



Buenos Aires Stroke School: a path to continuous medical education in stroke, empowering and connecting future specialists in vascular neurology across Latin America

Matías J. Alet^{a,b,*}, Raúl C. Rey^b, Sebastián F. Ameriso^a

^a Centro Integral de Neurología Vascular, Departamento de Neurología, Fleni. Montañeses 2325, C1428, Ciudad Autónoma de Buenos Aires, Argentina

^b Centro Universitario de Neurología, División de Neurología, Hospital J. M. Ramos Mejía. Gral. Urquiza 609, C1221. Ciudad Autónoma de Buenos Aires, Argentina

ARTICLE INFO

Keywords:

Stroke
Education
Neurology
Training
Certification
Latin America

ABSTRACT

Background: The Buenos Aires Stroke School was established in 2019 to address the unmet need for structured, high-quality stroke education in Latin America. Its goal is to provide intensive training in vascular neurology and foster collaboration among early-career professionals across the region.

Approach: The program offers a five-day, 50-hour curriculum that includes lectures, clinical case discussions, simulations, and hands-on workshops. Participants are selected based on academic background, motivation, and potential to improve stroke care in their local settings. The course integrates social and cultural activities to strengthen peer and faculty connections.

Outcomes: Over five editions, 69 professionals from 11 Latin American countries participated. A follow-up survey was completed by 29 alumni (42% response rate). Among respondents, 62% reported increased use of intravenous thrombolysis, 28% implemented it for the first time, 45% improved existing stroke units, and 17% established new ones. Mechanical thrombectomy was initiated or expanded in 10% of centers. Additionally, 21% of institutions achieved World Stroke Organization (WSO)/Iberoamerican Stroke Organization (IASO) Stroke Center Certification. Educational and outreach activities increased in 72% and 55% of institutions, respectively.

Conclusions: The Buenos Aires Stroke School offers an immersive, multidisciplinary, and regionally adapted educational model. By connecting and training early-career professionals, it may help strengthen national and regional stroke networks. While causality cannot be established, the reported outcomes suggest a possible association between participation in the program and subsequent institutional improvements. Continued expansion and structured follow-up efforts are planned to support long-term impact across Latin America.

Background

Training young professionals with an interest in stroke is essential, and the need for neurology- and stroke-trained physicians is rising^{1,2}. The World Stroke Organization (WSO) indicates that the key needs in this scenario are collaborative interdisciplinary training in stroke care, educational materials provided in a variety of formats that can be adapted to local circumstances and clinical practices, regionally organized educational activities (supported by WSO and local experts) and varied and interactive online resources, which help develop knowledge and skills in stroke care³.

However, time, opportunities, and resources are often limited. In Latin America there are centers of excellence in stroke treatment,

prevention and rehabilitation, with highly trained professionals. Many of them are also experienced educators. For several years, members of Fleni and Ramos Mejía Hospital, two institutions with extensive experience in cerebrovascular care, have recognized a growing demand for intensive training in vascular neurology across the region. With the initiative described here, young professionals had the opportunity to receive a quality education in a short period of time. To address this unmet need in our region, and inspired by the successful model of the Stroke Schools organized by the European Stroke Organization⁴, we launched the first edition of the Buenos Aires Stroke School in 2019.

* Corresponding author.

E-mail addresses: malet@fleni.org.ar (M.J. Alet), raulcrey@hotmail.com (R.C. Rey), sameriso@fleni.org.ar (S.F. Ameriso).

<https://doi.org/10.1016/j.jstrokecerebrovasdis.2025.108405>

Received 13 February 2025; Received in revised form 14 July 2025; Accepted 19 July 2025

Available online 23 July 2025

1052-3057/© 2025 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Institutional context and stroke infrastructure

Fleni Comprehensive Stroke Center is dedicated to the integral care of stroke patients 24/7, 365 days a year. It operates in close collaboration with multiple specialties, including Internal Medicine, Cardiology, Diagnostic Imaging, Neurosurgery, and Rehabilitation. The center includes a dedicated stroke unit, with its own infrastructure and staff, with specific areas for hospitalization and the capacity to administer both intravenous and endovascular reperfusion treatment, as well as advanced diagnostic imaging techniques. Fleni Rehabilitation Center in Escobar includes 86 operational beds, 6 respiratory care beds, 9 gyms, a hydrotherapy pool, a gait laboratory, 2 technology labs, an urban adaptation center, a driving track for patients with motor impairments, an assistive technology unit and a home adaptation unit⁵.

