

Developing a Successful Global Neurology Program

Omar K. Siddiqi, MD, MPH,^{1,2} Merritt Brown, MD,³ Christine Cooper, MD,⁴ Masharip Atadzhanov, MD, PhD,² Shabir Lakhi, MBChB, MMed, MPH,² and Igor J. Koralnik, MD^{1,5}

In the last decade, the field of global neurology has gained prominence. The American Academy of Neurology formed a global health section that currently has over 300 members.^{1,2} Numerous academic departments now have global neurology programs that provide support to institutions in low- and middle-income countries (LMICs). These relationships often take the form of patient care, teaching activities, research projects, and resident electives. The regulations surrounding clinical electives overseas are also clearer.³ Residency applicants often ask program directors about global neurology opportunities when interviewing, suggesting that residency programs that lack appropriate opportunities will become less competitive. A well-developed global neurology program provides a dynamic element for a department while enhancing neurological activities at both institutions involved in the collaboration.

Establish Collaborations With Institutions in Resource-Limited Settings

The most important aspect of developing a global neurology program is to establish collaboration with an appropriate and willing partner. This is most commonly done with institutions in a resource-limited setting because they have the greatest needs. The initial steps in building this relationship can occur in several ways. Many academic institutions already have a presence at an

overseas institution through other departments that can easily extend to neurology. In addition, residents often have pre-existing connections from a previous work experience or research activities in medical school that can help jump start a program. Developing a relationship with a single institution more easily allows for the building of trust and for the host institution to see the benefit of the collaboration. It also provides the benefit of understanding the politics and practice of neurology in a different setting in order to enact meaningful change.

Involve a Senior Faculty Member

The establishment of a global neurology program benefits greatly from the involvement of a senior faculty member who has experience in starting a division or new program within a neurology department. Such a person does not necessarily need to have global health experience. The senior faculty mentor should be someone who is respected in the academic setting, understands how to get buy-in from the leadership, and can advocate how a global neurology program adds value to the department. Involvement of a senior faculty member can help legitimize the program. Individuals with a research background are ideal given that they can help junior investigators navigate the funding environment, help formulate viable research projects, and critique grant applications. Ideally, this individual has an interest in a

View this article online at wileyonlinelibrary.com. DOI: 10.1002/ana.24863

Received Nov 18, 2016, and in revised form Dec 21, 2016. Accepted for publication Dec 22, 2016.

Address correspondence to Dr Omar K. Siddiqi, Beth Israel Deaconess Medical Center, 330 Brookline Avenue, Boston, MA 02215. E-mail: osiddiqi@bidmc.harvard.edu

From the ¹Global Neurology Program, Division of Neuro-Immunology, Center for Virology and Vaccine Research, Department of Neurology, Beth Deaconess Medical Center, Harvard Medical School, Boston, MA; ²Department of Internal Medicine, University of Zambia School of Medicine, Lusaka, Zambia; ³Division of Neurocritical Care, Department of Neurology, University of Pennsylvania Health System, Philadelphia, PA; ⁴Movement Disorders Division, Department of Neurology, Medical University of South Carolina, Columbia, SC; and ⁵Department of Neurological Sciences, Rush University Medical Center, Chicago, IL

subspecialty that is resonant with the health needs of the foreign partner as well as a research program and grant writing ability to help generate funds in that setting.

Aim for Financial Sustainability

The early stages of developing a global neurology program may be quite challenging. Single-year fellowships or grant funding from organizations such as the Fogarty International Center, the American Academy of Neurology, and the World Federation of Neurology can help spearhead the effort. Department chairs can also provide seed money, but ultimately the program has to become financially viable. This is difficult given that there is no direct clinical revenue. Philanthropy can play a role and should be cultivated in the parent and collaborating country. Philanthropic donations cannot sustain a program alone, outside of sizable gifts that establish an endowment. However, they allow for unrestricted and bridging funds to help maintain a program.

Anchoring a program in research is therefore the clearest way to access a steady funding stream. There are ample NIH and foundation grants available to fund neurological research in LMICs.⁴ This path is similar to researchers in other subspecialties of neurology. Academic productivity is measured in terms of publications and research accomplishments that can subsequently lead to larger funding opportunities.

