Indonesian Journal of Cardiology
Indonesian J Cardiol 2025:46:138-143
pISSN; 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1971

Editorial

Revisiting Subspecialty Training in Cardiology in Indonesia: Structural, Regulatory, and Global Perspectives

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Abstract

The rapid expansion of cardiology as a discipline has prompted the emergence of numerous subspecialties that require structured, competency-based training. In Indonesia, however, the development of subspecialty education remains inconsistent, divided between university-based programs known as *Spesialis-2* (Sp-2) and hospital-based clinical fellowships. The interchangeable use of the terms "fellowship" and "subspecialty" has generated conceptual ambiguity and regulatory uncertainty. Globally, cardiology subspecialty training follows a hospital-based apprenticeship model led by accredited teaching hospitals and regulated by national or regional professional boards such as the Accreditation Council for Graduate Medical Education (ACGME), the American College of Cardiology (ACC), or the European Society of Cardiology (ESC). Indonesia's deviation from these international norms has implications for both the quality of advanced cardiovascular training and the nation's potential to attract international fellows—a marker of global academic recognition. This review examines the current landscape of cardiology subspecialty training in Indonesia, compares it with global frameworks, and discusses academic, structural, and legal challenges, including those related to foreign trainees. A policy framework is proposed to harmonize Indonesia's subspecialty education with global standards, thereby strengthening national capacity and international credibility.

(Indonesian J Cardiol, 2025;46;138-143)

Introduction

Cardiology has evolved rapidly into a diverse field that requires highly specialized expertise, encompassing interventional cardiology, electrophysiology, heart failure, cardiac imaging, and preventive cardiology. This global shift has been supported by structured subspecialty programs emphasizing clinical apprenticeship, procedural competency, and research engagement. The American College of Cardiology (ACC) and the American Heart Association (AHA) have repeatedly emphasized the importance of competency-based subspecialty training as the cornerstone of high-quality cardiovascular care.[1-2]

In Indonesia, subspecialty training remains fragmented and inconsistently defined. The term *Spesialis*-2 (Sp-2) refers to a formal academic pathway under university governance[3], whereas fellowship denotes hospital-based programs often initiated by tertiary cardiac centers.[4] The absence of unified terminology and accreditation criteria creates confusion among both professionals and regulators. Furthermore, unlike the standardized hospital-based apprenticeship model widely accepted globally, Indonesia's system remains largely university-centric.

The emergence of foreign physicians seeking advanced training in Indonesia would signify the maturity and competitiveness of Indonesian cardiology education. However, such progress demands legal certainty, institutional readiness, and global alignment in training standards. This review critically analyzes the existing system of subspecialty training in cardiology in Indonesia, examining its terminological, structural, and legal dimensions, and providing evidence-based recommendations for reform.

Historical Evolution of Subspeciality Training: Europe, the United States, and Indonesia

The concept of medical subspecialization emerged as a natural consequence of scientific progress and the growing complexity of clinical medicine. In Europe, structured postgraduate specialization began in the early twentieth century but became systematized in Spain after the 1950s. The Spanish Médico Interno Residente (MIR) system, established in 1955, marked a transition from informal apprenticeship to a nationally regulated, merit-based training structure. By the 1980s, legislation through the Royal Decree formally recognized residency as the only legitimate route to specialization, integrating training within university hospitals and linking it to continuous quality assessment and public accountability. This model inspired other European nations to adopt state-regulated, competency-based specialty programs that emphasized hospital-centered apprenticeships and standardized evaluation.[5]

In the United States, specialization and subspecialization evolved in parallel with scientific and institutional reforms. Following the influential Flexner Report of 1910, which called for research-based medical education, American medicine entered an era of structured specialization. The American Board of Ophthalmology became the first specialty board in 1917, followed by the American Board of Medical Specialties (ABMS) in 1933 and the American Board of Internal Medicine (ABIM) in 1936. By the 1970s, internal medicine had divided into multiple organ- and disease-based subspecialties, including cardiology, nephrology, and infectious disease. Over the subsequent decades, the ABIM approved further subspecialties, including interventional cardiology, electrophysiology, and advanced heart failure, reflecting the increasing technical complexity of care and the need for credentialed expertise. Cassel and Reuben observed that subspecialization, although driven by scientific advancements and societal needs, also raised concerns regarding professional fragmentation and the balance between generalist and specialist roles.[6]

