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Global neurosurgery

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CHAPTER 12

General Discussion

GENERAL DISCUSSION

The purpose of this thesis was to explore the multifaceted challenges impeding neurosurgical care in underserved areas, particularly in low- and middle-income countries, as well as to identify opportunities for improvement. With the culmination of this thesis in 2024, it lies near the midpoint between the December 2016 Bogota Declaration on Global Neurosurgery that recognized the massive deficit in neurosurgical care, and the 2030 U.N. Sustainable Development goals that include 14 articles pertinent to improved neurosurgical care.^{1,2} Midpoints are critical moments to reflect on the path thus far, and analyze what changes need to be incorporated into the strategy to attain the goal. Behavioral Economist Daniel Pink notes that: “Midpoints can have two distinct effects. They can bring us down, or they can fire us up.”³ My hope is that we, the collective global neurosurgery community, come together in this midpoint and get fired up. To optimize the power of this midpoint, and truly get fired up, it is important to review where the field was at the start of this research, where we are now, and where we have to go.

Early Stages of the Global Neurosurgery Movement

The 2015 Lancet Commission of Global Surgery catalyzed a revolutionary movement as it changed the mindsets of many in the global health and global policy communities.⁴ It was no longer the neglected stepchild in the global health sector.⁵ The catalog of publications from the Commission united data to articulate the scale of the burden of surgical disease, and sounded the alarm that investing in global surgery and the surrounding infrastructure was both urgent and economical. Through the Bogota Declaration and subsequent series of publications in the Journal of Neurosurgery, the global neurosurgery community also gained momentum. The efforts by Dewan et al to combine country registries, third-party modeled data, and meta-analyzed published data to generate incidence and volume figures for 10 common neurosurgical conditions allowed approximation of the global burden of neurosurgical disease.⁶ That also clarified the 23,300 additional neurosurgeons who would be needed to address more than 5 million essential neurosurgical cases that go unmet each year. Transforming the global neurosurgery ecosystem required breaking down this massive challenge into smaller, tangible factors. Change would involve addressing the six domains of a healthcare system: infrastructure, workforce, service delivery, financing, information management, and governance.⁷

Getting to the Midpoint

The work of this thesis focused primarily on the workforce category. At the time of the Global Health Research Group on Neurotrauma launch in September 2017 in Cambridge, UK, there was ongoing debate about non-neurosurgeons performing neurosurgery around the world. Some felt that “something was better than nothing” if non-neurosurgeons were helping address the unmet need of neurosurgical care,

whereas others remarked that this could be introducing harm, both to patients and to the healthcare system. The discussion was lacking evidence to support either side, and was the inspiration for the core of this thesis.

To evaluate the potential of task shifting and sharing as strategic solutions, we first collected data and perspectives from global surveys that highlight varying levels of acceptance and application across different regions.^{8,9} This illustrated that task shifting and sharing was ongoing in many LMICs without substantial structure or oversight, which was concerning for patient safety. These data invited future clinical outcomes studies to assess effectiveness, and discussions on policy recommendations such as standardized curricula, certification protocols, specialist oversight, and referral networks to elevate the level of task shifting and sharing care while continuing to increase the specialist workforce. This allowed generation of a theoretical framework to approach the process. Furthermore, the global survey on perspectives of the challenge showed that both LMIC and HICs agreed that task-sharing should be prioritized over task-shifting and that additional recommendations and regulations could enhance care. These data invited future discussions on policy and training programs.

