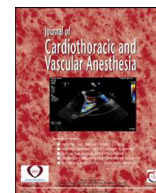




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Special Article

Heterogeneity Among Countries in the Subspecialty of Cardiovascular Anesthesia in Latin America: Survey Results

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Objectives: To evaluate demographics, workload, training, facilities, and equipment in cardiovascular anesthesia (CVA) in Latin America (LA).

Design: A descriptive cross-sectional study with data collected through a survey.

Setting: A multicenter, international web-based questionnaire that included 37 multiple-choice questions.

Participants: Physicians and specialists in anesthesiology who regularly participated in cardiovascular surgeries and were members of the scientific societies of the Latin American Confederation of Anesthesiology.

Interventions: None

Measurements and Main Results: A total of 484 completed questionnaires were collected. A total of 97.8% of the respondents had a university degree in anesthesiology. Most did not receive formal training in CVA, and only 41.5% received formal training. Moreover, most of them were trained in their own country, and a smaller percentage were trained abroad. Half of the respondents reported receiving <12 months of training. A third part of the respondents had received training in transesophageal echocardiography. Only 5.8% of the respondents worked exclusively in CVA, and a high percentage dedicated <60% of their weekly work hours to this subspecialty. A total of 80.6% of the centers had <3 cardiac surgery operating rooms. Only one-third of the centers performed heart/lung transplantation, venoarterial extracorporeal membrane oxygenation, venovenous extracorporeal membrane oxygenation, and ventricular assist device implantation.

Conclusions: A significant lack of training programs in anesthesiology practice and complex procedures in medical centers in LA are evident. Thus, basic accredited programs should be developed in medical centers in LA.

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Key Words: cardiovascular anesthesia; graduate medical education; fellowship accreditation; cardiac anesthesia survey

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THE INCORPORATION of subspecialties in anesthesiology, including cardiovascular anesthesiology, is the subject of discussion that is unresolved currently because it is a reality in different regions.¹ In the United States, recognition of

cardiovascular anesthesiology took more than 30 years.² Several factors have influenced the incorporation of subspecialties in anesthesiology, such as an increase in life expectancy associated with an increase in cardiovascular diseases, an increase in cardiovascular procedures, and the need for anesthesiologists to improve their cardiovascular skills.³ Currently, the Council for Graduate Medical Education has >60 accredited residency programs.⁴

Similar efforts have been made in Europe.⁵ The European Association of Cardiothoracic Anesthesiology and Intensive Care (EACTAIC) has 15 accredited centers to develop the subspecialty of cardiothoracic anesthesia and intensive care.⁶

In India, developing training programs for cardiovascular anesthesia (CVA) was driven by the exponential growth of cardiac surgery in the 1980s.⁷

Due to economic and healthcare inequalities, Latin America (LA) appears to have heterogeneous and inadequate development of CVA. According to the Pan American Health Organization, LA is one of the regions with the most significant economic and healthcare inequalities globally,⁸ including surgery access.⁹ Such concerns imply that each country has different strategies to reverse this situation.¹⁰ In CVA, there is a correlation between economic status and access to surgical outcomes.^{11–13} This reality is reflected in cardiovascular surgery and anesthesia regarding the complexity of procedures in different cardiovascular centers and training programs for anesthesiologists.

The Latin American Confederation of Anesthesiology (CLASA) includes 21 national anesthesiology societies in LA, with >25,000 active members whose main objective is to develop anesthesiology.¹⁴ With the exception of Mexico, where there is a specific society of CVA, CLASA has a working group, the Cardiovascular Anesthesia Committee (CAC). CLASA members have suggested the need to develop quality academic programs applicable in LA, and have even implemented some of them in their respective countries.^{15,16} This concern is supported by evidence that anesthesiology training programs impact patient outcomes.^{17,18} Different CLASA academic events, shared with other societies (Live CTVA Societies Executive Session Faculty members, Joint Congress EACTAIC/ICCVA, October 27–29, 2021), encouraged this interest group, CAC, to consider the importance of accurate diagnosis before undertaking any initiative.

To the best of the authors' knowledge, no survey has been conducted on CVA training, the complexity of procedures, and the characteristics of centers. The authors hypothesized that these issues are heterogeneous in LA. Understanding this is essential for designing and implementing educational programs.

This study aimed to evaluate the demographic characteristics, workload, training, facilities, and equipment in CVA in LA.

