormonal contraceptives and conjugated oestrogens
- Other forms of secondary hypertension.
- Cell biology of left ventricular hypertrophy

### Dyslipidemia

- Diagnoses and treatment of different forms of dyslipidemia.
- Cardiac and extra-cardiac complications of dyslipidemia.
- Epidemiology, aetiology and pathophysiology of dyslipidemia
- Complications and consequences of dyslipidemia
- Diagnosis, assessment and management of dyslipidemia.
- Cell biology of atherosclerosis.

**Diabetic heart disease**

- Diabetes Mellitus
- Role of diabetes in Coronary heart disease in the following areas
  - Epidemiology
  - Pathophysiology of cardiovascular complications
  - Role of risk factor intervention
  - screening for CAD in diabetics
  - screening for diabetes in CAD (oral glucose testing)
- Pathophysiology of diabetes and its non-cardiac and cardiac complications (CAD, diabetic cardiomyopathy, autonomic neuropathy and its cardiovascular affects).
- Treatments including diet, exercise, hypoglycaemic drugs and insulin
- Current thinking regarding the concept of the metabolic syndrome

**SKILLS**

- Evaluate CVD risk and assess global CVD risk at individual level (HeartSCORE).and population level (mortality, morbidity, disability)
- Evaluate the benefit of prevention at individual and population levels
- Appreciate the importance of risk factor management.
- Evaluate and manage risk factors appropriately and communicate their importance to patients, their families and the wider community.
- Appreciate variation in CVD risks across population, socioeconomic, gender, and racial groups.
- Through patient education, encourage a healthier lifestyle with specific emphasis on risk factors and maintenance of favourable risk profile over lifetime.
- Offer advice and support to family members with inherited CVD.
- Cooperate with other specialists such as dieticians, diabetologists and specialist nurses.
- Participate actively at CVD prevention programs (children, adults and elderly).
- Consider cost-effectiveness of the prescribed treatment regimen.
- Assess blood pressure using the correct methods for diagnosis and treatment control in hypertension, including ambulatory blood pressure monitoring.
- Advise patients on lifestyle management and treatment compliance.
- Advise patients on measuring their own blood pressure.
- Perform cost efficient screening for secondary hypertension.
- Select adequate treatment for lowering blood pressure to target values and prevent/treat end-organ damage.
- Select appropriate parameters in order to describe the risk profile in an individual patient with hypertension.
- Identify secondary organ damage (in particular cardiac, neurological, renal and atherosclerotic vascular disease) caused by hypertension.
- Manage multi-drug treatment regimes according to a patient's co-morbidities and possible side effects.
- Recognise that the diagnosis and treatment of hypertension need a multidisciplinary approach.
- Be able to motivate the patient to maintain long term compliance with antihypertensive therapy.
- Appreciate that hypertension itself is often under diagnosed and under -treated.
- Recognise the clustering of risk factors that include hypertension in order to formulate a holistic approach to patient management
- Assess dyslipidemia using the correct methods for diagnosis and therapeutic control.
- Advise patients on measuring their lipids.
- Select adequate treatment for lowering blood pressure to target values and prevent/treat its consequences
- Recognise that the diagnosis and treatment of dyslipidemia sometimes need a multidisciplinary approach.

- Be able to motivate the patient to maintain long-term compliance with antihypertensive lipid lowering therapy
- Recognise the clustering of risk factors that include dyslipidemia in order to formulate an integrated approach to patient management.
- Select appropriate parameters to describe the risk profile in an individual patient with dyslipidemia
- Identify other vascular areas affected by atherosclerotic vascular disease
- Manage multidrug treatment regimens according to a patient's comorbidities and possible side effects.
- Manage the prevention, diagnosis and treatment of diabetes and its associated cardiovascular complications.
- Actively participate in a multidisciplinary network of physicians and assistant medical personnel in order to treat patients with diabetes adequately according to disease state and complications.
- Be aware of the importance of recognising the continuum that extends from primary prevention to treatment of end organ damage.
- Appreciate the importance of treating asymptomatic patients in order to improve prognosis.
- Recognise the clustering of risk factors that include diabetes in order to formulate a holistic approach to patient management

#### **ASSESSMENT & LEARNING METHODS**

- Study Day

## Acute Coronary Syndrome (ACS)

**Objectives:** To be able to perform specialist assessment and treatment of patients with acute coronary syndromes including

- STEMI (ST segment elevation myocardial infarction)
- Non-STEMI
- Unstable angina

To understand indications, techniques, typical acute and long-term problems, limitations, complications, alternatives, and adjunctive pharmacotherapy of PCI

### KNOWLEDGE

- Pathophysiology of acute coronary syndromes; Myocardial ischaemia, Atherosclerosis of the epicardial coronary arteries, Events that precipitate ACS, Non-atheromatous CAD
- Dominant clinical features of ACS; Cardiac ischaemic chest pain, examination of CV system in ACS, Silent ischaemia and infarction
- Diagnostic process in unstable angina and non-ST elevation MI - analysis of symptoms and clinical differential diagnosis, 12-lead ECG, Laboratory studies, Imaging modalities
- Diagnostic procedures in AMI - analysis of symptoms and clinical differential diagnosis, 12-lead ECG, Laboratory studies, Imaging modalities
- Potential complications of AMI; Myocardial Ischemia, Arrhythmias and Mechanical complications
- Treatment options for AMI; Pre-hospital and early-hospital adjunctive pharmacological therapy, percutaneous coronary intervention (PCI), Coronary bypass grafting (CABG), early in-hospital.

### Percutaneous coronary intervention

- Mechanisms of action of main PCI techniques (balloon angioplasty, stent implantation, rotablation).
- Fundamental characteristics of balloons and stents, including typical lengths and diameters, antiproliferative drug coating.
- Problem of restenosis, acute and subacute stent thrombosis, and appropriately weigh risks and benefits of interventional techniques.
- Recognise the added risk from diabetes and renal impairment;
- Acute and chronic complications of PCI.
- Current differential indications for surgical and interventional revascularization as well as conservative treatment of CAD with respect to anatomy, extent of disease, role of left ventricular function both in the setting of ACS and of chronic CAD.
- Knowledge of adjuvant drug therapy, in particular anticoagulation regimes and platelet-inhibitors (aspirin, thienopyridines, glycoprotein IIb/IIIa inhibitors).

**SKILLS**

- Appreciate the role of risk factors, the clinical characteristics of coronary occlusion, and subsequent clinical course.
- Interpret biochemical markers of myocardial damage.
- Interpret ECG and imaging techniques to detect and locate ischaemia and/or infarction.
- Understand the importance of monitoring patients with ACS.
- Provide appropriate pharmacological treatment including analgesic, antiplatelet, and antithrombotic and anti-ischaemic therapy.
- Understand indications and contraindications for acute reperfusion treatment and make appropriate decisions.
- Demonstrate proficiency in selecting cardiac catheterisation in the context of ACS.
- Demonstrate proficiency in treating patients with heart failure and cardiogenic shock, including invasive haemodynamic monitoring.
- Demonstrate knowledge of advanced CPR techniques and management of life-threatening arrhythmias.
- Recognise the urgency of organised teamwork required for the optimal management of patients with ACS.
- Recognise the urgency of making rapid decisions regarding patients with ACS, from the time of their arrival in the emergency department until definitive therapy is established (for example minimising door-to-balloon/needle time).
- Appreciate the distress that unexpected and serious illness causes both to the patient and their relatives.
- Recognise when to transfer the patient to another hospital for interventional or surgical revascularisation.
- Contribute to improving public awareness of the significance of chest pain and encouraging early presentation.

**Percutaneous coronary intervention**

- To appropriately select ACS patients who are candidates for urgent angiography and PCI
- To appropriately select chronic CAD patients who are candidates for angiography and PCI.
- To adapt pharmacotherapy, especially anticoagulation and antiaggregatory medication, before and after PCI to clinical needs.
- To be responsive to potential hazards such as contrast nephropathy, arterial access complications (hematoma), drug compliance issues, drug resistance, non-cardiac diseases or interventions with bleeding risks while the patient is on thienopyridine and aspirin medication.
- Explain risk, benefits and alternatives in a compassionate way to the patient and be responsive to his fears and worries; take patient's wishes, co-morbidities and social situation into account when making medical decisions
- Interact and cooperate professionally with interventional cardiologists, heart surgeons, and supporting medical personnel

**ASSESSMENT & LEARNING METHODS**

- Study Day

## Chronic Ischaemic Heart Disease

**Objectives:** To be able to perform specialist assessment and treatment of patients with chronic Ischaemic Heart Disease (IHD).

To evaluate patients and interpret the results of diagnostic procedures.

To select and manage appropriate therapies

To be able to perform exercise or pharmacological stress testing alone, or in conjunction with, an imaging modality

### KNOWLEDGE

- Epidemiology of chronic IHD and its risk factors
- Molecular and cellular biology of IHD, its pathology and development, and the effects of ischaemia on the cardiac myocyte
- Describe events that precipitate a clinical angina attack
- Outline the prognosis of chronic IHD
- Clinical assessment of known or suspected chronic IHD, including evaluation of chest pain, other symptoms and signs, and diagnostic procedures
- Management of chronic IHD, including lifestyle measures, pharmacological management -
  - disease modifying drugs
  - symptom controlling drugs
- Explain the role and relative merits of medical therapy and revascularisation (percutaneous coronary intervention or coronary artery bypass surgery) in the patient with IHD

### Stress Testing

- Basic principles of coronary physiology
- Principles of exercise physiology
- Mechanisms of action of vasodilators and inotropic drugs used for stress testing
- Appreciating the indication of stress testing in other cardiac disorders (including valvular disease, arrhythmias and heart failure)

### SKILLS

- Risk stratify individual patients and to select an appropriate management strategy.
- Select, use and interpret non-invasive and invasive diagnostic tools for the evaluation of ischaemia, viability, left ventricular structure and function and coronary anatomy.
- Identify and treat risk factors for chronic IHD.
- Recognise the importance of risk factor management and secondary prevention.
- Consult with specialists such as interventional cardiologists, cardiac surgeons, dieticians and diabetologists in order to devise an appropriate management plan for individual patients
- Be able to interpret the ECG to detect ischaemia and/or arrhythmias
- Managing life-threatening arrhythmias, ischaemia, or other emergency situations, including ACLS, during the test
- Select the appropriate stress modality for a particular patient and interpret according to Bayesian principles taking into account specific strengths and weaknesses of a given test modality in a given patient (e.g., frequent false positive stress ECG in women)

### ASSESSMENT & LEARNING METHODS

- Study day



## Myocardial Disease

**Objectives:** To be able to perform specialist assessment and treatment of patients with cardiomyopathy, myocarditis and pericardial disease.

### KNOWLEDGE

- Epidemiology of dilated, hypertrophic, restrictive, infiltrative cardiomyopathies and obliterative endomyocardial disease
- Pathophysiology including genetics, clinical features and diagnostic criteria of cardiomyopathies
- Medical and invasive (surgical, electrophysiological and interventional) management of cardiomyopathies: indications, contraindications, possible adverse effects
- Prognostic factors

### Myocarditis

- Myocarditis and its aetiology
- Clinical features, pathology and diagnostic criteria of infective and non-infective myocarditis, in particular the typical features of different forms of myocarditis on magnetic resonance imaging
- Treatment of patients with myocarditis and its complications

### SKILLS

- Interpret diagnostic data (ECG, ambulatory ECG, Echo, exercise testing, chest X-ray, cardiac catheterisation, coronary angiography, magnetic resonance and radionuclide imaging, endomyocardial biopsy, genetic assessment)
- Select appropriate treatment and support modalities (medical, interventional, surgical, ICD/CRT, assist devices, balloon pumping or other treatment)
- Assess individual prognosis in relation to the need for transplantation.
- Evaluate patients for endomyocardial biopsy recognizing diagnostic yield and potential risk of this procedure.
- Establish cooperation with medical professionals in other specialties (immunology, bacteriology, genetics, cardiac surgery, interventional cardiology, imaging) for timely differential diagnosis of myocardial disease and further treatment
- Counsel patients with cardiomyopathies and their relatives about associated risks

### ASSESSMENT & LEARNING METHODS

- Study Day

## Pericardial Disease

**Objectives:** To be able to perform specialist assessment and treatment of patients with pericardial diseases

### KNOWLEDGE

- Classify and define
  - Acute pericarditis (infective, idiopathic or neoplastic)
  - Chronic pericarditis
  - Constrictive pericarditis
- Describe for each the epidemiology, pathophysiology, and aetiology (including infective, inflammatory and neoplastic disorders)
- Relevant investigations: non-invasive and invasive.
- Differential diagnosis of constrictive pericarditis from restrictive cardiomyopathy
- Management of pericarditis
- Related complications; pericardial effusion, cardiac tamponade and constriction

### SKILLS

- Demonstrates knowledge of the ECG abnormalities in acute pericarditis
- Select and use the different non-invasive imaging modalities: echo, CMR, CT as well as invasive pressure measurements to diagnose pericardial disease.
- Evaluate haemodynamic status;
- Determine the aetiology of pericardial effusion
- Clinically differentiate pericarditis from myocardial ischaemia.
- Assist in and ideally perform pericardiocentesis on appropriately selected patients
- Consider pericardial diseases within the differential diagnosis of a patient presenting with cardiovascular disease
- Be aware of the different diagnostic and therapeutic strategies required for each individual case
- To work closely with radiologists, cardiac surgeons and oncologists.