Ideally, a program should have a combination of research and philanthropic funds to remain sustainable. Depending on the program, a faculty member may live in the partnering country full time, spend weeks to months at the overseas site, or provide services in the form of telemedicine or research support from the home institution. The ability to work in shifts, generate salary, and not be tied to an outpatient clinic lends itself to working overseas for extended periods. A subspecialty that can be practiced in isolated blocks of time and does not require long-term follow-up of patients, such as a neurohospitalist, inpatient stroke specialist, or clinical neurophysiologist, is well suited to global health.

Encourage Multi-Institutional Involvement in the Parent Country

Global neurology programs are stronger when they are multi-institutional in the parent country. It is important to have an “all hands on deck” approach rather than being proprietary given the degree of need in most LMICs. Different institutions have varying degrees of expertise and resources to contribute. In addition, when multiple universities are invested in a common cause such as improving neurological care in a resource-limited environment, it has the added benefit of generating

research collaborations between institutions domestically and internationally that might not occur otherwise. Indeed, the Fogarty International Center Global Health Scholars and Fellows Program, one of the largest grants through the NIH aimed at training global health researchers, requires that US universities form consortia to carry out their proposed activities.⁵

Build Local Capacity

It is important that the collaborating institution in an LMIC derives a clear benefit from the partnership. The investment by the collaborating institution is magnified if the global neurology program improves local conditions of clinical care and research resources. For example, giving lectures or seeing patients for a short period of time once a year is not transformative and only provides modest benefit. Building up the local human capital through a training program or imparting research/laboratory skills provides a path to self-sustainability of the program. A good measure of the effectiveness of capacity building efforts is whether they will persist once the program has ended. Lasting change should not be contingent upon the involvement of a single individual.

There Is No Single Correct Model

A number of academic neurology departments have developed their own unique global neurology programs.⁶ These vary in scope from well-established research programs, month-long clinical rotations for residents, or support for nascent neurology training programs. The activities are based on a combination of the needs of the country and the skill set and interests of the individuals involved. Successful programs demonstrate a long-term commitment to the partnering LMICs.

The Authors' Experience

The development of the Global Neurology Program at Beth Israel Deaconess Medical Center (BIDMC) is one example of a program that evolved from a mere concept into a sustainable entity. The program initially started with a self-funded elective at the University Teaching Hospital (UTH) in Lusaka, Zambia, by Dr Omar Siddiqi during neurology residency in 2005. This was facilitated by Dr Gretchen Birbeck, who has a long-standing research program in the country. There were several elements that helped this develop into productive relationship between BIDMC and the University of Zambia School of Medicine (UNZA-SOM). The only neurologist in Zambia at the time, Dr Masharip Atadzhanov, was academically active, had a track record of successful collaborations, and was interested in building up neurological services. At that point, Dr Igor Korolnik, Director of the Neuro/HIV

center at BIDMC with a long-standing interest in human immunodeficiency virus and related infectious diseases, expressed an interest in helping to develop this collaboration. This resulted in a publication on the spectrum of neurological diseases in Zambia based on the resident elective.⁷ More important, this initial project provided preliminary data for future research proposals.

Our group then obtained research funding over several years through the Harvard Center for AIDS Research, the Fogarty International Center, the American Academy of Neurology, and the National Institutes of Neurological Disorders and Stroke. The primary benefit of this funding was to allow Dr Siddiqi, by that time a faculty member, to be based 10 months per year at UTH in Lusaka, Zambia, in order to carry out research studies. These grants resulted in publications that gave our program credibility.^{6,8–11} The Head of the Department of Internal Medicine at UNZA-SOM, Dr Shabir Lakhi, continued to be supportive of strengthening the relationship between our institutions. Recognizing the value of the program, our Neurology Department has dedicated funds since 2013 to send two residents per year for a 1-month elective at UTH during their training. In addition, our Global Neurology Program has developed collaborations with academic institutions and nongovernmental organizations that include the University of Rochester School of Medicine and Dentistry, Michigan State University, the University of Liverpool, the Zambia AIDS Related TB Project, and the Center for Infectious Diseases Research in Zambia. As a result, we have hosted medical students, fellows, and senior faculty from all over the world. Our capacity-building efforts include helping to develop a molecular diagnostic laboratory for cerebrospinal fluid analysis, a neurophysiology laboratory with two trained electroencephalography technicians, and mentoring Zambian medical and graduate students on neuroscience research projects.