Methods

A descriptive cross-sectional study was conducted internationally, with data collected through an online survey using

Google Forms. The survey was based on a questionnaire presented by the Society of Cardiovascular Anesthesiologists (SCA) and the Australian and New Zealand College of Anaesthetists at the Cardiac Thoracic Vascular and Perfusion Special Group of Interest meeting in 2019. Translation into Spanish and Portuguese and validation by the CAC-CLASA were performed with corresponding adaptations.

The study was reviewed by the Investigation Research Board of the authors' hospital, where the CLASA Cardiovascular Committee is located. Consent was requested for the survey to be conducted, and participation was voluntary. Data were anonymized, possible direct and indirect indicators were eliminated, and data reflecting a particular characteristic unrelated to the study were excluded. Once this process was completed, the participants were assigned a new identifier.

The target population of the study was physicians and specialists in anesthesiology who regularly participated in cardiovascular surgery and were members of the scientific societies of CLASA.

Nonprobability sampling by reference was conducted in the following order: reference collaborators and CAC members of each national society formed a network of contacts, which was completed with a cross-reference to the Latin American Association of Cardiac and Endovascular Surgery.

The survey included 37 questions regarding demographic characteristics, CVA training, employment, and hospital centers, some of which provided multiple answers (Q#7, Q#18, Q#25, Q#31, and Q#37) (Supplementary Appendix S1).

The survey was sent to CVA community groups via email and WhatsApp. The survey period was set between November 1 and 30, 2022. If no response was received from the potential participants, a reminder was sent 2 weeks later.

Additionally, different anesthesiology scientific societies of the CLASA were consulted regarding the presence of CVA training programs and their accreditation.

Statistical Analysis

Data quality control was performed through exploratory analysis to identify inconsistencies and missing data and refine the database to be analyzed. Categorical variables were presented as absolute frequencies and percentages (%). Differences in proportions between groups were estimated using 95% confidence intervals. All statistical analyses were performed using the R program (R Foundation for Statistical Computing).¹⁹

Results

Respondents' Characteristics

A total of 484 responses were received from anesthesiologists in 18 of the 21 CLASA societies. Societies with more members had the highest percentage of responses (Mexico, Brazil, Argentina, Colombia, and Chile), except for the Dominican Republic and French Guyana, from which only 1 response was obtained.

Table 1
General characteristics

General characteristics of the respondents	n (%)
Gender	
Female	178 (36.8%)
Male	302 (62.4%)
Other/no answer	4 (0.8%)
Age	
Up to 50 years	365 (75.4%)
Over 50 years	119 (34.6%)
Place of professional practice	
Brazil	121 (25%)
Argentina	61 (12.6%)
Chile	60 (12.4%)
Mexico	57 (11.7%)
Colombia	40 (8.3%)
Uruguay	34 (7%)
Peru	22 (4.5%)
Ecuador	16 (3.3%)
Costa Rica	13 (2.7%)
Guatemala	13 (2.7%)
Paraguay	13 (2.7%)
Panama	9 (1.9%)
Bolivia	8 (1.7%)
Venezuela	8 (1.7%)
Honduras	4 (0.8%)
El Salvador	3 (0.6%)
French Guyana	1 (0.2%)
Dominican Republic	1 (0.2%)
Anesthesiologist title	
I have an anesthesiology degree	473 (97.7%)
I do not have an anesthesiology degree	10 (2.1%)
No answer	1 (0.2%)
Perform anesthesia for other types of surgeries outside the cardiovascular area	
Yes	456 (94.2%)
No	28 (5.8%)

Most respondents were men (62.4%) younger than 50. (Table 1). A significant association was found between the number of male respondents and older age groups.

CVA Training

A total of 97.7% of the participants reported having the title of anesthesiologist, corresponding to a medical doctor who developed specific training in anesthesiology and obtained the degree of general anesthesiology awarded by the educational institutions of each country (Table 1).

Most participants did not receive formal training in CVA, and received training in daily practice (58.5%). Of those who received formal training, 70.6% received it in their own country, and 29.4% received it abroad (Table 2).

Table 3 shows countries that provide CVA training programs and their accreditation.