### ASSESSMENT & LEARNING METHODS

- Study Day

## Cardiac Tumours

**Objectives:** To be able to perform specialist assessment and treatment of patients with cardiac tumours

### KNOWLEDGE

**Given this is rare it is recommended that basic knowledge only is essential**

- Epidemiology, pathophysiology, pathology and clinical manifestations of primary cardiac tumours and metastatic cardiac tumours, including lymphoma
- Effect of tumour size and location
- Clinical features including
  - Impairment of cardiac function
  - Systemic manifestations
  - Systemic and pulmonary emboli
  - Signs of physical obstruction to blood flow (e.g. atrial myxoma)
  - Pericardial involvement-constriction and tamponade
- Appropriate diagnostic procedures
  - echocardiography, computed tomography, magnetic resonance imaging
- Operative management (tumour removal, heart transplantation, palliative management)

### SKILLS

- Select and use appropriate imaging modalities
- Consider a differential diagnosis of primary or secondary neoplastic involvement of the heart
- Recognise other cardiac masses including thrombi or vegetations
- Collaborate effectively with cardiovascular surgeons and with other specialists dealing with neoplastic disease
- Understand the importance of support and counselling for the patient and family

### ASSESSMENT & LEARNING METHODS

- Study Day

## Congenital Heart Disease in Adult Patients

**Objectives:** To be able to assess, manage and appropriately refer adult patients with congenital heart disease including those patients who have undergone previous cardiac surgery

### KNOWLEDGE

- Epidemiology, aetiology, prevention, pathophysiology, nomenclature, and foetal and transitional circulations
- Diagnosis and assessment
- Principles of management Identify pathology, diagnosis and management of specific conditions
  - Atrial septal defect
  - Atrioventricular septal defects
  - Double-outlet right ventricle
  - Complete transposition of the great arteries
  - Congenitally corrected transposition of the great arteries
  - Double outlet left ventricle
  - Common arterial trunk
  - Pulmonary atresia
  - Congenital malformations of coronary arteries
  - Congenital malformations of pulmonary arteries
  - Aortic arch anomalies
  - Arteriovenous malformations
  - Coarctation of the aorta
  - Tricuspid atresia
  - Ebstein's anomaly of the tricuspid valve
  - Abnormalities of the left atrioventricular junction
  - Tetralogy of Fallot
  - Pulmonary stenosis
  - Aortic stenosis
  - Patent ductus arteriosus
  - Anomalous pulmonary venous connections
  - Ventricular septal defects

### SKILLS

- Select imaging techniques and where appropriate use invasive procedures for diagnosis and treatment.
- Provide long term follow up, including patient monitoring and lifestyle advice.
- Understand the importance of referring patients for a specialist opinion.
- Appreciate the importance of genetic counselling.
- Appreciate the social and emotional difficulties encountered by adult patients with congenital heart disease

### ASSESSMENT & LEARNING METHODS

- Study Day

## Pregnancy and Heart Disease

**Objectives:** To be able to perform cardiac evaluation and treatment of women contemplating pregnancy.

To be able to perform cardiac follow-up of the pregnant patient with heart disease

To be able to perform specialist assessment and treatment of cardiac patients after pregnancy

### KNOWLEDGE

- For each of the listed objectives consider the following clinical conditions which may affect the pregnant woman: congenital heart disease, acquired valve disease, prosthetic valves, coronary artery disease, cardiomyopathies, arrhythmias, hypertension, Marfan's syndrome,
- Aortic dissection Define cardiac contraindications to pregnancy (or which justify early termination)
- Indications for genetic counselling for inheritable diseases
- Identify women who have a high risk of pregnancy-related cardiac complications and who may need intervention before considering pregnancy
- Outline cardiac follow-up of pregnant women
- Identify situations requiring medical therapy
- Outline treatment of arterial hypertension and its complications
- Identify situations in which cardiac intervention may be required
- Define the modalities of delivery
- Management of anticoagulation therapy
- Follow-up modalities during the post-partum period
- Diagnose and treat post-partum cardiomyopathy

**SKILLS**

- Perform clinical evaluation and interpret the results of diagnostic procedures to assess the cardiac risk of pregnancy
- Indicate preventive cardiac intervention if needed
- Recognise the importance of education for women with heart disease on the potential risks of pregnancy
- Co-operate with obstetricians and midwives to detect pregnant women with unknown heart disease and to identify those at high risk
- Perform clinical and non-invasive evaluation of the cardiac tolerance of pregnancy
- Select which drug therapies can be used during pregnancy
- Evaluate the foetal and maternal risk of different cardiac interventions
- Assess the foetal prognosis in association with Obstetrician/Paediatrician
- Recognise the importance of patient education on the symptoms of poor cardiac tolerance
- Educate obstetricians and midwives on symptoms of undiagnosed heart disease enabling the prompt identification of situations requiring rapid cardiac management
- Co-operate with obstetricians and anaesthesiologists to plan delivery (date, method, drug therapy, medical environment)
- Analyse cardiac condition after pregnancy
- Assess the cardiac risk of subsequent pregnancies
- Inform obstetricians and midwives on the risk of worsening of cardiac status during the early post-partum period
- Recall efficacy, risks, and contraindications to the various contraceptive methods according to type of heart disease
- Co-operate with gynaecologists and obstetricians with regard to recommendations on contraception

**ASSESSMENT & LEARNING METHODS**

- Study Day

## Valvular Heart Disease

**Objectives:** To be able to perform a specialist assessment and treatment of patients with the following valvular pathologies:

- Aortic stenosis
- Aortic regurgitation
- Mitral valve stenosis
- Mitral valve regurgitation
- Tricuspid stenosis
- Tricuspid regurgitation
- Pulmonary valve disease

To be able to perform follow up after valve surgery or percutaneous intervention, including immediate post-operative care and long-term management of patients with prosthetic valves

### KNOWLEDGE

- Pathology and pathophysiology
- Natural history and progression.
- Strengths and limitations of diagnostic techniques, in particular echocardiography, and recognising the value of additional techniques such as magnetic resonance imaging or an invasive hemodynamics in cases of discrepant findings
- Indications, benefits, and risks of medical therapy, and surgical or percutaneous interventions
- Indications for and management of anticoagulation
- Role of concomitant coronary heart disease in valvular heart disease and its impact on surgical management
- Post-operative care
- Postoperative pathophysiology
- Postoperative management of anticoagulants, diuretics and other drugs, prophylaxis against infective endocarditis, management of pregnancy and non-cardiac surgery in the patient with prosthetic valves

### SKILLS

- Select the appropriate use of invasive or non-invasive diagnostic techniques
- Interpret results of diagnostic procedures
- Be able to decide when to indicate surgery
- Co-operate with cardiovascular surgeons, interventional cardiologists, and radiologists
- Recognise importance of patient education, with respect to the natural history of valvular heart disease, management of anticoagulation, prophylaxis of bacterial endocarditis and choice of valve prosthesis when appropriate
- Convey to the patient the importance of monitoring of symptoms and signs of valvular heart disease and of periodic follow-up by the cardiologist
- Recognise and manage the complications which may occur in patients with prosthetic valves or after valvular interventions
- Co-operate with cardiac surgeons and anaesthetists
- Recognise the appropriate frequency of follow up with specific reference to the clinical condition following surgery or intervention.

### ASSESSMENT & LEARNING METHODS

- Study Day

## Infective Endocarditis

**Objectives:** Assess, diagnose and treat patients with infective endocarditis (of native and prosthetic valves as well as due to indwelling devices such as pacemakers and catheters)

### KNOWLEDGE

- Epidemiology, pathology, pathogenesis and microbiology of infective endocarditis
- Clinical features
- Laboratory investigations including microbiological results. Use of cardiac imaging and the importance of transoesophageal echocardiography to detect complications such as abscesses
- Selection and management of antibiotic therapy
- Role of valve surgery in patients with endocarditis
- Management of complications
- High-risk patients and situations
- Indications for antibiotic prophylaxis

### SKILLS

- Select the appropriate use of laboratory investigations and diagnostic procedures, in particular echocardiography
- Select appropriate antibiotic regimen
- Determine the need for, and timing of surgery
- Manage complications
- Prescribe appropriate antibiotic agents for prophylaxis
- Develop a multidisciplinary approach with cardiac surgeons, and microbiologists for diagnosis and management
- Recognise the importance of patient and physician education on prophylaxis

### ASSESSMENT & LEARNING METHODS

- Study Day



## Heart Failure (HF)

**Objectives:** To recognise the impact of heart failure on morbidity and mortality in the local and general population

To be able to recognise the different underlying causes of heart failure

To be able to perform specialist assessment and treatment of patients with heart failure

### KNOWLEDGE

- Epidemiology, pathophysiology and prognosis of heart failure
- Recognise complications
- International classifications of functional limitation (for example NYHA classes)
- Diagnostic procedures in the patient with known or suspected HF including Natriuretic peptides, Echo, ECG, ambulatory ECG, stress testing, cardiac catheterisation
- Medical management of acute and chronic HF (neurohumoral blockade)
- Device management of HF: Cardiac Resynchronisation Therapy, ICD
- Role of cardiac surgery including transplantation
- Role of exercise training programs in HF patients
- Multidisciplinary care, including home based nursing in HF
- Complications of HF patients
- Appropriate follow up of HF-patients
- Volemic status and the evaluation of renal function and electrolytes in HF patient
- Indications and contraindications for heart transplantation
- Follow up of patients following heart transplantation

### SKILLS

- Select and use diagnostic techniques to differentiate the underlying causes of HF
- Deliver lifestyle advice and home-based treatment strategy to patients
- Risk stratify HF patients and select appropriate drug and other therapies (Implantable Cardiac Defibrillator (ICD), Cardiac Resynchronisation therapy (CRT), surgery)
- Evaluate HF patients during follow up and appropriately and continuously adjust the treatment plan.
- Emphasise the importance of lifestyle, exercise and weight loss. Help patients to understand the need for long-term complex drug therapy
- Appreciate the importance of rehabilitation
- Develop and sustain supportive relationships with patients with chronic heart failure
- Teach patients, relatives and special nurses in HF treatment.
- Recognise the advantages and limitations of specific heart failure therapies
- Explain, negotiate and overcome the barriers to compliance with heart failure treatments
- Recognise the importance of supportive and palliative care in the heart failure population

### ASSESSMENT & LEARNING METHODS

- Study Day

## Pulmonary Arterial Hypertension

**Objectives:** To be able to diagnose pulmonary arterial hypertension (PAH)

To be able to provide optimal management for patients with PAH

To be able to distinguish between the different causes of pulmonary hypertension

### KNOWLEDGE

- Pulmonary hypertension and its functional classification
- Epidemiology of PAH (incidence, prevalence, aetiology, genetics, high-risk groups)
- Pathology and pathophysiology of PAH
- Clinical features and diagnostic criteria of PAH
- Identify prognostic markers
- Management of PAH (medical, surgical and interventional including balloon atrial septostomy, indications, contraindications and possible adverse effects)

### SKILLS

- Recognise clinical signs suggestive of PAH
- Differentiate between pulmonary hypertension and other diseases with similar symptoms
- Perform and interpret accurate medical assessment (using laboratory analyses including arterial blood gases, cardiac biomarkers; 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 appropriate medical or invasive (surgical or 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;
- Effectively collaborate with other medical specialists (family medicine, thoracic surgery, invasive cardiology, imaging) for differential diagnosis of pulmonary hypertension and timely referral to surgical treatment
- Provide genetic counselling to families affected by familial PAH
- Maintain long-term involvement of patients and their family members in supportive activities for healthy life-style adherence and treatment compliance
- Appreciate the increased prevalence of PAH in other medical conditions, such as scleroderma
- Refer to Specialists in PAH when appropriate

### ASSESSMENT & LEARNING METHODS

- Study Day

## Rehabilitation and Exercise Physiology

**Objectives:** To be able to provide appropriate rehabilitation and secondary prevention services to patients with cardiovascular disease, specifically acute coronary syndromes, after revascularisation, with stable angina pectoris, patients with high cardiovascular risk, heart failure, diabetes, and others  
To be able to evaluate the cardiovascular risk and the exercise capacity of the patients  
To be able to evaluate “athletes heart” characteristics

### KNOWLEDGE

- Rehabilitation and secondary prevention as integrated components of cardiac care
- Target populations and risk stratification of patients
- Baseline assessment, exercise testing, exercise training, patient education, lifestyle intervention, risk factor management, psychosocial and vocational support
- Exercise and sports physiology, and benefits of exercise training, Recognise safety issues
- Psychological aspects of rehabilitation
- specific population challenges
- Describe programmes for specific populations in appropriate settings

### SKILLS

- Perform and interpret risk stratification, using and/or performing namely the CPX or the conventional exercise test, the echocardiogram or other tests as indicated
- Prescribe exercise programmes, in terms of mode, intensity, duration and progression, and other lifestyle interventions
- Prescribe cardiovascular preventive medications according to best practice guidelines
- Recognise “athlete’s heart” characteristics (ECG, echo) and use the ESC recommendation for eligibility.
- Recognise rehabilitation and secondary prevention as an integrated component of cardiac care
- Recognise the importance of rehabilitation and secondary prevention for professional (work), personal (including driving, travelling, leisure and sex) and social life among patients with heart disease
- Recognise the interplay of physical and psychological aspects of heart disease
- Recognise the importance of patients and partners/families education
- Recognise the role of other professionals including nurse specialists, physiotherapists, psychologists, dieticians and general practitioners in rehabilitation and secondary prevention
- Recognise the role of sports in Cardiology

### ASSESSMENT & LEARNING METHODS

- Study Day

## Arrhythmias

**Objectives:** To be able to assess and treat patients with arrhythmias

- **Electrophysiology:** To have a good understanding of diagnostic and therapeutic electrophysiology in relation to patients with arrhythmias
- **Pacing:** To be able to assess patients for pacing. Be able to pace patients independently and safely
- **Implantable Cardioverter Defibrillator:** (ICD) To be able to assess patients who require ICD implantation

### KNOWLEDGE

- Classification and definition:
  - Bradycardias
  - Tachycardias
    - Supraventricular arrhythmias
    - Ventricular arrhythmias
- Epidemiology, pathophysiology, genetics, diagnosis and clinical features of arrhythmias
- Prognosis including risk evaluation
- Principles of electrocardiography and electrophysiology and relevant findings in different arrhythmias, including high risk features in the resting ECG such as long QT, short QT, and Brugada syndrome
- Pharmacology of antiarrhythmic drug therapy
- Principles of invasive and device management of arrhythmias, including
  - catheter ablation
  - Pacemaker therapy (temporary and permanent)
  - ICD therapy
  - Surgical therapy

### SKILLS

- Be competent in cardio-pulmonary resuscitation
- Classify arrhythmias by standard electrocardiogram
- Manage acute arrhythmias with drugs and cardioversion
- Prescribe appropriate preventative pharmacological therapy
- Perform and interpret electrocardiographic monitoring.
- Interpret electrophysiological study
- Refer patients for catheter ablation and perform follow-up after catheter ablation
- Pacing & ICD
- Appropriately select and refer patients for biventricular pacing
- Manage the follow up of patients with pacemakers including interrogation and programming of the device
- Appreciate the anxiety suffered by patients with arrhythmias and with some methods of management, e.g. catheter ablation, pacing and ICD
- Appreciate the importance of coexisting structural heart diseases, including coronary artery disease in relation to the outcome and management of arrhythmias
- Appreciate the limitations and potential risks of anti-arrhythmic drug therapy
- Use history, examination and cardiac imaging to determine which patients require an ICD.

