

First National Survey on Training in Interventional Cardio-Angiology in the Argentine Republic (ENFOCIRA I)

Primera Encuesta Nacional sobre Formación en Cardioangiología Intervencionista en la República Argentina (ENFOCIRA I)

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ABSTRACT

Introduction. Interventional cardiology is a medical specialty listed in the Argentine Ministry of Sanitation. In order to be licensed, a course including a theoretical and a practical part needs to be passed.

Objective: To evaluate the characteristics of practical training in interventional cardiology.

Methods. Retrospective, cross-sectional study of a voluntary anonymous survey on 3 characteristics of the doctors in training: demographics, training, and working conditions.

Results. The survey included 65 participants aged 34 years old (33-37), mostly males (94%), 80% from Argentina and most of them practicing in the City of Buenos Aires (55%) and the Province of Buenos Aires (20%). The trainees performed different endovascular interventions including coronary interventions (96%), arterial peripheral procedures (92%), and structural heart disease procedures (82%). Differences were seen in the learning curve and in the degree of independence among the trainees. Working conditions were not the right ones and 21% of the trainees never got paid. Eighty-five percent of them needed a second or third job to make it through the month. Only 34% had health insurance (only 39% had an occupational accident insurance and only 19% malpractice insurance).

Conclusion. In Argentina, interventional cardiology trainees undergo extensive training, have different learning curves, and lack proper working conditions.

Keywords: medical education, fellowships and scholarships, endovascular procedures.

RESUMEN

Introducción. La Cardioangiología Intervencionista es una subespecialidad médica reconocida por el Ministerio de Salud. Se obtiene el título a través de un curso teórico-práctico.

Objetivos. Evaluar las características de la formación práctica en Cardioangiología Intervencionista.

Métodos. Estudio descriptivo de corte transversal a partir de una encuesta voluntaria y anónima a médicos en formación, con tres ejes: datos demográficos, formación práctica y condiciones laborales.

Resultados. Sesenta y cinco encuestados, de 34 (33-37) años, casi todos (94%) de sexo masculino, 80% argentinos y en su mayoría en formación en la Ciudad Autónoma de Buenos Aires (55%) y Provincia de Buenos Aires (20%). Los centros donde se formaron realizaron distintos tipos de procedimientos: coronarios (96%), periféricos arteriales (92%) y estructurales valvulares (82%). Existió heterogeneidad en la curva de aprendizaje y el grado de independencia. Se observó precarización laboral sin recibir honorarios en el 21%, y el 85% realizó otras tareas laborales para subsistir. Solo el 34% fue provisto de cobertura de salud, el 39% de aseguradora de riesgos de trabajo y el 19% de seguro de mala praxis.

Conclusión. Los médicos en formación en Cardioangiología Intervencionista se exponen a diversos tipos de estudios, presentan distintas curvas de aprendizaje y alta precarización laboral.

Palabras claves: educación médica, residencias, procedimientos endovasculares.

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INTRODUCTION

Interventional cardiology is a medical subspecialty within the list of subspecialties recognized by the Argentine Ministry of Sanitation. It is often referred to as “General Angiology and Vascular Surgery” (Annex I of the Resolution 1418/2015 of the Argentine Ministry of Sanitation). The Argentinian College of Interventional Cardioangiologists (CACI) and the University of Buenos Aires School of Medicine (UBA) created a 3-year long medical specialty called General and Interventional Cardiology/Angiology (Res CD #1043/90) back in 1990. Seven years later, in 1997, it was renamed as “Hemodynamics, Angiology, and Interventional Cardiology” (Res CD #5751/97). Although it is a theoretical-practical specialty, training takes place in several Argentinian cath labs that need to be approved by CACI guaranteeing the quality and biosafety of patients, trainees, and

operators. Also, several prerequisites are required to be able to graduate such as the submission of statistical data from the cath lab to CACI, attending the theoretical workshops, passing the exams, conducting scientific activities, and performing a minimum number of procedures as lead operator. However, there is heterogeneity on the different ways practical training should be conducted and the working conditions effective during this training. Something similar happens in other countries where medical societies establish the prerequisites needed to obtain a degree as medical specialist, but they do not regulate practical training^{1,2}. Yet despite these differences, there is no report or regulation in the medical literature available today establishing practical training in interventional cardiology in Argentina or any other country. The objective of this study is to describe the characteristics of practical training in interventional cardiology in the Argentine Republic.

