

Cardiologist Training through the Residency System: a Proposal of the Teaching Area of SAC

Formación del médico cardiólogo a través del sistema de residencia: una propuesta del Área de Docencia de la SAC

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ABSTRACT

Residency is an in-service training system, based on supervised and evaluated scheduled activities. A residency program to train cardiologists must necessarily meet some conditions: it should be inserted in a healthcare establishment duly authorized by a competent authority and have equipment and trained human resources interested in teaching. The program must be formalized in a written document specifying professional skills to be achieved, practical activities and evaluation instances. Likewise, the document should detail working/administrative conditions (workload, scholarship/salary, insurance and other rights and responsibilities).

Training in Cardiology requires four years: the first year dedicated to Internal Medicine with two months in Intensive Care, and three years in Cardiology. It must necessarily include an Advanced Cardiac Life Support (ACLS) course implemented according to the American Heart Association regulations.

The residency program structure is based on rotations in the various areas of the Cardiology service; the resident participates in Continuing Education activities developed in the service (forums, rounds, seminars). It must include formative and cumulative evaluations using tools as the mini-CEX, clinical case discussions (CCD) and direct observation of procedures (DOP), and in all cases a constructive feedback should be provided. It is recommended to complement service training with a postgraduate course so that a specialist degree is achieved at the end of the residency after having fulfilled all the instances of the evaluation process.

Key words: Internship and Residency - Competency-based Education - Educational Measurement

RESUMEN

La residencia es un sistema de entrenamiento en servicio que se basa en actividades programadas, supervisadas y evaluadas. Un programa de residencia para la formación de cardiólogos debe reunir necesariamente algunas condiciones: estar inserto en un establecimiento asistencial debidamente habilitado por autoridad competente y contar con equipamiento y recursos humanos capacitados e interesados en la docencia. El programa debe estar formalizado en un documento escrito en el que se detallen las competencias profesionales a lograr, las actividades y prácticas y las instancias de evaluación. Asimismo, en el documento se deben explicitar las condiciones administrativas/laborales (carga horaria, beca/salario, seguros y otros derechos y responsabilidades del residente).

La formación en Cardiología requiere cuatro años: el primero dedicado a Clínica Médica con dos meses en Cuidados Intensivos y tres años de Cardiología. Obligatoriamente debe incluir el curso de Reanimación Cardiopulmonar Avanzada (ACLS) implementado de acuerdo con las normas de la American Heart Association.

El programa de la residencia se estructura con base en las rotaciones por los distintos sectores del servicio; el residente participa en las actividades de Educación Continua que se desarrollan en el servicio (ateneos, pases, jornadas). Se deben incluir evaluaciones formativas y sumativas utilizando instrumentos como el mini-CEX, la discusión de casos clínicos (DCC) y la observación directa de procedimientos (ODP) y en todos los casos se debe realizar una devolución constructiva (feedback). Es recomendable articular la formación en servicio con un posgrado universitario de manera que al finalizar la residencia y habiendo cumplido todas las instancias de evaluación se alcance el título universitario de especialista.

Palabras clave: Internado y Residencia - Educación basada en competencias - Evaluación educacional

INTRODUCTION

Communicable (infectious) and deficiency diseases are no longer the leading cause of death and disability worldwide, and have given way to cardiovascular diseases, cancer and injuries from external causes (ac-

cidents, suicides, assaults, etc.). It is estimated that by 2020, 75% of all deaths worldwide will correspond to non-communicable diseases. This transition can be explained by population aging and by certain behaviors such as certain food, alcohol and tobacco con-

REV ARGENT CARDIOL 2015;83:237-241. <http://dx.doi.org/10.7775/rac.v83.i3.5803>

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sumption. Argentina, like other countries, bears this epidemiological transition presenting a double burden: communicable and non-communicable diseases.