In Indonesia, the origin of cardiology subspecialty training is less clearly documented, but it can be traced back to the early 1990s under the pioneering leadership of Dr. Otte J. Rachman, who initiated short-term fellowship-style programs in interventional cardiology. During this period, training typically lasted three to six months and was reserved for cardiologists affiliated with satellite hospitals, focusing primarily on the transfer of procedural skills rather than structured curricula.[7] The modern era of subspecialty education began in 2010, when a physician from Vietnam applied for fellowship training at Binawaluya Cardiac Center, marking the first international participation in an Indonesian cardiac fellowship. Subsequently, Professor Dr. Harmani Kalim, as Chairman of the *Kolegium Jantung dan Pembuluh Darah Indonesia* (KJPDI, Indonesian College of Cardiology), formally appointed Binawaluya as Indonesia's first official

national training center for interventional cardiology. By 2012, a nationwide fellowship network was established across nine accredited training centers, each under the supervision of the KJPDI. This milestone marked the beginning of the National Fellowship Program in Interventional Cardiology, which opened access to all qualified cardiologists in Indonesia without institutional or regional discrimination. Other subspecialties were then established, including electrophysiology, echocardiography, and structural intervention. The establishment of this network not only standardized training but also symbolized Indonesia's commitment to developing a structured, equitable, and globally recognizable framework for cardiology subspecialties.

Global Standards in Cardiology Subspeciality Education

Internationally, subspecialty training in cardiology is guided by well-established frameworks. In the United States, the ACGME defines subspecialty training as a structured, hospital-based apprenticeship conducted after residency or general cardiology fellowship.[8] The 2023 ACC/AHA/SCAI Advanced Training Statement on Interventional Cardiology details competency domains, procedural requirements, and expected research output.[9] In Europe, the ESC and European Board for Accreditation in Cardiology (EBAC) accredit programs based on predefined curricula, mentorship models, and institutional capacity.[10]

These systems share key characteristics, including training within accredited hospitals, mentorship-driven apprenticeships, standardized competency assessments, and independent accreditation harmonized with national authorities. The apprenticeship model promotes direct skill transfer, mentorship, and early integration into multidisciplinary care.[11-12]

Indonesia's Dual System: University-Based versus Hospital-Based Pathways

Indonesia's postgraduate medical education system has evolved from a university-dominated framework where degrees are awarded through academic institutions. The Sp-2 system, administered by universities and accredited by the *Lembaga Akreditasi Mandiri Pendidikan Tinggi Kesehatan Indonesia* (LAM-PTKes, Indonesian Independent Accreditation Agency for Higher Education in Health), an independent regulatory body, continues formal academic pathways.[3] In contrast, hospital-based fellowship programs—usually offered by national cardiac centers—are designed to provide advanced, practical training without conferring an academic degree.

While the Sp-2 model ensures academic rigor and research exposure, it often suffers from bureaucratic rigidity and limited procedural experience due to constraints in patient volume and case diversity. Conversely, hospital-based fellowships are more responsive to clinical innovation and industry collaboration, yet often lack standardized national oversight. This dualism leads to uneven training quality, fragmented curricula, and uncertainty regarding professional recognition by regulatory bodies such as the *Konsil Kedokteran Indonesia* (KKI, Indonesian Medical Council) and the KJPDI.

Similar challenges were reported in surgery, where the introduction of hospital-based residency programs improved responsiveness to health system needs and reduced training bottlenecks.[5,13] Lessons from that reform suggest that cardiology could benefit from greater hospital autonomy under national accreditation supervision.

Apprenticeship as the Core of Subspecialty Training

The apprenticeship model, derived from centuries of medical tradition, remains the backbone of postgraduate clinical education. It emphasizes supervised experiential learning in real clinical environments rather than classroom-based instruction. In cardiology, this model is particularly critical given the rapid evolution of procedural technologies, device therapies, and multimodality imaging.

Studies from the United States and Europe highlight the superiority of apprenticeship-based subspecialty education in achieving procedural competency and in preparing for independent practice.[6,13] The ACGME and ESC frameworks require fellows to demonstrate mastery in procedural skills, clinical decision-making, and academic output before board certification.

In contrast, academic Sp-2 programs in Indonesia often emphasize coursework, thesis production, and theoretical examinations, which, although

academically valuable, may not fully align with the skill-based demands of modern cardiology. Without sufficient procedural volume and exposure, trainees may graduate with limited hands-on proficiency.

A hybrid model integrating the strengths of both systems (academic rigor from universities and clinical apprenticeship from hospitals) could provide an optimal solution. Such a model would require coordinated accreditation, joint supervision, and shared competency benchmarks among the Ministry of Education, the Ministry of Health, and professional bodies such as the *Perhimpunan Dokter Spesialis Kardiovaskular Indonesia* (PERKI, Indonesian Heart Association), the *Pokja Intervensi Kardiologi Indonesia* (PIKI, Indonesian Society of Intervention Cardiology), the KJPDI, and the KKI. A comparison between university-based and hospital-based models, in conjunction with the global model, is depicted in Table 1.

