

1st Guidelines of the Brazilian Society of Cardiology on Processes and Skills for Education in Cardiology in Brazil - Executive Summary

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Abstract

This article summarizes the “1st Guidelines of the Brazilian Society of Cardiology on Processes and Skills for Education in Cardiology in Brazil,” which can be found in full at: <<http://publicacoes.cardiol.br/consenso/2011/diretriz-tec.asp>>. The guideline establishes the education time required in Internal Medicine and Cardiology with Specialization through theoretical and practical training. These requirements must be available at the center forming Specialists in Cardiology and the Cardiology contents.

Introduction

The Jury of Specialist in Cardiology (CJTEC) of the Brazilian Society of Cardiology (SBC), in order to standardize and provide higher quality education to cardiologists in Brazil, released in March 2011 the “1st Guidelines of the Brazilian Society of Cardiology on Processes and Skills for Education in Cardiology in Brazil,” which should guide the programs of specialization in Cardiology accredited by SBC.

Cardiovascular diseases are highly relevant and lethal¹, making it especially important to define skills in Cardiology. Advances in scientific methodology led to reduced mortality of patients with infarction of 15%-20% in the 1980s to around 7% -5% in current times²⁻⁴. In addition, evidence has shown that practices based on the reduction of surrogate outcomes may not reduce or even increase unfavorable clinical outcomes⁵. Medicine incorporates science and the scientific method with the art of being a doctor. However, without humanistic qualities, the application of modern science is suboptimal, ineffective or even iatrogenic. In Medicine, and in Cardiology in particular, the emphasis of the evaluation

Keywords

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process should focus on skills, going thus beyond knowledge⁶. Competence in medicine is the habitual and judicious use of communication, knowledge, identification of evidence, technical skills, clinical reasoning, emotions, values and reflection in daily practice for the benefit of individuals and the community it serves. It is a habit of constant learning throughout life. Competence is contextual, reflecting the relationship between individual skills and the tasks one must perform in real world situation⁷.

Process of education, centers of specialization and programs

After intense discussions in the CJTEC, in all departments of SBC and in two plenary sessions in the 65th SBC Congress in Belo Horizonte, Minas Gerais, in 2010, it was decided that SBC will require training programs to follow the guidelines of the Joint Expert Committee (tripartite committee formed by the Federal Council of Medicine (CFM), the Brazilian Medical Association (AMA) and the National Commission of Medical Residency (CNRM)), which sets out that the time for education in cardiology, both for the CNRM and for the AMB, includes the prerequisite of Internal Medicine⁸. Importantly, theoretical graduate course are solely intended to recycle and can have other purposes, but not enough to form cardiologists. Therefore, they are tacitly rejected by the CFM as education courses⁹⁻¹⁰. The rules for a cardiologist to undergo the test on Specialist in Cardiology, from 2015, are presented in Box 1.

To be certified or to renew their accreditation, programs must follow these guidelines, with the following schedule:

Prerequisite required from January 1, 2015

Two years of Specialization in Internal Medicine with a workload of 2,880 hours per year (60 hours per week, 48 weeks). A single exam may take place for a four-year program (two years in Internal Medicine and two years in Cardiology, provided that it is accredited by both societies) or separate exams for the prerequisite and Cardiology. Applicants to Specialization in Cardiology must demonstrate education in the pre-requisite of Internal Medicine through:

- Declaration of completion of medical residency accredited by CNRM or specialization at a center accredited by the Brazilian Society of Internal Medicine; or
- Title of Specialist in Internal Medicine awarded by AMB.

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Box 1 - Additional information for applicants to Specialist in Cardiology

