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## REFORMS IN ACADEMIC NEUROLOGY: NEEDS OF A RAPIDLY CHANGING INDIA

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Healthy citizens are the greatest asset any country can have.

—Sir Winston Churchill

**Why neurology?** A nation's economic growth rides on the shoulders of its working class citizens and their health. A decline in the incidence of chronic diseases like stroke has been seen in high-income countries with the availability of good primary and specialty care.<sup>1</sup> In contrast, there is an upward trend in low-income countries, which can be explained by the increasing proportion of their elderly populations.<sup>1,2</sup>

It is predicted that in the coming years there will be a jump in the incidence of lifestyle-related diseases with the expansion of the middle-class society of modern India. India is already witnessing an increase in the incidence of neurologic disorders, described as the "hidden epidemic."<sup>3</sup> Das et al.<sup>3</sup> assessed the burden of neurologic diseases in India and reported 3 to 3.5 million new cases of traumatic brain injury, 1.6 million annual incidence of dementia, and 1.5 million new strokes in 2010. Recent advances in modern technology have equipped neurologists with better diagnostic and therapeutic capabilities, but what if there are not enough qualified neurologists in India to make use of this technology?

**Population per neurologist ratio.** It is important to consider the workforce available to manage this "hidden epidemic." A study in 1991 reported India's population per neurologist (PPN) ratio as 3 million.<sup>4</sup> This means there was one neurologist to cover 3 million Indians in 1991. The number was updated by a task force report in 2001 by the World Federation of Neurology, which reported the PPN ratio for India as 2.18 million.<sup>5</sup> It would be unfair to compare this with the United States, which had a PPN ratio of 26,000 in 2001. However, we can draw reasonable comparisons with countries like South Africa (PPN ratio 0.39 million) and Mexico (PPN ratio 0.29 million), as these countries are economically comparable with India.<sup>5</sup> Although the report did not include China and many African countries, an educated estimate can be applied regarding academic

neurology in India. It is evident that India is not training enough neurologists to cater to the needs of its huge population.

Some may argue that India is facing a general shortage of physicians and not just neurologists in particular. However, there is a disproportionate deficit of neurologists in India when compared with the United States, South Africa, and Mexico<sup>6</sup> (table). For example, India and South Africa have almost a similar number of physicians but South Africa has 6 times more neurologists when measured for a unit population.

In 2012, Khadilkar<sup>7</sup> reported that there are approximately 1,100 qualified neurologists in India. India's population was 1.24 billion in 2012, and thus the latest PPN ratio turns out to be 1.12 million. Although we are seeing an improvement in the ratio in recent years, the pace with which it is moving is not enough. Even a country like the United States is debating whether it will have enough working neurologists in the future despite having an impressive current PPN ratio of a little over 23,000.<sup>8</sup>

From the available pool of 1,100 neurologists, more than 400 work in the 4 metropolitan regions of India.<sup>7</sup> The 4 metropolitan areas of India—New Delhi, Mumbai, Kolkata, and Chennai metropolitan regions—account for 66 million people.<sup>9</sup> The remaining 1,174 million Indians are left with fewer than 700 qualified neurologists. As a result, the PPN ratio for these 4 metropolitan areas alone stands out as 0.16 million against the PPN ratio of 1.67 million for the rest of the country. Due to this uneven distribution of neurologists in India, rural patients have to travel long distances before they can be seen by a neurologist. Consequently, patients with neurologic emergencies, who need to be seen by a neurologist within a specified time window, experience unfavorable outcomes. This problem, coupled with poor emergency medical transport services, makes this crisis even worse.

**Current situation of academic neurology.** The path to become a neurologist in India starts with 5.5 years of medical school (MBBS), continues through a 3-year general medicine residency (MD Medicine), and is followed by another 3 years of subspecialization in neurology (DM Neurology). As of May 2013, there are 269 medical

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**Table** Comparing the available workforce of physicians in general and neurologists in particular in 4 different countries

Country	Physicians per 10,000 population <sup>6</sup>	Neurologists per 5 million population <sup>5</sup>
United States	28	192
Mexico	17	17
South Africa	7	13
India	6	2

Consult the cited references for raw data.

schools (public and private combined) accredited by the Medical Council of India with an aggregate annual intake of 34,700 students.<sup>10</sup> The graduates then opt for one of the 1,942 accredited MD General Medicine residency spots. After finishing general medicine residency, they enter a training program in one of the 36 medical schools that offer a total of 131 accredited DM Neurology positions.

Neurology is considered a subheading of general medicine and not a separate entity, which tends to undermine its importance. This is evident from the lack of dedicated neurology departments and patient floors in the majority of academic medical centers across India.

Moreover, subspecialties in neurology have not yet been introduced in India, so Indian neurologists aiming to train in subspecialties like movement disorders, epilepsy, neurocritical care, stroke, and others have to train in Western countries. As a result, many medical graduates from India are moving to developed countries in search of better training opportunities, with only a handful of them returning back to practice medicine in India.

Another aspect linked to academic neurology is basic and clinical research. A dearth of academic neurology programs across the country affects research as well. Large-scale epidemiologic studies and multicenter treatment trials are lacking and not much statistical information is available regarding the neurologic disease patterns in India. As a result, most of the clinical neurology practice in India is based on the guidelines set by the American Academy of Neurology. While these guidelines are helpful, Indian neurologists need a local approach in the diagnosis and treatment of patients.

**Looking forward.** The existing issue of the paucity of certified neurologists and awareness about neurologic diseases needs to be addressed. In addition, we cannot rely on general medicine specialists, who presently care for 90% of neurology cases in India,<sup>7</sup> to treat serious neurologic conditions. It is imperative that India expand the horizons of its academic neurology to keep pace with its rapidly shifting disease patterns. It is time to realize the importance of neurology and make it an independent branch in India with an improved academic layout;

compulsory teaching of neurology in the undergraduate course would be the first step.

I suggest that the Medical Council of India rewrite the course description for neurology and make it 4 years of training after medical school, which would include 1 year of medical internship followed by 3 years of neurology, the way it is in the United States. Otherwise, it takes at least 6 years after medical school to qualify as a neurologist in India.

Furthermore, US institutions could collaborate with some Indian medical schools to introduce neurology subspecialties. This is how residency programs in emergency medicine were recently established in India. This would enable Indian neurologists to pursue subspecialty training without having to leave the country and would slow the brain drain that India is facing today.

Most importantly, government and academic institutions should mobilize resources to fund more neurology training positions, which in turn will train more in the future.

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