CURRICULUM

FOR ACUTE CARDIAC CARE SUBSPECIALTY TRAINING IN EUROPE

PREAMBLE:

TABLE OF CONTENTS:

PART 1

PART 2

PART 3

DETAILED DESCRIPTION

PREAMBLE:

Medical knowledge has expanded rapidly in the last decades, as have advances in cardiology. Not only new drugs have become available but also different diagnostic, interventional and therapeutic procedures have been developed. All of them have resulted in better patient treatment and improved outcomes.

Increasingly, patients and society in general are aware of medical progress and demand to be given state of the art therapies. Because, much of cardiology has become very technical and sub-specialised, specific training is needed to assure that the process of investigation and management is of the high standards required by both the medical profession and their patients. One of the particular fields in which these complexities are very apparent is acute cardiac care (ACC).

Since the early 1970s, ACC has been delivered in coronary care units that were initially developed to treat lethal arrhythmias in patients with acute myocardial infarction. Later on, the scope of therapies offered in these units has greatly expanded. In the last decade there has been an increase in the number of patients with severe cardiological conditions requiring ACC, many of whom are elderly, presenting with acute coronary syndromes, severe heart failure, rhythm disturbances or severe valvular dysfunction. Thus, coronary care units are required to treat not only patients with acute coronary syndromes, but a wide range of severe cardiac conditions. Currently, these areas are generally known as called intensive cardiac care units (ICCUs) to reflect this change in patient demographics. Appropriately trained cardiologists should remain involved in the management of complex cardiac problems that may be associated with multi-system organ dysfunction as they will be able to address not only the investigation and management of the underlying cardiological disease, but also

the effects of the interaction of other organ system dysfunction on the cardiovascular system. To disregard this responsibility is not in the best interests of our patients.

PART 1

1. INTRODUCTION

Patients with acute cardiac conditions (i.e. acute myocardial infarction, severe unstable coronary syndrome, acute myocarditis, decompensated heart failure, complex cardiac arrhythmias, etc.) require continuous monitoring with special medical and nursing care. Therefore, they are admitted to ICCUs, designed, equipped and staffed by specially trained nurses. Although the number of patients with acute cardiovascular disorders or severe cardiac co-morbidities requiring special treatment is increasing, there is to date no pan-European standardized and accepted training program for physicians in charge of the ICCU. This document proposes a program for training and credentialing needed to become an accredited ICCU physician.

2. RATIONALE

A physician in charge of the ICCU should be able to recognize and treat a wide variety of acute and chronic cardiac conditions leading to cardiac decompensation. In addition, such a physician should be able to investigate and manage resulting organ system failure, in addition to determining more long-term management following stabilization. ICCU physicians should be well acquainted with the diagnostic and therapeutic means available to the modern cardiologist including electrocardiography, echocardiography, nuclear cardiology, hemodynamic measurements and their interpretation, cardiac and coronary angiography, cardiac pharmacotherapy, and interventional cardiology. They should be familiar and fluent in the operation of the available equipment including monitoring (invasive and non-invasive), cardiac pacemakers, defibrillators, artificial respirators (invasive and non-invasive), renal replacement therapy and

mechanical cardiac support. A comprehensive knowledge of drugs to treat cardiac conditions but also associated conditions such as liver and renal dysfunction, infection, nutrition, sedation, and analgesia is also mandatory. To meet these requirements demands training in cardiology (all applicants must be fully certified cardiologists) with additional training in intensive care medicine are required.

3. AIMS/LEARNING OUTCOMES

The aims of the learning process detailed in this document are:

1.- To provide guidance on the training requirements for cardiologist in charge or working in the ICCU

2.- To delineate the core competencies and curriculum for such physicians (see Part 3)

3.- To define the techniques in which the ICCU cardiologist should be proficient

4.- To describe the minimum numbers of procedures that trainees must have done before applying for accreditation

5- To determine the need for recertification

The major expected outcome is to have appropriately trained cardiologists in the subspecialty of acute cardiac care that will offer state of the art treatment for patients with severe cardiac dysfunction. In order to have credibility, the proposed programme contained in this document will need to be accepted by all the National Societies in Europe. This will result in a more uniform treatment of critically ill cardiac patients all over Europe, reducing inequalities among countries and improving outcomes.

4. LEARNING OBJECTIVES

Cardiologists wishing to be trained appropriately to manage an ICCU applying for accreditation in ACC must achieve the following objectives in the following items during their learning process:

All the skills outlined in this Curriculum are greater than what is expected from a general cardiologists not working regularly in an ICCU.

The levels of competence required below follow the recommendations of the Core Curriculum for the General Cardiologist and are defined as follows:

Level I: Experience of selecting the appropriate diagnostic modality and interpreting the results or choosing and appropriate treatment. Does not include the performance of a technique

Level II: Practical experience, but not as an independent operator (the technique is performed under the guidance of a superior)

Level III: Able to independently perform a technique unaided.

