

# THE RISE AND RISE OF NEUROSURGERY: ACADEMIC JOURNEY OF A YOUNG DEPARTMENT IN A DEVELOPING COUNTRY

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The Section of Neurosurgery, part of the Department of Surgery, and the Mind and Brain Service Line at the Aga Khan University Hospital Karachi, has come a long way since its recognition in mid-90s. Although the program itself was recognized in late 90's and the first resident graduated in 2004, it wasn't until 2008 that it assumed its current shape of a formal, structured training program. Currently it has six full-time faculty members, one part-time faculty member, two instructors, and a team of 12 residents. Following are few of the innovations introduced within the program over the last few years.

## Innovations in Education and Training

As one of the most sought after residency programs in the country, Neurosurgery Residency Program at AKU has been fortunate to have a brilliant group of residents and a robust academic program. There is an average of 7 hours per week of mandatory teaching for residents, including skills workshops. Apart from standard CPSP based curriculum, we have incorporated mandatory basic science teaching to residents and several faculty with PhD Neurosciences are involved in this teaching program. The university has high-speed internet access for all residents which allows residents to benefit from online learning resources, online access to library, digital journal clubs and Whatsapp based academic exchange. The Surgical Grand Round is a mandatory forum for residents to present their research work every year to the entire department, wherein each resident has to present at least four projects during training. (1) These projects are presented at national and international level through the department's generous and substantial funds reserved for individual residents. (1) Several residents and faculty have also been provided opportunities for several weeks' international rotations at international centers of repute. Moreover, we routinely invite and host national, international visiting faculty who spend time in our section with dedicated time for residents. These faculty members have helped us organize Pakistan's only hands-on microvascular course on live animals for three years in a row and this year, we plan to organize Pakistan's first

white matter dissection course, and a state of art brain tumor tissue repository as well. Local networking is further encouraged through monthly citywide meetings, and the annual Neurosurgery Review Course, that allows our residents to interact with senior residents and faculty from across the country. The CIME with state-of-art Neuro-Touch Simulator for brain tumor resections has been recently acquired for junior level residents, and in future, the addition of Exoscope and a dedicated cadaveric lab to the CIME will further aid in simulation based training. Like other sections of the department, Neurosurgery has now incorporated Mini-CEX, DOPS, One45, and 360-degree evaluations as part of the resident evaluations process. From next year, we are also starting Pakistan's first Surgical Neuro-Oncology Fellowship program. Similar annual and bi-annual teaching programs in collaboration with other specialties are in place for medical students, nurses and operating room technicians.

## Innovations in Patient Care

Over the last few years, the section has developed standard guidelines for management of neuro-oncological patients, including multi-disciplinary involvement, 24-hours post op imaging, and mandatory discussion of all tumor patients in Pakistan's first weekly Multi-Disciplinary Neuro-Tumor Board. For several pathologies, the management is now protocol based and involved cross specialty coverage, including our specialized nurse managers. (2) The monthly morbidity and mortality meeting has been held uninterrupted since 2004 and the data is maintained on a tailor-made M and M form. Almost all tumor surgery is being done under navigation guidance since 2004, and we have recently introduced DTI based, Exoscope assisted surgeries, and awake craniotomy, to our range of surgical options for brain tumor patients. Our volumes and more importantly, our benchmark quality outcomes including mean length of hospital stay, re-admission rates, post-operative morbidity/mortality have all shown continuous improvements.

## Innovations in Research

Our concept of Research-Retreat-Recovery has helped us make the most out of section based research projects. (3) We have developed multidisciplinary research groups involving Neurology, Oncology, Radiology, Vascular Interventional Radiology, Anesthesia, Emergency Medicine and Basic Sciences (Glioma Group). Several funded projects are currently underway, and international collaboration has also been established for other key projects. There is a dedicated group of statisticians available for residents' assistance and training. We have been the national leaders in neurosurgical research and have shown research outputs comparable to some of the leading programs around the world, based on i10 and h-index. (4) Our forte has been Traumatic Brain Injury based clinical research and outcome prediction, and our papers have been published in top neurosurgery journals. (5-8)

## Way forward

There is plenty of room for improvement. Firstly, the key to better patient outcomes, and better research remains sub-specialty development. Pediatric Neurosurgery and Functional Neurosurgery are two areas that require further strengthening and leadership. A dedicated state-of-art Neuro-ICU is also a key component of any Neurosurgical Centre of Excellence.

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