

TITLE

Current status of cardiovascular surgery training in Argentina: New challenges and demands. An Argentinian College of Cardiovascular Surgeons s National Survey.

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ABSTRACT

Objective: We developed a survey in order to identify the needs and demands of cardiovascular trainee population in Argentina in order to enhance quality of learning.

Methods: A survey was created and distributed to medical doctors enrolled in different accredited training pathways.

Results: A total of 83 trainees completed the survey (57% male). Fifty-one per cent chose for a combined training (cardiovascular), 35% only vascular and 14% pediatric cardiovascular surgery. The majority was part of an accredited training residency (59%). Most of respondents belonged to a public education system (49%). Prior general surgery training was informed by 67 surveyed (81%). Endovascular training experience revealed that 17% performed > 50 annual procedures. However, 40% of participants reported not receiving endovascular training. Open surgery experience showed that 40% of responders performed > 50 cases annually (16% > 100 cases). Cardiovascular trainees completed a higher number of open surgery procedures (64% vs 24%) whereas more endovascular cases were performed by vascular trainees (53% vs 29%). Almost one-third of participants indicated no having academic development time (28%). The choice of specialty and training paradigm option was highly considered for employability (47% and 60% respectively). More than 70% expressed to be pleased with overall training.

Conclusions: More academic time, increasing number of endovascular procedures and assessing mentoring must be seriously considered. An independent, not-for profit, physician-led organization that sets and monitors standards for successful training programs

is necessary.

Keywords: Continuing Medical Education, Postgraduate training, Professional Development, Faculty Development, Problem-Based Learning.

INTRODUCTION

Cardiac and vascular surgery training has undergone tremendous changes in the last years. The advent of endovascular therapies and minimally invasive techniques have led to redefine educational programs to better meet the evolving needs of young vascular specialists as they prepare to enter practice in a rapidly changing field ^{1,2,3}. Current training programs have the goal of providing to graduated doctors the knowledge and essential practical skills to function as qualified practitioners with clinical judgment for the management of cardiovascular surgical patients.

In Argentina, the level of education is quite heterogeneous probably due to the variety of pathways options combined with the lack of a consolidated professional regulatory authority. Different medical associations and public or private educational institutions offer diverse training paradigms and set own considered standards for future examinations.

The purpose of this survey was to know “real-world” cardiovascular surgery training in Argentina, identify the critical issues and demands of trainee population in order to enhance quality of education and obtain successful learning outcomes.

METHODS

In 2020, Argentinian College of Cardiovascular surgeons - Continuing Medical Education (CACCV-CME) distributed an electronic survey to members and non-members registered in a cardiovascular training programs across Argentine Republic. Car-

diac (adult and pediatric) and vascular trainees enrolled in different accredited training pathways received a link by mail to a voluntary, anonymous, multiple-choice questionnaire created by Google Form which was available from July 11, 2020 through October 11, 2020. The survey included 22 questions focused on assessment prior general surgery training, vascular training pathways chosen, open and endovascular surgery case volume, research time, overall satisfaction with training, professional development, expectations and future job opportunities. The responses were compiled and then analyzed. Data will be presented as a descriptive and statistical analysis as counts and percentages.

RESULTS

The survey was answered by 83 trainees from different training paradigms (57% male). Of the total of respondents, 49% belonged to a public education system. Fifty-one per cent chose for a combined training in cardiac and vascular surgery (cardiovascular), 35% only vascular and 14% pediatric cardiovascular surgery. Among all the respondents, 59% was part of an accredited training residency and 26% of a fellowship. An alternative training pathway called “Concurrence” (with a variation of workload and no financial remuneration) was reported in a 15% of surveyed.

Prior training in general surgery (GS) was reported in 81% of cases. The majority (90%) chose a GS residency pathway. The length of training was between 4 and 5 years (70%) and only 14% were trained by 1 year or less. Almost two-thirds of the surveyed reported they felt their previous GS training provided an advantage on performing future vascular procedures.

Looking at the overall cardiovascular operative experience and case volume re-

corded annually, our study revealed that a 40% of participants do not receive endovascular training. Among those who may access endovascular teaching, the majority (67%) trained within own educational institution and during a period longer than 12 months. Seventeen per cent (n=14) performed > 50 annual procedures but only 4% (n=3) recorded > 100 cases.

