

Current State of Neurosurgical Practice in Pakistan

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ABSTRACT

Objective: To observe the neurosurgical facilities and patient burden among practicing surgeons in the public and private sectors.

Study Design: Prospective observational study

Place and Duration of Study: This study was conducted at the Department of Neurosurgery, Liaquat National Hospital, Karachi from 25th May 2022 to 25th June 2022.

Materials and Methods: Representatives of neurosurgical institutes throughout Pakistan filled an e-questionnaire. This e-questionnaire comprised demographic details of the hospital, outpatient and in-patient load, number of cases and equipment facilities.

Results: Data was collected from 43 neurosurgery centers. Around 1/3rd were public-sector hospitals, and approximately 1/3rd was affiliated with Medical Universities. Most of the institutes were based in Punjab (41.9%) and Sindh (30.2%). Consultant (m:1, IQ:1) to patient burden (m:100, IQ:115) was found to be steep. There was non-availability of equipment like drill, endoscope, CUSA and image-guided system in all provinces, but severe deficiency was found in one province.

Conclusion: This study shows that improvement in the overall neurosurgical setup in Pakistan is required. Our results suggest that patient burden is increasing, and there is a deficiency of neurosurgical facilities in both public and private sectors all over Pakistan. The stakeholders in Neurosurgery need to take notice and correct this promptly, with local and international help.

Key Words: Neurosurgical practice, Neurosurgery in Pakistan, Neurosurgery practice in developing country, burden of Neurosurgery in Developing countries

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INTRODUCTION

Neurosurgery is one of the younger specialties in the surgical field of practice^[1]. In Pakistan, the neurosurgical practice was initiated in 1953 by Dr O.V Jooma. He was trained in England and started his practice in Jinnah Postgraduate Medical Center. A proper training program was then proposed and implemented by CPSP (College of Physicians and Surgeons Pakistan) in 1962. Since then, academic and neurosurgical clinical programs have spread throughout Pakistan.

In 2000, Pakistan had 150 practicing neurosurgeons^[2]. Since then, this number has increased, and neurosurgical training has become a significant trend in surgical education.

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There have been studies in several countries to describe the past and current (including recent advances) neurosurgical practices, describing the developments, promising discoveries and areas considered for improvements. Several authors have described different aspects of neurosurgical practices in Pakistan. These include academics, surgical training, and evidence-based practice along with considerations for recent advancements (e.g., Microsurgery, Image guidance, neuromonitoring, Ultrasonic aspirators, functional neurosurgery) for better practicing surgeons³⁻⁵. However, the studies mentioned above have not discussed patient burden, procedure workload, and equipment advancement in institutes of Pakistan.

A specialized unit requires well equipped radiological facilities and highly effective modern surgical tools. However, several institutes lack adequate exposure and equipment for an organized neurosurgical practice.

The objective of this study was to observe the overall patient burden among practicing neurosurgeons in the public and private sectors. This study will also focus on the diversity of procedures performed in institutes of different provinces of Pakistan. The study derives from the fact that no such research has been conducted in Pakistan.

MATERIALS AND METHODS

We performed a prospective observational study after getting an approval from ethical research committee.

This study was conducted at the Department of Neurosurgery, Liaquat National Hospital, Karachi from 25th May 2022 to 25th June 2022. An e-questionnaire was sent to representatives of participating hospitals with ongoing neurosurgical practice throughout Pakistan.

We created the questionnaire using the online services of “Google Form”. This online questionnaire comprised of demographic details of the hospital (province, public or private sector), university affiliation, number of consultants, number of beds and a few other queries like number of patients presenting via outpatient department (OPD) or emergency, procedures performed electively or in an emergency, and availability of radiological and surgical equipment facilities.

This e-questionnaire were sent to representative consultants of respective hospitals from neurosurgical departments throughout Pakistan via email. They were requested to fill the form via phone call (emails and phone numbers were retrieved through the database of the Pakistan Society of Neurosurgeons).

We included responses that were received within two months. Incomplete forms were excluded, and multiple responses from a single center’s data were merged.

Frequencies, mean and standard deviation were calculated for all the continuous variables using IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.

RESULTS

Table No.1: Institution-wise detail.