**ASSESSMENT & LEARNING METHODS**

- Study Day
- Document cases
  - Insert temporary pacing electrodes
  - Implantation of permanent single chamber
  - Dual chamber pacemakers

## Atrial Fibrillation

**Objectives:** To be able to carry out specialist assessment and treatment of patients with Atrial Fibrillation (AF).

### KNOWLEDGE

- Epidemiology, prognosis, and pathophysiology of atrial fibrillation
- Classify atrial fibrillation
- 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

**SKILLS**

- Perform or interpret:
  - electrocardiogram
  - echocardiogram
  - transoesophageal echocardiography
  - prolonged ECG monitoring (e.g. Holter monitoring) - exercise testing

**Management**

- Develop appropriate anti-thrombotic strategies for prevention of ischemic stroke and systemic embolism
- Select patients appropriately for cardioversion and perform competently: pharmacological electrical
- Perform rhythm control therapy: pharmacological
- Perform rate control therapy: pharmacological
- Select and refer patients for
  - electrophysiological studies
  - atrial catheter ablation
  - surgical ablation
  - pacemaker and defibrillator implantation
  - AV junction ablation and pacing
- Appreciate the anxiety patients suffer with AF, particularly in case of certain 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 risks of antiarrhythmic drug therapy of AF
- Appreciate the importance of anticoagulant therapy
- Appreciate the palliative nature and potential adverse effects of nonpharmacological therapies
- Appreciate newer methods for treating Atrial Fibrillation and how to refer patients for specialist treatment when appropriate, such as percutaneous or surgical ablation.

**ASSESSMENT & LEARNING METHODS**

- Study Day

## Syncope

**Objectives:** To define syncope

To differentiate syncope from the other causes of loss of consciousness

To assess and treat of patients with syncope

### KNOWLEDGE

- Epidemiology and pathophysiology and prevalence of different causes of syncope
- Causes of loss of consciousness (e.g. Neurally-mediated reflex syncope, Stokes Adams attack, orthostatic hypotension)
- Prognosis
- Diagnostic evaluation
  - Strategy of evaluation
  - Initial evaluation (history, physical)
  - examination, baseline ECG)
  - Echocardiogram
  - Exercise stress testing
  - Tilt testing
  - Electrocardiographic monitoring (Long term ECG, external and implantable loop recorders)
  - Electrophysiological testing
- Treatments: device based or pharmacological for
  - Neurally-mediated (reflex) syncope
  - Orthostatic hypotension
  - Cardiac arrhythmias as primary cause
  - Structural cardiac or cardiopulmonary disease

### SKILLS

#### Diagnosis

- Perform or interpret:
  - electrocardiogram
  - echocardiogram
  - carotid sinus massage
  - tilt testing
  - electrocardiographic monitoring (Long term ECG, external and implantable loop recorder)
  - electrophysiological test
  - exercise stress testing
  - cardiac catheterization and coronary angiography
- Perform risk stratification



**Treatment**

- Select appropriate treatment:
  - Education and reassurance
  - Physical manoeuvres
  - Drug therapy
  - Device implantation
- Appreciate the impact of syncope on the patients' lifestyle
- Appreciate that syncope is a transient symptom and not a disease
- Consult with other specialists
- Recognise the diagnostic criteria for the causes of syncope
- Recognise appropriate investigations in the various subgroups of patients with syncope
- Recognise how patients with syncope should be risk stratified
- Appreciate how patients with syncope should be hospitalized.
- Recognise treatments that are likely to be effective in preventing syncopal recurrences

**Diagnosis**

- Appreciate that the diagnosis of syncope is often presumptive
- Appreciate that the diagnostic value (sensitivity and specificity) of tests for syncope is imperfect
- Appreciate that observations during the event are of key importance
- Appreciate that the diagnostic yield of the tests depends on their appropriateness of their selection (pretest probability)

**Therapy**

- Recognise that most patients do not need any specific treatment apart from education and reassurance
- Recognise that drug therapies are often ineffective
- Recognise the risk-benefit and the cost efficacy of pacemaker, ICD and catheter ablation therapy

**ASSESSMENT & LEARNING METHODS**

- Study Day

## Sudden Cardiac Death (SCD) and Resuscitation

**Objectives:** Sudden Cardiac Death: To manage patients with threatened or aborted SCD, including risk stratification, investigation and treatment

**Resuscitation:** To be able to carry out basic and advanced cardiac life support

### KNOWLEDGE

#### Sudden Cardiac Death

- Definition of SCD, epidemiology, aetiology, pathology, pathophysiology and clinical presentation of the different conditions which may lead to SCD
- Principles of acute management of patients with SCD
- Principles of diagnostic work up and risk stratification of survivors; in particular, Recognise ECG signs indicative of high SCD risk (e.g., long QT, short QT, Brugada syndrome etc.) and know how to further evaluate patients with these signs and their families
- Appropriate long-term therapeutic options
- Current recommendations for secondary prevention of SCD (e.g., indications for preventive ICD implantation in patients with ischemic cardiomyopathy)
- Identify, risk stratify and manage individuals at elevated risk, including family members of SCD patients

#### Resuscitation

- Explain the methods and guidelines of basic and advanced life support including airway management, appropriate drug use, defibrillation and pacing

### SKILLS

#### Sudden Cardiac Death

- Perform resuscitation (see below)
- Interpret prodromal symptoms, underlying causes and prognosis of a SCD-Survivor
- Perform and interpret risk stratification using the following techniques (Holter-ECG, LV function, Echo, Cath, EP, heart rate variability)
- Follow up SCD-Survivors

#### Resuscitation

- Identify the cause of collapse
- Perform BLS (CPR) and ACLS including different skills.
- Lead and coordinate the actions of an ACLS-Team
- Teach basic life support (BLS)

#### Sudden Cardiac Death

- Recognise the urgency of the management of cardiac arrest,
- Recognise the importance of prodromal symptoms.
- Appreciate patient and family anxieties
- Appreciate the importance of patient education and secondary prevention
- Understand the medical, psychological, and social problems arising in patients with end-stage heart failure and frequent ICD activation

#### Resuscitation

- Appreciate the importance of working in a team with laypersons, paramedics and other medical personnel during resuscitation (BLS and ACLS).
- Understand the importance of regular audit of the basic and advanced life support programme

## **ASSESSMENT & LEARNING METHODS**

- Study Day
- ACLS

## Diseases of the Aorta and Trauma to the Aorta and Heart

**Objectives:** To be able to assess diseases of the Aorta, and trauma to the aorta and heart  
To be able to implement the appropriate medical, interventional or surgical treatment regime

### KNOWLEDGE

- Epidemiology, aetiology, pathology, genetics, pathophysiology and clinical presentation of aortic disease, aortic root disease, and trauma to the aorta and heart including:
  - Acute aortic syndromes:
    - Aortic dissection
    - Intramural haematoma
    - Traumatic aortic transection
    - Chronic aortic dissection
    - Aneurysm of the thoracic aorta
    - Aortic atheromatous disease
    - Aortitis
    - Trauma of the heart (including myocardial contusion)
- Strengths and limitations of different imaging modalities
- Appropriate medical, interventional or surgical management strategy

### SKILLS

- Choose, perform and interpret the appropriate imaging studies (transthoracic and transoesophageal echocardiography, magnetic resonance, computed tomography, ultrasound (surface and intravascular) and angiography of the aorta and of the heart to assess aortic disease and traumatic lesions
- Manage different aortic conditions with the appropriate treatment modality in a timely manner
- Cooperate with cardiovascular surgeons and interventional cardiologists as well as radiologists for diagnosis and treatment
- Recognise the potential urgency required in managing patients with diseases of the aorta and cardiac trauma
- Recognise and organize family screening where appropriate
- Recognise the need for and undertake long term follow-up of patients with chronic aortic disease

### ASSESSMENT & LEARNING METHODS

- Study Day

## Peripheral Arterial Vascular Disease

**Objectives:** To be able to assess and treat patients with peripheral arterial vascular disease

### KNOWLEDGE

- Epidemiology and pathology
- Diagnosis and assessment
- Medical and invasive (interventional and surgical) interventional management and their relative merit in different situations
- Prognosis
- Association of peripheral vascular disease with vascular disease in other territories in particular carotid and renal arteries
- Causes of acute limb ischaemia and the urgency of its management

### SKILLS

- Take a relevant history and perform an appropriate physical examination, especially the examination of peripheral pulses
- Identify the risk factors and select appropriately the management strategy keeping in mind that peripheral vascular disease is a manifestation of generalised atherosclerosis
- Select, use and interpret diagnostic tools appropriately including:
  - Ultrasound (duplex scanning and other Doppler modalities, including ankle brachial index)
  - MR angiography
  - CT angiography
  - Angiography
- Appreciate the systemic nature of atherosclerosis and its implication for a patient with disease manifested within a given territory
- Recognise the importance of risk factor modification in prevention.
- Encourage patients to adopt a healthier lifestyle with specific emphasis on risk factors
- Collaborate with specialists such as interventional cardiologists, radiologists, vascular surgeons and diabetologists.

### ASSESSMENT & LEARNING METHODS

- Study Day

## Thromboembolic Venous Disease

**Objective:** To be able to diagnose, treat and prevent:

- deep venous thrombosis
- pulmonary embolism

### KNOWLEDGE

- Epidemiology and risk factors for deep venous thrombosis in the clinical settings of: recovery from major surgery or trauma, prolonged immobility, oral contraceptive pill use, pregnancy and air travel
- Increased pulmonary vascular resistance and ventilation perfusion mismatch
- Clinical presentation of deep venous thrombosis and pulmonary embolism
- Diagnosis by:
  - Biomarkers: D-dimer and troponins
  - ECG
  - Echocardiography
  - Ultrasound and Doppler of leg and pelvis veins
  - MDCT
  - Ventilation-perfusion scan
  - MR-angiography
  - Pulmonary angiography
- Treatment: Heparins, Vitamin K antagonists, New anticoagulants, Thrombolysis, Embolectomy and fragmentation

### SKILLS

- Interpret ECG, echocardiography, spiral CT, ventilation-perfusion scanning signs of pulmonary hypertension or pulmonary thromboembolism
- Select appropriate therapy for acute pulmonary embolism
- Diagnose and manage acute and chronic deep venous thrombosis
- Decide upon the duration of anticoagulation therapy for patients with thromboembolic venous disease
- Appreciate the difficulties in diagnosing pulmonary embolism on the basis of symptoms and signs
- Collaborate with other imaging specialists including radiologists and nuclear imaging specialists
- Ensure patient understanding of the disease, the importance of compliance and appropriate precautions required during long term anticoagulant therapy
- Describe preventive measures: Compression stockings, heparins
- Describe management of chronic pulmonary hypertension, including thrombendarterectomy

### ASSESSMENT & LEARNING METHODS

- Study Day

## The Cardiac Consult

**Objectives:** Peri-operative cardiac consult for non-cardiac surgery

- To select appropriate preoperative imaging techniques from the following four imaging modalities for cardiac risk evaluation.
  - Resting/stress echocardiography
  - Resting/stress nuclear perfusion imaging
  - Cardiac computed tomography (CT)
  - Cardiovascular magnetic resonance (CMR)
- To integrate information regarding the estimated effects of surgical stress during operation.
- To integrate information on the long-term impact of cardiac disease on outcome in patients should they live long enough to enjoy the benefits of surgery.
- Cardiac consult in the patient with ischaemic neurologic symptoms:
  - Search for potential sources of cardiac embolism, and advise proper management
  - Search for other cardiovascular manifestations of atherosclerosis, in particular coronary heart disease and peripheral arterial disease, and advise proper management

### KNOWLEDGE

- Understand that preoperative tests should only be done if they will influence perioperative or long-term cardiac treatment and risk management, without delaying surgery if test results will not change management
- Imaging techniques to assess
  - Left ventricular ejection fraction at rest
  - Valve abnormalities (stenosis/insufficiency)
  - Calculation of valve stenosis gradient.
  - Estimation of valvular regurgitation fraction.
- Coronary artery disease, new wall motion abnormalities during stress. The severity, extent and ischemic heart rate threshold during stress testing.
- Intraoperative cardiac monitoring for volume and ischemia status.
- Non-invasive coronary angiogram
- Understand the mechanism, likelihood, and potential treatment options of cardiac and aortic sources of embolism
- Frequency of concomitant coronary and other arterial disease in the presence of ischemic neurologic disease
- Realize the frequency of cardiac symptoms, problems and considerations in other diseases, (e.g. pulmonary disease, connective tissue disorders) and be able to provide proper management advice

**SKILLS**

- Consider heart valve replacement in patients with severe stenosis prior to surgery.
- Consider coronary revascularization in selected patients with extensive stress induced ischemia prior to surgery.
- Consider immediate coronary revascularization in patients with intraoperative hemodynamic instability,
- ST-segment changes and new wall motion abnormalities.
- Communicate to patients the implications of the results of preoperative tests on perioperative management. Indicate the potential complications of delaying the index surgical procedure and the benefit of additional (invasive) cardiac therapy.
- Communicate with other specialties involved in perioperative care (anaesthesiologist, surgeon, and intensivist) to individualize patient care.
- Recognise strengths and limitations of each imaging modality.
- Use echocardiography, including transoesophageal echocardiography, and other techniques to search for potential sources of embolism
- Propose a diagnostic work-up of the patient for other atherosclerotic manifestations, and devise proper therapy and risk management
- Appreciate that potential sources of embolism are frequently of low probability (in particular, patent foramen ovale) and commonly co-exist
- Understand the importance of diagnosing and treating co-existing cardiovascular atherosclerotic disease
- Anticipate cardiovascular problems accompanying primarily non-cardiac diseases
- Cooperate closely with other disciplines and offer prompt support for their needs and questions

**ASSESSMENT & LEARNING METHODS**

- Mini-CEX
- DOPS
- CBD
- used on the presence or absence of possible cardiovascular symptoms
- The past medical history
- Symptoms of any co-morbidities
- The social history
- Current and past drug therapy
- Clinical Examination

To complement the subjective findings from the clinical history, with the objective findings on clinical examination of the cardiovascular system.