Experience with open surgery was slightly better, with 40% (n=33) of responders reporting they have performed up to 50 or greater than 100 cases annually.

We noted that trainees enrolled in a combined cardiac and vascular training pathway completed a significantly higher number of open surgery procedures compared with their vascular counterparts (64% vs 24%). In contrast, a major number of endovascular cases were reported by trainees enrolled in the vascular training paradigm group (53% vs 29%).

With reference to pediatric cardiovascular trainees, only 12% reported more than 50 annual open surgery procedures.

Of all participants, 72% reported having research protected time and education including teaching conferences, vascular lab interpretation, hands-on or meeting participation. No academic development provided by educational institution was informed in 28% of surveyed.

As regards overall satisfaction, most of them stated that the impact of current trainings was positive. More than 70% expressed to be pleased with it. Only 11% answered to be unsatisfied. The majority of learners reported that the choice of specialty as well training paradigm options were seriously taken into account for employability and future job opportunities (47% and 60% respectively). It was not considered in only 14% and 6% respectively.

When asked what could enhance their current trainings, the top responses included: increased cases volume (mainly endovascular procedures), simulation programs and external rotations in specialized centers, structured academic development time, assigned mentoring and supervised of training programs by accredited colleges or universities to assure an appropriate learning curve and met the specific educational goals and requirements for board certification exam.

The results of the survey are summarized in *Table I*.

DISCUSSION

The effort to recognize cardiovascular surgery as a separate surgical specialty was a topic of discussion throughout the 1970s and 1980s.

Teaching and learning cardiovascular surgery undoubtedly are going through a transition. The endovascular revolution of the last years has created the need for additional specific training for the next generation of surgeons. The advents of new technologies and minimally invasive techniques (EVAR, TEVAR, TAVR or hybrid procedures) have led to restructure classical training programs.^{1,2,3}

In Argentina, some educational programs provide cardiac and vascular surgery training combined leading to a common certification (“Cardiovascular”) provided by the Ministry of National Health . Other programs offer only “vascular surgery” training separated from cardiac surgeons leading to a single primary certification of competence in this speciality. On the other hand, “Pediatric Cardiovascular Surgery” is considered a distinct specialty with little or no relationship to cardiac or vascular surgery in training, certification, or practice.

There are various pathways to become a board certified cardiovascular or vascular surgeon in our country. We may cite: ⁴⁻⁶

- 1-2+3: 1 or 2 years of core surgery training followed by 3 years of advanced cardiovascular or vascular training
- 1+4: An alternative pathway called “Concurrence” which involves less workload without financial remuneration and include 1 year of core general surgery followed by 4 years of advanced cardiovascular or vascular training.
- 5+2/3: Another paradigm is to complete general surgery training (5 years) followed by 2-3 year of cardiovascular surgery. Board certification in general surgery is required. Nevertheless, this pathway is less and less offered by institutions.

In pediatric cardiovascular surgery, although training programs are very heterogeneous, most of them are grouped as residencies or fellowships. We may cite:

- 0+4: 5 years (4 years of pediatric cardiovascular surgery + 1 year Chief-of-Resident)
- 2+4: 2 years of pediatric general surgery + 4 years of pediatric cardiovascular surgery.
- 4/5+4: 4 or 5 years of core surgery training followed by 4 years of advanced pediatric cardiovascular fellowship. Board certification in core surgery is required.