- **ACUTE CORONARY SYNDROME (ACS)**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1.- A complete theoretical knowledge of the principles underlying this syndrome

2.- Application of the theoretical knowledge in the treatment of a minimum 300 patients or all patients with ACS admitted to an ICCU during 1-year residency/fellowship, (level III competence).

- **ACUTE HEART FAILURE (AHF)**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1.- A complete theoretical knowledge of the principles underlying this syndrome

2.- Application of the theoretical knowledge in the treatment of a minimum 100 patients with AHF and cardiogenic shock admitted to an ICCU (level III competence).

- **MYOCARDITIS**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1.- A complete theoretical knowledge of the principles underlying this syndrome

2.- Application of the theoretical knowledge in the treatment of a minimum 10 patients with myocarditis admitted to an ICCU (level III competence).

- **CARDIAC TAMPONADE**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1.- A complete theoretical knowledge of the principles underlying this syndrome

2.- Application of the theoretical knowledge in the treatment of a minimum 10 patients with cardiac tamponade admitted to an ICCU (level III competence).

- **ACUTE VALVE COMPLICATIONS (endocarditis, degenerative valve, artificial valves, chest trauma and AMI)**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1 - A complete theoretical knowledge of the principles underlying this syndrome

2 - Application of the theoretical knowledge in the treatment of a minimum 10 patients with severe acute valve disease admitted to an ICCU (level III competence).

- **DISEASES OF THE AORTA**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1 – A complete theoretical knowledge of the principles underlying this syndrome

2 - Application of the theoretical knowledge in the treatment of a minimum 2-5 patient with aneurysm or dissection of the aorta admitted to an ICCU (level III competence).

- **RESPIRATORY INSUFFICIENCY**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1.- A complete theoretical knowledge of the principles underlying this syndrome

2 - Application of the theoretical knowledge in the treatment of 50 patients in need of respiratory support, invasive or non-invasive and to perform 20 endotracheal intubations (level III competence)..

- **ARRHYTHMIAS**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1.- A complete theoretical knowledge of the principles underlying this syndrome

2.- Application of the theoretical knowledge in the treatment of a minimum 20 patients with ventricular tachycardia, 50 with supraventricular tachycardia, 20 patients with atrio-ventricular block admitted to an ICCU (level III competence).

- **PULMONARY EMBOLISM (PE) AND PRIMARY PULMONARY HYPERTENSION (PPH)**

To understand the pathophysiology, clinical presentation, investigation, differential diagnosis, treatment options, complications and secondary prevention measures. These objectives will be achieved by:

1.- A complete theoretical knowledge of the principles underlying this syndrome

2.- Application of the theoretical knowledge in the treatment of a minimum 10 patients with PE and 3 patients with PPH (level III competence).

It is expected that during the learning process, the trainee will do the following techniques at the level of competence requested:

• TECHNIQUE	• NUMBER	• LEVEL OF COMPETENCE
• Primary angioplasty	• 50	• II
• Right heart catheterization	• 20	• III
• Central venous line	• 20	• III
• Intraaortic balloon pump	• 10	• III
• Hemodiafiltration	• 10	• II
• Non-invasive	• 30	• III

ventilation		
• Endotracheal intubation	• 20	• III
• Mechanical ventilation	• 20	• III
• Pericardiocentesis	• 10	• III
• Temporary pacemaker implantation	• 50	• III
• CPR	• 50	• III
• Ventricular assistance devices	• 5	• I

From the above 12 skills listed, the applicant should comply with at least 10.

To achieve the above outlined goals, the trainee must be a fully trained cardiologist, who has worked full time in an ICCU of a Department of Cardiology for a total of at least 12 months and has been on call at least 1 night per week for at least three years. The following full-time training will be required: anaesthesiology 1 month, pulmonology 1 month, nephrology 1 month, and general ICU 3 months. A total of 6 months ICCU during general cardiology training, 6 month special training as junior attending physician and 6 months in the other listed specialties should be undertaken.

In order to ascertain that the trainee has fulfilled the above requirements they will be assessed by an examination, presentation of a log-book, and a certification of the hospital that must be also a certified training centre (see below).

5. TEACHING AND LEARNING METHODS

The trainee will assume appropriate responsibility in obtaining the theoretical knowledge outlined in the syllabus (see below). To do this, it is advisable to

use the Core Curriculum book of Cardiology from the ESC (CD, tutorials in the web page of the ESC) and other teaching materials from the different and relevant Working Groups of the ESC, especially those from the WG on ACC, and also from other textbooks. The trainee will therefore be required to engage in continuous, independent self-directed learning and self-assessment.

