A system divided: the state of neurosurgical training in modern-day Vietnam

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The current report is the first of its kind in describing the neurosurgical training in modern-day Vietnam. Starting with in-depth face-to-face interviews, followed by electronically distributed questionnaires, a detailed picture of the training systems emerged.

Neurosurgical training in Vietnam is multifaceted and dichotomous. The country of nearly 100 million people currently has only one neurosurgery-specific residency program, at the University of Medicine and Pharmacy at Ho Chi Minh City (UMPHCMC). This program lasts for 3 years, and Westerners might recognize many similarities to programs native to their countries. A similar training program exists in the north, at the Hanoi Medical University, but at this institution, trainees focus on neurosurgery only in the final year of their 3-year training. Neurosurgical training that resembles the program in Hanoi permeates the rest of the country, and the goal for all of the programs is to rapidly produce surgeons who can be dispersed throughout the country to treat patients requiring urgent neurosurgical procedures who are medically unsuitable for transfer to large urban centers and multispecialty hospitals. For the privilege of practicing elective neurosurgery, trainees around the country are required to acquire further training in Ho Chi Minh City or Hanoi or during fellowships abroad.

A clear description of the neurosurgical training systems in Vietnam is hard to achieve, as there exist many diverse pathways and no standard definition of the endpoint for training. Unification and a clearer certification standard will likely help to elevate the standards of training and the state of neurosurgical practice in Vietnam.

<https://thejns.org/doi/abs/10.3171/2019.12.FOCUS19800>

KEYWORDS global neurosurgery; Vietnam; low- to middle-income countries; neurosurgical training

ACCORDING to historical records, Vietnam was reunified in 1975 after the fall of Saigon and the end of the Vietnam War. Though the reunification might be true for the political system of the country, the deep schism cast on Vietnamese society by Ho Chi Minh's defeat of the French at Dien Bien Phu in 1954 persists today in many aspects of life. For contemporary Vietnamese neurosurgical training, there exist two, perhaps more, systems of training roughly divided geographically by the 17th parallel, not unlike the separation of the country when the French departed abruptly after nearly a century of rule. The purpose of the current report is to shed light on the fragmented training system in this low- to middle-income country (LMIC), with the hope that understanding

and clarifying it can elucidate ways for its simplification and unification.

Methods

The initial portion of the investigations was done through in-person interviews with faculty and trainees during clinical and academic activities when members of the Global Brainsurgery Initiative were in Vietnam during January 2019.

As follow-up to these interviews, a list of 28 questions regarding neurosurgical training was sent to all major Vietnamese training hospitals through personal and institutional contacts. We received responses from 7 neurosur-

ABBREVIATIONS HMU = Hanoi Medical University; LMIC = low- to middle-income country; UMPHMC = University of Medicine and Pharmacy at Ho Chi Minh City.

SUBMITTED October 15, 2019. **ACCEPTED** December 16, 2019.

INCLUDE WHEN CITING DOI: 10.3171/2019.12.FOCUS19800.

geons, 6 of whom are leaders or senior faculty members of training programs from 5 major hospitals: Viet Duc (Hanoi), St. Paul's (Hanoi), Hue Central Hospital, Da Nang Hospital, and Cho Ray Hospital/University of Medicine and Pharmacy at Ho Chi Minh City (UMPHCMC). The responses were supplemented with more internet-based question-and-answer sessions aimed at further clarification of the neurosurgeons' answers.

Results

It is difficult to describe the Vietnamese neurosurgery training system in clean outlines because the system is confusing, both in structure and its geographic diversity. Although medical graduates from any part of Vietnam can continue their education and career development anywhere else in the country, there remains a strong regional divide in the country (Fig. 1), and young doctors do not routinely work far from their hometowns. A schematic summary of the regional training systems is presented in Fig. 2, and the three “arms” of the diagram are discussed separately below.

Ho Chi Minh City and the Southern Region

In Vietnam, medical school consists of 6 years, commencing after high school graduation. Classes are taught in Vietnamese, but anatomical and procedural terms are heavily influenced by the English language. In most university systems, online textbooks and scientific publications are accessible to the students.