Non-communicable diseases are ranked as the leading cause of the population morbidity and mortality and, for several years, have represented 60% of all deaths in Argentina. (1)

Cardiology is a medical specialty in the field of medicine, involving all ages, intended to Promote, Prevent, Diagnose, Treat and Rehabilitate the Circulatory System Disorders. (2) It should be noted that in the last 20 years the study of psychosocial factors as determining or conditioning cardiovascular "pathogenic" agents (3) has been reinforced, increasing the complexity of this specialty. (4)

In the year 2000, SAC published the Medical Education in Cardiology Consensus (5) which mentioned the activities to be fulfilled by a physician in order to complete the training as a specialist in cardiology. In 2012 the Teaching area established a working group that presented the document Reference Framework for Cardiologist Training. A draft was submitted to several professionals representing professional and academic associations (6) and the final version was presented at the National Human Resources and Occupational Health Department of the National Ministry of Health as a contribution of SAC to the National Evaluation and Accreditation System of Health Team Residencies. Currently, the Reference Framework is being discussed at the National Accreditation Department with representatives from different Argentine jurisdictions and professional associations and academic institutions.

This article was prepared as a summary of the document submitted to the Ministry and aims to present SAC's proposal concerning the organization of cardiology residencies.

Although there are different ways to obtain the specialist's certificate and advertise as such, (7-8) there is a certain consensus in the professional community regarding the medical residency system as the best strategy to train specialists. (9-10)

Medical residencies were formalized in 1960, when The State Department of Public Health adopted Resolution No. 1778 which defines residency as "a system of professional education for medical school graduates, with full-time in-service training during an established period of time, to prepare for the comprehensive, scientific, technical and social practice of the specialty".

Residency is a system of in-service training, based on monitored and evaluated activities, planned according to increasing complexity.

In this document a training proposal is presented, detailing the requirements to be complied by a cardiology service to become a residency center.

TERMS OF THE CARDIOLOGY SERVICE

The cardiology service, seat of a cardiology resi-

dency, must be situated in a healthcare establishment that:

- Is authorized by competent authority.
- Has a Teaching and Research Department/Committee.
- Is associated with an Ethics Committee.
- Has implemented central filing of clinical records.
- Has access to electronic databases and mechanism for information retrieval.
- Has 24-hour Laboratory and Radiology services.

The cardiology service, seat of a cardiology residency, must necessarily have a Basic Complexity and the following equipment:

- **General admission.** Eight beds at least. Blood pressure monitor; electrocardiograph; cardioverter defibrillator; oximeter; weighing scale.
- **Coronary Care Unit.** Six beds at least. Blood pressure monitor; electrocardiograph; cardioverter defibrillator; oximeter; weighing scale, infusion pumps, ventilator; ECG and hemodynamic monitors; Swan Ganz catheter; temporary pacemaker. In the Coronary/Intensive Care Unit, at least 80% of nursing staff should be professional (full secondary school and 3 years of professional training). (11)
- **Outpatient offices.** Blood pressure monitor; electrocardiograph; weighing scale.
- **Electrocardiography.** Noninvasive and arrhythmia electrophysiology (Holter - pacemaker control).
- **Echocardiography.** M-mode, two-dimensional and Doppler ultrasound devices.
- **Ergometry.**

In addition, the cardiology service must ensure resident training in various subspecialties and in High-Complexity cardiology. At the same institution or by agreement to perform external rotations, it should have:

- Interventional Cardiology.
- Cardiac Surgery.
- Invasive Electrophysiology.
- Nuclear Medicine.
- Pediatric Cardiology.

The cardiology service, seat of a cardiology residency, must have trained human resources interested in teaching to ensure an adequate environment for resident training, deliberation on medical practice and continuing supervision. The cardiology service professionals must be able to provide support for the stress generated in the first years of professional activity; they have to propose areas for the discussion of complex social and/or emotional situations both for the patients and the health team members.

The cardiology service, seat of a cardiology residency, must see to a wide number and variety of pathologies in different modalities of care: outpatient and in-hospital care. It should ensure monitoring during various procedures and practices in the differ-

ent scenarios: outpatient clinic, wards, medical shifts, coronary care unit, operating rooms, cath-lab, and noninvasive (echocardiography, nuclear medicine, CT, MRI) and invasive (electrophysiology) diagnostic laboratories.

The cardiology service, seat of a cardiology residency, should facilitate teamwork and promote the collaboration in research projects. Continuing Medical Education activities such as daily ward rounds, medical record audits and clinical and bibliographical seminars should be performed with the resident participating as another professional member of the service. Cultural and humanistic education and a space for reflection on medical practice should be emphasized, in order to contribute to a better professional performance.