The Argentinian College of Cardiovascular Surgeons (CACCV) was born in 1975 with the aim of promoting and improving the dissemination of knowledge concerning all aspects of cardiovascular diseases and becoming the primary source of cardiovascular surgeon advice and advocacy in social, economic, ethical and legal issues related to the specialty. ^{7,8} Together with the Ministry of Health, CACCV provides Board Certification in Cardiovascular, Vascular or Pediatric cardiovascular surgery to those

trainees who have met the basic set of standards (requirements), skills, knowledge and attitudes necessary to take personal responsibility for the individual care of patients.⁴ However, it is not mandatory to become a member of the CACCV in order to obtain specialty. CACCV membership will depend on academic and professional motivation of each applicant. Independent educational institutions (public or private) and regional medical associations also offer diverse cardiovascular training programs and certification application conformed to own considered requirements.⁴⁻⁶ This current decentralized model of accreditation implies variable and unsystematic set of standards to ensure the highest quality physicians and patient care. Residency and fellowship programs should be monitored by a single accreditation professional system. Residents and fellows should provide regular feedback about their programs to improve the overall quality of accredited pathways. These changes would contribute to consolidate and standardize our varied and complex either rural and urban medical care.

In the last 3 years (2017-2018-2019), CACCV provided 44 Board Certifications in cardiovascular (27) and vascular surgery (17). However, we have noted a continuous decrease in the amount of applicants.

The results of our training survey yielded several important findings. First of all, prior general surgery training seems to be quite necessary. However, the development of new and more complex technologies and specific skills are increasingly falling into the cardiac or vascular surgeon's hands rather than general surgeons.³ Today, new training programs offer more paradigm options spending time to teach basic surgical skills and valid assessment in core surgery.¹⁰⁻¹⁴ But the question is: How should general surgery training be integrated into the cardiovascular career? It is clear from our survey that prior core surgery training is not debatable to get basic surgical skills. Perhaps the

topic of discussion should not be the excessive duration of such training but how do we focus on the necessary requirements for qualification to a cardiovascular specialization in a shorter period of time. Brief total training is likely to be more attractive for many future surgeons who have incurred debt.¹⁵

This survey demonstrated endovascular experience seems to be limited and even significant number of students do not have access to endovascular training. We noted that overall volume of procedures performed annually by trainees are quite low and most of trainees must rotate outside of own institutions. This data probably reflects that many centers do not provide to trainees the number of sufficient cases to achieve the ability and confidence to master cardiovascular therapies. On the other hand, this issue is quite disturbing for young surgeons because it may specially have an effect in early specialization tracks due to limited exposure to know which field of surgery to pursue or adequate training. The recent impact of the COVID-19 pandemic affected even more surgical activity in residencies and fellowship`s programs generating further reduction in surgery case volumes mainly among lower residents.¹⁶

In Argentina operative experience for cardiovascular, vascular or pediatric trainees is highly variable in terms of overall case requirements. There is not specific number of major cases defined for each year/training. Only operative requirements may be determined at individual training centers. Establishing and performing minimum numbers of cases should be necessary for appropriate competency. A comprehensive protocol would allow to document the level of training as well as define minimum number of operations required for board certification.

As regards academic development, an alarming 30% of respondents indicated their training programs have not dedicated research and educational time. This is a mat-

ter of big concern. Comprehensive clinical learning of the global cardiovascular system, guided-research development and lessons learned to manage complex cases are fundamental to acquire an appropriate surgical judgment and become a well-rounded and a proficient specialist.¹⁷ These results illustrate a greatly opportunity for educators to enhance academic quality and research time for young trainees. Further development of teaching courses, research projects and/or participation in conferences may provide additional training and skills acquisition for those most interested in an academic career. However, a more serious problem is that usually teachers and instructors are not paid hence desire and dedication become essential in these circumstances.

When given a chance to grade their program, majority of learners expressed a useful experience and satisfaction. Only a few reported dissatisfactions on free-response additional comments. Deficient or inadequate endovascular training, absence of any regulatory body and poor academic development were the most demanding issues.

Finally, there is no doubt that employability and future job opportunities are issues seriously taken into account by young doctors. Our data indicate that despite new training pathways offer, most of trainees still believe that residency paradigm and prior core surgery training are considered valuable curricular elements for potential employers.

Our study has several limitations including a small sample size which may introduce non-response bias into our results. Making broad statements from this sample may be unreliable, but our main intention was to provide the preliminary work for improvement and continued assessment. Our results and analysis are only based on the individual experience of trainees but this survey did not include the perception or impression of programs directors or instructors, a key component of training process.