MATERIAL AND METHODS

This is a descriptive, cross-sectional study from data obtained through a survey. An online, anonymous, semi-structured and voluntary survey was conducted. Three items were considered (appendix) to conduct this survey: demographic data, practical training, and working conditions. The survey was conducted using the free of charge survey administration application app Goo-

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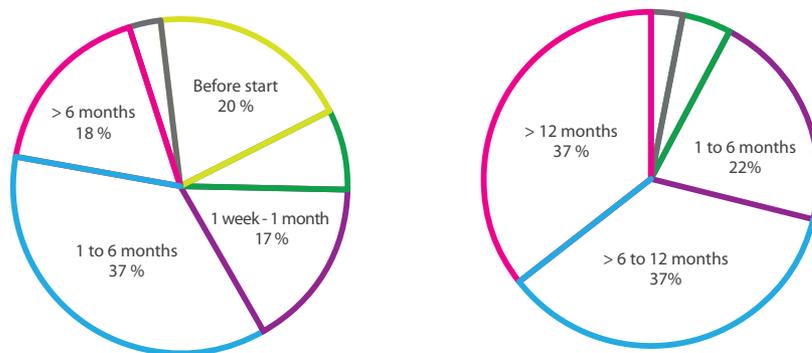


Figure 1. Learning curve assessed based on the time it took trainees to become lead operators in diagnostic (cine coronary arteriography) and therapeutic procedures (angioplasty).

TABLE 1. Different procedures the respondents were exposed to during their training.

Procedures	Number (n)	Percentage
Coronary	62	95%
Structural heart disease (valvular)	53	82%
Structural heart disease (non-valvular)	39	59%
Arterial peripheral	60	92%
Venous peripheral	41	63%
Splanchnic vessels	36	55%
Pediatric	19	29%
Neurological	15	23%

gle Forms (Google LLC, CA, United States). Some squares were “free text” squares (respondents could write anything they wanted) while others showed just a menu. Some questions were one-answer only while other were multiple-answer questions (this was always specified in the heading to avoid misunderstanding). Regarding the location of training, the different participant provinces were divided based on the geographical regions of the Argentine Republic into the Autonomous City of Buenos Aires and the Buenos Aires Province given the geographical density of this city. When the trainee would study in different locations, the main study center was considered as the central center for geographical location purposes.

The survey was submitted from the cell phone of the author of this article using WhatsApp Messenger (Facebook Inc, CA, United States) to a group called CACI 17 that was created in September 8th, 2017, by students of this medical specialty that started studying that year and had over 50 members by the time the survey was submitted to the respondents. Since starting June 2018 training in his medical specialty stopped happening every 3 years, meaning that residents could join every year, the WhatsApp group included mostly students who started in 2017 and students who started in 2018 and 2019. The survey was submitted on August 15th, 2019 through a message linked to the survey. Permission to submit the survey to other contacts of the medical specialty was requested too. Also, it was requested that the survey be submitted to a few more contacts (around 5 people) who had completed their medical specialty between 2014 and 2017. At all time we tried to submit the survey to more and more trainees for the sake of increasing representativity. No databases were used or centers involved in

the submission of the survey. The survey was considered complete on October 15th, 2019, two months after being implemented.

Data were exported to a spread sheet (Excel, Microsoft Corporation, WA, United States) that was later used for analysis and to make the charts. Qualitative variables were expressed as frequency (percentage) and the quantitative ones as mean and interquartile range (IQR). In the case of frequencies, no decimals were used. Instead, rounding was used towards the immediately higher number if the next decimal was ≥ 5 .

RESULTS

From August to October 2019, a total of 65 trainees responded to the survey. Eighty-five percent of them completed it within 48 hours after submission of the survey to the WhatsApp group; the last registry received was obtained 19 days later. The median age was 34 years (IQR: 33-37) and 94% (61/65) were males. Eighty-three percent (54/65) were born in Argentina and 80% (51/65) had obtained their medical degree in an Argentinian school of medicine. The rest had graduated in other Latin American countries that were not specified in the survey. Eighty-eight percent studied their medical specialty at UBA-CACI and 60% of these (34/57) entered the specialty back in 2017. The remaining trainees entered their specialty in different years [2011 (11%), 2014 (15%), 2018 (7%), and 2019 (6%)]. The training medical center was located in the Autonomous City of Buenos Aires (54%) followed by the Buenos Aires Province (19%), Central region (11%), Cuyo (8%), Northwest Argentina (5%), and Northeast Argentina (3%). Patagonia was not represented. Eighty-one percent of the training happened in private centers and 34% in public hospitals. Regarding the number of health centers where training took place, 49% of the trainees studied in one center only, 22% in 2 centers, and 29% in 3 or more centers. Regarding the number of cath labs used, 49% used 1 or 2 labs, 45% used 3 or 4 cath labs, and only 6% used 5 or more labs. Centers were defined as medical institutions. Cath labs were defined as PCI-capable facilities. Ultimately, trainees were exposed to a large variety of procedures (Table 1), not only coronary, but also structural and from other medical specialties.

Afterwards, practical training was assessed until the trainee would become knowledgeable enough to be able to perform a procedure as lead operator (Figure 1). As ex-

TABLE 2. Supplementary working activities performed by trainees.