Future Plans

After 10 years of a highly gratifying and mutually beneficial relationship, we are now in a position to achieve the most effective capacity-building effort needed to improve neurological care in Zambia: an in-country neurology training program. We have drafted a curriculum for a neurology training program adapted to the academic requirements of the University of Zambia School of Medicine. We hope to enroll the first group of trainees within 1 to 2 academic years. This program will result in the first generation of Zambian neurologists who can continue to build a neurological community without relying on resource-rich settings for support. That outcome will fulfill the goal inherent in any successful global

neurology program: ensuring that local expertise endures independently. In turn, there will eventually be a cadre of local physician scientists who can engage in more-extensive research collaborations with institutions throughout the world.

Resident's Perspective

During our elective at UTH in Lusaka, we both found neurology to be particularly well suited for a resource-limited setting due to its focus on localization through detailed history and physical examination. We were exposed to a wide spectrum of neurological diseases, such as tetanus, cerebral malaria, and African trypanosomiasis, that we otherwise would not encounter during our US-based training.

In addition to the bolstering of diagnostic acumen and clinical exposure, a global neurology elective reveals a number of potential opportunities for advocacy, public health education, and, most important, capacity building in the host institution. In Zambia, we saw an unusually large number of strokes in patients with untreated hypertension. This was attributed to many in the population having high sodium diets and lack of preventative health care. Whereas in the United States there is a strong focus on preventative care, in many resource-limited areas this has been a relatively new focus over the past few years. US neurology trainees can engage in meaningful medical educational activities in resource-limited countries, particularly when there is an ongoing, well-organized collaboration between institutions.

In summary, pursuing a global neurology rotation during neurology residency has many advantages and can help contribute to a well-rounded neurology education that is beneficial to both settings. From a resident perspective, the opportunity to practice neurology in a new culture, and in a resource-limited setting, requires skills in line with all the Accreditation Council for Graduate Medical Education core competencies: patient care, medical knowledge, practice-based learning, communication, professionalism, and systems-based practice. Altogether, our experience in Zambia proved to be the highlight of our residency.

Author Contributions

All authors contributed to the conception, design, and drafting of the manuscript.

Potential Conflicts of Interest

I.J.K. has participated in scientific advisory boards for Medimmune and Johnson & Johnson and receives royalties for chapters on Neuro-HIV and PML in UpToDate.

References

1. Lee AC, Chin J, Birbeck GL, Bower J, Meyer AC. Creation of the AAN Global Health Section, Part I: introduction and background. *Neurology* 2013;80:2062–2064.
2. Lee AC, Chin J, Birbeck GL, Bower J, Meyer AC. Creation of the AAN Global Health Section, part II: vision and goals. *Neurology* 2013;80:2151–2153.
3. Jozefowicz RF, Birbeck GL. The globalization of US and Canadian neurology residency training: is it just about the money? *Neurology* 2014;82:100–101.
4. Siddiqi OK, Koralnik IJ, Atadzhanov M, Birbeck GL. Emerging subspecialties in neurology: global health. *Neurology* 2013;80:e78–e80.
5. Zunt JR, Chi BH, Heimbürger DC, et al. The National Institutes of Health Fogarty International Center Global Health Scholars and Fellows Program: Collaborating Across Five Consortia to Strengthen Research Training. *Am J Trop Med Hyg* 2016;95:728–734.
6. Global Neurology. 2016 [accessed 2016 November 6]. Available at: <https://sites.google.com/site/globalneurology/home>.
7. Siddiqi OK, Atadzhanov M, Birbeck GL, Koralnik IJ. The spectrum of neurological disorders in a Zambian tertiary care hospital. *J Neurol Sci* 2010;290:1–5.
8. Siddiqi OK, Elafros MA, Sikazwe I, et al. Acute EEG findings in HIV-infected Zambian adults with new-onset seizure. *Neurology* 2015;84:1317–1322.
9. Siddiqi OK, Ghebremichael M, Dang X, et al. Molecular diagnosis of central nervous system opportunistic infections in HIV-infected Zambian adults. *Clin Infect Dis* 2014;58:1771–1777.
10. Siddiqi OK, Atadzhanov M. Neurological letter from Zambia. *Pract Neurol* 2013;13:281–285.
11. Thakur KT, Mateyo K, Hachaambwa L, et al. Lumbar puncture refusal in sub-Saharan Africa: a call for further understanding and intervention. *Neurology* 2015;84:1988–1990.