At UMPHCMC (Fig. 3), there are two tracks for neurosurgical training. One is reserved for trainees mostly from outside Ho Chi Minh City, who already have some experience in clinical neurosurgery. This track will be described below. For their “home-grown” talent, graduating students from UMPHCMC who wish to enter neurosurgery take an entrance examination to determine their qualification for the training. If selected, they enter a 3-year residency program that accepts 3–6 residents per year (depending on the number of qualified candidates), the overwhelming majority of whom are medical graduates of UMPHCMC. This is the only residency program in the country dedicated solely to neurosurgery, and graduates of the program obtain specialist certification specific to neurosurgery. In many ways, this residency at UMPHCMC is the easiest to understand, because it functions very similarly to the training systems employed in non-LMICs. After entering training, the residents rotate through the neurosurgical services of 5 different hospitals, including Cho Ray Hospital,³ the University Medical Center, and a pediatric hospital. During their training, the residents follow a formalized curriculum with scheduled lectures and cadaveric dissections. They also receive official evaluations of their performance every 3 months.

Splitting time among the intensive care unit, surgical suites, and clinic, the residents are nonetheless expected to participate in approximately 10 operative cases per week. There are no work-hour limitations in Vietnam, and the residents spend about 90 hours each week at the hospitals, with 2–3 in-hospital on-call nights per week.

FIG. 1. The regional divide of modern Vietnam. The map summarizes the population (pop.) density of the country.^{1,6} The divisions indicated on the map are not official, governmental designations. Instead, the *black lines* denote unofficial and conceptual divisions used by the Vietnamese people to designate the regions they are from. The total populations of the regions are as follows: “The North,” 39.1 million (41%), “The South,” 42.1 million (43%), and the central region, 15 million (16%). Map created by Walter C. Jean and Trong Huynh.

At the conclusion of their 3-year training, the expectation is that a resident would be able to practice common neurosurgical procedures independently, including all intracranial trauma operations, resection of a convexity tumor, clipping of a middle cerebral artery aneurysm, resection of a spinal cord tumor, and spinal fusion for trauma. According to leadership of the UMPHCMC program, the general distribution of in-training experience of a graduating resident is as follows: 50% neurosurgical trauma,

FIG. 2. Flowchart showing the diverse pathways of neurosurgical training in modern-day Vietnam. Medical graduates from the north generally follow the path through Hanoi, whereas those from the south follow the path through Ho Chi Minh City. The third pathway applies to trainees from other parts of Vietnam.

20% spinal surgery, 15% brain oncology, and 15% cerebrovascular surgery. There is practically no exposure to epilepsy/functional surgery, radiosurgery, or endovascular therapies in residency. Graduation from this residency is contingent on completion of a thesis, and a graduation committee makes the final determination.

Unlike graduates from training programs in most non-LMICs, neurosurgeons who complete training in the UMPHCMC residency are not yet qualified to practice completely on their own. On finishing their residency, they become junior faculty, resembling associate consultants in some countries, allowed to perform urgent, mostly trauma, cases independently but still function under the supervision of senior faculty under most circumstances.

At this stage, a neurosurgeon has two choices: to work at a provincial or lower-tier hospital where he or she can function independently performing simple, mostly urgent procedures, or to continue their career in academic practice in a major city. For the latter path, junior faculty would have to eventually pursue further training, called “Specialist 2” at UMPHCMC, or go abroad for a fellowship. Only on completion of that extra training would the neurosurgeon be considered fully independent in an academic center.

Hanoi and the Northern Region

At the Hanoi Medical University (HMU), medical graduates also take an entrance examination to be selected for neurosurgical training, but those who qualify enter surgical

FIG. 3. The University of Medicine and Pharmacy at Ho Chi Minh City. Copyright Tuan A. Pham. Published with permission.

training with a neurosurgical concentration quite different from the one previously described. The program is 3 years long and accepts 5 trainees per year. Trainee rotations also involve 5 hospitals in Hanoi affiliated with the Hanoi Medical University, including the large, multisubspecialty Viet Duc Hospital (Fig. 4).² However, there is currently no set curriculum, case logs or minimums, neurosurgical lecture schedule, or access to cadaver dissection.