No association was found among the countries with regular practice and the presence or absence of formal training in CVA, except in Colombia, where 100% of the respondents received such training. Half of the respondents reported <12 months of formal or nonformal training (Table 2). No

Table 2
Training and work characteristics

Training and work characteristics of the respondents	n (%)
Training in cardiovascular anesthesia	
I have no formal training; I acquired training in practice	283 (58.5%)
I have an accreditation/diploma awarded in my country	142 (29.3%)
I have an accreditation/diploma awarded abroad	59 (12.2%)
Time dedicated to training as a cardiovascular anesthetist	
More than 12 months	259 (53.5%)
Between 7 and 12 months	149 (30.8%)
Less than 6 months	76 (15.7%)
Years of work as an anesthesiologist/consultant in cardiovascular anesthesia	
Up to 10 years	267 (55.2%)
More than 10 years	217 (44.8%)
On average, what percentage of your weekly work hours is dedicated to cardiovascular anesthesia?	
Up to 20%	176 (36.4%)
21% to 40%	117 (24.2%)
41% to 60%	68 (14.0%)
61% to 80%	56 (11.6%)
81% to 100%	67 (13.7%)
On average, how many cardiovascular surgeries do you perform per month?	
1-5	159 (32.9%)
6-10	142 (29.3%)
11-15	88 (18.2%)
16-20	48 (9.9%)
21-30	35 (7.2%)
31-50	7 (1.4%)
More than 50	5 (1.0%)
How much of your cardiac anesthesia practice is performed on pediatric patients?	
I do not participate in pediatric cardiac surgery	271 (56%)
Up to 25%	104 (21.5%)
26% to 50%	42 (8.7%)
51% to 75%	15 (3.1%)
76% to 100%	52 (10.7%)
Provide regular (one or more times a week) anesthesiologic assistance for the following types of situations:	
Heart transplant	106 (21.9%)
Interventional cardiology procedures	97 (20.0%)
Transarterial valve implants/repairs (TAVI/TAVR)	289 (59.7%)
Ventricular assist device implants	147 (30.4%)
ECMO	133 (27.5%)
Postoperative care of patients in cardiac surgery	87 (18.0%)

statistical differences were found between training duration and the presence of programs in each country (Table 4).

A total of 169 participants (34.9%) reported receiving training in transesophageal echocardiography (TEE). Of these, 127 participants (75%) received it in a local program and the others in the SCA. One-third of the respondents performed TEE without training.

CVA Work Characteristics

Only 5.8% worked exclusively in CVA (Table 1), and 74.6% dedicated less than 60% of their weekly work hours to this subspecialty. The authors found an association ($p < 0.05$)

Table 3
CVA Training Programs in Latin America

Country	Society	Program	Duration	Accreditation
Brazil	Sociedad Paulista de Anestesiología	Basic program in Cardiovascular and Thoracic Anesthesia. Pediatric Cardiovascular Anesthesia Program	1-2 y	European accreditation: ESAIC y EACTAIC
Chile	Sociedad de Anestesiología de Chile	Program of the Pontifical Catholic University of Chile	2 y	APICE (This regulatory entity no longer exists)
Peru	Sociedad Peruana de Anestesia, Analgesia y Reanimación	Anesthesia and Intensive Cardiovascular Therapy, granted by the Peruvian University Cayetano Heredia and San Martin University	2 y	Superintendencia Nacional de Educación Superior Universitaria attached to the Ministry of Education
Mexico	Sociedad Mexicana de Anestesiología	Cardiovascular Anesthesia, Universities of Mexico (Universidad Autónoma Nacional de México/ Universidad de Monterrey)	-	Health Secretary
Colombia	Sociedad Colombiana de Anestesiología y Reanimación	Subspecialty (Fellowship) in cardiovascular and thoracic anesthesia	1-2 y	Ministry of Education and Health

NOTE. Links to cardiovascular anesthesia programs. Brazil: <https://www.eactaic.org/education-research/fellowship-in-ctva/>; Chile: <https://medicina.uc.cl/postgrado/especialidades-medicas/especialidades-derivadas/anestesia-cardiovascular/>; Peru: <http://medicina.upch.edu.pe/famed/especializacion/es/anestesiologia-cardiovascular>, <https://www.conareme.org.pe/web/Documentos/Estandares%20Minimos/GRUPO%20IV/ANESTESIA20CARDIOVASCULAR.pdf>; Mexico: <http://www.sidep.fmposgrado.unam.mx:8080/fmposgrado/Cursos.jsp?medicalllevel=CPAEM>; Colombia: <https://www.upb.edu.co/es/postgrados/especializacion-anestesia-cardiovascular-medellin>, <https://urosario.edu.co/especializacion-en-anestesia-cardiotoracica>.