It is also recommended that other learning resources be used, such as:

- Ward rounds and supervised consultation in outpatient clinics
- Case presentations
- Bedside teaching
- Lectures, tutorials
- Seminars
- Simulations
- Web-based teaching
- Courses
- Journal clubs
- Annual meetings of Scientific Societies

6. ASSESSMENT METHODS

The Accreditation Committee (see below) is responsible for ensuring that the theoretical examination is based on the Curriculum and that the questions asked are relevant. Thus, to assess the proficiency in Acute Cardiac Care, several methods will be used to ensure that both the theoretical and practical skills have been mastered by the applicant. The trainees must therefore prove that they have undergone the appropriate training (listed above) in a Certified Unit under the guidance of an accredited staff. They will be asked to provide a log-book in which all procedures and patients taken care of have been listed and signed by the trainee's tutor. They will also provide a list of other educational activities in which they have actively participated, including: case presentations, lectures, case notes reviews, teaching ward rounds, journal clubs, and accredited national

and international meetings. This documentation should be provided before applying for the examination. Only trainees with an adequate CV will be allowed to sit the written examination. The examination will be in English.

Theoretical assessment

The theory examination will consist of 100 multiple-choice questions which will be based on the Syllabus (see part 3). The examination will be compiled by the Accreditation Committee and designed to be completed in two consecutive parts of 3 hours with an intermission of 1 hour in between. The examination will be marked by the examination team, and the pass mark set at 50%.

Candidates will be notified of the results by mail. The names of candidates will remain confidential. However, the WG on ACC reserves the right to publish lists of successful candidates. A period for appeals will be opened after the candidates have been notified of their results.

There is no limit on the number of times a candidate may sit the examination. Upon re-examination, it will not be necessary for documentation to be re-presented with the exception of the receipt for payment of the applicable fees.

Frequency

Examinations will be held annually during the ESC annual meeting and biannually during the WG on ACC meeting; this may subsequently be modified depending on the demand for the same. In the event there are insufficient candidates, the Accreditation Committee will be authorised to cancel an examination round.

6.1 ASSESSMENT ORGANIZATION

It is proposed to create the following Accreditation System structure:

- An Accreditation Committee

- The WG Nucleus
- Evaluation teams.

Accreditation Committee

Composition

The committee will be composed of 7 previously accredited WG members, one of these necessarily being a member of the WG Nucleus. One member will be nominated by the UEMS cardiology section. Other members will be appointed by the WG chairman

1. The first Accreditation Committee will be formed by 5 WG members with recognised prestige and merit. The members of this first committee will also be appointed by the WG chairman.

Initially, an automatic accreditation to founding fathers (ICCU directors at the date of October 2006) may be given. They will need to supply formal documents from hospital administration indicating that they hold a permanent formal position as head of ICCU. Those who do not apply within the first three years, should sit the examination and present the log-book.

Functions

The functions of the Accreditation Committee are:

- To announce and open the period for the presentation of applications for examination from both professionals and training centres, as well as the management of the same.
- Coordination of degree and diploma verification and audits to evaluate the merits of those professionals and centres applying for accreditation, as well as participation in carrying out the same when deemed necessary.

- Preparation and composition of theoretical examination exercises. Maintenance of a question database and practical cases for the composition of future examinations.
- Coordination and management of examination results.
- Offer and attend appeals from candidates regarding the evaluation of the merits they present or the results of the examination.
- Submit ratification of accreditation of those candidates who are considered suitable by virtue of the results obtained in examination to the WG Nucleus.
- Maintain a register of those who are accredited together with their merits and requisites accomplished.
- Maintain a register of activities and the activities of previous Accreditation Committees.
- Promote, plan and organise training courses in coordination with the WG Nucleus.
- Notify the WG Nucleus of any changes in the accreditation system which is deemed necessary to adapt to changes and evolution in Acute Cardiac Care.
- Implement any changes which are deemed necessary to adapt the accreditation system to changes and evolution in Acute Cardiac Care.
- Coordinate with the relevant bodies of other national or European accrediting entities, and if considered proper, those of non-European international standing.
- Take steps to publicise the accreditation system so it is known and can serve as a reference for third parties.
- Keep the WG Nucleus informed about the activities, status and changes of the accreditation system.

Meetings

- Frequency

  The Accreditation Committee will hold ordinary meetings at least twice a year. The Secretary to the Committee may call extraordinary meetings at the request of the Chairman of the WG when there are matters of sufficient urgency or importance to warrant the same.

- Attendance

  Accreditation Committee meetings will always be held with a quorum equal to half the members plus one.

Dependence

The Accreditation Committee will be appointed by and organically dependent on the WG Nucleus.

Elections

Designation for committee members will be held every three years, but not coinciding with elections for the WG Nucleus members. With the objective of guaranteeing a degree of continuity, no more than 4 members may be re-elected to the committee.

The WG Nucleus

The WG nucleus is formed by a Chairman, past-chairman, secretary, treasurer and other 8 members from different National Societies.