The case study in the Philippines was one of the first to examine outcomes of neurosurgical task-sharing, demonstrated that a strategic task-sharing model for emergency neurosurgery produced comparable outcomes to the local neurosurgeons.¹⁰ Altogether, these three studies helped frame the need to continue training fully trained neurosurgeons, but also articulate recommendations for task sharing. First, systematic training programs should occur locally and involve a structured training curriculum, adequate oversight during medical and operative management, and competency-based evaluation at the end of the dedicated training cycle. Subsequently, local supervision should happen periodically to ensure maintenance of skills and competencies, and proper referral networks should be established for complex cases and complications to allow for tele-consultation and physical transfer of patients when necessary. Furthermore, it is critical for task-sharers to be officially recognized and supported by their institutions with a clear definition of their scope of practice, adequate financial remuneration, and clear career progression avenues in order to prevent attrition of practitioners and prevent task-creep: practicing beyond the scope of their training.¹¹

That framework for task sharing was incorporated into the 2019 Comprehensive Policy Recommendations for Head and Spine Injury Care in LMICs.¹² Task sharing plays a small but important role in the broader context of infrastructure, workforce, service delivery, financing, information management, and governance.

Impact of the Global Pandemic

During this journey toward global surgical development milestones for 2030, the world faced an unprecedented turn of events with a global pandemic. The novel coronavirus disease (COVID-19), caused by the severe acute respiratory distress

syndrome coronavirus 2 first appeared in December 2019 and was declared a pandemic by the World Health Organization on March 11, 2020.¹³ By September 9, 2020, 27.7 million cases and 0.9 million deaths were confirmed globally.¹⁴ This disease placed an unprecedented strain on healthcare systems around the world,¹⁵ and had a substantial effect on clinical practice across all surgical specialties, with neurosurgery being no exception.

While the pandemic introduced an abrupt barrier and negative effect on the ability to train neurosurgeons, especially in LMICs, the increased use of social media and virtual platforms is markedly improving the interactions between institutions for shared learning between neurosurgeons at an international scale. Neurosurgical societies and organizations worldwide regularly conducted online webinars on myriad topics, often focusing on clinical evaluation of neurosurgical diseases and pearls and pitfalls of neurosurgical approaches.¹⁶ As the vaccine was developed and distributed, and healthcare systems rebounded, the newfound strength in global communication over webinars and other virtual meetings persisted, which is likely a benefit to democratized education and collaboration for the field.¹⁷ There was even the innovation of hybrid workshops that combined virtual teaching with hands-on simulators (e.g. UpSurgeOn) to enable anatomical learning and technical training.¹⁸ At Massachusetts General Hospital, the positive effects of using these simulators for spaced repetition learning was validated.^{19,20} This approach can be leveraged to facilitate collaboration between HICs and LMICs despite the geographic distances.¹⁸

Workforce Today

A study published by Gupta et al in January 2024 re-evaluated the global neurosurgery workforce density compared to the 2016 study.²¹ They estimate that the neurosurgeon workforce has grown by 11.9% per year between 2016 and 2022, with the fastest growth in upper-middle income countries (21.3%), and LMICs (26.0%), and the most rapid annual growth was in the Southeast Asia region (33.0%). There were nearly 73,000 estimated neurosurgeons worldwide (0.93 neurosurgeons per 100,000 people; median national density, 0.44/100,000; **Figure 1**). Variables associated with increased neurosurgery workforce growth included the presence of a national neurosurgery society, increasing global development aid, and national gross domestic product. To achieve the goals of 1 neurosurgeon per 100,000 by 2030, more needs to be done.