Variable	n (%)
Hospital	
Government	29 (67.4)
Private	14 (32.6)
University Affiliated	28 (65.1)
Established since	
<10yrs	10 (23.3)
10-20yrs	10 (23.3)
>20yrs	22 (51.2)
Province	
Sindh	13 (30.2)
Punjab	18 (41.9)
Balochistan	2 (4.7)
KPK	10 (23.3)
Faculty	
<5 consultants	21 (48.8)
>5 consultants	19 (44.2)
Consultant	
Professors	39
Associate Professors	23
Assistant Professors	93

n* =number of faculty, n̄=number of hospitals

Out of 48 institutes, 43 responses were recorded. 67% of these were public-sector hospitals, and approximately 1/3rd was affiliated with Medical

Universities. Most of the institutes were based in Punjab (42%) and Sindh (30%). We also observed that almost half (51%) of the institutes are more than 20 years old, and only one-fourth of these hospitals have been established in the past 10 years. [Table 1].

Workload: The number of Professors (m:1, IQ:1), Assistant Professors (m:2, IQ:1) and Associate Professors (m:1, IQ:2) were noted to be relatively less compared to the number of patients per OPD (m:100, IQ:115) and per month (med:1000, IQ:1865) [table 2].

Table No.2: Workload.

	Median (IQ range)
Faculty	
Professors	1 (1)
Associate Professors	1 (2)
Assistant Professors	2 (1)
Residents	3.5 (21)
FCPS cleared/year	0 (2)
Surgery/year	600 (1453)
Trauma Surgery/month	35 (70)
Cranial	35 (392)
Spine	17.5 (43)
Elective Surgery/month	
Cranial	32.5 (224)
Spine	25 (116)
Vascular surgery	1.5 (9)
Endoscopic surgery	
Cranial	3.5 (21)
Spine	0 (2)
Beds	
Total beds	62 (176)
ICU Beds	8.5 (7)
OPD patients	
per month	1000 (1865)
per OPD	100 (115)
No. of drills	1 (4)
No. of Theatre	2 (2)
Weekly session	1.5 (2)

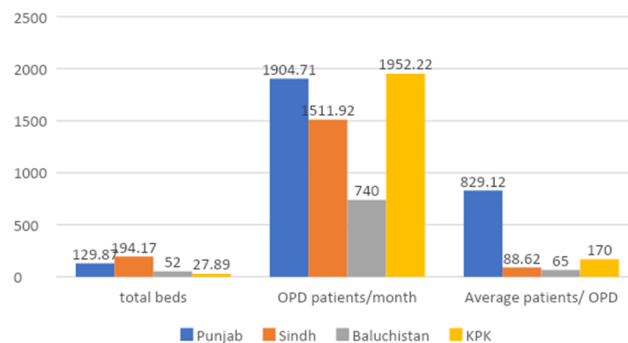


Figure No.1: Comparing Patient Burden between Provinces

Patient Burden: There was a significant difference (p=.001) in the average number of patients per OPD in

Public compared to Private hospitals ($p=.001$) and Sindh compared to KPK ($p=.042$). [figure 1,2]

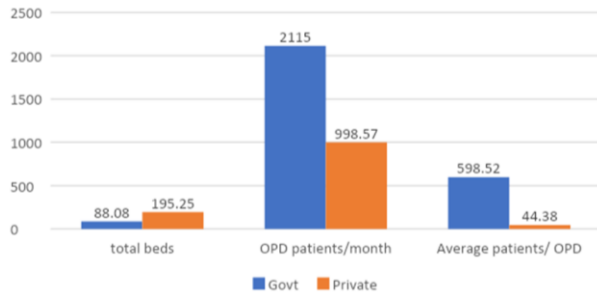


Figure No.2: Comparison of Patient Burden in private & Public Hospital

Equipment Statistics: According to our data, there was non-availability of equipment like a drill, endoscope, CUSA and image-guided systems in one province [figure3]. This equipment's were widely available in all other provinces [figure 4]. We also observed the absence of vascular and endoscopic procedures in that province.