Duties

The fundamental duties of the WG Nucleus will be to ratify and legitimise the decisions taken by the Accreditation Committee and at all times to supervise and rectify any deviation which endangers the integrity of the system. These functions will fundamentally be as follows:

- Settle appeals where there is disagreement with decisions taken by the Accreditation Committee.
- Ratify and approve Accreditation of those candidates presented to this end by the Accreditation Committee.
- Ratify and approve any proposals for adaptation presented by the Accreditation Committee.
- Perform an annual review of the Accreditation System procedures and results, and present the report to the WG members and the ESC's Board of Directors.
- Ensure the integrity, impartiality and independence of the Accreditation Committee and System.

Teams and Evaluators

The Accreditation Committee will assign teams of evaluators to assist in the preparation of the examination and to audit merits presented by accreditation candidates.

Composition

These will be constituted by WG members who have previously been accredited *(initially by members with recognised prestige and merit)*.

Duties

Evaluators will have the following duties:

- Assist in preparing and carrying out the theoretical and practical examination.
- Assist in auditing the merits presented by accreditation candidates.
- Maintain the confidentiality of all data obtained.
- Maintain impartiality to satisfactorily perform evaluations.

Dependence

Evaluation teams will be selected directly by the Accreditation Committee and will also be dependent on the same.

Note: This composition is proposed as a minimum at the beginning of the activity. Subsequent circumstances will determine the necessities for change of duties and/or the incorporation of additional personnel.

PART 2

- **THE TRAINING PROGRAMME**

This training is available to board certified or country recognised cardiologists. A complete cardiologic background is necessary not only to master the technical aspects of the invasive techniques but also to recognise the indications, and the contraindications of different treatments for patients in need of acute cardiac care.

The trainee should be employed full-time over a minimum of 1 year period in one centre authorized to give this training, and participate fully and regularly in formal and informal training provided by the centre. This will be in addition to time spent in the ICCU as part of general cardiology fellowship training.

In addition, the trainee will be an on- call junior cardiologist responsible for the ICCU during the training period. The 1 year period will include at least 6 months as an ICCU attending physician, 3 months in a general intensive care unit, 1 month in intensive pulmonology unit, 1 month in nephrology and 1 month in anesthesia.

The requirements of the procedures that the trainee needs to perform are listed above (see Part 1, paragraph 4 LEARNING OBJECTIVES)

The trainee should keep a log book to register the patients he/she has taken care of, and invasive and non invasive diagnostic and therapeutic procedures used in each patient. The logbook will be verified by the supervisor.

In addition to the clinical activities and training, the trainee will be directly involved in the research activities of the institution. Further, the trainee should attend relevant national and international meetings during their training.

This training should be done in certified training centres for acute cardiac care and under the supervision of certified supervisors (see below)

- **ENTRY REQUIREMENTS FOR CARDIOLOGISTS**

Applicants for accreditation must meet each and every one of the following requisites:

1. Theoretical and practical training in the diagnosis and treatment of all types of cardiac pathologies and, especially, in cardiac catheterisation techniques, mechanical ventilation, renal replacement therapy and mechanical cardiac support, insertion of pacemakers and their possible complications, and echocardiographic techniques. (transthoracic and transesophageal)

   Hold a **Cardiology Specialist** qualification issued by a National Authority of Health or the European Union or, in the future, by the EUMS.

   Similarly, accreditation will be contemplated for those professionals who hold a Cardiology Specialist qualification issued by a foreign country, always provided that the same is homologated by an equivalent in Europe.

   Other non cardiologist physicians will be allowed to sit the theoretical examination and will be issued a certification of this examination but will not be accredited as an acute cardiac care cardiologist.

2. Theoretical and practical training in Acute Cardiac Care.
   Until the system is implemented and available to future professionals, it must be possible to recognise the training of those trained prior to the same. Thus training may be proven by the following two methods:
   i. Standard method. Full time training of at least one year (in addition to ICCU for Cardiology specialization training) in a centre which is recognised and accredited. Subspeciality training may take place at any time during training in cardiology as well as after its completion.
   ii. Exceptional method. Formal heads of CCU's accredited for training (valid for three years following the implementation of the system) may be awarded accreditation. All staff cardiologists working full time in an ICCU will be immediately recognized as fully trained in ACC
3. Theoretical and practical examinations in Acute Cardiac Care:
   Examination of clinical cases and theoretical questions prepared and coordinated by the Accreditation Committee.

Accreditation procedure

Professionals

Applications

The Accreditation Committee will announce the period for the submission of accreditation applications through diverse media (letter to all WG on ACC members, WG Web page and other means). Accreditation candidates must submit the following documentation within the aforementioned period:

- MD degree
- License to practice medicine
- Standard form completed with records and a recent photograph.

- Receipt showing payment of Accreditation fees
- *Curriculum vitae.*
- Certified photocopy of the Cardiology Specialist qualification issued by the National Authority of Health or the European Union.
- Original letter signed and stamped by the Director of the ICCU Accredited for Training, as well as the Head of the Cardiology Department/Service of the corresponding centre, certifying that the applicant has completed a full-time stay of at least one year in the unit detailing the activities undertaken, and the degree of competence attained.
- A log-book

After evaluation, the Accreditation Committee will send candidates a letter indicating the result of their application and setting a date and place for the examination. The Accreditation Committee has the right to investigate any applications.

