

Original Article

Pediatric neurologists in Saudi Arabia: An audit of current practice

Mohammed M.S. Jan*

Department of Pediatrics (Neurology), King Abdulaziz University Hospital, Jeddah, Kingdom of Saudi Arabia

Received 9 November 2004

Revised 8 February 2005

Accepted 9 February 2005

Abstract. Pediatric neurological disorders are common and constitute up to 30% of children seen in general pediatrics. Information about the availability and practice of pediatric neurologists is vital for strategic planning of management of neurological disorders. The aim of this study was to audit current pediatric neurology services in Saudi Arabia and establish a correlation with regional population figures. Physicians practicing in the field of pediatric neurology in Saudi Arabia were identified and contacted. A structured 17-item questionnaire designed to examine their clinical practice was completed and validated by a follow-up interview. Thirty-two full-time hospital based pediatric neurologists were concentrated in the 3 most heavily populated regions of the country. Saudi Arabia as a whole had a ratio of 0.4 pediatric neurologists per 100,000 children <15 years of age given that 38.3% of the general population was <15 years at the time of the study. Pediatric neurologists had an average of 3 half-day clinics per week with an average of 13.4 patients per clinic. The ratio of follow-up visits to new patients was 3:1. Waiting times for a new non-urgent consultation ranged from 1–6 months (mean 3.4 months). Inpatient hospital admissions ranged from 1–20 (mean 6.5) per week with an average of 5.7 in-hospital consultations per week. Major deficiencies were identified in the availability of specialized nurses, occupational therapists, and psychologists. The study documents a significant shortage of pediatric neurologists in our country. The currently practicing neurologists are required to see many patients with long waiting lists and inadequate support services in many institutions. I feel that a strong demand exists to train and recruit more pediatric neurologists and that generalists and pediatricians need to continue to take a proactive role in the routine care of children with neurological disorders in Saudi Arabia.

Keywords: Pediatrics, child, neurology, audit, practice, Saudi Arabia

1. Introduction

Pediatric neurological disorders are common in daily practice and constitutes up to 30% of children seen in general pediatrics [1–4]. General practitioners and pediatricians are less confident in handling neurology pa-

tients when compared to patients with other common pediatric conditions [1,5]. In one study, more than 50% of pediatricians referred more than 90% of their children with neurological complaints to pediatric neurologists [6]. Other investigators found increasing pressure on the pediatric neurology service because of unnecessary referrals for benign or transient conditions [2]. Pediatric neurology services are therefore generally busy with large volume of referrals and consultations [2,3,6,7]. Horiguchi et al. [8] assessed physicians working in pediatric neurology using a burnout inventory and a general health questionnaire and found 27% of the re-

*Correspondence: Dr. Mohammed M.S. Jan, Department of Pediatrics (Neurology), King Abdulaziz University Hospital, P.O. Box 80215, Jeddah 21589, Kingdom of Saudi Arabia. Tel.: +996 2 6401000 (ext. 20208); Fax: +996 2 6403975; E-mail: mmsjan@yahoo.ca.



Fig. 1. Administrative regions of the Kingdom of Saudi Arabia.

spondents had attained a burnout status and 93% were suffering from stress related neurosis. There are concerns worldwide about the current shortage of trained pediatric neurologists [1,9–12].

Saudi Arabia is a large developing country of about 2,149,700 square kilometers in area [13]. The estimated Saudi population for the year 2000 was 20,846,884 with 38.3% of the population less than 15 years of age [14]. Saudi Arabia is made up of several administrative regions (Fig. 1); however, about 80% of the urban population resides in the Riyadh, Western, and Eastern regions [15]. Genetic and inherited neurological disorders are more prevalent as a result of high consanguinity rates reaching up to 70% of marriages in some regional population [16,17]. Although pediatric neurology is considered a separate and evolving subspecialty, trained pediatric neurologists are few and available only in certain tertiary care centers of larger cities [1,11]. It has been suggested that one pediatric neurologist is required for every 100,000 children less than 15 years of age [18]. A recent Canadian study revealed an overall ratio of 1.1 pediatric neurologists per 100,000 children [9]. Information about the distribution, number, and practice of pediatric neurologists is vital for strategic planning of management of disorders involving the nervous system [11]. It was for this reason that the present study was undertaken with an aim to audit current pediatric neurology services in Saudi Arabia and establish a correlation with regional population figures.