In this system, the first year is mainly spent in general surgical training, and the second is with various surgical subspecialties. During these 2 years, only 8 months involve neurosurgery. The final year is the only one spent completely in the neurosurgical department. The workload is more or less the same as described for residents in Ho Chi Minh City, and again, by completion, 50% of the experience involves trauma, with 30% involving brain oncology procedures, 10% involving spinal surgery, and about 5% each involving cerebrovascular and functional surgery. According to leadership of the HMU program, graduates are expected to independently perform trauma procedures only, and the certification on completion is for general surgery, not neurosurgery. Although there is a thesis requirement, the standard for graduation is per the chief of the department.

On completion of this training, graduates qualify to practice independently in a lower-tier hospital in the countryside, performing mostly urgent procedures. The other options open to them are going abroad for fellowship training, or continuation at HMU for further neurosurgical training to reach Specialist 2 status. Only about 40% of trainees return to HMU for Specialist 2 training in neurosurgery, and many trainees in fact turn to orthopedics for more advanced training in spinal surgery.

Central Vietnam

For medical graduates from the rest of the country, their career path toward neurosurgery is far less structured and predictable. For them, there is no option to enter directly into neurosurgical training and most enter a general sur-

FIG. 4. The Viet Duc Hospital in Hanoi, affiliated with the Hanoi Medical University. Copyright Walter C. Jean. Published with permission.

gery training program. As part of that program, they would spend variable amounts of time, up to 1–2 years, in rotation with the local neurosurgery department. If well regarded, they might be asked to spend another variable period, up to 2–3 years, solely with the neurosurgery department.

After this experience, the trainee would be asked to enter the second track of training at either UMPHCMC or HMU. For most trainees, this is a 2-year program with no cap in number of candidates per year. Unlike the previously described surgical trainees at HMU or residents at UMPHCMC, trainees in this track are not required to complete a thesis, but the rest of their training is identical. On finishing, they would be recognized as a Specialist 1 in neurosurgery, and, in most cases, these trainees would return to the neurosurgery department in their hometown, the one that sponsored their second track of training. There, they would function as junior faculty members, and either progressively acquire seniority in this setting or return to HMU/UMP HCMC for more advanced neurosurgical training to become a Specialist 2.

Discussion

Neurosurgery developed in Vietnam in the late 1950s, in the former Saigon (now Ho Chi Minh City) assisted by Australian and Japanese surgeons, and in Hanoi, assisted by Hungarian surgeons.⁵ Not only is a rigorous and uniform certification process missing, there is also no official count of neurosurgeons in the country today who are capable of fully independent practice. Neurosurgeons interviewed and surveyed for the current study estimate that number to be between 400 and 800, with approximately 10%–15% of those skilled in complex intracranial surgeries. These numbers are extremely small, considering that contemporary Vietnam has a population of 96 million people. Its gross domestic product in 2017 was \$224 million (USD) (<https://data.worldbank.org/country/>). For specialty

care relevant to neurosurgery, the hospitals in the health-care system are structured as a pyramid with 4 tiers: communal level (covering a population of < 10,000), district level (< 200,000), provincial level (< 2 million), and finally, central. There are government-derived financial incentives for patients to seek care in hospitals at the lowest level possible, such that they do not flood the central specialty hospitals in the large urban centers.² The training system for neurosurgeons is also designed to fit the structure of this overall healthcare system, and the main impetus is to train a large number of neurosurgeons in the shortest time possible to disperse throughout the country to perform urgent but relatively simple neurosurgical procedures. With the large number of road accidents in Vietnam, the majority of these procedures relate to neurosurgical trauma.

Other than the neurosurgery residents at UMPHCMC, medical school graduates who enter neurosurgical training go through diverse pathways with variable concentration in neurosurgery, before they emerge as graduates, and then resubmerge for more variable advanced training in neurosurgery. Although the system may be functional, it is certainly not the best way to attract the brightest medical graduates to become neurosurgeons who are not just capable of urgent surgery, but also the full breadth of elective neurosurgical procedures.