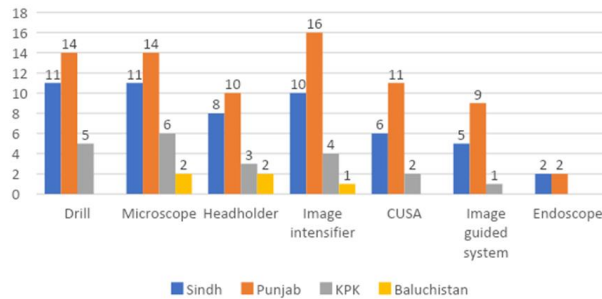


Figure No.3: Comparison of Equipment availability among Provinces

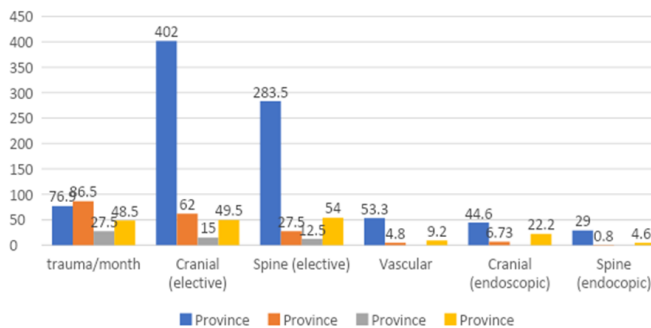


Figure No.4: Mean Operative Cases per Province

DISCUSSION

In Pakistan, neurosurgical practice started in 1951 at Jinnah Postgraduate Medical Center in Karachi due to the selfless efforts of Professor Omar Vali Jooma. He was the first to perform a thoracolumbar laminectomy for a spinal cord tumor. Later in 1956, G.D. Qazi, who had his neurosurgical training from the UK, established Pakistan's second neurosurgery center at Combined Military Hospital Lahore. In 1963, Bashir Ahmed started a neurosurgical unit at Multan^(6,7). Furthermore,

the Pakistan Society of Neurosurgeons was formed in 1989. Since then, the neurosurgical fraternity has evolved tremendously.

As per our study, there are 43 neurosurgery centers in Pakistan. Among these, 28 centers are affiliated with teaching universities, and 29 are public sector hospitals. These units provide specialized care in neuro-oncology, pediatric neurosurgery, micro-vascular neurosurgery, spinal neurosurgery, endoscopic surgeries and minimally invasive procedures along with neurosurgical trauma.

We noticed that the outpatient department has a busy routine of 100 patients per consultant. 155 neurosurgeons are practicing in these centers, for a population of around 224 million in Pakistan⁽⁸⁾. In other words, there is one neurosurgeon for every 1.5 million persons in this country. This burden is way higher than for neurosurgeons in Turkey (1/56,000 persons), European Union (1/121,000 persons) or the United States (1/81000 persons)⁽⁹⁾.

An average of 600 surgeries is performed per year in a neurosurgery center in Pakistan, with around 35 neurotrauma patients per month. This range is similar to the number of procedures in Ethiopia (1500 cases in 5 units)⁽¹⁰⁾. However, approximately twice these cases are performed in a large-scale center in Oslo (1000/year)⁽¹¹⁾.

Routine elective and emergency neurosurgical procedures require specialized instruments like an electric drill, operating microscope, Mayfield head holder, image intensifier, ultrasonic aspirator, image-guided system and endoscopic system for a minimally invasive approach. Neurosurgery units in major provinces like Punjab and Sindh are well equipped with these instruments. However, we observed major deficiencies in the province of Balochistan, where there is the unavailability of ultrasonic aspirators, image-guided systems and endoscopic systems. Hence, specialized cases like microvascular surgery and endoscopic procedures are not being performed in Balochistan based centers. This lack of surgical exposure and equipment has a major negative impact on the skillset of neurosurgical residents and attending in this area.

El-Fiki, an African neurosurgeon, also stated the similar scarcity of neurosurgical services and neurosurgeons available in sub-Saharan countries, compared to North and South African countries. He proposed to expand the WFNS initiative for underdeveloped countries to provide basic neurosurgical equipment at low-cost, whether public or private centers⁽¹²⁾.

Over the past 50 years, there has been a major advancement from 3 institutes to >50 neurosurgical units in Pakistan. Most of these institutes are well equipped with modern and sophisticated diagnostic and surgical instruments for several neurosurgical disorders. Unfortunately, only 3 centers in Pakistan perform

stereotactic and functional neurosurgery, which is still limited to oncological procedures, whereas many countries like Korea, Oslo and Russia have progressed dramatically^(13,14,15). It is recommended to improve this subspecialty's expertise and equipment and introduce easy access to equipment for modern neurosurgical procedures.

CONCLUSION

We need to improve our overall neurosurgical practice in Pakistan as evident from our results that patient burden is increased and deficiency of neurosurgical facilities in both public and private sectors which will improve our outcome in these patients.

Author's Contribution:

Concept & Design of Study: Syed Maroof Ali
 Drafting: Priyanka Ramesh, Aamir Saghir
 Data Analysis: Salman Sharif, Samir Irfan Wasi
 Revisiting Critically: Syed Maroof Ali, Priyanka Ramesh
 Final Approval of version: Syed Maroof Ali

Conflict of Interest: The study has no conflict of interest to declare by any author.

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