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Letter to the editor

Addressing the workforce gap: a call to action for aortic surgery training in Peru

Abordando la brecha de profesionales: un llamado a la acción para la formación en cirugía aórtica en el Perú

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To the Editor:

The management of complex aortic disease has undergone a profound transformation over the past two decades, evolving from a predominantly open surgical discipline into a sophisticated field requiring expertise in open, endovascular, hybrid, and multidisciplinary approaches [1-3]. The contemporary aortic surgeon must function as a true "surgeon-physician," with expertise in pathophysiology, advanced imaging, pharmacological and procedural therapies, and lifelong surveillance [3]. This evolution has led to specialized aortic centers, multidisciplinary teams, and dedicated training pathways in high-income countries [1,2]. The urgency of developing such expertise is underscored by the devastating natural history of acute aortic syndrome (AAS), including acute aortic dissection, intramural hematoma, and penetrating aortic ulcer. Untreated AAS may carry mortality rates of approximately 1–2% per hour during the initial phase, while substantial pre-hospital mortality occurs before patients reach definitive care. Even among patients who reach the hospital, Type A dissection remains associated with considerable early mortality [4]. Timely access to expert aortic care is therefore a matter of life and death.

The Peruvian reality: a critical workforce gap

Peru currently has approximately 580 cardiovascular and thoracic surgeons, yet fewer than ten have received formal, structured training specifically in aortic surgery [5]. Most surgeons performing aortic procedures have acquired their expertise through clinical rotations, international observerships, or accumulated experience rather than through dedicated competency-based fellowships. Although these pathways reflect individual initiative and institutional needs, they cannot consistently provide the comprehensive expertise required for increasingly complex aortic disease. The current structure of cardiovascular surgical training further compounds this problem. The Thoracic and Cardiovascular Surgery program in Peru is generally organized as a four- to five-year integrated pathway encompassing cardiac surgery, vascular surgery, thoracic disease, and critical care. Although this provides essential breadth, it necessarily limits the time available for advanced aortic training or any dedicated cardiac, vascular, or thoracic training. Geographic centralization represents an additional challenge. Approximately 85% of cardiovascular surgeons practice in Lima, although the capital represents only around 30% of the national population. Consequently, the remaining population has substantially less access to specialized cardiovascular care [5]. Major cardiovascular centers in Lima have demonstrated the capacity to perform high volumes of cardiovascular surgery. Still, national training infrastructure has not kept pace with demand for complex aortic expertise [6].

The case for specialization

Clinical outcomes support the argument for dedicated aortic training. In a retrospective study of 232 patients undergoing surgery for acute Type A aortic dissection, specialist aortic surgeons achieved a 30-day mortality rate of 10%, compared with 26% among non-specialists. The survival advantage persisted long-term, with a 14-year mortality rate of 26% versus 52%, respectively [7]. Specialist surgeons also performed more complex aortic root procedures and achieved shorter cross-clamp and cardiopulmonary bypass times [7]. Evidence from thoracoabdominal aortic aneurysm surgery similarly demonstrates the importance of specialization and volume. Among 3,912 patients undergoing AAA repair, mortality was

2.2% for vascular surgeons, compared with 4.0% for cardiac surgeons and 5.5% for general surgeons. High-volume surgeons had a substantially lower risk, while vascular specialty training remained independently associated with better outcomes [8].

These findings support a fundamental principle: complex aortic pathology requires focused expertise. The breadth of disease, including acute dissection, aneurysmal degeneration, arch pathology, connective tissue disorders, and lifelong surveillance, demands structured education extending beyond conventional 4-to 5-year cardiovascular surgical training [1,2].

The multidisciplinary imperative

Modern aortic care requires more than technical proficiency. The contemporary model emphasizes multidisciplinary decision-making involving cardiac and vascular surgeons, cardiologists, intensive care medicine specialists, interventional and diagnostic radiologists, and other relevant specialists [1]. Such teams facilitate shared decision-making, standardize treatment pathways, establish quality benchmarks, and support the regionalization of complex care [1,9]. The aortic arch illustrates this need particularly well. Its anatomical complexity and the increasing availability of open, hybrid, and endovascular strategies make treatment decisions highly individualized. No single specialty necessarily possesses all the specialized knowledge required to provide comprehensive care; therefore, collaborative assessment is essential [9]. For Peru, developing multidisciplinary aortic teams should accompany workforce development. This requires dedicated centers, referral pathways for acute and chronic aortic disease, coordinated imaging and treatment strategies, and lifelong surveillance programs.