The Neurology Division of the Ramos Mejía Hospital and the University Neurology Center represents one of the main centers dedicated to the study and treatment of neurological diseases in Argentina. Currently, it devotes equal importance to the three main areas of work: patient care, teaching and research. Hundreds of neurologists from Argentina and other Latin American countries have been trained at this center and its Neurology Residency was the first in the country. It also includes a dedicated stroke unit and neurologists on call 24/7, with the possibility of performing intravenous reperfusion treatment⁶.

Approach

Design and structure of the Buenos Aires Stroke School

The Buenos Aires Stroke School is a training course with a program of practical and theoretical activities covering core topics and key clinical scenarios in vascular neurology. Its dynamic and participatory format emphasizes the latest advances in the field. The course is aimed at young physicians including neurologists, neurosurgeons, emergency doctors, intensivists, cardiologists, and general practitioners with a clear interest in expanding their training in cerebrovascular diseases.

The course directors are Dr. SA and Dr. RR. Dr. SA is Head of the Comprehensive Stroke Center and the Department of Neurology at Fleni. He completed a cerebrovascular fellowship and served as Assistant Professor of Neurology at the University of Southern California. He is a Fellow of the American Heart Association and serves on the editorial boards of several scientific journals. Dr. RR is Chief of the Neurology Division at Hospital J. M. Ramos Mejía and Professor of Neurology at the Faculty of Medicine, University of Buenos Aires. Both directors have led pioneering clinical and epidemiological studies in the region, have published original articles and book chapters, and have organized numerous national and international conferences.

Candidates are recruited through an open call announced via multiple platforms, including social media, institutional mailing lists, and conference presentations across the region. A dedicated website was created for the application process, where interested professionals submitted their curriculum vitae, a letter of recommendation from a supervisor, and a personal statement outlining their motivation and interest in participating. The pre-selection period lasts one month. Applications are individually reviewed by the course directors, who assess each candidate's background and materials to ensure alignment with the program's goals—namely, a strong interest in vascular neurology and a commitment to improving stroke care in the region. Special attention is given to gender balance, country representation, and age distribution, aiming to ensure diversity and equity among selected participants.

The first edition took place in 2019 with a Summer School, followed by a second in 2020. The COVID-19 pandemic led to the postponement of the third edition, which was finally held in March 2023. Due to a large number of pending applications, a Winter School was organized in September 2023 to accommodate a large number of applicants. The last edition took place in March 2024, and a new one is currently being planned at the time of this manuscript's drafting.

Each edition has received sponsorship from the WSO and the Argentine Neurological Society (SNA). In the last editions, additional support was provided by IASO.

Curriculum components and educational methods

The primary goal of the Buenos Aires Stroke School is to provide intensive, multidisciplinary training in cerebrovascular disease. The five-day program comprises 50 hours of academic activities, including lectures, clinical case discussions, and hands-on workshops. These workshops cover acute stroke management simulations, mechanical thrombectomy and patent foramen ovale closure simulations, and Doppler ultrasound training, among others. Participants also engage in academic rounds in stroke units and visit the rehabilitation center. A team of experienced stroke specialists supervises and mentors attendees throughout the course. The academic program is further enriched by social and cultural activities designed to foster participant integration and strengthen connections with faculty.

The program content is developed and updated annually by the course directors. Content selection is informed by regional training needs, international recommendations, prior participant feedback, and advances in stroke science and systems of care. The teaching faculty is composed of volunteer stroke neurologists, neurointerventionists, intensivists, rehabilitation professionals, cardiologists, and diagnostic imaging specialists, all with extensive expertise in their respective fields. A detailed schedule of the curriculum is provided in Fig. 1.