2. Materials and methods

A list of physicians practicing in the field of pediatric neurology was obtained from several sources including membership with the Saudi Council of Health Specialties, national and regional pediatric neurology groups, and communications during national and regional neuroscience meetings in the Kingdom of Saudi Arabia. The study's author has personal knowledge of most practicing pediatric neurologists in Saudi Arabia as he is a member of the pediatric neurology committee of the Saudi Council of Health Specialties and the president of the pediatric neurology periodic club meeting in the western region. Most pediatric neurologists in Saudi Arabia are trained fully or partially outside the country, however, a small percentage are general pediatricians with special interest in neurology and shorter training, such as 1–2 years pediatric neurology diploma (i.e. neuro-pediatricians). All pediatric neurologists in Saudi Arabia practice within a hospital based setting in close proximity to diagnostic and allied health services. A structured 17-item questionnaire designed to examine their clinical practice was electronically mailed to all pediatric neurologists across Saudi Arabia, in the year 2004. This was followed by phone or personal communication by the study author to validate the accuracy of the data. Key clinical practice questions are listed in Table 1. Additional data sought included number of full-time and/or part-time pediatric neurologists

Table 1
Key clinical practice questions addressed in the study questionnaire

What is your hospital practice (tertiary/university/private/other)?
How many half-day clinics per week?
How many patients' slots (new – follow-up) per clinic?
What is the average number of patients seen per clinic?
What is the average waiting time for new non-urgent patients?
What is the average number of non-clinic neurology consultations per week?
What is the average number of neurology admissions per week?
What type and number of specialty neurology clinics if any per week?
Availability and number of allied health professionals such as specialized nurses, social workers, occupational and physiotherapists, psychologists, and dietitians?

Table 2
Ratio of pediatric neurologists to children <15 years of age in the five most heavily populated regions of Saudi Arabia

Regions	Major cities	Population	Number of pediatric neurologists	Ratio*
Central	Riyadh	5,024,200	15	0.78
	Kharj			
Western	Jeddah	5,817,500	11	0.49
	Makkah			
	Taif			
Eastern	Hada	3,233,700	4	0.32
	Dammam			
	Dhahran			
	Khobar			
Madina	Madina	1,468,000	1	0.18
Tabuk	Tabuk	627,600	1	0.42

*Ratio calculated per 100,000 children <15 years of age, given that 38.3% of the general population was <15 years at the time of the study.

in each institution, number of adult neurologists or pediatricians with special interest and training in pediatric neurology (neuro-pediatricians), the training experiences of pediatric neurologists, and the size of the served population.

3. Results

All contacted centers responded to our questionnaire. A total of 32 full-time physicians practicing in the field of pediatric neurology across Saudi Arabia were identified. Most of these physicians (75%) were fully trained pediatric neurologists and the remaining 8 physicians were pediatricians with interest and special training in pediatric neurology (neuro-pediatricians). Most pediatric neurologists received training in North America (33% USA, 29% Canada) and 21% and 17% received their training in Europe or other Arab countries respectively. All physicians were hospital based and concentrated in the 3 most heavily populated regions of the country (Table 2). Saudi Arabia as a whole had a ratio of 0.4 pediatric neurologists per 100,000 children less than 15 years of age given that 38.3% of the general population was less than 15 years of age at the

time of the study. The ratio decreases to 0.3 if neuro-pediatricians were excluded. Regional variations in the ratio ranged from a low of 0.18 in the Madina region to a high of 0.78 in the Riyadh region (Table 2). Many other regions had no coverage with pediatricians and adult neurologists looking after pediatric neurology patients or refer them to the closest center. The number of adult neurologists in the contacted centers ranged from 1 to 9 (mean 2.5).

Table 3 summarized the distribution and practices of pediatric neurologists in various institutions of Saudi Arabia. Overall, pediatric neurologists had an average of 3 half-day clinics per week with an average of 13.4 patients per clinic. The ratio of follow-up visits to new patients was 3:1. Excluding private hospitals, where pediatric neurologists have daily walk in clinics, waiting times for a new non-urgent consultation ranged from 1 to 6 months (mean 3.4 months). The centers offering various subspecialty clinics are also shown in Table 3. Inpatient pediatric neurology hospital admissions ranged from 1 to 20 (mean 6.5) per week and the pediatric neurologists saw 1–10 (mean 5.7) in-hospital consultations per week. Variations in the availability of allied health professionals (specialized nurses, social workers, physical and occupational therapists, psychol-