The cardiology service, seat of a cardiology residency, must ensure adequate accommodations for residents (bedrooms with beds for days on duty, complete bathrooms and meals during working hours), and areas for the development of academic activities and study (classroom and meeting room, and computer information retrieval systems)

CARDIOLOGIST TRAINING

The residency program must be a written document detailing the skills to be achieved (expected results), the activities and practices and evaluation instances.

1. Focus based on competencies.

This approach emerged in the business world and in technical schools in order to promote coordination between training -in educational institutions- and the workplace. (12) In the last decades of the twentieth century this approach gained strength in higher education.

In 1996, the Royal College of Physicians and Surgeons of Canada defined the “can MEDS” physician competencies (13), which are common to all specialties. The competencies combine the knowledge, abilities, skills and values that physicians need in order to provide better patient care. (14)

- As an expert clinician, the cardiologist should be trained to:
 - Perform the diagnosis, evaluation and management of patients referred from primary care and/or other medical specialties.
 - Solve cardiovascular emergencies.
 - Assess cardiovascular risk in individuals and in the community.
- As a communicator, the cardiologist should establish effective communication with patients and their families, peers and colleagues.
- As a partner, the cardiologist should integrate teams, and be willing to perform interdisciplinary work.
- As a manager, the cardiologist should help in the organization and management of available resources.

- As a health promoter, the cardiologist should provide information on the prevention of cardiovascular diseases and promote healthy behaviors.
- As a permanent “student”/academic, the cardiologist should be willing to undergo self-assessment, participate in continuing education activities, assist in the training of new health professionals and participate in research projects.
- As a professional, the cardiologist should be committed with the patient’s well-being and the health of the community; with an ethical and responsible performance compliant with the current legislation.

2. Working organization.

Medical assistance and academic activities are the basis of the residency program. Both undertakings should keep a balance with a clear predominance of practice. (15)

Training in cardiology requires four years: the first devoted to training in Internal Medicine with two months in an Intensive Care Unit and three years in a Cardiology Service. It must necessarily include Advanced Cardiac Life Support (ACLS) implemented according to the rules of the American Heart Association.

2.1. Theoretical-practical training:

The residency program is built based on rotations through different areas of the service that generally correspond to diverse cardiologic studies and practices. In addition to rotations, the resident participates in clinical and bibliographic seminars and other continuing education activities developed in the service.

During the rotation, the resident can develop three levels of activities:

- a) Observes. Attends the performance of a procedure.
- b) Analyzes, interpret results. Discusses data from a diagnostic study, and is actively involved in the elaboration of the report.
- c) Performs the procedure, under supervision and/or as autonomous operator.

Each rotation should have specific objectives, responsible professional supervision and evaluation. In each rotation, the number of activities carried out by the resident corresponds to the different levels of desirable autonomy:

- Level I: *ability to select the appropriate diagnostic modality and interpret the results and properly choose the treatment assigned to each patient. This level does not include the performance of the procedures or technique. For example: radiofrequency ablation.*
- Level II: *ability to select the appropriate diagnostic modality and interpret the results and properly choose the treatment. The resident is able to perform the technique but not as an independent operator (assists or performs under supervision). For*

example: *transesophageal echocardiogram*.

- Level III: *ability to indicate, interpret and perform independently a technique or procedure. For example: ECG, Holter, ABPM, ECG monitoring, exercise testing, temporary pacemaker implantation, right heart catheterization.*

The rotation plan agreed with all the directors of residencies in cardiology associated to SAC sets the time/duration of each rotation and the number of practices that the resident must attend and/or perform to achieve the expected level of competence. (16)

2.2. Academic and university training

At present there are universities (17) which have implemented postgraduate degrees and Specialization Careers which articulate the training focused on practice (residencies) with an academic background (postgraduate courses).

SAC's experience with the Universidad de Buenos Aires (UBA) School of Medicine is an example of this modality, allowing residents at the end of 4 years of residency, and after having passed all the implemented levels of university evaluation, to achieve the title of university cardiologist. A similar pattern has been implemented by Universidad Austral. (18)

3. Evaluations of competencies.

The evaluation of resident performance is a key training element. (19-20) Daily and continuous monitoring of activities should be accompanied by systematic evaluations. Different and varied levels of assessment increase the consistency of the results and reduce personal biases. (21-22)

It is advisable to include at least the following levels of assessment.

