Neurosurgical training

- Evaluation of the clinical effectiveness of bundled care interventions on pressure ulcer incidence in neurosurgical patients
- Additive Manufacturing, Thermoplastics, CAD Technology, and Reverse Engineering in Orthopedics and Neurosurgery-Applications to Preventions and Treatment of Infections
- Advancing Neurosurgical Oncology and AI Innovations in Latin American Brain Cancer Care: Insights from a Center of Excellence
- Photogrammetry Foundations and Guidelines for Acquisition of High-Definition 3-Dimensional Models Using Photographic Cameras and Smartphones: An Optimized Tool to Improve Neuroanatomy Research and Education
- Simulating Endonasal Endoscopic Skull Base Surgery on Animal Carcasses: A Prospective Observational Study
- Formation of the NSI-Young Neurosurgeons Forum and the Fellowship Landscape in India: Wants vs Needs
- NeuroLens: organ localization using natural language commands for anatomical recognition in surgical training
- A Comprehensive Review of the Role of the Latest Minimally Invasive Neurosurgery Techniques and Outcomes for Brain and Spinal Surgeries

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A sustainable neurosurgical workforce depends on robust training pipelines, but the size and distribution of the global neurosurgery trainee workforce have not been described. The objective of this study was to identify the types of training programs that exist in the global neurosurgery workforce, the support that trainees receive, the diversity of trainee experiences, and the accreditation processes that exist to regulate training programs.

Methods: This study was a subanalysis of a cross-sectional survey administered online in all 193 countries and 26 territories, independent states, and disputed regions as defined by the World Bank and the United Nations. Participants were identified through neurosurgery society leadership, the personal contacts of the coauthors, and bibliometric and search engine searches. Population-weighted statistics were constructed and segregated by country income level and WHO regions.

Results: Data were obtained for 187 countries (96.9%) and 25 additional territories, states, and disputed regions (96.2%). There were an estimated 1261 training programs and 10,546 trainees within the regions sampled, representing a global pooled density of 0.14 neurosurgery trainees per 100,000 people and a median national density of 0.06 trainees per 100,000 people. There was a higher density in high-income countries (HICs; 0.48 trainees per 100,000 people) compared with upper-middle-income countries (0.09 per 100,000), lower-middle-income countries (0.06 per 100,000), and low-income countries (LICs; 0.07 per 100,000). The WHO European (0.36 per 100,000) and Americas (0.27 per 100,000) regions had the highest trainee densities, while Southeast Asia (0.04 per 100,000) and African (0.05 per 100,000) regions had the lowest densities. Among countries with training programs, LICs had the poorest availability of subspecialty training and resources such as cadaver laboratories and conference stipends for trainees. Training program accreditation processes were more common in HICs (81.8%) than in low- and middle-income countries (LMICs; 69.2%) with training programs.

Conclusions: The authors estimate that there are at least 1261 neurosurgery training programs with

10,546 total trainees worldwide. The density of neurosurgery trainees was disproportionately higher in HICs than in LMICs, and the WHO European and Americas regions had the highest trainee densities. The trainee workforce in LICs had the poorest access to subspecialty training and advanced resources [1].

Residents have a positive attitude towards research. However, research engagement among residents is low. Improving research mentorship and creating systems that enable protected time and institutional access to data are needed to increase research output of postgraduate trainees [2]

In a retrospective analysis of patients who have undergone Microvascular decompression by the trainee (07/2014-07/2017) and by the senior neurosurgeon (03/2011-04/2015). Data such as surgery time, length of stay, outcomes and complications were collected.

Out of the 18 cases of MVD were performed by the trainee, 10 were supervisor trainer unscrubbed (STU) or performed (P) and 8 were supervisor trainer scrubbed (STS). Mean surgical time was 2:30 hrs and mean length of stay was 6.33 days. The mean outcome score was 2.33/3 with 89% cases a positive outcome. The complication rate was 16.7%, of which one had meningitis, one had CSF leak and one developed a pseudomeningocele. The trainee's surgery time, outcomes and complication rates were comparable to trainer and the literature. There was a statistically significant correlation between number MVD performed and operative time ($R = -0.50$, $p < .05$), intervals between MVDs and complication rates ($R = 0.64$, $p < .05$), and interval between MVDs and outcome scores ($R = -0.66$, $p < .05$). Phang et al., estimate the time between cases should be below 40 days.

Training a trainee is safe and does not add much burden to the hospital. A trainee will benefit the most if they have the same supervisor at least for the first eight cases and that each case should be done within 40 days of each other [3].

Neurosurgical training is an intensive and highly specialized process that prepares doctors to diagnose, manage, and surgically treat conditions related to the central and peripheral nervous systems, including the brain, spinal cord, and spine. Here are the key stages and components typically involved:

Pre-Residency (Medical School)

Foundation in Medicine: Aspiring neurosurgeons begin with a medical degree, usually lasting four to six years. This includes general medical training with rotations in various specialties, including neurology and surgery. Exams and Requirements: Many regions require passing specific exams to qualify for a neurosurgical residency, and some may require additional research experience or internships in neurology or neurosurgery.

Neurosurgical Resident Training

Neurosurgical Resident Training.

Neurosurgical Training Program

Neurosurgical Training Program

Fellowship and Subspecialty Training

A study demonstrated the high acceptance of augmented 360° VR videos as a valuable tool for early student neurosurgical education. While hands-on training remains indispensable, these videos promote conceptual knowledge, ignite interest in neurosurgery, and provide a much-needed orientation within the operating room. The incorporation of detailed explanations throughout the surgies with augmentation using superimposed elements, offers distinct advantages over simply observing live surgeries [4)]

Virtual Reality in Neurosurgery included their utility as a supplement and augment for neuronavigation in the fields of diagnosis for complex vascular interventions, spine deformity correction, resident training, procedural practice, pain management, and rehabilitation of neurosurgical patients. These technologies have also shown promise in other area of neurosurgery, such as consent taking, training of ancillary personnel, and improving patient comfort during procedures, as well as a tool for training neurosurgeons in other advancements in the field, such as robotic neurosurgery.

Mishra et al. present the first review of the immense possibilities of VR in neurosurgery, beyond merely planning for neurosurgical procedures. The importance of VR and AR, especially in "social distancing" in neurosurgery training, for economically disadvantaged sections, for prevention of medicolegal claims and in pain management and rehabilitation, is promising and warrants further research [5)].

Neurosurgeons undergo extensive education and training, typically requiring 7-8 years of postgraduate medical education, including medical school and residency. Many neurosurgeons also pursue additional fellowship training in subspecialties such as pediatric neurosurgery, neuro-oncology, or functional neurosurgery.

The Halstedian model, named after Dr. William Stewart Halsted, is an approach to surgical education and training that was developed in the late 19th and early 20th centuries.

[1)]
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