To perform a general examination of the patient searching for evidence of co-existing illness, as well as manifestations of cardiovascular disease.

**KNOWLEDGE**

- Describe the range of, and the meaning of, words used by patients to describe cardiovascular systems
- Recognise classical symptoms of cardiovascular disease, that patients with cardiac chest pain may not present with classical symptoms and to Recognise the characteristics of non-cardiac chest pain
- Recognise typical and atypical symptoms of cardiovascular disease
- Recognise cardiovascular risk factors from the patient's history
- Names and side effects of drugs used
- Symptoms and treatments of the co-morbidities often associated with cardiovascular disease.
- Recognise the features on general examination caused by cardiovascular disease



- The physiology and patho-physiology of the cardiac cycle and understand how normal heart sounds, abnormal heart sounds and systolic and diastolic murmurs are generated and how to best auscultate them
- Patho-physiology of the clinical signs of under perfusion and fluid retention
- Ankle-brachial index as a measure of peripheral arterial disease

**SKILLS**

- Examine the arterial pulse at different arteries for rate, rhythm and haemodynamic profile, and how to measure arterial blood pressure
- Examine the venous system and in particular to be able to clinically estimate the right atrial pressure
- Examine the precordial impulse
- Analyse and integrate the information obtained by taking a history from a patient to contribute to the development of an overall assessment
- Assess global cardiovascular risk
- Establish a relationship with the patient based on empathy and trust
- Allow the patient time to express his or her symptoms in their own words
- Sympathetically direct open ended questions to the patient
- Take into account the importance of both co-morbidities and social circumstances in relation to cardiovascular disorders
- Examine the peripheral, arterial and venous systems.
- Examine the heart
- Make and record accurate observations about the clinical state of the patient with particular emphasis on the cardiovascular system.
- Use a stethoscope and blood pressure cuff to maximise the information to be gained about abnormalities of the heart and blood vessels.
- Obtain the ankle-brachial index as a sign of peripheral arterial disease
- Examine the patient with due regard for the patients dignity.
- Continually seek or correlate findings on examination with subsequent findings at echocardiography or surgery, thus emphasising lifelong learning.

**ASSESSMENT & LEARNING METHODS**

- Mini-CEX

## The Electrocardiogram: Standard ECG, Ambulatory ECG, Exercise ECG

**Objectives:** To select, perform and interpret each of the three non-invasive ECG techniques

### KNOWLEDGE

**Identify the indications and recognise the limitations of the following modalities**

#### ECG

- The physiology and anatomy of the conduction system.
- Cellular and molecular mechanisms involved in the electrical activity of the heart.
- Basic principles of ECG.
- Normal evolution of the electrical vectors during the cardiac cycle.
- Recognise the normal ECG, and explain how it is formed.
- ECG characteristics of atrial and ventricular hypertrophies, bundle branch blocks and other conduction blocks, tachycardias, bradycardias, acute and chronic myocardial ischemia, pericarditis and myocarditis, electrolyte abnormalities, preexcitation, QT abnormalities, pacemaker dysfunction.

#### Exercise ECG Testing

- Main indications, contraindications and limitations
- Evaluation of
  - ischemia
  - valvular diseases
  - hypertrophic cardiomyopathy
  - treatment response
  - functional capacity
  - inducible arrhythmias
- Criteria for stopping the testing
- Complications and their treatment

**SKILLS**

- Choose the appropriate techniques for specific clinical situations including a thorough understanding of the Bayesian approach.
- Choose techniques modalities and protocols in a clinical useful and cost effective way, avoiding over- and underutilisation of tests
- Appropriate selection of ECG techniques necessary for the patients' management.
- Explain to patients and their family the implications of the results of the electrocardiogram.
- Perform and interpret ECG, ambulatory ECGs/loop recorder ECGs and exercise ECG testing in the clinical context
- Identify the normal and abnormal ECG, in particular:
  - arrhythmias
  - bundle branch blocks
  - hypertrophy
  - acute and chronic ischemia
  - QT abnormalities
  - pericarditis
  - electrolyte abnormalities
  - pacemaker dysfunctions
- Integrate data from different electrocardiographic techniques, as well as from other non-invasive and invasive techniques.
- Recognise strengths and weaknesses of ambulatory ECGs/loop recorder ECGs in a clinical situation.
- Cooperate with interventional cardiologists, electrophysiologists, anaesthetists, cardiac surgeons, as well as with other doctors involved in emergency medicine and intensive care.
- Recognise that the diagnosis and treatment of some arrhythmias need sometimes a multidisciplinary approach.
- Manage complications in a proper and timely way.

**ASSESSMENT & LEARNING METHOD**

- Record of ECGs performed and interpreted in logbook:
  - ECG
  - Ambulatory ECGs/loop recorder ECGs
  - Exercise ECG testing
- DOPs
  - Stress Test
  - Ambulatory ECGs
- In-house ECG's

## Non Invasive Imaging – Echocardiography, CMR, Cardiac CT and Nuclear Techniques

**Objectives:** Appropriately select from the four imaging modalities of:

- Echocardiography;
- Cardiac Magnetic Resonance (CMR)
- Computed Tomography (CT)
- Nuclear Techniques

and then integrate the results into individual patient care.

### KNOWLEDGE

- Knowledge of indications and interpretation of ultrasound measurements for cardiac structure and function.

#### Echocardiography Techniques

- M-mode
- 2-dimensional (2D) mode
- Doppler imaging (blood flow and tissue)
- Contrast echocardiography
- Indications:
  - Evaluation of systolic and diastolic function (including ejection fraction) of the left ventricle
  - Regional wall motion abnormalities
  - LV mass
  - Chamber volumes and wall dimensions
  - Cardiomyopathies
  - Valvular morphology and function, including stenosis and regurgitation
  - Right ventricular function
  - Shunt lesions
  - Pericardial masses (tumors, thrombi, vegetations)
  - Congenital heart disease
  - Aortic disease
- Modalities
  - Transthoracic echo
  - Stress test
  - Contrast echocardiography
  - 3D echocardiography

#### Cardiovascular Magnetic Resonance (CMR) Techniques

- 2D mode
- Perfusion imaging
- Late enhancement
- Indication
  - Volumes
  - Ejection fraction
  - LV mass
  - Shunt
- Modalities
  - Cine-MR
  - MR angiography
  - T1 imaging

**Cardiac Computed Tomography Techniques**

- 2D
- 3D
- Indications
  - Calcium score
  - Coronary Artery Disease (CAD) (including grafts and stents)
- Modalities
  - Ultra-fast CT
  - Coronary angiogram

**Nuclear Imaging Techniques – Does this need to be further reduced?**

- Planar angiography
- SPECT
- Gated SPECT
- Gated blood pool SPECT
- PET
- Tracers
- Thallium
- Technetium-labeled tracers
- Fluorodeoxyglucose
- Indications
  - Myocardial perfusion
  - Viability
  - RV and LV volumes
  - Ejection fraction
  - Diastolic function
  - Phase analysis for cardiac asynchronic
  - Shunt
- Modalities
  - Rest metabolism
  - Stress protocols (exercise or pharmacological)
- Remain current with developments in the field of non-invasive imaging

**SKILLS**

- Appropriate selection of imaging techniques for specific clinical situations, including a thorough understanding of the Bayesian approach
- Choose imaging techniques, modalities and protocols in a clinically useful and cost effective way, avoiding over and under utilisation of tests, keeping in mind radiation exposure, where appropriate
- Integrate data from different noninvasive techniques as well as from invasive imaging
- Stress testing
- Cooperate with interventional cardiologists, electrophysiologists, anesthesiologists and other physicians involved in emergency medicine and intensive care, and with cardiac surgeons
- Explain to patients the implications of the results of the test
- Assess the side effects of contrast media and Recognise the risk of radiation to patient and personnel
- Recognise the risk of ionizing radiation for patient and personnel

**ASSESSMENT & LEARNING METHOD**

- ACLS
- DOPS:
  - Year 1 and 2: Transthoracic echo
  - Year 3 – 4 Transoesophageal echo
- Minimum of 6 months experience in an echo laboratory
- Document performance and interpretation of:
  - Transthoracic, transoesophageal and stress echocardiography
- ≥350 transthoracic echocardiograms
- Exposure to CT, CMR and nuclear sessions
  - Evaluate CT examinations in the clinical context (50 cases)
  - Evaluate cardiac nuclear examinations in the clinical context and with reference to other noninvasive and invasive approaches. (50 cases)
- CT, Nuclear to certify competence and knowledge
- Radiation Protection Course
- Study Day

## Invasive Imaging – Catheterisation and Angiography

**Objectives:** Coronary and left ventricular angiography: To be able to perform and interpret native coronary and surgical conduit angiograms and left ventricular angiograms

Cardiac catheterisation: To be able to perform and interpret right and left heart catheterisation.

### KNOWLEDGE

- Principles of fluoroscopic imaging, radiation physics and safety.
- Potential complications of cardiac catheterisation and angiography (including hypotension, heart failure, arrhythmias, ischemic neurologic damage, myocardial ischaemia, contrast reaction, cholesterol embolism, renal failure, vascular complications retroperitoneal bleeding, and cardiac tamponade).
- Radiological anatomy of the heart, aorta, large vessels and coronary arteries, as well as that of the femoral, radial and brachial arteries used for vascular access during catheterisation.
- Knowledge of catheterisation lab equipment (physiological monitoring, transducers, blood gas analysers, power injector).
- Pressure waveforms obtained during cardiac catheterisation.
- Routine collection of haemodynamic and oxymetric data, and how to calculate cardiac output, vascular resistances, valve areas, and AV shunts from measurements.
- Percutaneous and cut down techniques of catheterisation.
- Type of catheters used in coronary arteriography and cardiac catheterisation.
- Equipment and technique used of transeptal cardiac catheterisation, and its applications.
- When and how to perform cardiac pacing and pericardiocentesis, and the potential complications associated with its use.
- Basic principles and indications for intracoronary ultrasound, Doppler and pressure assessment.

### SKILLS

- Ordering, performing and interpreting invasive tests, by appropriately weighing up the risks and benefits of these procedures.
- Select the appropriate treatment modality (medical, percutaneous or surgical) based on the data generated by cardiac catheterisation, taking the clinical context into account.
- Obtain percutaneous arterial access (femoral, radial, brachial) and venous access and achieve haemostasis after catheterisation.
- Perform left heart catheterization including coronary angiography, ventriculography, and angiography of coronary bypass grafts
- Perform right heart catheterisation at the bedside including measurement of cardiac output, pressure measurement and oxymetry
- Proficiency in managing life-threatening arrhythmias and other emergency situations in the cath lab, including resuscitation and life support measures.
- Evaluate normal and pathological coronary angiograms. ventriculograms, aortograms, and pulmonary angiograms.
- Recognise the limitations and potential risk of invasive procedures and inform patients accordingly.
- Recognise the risks of ionizing radiation for the patient and clinical personnel.
- Consult and liaise with nurse and technician personnel and specialized physicians



**ASSESSMENT & LEARNING METHODS**

- DOPS
  - Year 5/6:
    - Transeptal cardiac catheterisation
    - Intracoronary ultrasound
- Documented experience:
  - Left heart catheterization including coronary angiography, ventriculography, and angiography of coronary bypass grafts
  - Right heart catheterisation at the bedside including measurement of cardiac output, pressure measurement and oxymetry
- Study Day

## Genetics

**Objectives:** To be able to perform general cardiological assessment and treatment of patients with inherited or familial cardiovascular disease.