3.1. Formative evaluation

Its purpose is to guide learning during the training period, to point out rights and wrongs and to propose improvement alternatives.

- a) An evaluation at the end of each rotation using direct observation of procedures (DOP) and clinical case discussion (CCD)
- b) A comprehensive/general performance assessment, three or four times a year, using an instrument like the mini-CEX (mini clinical evaluation exercise) to systematize observation and provide feedback. (23)

3.2. Cumulative evaluation. (24-25)

Its purpose is to verify the achievement of learning objectives, mastering the specialist competencies. It is suggested to implement theoretical-practical tests at the end of each year of residency and at the end of the residency. If expected goals or results are not achieved new learning opportunities should be established.

Competence and examination item descriptors should be discussed and approved by the teachers involved in

the evaluation instances. When Mini-CEX, CCD and/or DOP implementation is decided in a residency, it is essential that principals, teachers and heads of residents define learning objectives to be achieved in each year of residency in order to facilitate each resident's longitudinal evaluation.

4. Resources and conditions

- Residency Program Director (final responsibility). He/she can be the Head of Service or any staff clinical cardiologist appointed by the institution's Head of Service or Medical Director.
- A chief of residents every 12 cardiology residents. He/she coordinates the specific teaching and medical activities of the residents and organizes systematic training through classes, workshops, review of clinical records, bibliographic seminars and supervision of scientific works. This task can be shared with a Resident Instructor.
- A staff physician with teaching responsibilities every 4 residents. They must all credit teaching training and participation in congresses and meetings of the specialty.
- Three staff physicians with at least 30 hours per week dedication to resident training. The resident has 24-hour possibility of consulting a service-appointed physician (either staff and/or on duty).
- One hundred percent of these instructors actively participate in congresses and meetings of the specialty, and credit publications in local or international journals of the specialty.
- One hundred percent of staff physicians are certified/recertified cardiology specialists.
- Duly established labor relation of each resident.
- Paid training contract (training scholarship).
- Full-time dedication (at least 60 hours per week).
- Maximum two and minimum one weekly shift. *Resting regime after the shift.*
- Provision of medical uniform and lab coats. Meals. Adequate physical space.
- Social insurance and benefits (disease and maternity leaves, holidays, labor risk insurance)

CONCLUSIONS

The system of medical residencies is the best strategy to train cardiology specialists provided certain requirements concerning equipment and consultation load are fulfilled. The distinctive feature of this system is in-service training; a hands-on learning program with permanent supervision in charge of older residents and staff physicians committed to teaching is the key strategy for training.

In addition, as in any other training system, the residency must have a system of formative, formal and systematic training evaluation, allowing the resident to acknowledge his competencies or mistakes and organize his learning experiences. The cumulative, final evaluation works as a quality control and

has to guarantee the community the level of competence achieved by the professional who is going to act as a cardiologist.

The National Ministry of Health has implemented the National Evaluation and Accreditation System of Health Team Residencies, with the purpose of contributing to improve the specialists' training quality. It seems important to recommend the evaluation and accreditation of Cardiology Residency Programs by the National Human Resources and Occupational Health Department of the National Ministry of Health. (26)

Conflicts of interest

None declared.

(See author's conflicts of interest forms in the web / Supplementary Material)