Reimagining aortic training in Peru

A pragmatic strategy should combine domestic development with international exposure. First, ideally, the thoracic and cardiovascular surgery program must be divided, possibly into cardiovascular and thoracic, with independent pathways and a period of hospital training. However, another possibility would be to encourage an international advanced aortic training program after the completion of a core cardiovascular surgical program. This program would be a one- to three-year period of focused training that could provide progressive exposure to open aortic surgery, endovascular therapy, hybrid procedures, advanced imaging, and multidisciplinary decision-making. Second, these structured international aortic fellowships or programs should be widely and actively promoted across the Peruvian cardiovascular centers. International "super-fellowships" can provide concentrated exposure to complex endovascular procedures, including fenestrated and branched repairs, as well as preoperative planning, fusion imaging, and multidisciplinary workflows [10]. Such programs are particularly valuable when specific technologies or case volumes are not yet available nationally. Third, Peru should establish recognized aortic centers capable of concentrating expertise and case volume. These centers should integrate open and endovascular capabilities and use multidisciplinary teams to determine individualized treatment strategies [1,3]. Regionalization of complex cases could simultaneously improve patient access to expertise and create an appropriate environment for trainee education. Finally, dedicated aortic outpatient clinics and surveillance programs should be developed. Aortic care extends beyond the index operation; specialists must monitor repair integrity, untreated aortic segments, disease progression, and indications for future intervention [2].

The path forward

Closing Peru's aortic workforce gap will require sustained institutional commitment and major surgical residency changes, investment in training, international collaboration, and strategic regionalization. The challenge is substantial, particularly given the concentration of specialists in Lima and the limitations of healthcare resources [5]. Nevertheless, Peru possesses the clinical infrastructure and human capital necessary to develop a new generation of aortic specialists. Structured specialty training, international aortic fellowships, multidisciplinary aortic teams, and dedicated centers provide a realistic roadmap. The objective should not simply be to increase the number of surgeons performing aortic procedures but to develop specialists capable of managing the entire spectrum of aortic disease through open, endovascular, and hybrid approaches. Young Peruvian surgeons should have access to clearly defined training pathways, appropriate mentorship, progressive autonomy, and exposure to high-volume multidisciplinary practice. The time for action is now. Developing a structured national strategy for aortic surgery training would represent an important step toward reducing inequities in access to complex cardiovascular care and ensuring that patients throughout Peru can receive timely, comprehensive, and contemporary treatment for aortic disease **(Figure 1)**.

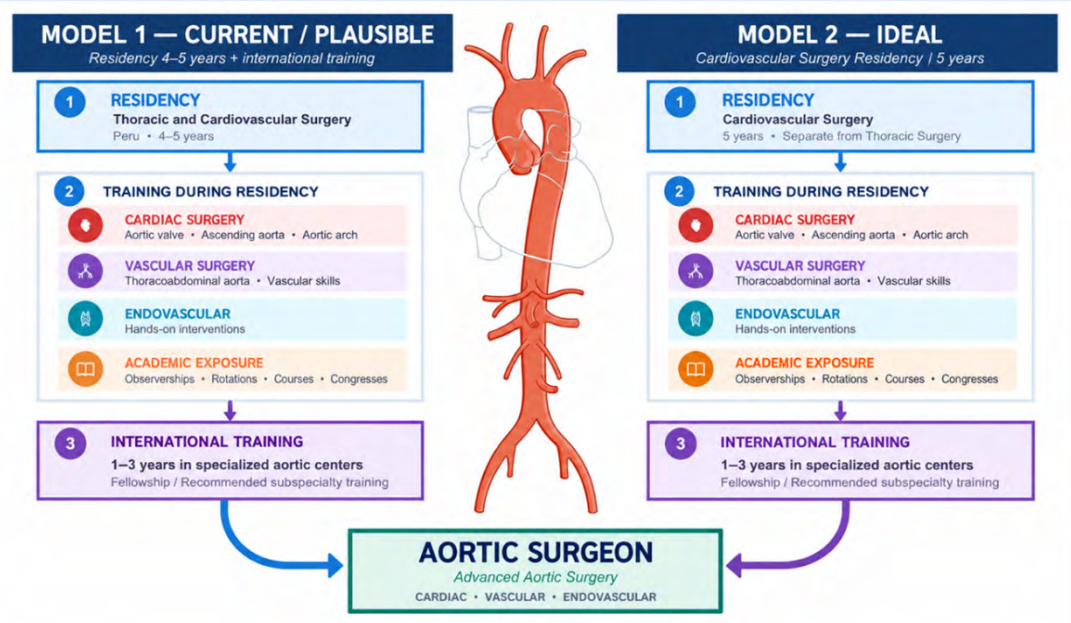


Figure 1. Comparison of two potential training pathways toward advanced aortic surgery.

Model 1 (current/plausible) combines a 4–5-year Thoracic and Cardiovascular Surgery residency with cardiac, vascular, and endovascular training, followed by 1–3 years of international training at specialized aortic centers. Model 2 (ideal) proposes an independent 5-year Cardiovascular Surgery residency integrating cardiac, vascular, and endovascular training, followed by 1–3 years of international aortic fellowship or subspecialty training. Both pathways converge toward advanced aortic surgical expertise.

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