### KNOWLEDGE

- Incidence and prevalence of inherited cardiovascular disorders in the local community.
- Knowledge of cardiac embryology and major gene families involved in cardiogenesis.
- Principles of Mendelian inheritance.
- Principles of polygenic cardiovascular diseases (such as hypertension, diabetes and dyslipidaemias)
- Knowledge of major monogenic cardiovascular diseases; hypertrophic cardiomyopathy, familial aortopathies such as the Marfan syndrome, Ehlers Danlos syndrome, and William's syndrome; familial dilated cardiomyopathies; familial channelopathies; familial disorders of septation; familial basis of conotruncal anomalies; trisomies in particular trisomy 21; familial dyslipidaemias in particular disorders of the low density lipoprotein receptor.
- Familial basis of inherited cardiac tumours

### SKILLS

- Evaluate relevant family history and construct a family pedigree.
- Distinguish autosomal dominant, autosomal recessive, X-linked, and mitochondrial patterns of inheritance.
- Develop a systematic method of approaching a family with a potentially inherited cardiovascular disease.
- Counsel index cases, family members at risk on the probability of being affected by a genetic cardiovascular disorder.
- Adopt appropriate counseling skills to explain, educate and inform patients fully of the nature of their disease, the diagnostic tests used to make a diagnosis and the inherent strengths and weaknesses of such diagnostic tests in individuals at risk.
- Recognise problems with pedigree interpretation such as incomplete penetrance, variable expressivity, and age related patterns of expressivity.
- Consult with clinical geneticists and medical professionals of other specialties on patients with genetic disorders

### ASSESSMENT & LEARNING METHODS

- Study day

## Clinical Pharmacology

**Objectives:** To master the theory and practice of state of the art pharmacological treatment of cardiovascular disorders

### KNOWLEDGE

- Classification and mode of action of drugs (with emphasis on angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers, aldosterone antagonists, renin inhibitors, antiarrhythmic drugs, betablockers, calcium antagonists, diuretics, lipid-lowering drugs, antiplatelet agents, anticoagulants, inotropes, digitalis, nitrates, other vasodilating drugs, drugs with cardiac toxicity and other drugs with novel mechanisms like potassium channel blockers)
- Recognise for the drugs listed above:
  - Pharmacokinetics (absorption, bioavailability, distribution, biotransformation, excretion)
  - Pharmacodynamics
  - Pharmacogenetics
  - Indications.
  - Contraindications
  - Interactions
  - Adverse effects and toxicity.
- Perform and interpret diagnostic tests to assess drug efficacy and safety (laboratory tests, ECG and haemodynamic monitoring, Echo).
- Knowledge of randomised clinical trials and evidence based medicine.

### SKILLS

- Take a relevant history of a patient's medication regime, including purchase of over the counter medicines. Identify and incorporate the importance of herbal remedies taken by patients.
- Assess the risks and benefits of prescribing an individualized drug treatment regimen for a given cardiovascular condition.
- Monitor the desired effects of a patient's drug therapy and also the side effects.
- Recognise and manage possible drug interactions (including treatments of concomitant diseases).
- Evaluate the design and results of published clinical trials.
- Incorporate the principles of evidence based therapy and current guidelines into clinical practice.
- Communicate with patients and their family members to improve treatment compliance, and to ensure early recognition of possible adverse effects.
- Consider cost-effectiveness and feasibility of the prescribed treatment regimen

### ASSESSMENT AND LEARNING METHODS

- Study Day

## Cardiovascular Disease Prevention – Risk Factors, Assessment and Management

**Objectives:** To assess and treat patients with risk factors for cardiovascular disease. Evaluate how different prevention methods work. Describe cardiovascular disease and risk factors in the local community. Contribute to the global efforts in reducing Cardiovascular morbidity and mortality by communicating the prevention message to the public. Approach risk prevention in a holistic way, understanding the potentiation of cardiovascular risk by clustering of risk factors. Diagnose and treat different forms of arterial hypertension. Assess cardiac and other endorgan complications in patients with arterial hypertension. Diagnose and treat cardiovascular complications in the diabetic patient, appreciating the continuum ranging from impaired fasting glucose to insulin dependent diabetes and its complications.

### KNOWLEDGE

- Epidemiology of cardiovascular disease in the local community: incidence, prevalence, survival
- Risk factors and describe distribution and frequency of high risk conditions in the local community
- Risk assessment in primary prevention, multifactorial risk interaction: risk scoring charts.
- Diet and nutrition in relation to cardiovascular risk management.
- Special treatment/prevention strategies for smoking, dyslipidaemia, diabetes mellitus, hypertension, physical inactivity, left ventricular hypertrophy (LVH), obesity, metabolic syndrome, psychosocial factors.
- Recognise that risk factors often cluster and require a comprehensive approach.
- Risk assessment in secondary prevention including drug therapy.
- Complications and consequences of specific risk factors.

### Hypertension

- Epidemiology aetiology and pathophysiology of Essential Hypertension.
- Complications and consequences of essential hypertension.
- Diagnosis and assessment of essential hypertension; - Blood pressure measurement, including ambulatory blood pressure monitoring
- Symptoms and signs of target organ damage
- Diagnostic procedures
- Management of essential hypertension.
- Secondary hypertension and recall its various causes
- Renovascular hypertension
- Bilateral renal parenchymal disease
- Hypertension induced by hormonal contraceptives and conjugated oestrogens
- Other forms of secondary hypertension.
- Cell biology of left ventricular hypertrophy

### Dyslipidemia

- Diagnoses and treatment of different forms of dyslipidemia.
- Cardiac and extra-cardiac complications of dyslipidemia.
- Epidemiology, aetiology and pathophysiology of dyslipidemia
- Complications and consequences of dyslipidemia
- Diagnosis, assessment and management of dyslipidemia.
- Cell biology of atherosclerosis.

**Diabetic heart disease**

- Diabetes Mellitus
- Role of diabetes in Coronary heart disease in the following areas
  - Epidemiology
  - Pathophysiology of cardiovascular complications
  - Role of risk factor intervention
  - screening for CAD in diabetics
  - screening for diabetes in CAD (oral glucose testing)
- Pathophysiology of diabetes and its non-cardiac and cardiac complications (CAD, diabetic cardiomyopathy, autonomic neuropathy and its cardiovascular affects).
- Treatments including diet, exercise, hypoglycaemic drugs and insulin
- Current thinking regarding the concept of the metabolic syndrome

**SKILLS**

- Evaluate CVD risk and assess global CVD risk at individual level (HeartSCORE).and population level (mortality, morbidity, disability)
- Evaluate the benefit of prevention at individual and population levels
- Appreciate the importance of risk factor management.
- Evaluate and manage risk factors appropriately and communicate their importance to patients, their families and the wider community.
- Appreciate variation in CVD risks across population, socioeconomic, gender, and racial groups.
- Through patient education, encourage a healthier lifestyle with specific emphasis on risk factors and maintenance of favourable risk profile over lifetime.
- Offer advice and support to family members with inherited CVD.
- Cooperate with other specialists such as dieticians, diabetologists and specialist nurses.
- Participate actively at CVD prevention programs (children, adults and elderly).
- Consider cost-effectiveness of the prescribed treatment regimen.
- Assess blood pressure using the correct methods for diagnosis and treatment control in hypertension, including ambulatory blood pressure monitoring.
- Advise patients on lifestyle management and treatment compliance.
- Advise patients on measuring their own blood pressure.
- Perform cost efficient screening for secondary hypertension.
- Select adequate treatment for lowering blood pressure to target values and prevent/treat end-organ damage.
- Select appropriate parameters in order to describe the risk profile in an individual patient with hypertension.
- Identify secondary organ damage (in particular cardiac, neurological, renal and atherosclerotic vascular disease) caused by hypertension.
- Manage multi-drug treatment regimes according to a patient's co-morbidities and possible side effects.
- Recognise that the diagnosis and treatment of hypertension need a multidisciplinary approach.
- Be able to motivate the patient to maintain long term compliance with antihypertensive therapy.
- Appreciate that hypertension itself is often under diagnosed and under -treated.
- Recognise the clustering of risk factors that include hypertension in order to formulate a holistic approach to patient management
- Assess dyslipidemia using the correct methods for diagnosis and therapeutic control.
- Advise patients on measuring their lipids.
- Select adequate treatment for lowering blood pressure to target values and prevent/treat its consequences
- Recognise that the diagnosis and treatment of dyslipidemia sometimes need a multidisciplinary approach.

- Be able to motivate the patient to maintain long-term compliance with antihypertensive lipid lowering therapy
- Recognise the clustering of risk factors that include dyslipidemia in order to formulate an integrated approach to patient management.
- Select appropriate parameters to describe the risk profile in an individual patient with dyslipidemia
- Identify other vascular areas affected by atherosclerotic vascular disease
- Manage multidrug treatment regimens according to a patient's comorbidities and possible side effects.
- Manage the prevention, diagnosis and treatment of diabetes and its associated cardiovascular complications.
- Actively participate in a multidisciplinary network of physicians and assistant medical personnel in order to treat patients with diabetes adequately according to disease state and complications.
- Be aware of the importance of recognising the continuum that extends from primary prevention to treatment of end organ damage.
- Appreciate the importance of treating asymptomatic patients in order to improve prognosis.
- Recognise the clustering of risk factors that include diabetes in order to formulate a holistic approach to patient management

#### **ASSESSMENT & LEARNING METHODS**

- Study Day

## Acute Coronary Syndrome (ACS)

**Objectives:** To be able to perform specialist assessment and treatment of patients with acute coronary syndromes including

- STEMI (ST segment elevation myocardial infarction)
- Non-STEMI
- Unstable angina

To understand indications, techniques, typical acute and long-term problems, limitations, complications, alternatives, and adjunctive pharmacotherapy of PCI

### KNOWLEDGE

- Pathophysiology of acute coronary syndromes; Myocardial ischaemia, Atherosclerosis of the epicardial coronary arteries, Events that precipitate ACS, Non-atheromatous CAD
- Dominant clinical features of ACS; Cardiac ischaemic chest pain, examination of CV system in ACS, Silent ischaemia and infarction
- Diagnostic process in unstable angina and non-ST elevation MI - analysis of symptoms and clinical differential diagnosis, 12-lead ECG, Laboratory studies, Imaging modalities
- Diagnostic procedures in AMI - analysis of symptoms and clinical differential diagnosis, 12-lead ECG, Laboratory studies, Imaging modalities
- Potential complications of AMI; Myocardial Ischemia, Arrhythmias and Mechanical complications
- Treatment options for AMI; Pre-hospital and early-hospital adjunctive pharmacological therapy, percutaneous coronary intervention (PCI), Coronary bypass grafting (CABG), early in-hospital.

### Percutaneous coronary intervention

- Mechanisms of action of main PCI techniques (balloon angioplasty, stent implantation, rotablation).
- Fundamental characteristics of balloons and stents, including typical lengths and diameters, antiproliferative drug coating.
- Problem of restenosis, acute and subacute stent thrombosis, and appropriately weigh risks and benefits of interventional techniques.
- Recognise the added risk from diabetes and renal impairment;
- Acute and chronic complications of PCI.
- Current differential indications for surgical and interventional revascularization as well as conservative treatment of CAD with respect to anatomy, extent of disease, role of left ventricular function both in the setting of ACS and of chronic CAD.
- Knowledge of adjuvant drug therapy, in particular anticoagulation regimes and platelet-inhibitors (aspirin, thienopyridines, glycoprotein IIb/IIIainhibitors).

**SKILLS**

- Appreciate the role of risk factors, the clinical characteristics of coronary occlusion, and subsequent clinical course.
- Interpret biochemical markers of myocardial damage.
- Interpret ECG and imaging techniques to detect and locate ischaemia and/or infarction.
- Understand the importance of monitoring patients with ACS.
- Provide appropriate pharmacological treatment including analgesic, antiplatelet, and antithrombotic and anti-ischaemic therapy.
- Understand indications and contraindications for acute reperfusion treatment and make appropriate decisions.
- Demonstrate proficiency in selecting cardiac catheterisation in the context of ACS.
- Demonstrate proficiency in treating patients with heart failure and cardiogenic shock, including invasive haemodynamic monitoring.
- Demonstrate knowledge of advanced CPR techniques and management of life threatening arrhythmias.
- Recognise the urgency of organised teamwork required for the optimal management of patients with ACS.
- Recognise the urgency of making rapid decisions regarding patients with ACS, from the time of their arrival in the emergency department until definitive therapy is established (for example minimising door-to-balloon/needle time).
- Appreciate the distress that unexpected and serious illness causes both to the patient and their relatives.
- Recognise when to transfer the patient to another hospital for interventional or surgical revascularisation.
- Contribute to improving public awareness of the significance of chest pain and encouraging early presentation.

**Percutaneous coronary intervention**

- To appropriately select ACS patients who are candidates for urgent angiography and PCI
- To appropriately select chronic CAD patients who are candidates for angiography and PCI.
- To adapt pharmacotherapy, especially anticoagulation and antiaggregatory medication, before and after PCI to clinical needs.
- To be responsive to potential hazards such as contrast nephropathy, arterial access complications (hematoma), drug compliance issues, drug resistance, non-cardiac diseases or interventions with bleeding risks while the patient is on thienopyridine and aspirin medication.
- Explain risk, benefits and alternatives in a compassionate way to the patient and be responsive to his fears and worries; take patient's wishes, co-morbidities and social situation into account when making medical decisions
- Interact and cooperate professionally with interventional cardiologists, heart surgeons, and supporting medical personnel

**ASSESSMENT & LEARNING METHODS**

- Study Day



## Chronic Ischaemic Heart Disease

**Objectives:** To be able to perform specialist assessment and treatment of patients with chronic Ischaemic Heart Disease (IHD).

To evaluate patients and interpret the results of diagnostic procedures.

To select and manage appropriate therapies

To be able to perform exercise or pharmacological stress testing alone, or in conjunction with, an imaging modality

### KNOWLEDGE

- Epidemiology of chronic IHD and its risk factors
- Molecular and cellular biology of IHD, its pathology and development, and the effects of ischaemia on the cardiac myocyte
- Describe events that precipitate a clinical angina attack
- Outline the prognosis of chronic IHD
- Clinical assessment of known or suspected chronic IHD, including evaluation of chest pain, other symptoms and signs, and diagnostic procedures
- Management of chronic IHD, including lifestyle measures, pharmacological management -
  - disease modifying drugs
  - symptom controlling drugs
- Explain the role and relative merits of medical therapy and revascularisation (percutaneous coronary intervention or coronary artery bypass surgery) in the patient with IHD

### Stress Testing

- Basic principles of coronary physiology
- Principles of exercise physiology
- Mechanisms of action of vasodilators and inotropic drugs used for stress testing
- Appreciating the indication of stress testing in other cardiac disorders (including valvular disease, arrhythmias and heart failure)

### SKILLS

- Risk stratify individual patients and to select an appropriate management strategy.
- Select, use and interpret non-invasive and invasive diagnostic tools for the evaluation of ischaemia, viability, left ventricular structure and function and coronary anatomy.
- Identify and treat risk factors for chronic IHD.
- Recognise the importance of risk factor management and secondary prevention.
- Consult with specialists such as interventional cardiologists, cardiac surgeons, dieticians and diabetologists in order to devise an appropriate management plan for individual patients
- Be able to interpret the ECG to detect ischaemia and/or arrhythmias
- Managing life-threatening arrhythmias, ischaemia, or other emergency situations, including ACLS, during the test
- Select the appropriate stress modality for a particular patient and interpret according to Bayesian principles taking into account specific strengths and weaknesses of a given test modality in a given patient (e.g., frequent false positive stress ECG in women)

### ASSESSMENT & LEARNING METHODS

- Study day

## Myocardial Disease

**Objectives:** To be able to perform specialist assessment and treatment of patients with cardiomyopathy, myocarditis and pericardial disease.