CONCLUSIONS

Results of our training survey characterize the current cardiovascular trainee population in Argentina. The majority of trainees report satisfaction with training programs. However, several shortcomings are highlighted. Considering our results, more structured academic development time, further access to endovascular procedures, rotations in specialized centers, simulators training and supervision of cardiovascular training pathways must be seriously considered in order to meet learners' demands and improve cardiovascular career.

Unfortunately, lack of consolidated professional regulatory authority associated with a consequent state of decentralization are the responsible for the heterogeneous levels of training and additional examinations that found around our country. An independent, not-for profit, physician-led organization that sets and monitors minimum and uniform standards to ensure best practices in the field is necessary.

REFERENCES

1. Hekman KE, Wohlaer MV, Magee GA, Shokrzadeh CL, Brown KR, Carsten CG 3rd, et al. Current issues and future directions for vascular surgery training from the results of the 2016-2017 and 2017-2018 Association of Program Directors in Vascular Surgery annual training survey. *J Vasc Surg.* 2019 Dec;70(6):2014-2020. doi: 10.1016/j.jvs.2019.02.050. Epub 2019 May 27. PMID: 31147127; PMCID: PMC6878124.

2. Reed AB. Advanced training in vascular surgery: how does it need to change? Semin Vasc Surg. 2006 Dec;19(4):191-3. doi: 10.1053/j.semvascsurg.2006.08.006. PMID: 17178321.
3. Duran C, Bismuth J, Mitchell E. A nationwide survey of vascular surgery trainees reveals trends in operative experience, confidence, and attitudes about simulation. J Vasc Surg. 2013 Aug;58(2):524-8. doi: 10.1016/j.jvs.2012.12.072. Epub 2013 Mar 29. PMID: 23541545.
4. Accreditation Committee for Graduate Medical Education. Available at: <http://www.caccv.org.ar/aspirantes-a-miembros-adherentes-y-titulares.html>. Accessed March 27, 2021.
5. General Requirements for Certification in Cardiovascular Surgery. Available at: <https://inscripcion.fmed.uba.ar/cgi-bin/residencias/infoPosbasicas.py>. Accessed March 27, 2021.
6. General Requirements for Certification in Cardiovascular Surgery. Available at: <https://www.buenosaires.gob.ar/salud/docenciaeinvestigacion/residenciasyconcurrencias/normativas>. Accessed March 27, 2021.
7. General Requirements for Certification in Cardiovascular Surgery. Available at: <https://www.colmed3.com.ar/index.php/reglamentos/especialidades>. Accessed March 27, 2021.
8. Bracco DA. Memoria institucional: Colegio Argentino de Cirujanos Cardiovasculares 1975-2015. RACCV. 2015. XIII(2):14-41.
9. Chikiar DS, Posse MA. Evolución histórica, enseñanza y perspectivas de la cirugía vascular. Vascular surgery: Historical evolution, teaching and perspectives. Relato

oficial 2019 Asociación argentina de angiología y cirugía vascular. RACCV. 2018; 14;18-40.

10. Batista P, Abai B, Salvatore D, DiMuzio P. The first assessment of operative logs for traditional vascular fellowship track versus integrated vascular training programs. *J Vasc Surg.* 2015 Oct;62(4):1076-82. doi: 10.1016/j.jvs.2015.05.039. Epub 2015 Jul 23. PMID: 26210491.
11. Shames M, Bandyk D. Introduction: Evolution of vascular surgery training-Apprentice to fellow to integrated resident. *Semin Vasc Surg.* 2019 Mar-Jun;32(1-2):1-4. doi: 10.1053/j.semvascsurg.2019.05.005. Epub 2019 May 31. PMID: 31540647.
12. Colvard B, Shames M, Schanzer A, Rectenwald J, Chaer R, Lee JT. A Comparison of Training Experience, Training Satisfaction, and Job Search Experiences between Integrated Vascular Surgery Residency and Traditional Vascular Surgery Fellowship Graduates. *Ann Vasc Surg.* 2015 Oct;29(7):1333-8. doi: 10.1016/j.avsg.2015.04.078. Epub 2015 Jun 30. PMID: 26133994.
13. Tanious A, Wooster M, Jung A, Nelson PR, Armstrong PA, Shames ML. Open abdominal surgical training differences experienced by integrated vascular and general surgery residents. *J Vasc Surg.* 2017 Oct;66(4):1280-1284. doi: 10.1016/j.jvs.2017.02.059. Epub 2017 Jun 2. PMID: 28583729.
14. McMackin KK, Caputo FJ, Hoell NG, Trani J, Carpenter JP, Lombardi JV. Trends in the 10-year history of the vascular integrated residency match: More work, higher cost, same result. *J Vasc Surg.* 2020 Jul;72(1):298-303. doi: 10.1016/j.jvs.2019.10.066. Epub 2020 Feb 7. PMID: 32037082.
15. Sidawy AN. Presidential address: generations apart-bridging the generational divide in vascular surgery. *J Vasc Surg* 2003;38:1147-53.

