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 neurosurgical training programs.

ABBREVIATIONS

HMU = Hanoi Medical University; LMIC = low- to middle-income country; UMPHCMC = University of Medicine and Pharmacy at Ho Chi Minh City.
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, 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.
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
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). 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 neurological 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 surgery 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/UMPHCMC 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. 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
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

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Supplemental Information
Videos

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