REFERENCES

- Ministerio de Salud de la Nación. REMEDIAR. Curso Riesgo Cardiovascular Global. Unidad 1. Pág 16. CABA 2011.
- Gillebert TC, Brooks N, Fontes-Carvalho R, Frascos Z, Gueret P, Lopez-Sendon J, et al. ESC core curriculum for the general cardiologist (2013). *Eur Heart J* 2013;34:2381-411. <http://doi.org/2rj>
- Rosengren A, Hawken S, Ounpuu S, Sliwa K, Zubaid M, Almahmeed WA, et al; INTERHEART investigators. Association of psychosocial risk factors with risk of acute myocardial infarction in 11119 cases and 13648 controls from 52 countries (the INTERHEART study): case-control study. *Lancet* 2004;364:953-62. <http://doi.org/dmx3q2>
- Tajer C. El Corazón Enfermo. Puentes entre las Emociones y el Infarto. Buenos Aires: Libros del Zorzal; 2008.
- Trongé J, Iglesias R. Consenso de Educación Médica en Cardiología en la República Argentina. *Rev Argent Cardiol* 2000;68 (Supl V).
- La nómina de los profesionales que colaboraron en la revisión de la versión preliminar está disponible en <http://www.sac.org.ar/formacion-del-medico-cardiologo/>
- Ley N° 17.132: establece las normas para el Ejercicio de la Medicina, Odontología y Actividades de colaboración modificada por Ley N° 23.873. Decreto N° 10/2003: reglamenta los artículos 21 y 32 de la Ley N° 17.132.
- Atamañuk N, Galli A, Ahuad Guerrero RA, Roiter HG, De Mollein D, Grancelli H. Especialista en cardiología: diferentes caminos, ¿iguales resultados? *Rev Argent Cardiol* 2012;80:152-6.
- Buzzi A. Pasado, presente y futuro de las residencias médicas. Conferencia dictada en el Hospital Naval el 12 de diciembre de 2002. *Rev Asoc Med Argent* 2003;116:16-21.
- Ministerio de Salud. Dirección Nacional de Capital Humano y Salud Ocupacional. Residencias del Equipo de Salud Documento Marco / 2011.
- Ministerio de Sanidad y Política social de España. Informes, estudios, investigación 2010. Unidad de cuidados intensivos. Estándares y recomendaciones. Disponible en <http://www.msssi.gob.es/organizacion/sns/planCalidadSNS/docs/UCI.pdf>
- Varela M, Vives T, Hamui L, Fortoul van der Goes T. Educación basada en competencias. Buenos Aires: Editorial Médica Panamericana; 2011.
- <http://www.royalcollege.ca/portal/page/portal/rc/canmeds/framework>
- Una detallada descripción de las competencias del médico cardiólogo se encuentra disponible en <http://www.sac.org.ar/formacion-del-medico-cardiologo/>
- Ministerio de Salud de la Nación. Dirección Nacional de Capital Humano y Salud Ocupacional. Guía para la Elaboración de Marcos de Referencia de Residencias. Buenos Aires, 2010.
- El Plan de rotaciones y una detallada descripción de las actividades a desarrollar en cada una de las rotaciones se presentan en <http://www.sac.org.ar/formacion-del-medico-cardiologo/>
- Universidad de Buenos Aires. Resolución N° 4657 /abril 2005. Reglamentación de carrera de médico especialista.
- El programa del Curso Bial de Cardiología que se dicta en la SAC como parte de la Carrera Universitaria de Especialista en Cardiología se encuentran en www.sac.org.ar/formacion-del-medico-cardiologo
- Epstein RM, Hundert EM. Defining and assessing professional competence. *JAMA* 2002;287:226-35. <http://doi.org/cvb5v3>
- Alves de Lima A. Claves para la evaluación efectiva del residente. *Rev Hosp Ital B Aires* 2005;25:107-11.
- Durante Montiel M, Lozano Sánchez J, Martínez González A, Morales López S, Sánchez Mendiola M. Evaluación de competencias en ciencias de la salud. México: Editorial Médica Panamericana; 2012.
- Durante E. Algunos métodos de evaluación de las competencias: escalando la pirámide de Miller. *Rev Hosp Ital BAires* 2006;26:55-61.
- Una descripción de estos instrumentos-mini-cex, ODP y DCC- y un texto sobre feedback están disponibles en www.sac.org.ar/formacion-del-medico-cardiologo
- Schuwirth LW. How to write short cases for assessing problem-solving skills. *Med Teach* 1999;21:144-50. <http://doi.org/dxwpfz>
- Case SM, Swanson DB. Cómo elaborar preguntas para evaluaciones escritas en el área de ciencias básicas y clínicas. National Board of Medical Examiners. Disponible en <http://www.nbme.org/pdf/iwg-sp/iwg-spanish2006.pdf>
- <http://www.msal.gov.ar/residencias/index.php/la-acreditacion/sistema-nacional-de-acreditacion>