Over time, the program has evolved significantly based on participant feedback, which is collected both through in-person group discussions during the closing session and via anonymous post-course satisfaction surveys. While the early editions were more lecture-based, subsequent versions introduced a greater emphasis on interactive learning, including a broader range of workshops, extended time for discussion, and the addition of participant-led activities such as regional action planning and clinical case presentations. These adjustments were made in response to learner needs and helped transform the course into a more dynamic and hands-on training experience.

Learning objectives and competencies

Participants are expected to achieve the following learning objectives:

- Develop diagnostic and treatment strategies based on clinical reasoning and current literature.
- Participate in neurological case discussions.
- Apply methodologies for assessment and management of patients with cerebrovascular diseases, including neurological examination, laboratory studies, neurophysiological tests, and imaging studies.
- Manage stroke patients in both emergency and outpatient settings, with clear understanding of indications for intravenous thrombolysis and mechanical thrombectomy.
- Understand the organization and layout of a stroke unit.
- Learn the basic principles of stroke rehabilitation.
- Acquire knowledge through critical reading of relevant literature.
- Exchange knowledge and experiences with peers.
- Contribute to the design and implementation of national and regional public health policies related to stroke.

Program costs and funding

The Buenos Aires Stroke School is a non-profit educational initiative. While participation fees are required to help cover organizational expenses, the program's cost structure aims to ensure accessibility and financial sustainability. Fees evolved over time due to economic fluctuations in Argentina. For instance, in 2019, the registration fee was ARS 15,000 (approximately USD 250 at the time), while the most recent



Fig. 1. Curriculum of the Buenos Aires Stroke School (March 2024 edition).

The program consists of 50 hours of academic activities delivered over five days, including lectures, clinical case discussions, simulation-based workshops, and hospital tours. Topics cover acute stroke management, imaging, stroke unit organization, neurocritical care, rehabilitation, and public health strategies. Educational formats include plenary sessions, parallel workshops, and interprofessional simulations. The curriculum is delivered by a multidisciplinary faculty from across Latin America.

edition in 2024 had a fee of USD 500. These fees covered on-site costs such as venue services, daily meals (breakfast, lunch, and snacks), social and cultural activities, and participant transportation between sites.

Several participants received financial support from their home institutions, local health ministries, or national stroke programs. In recent editions, a number of attendees from Latin America also benefited from travel grants and sponsorships provided by the Angels Initiative. No faculty member received compensation, and all funds collected were exclusively allocated to delivering the program.

Follow-up survey design and implementation

To evaluate the medium-term institutional impact of the Buenos Aires Stroke School, a structured follow-up survey was sent electronically to all 69 participants from the five editions. The survey, developed using Google Forms, included closed-ended and multiple-response items addressing stroke care implementation at participants' institutions. Domains included the initiation or expansion of intravenous thrombolysis and mechanical thrombectomy, establishment or improvement of stroke units, pursuit of stroke center certification, and subsequent engagement in stroke-related educational and community initiatives, following course participation.

The instrument was initially drafted by the program team and reviewed by the course directors. Its structure followed internal recommendations from the institutional Department of Medical Education for post-training assessments. The survey was first distributed in January 2025, and two reminder emails were sent 15 and 30 days later. Participation was voluntary, anonymous, and non-incentivized. The complete survey instrument is available as Supplementary Material.

Outcomes

Participant characteristics and institutional background

Across the five editions, a total of 69 participants from 11 Latin American countries attended the program. Of these, 30 were from

Argentina, representing 13 provinces including Córdoba (8), Buenos Aires Province (5), Mendoza (3), Santa Fe (3), Neuquén (3), and others with individual representation. The remaining 39 participants came from Peru (14), Uruguay (8), Chile (5), Ecuador (2), Colombia (2), Mexico (3), Costa Rica (2), Panama (1), Honduras (1), and the Dominican Republic (1) (Fig. 2).

Diversity was a key consideration during the selection process, with equal opportunity promoted across gender (56% women, 44% men). The average age was 34 years. Of the 69 participants across all editions, 59 (85.5%) were neurologists, most of them in the final stage of residency or early subspecialty training. The remaining 10 participants represented other disciplines involved in stroke care, including intensivists (4.3%), internists (2.9%), neurointerventionists (2.9%), and emergency physicians (1.4%).

