



## Strengthening the backbone of global spine surgery

Spinal disorders contribute to significant disability and burden for affected individuals and society worldwide. The Lancet commission on global burden of disease in 2019 identified low back pain as one of the top causes of disability in the adult population (aged 25–49 years old), causing disability and loss of function in more than half a billion individuals (GBD, 2019 Diseases and Injuries Collaborators, 2020). Fortunately, over the last decade, giant leaps in neurosurgical care have contributed to numerous advances that enable safe, effective and efficient surgery of the brain and spine. As it stands today, the modern practice of spine surgery has catapulted into one of the most dynamic and innovative specialties in surgery due to the collective and collaborative effort of many neurosurgeon and orthopedic specialists across the globe. The benefits of these innovations, however, have trickled disproportionately across nations. Currently, many patients from low and middle-income countries (LMICs) still lack access to essential neurosurgical care, and this reality brings into focus several important issues that transcend the realms of equitable and quality health care for all.

The series of papers (Marchesini et al., 2022a, 2022b; Demetriades et al., 2022) recently published in *Brain & Spine*'s inaugural special issue on Global and Humanitarian Neurosurgery discuss the management of traumatic spinal cord injury (SCI) in LMICs and serve to highlight deficiencies in the delivery of this aspect of neurosurgical care as well as to identify the spatial geographic locations where this continues to engender suboptimal patient care. In many high-income countries, the provision of basic and advanced spine surgery and anesthesia is considered an essential component of standard of care. However, in developing countries, poor access to affordable and safe spine surgical care remains a major cause of mortality and morbidity, impacting approximately five billion people and representing over one third of the global burden of disease (Meara et al., 2015). As a result, the survival difference continues to widen between high income countries (HICs) and LMICs. The seminal three-part paper serves to provide a contextualized understanding of the unmet spinal surgery needs by showcasing the current existing ground-level realities in many LMICs. We believe that these studies satisfy the urgent need for a pragmatic description of the actual deficiencies in spine trauma care, and therefore represent an important initial step towards developing potential strategies to close the existing worldwide gap.

In recent years, key global and international neurosurgical organizations increased collaboration to improve access and delivery of neurosurgical care, particularly in LMICs; giving rise to what has been termed the *global neurosurgery* movement. The origin of this crusade dates back to 1980 when the former WHO Director General Halfdan T. Mahler in his address floated the concept of "Surgery and Health for All".

Since this time, however, only a few small, discrete and fatigable actions were instituted. Vast inequity in surgical access continued globally, condemning surgery as the "neglected stepchild of global health" (Farmer and Kim, 2008). In 2015, however, a major inflection point occurred after the Lancet Commission on Global Surgery published its report, which highlighted the urgency to act on a worldwide scale to address the almost 5 million surgical cases that remain unattended on a yearly basis (Meara et al., 2015). This was then closely followed by the unanimous espousal of the World Health Assembly (WHA) resolution WHA68.15, which encoded the vital call to strengthen emergency and essential surgical care, as well as anesthesia, as a component of universal health coverage (World Health Organization, 2015). For the first time, after decades of long silence, a coherent voice was heard, and the field of neurosurgery was placed on spotlight in various national health agendas and was slowly absorbed into the vernacular of health systems planning.

Though it is widely recognized that neurosurgical conditions like SCI and traumatic brain injury (TBI) continue to be one of the top causes of morbidity and/or mortality, it was only recently acknowledged that their societal and health effects are often lopsided, unfavourably impacting patients in developing countries. Traumatic spinal injuries, for example, are estimated to occur 8x more frequently in LMICs than HICs, and more than 2/3 of worldwide cases occur in Africa, Western Pacific and Southeast Asian Regions (Kumar et al., 2018). With increasing rates of urbanization and life expectancy, it is estimated that this pattern will continue to linger and influence future political and health system reform agendas. Unfortunately, only about 50% of patients with spinal injuries receive surgery on a global scale, adding up to the estimated burden of about 5 million neurosurgical operation backlogs (Meara et al., 2015): highlighting the need for additional neurosurgical manpower in many high-burden countries. Interestingly, however, most of the research and guidance on managing traumatic spine and brain injuries comes from HICs. Around 90 percent of research on TBI and SCI is believed to be generated from countries like the UK, USA and Canada. Ironically, the regions where these conditions are highly prevalent (e.g LMICs) are largely under-represented as a result of poor local research productivity (Park et al., 2016). As the study by Marchesini et al. demonstrates, the knowledge and level of confidence in many guidelines coming from HICs is generally overwhelming and encouraging (Marchesini et al., 2022a), but challenges exist on multiple levels worldwide, which creates artificial barriers to adherence and consequently to their real-world implementation.