- A) Applicants with Specialization in Clinical Cardiology completed **AFTER** December 31, 2014 at institutions **NOT ACCREDITED** by SBC or MEC can only take their TEC exam if they meet the requirement of 12 years of hospital activity in clinical cardiology.
- B) Applicants with Specialization in Clinical Cardiology completed **BEFORE** January 01, 2015 at institutions **NOT ACCREDITED** by SBC or MEC will be entitled to take their TEC exam at any time upon confirmation of completion of the two-year Clinical Cardiology course, according to the rules previously in force, combined with a similar medical residency program (both practical and theoretical).
- B) Applicants with Specialization in Clinical Cardiology started **BEFORE** January 1, 2015 at institutions **ACCREDITED** by SBC will be entitled to take their TEC exam at any time upon confirmation of completion of the two-year Clinical Cardiology course according to the rules previously in force.
- D) Candidates who enroll in programs of **SPECIALIZATION** in cardiology **FROM** 2015 will be required to produce documented confirmation of having completed a two-year Internal Medicine period to take the TEC exam. These applicants are only allowed to take the exam with evidence of Specialization in Internal Medicine accredited by SBCM and evidence of Specialization in Cardiology accredited by SBC.
- E) Applicants with training in **MEDICAL RESIDENCY** in Cardiology (four-year medical residency including Internal Medicine) accredited by CNRM will have their rights ensured and will be allowed to take the TEC exam at any time.

Cardiology

Minimum duration of 24 months, workload of 2,880 hours per year (60 hours per week, 48 weeks), including:

A — The program must have at least 10% and at most 20% of its workload exclusively devoted to theoretical activities: lectures, seminars, scientific meetings, discussions of journals (journal clubs or groups of study), sessions for discussion of complementary methods.

- We also suggest Specialization in basic clinical research and basic methodology, statistics and pedagogy (or communication skills) in order to provide doctors with critical and scientific insight and ease of communication.

B - The practical program, under supervision, should consist of:

- Unit of hospitalization for medical care to patients admitted to medical wards, emergency rooms, intensive care units;
- Outpatient unit, with at least one shift (morning or afternoon) of longitudinal follow-up clinic for patients over two years of training;
- Invasive and noninvasive diagnostic methods: minimum of 10% of Specialization activity.

C - Assessment of students enrolled in the specialization course: the institution may develop its own criteria, recommending transparency in the adoption of these criteria, which must contain, in addition to subjective "on duty"

evaluation, a self-assessment and scale of attitudes, and objective criteria as well as: written or practical tests. In addition, CJTEC-SBC will hold, on an annual basis, an evaluation of specialization students and residents in accredited programs, developed by SBC experts, targeting at practical experience and theoretical knowledge. These exams will be used to evaluate both the resident and the service in question, being one of the criteria for judging applications for reaccreditation.

Faculty

The supervisor/coordinator of the Specialization in Cardiology Program should have, in addition to the prerequisites of tutor, dedication of time of at least 12 hours per week in activities related to the program.

The programs must have a minimum ratio of one tutor per student. Prerequisites to be a tutor in Cardiology:

- Title of specialist in Cardiology;
- Take teaching commitments in activities such as visits, case discussions, discussions of exams, discussions of themes or other scientific activities that enable effective participation in training and assessment of students, and assessment of the program itself.

The Centers of Specialization should be centers of excellence, with minimum resources, including the minimum requirements shown in Box 2.

Box 2 - Minimum requirements to be demanded from education centers

- A** - Ward and outpatient clinic with adequate number of patients and records (average of five to eight patients in the ward under the assistance of each student and an average of outpatient care to five to ten patients per shift for each student);
- B** - Electrocardiography, exercise testing, echocardiography, Holter monitoring, chest radiography, hemodynamic laboratory with diagnostic techniques and percutaneous intervention. Training in nuclear cardiology, cardiovascular magnetic resonance imaging and computed tomography is recommended;
- C** - Evaluation of patients with pacemakers, resynchronizers and defibrillators (outpatient care unit specifically designed for implantable devices). Training in electrophysiology is recommended;
- D** - Intensive care unit and/or coronary care unit (two to eight patients with heart disease for each student) and emergency unit;
- E** - Cardiovascular Surgery with great activity (at least two heart surgeries per week), pre and postoperative service. Training in heart transplant is recommended;
- F** - Outpatient and hospital care for congenital heart defects;
- G** - Specialization in prevention, health promotion and rehabilitation;
- H** - Access to electronic libraries and reference books in internal medicine and cardiology;
- I** - When there is no basic requirement in the institution, this may establish an agreement with another institution, provided that it is also accredited by SBC.

Cardiology syllabus

Below we present specific aspects of the skills required from Cardiologists in Brazil. The syllabus specifies fields of knowledge in which cardiology students should be trained in order to develop such skills. Some of the items were adapted from international guidelines^{11,12} to the Brazilian reality.