### KNOWLEDGE

- Epidemiology of dilated, hypertrophic, restrictive, infiltrative cardiomyopathies and obliterative endomyocardial disease
- Pathophysiology including genetics, clinical features and diagnostic criteria of cardiomyopathies
- Medical and invasive (surgical, electrophysiological and interventional) management of cardiomyopathies: indications, contraindications, possible adverse effects
- Prognostic factors

### Myocarditis

- Myocarditis and its aetiology
- Clinical features, pathology and diagnostic criteria of infective and non-infective myocarditis, in particular the typical features of different forms of myocarditis on magnetic resonance imaging
- Treatment of patients with myocarditis and its complications

### SKILLS

- Interpret diagnostic data (ECG, ambulatory ECG, Echo, exercise testing, chest X-ray, cardiac catheterisation, coronary angiography, magnetic resonance and radionuclide imaging, endomyocardial biopsy, genetic assessment)
- Select appropriate treatment and support modalities (medical, interventional, surgical, ICD/CRT, assist devices, balloon pumping or other treatment)
- Assess individual prognosis in relation to the need for transplantation.
- Evaluate patients for endomyocardial biopsy recognizing diagnostic yield and potential risk of this procedure.
- Establish cooperation with medical professionals in other specialties (immunology, bacteriology, genetics, cardiac surgery, interventional cardiology, imaging) for timely differential diagnosis of myocardial disease and further treatment
- Counsel patients with cardiomyopathies and their relatives about associated risks

### ASSESSMENT & LEARNING METHODS

- Study Day

## Pericardial Disease

**Objectives:** To be able to perform specialist assessment and treatment of patients with pericardial diseases

### KNOWLEDGE

- Classify and define
  - Acute pericarditis (infective, idiopathic or neoplastic)
  - Chronic pericarditis
  - Constrictive pericarditis
- Describe for each the epidemiology, pathophysiology, and aetiology (including infective, inflammatory and neoplastic disorders)
- Relevant investigations: noninvasive and invasive.
- Differential diagnosis of constrictive pericarditis from restrictive cardiomyopathy
- Management of pericarditis
- Related complications; pericardial effusion, cardiac tamponade and constriction

### SKILLS

- Demonstrates knowledge of the ECG abnormalities in acute pericarditis
- Select and use the different noninvasive imaging modalities: echo, CMR, CT as well as invasive pressure measurements to diagnose pericardial disease.
- Evaluate haemodynamic status;
- Determine the aetiology of pericardial effusion
- Clinically differentiate pericarditis from myocardial ischaemia.
- Assist in and ideally perform pericardiocentesis on appropriately selected patients
- Consider pericardial diseases within the differential diagnosis of a patient presenting with cardiovascular disease
- Be aware of the different diagnostic and therapeutic strategies required for each individual case
- To work closely with radiologists, cardiac surgeons and oncologists.

### ASSESSMENT & LEARNING METHODS

- Study Day

## Cardiac Tumours

**Objectives:** To be able to perform specialist assessment and treatment of patients with cardiac tumours

### KNOWLEDGE

**Given this is rare it is recommended that basic knowledge only is essential**

- Epidemiology, pathophysiology, pathology and clinical manifestations of primary cardiac tumours and metastatic cardiac tumours, including lymphoma
- Effect of tumour size and location
- Clinical features including
  - Impairment of cardiac function
  - Systemic manifestations
  - Systemic and pulmonary emboli
  - Signs of physical obstruction to blood flow (e.g. atrial myxoma)
  - Pericardial involvement-constriction and tamponade
- Appropriate diagnostic procedures
  - echocardiography, computed tomography, magnetic resonance imaging
- Operative management (tumour removal, heart transplantation, palliative management)

### SKILLS

- Select and use appropriate imaging modalities
- Consider a differential diagnosis of primary or secondary neoplastic involvement of the heart
- Recognise other cardiac masses including thrombi or vegetations
- Collaborate effectively with cardiovascular surgeons and with other specialists dealing with neoplastic disease
- Understand the importance of support and counselling for the patient and family

### ASSESSMENT & LEARNING METHODS

- Study Day

## Congenital Heart Disease in Adult Patients

**Objectives:** To be able to assess, manage and appropriately refer adult patients with congenital heart disease including those patients who have undergone previous cardiac surgery

### KNOWLEDGE

- Epidemiology, aetiology, prevention, pathophysiology, nomenclature, and foetal and transitional circulations
- Diagnosis and assessment
- Principles of management Identify pathology, diagnosis and management of specific conditions
  - Atrial septal defect
  - Atrioventricular septal defects
  - Double-outlet right ventricle
  - Complete transposition of the great arteries
  - Congenitally corrected transposition of the great arteries
  - Double outlet left ventricle
  - Common arterial trunk
  - Pulmonary atresia
  - Congenital malformations of coronary arteries
  - Congenital malformations of pulmonary arteries
  - Aortic arch anomalies
  - Arteriovenous malformations
  - Coarctation of the aorta
  - Tricuspid atresia
  - Ebstein's anomaly of the tricuspid valve
  - Abnormalities of the left atrioventricular junction
  - Tetralogy of Fallot
  - Pulmonary stenosis
  - Aortic stenosis
  - Patent ductus arteriosus
  - Anomalous pulmonary venous connections
  - Ventricular septal defects

### SKILLS

- Select imaging techniques and where appropriate use invasive procedures for diagnosis and treatment.
- Provide long term follow up, including patient monitoring and lifestyle advice.
- Understand the importance of referring patients for a specialist opinion.
- Appreciate the importance of genetic counselling.
- Appreciate the social and emotional difficulties encountered by adult patients with congenital heart disease

### ASSESSMENT & LEARNING METHODS

- Study Day

## Pregnancy and Heart Disease

**Objectives:** To be able to perform cardiac evaluation and treatment of women contemplating pregnancy.

To be able to perform cardiac follow-up of the pregnant patient with heart disease

To be able to perform specialist assessment and treatment of cardiac patients after pregnancy

### KNOWLEDGE

- For each of the listed objectives consider the following clinical conditions which may affect the pregnant woman: congenital heart disease, acquired valve disease, prosthetic valves, coronary artery disease, cardiomyopathies, arrhythmias, hypertension, Marfan's syndrome,
- Aortic dissection Define cardiac contraindications to pregnancy (or which justify early termination)
- Indications for genetic counselling for inheritable diseases
- Identify women who have a high risk of pregnancy-related cardiac complications and who may need intervention before considering pregnancy
- Outline cardiac follow-up of pregnant women
- Identify situations requiring medical therapy
- Outline treatment of arterial hypertension and its complications
- Identify situations in which cardiac intervention may be required
- Define the modalities of delivery
- Management of anticoagulation therapy
- Follow-up modalities during the post-partum period
- Diagnose and treat post-partum cardiomyopathy

**SKILLS**

- Perform clinical evaluation and interpret the results of diagnostic procedures to assess the cardiac risk of pregnancy
- Indicate preventive cardiac intervention if needed
- Recognise the importance of education for women with heart disease on the potential risks of pregnancy
- Co-operate with obstetricians and midwives to detect pregnant women with unknown heart disease and to identify those at high risk
- Perform clinical and non-invasive evaluation of the cardiac tolerance of pregnancy
- Select which drug therapies can be used during pregnancy
- Evaluate the foetal and maternal risk of different cardiac interventions
- Assess the foetal prognosis in association with Obstetrician/Paediatrician
- Recognise the importance of patient education on the symptoms of poor cardiac tolerance
- Educate obstetricians and midwives on symptoms of undiagnosed heart disease enabling the prompt identification of situations requiring rapid cardiac management
- Co-operate with obstetricians and anaesthesiologists to plan delivery (date, method, drug therapy, medical environment)
- Analyse cardiac condition after pregnancy
- Assess the cardiac risk of subsequent pregnancies
- Inform obstetricians and midwives on the risk of worsening of cardiac status during the early post-partum period
- Recall efficacy, risks, and contraindications to the various contraceptive methods according to type of heart disease
- Co-operate with gynaecologists and obstetricians with regard to recommendations on contraception

**ASSESSMENT & LEARNING METHODS**

- Study Day

## Valvular Heart Disease

**Objectives:** To be able to perform a specialist assessment and treatment of patients with the following valvular pathologies:

- Aortic stenosis
- Aortic regurgitation
- Mitral valve stenosis
- Mitral valve regurgitation
- Tricuspid stenosis
- Tricuspid regurgitation
- Pulmonary valve disease

To be able to perform follow up after valve surgery or percutaneous intervention, including immediate post-operative care and long term management of patients with prosthetic valves

### KNOWLEDGE

- Pathology and pathophysiology
- Natural history and progression.
- Strengths and limitations of diagnostic techniques, in particular echocardiography, and recognising the value of additional techniques such as magnetic resonance imaging or an invasive hemodynamics in cases of discrepant findings
- Indications, benefits, and risks of medical therapy, and surgical or percutaneous interventions
- Indications for and management of anticoagulation
- Role of concomitant coronary heart disease in valvular heart disease and its impact on surgical management
- Post operative care
- Postoperative pathophysiology
- Postoperative management of anticoagulants, diuretics and other drugs, prophylaxis against infective endocarditis, management of pregnancy and non-cardiac surgery in the patient with prosthetic valves

### SKILLS

- Select the appropriate use of invasive or non-invasive diagnostic techniques
- Interpret results of diagnostic procedures
- Be able to decide when to indicate surgery
- Co-operate with cardiovascular surgeons, interventional cardiologists, and radiologists
- Recognise importance of patient education, with respect to the natural history of valvular heart disease, management of anticoagulation, prophylaxis of bacterial endocarditis and choice of valve prosthesis when appropriate
- Convey to the patient the importance of monitoring of symptoms and signs of valvular heart disease and of periodic follow-up by the cardiologist
- Recognise and manage the complications which may occur in patients with prosthetic valves or after valvular interventions
- Co-operate with cardiac surgeons and anaesthetists
- Recognise the appropriate frequency of follow up with specific reference to the clinical condition following surgery or intervention.

### ASSESSMENT & LEARNING METHODS

- Study Day



## Infective Endocarditis

**Objectives:** Assess, diagnose and treat patients with infective endocarditis (of native and prosthetic valves as well as due to indwelling devices such as pacemakers and catheters)

### KNOWLEDGE

- Epidemiology, pathology, pathogenesis and microbiology of infective endocarditis
- Clinical features
- Laboratory investigations including microbiological results. Use of cardiac imaging and the importance of transoesophageal echocardiography to detect complications such as abscesses
- Selection and management of antibiotic therapy
- Role of valve surgery in patients with endocarditis
- Management of complications
- High-risk patients and situations
- Indications for antibiotic prophylaxis

### SKILLS

- Select the appropriate use of laboratory investigations and diagnostic procedures, in particular echocardiography
- Select appropriate antibiotic regimen
- Determine the need for, and timing of surgery
- Manage complications
- Prescribe appropriate antibiotic agents for prophylaxis
- Develop a multidisciplinary approach with cardiac surgeons, and microbiologists for diagnosis and management
- Recognise the importance of patient and physician education on prophylaxis

### ASSESSMENT & LEARNING METHODS

- Study Day

## Heart Failure (HF)

**Objectives:** To recognise the impact of heart failure on morbidity and mortality in the local and general population

To be able to recognise the different underlying causes of heart failure

To be able to perform specialist assessment and treatment of patients with heart failure

### KNOWLEDGE

- Epidemiology, pathophysiology and prognosis of heart failure
- Recognise complications
- International classifications of functional limitation ( for example NYHA classes)
- Diagnostic procedures in the patient with known or suspected HF including Natriuretic peptides, Echo, ECG, ambulatory ECG, stress testing, cardiac catheterisation
- Medical management of acute and chronic HF (neurohumoral blockade)
- Device management of HF: Cardiac Resynchronisation Therapy, ICD
- Role of cardiac surgery including transplantation
- Role of exercise training programs in HF patients
- Multidisciplinary care, including home based nursing in HF
- Complications of HFpatients
- Appropriate follow up of HF-patients
- Volemic status and the evaluation of renal function and electrolytes in HF patient
- Indications and contraindications for heart transplantation
- Follow up of patients following heart transplantation

### SKILLS

- Select and use diagnostic techniques to differentiate the underlying causes of HF
- Deliver lifestyle advice and home based treatment strategy to patients
- Risk stratify HF patients and select appropriate drug and other therapies (Implantable Cardiac Defibrillator (ICD), Cardiac Resynchronisation therapy (CRT), surgery)
- Evaluate HF patients during follow up and appropriately and continuously adjust the treatment plan.
- Emphasise the importance of lifestyle, exercise and weight loss. Help patients to understand the need for long-term complex drug therapy
- Appreciate the importance of rehabilitation
- Develop and sustain supportive relationships with patients with chronic heart failure
- Teach patients, relatives and special nurses in HF treatment.
- Recognise the advantages and limitations of specific heart failure therapies
- Explain, negotiate and overcome the barriers to compliance with heart failure treatments
- Recognise the importance of supportive and palliative care in the heart failure population