A worldwide campaign has been undertaken to broaden the scope of global cooperation to address the burgeoning neurosurgical deficit. The design of these programs has been largely predicated upon the success of several select global projects in the past that promoted pioneering

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solutions to address the disparities in health care and manpower capacity. In 2019, the Harvard Global Neurosurgery group endorsed the *Comprehensive Policy Recommendation for Head and Spine Injury Care in LMICs*, a vital document that laid the foundation for the creation of national health care policy blueprints (Corley et al., 2019). This initiative is the result of an extensive expert panel review that provided an exhaustive and all-inclusive list of suggestions to help policymakers in the design of effective national plans in order to reduce head and spine injuries secondary to road traffic accidents. The *Global Spine Care Initiative*, established in 2018, represents an important conglomeration of spine experts, scientists, patients and policymakers with the primary aim of bringing practical, evidence-based and sustainable spine care for communities around the world (Chou et al., 2018). More recently, a global spine advocacy group called *Spine20* was founded in 2019 by four of the largest spine societies worldwide in response to the increasing prevalence of spinal disorders (AlEissa et al., 2021). As of 2022, this advocacy program is endorsed and supported by over 31 spine societies around the world, sharing the same invigorated desire to act on mitigating the burden of spine disorders on a global scale. The *World Federation of Neurosurgical Societies (WFNS)* has also recently established a global neurosurgery committee, which provides a nurturing avenue for healthy discourse on issues confronting equitable delivery of neurosurgical care. These global actions prove that working with partners towards a shared vision is an important first step in bolstering better care and affordable neurosurgery, especially in places with greatest need and impact.

Global neurosurgery presents a unique opportunity for neurosurgeons to showcase their flexibility and innate leadership ability beyond the confines of the operating room. At least four potential avenues of action align specifically with the aims and aspirations of this worldwide movement. (Fig. 1). Knowledge and skills sharing plays a central role in achieving long-term sustainable impact through information dissemination and technical know-how sharing. The covid pandemic has made this process remarkably seamless, practical and with greater breadth of coverage after large neurosurgical gatherings and conferences were shifted to online platforms and virtual skills demonstrations. The process of knowledge transfer can be achieved not only through teaching and lectures, but also through mentoring budding residents/fellows and by providing educational tools and equipment that are accessible to all interested parties. Training, as opposed to education, is a strategy that aims to increase the number of expert specialists in the field, augmenting the overall neurosurgical manpower capacity. Various models of HIC-LMIC partnerships, or the so-called North-South collaboration in fellowship training, have been described in different subspecialties but all have the common aim of training neurosurgeons who will return to their home country and become future experts and leaders in their own area of interest. The cost of training can also be augmented through various scholarships and grants offered exclusively to trainees from LMICs. Research capacity strengthening is another pillar of global spine surgery that can further enhance the delivery of spine care in developing nations. The Duke Global Neurosurgery and Neurology (DGNN) and Harvard Global Neurosurgery Initiative (GNI) are two examples of strong research collaboration between HICs and LMICs, which have facilitated the creation of targeted epidemiologic studies to better understand ways to deliver optimal neurosurgical care. Lastly, by engaging in health policy and advocacy, neurosurgeons can influence and steer national progress towards the allocation of essential spine care at all levels. The representation of neurosurgery in the World Health Assembly, the decision-making body of the World Health Organization, is considered a landmark achievement in this aspect as it provides an opportune occasion to ensure that inputs from this specialty are incorporated in planning processes to achieve accessible and safe surgery in the context of universal health care.

Indeed, the quest for equitable and quality spine care will continue to be a major global challenge in the current post-covid era. The call to action has been sounded and the burden is now upon the shoulder of