Activity	Number (n)	Percentage
Calls (external/CLU)	48	84%
Cardiology consultation	29	46%
Cardiology monitoring	8	14%
Ambulance/General practitioner	6	10%
Other	16	28%

CU, Coronary unit.

pected, most trainees (82%) performed a cine coronary arteriography as lead operators within 6 months after starting training (**Figure 1A**) while only 25% performed coronary angioplasties during this time (**Figure 1B**). It was considered that a coronary angioplasty had been performed as a lead operator when a 0.014 in guidewire had crossed an obstruction and balloon predilatation had been performed if appropriate. Then, the degree of independence was assessed by asking whether the procedure had been performed without direct supervision defined as the presence of a doctor with specific training on interventional cardiology near at the cath lab. At this point, we saw that 72% of trainees (66% were positive on the answer while 6% said "maybe") performed a cine coronary arteriography without direct supervision during their training and even 65% (60% were sure about the procedure while 5% had some reservations) performed a coronary angioplasty without direct supervision. Within the latter group that performed a therapeutic procedure 50% (21/42) did so during their 3rd year of training, 31% (13/42) during their 2nd year, and 19% (8/42) during their 1st year of training. Since medical practices required doctors to remain on passive calls for emergency reasons, this point was assessed too. It was seen that 41% were on call without direct supervision during their training. This basically happened during the trainees' 3rd year of training (58% of them did remain on call), 38% during their 2nd year, and even 1 respondent (4%) during his 1st year of training. In the Autonomous City of Buenos Aires, where medical practices are run by the Argentinian Ministry of Health, it was reported that 71% of trainees (25/35) performed a therapeutic procedure while 43% (15/34) remained on call without direct supervision. Finally, 65% of trainees said that the duration of the training received was appropriate, 28% said training went very slow, and 2% said it went very fast (5% did not know/did not answer).

Lastly, the working conditions implemented during training were studied as well. In the first place, we saw that working conditions were self-employment in 63% of the respondents. The remaining trainees signed contracts as residents or on dependency conditions without any distinctions between the two. Twenty percent received no income during their training and even 1 respondent (2%) said he had to pay for his practical training. Eighty percent of the respondents who were actually being paid said they did not make enough money and 85% said that they had to look for another job to make it through the month as shown on **Table 2**. Regarding working benefits (**Table 3**) nearly 1 of every 3 respondents had occupational accident insurance (OAI) or personal health insurance while 1 of every 5 had malpractice insurance or paid emergency calls. Finally, 62% of respondents had a dosimeter to measure exposure at the different centers where they were doing their practices. Thirty percent said

TABLE 3. Beneficios laborales recibidos por los profesionales en formación.

Benefits	Number (n)	Percentage
Health insurance (social security or private)	22	34%
Occupational accident insurance (OAI)	25	39%
Malpractice insurance	12	19%
Transportation for ER calls (paid calls)	13	20%

they actually had a dosimeter but not in every center while 8% had no dosimeter at all. Sixty-five percent of those who did have a dosimeter (92%) were aware of their dose levels.

DISCUSSION

Unlike other countries in the region, the Argentine Republic offers a medical specialty regulated by CACI and UBA required to obtain the degree of specialist to be able to practice this medical specialty. Since it is listed as one of the medical subspecialties of the Argentine Ministry of Sanitation this degree provides the necessary qualification at least in the Autonomous City of Buenos Aires. This specialist degree includes a theoretical part and a practical part that should both be conducted at the corresponding training center. Although the participant centers need to be qualified and meet the necessary standards, the special characteristics of practical training and working conditions vary from one center to the next. Despite this heterogeneity in practical training, no data have been published reporting on this issue. That is why we decided to submit a survey precisely to know more about the issue at stake. The modality selected was the medical survey, similar to what had been done in the Argentine Republic with cardiology residences³.

This first medical survey was submitted to 65 respondents, which is an important and representative number of respondents in our setting. According to CACI official website (www.caci.org.ar), the 2017-2020 medical degree includes 72 students, meaning that in this cross-sectional cut-off value, 90% of those who completed the course at that time could have surveyed. These numbers are similar to those reported by other countries. Back in 2015, Spain reported a total number of trainees of 76⁴. The number of respondents is also higher compared to the 20 surveys completed in Europe⁵, 26 in Canada⁶, and 50 in the United States⁷ on a study regarding procedural training to treat structural heart disease. However, in these surveys the training center was assessed by surveying the director in charge and not the trainee himself. In our survey, trainees had to complete the survey themselves, which is why the centers with the largest number of doctors could alter the final results. However, this same modality was used in the survey submitted to cardiology residents and it can identify differences among trainees of the same center, if any. Unfortunately, in our survey the degree of acceptance of the survey could not be estimated, that is, the number of people who actually received the questionnaire but decided not to fill it out.