Participants were affiliated with a wide range of institutions across Latin America. A total of 63.8% were based in public hospitals, 30.4% in private institutions, and 5.8% in mixed or university-affiliated centers. Approximately one-third of the cohort worked in tertiary care hospitals with academic affiliations, including teaching hospitals and nonprofit training centers. The remaining participants were based in general hospitals or regional referral centers, some of which serve rural or underserved populations with limited access to specialized stroke care. This diversity in institutional background was deliberate: the program aimed to train future stroke leaders from both well-resourced academic centers and underserved areas, increasing the potential for system-level improvements across different health care settings.

Follow-up survey results

A total of 29 responses were collected (42% of the 69 participants across all five editions). The majority of respondents were neurologists (90%). Among the most commonly reported improvements were an increase in the use of intravenous thrombolysis (62%) and updates to existing stroke units (45%). A total of 28% reported initiation of IV thrombolysis at their institution, and 17% reported the creation of a new stroke unit. While mechanical thrombectomy had a lower frequency of

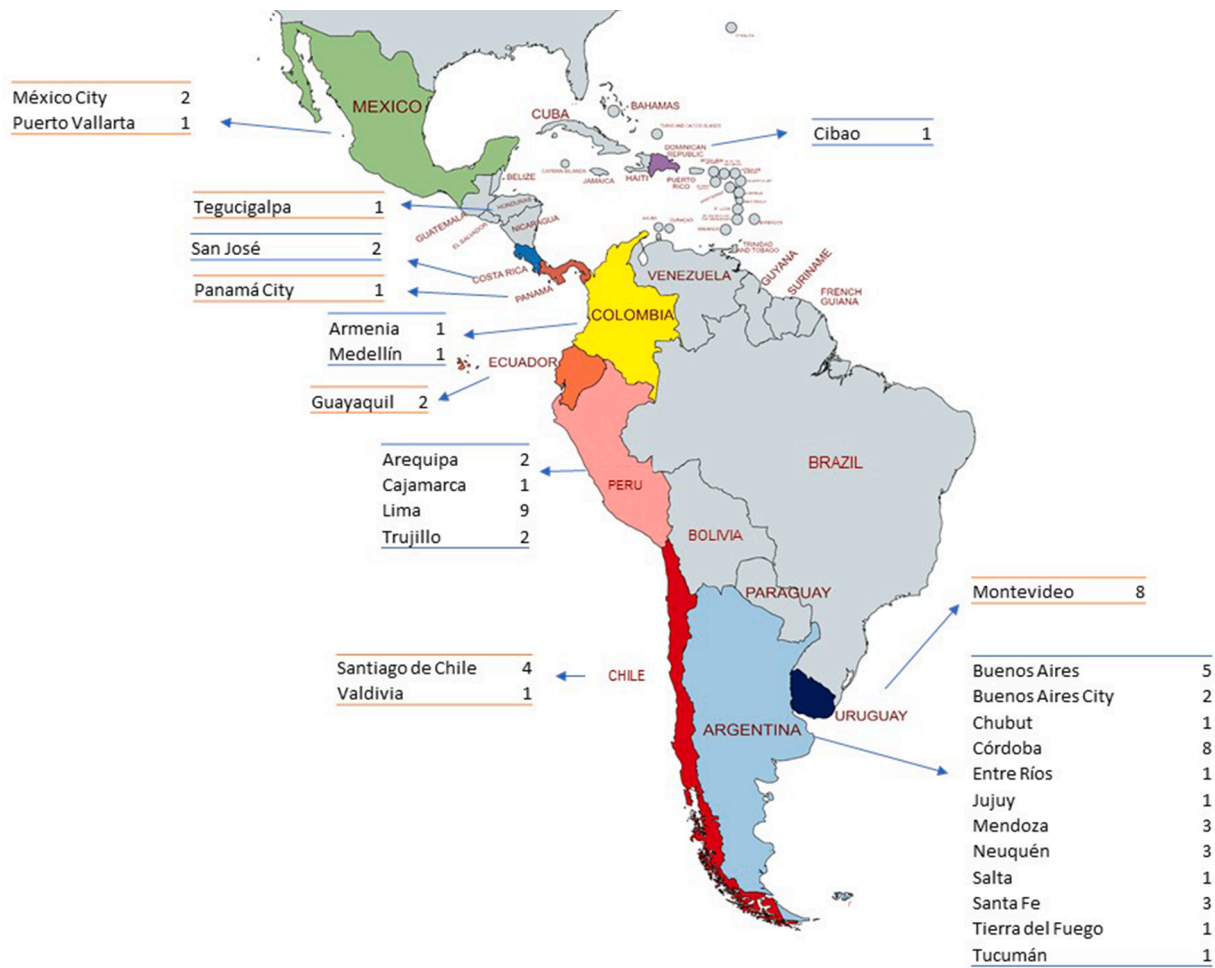