The fundamental principles of **Bioethics**: autonomy, beneficence, nonmaleficence and social justice should guide the performance of cardiologists. The autonomy principle statement tells us that the doctor should make recommendations and the patient should take the final decision one he/she is properly informed. Having the well-being of the patient (beneficence) as a fundamental principle helps making decisions on ethical dilemmas: dedication to the patient should outweigh the interests of others or themselves, either bureaucratic, economic or political. The doctor does not work in a vacuum; instead, he is part of a complex health system and needs to engage in the rules and system improvements, therefore the concept of social justice is also critical⁵. He needs to develop health promotion, prevention, recovery and rehabilitation actions with a sense of social responsibility and commitment to citizenship, as a promoter of the health of human beings¹³. Appropriate professional relationship with their teams is paramount. Working with professionalism: integrity, reliability, teamwork, confidentiality of information and patient privacy, respect, empathy, dedication to the patient that outweighs their own interests¹⁴. Doctors should be sensitive and respectful to the patient's culture, beliefs¹⁵, age, sex and physical limitations. Doctors should know how to assist students and colleagues under training. Doctors should know how to redesign their own posture whenever required. They should develop the ability to listen and understand "difficult"¹⁶ patients (with problems of behavior and relationship), while establishing a relationship based on trust and sincerity. They should know how to exercise leadership when necessary by organizing the team in multidisciplinary care, such as in cardiac arrest. They should write reports and communications in an organized, complete and legible manner. They should record information, clinical data and conducts in a legible and organized manner.

They should be familiar with indications, contraindications, and preparation for procedures, necessary equipment, handling of biological material, minimizing risk and discomfort. Assist and clarify patients when obtaining informed consent and making decisions based on evidence, while respecting patients' individual preferences. Demonstrate clinical judgment capacity for medical decisions and planning of approaches and clinical follow-ups: ability to assimilate information from history taking and clinical examination and merge them into a rationale for a differential diagnosis hierarchy of priorities. Correctly interpret electrocardiogram tests and all complementary tests in cardiology.

It is important that the cardiologist understand the Bayesian logic for the diagnostic reasoning: estimate the probability of a diagnosis according to a pretest probability (which depends on the risk factors and clinical presentation) and accuracy of the tests requested. It is important that cardiologists understand their own limitations and know how to seek help from colleagues and literature. Requesting tests in an orderly manner based on findings and hypotheses is of essence. Demonstrate appropriate

reasoning in situations of ambiguity and uncertainty, ability to challenge the veracity of their own beliefs, while pursuing clarity, not blindly relying on diagnostic tests regardless of the clinical findings. Cardiologists should know how to review their approaches vis-à-vis new observations and information. A therapeutic plan should be developed. They should be aware of the side effects of prescription drugs and inform the patients in an understandable way. Cardiologists should be aware of the way to administrate drugs, drug interactions and their expected effects.

Cardiologists need to know how to seek updates and incorporate new information: they should know how to search information in the medical literature, including electronic databases. They should incorporate new information to the conventional approach by weighing the risks and benefits of new options of diagnosis and treatment in an organized manner based on analysis of the quality of evidence, methodology, clinical relevance, cost-effectiveness; they should know how to use information on absolute reduction of risk and number necessary; treat patients considering the outcome analyzed and the patient's individual preferences. Doctors should know how to follow the guidelines of medical organizations, recognizing their limitations and exceptions. Doctors should be aware of the advantages and disadvantages of different treatment options for the same situation. They should be committed to continuous development and professional excellence.

They need to know how to monitor and follow up patients at the hospital and at the outpatient care. Cardiologists should correctly identify patients who do not respond to treatment; medicines that no longer improve the quality of life; provide emotional support and quality of life to terminal patients¹⁷. They need to develop communication ability: educate patients about habits and lifestyle changes. Doctors should provide information to enhance adherence to treatment, with skill and without imposing a state of terror and fear. They should be able to inform serious situations to critical patients. Doctors should be able to communicate specific measures to be implemented or discontinued for terminal patients¹⁷. Some basic management skills are recommended: basics of administration of assistance, creating and interpreting quality indicators, developing improvement plans.