- **REQUIREMENTS FOR TRAINING CENTRES AND TRAINING SUPERVISORS**

Training centres must be located in hospitals certified by the local authorities to train general cardiologists. The ICCU must be part of the Cardiology Department and directed by a cardiologist who has been accredited by the WG on ACC. The hospital may also have other intensive care units where the trainee may complete his/her training. Training centres must be able to offer minimum capacity for training which will be evaluated by the Accreditation Committee in accordance with the following recommendations:

- Patient care capacity:

Have a staff level which includes at least 2 professionals that hold ACC accreditation and that a minimum of 4 beds

- Research capacity:

Maintain a minimum level of scientific activity and interest in Acute Cardiac Care which is endorsed by the presentation of at least 3 Acute Cardiac Care related scientific communications to recognised speciality congresses during the previous three 3 years (ESC, American Heart Association, American College of Cardiology and European National annual congresses) and the publication of at least one scientific article related to ACC in a journal with an objective 'impact factor' during the previous 3 years.

It is expected that the training supervisor is an accredited cardiologist in ACC and the director of the hospital's ICCU. Those centres that comply with all the above-mentioned requisites, with the exception of accreditation of their professionals may apply for accreditation for training imparted during the 3 years prior to the implementation of the Accreditation System provided that these obtain accreditation as professionals during the first three years following implementation of the Accreditation System. The training supervisor will supervise training during the whole period and ensure that the trainee becomes fully competent in the subjects and techniques specified in this document. The supervisor should certify the learning skills of the trainee at the end of the training period

Application of Training Centres

The Accreditation Committee will announce the period for the submission of accreditation applications through diverse media (letter to all WG on ACC

members, WG Web page and other means). Accreditation candidates must submit the following documentation within the aforementioned period:

- Standard form.
- Receipt showing payment of Accreditation fees (audit and evaluation).
- Report on the ICCU detailing all the merits for patient care, research and training performed the previous two years.
- If there are any doubts on the merits of the centre an audit must be done, the Accreditation Committee may delegate it to the National Working Groups on ACC which would act as team of evaluators under the support and expertise of the Accreditation Committee. For this purpose, candidates for accreditation by this method must attach a standard signed letter of authorisation agreeing to facilitate and cooperate with the eventual audit.

After evaluating the applications, checking the documentation and performing appropriate investigations where indicated, the Accreditation Committee will notify candidates about the result of their application by letter.

Frequency

Accreditation rounds for Training Centres will coincide with those for accrediting professionals.

- **ADVANCED TRAINING**

Candidates may wish to undertake a second year of training, with the aim of extending their skills in more specialised techniques.

Recertification

Professionals and centres must recertify their accreditation at least every 5 years or whenever there is any substantial change in their structure or operation, the latter case may result in the centre requiring recertification by the Accreditation Committee

- **FUNDING**

The Accreditation System therefore requires a solid organisational base and this implies structural and personnel costs. Therefore, accreditation fees that cover procedural costs should be established. The costs must include: Travelling fees for Accreditation Committee members and examination teams; also, stationary and correspondence, printing exams and diplomas and other expenses.

Fees for individuals and training centres must also be defined.

PART 3

2. SYLLABUS

Cardiologists applying for accreditation on Acute Cardiac Care must be fully trained. Therefore, the following syllabus provided below focuses on very specific problems encountered in the everyday care in an intensive coronary care unit. Other basic cardiologic knowledge is considered a given.

1.- MYOCARDIAL INFARCTION AND ACS

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with: • **STEACS** • **NSTEACS** • **Unstable angina**	- Identify clinical characteristics, ECG changes and laboratory results that are diagnostic of acute myocardial	- Analyse clinical, ECG and laboratory data to diagnose AMI	- Choose properly the best treatment strategies for each patient - Recognise complications as soon

	infarction (AMI). - Explain initial risk stratification for STEACS and NSTEACS and the utilization of the different risk scores - Describe the importance of time to treatment and the choices of reperfusion - Outline antithrombin and antiplatelet therapies and other pharmacological treatments: Indications and contraindications - Explain hemodynamic problems related to AMI (left ventricular failure and cardiogenic shock, right ventricular infarction, mechanical problems) - Describe associated arrhythmias (bradyarrhythmias, ventricular arrhythmias and supraventricular arrhythmias). - Outline risk	- Apply risk scores to stratify patients with ACS - Evaluate time delays and hospital setting to determine the best reperfusion option - Participate in primary angioplasty - Select the optimal pharmacological treatment - Discuss hemodynamic measurements and imaging findings -Interpret rhythm disturbances	as they appear - Participate in the treatment decision from the emergency room until discharge - Consult with other colleagues on specific matters (image, cardiac catheterization, surgery, electrophysiologists, etc…) - Inform the patient and family members of the prognosis and treatment decisions - Educates patient and family members on secondary prevention measures - Refers to ESC guidelines to choose the best evidence-based therapies

	stratification after AMI - Explain secondary prevention measures	- Evaluate short and long-term risk - Select the best secondary prevention strategies	