Fig. 2. Geographic distribution of participants in the Buenos Aires Stroke School (2019–2024). Map showing the cities and countries of origin of the 69 participants across the first five editions of the program. Argentina had the highest representation, with participants from 13 different provinces. Other countries represented include Peru, Uruguay, Chile, Ecuador, Colombia, Mexico, Costa Rica, Panama, Honduras, and the Dominican Republic. The numbers indicate the total participants from each location.

change (reported by 10% for both initiation and increase), these cases remain relevant given the infrastructure requirements and complexity of implementation.

Importantly, 72% of respondents reported conducting educational or

training activities at their institution after participating in the course, and 55% launched or expanded community education initiatives focused on stroke. Additionally, six centers (21%) completed the WSO/SIECV Stroke Center Certification process, demonstrating sustained

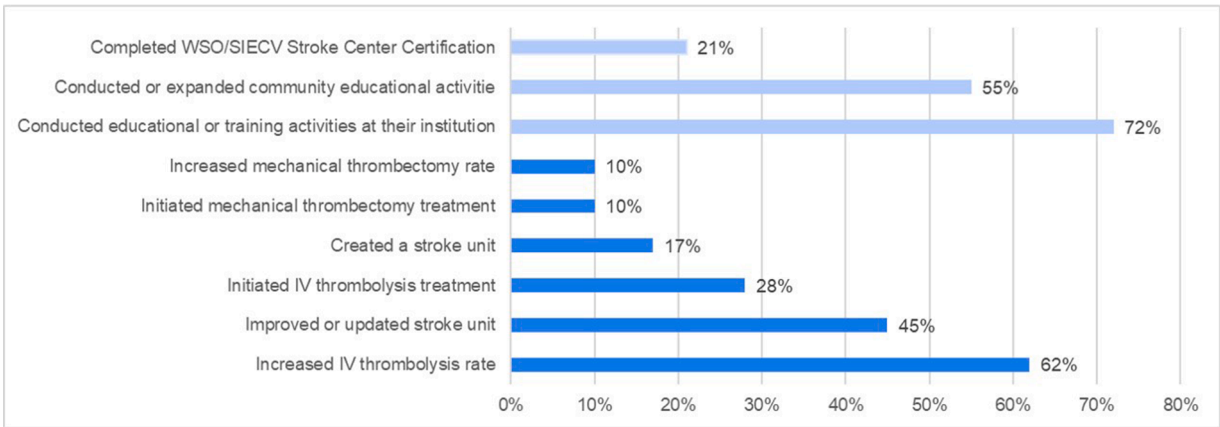


Fig. 3. Self-reported improvements and activities implemented after participation in the Buenos Aires Stroke School. Results from the follow-up survey completed by 29 participants across the first five editions of the program. Respondents reported a variety of institutional improvements in stroke care, including increased use of intravenous thrombolysis (62%), updated stroke units (45%), and new educational or community outreach initiatives. WSO: World Stroke Organization; SIECV: Ibero-American Stroke Organization; IV: Intravenous.

institutional progress. These outcomes are summarized in Fig. 3.