Abbreviations: EACTAIC, European Association of Cardiothoracic Anesthesiology and Intensive Care; ESAIC, European Organisation for Anaesthesia, Intensive Care, Pain and Perioperative Medicine.

between training programs in the respective countries and weekly dedication of hours to CVA (Table 4).

Fifty-five percent had >10 years of work experience. Of these, 62.2% performed <10 surgeries per month, and 32.9% performed <5 surgeries per month (Table 2).

Thirty percent of the respondents provided regular anesthesia care (1-2 times per week) for heart transplants, interventional cardiology, ventricular assist device implantation, and extracorporeal membrane oxygenation (ECMO). Fifty-six percent had not participated in pediatric cardiac surgeries.

Fifty-four percent and 10.3% of the participants reported regular use of TEE and Swan-Ganz catheters, respectively. Transesophageal echocardiography was used more frequently ($p < 0.05$) by CVA-accredited anesthesiologists and in centers with >2 simultaneous cardiac surgeries ($p < 0.05$). A total of 24.8% used TEE with cardiologist support, whereas 6% did not have TEE in their centers.

Characteristics of Health Centers (Table 5)

Most centers had 1 or 2 operating rooms for cardiac surgery. Table 5 shows the percentages of procedures performed, highlighting that only one-third of the centers performed heart/lung transplantation, venoarterial ECMO, venovenous ECMO, and ventricular assist device implantation.

Centers in countries providing training programs showed a statistically significant difference in the most complex procedures: heart/lung transplantation, pediatric congenital heart surgery, endovascular and thoracic surgery, transarterial valve implantation, and use of ECMO and ventricular assist device (Table 4). There was a significant association ($p < 0.05$) between CVA training and ECMO, aortic valve implantation, and transarterial valve repair.

A total of 53.7% of the centers used "fast-track" programs, and only a quarter routinely performed extubation in the operating room. Moreover, 60.7% of the centers used the enhanced recovery after cardiac surgery program, but only 9.5% fully implemented it (Table 5). There was no association between routine extubation in the operating room and the implementation of enhanced recovery after cardiac surgery programs in the centers.

Discussion

To the best of the authors' knowledge, this was the first study on CVA in LA. The survey showed a lack of training among physicians, with significant heterogeneity among countries.

Accredited Training and Dedication to the Subspecialty

The anesthesiologists surveyed received no formal training and had low dedication to CVA. Cardiovascular anesthesia competencies require the integration of theoretical knowledge and technology.²⁰ Training programs in LA are heterogeneous, and there is no standardized form with regard to duration and content. In some cases, training is limited to adult and/or pediatric CVA; in others, it involves thoracic anesthesia and critical care. However, when compared with established programs,²¹ there are significant differences in the content of programs and their accreditation, especially in TEE training.

Anesthesiologists who received CVA training and centers with >2 cardiac surgery operating rooms used TEE more frequently. It is reasonable to think that this association facilitates a care structure for more complex procedures. However, there was no association between countries that offered training

Table 4
Formal training, work characteristics, and procedures performed

	Countries that do have formal training (n=300)*	Countries that do not have formal training (n=184)**	Difference (IC 95%)	p- value
Time dedicated to cardiovascular anesthesia training				
More than 12 months	166 (55.3%)	93 (50.5%)	4.8% [-4% - 14%]	> 0.05
Up to 12 months	134 (44.7%)	91 (49.5%)		
Percentages of weekly work hours dedicated to cardiovascular anesthesia				
More than 60%	89 (29.7%)	34 (18.5%)	11.2% [3% - 19%]	< 0.05
Up to 60%	201 (70.3%)	150 (81.5%)		
Procedures performed in the center				
Revascularization with extracorporeal circulation				
Yes	275 (91.7%)	147 (79.9%)	11.8% [5% - 19%]	< 0.05
Revascularization without extracorporeal circulation				
Yes	215 (71.7%)	130 (70.7%)	1% [-8% - 10%]	> 0.05
Valvular surgery				
Yes	279 (93.0%)	161 (87.5%)	5.5% [-0.5% - 12%]	> 0.05
Heart/lung transplant				
Yes	128 (42.7%)	50 (27.2%)	15.5% [7% - 25%]	< 0.05
Adult congenital heart disease surgery				
Yes	200 (66.7%)	107 (58.2%)	8.5% [-0.8% - 18%]	> 0.05
Pediatric congenital heart disease surgery				
Yes	165 (55.0%)	79 (42.9%)	12.1% [3% - 22%]	< 0.05
Aortic dissection surgery (Type A)				
Yes	246 (82.0%)	142 (77.2)	4.8% [-3.1% - 13%]	> 0.05
Endovascular surgery				
Yes	243 (81.0%)	125 (67.9%)	13.1% [5% - 22%]	< 0.05
Thoracic surgery				
Yes	244 (81.3%)	127 (69.0%)	12.3% [4% - 21%]	< 0.05
Transarterial valvular implant				
Yes	215 (71.7%)	106 (57.6%)	14.1% [5% - 23%]	< 0.05
Venoarterial ECMO				
Yes	156 (52.0%)	42 (22.8%)	29.2% [20% - 38%]	< 0.05
Venovenous ECMO				
Yes	142 (47.3%)	39 (21.2%)	26.1% [18% - 35%]	< 0.05
Ventricular assistance with implantable devices				
Yes	122 (40.7%)	42 (22.8%)	17.9% [9% - 27%]	< 0.05