Regarding history taking, students must collect medical history in a logical and organized manner. Recognizing the practical differences of patients who should be in different environments: emergency room, doctor's surgery, inpatient unit, intensive care unit, and adapt patient's clinical history to the time available according to the patient's priority demands. Doctors should listen to the patient and use non-verbal techniques to obtain information, and demonstrate consideration and respect for the patient. Doctors should inquire and observe the emotional aspects of patient's experience while demonstrating flexibility based on the needs of such patient. They should be aware of the meaning of the words used by the patients to describe their symptoms — recognize the classical signs/symptoms of cardiovascular diseases —, and recognize that diseases do not always present classical signs/symptoms. Doctors should identify typical and atypical manifestations of cardiovascular diseases; recognize the risk factors for cardiovascular diseases; know the names and side effects of

the agents used by the patient; recognize symptoms and be acquainted with the treatment of comorbidities often associated with cardiovascular diseases; assess global cardiovascular risks. Behaviors and attitudes: doctors need to establish a relationship with the patient based on empathy and trust; provide the time required for the patients to express their symptoms in their own words; be able to ask specific questions at the end of the patient's spontaneous reporting; consider the importance of the relationship between comorbidities and social conditions with cardiovascular diseases.

As for **clinical examination**, the doctor should know how to perform thorough clinical examination, describing the physiological and pathophysiological findings for normal and abnormal findings. Doctors should complement the subjective findings of patient's medical history with objective findings from physical examination of the cardiovascular and other systems, searching for evidence of cardiovascular manifestations and associated diseases; examine the peripheral venous and arterial systems; examine the heart; know how to examine arterial pulses and their characteristics on different arteries (rate, rhythm, amplitude and hemodynamic profile); know how to measure blood pressure; be able to examine the venous system and, in particular, to estimate the right atrial pressure (jugular venous pressure); be able to examine precordial activity. Understand the physiology and pathophysiology of the cardiac cycle and thus understand how both normal and abnormal systolic and diastolic heart sounds are formed, and which maneuvers are necessary to listen to them better; understand the pathophysiology of clinical signs of fluid retention and low perfusion; understand the ankle-brachial index as a measure of the presence of peripheral arterial disease and cardiovascular prognosis; be able to make accurate assessment of the patient's clinical status, with particular emphasis on the cardiovascular system; be able to use the stethoscope and sphygmomanometer to evaluate the heart and blood vessels; be able to get an ankle-brachial index; examine the patient with respect for their dignity; continuously correlate the findings on physical examination with the subsequent findings on echocardiography and/or heart surgery, thereby emphasizing constant learning throughout life.

Regarding **complementary methods**, our purpose should be: to select, analyze and interpret each invasive and noninvasive technique. The necessary knowledge and skills are to be able to identify tests with normal results and the specific abnormalities of each complementary method. Doctor's behaviors and attitudes should focus on choosing techniques and protocols in a useful and cost-effective manner, thus avoiding over- and/or underutilized methods; integrating data from different forms of invasive and noninvasive techniques. Complementary tests are divided into **graphic methods**: electrocardiography, Holter, stress test, tilt test, Ambulatory Blood Pressure Monitoring (ABPM), Home Blood Pressure Monitoring (HBPM), **non-invasive imaging tests**: radiography, echocardiography, tomography, magnetic resonance imaging, nuclear medicine and **invasive imaging tests**: diagnostic catheterization, electrophysiology and catheter interventions.

As for **prevention and health promotion**, the purposes are to evaluate and treat patients with risk factors for cardiovascular disease; evaluate the action of the different methods of prevention; be acquainted with cardiovascular diseases and risk

factors in the local community; contribute to the global effort in reducing morbidity and mortality by raising people's awareness of prevention and control of risk factors; address prevention in a holistic way, considering the potentiation of cardiovascular risk by clustering of risk factors. The skills needed are epidemiology of cardiovascular diseases in the local community; risk factors describing the distribution and frequency of high-risk conditions in the local community; risk assessments: primary prevention, secondary prevention, multifactorial risk interaction, risk scores; provide diet and nutrition guidance in relation to cardiovascular risk approach; strategies for prevention and treatment of risk factors; recognize that the risk factors are generally associated and require a multidisciplinary approach; complications and consequences of specific risk factors. The skills required are: assess cardiovascular risk and benefits of prevention for the individual and the population; address the risk factors appropriately, communicate its importance to patients, their families and the community. The behaviors and attitudes expected from doctors involve considering the importance of addressing risk factors; considering the variation of cardiovascular risk factors according to the population, socioeconomic factors, gender and racial groups; encouraging the patient to adopt a healthy lifestyle, with specific emphasis on control of risk factors and maintaining a favorable risk profile throughout their life; providing support and advice to members of families with hereditary cardiovascular diseases; cooperating with the multidisciplinary team; actively participating in programs to prevent cardiovascular diseases; considering the cost-effectiveness of tests proposed and therapy prescribed.