### ASSESSMENT & LEARNING METHODS

- Study Day

## Pulmonary Arterial Hypertension

**Objectives:** To be able to diagnose pulmonary arterial hypertension (PAH)

To be able to provide optimal management for patients with PAH

To be able to distinguish between the different causes of pulmonary hypertension

### KNOWLEDGE

- Pulmonary hypertension and its functional classification
- Epidemiology of PAH (incidence, prevalence, aetiology, genetics, high-risk groups)
- Pathology and pathophysiology of PAH
- Clinical features and diagnostic criteria of PAH
- Identify prognostic markers
- Management of PAH (medical, surgical and interventional including balloon atrial septostomy, indications, contraindications and possible adverse effects)

### SKILLS

- Recognise clinical signs suggestive of PAH
- Differentiate between pulmonary hypertension and other diseases with similar symptoms
- Perform and interpret accurate medical assessment (using laboratory analyses including arterial blood gases, cardiac biomarkers; 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 appropriate medical or invasive (surgical or 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;
- Effectively collaborate with other medical specialists (family medicine, thoracic surgery, invasive cardiology, imaging) for differential diagnosis of pulmonary hypertension and timely referral to surgical treatment
- Provide genetic counseling to families affected by familial PAH
- Maintain long-term involvement of patients and their family members in supportive activities for healthy life-style adherence and treatment compliance
- Appreciate the increased prevalence of PAH in other medical conditions, such as scleroderma
- Refer to Specialists in PAH when appropriate

### ASSESSMENT & LEARNING METHODS

- Study Day

## Rehabilitation and Exercise Physiology

**Objectives:** To be able to provide appropriate rehabilitation and secondary prevention services to patients with cardiovascular disease, specifically acute coronary syndromes, after revascularisation, with stable angina pectoris, patients with high cardiovascular risk, heart failure, diabetes, and others  
To be able to evaluate the cardiovascular risk and the exercise capacity of the patients  
To be able to evaluate “athletes heart” characteristics

### KNOWLEDGE

- Rehabilitation and secondary prevention as integrated components of cardiac care
- Target populations and risk stratification of patients
- Baseline assessment, exercise testing, exercise training, patient education, lifestyle intervention, risk factor management, psychosocial and vocational support
- Exercise and sports physiology, and benefits of exercise training, Recognise safety issues
- Psychological aspects of rehabilitation
- specific population challenges
- Describe programmes for specific populations in appropriate settings

### SKILLS

- Perform and interpret risk stratification, using and/or performing namely the CPX or the conventional exercise test, the echocardiogram or other tests as indicated
- Prescribe exercise programmes, in terms of mode, intensity, duration and progression, and other lifestyle interventions
- Prescribe cardiovascular preventive medications according to best practice guidelines
- Recognise “athlete’s heart” characteristics (ECG, echo) and use the ESC recommendation for eligibility.
- Recognise rehabilitation and secondary prevention as an integrated component of cardiac care
- Recognise the importance of rehabilitation and secondary prevention for professional (work), personal (including driving, travelling, leisure and sex) and social life among patients with heart disease
- Recognise the interplay of physical and psychological aspects of heart disease
- Recognise the importance of patients and partners/families education
- Recognise the role of other professionals including nurse specialists, physiotherapists, psychologists, dieticians and general practitioners in rehabilitation and secondary prevention
- Recognise the role of sports in Cardiology

### ASSESSMENT & LEARNING METHODS

- Study Day

## Arrhythmias

**Objectives:** To be able to assess and treat patients with arrhythmias

- **Electrophysiology:** To have a good understanding of diagnostic and therapeutic electrophysiology in relation to patients with arrhythmias
- **Pacing:** To be able to assess patients for pacing. Be able to pace patients independently and safely
- **Implantable Cardioverter Defibrillator:** (ICD) To be able to assess patients who require ICD implantation

### KNOWLEDGE

- Classification and definition:
  - Bradycardias
  - Tachycardias
    - Supraventricular arrhythmias
    - Ventricular arrhythmias
- Epidemiology, pathophysiology, genetics, diagnosis and clinical features of arrhythmias
- Prognosis including risk evaluation
- Principles of electrocardiography and electrophysiology and relevant findings in different arrhythmias, including high risk features in the resting ECG such as long QT, short QT, and Brugada syndrome
- Pharmacology of antiarrhythmic drug therapy
- Principles of invasive and device management of arrhythmias, including
  - catheter ablation
  - Pacemaker therapy (temporary and permanent)
  - ICD therapy
  - Surgical therapy

### SKILLS

- Be competent in cardio-pulmonary resuscitation
- Classify arrhythmias by standard electrocardiogram
- Manage acute arrhythmias with drugs and cardioversion
- Prescribe appropriate preventative pharmacological therapy
- Perform and interpret electrocardiographic monitoring.
- Interpret electrophysiological study
- Refer patients for catheter ablation and perform follow-up after catheter ablation
- Pacing & ICD
- Appropriately select and refer patients for biventricular pacing
- Manage the follow up of patients with pacemakers including interrogation and programming of the device
- Appreciate the anxiety suffered by patients with arrhythmias and with some methods of management, e.g. catheter ablation, pacing and ICD
- Appreciate the importance of coexisting structural heart diseases, including coronary artery disease in relation to the outcome and management of arrhythmias
- Appreciate the limitations and potential risks of anti-arrhythmic drug therapy
- Use history, examination and cardiac imaging to determine which patients require an ICD.

**ASSESSMENT & LEARNING METHODS**

- Study Day
- Document 50 cases
  - Insert temporary pacing electrodes
  - Implantation of permanent single chamber
  - Dual chamber pacemakers

## Atrial Fibrillation

**Objectives:** To be able to carry out specialist assessment and treatment of patients with Atrial Fibrillation (AF).

### KNOWLEDGE

- Epidemiology, prognosis, and pathophysiology of atrial fibrillation
- Classify atrial fibrillation
- 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

**SKILLS**

- Perform or interpret:
  - electrocardiogram
  - echocardiogram
  - transoesophageal echocardiography
  - prolonged ECG monitoring (e.g. Holter monitoring) - exercise testing

**Management**

- Develop appropriate anti-thrombotic strategies for prevention of ischemic stroke and systemic embolism
- Select patients appropriately for cardioversion and perform competently: pharmacological electrical
- Perform rhythm control therapy: pharmacological
- Perform rate control therapy: pharmacological
- Select and refer patients for
  - electrophysiological studies
  - atrial catheter ablation
  - surgical ablation
  - pacemaker and defibrillator implantation
  - AV junction ablation and pacing
- Appreciate the anxiety patients suffer with AF, particularly in case of certain 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 risks of antiarrhythmic drug therapy of AF
- Appreciate the importance of anticoagulant therapy
- Appreciate the palliative nature and potential adverse effects of nonpharmacological therapies
- Appreciate newer methods for treating Atrial Fibrillation and how to refer patients for specialist treatment when appropriate, such as percutaneous or surgical ablation.

**ASSESSMENT & LEARNING METHODS**

- Study Day



## Syncope

**Objectives:** To define syncope

To differentiate syncope from the other causes of loss of consciousness

To assess and treat of patients with syncope

### KNOWLEDGE

- Epidemiology and pathophysiology and prevalence of different causes of syncope
- Causes of loss of consciousness (e.g. Neurally-mediated reflex syncope, Stokes Adams attack, orthostatic hypotension)
- Prognosis
- Diagnostic evaluation
  - Strategy of evaluation
  - Initial evaluation (history, physical)
  - examination, baseline ECG)
  - Echocardiogram
  - Exercise stress testing
  - Tilt testing
  - Electrocardiographic monitoring (Long term ECG, external and implantable loop recorders)
  - Electrophysiological testing
- Treatments: device based or pharmacological for
  - Neurally-mediated (reflex) syncope
  - Orthostatic hypotension
  - Cardiac arrhythmias as primary cause
  - Structural cardiac or cardiopulmonary disease

### SKILLS

#### Diagnosis

- Perform or interpret:
  - electrocardiogram
  - echocardiogram
  - carotid sinus massage
  - tilt testing
  - electrocardiographic monitoring (Long term ECG, external and implantable loop recorder)
  - electrophysiological test
  - exercise stress testing
  - cardiac catheterization and coronary angiography
- Perform risk stratification

**Treatment**

- Select appropriate treatment:
  - Education and reassurance
  - Physical manoeuvres
  - Drug therapy
  - Device implantation
- Appreciate the impact of syncope on the patients' lifestyle
- Appreciate that syncope is a transient symptom and not a disease
- Consult with other specialists
- Recognise the diagnostic criteria for the causes of syncope
- Recognise appropriate investigations in the various subgroups of patients with syncope
- Recognise how patients with syncope should be risk stratified
- Appreciate how patients with syncope should be hospitalized.
- Recognise treatments that are likely to be effective in preventing syncopal recurrences

**Diagnosis**

- Appreciate that the diagnosis of syncope is often presumptive
- Appreciate that the diagnostic value (sensitivity and specificity) of tests for syncope is imperfect
- Appreciate that observations during the event are of key importance
- Appreciate that the diagnostic yield of the tests depends on their appropriateness of their selection (pretest probability)

**Therapy**

- Recognise that most patients do not need any specific treatment apart from education and reassurance
- Recognise that drug therapies are often ineffective
- Recognise the risk-benefit and the cost efficacy of pacemaker, ICD and catheter ablation therapy

**ASSESSMENT & LEARNING METHODS**

- Study Day

## Sudden Cardiac Death (SCD) and Resuscitation

**Objectives:** Sudden Cardiac Death: To manage patients with threatened or aborted SCD, including risk stratification, investigation and treatment

**Resuscitation:** To be able to carry out basic and advanced cardiac life support

### KNOWLEDGE

#### Sudden Cardiac Death

- Definition of SCD, epidemiology, aetiology, pathology, pathophysiology and clinical presentation of the different conditions which may lead to SCD
- Principles of acute management of patients with SCD
- Principles of diagnostic work up and risk stratification of survivors; in particular, Recognise ECG signs indicative of high SCD risk (e.g., long QT, short QT, Brugada syndrome etc.) and know how to further evaluate patients with these signs and their families
- Appropriate long term therapeutic options
- Current recommendations for secondary prevention of SCD (e.g., indications for preventive ICD implantation in patients with ischemic cardiomyopathy)
- Identify, risk stratify and manage individuals at elevated risk, including family members of SCD patients

#### Resuscitation

- Explain the methods and guidelines of basic and advanced life support including airway management, appropriate drug use, defibrillation and pacing

### SKILLS

#### Sudden Cardiac Death

- Perform resuscitation (see below)
- Interpret prodromal symptoms, underlying causes and prognosis of a SCD-Survivor
- Perform and interpret risk stratification using the following techniques (Holter-ECG, LV function, Echo, Cath, EP, heart rate variability)
- Follow up SCD-Survivors

#### Resuscitation

- Identify the cause of collapse
- Perform BLS (CPR) and ACLS including different skills.
- Lead and coordinate the actions of an ACLS-Team
- Teach basic life support (BLS)

#### Sudden Cardiac Death

- Recognise the urgency of the management of cardiac arrest,
- Recognise the importance of prodromal symptoms.
- Appreciate patient and family anxieties
- Appreciate the importance of patient education and secondary prevention
- Understand the medical, psychological, and social problems arising in patients with end-stage heart failure and frequent ICD activation

#### Resuscitation

- Appreciate the importance of working in a team with laypersons, paramedics and other medical personnel during resuscitation (BLS and ACLS).
- Understand the importance of regular audit of the basic and advanced life support programme

## **ASSESSMENT & LEARNING METHODS**

- Study Day
- ACLS

## Diseases of the Aorta and Trauma to the Aorta and Heart

**Objectives:** To be able to assess diseases of the Aorta, and trauma to the aorta and heart  
To be able to implement the appropriate medical, interventional or surgical treatment regime

### KNOWLEDGE

- Epidemiology, aetiology, pathology, genetics, pathophysiology and clinical presentation of aortic disease, aortic root disease, and trauma to the aorta and heart including:
  - Acute aortic syndromes:
  - Aortic dissection
  - Intramural haematoma
  - Traumatic aortic transection
  - Chronic aortic dissection
  - Aneurysm of the thoracic aorta
  - Aortic atheromatous disease
  - Aortitis
  - Trauma of the heart (including myocardial contusion)
- Strengths and limitations of different imaging modalities
- Appropriate medical, interventional or surgical management strategy

### SKILLS

- Choose, perform and interpret the appropriate imaging studies (transthoracic and transoesophageal echocardiography, magnetic resonance, computed tomography, ultrasound (surface and intravascular) and angiography of the aorta and of the heart to assess aortic disease and traumatic lesions
- Manage different aortic conditions with the appropriate treatment modality in a timely manner
- Cooperate with cardiovascular surgeons and interventional cardiologists as well as radiologists for diagnosis and treatment
- Recognise the potential urgency required in managing patients with diseases of the aorta and cardiac trauma
- Recognise and organize family screening where appropriate
- Recognise the need for and undertake long term follow-up of patients with chronic aortic disease

### ASSESSMENT & LEARNING METHODS

- Study Day

## Peripheral Arterial Vascular Disease

**Objectives:** To be able to assess and treat patients with peripheral arterial vascular disease

### KNOWLEDGE

- Epidemiology and pathology
- Diagnosis and assessment
- Medical and invasive (interventional and surgical) interventional management and their relative merit in different situations
- Prognosis
- Association of peripheral vascular disease with vascular disease in other territories in particular carotid and renal arteries
- Causes of acute limb ischaemia and the urgency of its management

### SKILLS

- Take a relevant history and perform an appropriate physical examination, especially the examination of peripheral pulses
- Identify the risk factors and select appropriately the management strategy keeping in mind that peripheral vascular disease is a manifestation of generalised atherosclerosis
- Select, use and interpret diagnostic tools appropriately including:
  - Ultrasound (duplex scanning and other Doppler modalities, including ankle brachial index)
  - MR angiography
  - CT angiography
  - Angiography
- Appreciate the systemic nature of atherosclerosis and its implication for a patient with disease manifested within a given territory
- Recognise the importance of risk factor modification in prevention.
- Encourage patients to adopt a healthier lifestyle with specific emphasis on risk factors
- Collaborate with specialists such as interventional cardiologists, radiologists, vascular surgeons and diabetologists.