* Number of anesthesiologists in countries with formal training in CVA

** Number of anesthesiologists in countries without formal training in CVA

courses and the percentage of anesthesiologists who formally attended them (except for Colombia).

Most respondents dedicated less than 1 year to formal or nonformal training. This is concerning because there is a consensus that the minimum training duration required by accredited programs in the United States, Europe, India, and even LA is 12 months. Therefore, availability did not seem to be the only limiting factor.

El Tahan et al.⁵ pointed out that there are few graduates in CVA in Europe. The possible causes are the few places available in training centers, the lack of formal training requirements to work in cardiovascular centers, and the need to work in stable conditions.

Transesophageal echocardiography is mandatory in all accredited programs.^{3–6} The authors' results showed infrequent use of TEE, even by CVA-trained anesthesiologists. Although 34.9% reported having received training in TEE use (through local certification or SCA), this percentage was lower than that of those who received subspecialty training. Of the programs listed in Table 3, TEE training was even more heterogeneous than other training programs.

Borde et al.²² found a significant difference in TEE use in India. The availability of equipment does not seem to be a problem in LA, as most centers have appropriate equipment.

Characteristics of Centers

Most of the centers analyzed were small (one or 2 cardiac surgery operating rooms), with a low percentage of complex procedures. Center volume is a limiting factor in the development of subspecialties in Europe, which is similar to the situation in LA. High-volume centers reported greater use of TEE than low-volume centers (76.7% v 47.5%, respectively). These results were consistent with those reported by other studies.²² Moreover, most respondents performed fewer than 10 cardiac surgeries per month. The 2022 EACTAIC curriculum update set a minimum annual volume of 100 on-pump cardiac surgeries, 25 vascular surgeries, 25 thoracic surgeries, and transesophageal ultrasound certification.²⁰

Fast-track protocols are defined as complex procedures that involve various components of care. Therefore, they require significant institutional support, as they are safe for patients

Table 5
Characteristics of Centers, Procedures Performed, and ERASc/ Fast-Track Programs

Characteristics of Centers	n (%)
Are there morbidity statistics associated with cardiovascular surgery at your hospital?	
Yes	294 (60.7%)
No	120 (24.8%)
Unknown	70 (14.5%)
On average, how many cardiac surgery operating rooms are functioning simultaneously in your institution?	
1	284 (58.7%)
2	106 (21.9%)
3-4	71 (14.7%)
5-8	14 (2.9%)
9-12	6 (1.2%)
13-16	1 (0.2%)
>16	2 (0.4%)
Procedures performed at your center	
Revascularization with extracorporeal circulation	422 (87.2%)
Revascularization without extracorporeal circulation	345 (71.3%)
Valvular surgery	440 (90.9%)
Heart/lung transplant	178 (36.8%)
Adult congenital heart disease surgery	307 (63.4%)
Pediatric congenital heart disease surgery	244 (50.4%)
Aortic dissection surgery	388 (80.2)
Endovascular surgery	368 (76.0%)
Thoracic surgery	371 (76.7%)
Transarterial valvular implant	321 (66.3%)
Venoarterial ECMO	198 (40.9%)
Venovenous ECMO	181 (37.4%)
Ventricular assistance with implantable devices	164 (33.9%)
Are patients routinely extubated in the operating room?	
Yes	125 (25.8%)
No	359 (74.2%)
Does your center apply an ERASc program?	
Yes, full performed	46 (9.5%)
Yes, partially performed	249 (51.2%)
No	189 (39.0%)
Does your center apply a fast-track program to patients undergoing cardiac surgery?	
Yes	260 (53.7%)
No	224 (46.3%)
What opioid-free multimodal techniques do you use in your practice in cardiac surgery?	
Ultrasound regional blocks	265 (54.8%)
Adjuvants	340 (70.2%)
Paracetamol	230 (47.5%)
They are not part of my usual practice	88 (18.2%)