Legal, Immigration, and Ethical Dimensions

Opening Indonesia's subspecialty programs to foreign physicians entails complex legal and ethical considerations. Current immigration and labour regulations do not specifically address foreign doctors in training programs. While temporary medical practice permits can be issued under supervision, there is no comprehensive framework governing academic or clinical apprenticeships for non-Indonesian physicians.

Table 1. Comparison of subspeciality training models.

Aspect	University-Based (Sp-2)	Hospital-Based Fellowship	Global Apprenticeship Model
Governing Body	University / Ministry of Education	Hospital / Specialist Society	Teaching Hospital under National Medical Board
Primary Focus	Academic / research-based	Clinical / procedural skills	Competency-based clinical mastery
Accreditation	Academic accreditation (LAM-PTKes)	Institutional / internal	Independent national / international accreditation
Certification	Academic degree (Sp-2)	Fellowship certificate (KJPDI)	Board certification
Flexibility and responsiveness	Low	Moderate	High
International Recognition	Limited	Low	High

Explanatory note: Flexibility and responsiveness indicate how quickly a subspecialty program adapts to changes in technology and clinical practice. University-based programs typically adapt more slowly due to academic processes, while hospital-based and global models can adjust curricula and clinical experiences more rapidly. International recognition refers to whether a program's training standards and certifications are recognized globally; LAM-PTKes: *Lembaga Akreditasi Mandiri Pendidikan Tinggi Kesehatan Indonesia* (Indonesian Independent Accreditation Agency for Higher Education in Health); KJPDI: *Kolegium Jantung dan Pembuluh Darah Indonesia* (Indonesian College of Cardiology).

This legal vacuum creates risks for both hosting institutions and trainees. Without clear rules on liability, malpractice coverage, or training status, hospitals may be reluctant to accept foreign fellows. Conversely, the absence of legal protection may discourage international participation. Comparative examples from Singapore, Malaysia, and Australia show that structured medical training visas and limited practice licenses can safely regulate international fellowships.[14-16]

Ethically, institutions must ensure equitable access for local physicians, transparent selection, and educational objectives consistent with patient safety. Balancing these concerns requires collaboration among ministries, immigration authorities, and professional associations.

Potential Global Recognition and Academic Diplomacy

The ability to attract international trainees is a recognized indicator of medical-education maturity. Nations such as Singapore, Thailand, and India have become regional hubs for subspecialty training due to

harmonization with global standards and proactive academic diplomacy. If Indonesian institutions can provide accredited, transparent, and competency-based subspecialty programs, they could enhance regional cooperation and elevate Indonesia's academic reputation in cardiovascular medicine.

Beyond prestige, international fellows contribute to local innovation, joint research, and economic growth through tuition and service exchange. The broader impact includes strengthening Indonesia's soft power in global health and fostering collaboration at the ASEAN level. However, to achieve this, programs must be standardized, internationally benchmarked, and legally protected. Without such reforms, Indonesia risks remaining an educational consumer rather than a provider in the global medical ecosystem.

Policy Recommendations

Reform of subspecialty cardiology education in Indonesia requires multisectoral coordination. A unified terminology should clearly distinguish between academic Sp-2 programs and clinical fellowships while placing both under a national competency framework. An independent accreditation system—analogous to ACGME or EBAC—should be established under joint oversight by the KKI and KJPDI. Legal mechanisms must regulate the participation of foreign trainees, including visa, licensing, insurance, and institutional responsibility.

In the long term, Indonesia should pursue mutual-recognition agreements with international cardiology societies. Such reciprocity would enable exchange fellowships, collaborative research, and elevate Indonesia's role as a regional leader in cardiovascular education.

Limitation

This article is a narrative and policy-oriented analytical review that synthesizes publicly available regulatory documents, historical accounts, and international accreditation standards. No primary empirical data, surveys, or quantitative evaluations were collected. Accordingly, the analysis depends on the completeness and accuracy of existing policies and published literature. While the recommendations are grounded in comparative and normative frameworks, future empirical research—such as competency-based assessments, stakeholder interviews, systematic data collection from training centers, and quantitative evaluations of training outcomes and national workforce needs—is required to validate and refine the proposals presented in this manuscript.

Conclusion

Cardiology subspecialty education in Indonesia stands at a crossroads. While academic universities provide a robust scientific foundation, they lack the procedural dynamism and flexibility of hospital-based apprenticeship programs. The coexistence of university-based and hospital-based systems without a unified regulatory framework has resulted in ambiguity and fragmentation. To elevate Indonesia's position in global cardiovascular medicine, an integrated hybrid model—combining academic rigor, clinical apprenticeship, and international accreditation—is essential. Furthermore, legal reforms to support international trainees would enhance Indonesia's global recognition and reinforce the country's vision to become a center of excellence in cardiovascular training and innovation.