Regarding the population surveyed, most respondents were Argentinian male doctors who were studying their medical specialty at UBA-CACI 2017-2020 and who were working in large metropolitan areas in the Autonomous City of Buenos Aires and the Buenos Aires Province, mostly in the private sector. The number of centers and cath labs was more diverse. Half of the respon-

dents did their practices in 1 center and in 1 to 2 cath labs. In the first place we saw that the practices the trainees were exposed to were very diverse including a higher percentage of peripheral procedures and structural heart disease procedures (valvular and non-valvular). There is no doubt that this is beneficial since it expands the trainee's field of expertise. As expected, respondents were less exposed to neurological and pediatric procedures since these are often performed by other health professionals. However, almost a third was exposed to these procedures, which is acceptable considering the heterogeneity of respondents.

Afterwards, we saw the learning curve and found heterogeneity in it with some respondents performing diagnostic studies as lead operators even before starting their training and angioplasties within the first month. However, other trainees performed their first angioplasty after one year. At this point, we should mention that the variable "time" and not the variable "number of cases" was used, which is a limitation regarding analysis since those who performed earlier procedures may have been exposed to more cases. Unfortunately, since we do not know the participant center in each case, we cannot establish a correlation between time and volume of cases per center. On the other hand, we also studied the degree of independence and found that two thirds of the respondents performed a therapeutic procedure without any supervision from expert physicians. Although the number of procedures performed by respondents before becoming self-sufficient cannot be established, we believe that during training a registered expert physician should have been near the cath lab at all time to help the trainee should any complications arise. At this point, the survey was very clear on the concept of presence of a registered expert physician "near the cath lab." Technically, this physician was required to be close enough to the cath lab (not actually inside the cath lab) to take charge should any complications arise. It is even more surprising to see that almost half of the respondents performed unsupervised emergency procedures (in the modality of passive calls). This group of patients has higher risks, morbidity, and mortality, which is why they are expected to benefit from the procedures performed by health professionals with more experience. Since until 2017 the medical specialty was opened for registration every 3 years and several trainees would often join the practical training programs every the year, trainees may have been involved in unsupervised practices after completing their 3-year practical training without obtaining an official degree from the Argentine Ministry of Sanitation. For this reason, the survey was very specific on the years passed since the start of practical training regardless of the training period as a specialist. We should mention that one respondent said that he worked at the ER without even being exposed to interventional procedures for 1 full year and 17% without having completed a 2-year training program.

However, this was not perceived negatively by the trainees since only 2% thought that their learning curve had been too fast.

Then, the working conditions were studied. Considering that trainees already have a medical degree and their specialty on cardiology, we found that the working conditions of two thirds the trainees were not residencies or dependency conditions since very few of these trainees had working benefits as occupational accident insurance (OAI) or health insurance. This means that these were more precarious working conditions compared to cardiology residencies in our country where 60% had health insurance and 67% OAI³. Also, on top of the fact that many trainees were doing unsupervised emergency procedures, all costs had to be paid by the trainees in almost all of the cases. Lastly, over 80% had to take other jobs to be able to make it through the month, which is > 60% compared to cardiology residents³.

This study has some limitations. In the first place, this survey was only submitted to a group of interventional cardiology medical students from UBA-CACI between 2017 and 2019. Secondly, the survey is representative of an even more select group since no databases were used for its submission. Only a WhatsApp group was created for other purposes. Still, the questionnaire was submitted to most students from that batch. Thirdly, in order to prioritize anonymity, the form did not request any personal information so anybody could have accessed the questionnaire several times and answered it. Also, the veracity of the answers can only be attributed to the honorability of respondents since no internal control was implemented for confirmation purposes. However, we believe anonymity is an essential part of this type of surveys to avoid any possible retaliation against the respondents. It is the only way to answer freely to questions that otherwise may be detrimental those involved in the training programs. Fourthly, this was the first survey ever conducted in Argentina to learn about the characteristics of interventional cardiology training. This means that no chronological comparisons can be established to know whether this training has improved or not through time. In order to solve this, whenever possible, comparisons with cardiology residencies were drawn. Lastly, the questionnaire was designed without using any other valid surveys including 3 areas of interest that were arbitrarily considered for both the respondents and the medical community in general paying special interest in that the survey should be brief so it could be completed easily. It is expected that future iterations of this survey will include other suggestions and comments from the parties and regulatory entities involved so this questionnaire can become a useful tool with room for improvement.

In conclusion, in this first survey on training programs in cardioangiopathy in the Argentine Republic we see a huge diversity of procedures, heterogeneity in training times, self-sufficiency and independence, and precarious working conditions.

CONFLICTS OF INTEREST

None reported. No funding received either.

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