2.- ACUTE HEART FAILURE (AHF)

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with AHF secondary to: • **Myocardial disease** • **Hypertension** • **Valve disease** • **Pericardial disease** • **High output syndromes**	- Identify the maladaptative responses to heart failure. - Explain symptoms due to heart failure and physical examination findings - Describe diagnostic procedures to: confirm diagnosis, identify causes, prognosis and response to treatment - Outline diagnostic tests: chest X-ray, ECG, oxygen saturation, , general biochemistry and full blood count,	- Interpret clinical findings, chest X-ray, ECG and laboratory data to diagnose AHF - Analyse the causes of AHF in relationship with patients medical history -Interpret results of diagnostic tests to determine the best treatment options	- Choose properly the best treatment strategies for each patient - Recognise complications as soon as they appear - Participate in the treatment decision from the emergency room until discharge - Consult with other colleagues on specific matters (imaging, cardiac catheterization, surgical options, arrhythmia ablation, etc) - Inform the patient and family members

	natriuretic peptides imaging (echo, MRI), endomyocardial biopsy. - Identify the need for invasive hemodynamic monitoring - Describe the use of diuretic, vasodilators, and inotropes: Indications and contraindications - Explain when and how to use mechanical ventilation (invasive and non-invasive) - Describe associated arrhythmias - Outline ventricular support (IABP, ventricular assist devices), surgical treatment (CABG, valve replacement, heart transplantation) - Explain predictors of survival and outcomes	- Select the optimal noninvasive and invasive tests to obtain the appropriate diagnosis -Insert PAC or central venous line if necessary - Interpret hemodynamic (invasive and non-invasive) measurements and imaging findings Select the best drug treatment according to changes in patient condition - Apply invasive or non-invasive mechanical ventilation, when needed - Interpret and treat acute rhythm disturbances - Select the best ventricular support, when needed	of the prognosis and treatment decisions - Educate patient and family members on secondary prevention measures - Refer to ESC guidelines to choose the best evidence-based therapies

		-Insert IABP, if needed (level III); cooperate with surgeons with ventricular assistance devices - Evaluate short and long-term risk - Select the best secondary prevention strategies	

3.- MYOCARDITIS

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with myocarditis	- Describe the aetiology of acute myocarditis - Explain the pathology of viral, non-viral and non-infective myocarditis - Outline clinical features (fever, chest pain, acute heart failure, arrhythmias,…) - Identify diagnostic tests: chest X-ray, ECG, natriuretic peptides, general biochemistry and full	- Analyse the causes of myocarditis - Interpret clinical findings, chest X-ray, ECG and laboratory data to diagnose myocarditis	- Choose properly the best treatment strategies for each patient - Recognise complications as soon as they appear - Participate in the treatment decision from the emergency room until discharge - Consult with other colleagues on specific matters (imaging, cardiac catheterization, surgical options,

	blood count, imaging (echo, MRI), endomyocardial biopsy. - Describe the use of diuretic, vasodilators, inotropes and anthyarrhytmics drugs: Indications and contraindications - Outline the need for ventricular support (IABP, ventricular assist devices) heart transplantation) - Explain predictors of survival and outcomes	-Select the best drug treatment according to changes in patient condition - Interpret rhythm disturbances - Select the best ventricular support, when needed -Insert IABP, if needed (level III); cooperate with surgeons with ventricular assistance devices - Evaluate short and long-term risk - Select the best secondary prevention strategies	control of arrhythmia, etc) - Inform the patient and family members of the prognosis and treatment decisions - Educate patient and family members on secondary prevention measures - Refer to ESC guidelines to choose the best evidence-based therapies

4.- CARDIAC TAMPONADE

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and	- Describe the	- Analyse the causes	- Choose properly the

treat patients with cardiac tamponade	aetiology of cardiac tamponade - Explain the pathology of cardiac tamponade - Outline signs and symptoms of cardiac tamponade - Describe diagnostic tests: chest X-ray, ECG, general biochemistry and full blood count, and echocardiography - Indicate the need for pericadiocentesis (percutaneous or surgical) - Explain outcomes according to diagnosis	of cardiac tamponade - Interpret clinical findings, chest X-ray, ECG, echocardiographic findings and laboratory data to diagnose cardiac tamponade -Perform pericardiocentesis or refer patient to surgical drainage - Evaluate short and long-term risk	best treatment strategies for each patient - Recognise complications as soon as they appear - Participate in the treatment decision - Consult with other colleagues on specific matters (echocardiography, surgical option, oncologist) - Inform the patient and family members of the prognosis and treatment decisions - Refer to ESC guidelines to choose the best evidence-based therapies