To further explore the geographic variability of impact, we reviewed the data by country, which is presented in Fig. 4. Countries with the highest number of responses included Argentina, Peru, Chile and Mexico. Improvements such as the implementation of thrombolysis and the creation or upgrading of stroke units were reported across multiple countries, though more frequently in Argentina and Peru.

While the survey did not include a dedicated section on challenges, several participants described ongoing difficulties in the open-ended responses. Some respondents indicated that although they were motivated to implement changes, they had not yet initiated educational activities or institutional improvements due to limited support or competing responsibilities. Others mentioned delays in achieving stroke center certification, often related to institutional bureaucracy or lack of resources. During post-course discussions and alumni events, additional challenges were frequently raised. These included the limited availability of high-quality stroke training opportunities in some countries, difficulties in accessing international mentorship, and structural barriers to conducting stroke-related research in Latin America. These insights reflect broader systemic limitations and underscore the need for sustained support and regional collaboration to ensure long-term impact.

Limitations

As with any educational initiative, the Buenos Aires Stroke School faced several challenges during its development, implementation, and evaluation. In the initial design phase, aligning resources, values, and operational workflows between a public and a private institution required sustained coordination and mutual adaptation. During implementation, logistical complexity was significant. Organizing requirements for participants from multiple Latin American countries demanded careful planning. Scheduling a full week in which a large number of faculty could devote exclusive time to teaching activities also represented a considerable institutional commitment.

Although the follow-up survey was sent to all 69 participants, the response rate was low, despite multiple reminders. This limited our ability to capture a fully representative picture of program impact. Additionally, as participation in the survey was voluntary, it is possible that those who responded were more engaged or motivated than others, introducing a potential response bias. Most importantly, the observational and retrospective design of this evaluation does not allow for

causal inference. While many participants reported institutional improvements following their participation in the program, we cannot determine whether these changes were a direct result of the Stroke School. It is possible that some of the reported improvements were already planned or underway prior to course attendance. Furthermore, individuals already motivated to lead institutional change may have been more likely to apply and be selected, introducing a selection bias. These limitations should be considered when interpreting the results.

As with many short-format training programs, long-term knowledge retention and practice change were not formally assessed, and future meetings may benefit from longitudinal tracking of participant outcomes.

Broader impact and future directions

Educational and exchange activities are essential to foster the development of vascular neurology specialists in Latin America. The Buenos Aires Stroke School reflects the value of structured, multimodal stroke education. Initiatives combining lectures, simulation-based training, and interdisciplinary collaboration have shown measurable benefits in improving acute stroke management and clinical decision-making skills⁷. Programs that incorporate simulation and active learning have also proven effective in promoting long-term retention and application of knowledge^{8,9}.

Beyond technical content, the development of teaching and leadership competencies among medical trainees is increasingly recognized as a critical component of clinician training^{10,11}. Resident-to-resident teaching and interdisciplinary educational strategies have demonstrated strong outcomes in terms of engagement and knowledge acquisition¹².

Globally, academic organizations have highlighted the importance of virtual and flexible learning models in stroke education. The World Stroke Academy has promoted the dissemination of evidence-based content in low- and middle-income countries, adapting formats to meet local needs and constraints^{13,14}. Similarly, new curriculum designs, such as the STaR program (Stroke, Thrombectomy, and Revascularization), have successfully increased exposure to vascular neurology during residency, even in settings with limited access to stroke specialists¹⁵.

Efforts to enhance stroke education must also address structural challenges. Reports from neurology residency programs in high-income