16. Palacios Huatuco RM, Liaño JE, Moreno LB, Ponce Beti MS. Analysis of the impact of the pandemic on surgical residency programs during the first wave in Argentina: A cross - sectional study. *Ann Med Surg (Lond)*. 2021 Feb;62:455-459. doi: 10.1016/j.amsu.2021.01.065. Epub 2021 Jan 28. PMID: 33532065; PMCID: PMC7843101
17. Andriole DA, Klingensmith ME, Fields RC, Jeffe DB. Is Dedicated Research Time During Surgery Residency Associated With Surgeons' Future Career Paths?: A National Study. *Ann Surg*. 2020 Mar;271(3):590-597. doi: 10.1097/SLA.0000000000003015. PMID: 30829693; PMCID: PMC6401322.

Table I. Results of the survey

QUESTIONS	OPTIONS	RESULTS (%)
GENDER	MALE	57
	FEMALE	43
SPECIALITY	CARDIAC	51
	VASCULAR	35
	PEDIATRIC	14
GENERAL SURGERY TRAINING	YES	81
	RESIDENCY	90
	CONCURRENCE	10
	NO	19
YEARS OF GENERAL SURGERY TRAINING	1	14
	2	5
	3	11
	4	48
	5	22
CONSIDER A PRIOR GENERAL SURGERY TRAINING NEEDED?	YES	69
	NO	17
	INDIFFERENT	14
REQUIREMENT OF GENERAL SURGEY BY CURRENT EDUCATIONAL INSTITUTION?	YES	80
	NO	20
TYPE OF VASCULAR TRAINING INSTITUTION	PUBLIC	49
	PRIVATE	51
TRAINING PATHWAY	RESIDENCY (1/2+3)	59
	CONCURRENCE (1+4)	15
	FELLOWSHIP (5+2/3)	26
YEARS OF VASCULAR TRAINING	1	0
	2	8
	3	26

QUESTIONS	OPTIONS	RESULTS (%)
	4	46
	5	20
ENDOVASCULAR TRAINING	YES	60
	NO	40
LENGTH OF ENDOVASCULAR TRAINING	< 6 months	39
	6 - 12 months	14
	> 12 months	47
ENDOVASCULAR ROTATIONS	Inside own educational institution	67
	Outside own educational institution	33
OPEN VASCULAR CASE VOLUME	< 30	40
	30 - 50	20
	50 - 100	24
	> 100	16
ENDOVASCULAR CASE VOLUME	< 30	63
	30 - 50	20
	50 - 100	13
	> 100	4
ACADEMIC DEVELOPMENT	YES	72
	NO	28
DEGRE OF SATISFACTION WITH ACADEMIC DEVELOPMENT	VERY SATISFIED	11
	SATISFIED	59
	LESS SATISFIED	23
	UNSATISFIED	7
DEGREE OF SATISFACTION WITH OPERATIVE EXPERIENCE	VERY SATISFIED	25
	SATISFIED	48
	LESS SATISFIED	23
	UNSATISFIED	4
JOB SEARCH - SPECIALITY	HIGHLY CONSIDERED	47
	LESS CONSIDERED	39

QUESTIONS	OPTIONS	RESULTS (%)
	NO CONSIDERED	14
JOB SEARCH - TRAINING PATHWAY	HIGHLY CONSIDERED	60
	LESS CONSIDERED	34
	NO CONSIDERED	6