5.- ENDOCARDITIS

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with endocarditis	- Identify bacteria, fungi and other microorganisms as the cause of endocarditis - Explain the	- Discuss the relationship between infection and cardiac disease - Analyse the cause of endocarditis in	- Choose properly the best treatment strategies for each patient - Recognise complications as soon

	pathophysiology of endocarditis (predisposing lesions, cardiac tissue destruction, anatomic location, immunologic process, embolisation) - Outline clinical findings (cardiac, systemic) - Describe diagnostic tests: general biochemistry, full blood count and inflammatory markers, chest X-ray, ECG, microbiology, echocardiography - Identify the use of antibiotics, medical and surgical treatment: Indications and contraindications - Explain predictors of survival and outcomes	relationship with patient's medical history - Interpret clinical findings. -Analyse chest X-ray, ECG, laboratory data and echocardiographic findings to diagnose endocarditis -Select the adequate antibiotic regimen and other medical treatment or surgical procedure - Evaluate short and long-term risk - Select the best secondary prevention strategies	as they appear - Participate in the treatment decision from admission until discharge - Consult with other colleagues on specific matters (imaging, surgical options, infectious disease specialist, microbiologist) - Inform the patient and family members of the prognosis and treatment decisions - Educate patient and family members on secondary prevention measures - Refer to ESC guidelines to choose the best evidence-based therapies

6.- DISEASES OF THE AORTA

OBJECTIVES	**KNOWLEDGE**	**SKILLS**	**ATTITUDES**
- To diagnose and treat patients with • **Aortic dissection/**	- Describe and classify aortic dissections /hematoma	- Discuss the relationship between dissection and previous medical	- Choose properly the best treatment strategies for each patient according to

hematoma	- Explain the aetiology of dissection /hematoma (intimal tear, hematoma, ulcer, involvement of the media, false lumen) - Outline clinical signs and symptoms (pain, syncope, emboli, pulses, murmurs) - Describe diagnostic tests: chest X-ray, transesophageal echocardiography, CT, MRI, angiography - Identify the use of medical and surgical treatment: Indications and contraindications - Explain predictors of survival and outcomes - Outline long-term treatment	history - Interpret clinical findings. - Analyse chest X-ray, and findings from imaging techniques - Select the adequate hypotensive regimen and surgical treatment - Evaluate short and long-term risk - Select the best secondary prevention strategies	presentation - Recognise complications as soon as they appear - Participate in the treatment decision from admission until discharge - Consult with other colleagues on specific matters (imaging, surgical options) - Inform the patient and family members of the prognosis and treatment decisions - Educate patient and family members on secondary prevention measures - Refer to ESC guidelines to choose the best evidence-based therapies

7.- TRAUMA TO THE HEART AND AORTA

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with • **Trauma to the aorta** • **Trauma to the heart**	- Describe incidence and causes of trauma to the aorta / heart - Explain the pathophysiology of different trauma	- Discuss the relationship between the type of accident and lessions	- Choose properly the best treatment strategies for each patient according to presentation - Recognise

	(deceleration, penetrating, blunt and electrical trauma. -Identify injured structures and location of rupture - Outline clinical signs and symptoms (pain, hypovolemia, tamponade…) - Describe diagnostic tests: chest X-ray, aortography, CT, echocardiography, myocardial enzymes - Explain the urgency of surgical repair and medical management of pain and other complications - Outline predictors of survival and outcomes	- Interpret clinical findings according to injury and clinical findings. - Analyse chest X-ray, and findings from imaging techniques - Select the adequate surgical treatment and other therapies to treat complications (heart failure, arrhythmias, pain..) - Evaluate short and long-term outcomes	complications as soon as they appear - Participate in the treatment decision from admission until discharge - Consult with other colleagues on specific matters (imaging, surgical options) - Inform the patient and family members of the prognosis and treatment decisions - Refer to ESC guidelines to choose the best evidence-based therapies

8.- ARRHYTHMIAS

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with • **Bradyarrhythmia** • **Atrial fibrillation** • **Supraventricular**	- Identify different rhythm disturbances on surface ECG - Explain symptoms due to bradycardia	- Interpret surface ECG and clinical findings - Analyse the causes of rhythm	- Choose properly the best treatment strategies for each patient - Recognise

tachychardia • **Ventricular tachycardia**	or tachycardia and physical examination findings - Describe diagnostic procedures: ECG, Holter, carotid sinus massage, tilt-test, invasive electrophysiology, exercise test, echo, MRI - Outline the use of drugs to treat rhythm disturbances and prevention of emboli - Explain indications for: cardiac pacing, external and internal defibrillation, cardioversion, catheter ablation, - Classify tachyarrhythmia by QRS width - Explain the use of imaging techniques to study size and function of cardiac chambers - Outline predictors of survival and outcomes in the different categories	disturbances in relationship with patient medical history -Interpret results of diagnostic tests to determine the best treatment options - Select the optimal treatment to end an arrhythmic episode (provisional pacemaker, cardioversion, defibrillation) - Implant a temporary pacemaker - Evaluate short and long-term risk - Select the best secondary prevention strategies	complications as soon as they appear - Participate in the treatment decision from the emergency room until discharge - Consult with other colleagues on specific matters (arrhythmia ablation, permanent pacemaker, ICD.. - Inform the patient and family members of the prognosis and treatment decisions - Educate patient and family members on secondary prevention measures - Refer to ESC guidelines to choose the best evidence-based therapies