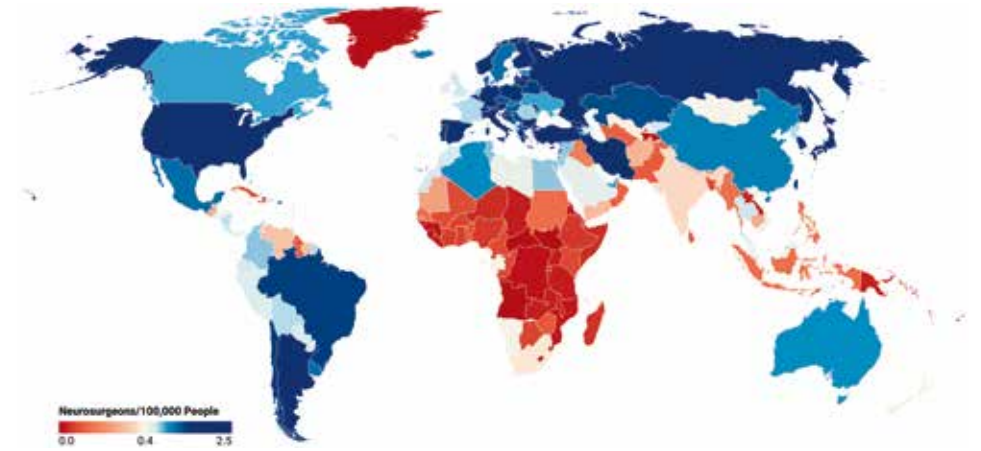


Figure 1: Map demonstrating the global neurosurgeon density. Countries near the average national median density (0.44 neurosurgeons per 100,000 people) are demonstrated in white, those increasingly above the median are demonstrated in increasingly dark blue, and those increasingly below the median are demonstrated in increasingly dark red. This figure was created with Data wrapper (Datawrapper GmbH).²¹

At the Policy Level

There have been tremendous strides since 2015 to institute strong policy as means to facilitate alignment on goals and strategies for global surgical systems strengthening. By 2019, five countries had completed an NSOAP and an additional 37 member states had either completed or were in the process of drafting or initiating a National Plan for Surgical Care.¹² Also in 2019, the WFNS established the Global Neurosurgery Committee, to assist in designing a global action plan with 5 key objectives and over 20 targets. The 5 objectives were 1. Amplify neurosurgical access, 2. Align global neurosurgery activity, 3. Advance relevant research, especially from LMICs, 4. Assimilate global neurosurgery activity within the global surgery framework, and 5. Advocate for neurosurgical care for all. Furthermore, the development of comprehensive recommendations for neurotrauma, spina bifida, and hydrocephalus have furthered the detail to which neurosurgical objectives can be instituted to augment care and mitigate the burden of neurosurgical disease worldwide. In 2021, the Journal of Global Neurosurgery launched as a free, open access journal that gives preferences to LMIC authors to ensure research in the most affected countries is being empowered and shared. In 2023, there were continued global efforts on the development and implementation of NSOAPs and the WFNS World Congress in Cape Town, South Africa with a full day dedicated to global initiatives.

Moving beyond the Midpoint

Overall, tremendous progress has been made in the field of global neurosurgery and there is much enthusiasm as the field nears the 2030 goals. Going forward, we as a neurosurgical community must come together to increase efforts in advocacy, further

the recommendations for additional neurosurgical subspecialties and associated technologies, as well as partner with neurosurgical leaders across the globe to form national context-specific plans (NSOAPs). Though, the work does not stop there. Policy helps ensure goal alignment and dedication of funds, but much work must go into policy adoption, implementation, and enforcement. Policy formation also calls the global neurosurgical community to action to assist in resource provision and investment in training, building data registries, developing resource-stratified guidelines for specific neurosurgical conditions through expert teams, enabling research in the local context, regularly examining progress, and sharing knowledge.

From a workforce standpoint, to achieve the goals of 1 neurosurgeon per 100,000 by 2030, there are needs for development of local and regional plans, collaboration between HICs and LMICs to implement robust training systems, collaboration between neurosurgeons and neurologists to build local centers of excellence, and leveraging technologies and low-cost innovation for education and training, to name a few. By leveraging task-sharing strategies alongside of investing in traditional training, embracing technological advancements, and advocating for supportive policies, significant progress can be made towards improving neurosurgical workforce density. Gupta et al. also insightfully call for a central, organized effort to estimate the neurosurgeon workforce and resources available to neurosurgeons in 2030, possibly through a collaborative, multilateral effort through the global neurosurgery committees of national and international neurosurgery societies.²¹

Charting a path forward, we must emphasize collaboration, innovation, and equity in healthcare access. It is only through the unity of policy makers, practitioners, and researchers that we can raise the level of neurosurgical care throughout the world.

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