### ASSESSMENT & LEARNING METHODS

- Study Day

## Thromboembolic Venous Disease

**Objective:** To be able to diagnose, treat and prevent:

- deep venous thrombosis
- pulmonary embolism

### KNOWLEDGE

- Epidemiology and risk factors for deep venous thrombosis in the clinical settings of: recovery from major surgery or trauma, prolonged immobility, oral contraceptive pill use, pregnancy and air travel
- Increased pulmonary vascular resistance and ventilation perfusion mismatch
- Clinical presentation of deep venous thrombosis and pulmonary embolism
- Diagnosis by:
  - Biomarkers: D-dimer and troponins
  - ECG
  - Echocardiography
  - Ultrasound and Doppler of leg and pelvis veins
  - MDCT
  - Ventilation-perfusion scan
  - MR-angiography
  - Pulmonary angiography
- Treatment: Heparins, Vitamin K antagonists, New anticoagulants, Thrombolysis, Embolectomy and fragmentation

### SKILLS

- Interpret ECG, echocardiography, spiral CT, ventilation-perfusion scanning signs of pulmonary hypertension or pulmonary thromboembolism
- Select appropriate therapy for acute pulmonary embolism
- Diagnose and manage acute and chronic deep venous thrombosis
- Decide upon the duration of anticoagulation therapy for patients with thromboembolic venous disease
- Appreciate the difficulties in diagnosing pulmonary embolism on the basis of symptoms and signs
- Collaborate with other imaging specialists including radiologists and nuclear imaging specialists
- Ensure patient understanding of the disease, the importance of compliance and appropriate precautions required during long term anticoagulant therapy
- Describe preventive measures: Compression stockings, heparins
- Describe management of chronic pulmonary hypertension, including thrombendarterectomy

### ASSESSMENT & LEARNING METHODS

- Study Day

## The Cardiac Consult

**Objectives:** Peri-operative cardiac consult for non-cardiac surgery

- To select appropriate preoperative imaging techniques from the following four imaging modalities for cardiac risk evaluation.
  - Resting/stress echocardiography
  - Resting/stress nuclear perfusion imaging
  - Cardiac computed tomography (CT)
  - Cardiovascular magnetic resonance (CMR)
- To integrate information regarding the estimated effects of surgical stress during operation.
- To integrate information on the long-term impact of cardiac disease on outcome in patients should they live long enough to enjoy the benefits of surgery.
- Cardiac consult in the patient with ischaemic neurologic symptoms:
  - Search for potential sources of cardiac embolism, and advise proper management
  - Search for other cardiovascular manifestations of atherosclerosis, in particular coronary heart disease and peripheral arterial disease, and advise proper management

### KNOWLEDGE

- Understand that preoperative tests should only be done if they will influence perioperative or long-term cardiac treatment and risk management, without delaying surgery if test results will not change management
- Imaging techniques to assess
  - Left ventricular ejection fraction at rest
  - Valve abnormalities (stenosis/insufficiency)
  - Calculation of valve stenosis gradient.
  - Estimation of valvular regurgitation fraction.
- Coronary artery disease, new wall motion abnormalities during stress. The severity, extent and ischemic heart rate threshold during stress testing.
- Intraoperative cardiac monitoring for volume and ischemia status.
- Non-invasive coronary angiogram
- Understand the mechanism, likelihood, and potential treatment options of cardiac and aortic sources of embolism
- Frequency of concomitant coronary and other arterial disease in the presence of ischemic neurologic disease
- Realize the frequency of cardiac symptoms, problems and considerations in other diseases, (e.g. pulmonary disease, connective tissue disorders) and be able to provide proper management advice



**SKILLS**

- Consider heart valve replacement in patients with severe stenosis prior to surgery.
- Consider coronary revascularization in selected patients with extensive stress induced ischemia prior to surgery.
- Consider immediate coronary revascularization in patients with intraoperative hemodynamic instability,
- ST-segment changes and new wall motion abnormalities.
- Communicate to patients the implications of the results of preoperative tests on perioperative management. Indicate the potential complications of delaying the index surgical procedure and the benefit of additional (invasive) cardiac therapy.
- Communicate with other specialties involved in perioperative care (anesthesiologist, surgeon, and intensivist) to individualize patient care.
- Recognise strengths and limitations of each imaging modality.
- Use echocardiography, including transoesophageal echocardiography, and other techniques to search for potential sources of embolism
- Propose a diagnostic work-up of the patient for other atherosclerotic manifestations, and devise proper therapy and risk management
- Appreciate that potential sources of embolism are frequently of low probability (in particular, patent foramen ovale) and commonly co-exist
- Understand the importance of diagnosing and treating co-existing cardiovascular atherosclerotic disease
- Anticipate cardiovascular problems accompanying primarily non-cardiac diseases
- Cooperate closely with other disciplines and offer prompt support for their needs and questions

**ASSESSMENT & LEARNING METHODS**

- Mini-CEX
- DOPS
- CBD

## Documentation of Minimum Requirements for Training

- These are the minimum number of cases you are asked to document as part of your training. It is recommended you seek opportunities to attain a higher level of exposure as part of your self-directed learning and development of expertise.
- You should expect the demands of your post to exceed the minimum required number of cases documented for training.
- If you are having difficulty meeting a particular requirement, please contact your specialty coordinator
- All General Internal Medicine requirements are completed in years 1 – 3 of training.

Curriculum Requirement	Required/ Desirable	Minimum Requirement	Reporting Period	Form Name
<b>Section 1 - Training Plan</b>				
<b>Personal Goals Plan</b> (Copy of agreed Training Plan for your current training year signed by both Trainee & Trainer)	Required	1	Training Post	Personal Goals Form
<b>On Call Rota Unselected Admissions for General Internal Medicine (Completed within the first 3 years)</b>				Clinical Activities
<b>GIM Year</b>	Required	480	Training Programme	
<b>Dual Specialty Years</b>	Required	480	Training Programme	
<b>Section 2 - Training Activities</b>				
<b>Outpatient Clinics</b>				Clinics
Cardiology (minimum 2 per week)	Required	80	Year of Training	
Sub-Specialty	Desirable	1	Year of Training	
<b>Ward Rounds/Consultations</b>				Clinical Activities
Consultant Led (minimum 1 per week)	Required	40	Year of Training	
SpR led (1 per week)	Required	40	Year of Training	
Consultations	Required	1	Year of Training	
<b>Emergencies/Complicated Cases</b>				Cases
(Diagnosis of nature of problem and its presentation, emergency case for investigation)	Required	1	Training Programme	
<b>Procedures/Practical Skills/Surgical Skills</b>				Procedures, Skills & DOPS

<b>Section 2 - Training Activities</b>				
Exercise ECGs (minimum supervise and analyse 100 per year)	Required	100	Year of Training	
Holter ECGs (minimum report on 100 per year)	Required	100	Year of Training	
Basic Echocardiography (minimum review 400)	Required	400	Training Programme	
Basic Echocardiography (minimum perform 200 over training period)	Required	200	Training Programme	
Basic Electrophysiology (minimum 15 EP studies during training)	Required	15	Training Programme	
Basic PTCA (minimum 100 cases during training)	Required	100	Training Programme	
Basic Cardiac Pacing (minimum 25 temporary implantations)	Required	25	Training Programme	
Basic Cardiac Pacing (minimum monitor 75 Permanent (including 25 dual) during training)	Required	75	Training Programme	
TOE Echocardiography (minimum 150 transoesophageal, 100 TOE performed and report during training)	Required	150	Training Programme	
Coronary Angiography (minimum 400 cases during training)	Required	400	Training Programme	
Right heart catheterisations (minimum 50 during training)	Required	50	Training Programme	
Defib and BiVent implants (minimum 30 during training)	Required	30	Training Programme	
Investigations of adult with congenital HD (Optional: include advanced imaging (TOE, MRI) in congenital HD)	Desirable		Training Programme	
Advanced Cardiac CT/MRI co read and report 50 each	Required	50	Training Programme	
<b>General Internal Medicine Procedures/Practical Skills/Surgical Skills</b>				Procedures, Skill & DOPS
BIPAP/CPAP	Required	10	Training Programme	
Emergency DC cardioversion	Required	10	Training Programme	
ECG interpretation	Required	50	Training Programme	
Joint aspiration	Required	4	Training Programme	
Lumbar puncture	Required	20	Training Programme	
Abdominal paracentesis – under ultrasound	Desirable	4	Training Programme	
Femoral venous line placement – under ultrasound	Desirable	1	Training Programme	
Pleural aspiration – under ultrasound	Desirable	4	Training Programme	

Intercostal drain Insertion – under ultrasound	Desirable	1	Training Programme	
<b>Additional/Special Experience Gained</b>	Desirable	1	Training Programme	Clinical Activities
<b>Relatively Unusual Cases</b>	Desirable	1	Training Programme	Cases
<b>Chronic Cases/Long term care</b>	Desirable	1	Training Programme	Cases
<b>ICU/CCU Cases</b>	Desirable	1	Training Programme	Cases
<b>Management Experience</b>	Desirable	1	Training Programme	Management Experience
<b>Section 3 - Educational Activities</b>				
<b>Mandatory Courses</b>				Teaching Attendance
ACSL	Required	1	Training Programme	
Delirium Recognition and Response (Online)	Required	1	Training Programme	
Ethics Foundations	Required	1	Training Programme	
Ethics for General Medicine	Required	1	Training Programme	
An Introduction to Health Research Methods	Required	1	Training Programme	
HST Leadership in Clinical Practice (Year 3+)	Required	1	Training Programme	
Mastering Communication (Year 1)	Required	1	Training Programme	
NIHSS Stroke Scale	Required	1	Training Programme	
Performing Audit (Year 1)	Required	1	Training Programme	
Radiation Protection Course	Required	1	Training Programme	
Wellness Matters	Required	1	Training Programme	
<b>Non – Mandatory Courses</b>	Desirable	1	Training Programme	Teaching Attendance
<b>Study Days</b>				
Years 1 - 3 For non-GIM Years: Minimum of 3 GIM study days per year: 2 'core' and 1 'non-core' and attend 3 Cardiology Study days per year	Required	6	Year of Training	Teaching Attendance
General Internal Medicine specialty year (Minimum of 6 GIM study days: 3 'core' and 3 'non-core')				
Years 4- 6 Attend 3 Cardiology Study days per year	Required	3	Year of Training	

<b>National/International meetings</b> (minimum 1 per year)	Required	1	Year of Training	Additional Professional Experience
<b>Participation at In-house activities</b> minimum of 1 per month from the categories below:				Attendance at hospital based learning
Grand Rounds (minimum of 1 per month)	Required	10	Year of Training	
Cardiology Meeting (average 1 per week)	Required	40	Year of Training	
Other (minimum of 1 per month from the categories below)				
Journal Club	Required	2	Year of Training	
Radiology Conferences	Required	2	Year of Training	
Pathology Conferences	Required	2	Year of Training	
Multidisciplinary Conferences or Meetings	Required	6	Year of Training	
Seminar	Required	2	Year of Training	
Lecture	Required	2	Year of Training	
<b>Examinations</b>				
<b>Specialty examination</b>	Desirable	1	Training Programme	Examinations
<b>Delivery of Teaching</b> minimum 1 formal teaching session per month from the categories below: Lecture Tutorial Bed side Teaching	Required	10	Year of Training	Delivery of Teaching
<b>Research Activities</b>	Desirable	1	Training Programme	Research Activities
<b>Audit Activities</b> (1 per year to either start or complete, Quality Improvement (QI) projects can be uploaded against audit)	Required	1	Year of Training	Audit & QI
<b>Publications</b>	Desirable	1	Year of Training	Additional Professional Experience
<b>Presentations</b>	Required	1	Year of Training	Additional Professional Experience
<b>National/International meetings</b> (minimum 1 per year)	Required	1	Year of Training	Additional Professional Experience
<b>Committee Attendance</b>	Desirable	1	Training Programme	Additional Professional Experience

<b>Additional Qualifications</b>	Desirable	1	Training Programme	Additional Professional Experience
<b>Section 4 - Assessments</b>				
<b>CBD</b>	Required	1	Year of Training	Case Based Discussion
<b>DOPS</b>				Procedures, Skills & DOPS
Stress Test	Required	1	Training Programme	
Ambulatory ECG	Required	1	Training Programme	
Transthoracic Echo	Required	1	Training Programme	
Transoesophageal Echo	Required	1	Training Programme	
Cardiac Catheterisation	Required	1	Training Programme	
<b>General Internal Medicine DOPS</b>				Procedures, Skills & DOPS
BIPAP/CPAP	Required	1	Training Programme	
Communication e.g. chairing care planning meeting for complex discharge, procedure consent	Required	1	Training Programme	
DC cardioversion	Required	1	Training Programme	
ECG interpretation	Required	1	Training Programme	
Joint aspiration	Required	1	Training Programme	
Lumbar puncture	Required	1	Training Programme	
Abdominal paracentesis under ultrasound	Desirable	1	Training Programme	
Femoral venous line placement under ultrasound	Desirable	1	Training Programme	
Pleural aspiration under ultrasound	Desirable	1	Training Programme	
<b>Mini-CEX (At least two Mini-CEX assessments)</b>	Required	2	Year of Training	Mini CEX
<b>Quarterly Assessments/End-of-Post Assessments</b>	Required	4	Year of Training	Quarterly Assessments/End-of-Post Assessments
<b>End of year evaluation</b>	Required	1	Year of Training	End of year evaluation