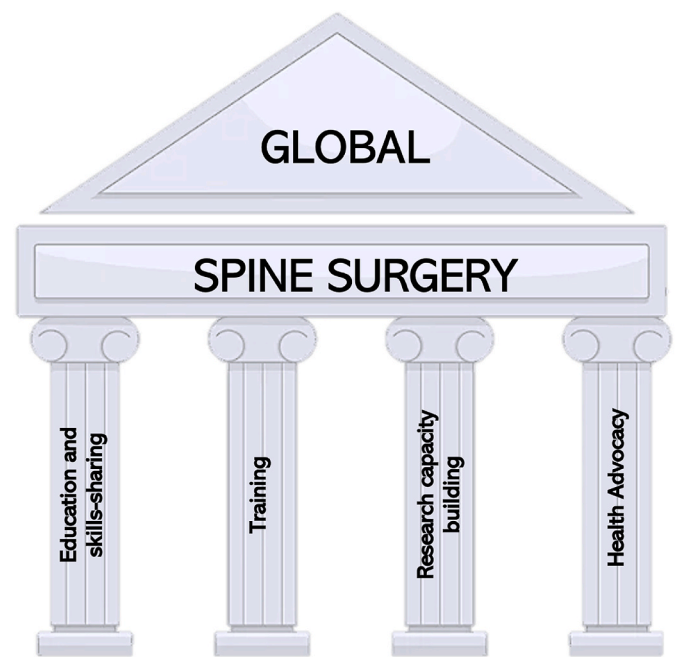


Fig. 1. Four pillars of global spine surgery.

spine surgeons worldwide to champion the cause of global neurosurgery. Just as neurosurgeons were trained to be inquisitive problem solvers under the most perplexing and complicated situations, they are most favorably positioned to assume this task. Neurosurgeons around the world bear the important social responsibility of ensuring that essential and holistic spine care is available to all patients by promoting equal access to quality health care systems. Through international collaboration and partnership, we look forward to the day that surgical care, especially as it pertains to neurosurgical and spine care, will be transformed from being the *neglected stepchild* to the coveted *poster child* of global health.

## References

- AlEissa, S.I., Tamai, K., Konbaz, F., et al., 2021. SPINE20 A global advocacy group promoting evidence-based spine care of value. *Eur. Spine J.* 30 (8), 2091–2101. <https://doi.org/10.1007/s00586-021-06890-5>.
- Chou, R., Côté, P., Randhawa, K., et al., 2018. The Global Spine Care Initiative: applying evidence-based guidelines on the non-invasive management of back and neck pain to low- and middle-income communities. *Eur. Spine J.* 27 (Suppl. 6), 851–860. <https://doi.org/10.1007/s00586-017-5433-8>.
- Corley, J., Barthélemy, E.J., Lepard, J., et al., 2019. Comprehensive policy recommendations for head and spine injury care in low- and middle-income countries [published correction appears in *World Neurosurg.* 2020 may;137:504]. *World Neurosurg.* 132, 434–436. <https://doi.org/10.1016/j.wneu.2019.05.011>.
- Demetriades, A.K., Marchesini, N., Alves, O.L., et al., 2022. A survey on the early management of spinal trauma in low and middle-income countries: from the scene of injury to the diagnostic phase (part II). *Brain Spine* 2, 101185, 1–7.
- Farmer, P.E., Kim, J.Y., 2008. Surgery and global health: a view from beyond the OR. *World J. Surg.* 32 (4), 533–536. <https://doi.org/10.1007/s00268-008-9525-9>.
- GBD 2019 Diseases and Injuries Collaborators, 2020. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019 [published correction appears in *Lancet.* 2020 Nov 14;396(10262):1562]. *Lancet* 396 (10258), 1204–1222. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9).
- Kumar, R., Lim, J., Mekary, R.A., et al., 2018. Traumatic spinal injury: global epidemiology and worldwide volume. *World Neurosurg.* 113, e345–e363. <https://doi.org/10.1016/j.wneu.2018.02.033>.
- Marchesini, N., Demetriades, A.K., Alves, O.L., et al., 2022a. Exploring perspectives and adherence to guidelines for adult spinal trauma in low and middle-income health-care economies: a survey on barriers and possible solutions (part I). *Brain Spine* 2, 100932, 1–7.
- Marchesini, N., Rubiano, A.M., Sala, F., et al., 2022b. Secondary damage management of acute traumatic spinal cord injury in low and middle-income countries: a survey on a global scale (Part III). *Brain Spine* 2, 101694, 1–8.

- Meara, J.G., Leather, A.J., Hagander, L., et al., 2015. Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. *Lancet* 386 (9993), 569–624. [https://doi.org/10.1016/S0140-6736\(15\)60160-X](https://doi.org/10.1016/S0140-6736(15)60160-X).
- Park, K.B., Johnson, W.D., Dempsey, R.J., 2016. Global neurosurgery: the unmet need. *World Neurosurg* 88, 32–35. <https://doi.org/10.1016/j.wneu.2015.12.048>.
- World Health Organization, 2015. WHA68.15: Strengthening Emergency and Essential Surgical Care and Anaesthesia as a Component of Universal Health Coverage. WHO, Geneva. [http://apps.who.int/gb/ebwha/pdf\\_files/WHA68/A68\\_R15-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/WHA68/A68_R15-en.pdf).

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