9.- SUDDEN CARDIAC DEATH AND RESUSCITATION

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with • **Sudden cardiac death (SCD)**	- Identify causes of sudden cardiac death - Explain the pathology underlying SCD - Describe the pathophysiology (tachyarrhythmias, bradyarrhythmias, cardiac arrest) - Identify clinical characteristics (onset, survivors..) - Outline techniques of CPR - Identify legal and ethical issues of CPR - Describe use of cardioversion, pacemaker, drugs in advanced life support and resuscitation - Explain associated cardiac conditions leading to SCD - Outline therapies to prevent cardiac arrest (ICD, catheter or surgical ablation, CABG)	- Analyse SCD in relationship with patients medical history -Interpret rhythm recordings and circumstances previous to SCD - Select the best treatment to resuscitate the patient (perform endotracheal intubation, insert a temporary pacemaker, cardioversion, defibrillation) - Select the best treatment to resuscitate the patient: perform CPR, endotracheal intubation, insert a temporary pacemaker, cardioversion, defibrillation - Analyse the best drug treatment according to patients response	- Choose properly the best strategies for each patient - Recognise the need for termination of CPR or “do not resuscitate” orders - Participate actively in the CPR - Consult with other colleagues on specific matters (arrhythmia ablation, permanent pacemaker, ICD.. - Inform the family members of the prognosis and treatment decisions - Educate patient and family members on secondary prevention measures - Refer to ESC guidelines to choose the best evidence-based therapies

		- Interpret associated medical conditions that may have triggered cardiac arrest - Evaluate short and long-term risk - Select the best secondary prevention strategies	

10.- PULMONARY EMBOLISM

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with • **Pulmonary embolism (PE)**	- Identify incidence and risk factors of PE - Describe clinical characteristics (dyspnea, syncope, tachycardia, hypotension…) - Outline findings on ECG, blood markers (troponins, D-Dimer, BNP), chest X-ray, echo, CT angio - Explain differential diagnosis of acute PE - Describe use of Thrombolytics, embolectomy and other medical measures - Outline secondary prevention	- Analyse PE in relation to patients medical history -Interpret clinical signs and symptoms in patients with PE - Evaluate the results of laboratory and imaging in relation to PE - Select the best treatment for PE - Evaluate short and long-term risk - Select the best secondary prevention strategies	- Choose properly the best strategies for each patient - Participate actively in the diagnosis and treatment - Consult with other colleagues on specific matters (radiologists, surgeons) - Inform the patient and family members of the prognosis and treatment decisions - Educate patient and family members on secondary prevention measures - Refer to ESC guidelines to choose the best evidence-

			based therapies

11.- PULMONARY HYPERTENSION

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with • **Primary pulmonary hypertension (PPH)**	- Describe definition, classification and epidemiology of PPH - Identify the pathology of PPH - Outline clinical findings - Explain the value of blood tests, blood gases, chest X-ray, CT, MRI, cardiac catheterization, lung scan,… - Outline management: medical and surgical treatments. - Define prognosis	-Interpret clinical signs and symptoms in patients with PPH - Evaluate the results of laboratory and imaging in relation to PPH - Select the best treatment for PPH - Evaluate prognosis in relation to the response of management	- Choose properly the best strategies for each patient - Participate actively in the diagnosis and treatment - Consult with other colleagues on specific matters (radiologists, surgeons, pneumologists) - Inform the patient and family members of the prognosis and treatment decisions - Educate patient and family members disease management - Refer to ESC guidelines to choose the best evidence-based therapies

12.- Sepsis

OBJECTIVES	KNOWLEDGE	SKILLS	ATTITUDES
- To diagnose and treat patients with • **Sepsis**	- Describe definition, classification and epidemiology of sepsis - Characterize the pathology of sepsis - Summarize clinical findings - Explain the value of blood tests, blood gases, chest X-ray, abdomen X-ray, CT, ultrasonography, echocardiography, etc. - Review management: medical and surgical treatments. - Define prognosis	-Interpret clinical signs and symptoms in patients with sepsis - Evaluate the results of laboratory and imaging in relation to sepsis - Select the best treatment for sepsis (e.g. early goal directed therapy, early antibiotic therapy etc.) - Select the best treatment for sepsis:. early goal directed therapy, early antibiotic therapy etc. - Describe monitoring techniques - Adequate hemodynamic monitoring and interpretation of hemodynamic findings	