In our investigation, we noted two other shortcomings of the system that apply uniformly throughout the country. As an LMIC with a per capita healthcare expenditure equivalent to 1% that of the United States, it is perhaps not surprising that technologically driven, and therefore expensive, subspecialties of neurosurgery, such as epilepsy surgery, radiosurgery, and endovascular therapy, are rarely practiced in Vietnam.^{2,4} As the practice of neurosurgery advances in Vietnam, the training in these areas will have to progress rapidly to catch up. As a system focused on producing practitioners quickly to fit the needs of the country, the training is perhaps overfocused on technical operative skills at the expense of understanding the disease processes and indication for surgery. Many of the trainees we interviewed said they learn “how to operate, and why to operate, later.” The senior faculty respondents to our study also uniformly agreed that decision-making on operative indications and the foundation of knowledge of the nervous system and its disease are the weakest aspects of the training, regardless of location in the country.

Despite the lack of resources, geographic disparity, and the need to fulfill specific deficiencies in a rapidly growing nation with few luxuries, there are many strengths in the training system, the most awe-inspiring of which is the sheer volume of highly complex operations that serve as the essential substrate for training neurosurgeons. In the last decade, the elective case volume at Cho Ray Hospital in Ho Chi Minh City never dipped below 4000, whereas the volume at Viet Duc in Hanoi in 2018 was 3500. Thus, despite the aforementioned shortcomings, this large volume of highly complex cases is able to power the system to ultimately produce excellent neurosurgeons. Indeed, departments throughout Vietnam showcase world-class neurosurgeons who routinely perform complex procedures without high-tech equipment (e.g., Doppler or indocyanine green microscopy) that would buffer the margin of error.²

There is little doubt that, when harnessed properly, these strengths can translate into world-class neurosurgical training. Perhaps the most important ingredient missing in Vietnam is a governing neurosurgical body, such as a neurosurgery board. If such a body can unify the voices of the neurosurgeons and represent them to the health ministry, it may also be able to simplify the confusing diversity in training in the country and increase resources to expand the practice of neurosurgery in Vietnam to its full international range. Indeed, expansion of the educational curriculum to emphasize decision-making, standardization of it throughout the country, and unification of the certification process for all neurosurgeons will go a long way to attract the best medical graduates into the field, and with that, there is little doubt that the practice of neurosurgery in Vietnam will reach world-class standards.

References

1. Encyclopedia Britannica: Population of Vietnam by region. (<https://kids.britannica.com/students/assembly/view/140291>) [Accessed January 10, 2019]
2. Jean WC, Huynh T, Tai AX, Felbaum DR, Syed HR, Ngo HM: Outcome of microsurgery for arteriovenous malformations in a resource-restricted environment: single-surgeon series from Vietnam. **World Neurosurg** 132:e66–e75, 2019
3. Karras CL, Tran HM, Dornbos D III, Nguyen P, Nimjee SM, Prevedello DM, et al: Inside Vietnam's largest neurosurgery department. **World Neurosurg** 105:122–125, 2017
4. Rocque BG, Davis MC, McClugage SG III, Tuan DA, King DT III, Huong NT, et al: Surgical treatment of epilepsy in Vietnam: program development and international collaboration. **Neurosurg Focus** 45(4):E3, 2018
5. Rosenfeld JV, Xuan NT: Neurosurgery in Vietnam. **Surg Neurol** 48:307–311, 1997
6. Vietdata: The population of Vietnam. (<https://www.vietdata.vn/info-toan-can-h-dan-so-viet-nam-moi-nhat-2-vung-co-dan-ong-dong-hon-phu-nu1930133059>) [Accessed January 10, 2020]

Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author Contributions

Conception and design: Jean, Syed, Felbaum. Acquisition of data: Huynh, Pham, Ngo, Syed, Felbaum. Analysis and interpretation of data: all authors. Drafting the article: all authors. Critically revising the article: Jean, Huynh, Ngo, Syed, Felbaum. Reviewed submitted version of manuscript: Jean, Huynh, Ngo, Syed. Approved the final version of the manuscript on behalf of all authors: Jean. Administrative/technical/material support: Jean, Huynh. Study supervision: Jean.

Supplemental Information

Videos

Video Abstract. <https://vimeo.com/384808985>.

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