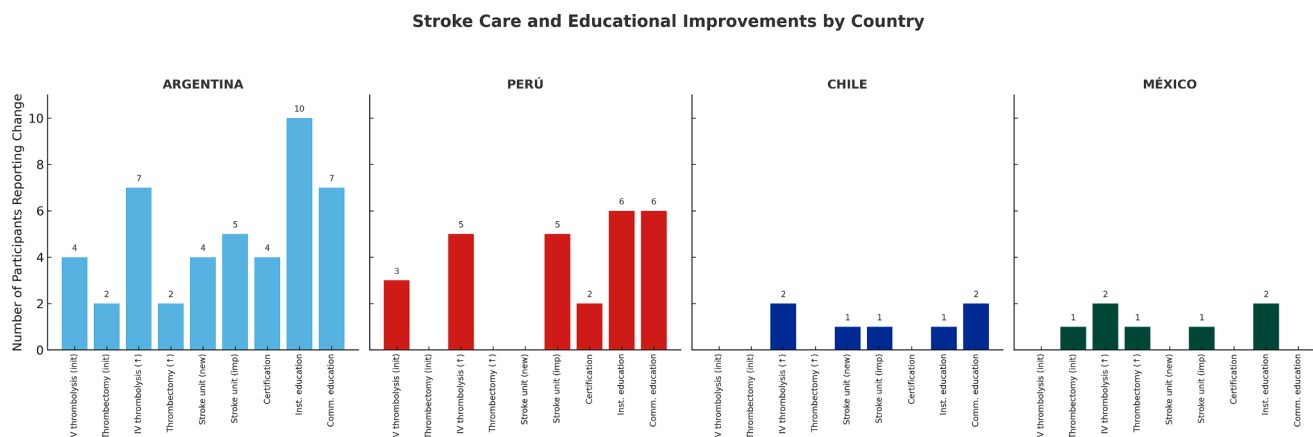


Fig. 4. Self-reported stroke care improvements and educational activities by country among participants of the Buenos Aires Stroke School.

This figure summarizes the number of participants who reported implementing specific stroke care improvements or educational initiatives following their participation, grouped by country. Only countries with at least two survey responses were included: Argentina (n=11), Peru (n=10), Chile (n=3), and Mexico (n=2). Bars represent the number of participants from each country who reported achieving each item.

Abbreviations: IV thrombolysis (init) = initiation of intravenous thrombolysis; Thrombectomy (init) = initiation of mechanical thrombectomy; IV thrombolysis (↑) = increased rate of intravenous thrombolysis; Thrombectomy (↑) = increased rate of mechanical thrombectomy; Stroke unit (new) = creation of a new stroke unit; Stroke unit (imp) = improvement of an existing stroke unit; Certification = WSO/SIECV stroke center certification; Inst. education = institutional stroke training activities; Comm. education = community-focused stroke education or outreach.

countries reveal variability in clinician-educator tracks and limited formal preparation for teaching roles¹⁶. In Latin America, these challenges are compounded by disparities in access to training, especially in underserved areas. The Buenos Aires Stroke School responds to this regional gap by offering an immersive, multidisciplinary, and regionally adapted training model.

Many alumni have gone on to lead institutional change: implementing or expanding stroke units, obtaining international certifications, launching telestroke networks, and organizing local training programs. At the 2023 Global Stroke Alliance Meeting, a dedicated session brought together alumni from multiple cohorts, illustrating the program's impact on peer collaboration, and regional leadership. The success of this initiative has also inspired similar programs, including the Autumn Stroke School held in Mexico^{17,18}.

Inspired by international models such as the European Stroke Organization Summer and Winter Schools or the World Stroke Organization Future Stroke Leaders Program¹⁹, our initiative builds a platform that connects early-career professionals with mentors, training, and regional integration opportunities. Future editions aim to deepen these connections through long-term follow-up, virtual alumni forums, and partnerships with national and regional stroke programs.

Funding

This article did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author contributions

All authors contributed to the conceptualization, writing, and editing of the manuscript, and approved the final version.

Generative AI and AI-assisted technologies were not used in the preparation of this work.

CRediT authorship contribution statement

Matías J. Alet: Writing – review & editing, Writing – original draft. **Raúl C. Rey:** Writing – review & editing, Writing – original draft, Conceptualization. **Sebastián F. Ameriso:** Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in

the online version, at [doi:10.1016/j.jstrokecerebrovasdis.2025.108405](https://doi.org/10.1016/j.jstrokecerebrovasdis.2025.108405).