Abbreviations: ECMO, extracorporeal membrane oxygenation; ERASc, enhanced recovery after cardiac surgery

and beneficial to institutions by increasing the use of material and human resources.^{23,24} Although fast-track protocols are widespread, only 53.6% of the respondents reported using them in their institutions.

Enhanced recovery after surgery-type programs are even more complex because they are multimodal and interdisciplinary, and require digital platforms to function properly.^{25,26} Only 51.5% applied enhanced recovery after surgery protocols, and most reported that they did so partially.

In conclusion, most centers did not perform highly complex procedures because of their low volume, and programs requiring institutional support were not frequent.

Glance et al.¹⁷ found that mortality and major complications increased more than two-fold when less-trained anesthesiologists assisted patients undergoing myocardial revascularization surgery. The main limitations of this study were its retrospective nature, the definition of the group of "low-performance" anesthesiologists, and the possible bias of the type of surgery and characteristics of the patients treated. Papachristofi et al.¹⁸ conducted a prospective study that controlled for variables related to the characteristics of patients, surgeons, and anesthesiologists. The results showed that patient risk explained 95.75% of the variation in-hospital mortality. Surgeons were involved in 4% of the cases, whereas the impact of individual anesthesiologists was minimal (0.25%). No variation was attributable to the centers; all were high-volume centers with anesthesiologists who performed at least 50 procedures per year. As reflected in the proposed programs, this concern has been present in LA for a long time, with efforts from different societies.^{15,16}

Some of the associations that were examined in this survey, which should be further investigated in future studies, showed the following: (1) countries that can train anesthesiologists dedicate more time to practicing the subspecialty, use more complex monitoring (TEE and Swan-Ganz), and perform more complex procedures. Mackersey et al.³ noted that one of the causes of subspecialty development was the increase in complex cardiovascular procedures. (2) All respondents in Colombia received training, and centers with more cardiac surgery operating rooms were associated with greater use of TEE by anesthesiologists. These strengths should be the basis for reaching a consensus on a primary curriculum with properly accredited programs in hospital centers. It is essential to collect information on the experiences of LA countries, taking them as a basis, along with the experiences of other societies.

Centers providing accredited programs present a double challenge. On the one hand, there is a need to reach a consensus on a basic program of cardiovascular anesthesia. On the other hand, there is a need to develop education and research accessible to a heterogeneous region.

Limitations

Due to the survey's characteristics, it was impossible to capture all the heterogeneity in this area of interest. The authors attempted to minimize this limitation by selecting questions that would achieve their objectives.

Because the authors did not know the number of anesthesiologists and did not have a sampling frame of professionals dedicated to CVA in LA, it was impossible to employ a probability design. To minimize this error, the authors contacted members of each society in different countries. Moreover, the authors contacted CV centers through the Latin American Association of Cardiac and Endovascular Surgery for the broadest possible diffusion.

The limitations of the design implied that some characteristics of the population under study were over- or underrepresented. This could have led to sampling bias, as some of the parameters of interest were underestimated or overestimated.

To ensure the widest possible dissemination of information, all LA countries were included in the survey, even if they were not members of the CLASA. Some countries, especially those with a small number of anesthesiologists, did not respond. One limitation of the survey structure was that some questions did not allow free text or the option of not answering.

Conclusion

According to the survey results, there was a severe lack of training and dedication among anesthesiologists performing CVA. This was because most centers had a low volume and performed complex procedures, which, together with the scarcity of training programs, were the leading causes of the current situation.

The significant associations among accredited programs, formal training in CVA, greater dedication to the subspecialty, and performance of more complex procedures reinforce the need to establish basic and unique programs in LA.

Declaration of competing interest

None.

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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1053/j.jvca.2023.10.015.

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