Cardiac inter-consultation can be divided into consultation for preoperative evaluation for non-cardiac surgery, inter-consultation with neurology in patients with neurological ischemic symptoms or stroke, and cardiac inter-consultation with other specialties.

Consultation for preoperative evaluation for non-cardiac surgery aims to: correctly indicate additional preoperative assessment; integrate information regarding the estimated effects of surgical stress; assess cardiovascular risk and participate in decision-making regarding the benefit-risk of non-cardiac surgery (estimated survival, impact of cardiovascular disease versus benefits of non-cardiac disease). The knowledge needed to understand that the procedures indicated in preoperative cardiovascular workup should be performed as indicated by the cardiovascular disease rather than by virtue of non-cardiac surgery; preoperative tests should be made only if they result in a change in patient approach in the perioperative period and in the long term; correctly apply imaging techniques for preoperative assessment, as indicated. The skills required are: properly estimating cardiovascular risk and suggesting behaviors to decrease such risk. The behaviors and attitudes expected are informing the patients about the implications of the results of preoperative tests in the perioperative approach. Informing the potential risks of delayed non-cardiac surgery and the benefits of cardiac therapy/surgery; interacting with other specialists involved in perioperative care; recognizing the limitations of various imaging tests.

Inter-consultation with neurology in patients with neurological ischemic symptoms or stroke aims to search for potential sources of cardiac embolism and guide appropriate

approach; and search for other manifestations of atherosclerosis. The skills required are in atrial fibrillation; being familiar with the mechanism, likelihood and treatment options for cardiac embolism and aortic embolism; be alert to the frequency of coronary artery disease and other atherosclerotic vascular diseases in patients with ischemic neurological disease. The skills needed are being able to indicate transesophageal echocardiography in order to search for potential sources of embolism; propose a broader assessment of the patient for the investigation of other manifestations of atherosclerotic disease and advise treatment and risk approach. The behaviors and attitudes expected involve understanding the importance of diagnosis and treatment of coexisting cardiovascular diseases; and considering the potential sources of embolism.

Cardiac inter-consultation with other specialties aims to evaluate the frequency of cardiac symptoms, problems related to other diseases and provide proper follow-up and approach; learn the cardiovascular complications of chemotherapy and radiotherapy. The skills required involve being able to predict cardiovascular problems in cases of primarily non-cardiac diseases, chemotherapy and radiotherapy. Behaviors and attitudes involve cooperating with other specialists and health professionals to provide prompt support and patients' needs.

Box 3 presents topics that are explored in more detail in the full version of the guideline. In these topics, the

Box 3 - Specific subjects of knowledge in Cardiology

- Arrhythmias
- Cardiology in women
- Cardiomyopathies
- Cardiac surgery
- Diabetes mellitus
- Dyslipidemia
- Peripheral arterial disease
- Congenital heart disease
- Chronic ischemic heart disease
- Valvular heart disease
- Chagas Disease
- Pericardial disease
- Venous thromboembolism
- Cardiovascular disease in elderly patients
- Aorta diseases, aortic trauma and heart diseases
- Infective endocarditis
- Clinical Pharmacology
- Rheumatic fever
- Atrial fibrillation
- Genetics
- Hypertension
- Pulmonary arterial hypertension
- Heart failure
- Percutaneous coronary intervention
- Sudden death and resuscitation
- Rehabilitation and exercise physiology
- Syncope
- Acute coronary syndromes
- Smoking
- Cardiac tumors

Note: Each item has requirements for knowledge, skills and attitudes detailed in the full text of the Guideline.

specialist needs to have specific knowledge about each topic, and skills, attitudes and behaviors are targeted at each specific item and must be explored with maximum detail in order to adjust the most current knowledge to the clinical-cardiologic context of patients. It is noteworthy that these include issues in several areas, such as Clinical Cardiology, cardiovascular risk factors, specific subgroups such as women and the elderly, congenital diseases and surgical cardiology.

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