References

- Geraghty JR, Testai FD, Biller J. Stroke education: Engaging learners and the community to advance care for cerebrovascular disease. *J Stroke Cerebrovasc Dis*. 2025;34(1), 108152. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2024.108152>.
- Gompertz P, Slack A, Vogel M, Burrows S, Clark P. Education in stroke: strategies to improve stroke patient care. *Hosp Med*. 2002;63(7):408–411. <https://doi.org/10.12968/hosp.2002.63.7.1984>.
- Gubitz G, Saini M, Belson S, Sahathevan R, Sandercock P. How can the World Stroke Organization (WSO) optimize education in stroke medicine around the world? Report of the 2018 WSO Global Stroke Stakeholder Workshop. *Int J Stroke*. 2019;14(8):803–805. <https://doi.org/10.1177/1747493019874726>.
- ESO Stroke Summer School. Accessed 2 January 2025. <https://eso-stroke.org/meetings/summer-school/>.
- Fleni Centro Integral de Neurología Vascular. Accessed 3 January 2025. <https://www.fleni.org.ar/especialidades/neurologia/centro-integral-de-neurologia-vascular/>.
- Neurología Hospital J. M. Ramos Mejía. Accessed 3 January 2025. <https://www.hospitalramosmejia.com.ar/neurologia.html>.
- Mehta T, Strauss S, Beland D, Fortunato G, Staff I, Lee N. Stroke simulation improves acute stroke management: a systems-based practice experience. *J Grad Med Educ*. 2018;10(1):57–62. <https://doi.org/10.4300/JGME-D-17-00167.1>.
- Evans NR, Minhas JS, Mehdi Z, Mistri AK. Incorporating simulation-based education into stroke training. *Stroke*. 2021;52(1):e6–e9. <https://doi.org/10.1161/STROKEAHA.120.031056>. Epub 2020 Nov 20.
- Karpa K, Pinto C, Possanza A, et al. Stroke simulation activity: a standardized patient case for interprofessional student learning. *MedEdPORTAL*. 2018;14, 10698. <https://doi.org/10.15766/mep.2374-8265.10698>.
- Chen HC, Wamsley MA, Azzam A, Julian K, Irby DM, O'Sullivan PS. The health professions education pathway: preparing students, residents, and fellows to become future educators. *Teach Learn Med*. 2017;29(2):216–227. <https://doi.org/10.1080/10401334.2016.1230500>.
- Habibi J, Bosch J, Bidulka P, et al. Strategies for specialty training of healthcare professionals in low-resource settings: a systematic review on evidence from stroke care. *BMC Med Educ*. 2023;23(1):442. <https://doi.org/10.1186/s12909-023-04431-w>.
- Rodriguez A, Strowd R, Reynolds P, Lefebvre C. Integrating resident-to-resident teaching in interdisciplinary stroke education. *Med Educ*. 2014;48(5):534. <https://doi.org/10.1111/medu.12462>.
- Markus HS, Saposnik G. Improving stroke care through education: the world stroke academy. *Int J Stroke*. 2020;15(7):703. <https://doi.org/10.1177/1747493020954748>.
- Saposnik G, Galanos LC, Guerrero R, et al. The world stroke academy: a world stroke organization global pathway to improve knowledge in stroke care. *Int J Stroke*. 2022;17(8):829–834. <https://doi.org/10.1177/17474930221085895>.
- Loebel E, Markantone D, Sisniega D, Stein L. Curriculum innovation: increasing exposure to stroke neurology with multi-modal virtual education in the stroke, thrombectomy, and revascularization course. *Neurol Educ*. 2024;3, e200145. <https://doi.org/10.1212/NE9.00000000000200145>.
- Jacoby N, Lau KHV, Ekwebelem MI, Moeller JJ, Shalev D. Education research: the current landscape of clinician educator tracks in adult neurology residency programs: a national survey of program directors. *Neurol Educ*. 2024;3(3), e200142. <https://doi.org/10.1212/NE9.00000000000200142>.
- Autumn Stroke School. Accessed 12 July 2025. <https://www.world-stroke.org/what-we-do/uniting-the-stroke-community/regional-engagement/upcoming-events/autumn-stroke-school-Mexico>.
- Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez. Accessed 12 July 2025. <https://www.gob.mx/innn>.
- World Stroke Future Leaders. Accessed 2 January 2025. <https://www.world-stroke.org/world-stroke-future-leaders>.