List of Abbreviations

ABIM	American Board Internal Medicine
ABMS	American Borad of Medical Specialties
ACC	American College of Cardiology
ACGME	Accreditation Council for Graduate Medical Education
AHA	American Heart Association
EBAC in	European Board for Accreditation Cardiology
ESC	European Society of Cardiology
KJPDI	Indonesian College of Cardiology
KKI	Indonesian Medical Council
LAM-PTKes	Indonesian Independent Accreditation Agency for Higher Education in Health
MIR	Médico Interno Residente
PERKI	Indonesian Heart Association
PIKI	*Pokja Intervensi Kardiologi Indonesia*
SCAI	Society for Cardiovascular Angiography & Interventions
Sp-2	*Spesialis-2*

Conflict of Interest Statement

The authors declare no conflicts of interest related to the preparation, content, or publication of this manuscript. No funding was received for this work.

Generative AI and AI-Assisted Technologies in the Writing Process

The authors acknowledge that artificial intelligence (AI) tools were used solely for language editing (Grammarly) and for assisting in reference checking (Scopus AI). These tools did not generate, analyze, or alter any scientific content, results, or conclusions presented in this manuscript.

References

1. Shapiro MD, Maron DJ, Morris PB, Kosiborod M, Sandesara PB, Virani SS, Khera A, Ballantyne CM, Baum SJ, Sperling LS, et al. Preventive Cardiology as a Subspecialty of Cardiovascular Medicine: JACC Council Perspectives. J Am Coll Cardiol. 2019;74:1926–42. doi: 10.1016/j.jacc.2019.08.1016
2. Bass TA. Certification and competency in interventional cardiology: the changing landscape. Circ Cardiovasc Interv. 2012;5:450–3. doi: 10.1161/CIRCINTERVENTIONS.112.972844
3. *Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi, Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia. Penugasan Pembukaan Program Studi Dokter Spesialis dan Subspesialis.* Jakarta: 2025.
4. Jaya A. *Surat Edaran Nomor* TK.02.04/D/5098/2025: *Penguatan Peran Rumah Sakit dalam Program Pendidikan Dokter Spesialis.* Jakarta: 2025.
5. Freire JM, Infante A, de Aguiar AC, Carbajo P. An analysis of the medical specialty training system in Spain. Hum Resour Health. 2015;13:42. doi: 10.1186/s12960-015-0038-y
6. Cassel CK, Reuben DB. Specialization, subspecialization, and subsubspecialization in internal medicine. N Engl J Med. 2011;364:1169–73. doi: 10.1056/NEJMsb1012647
7. Munawar M. *Perkembangan Kedokteran Kardiologi di Indonesia: Layanan, Pendidikan Dokter Spesialis dan Pendidikan Lanjutan di Bidang Kardiologi.* Indonesian Journal of Cardiology. 2007;28:2–5.
8. Education ACGME. ACGME Program Requirements for Graduate Medical Education in Cardiovascular Disease: Summary and Impact of Major Requirement Revisions. In: Chicago, IL: Accreditation Council for Graduate Medical Education; 2023.
9. Wiley BM, Zern EK. Defining Training in Critical Care Cardiology: What is the "Gold Standard?". JACC Adv. 2024;3:100849. doi: 10.1016/j.jacadv.2024.100849
10. EBAC. EBAC Policy Statement and Accreditation Rules. In: Paris, France: European Board for Accreditation in Cardiology; 2011.
11. Holmboe ES, Sherbino J, Long DM, Swing SR, Frank JR. The role of assessment in competency-based medical education. Med Teach. 2010;32:676–82. doi: 10.3109/0142159X.2010.500704
12. Faiella W, Navjot S, Ramer S. Competency-Based Cardiology Training: A Simple Approach to Improve Supervisor Completion of Entrustable Professional Activities. CJC Open. 2024;6:1248–53. doi: 10.1016/j.cjco.2024.07.007
13. Lukman K. Establishment of hospital-based surgical residency programs as a health policy for surgical needs provision: an Indonesian perspective. Ann Med Surg (Lond). 2023;85:4643–5. doi: 10.1097/MS9.0000000000001130
14. Council SM. Apply for Registration. https://www.smc.gov.sg/for-professionals/apply-for-registration. 2025. Accessed October 26.
15. AMC. Resources for international medical graduates. https://www.amc.org.au/resources-for-international-medical-graduates/. 2025.
16. Shapie DDAB. Malaysia's Experience: Procedures on Mobility of ASEAN Doctors. In: Practitioners AJCCoM, ed. 20th Meeting of the AJCCM. Semarang, Indonesia: Malaysian Medical Council; 2017.