Table 3
Pediatric neurology practices in the different hospital settings

Institutions with pediatric neurologist (number of hospitals)	Number of pediatric neurologists	Number of weekly clinics per physician (mean)	Number of patients per clinic (mean)	Waiting time in months (mean)	Specialty clinics
King Faisal Specialist Hospitals and Research Centers (2)	6	3-4 (3.3)	8-12 (9)	1-2 (1.5)	Epilepsy Neuromuscular Neuro-oncology Neurodevelopment
Military Hospitals (5)	6	3	12-25 (18)	3-6 (4)	Epilepsy Neuromuscular Disability
Ministry of Health (6)	6*	1-4 (2)	10-30 (19)	1-6 (3)	Epilepsy
University Hospitals (3)	5	1-2 (1.5)	15-22 (17)	4-6 (5)	Epilepsy Neuromuscular
National Guard (2)	4	3	10-15 (12)	3-5 (4)	Epilepsy Neuromuscular
Private (2)	2**	daily	8-12 (10)	Walk-in	Epilepsy
Other (2)	3	3-5 (4)	8-10 (9)	2-4 (3)	Epilepsy Disability Spina bifida

*Four are pediatricians with special interest and training in pediatric neurology.

**Pediatric neurologists in private hospital practice only. Many pediatric neurologists have private clinics within their hospital practice.

Table 4
Allied health professionals in pediatric neurology practices, by institution

Hospitals	Specialized nurse	Social workers	PT	OT	Psychology	Dietitian
King Faisal Specialist Hospitals and Research Centers	+	+	+	+	+/-	+
Military Hospitals	+/-	+/-	+	+/-	+/-	+/-
Ministry of Health	-	+	+/-	-	-	-
University Hospitals	+	+	+	+/-	+/-	+
National Guard	+/-	+	+	+	+	+
Private	+/-	+	+	-	+/-	+
Other	+/-	+	+	+/-	+/-	+

+/- Available in only some hospitals or part-time service only.

ogists, and dietitians) in different Saudi institutions are shown in Table 4.

4. Discussion

This study documents the significant shortage of pediatric neurology services in our country. This is the first study to evaluate pediatric neurology services in our region. Pediatric neurologists were concentrated in 3 regions of the country with many regions with limited or no coverage. Furthermore, the current population figures may be significantly higher than the 2000 estimates mainly because of our very high crude birth rate of 35/1000 population [15]. The estimate for the Saudi population in 2004 has exceeded 25,000,000 [19]. As well, some of the pediatric neurologists are not readily accessible to the general public because of the nature of their hospital practice such as military or National

Guard hospitals. This means that the demand for pediatric neurologists is even stronger than the estimated ratios. Our shortage highlights the concerns worldwide about the current and future trends in the supply and demand of pediatric neurologists [1,9-12]. However, the internationally accepted ratio may need to be modified in the developing regions of the world where pediatricians usually take care of all pediatric disorders. Promoting and expanding the pediatric neurology specialty are critical, particularly given that many cases seen by general pediatricians are primarily neurological accounting for up to 30% of all consultations to pediatrics with a high ratio of follow-up visits to new patients [1-3]. The assessment and management of neurological disorders requires specific knowledge, skills, and attitudes, which can be supported by medical education [20]. However, some authors have found a decline in general neurology education and that the education was deficient in training physicians to manage gen-

eral neurological disorders [21,22]. In our recent study evaluating the attitudes of medical students toward pediatric neurology, we found that although 92% found neurological disorders challenging and interesting, the majority (77–100%) had unfavorable attitudes [21]. Most students felt that their teaching experiences were not strong and only 9 (6%) actually selected pediatric neurology as the first future career choice [21]. Other authors recently confirmed the decline in the number of medical students and residents choosing the field of pediatric neurology [23,24]. However, the actual clinical pediatric experience may influence many of their misconceptions and apprehension [25]. We recently found that only 30% of generalists were moderately or highly confident in diagnosing or treating children with neurological disorders [1]. Although many generalists felt that pediatric neurology is a challenging and interesting field that provides help to children, they also felt that many disorders are difficult, complicated, and carry poor prognosis with limited treatments. Some reported that pediatric neurology is emotionally charged and requires very long post-graduate training [1]. In other words, the specialty is unpopular not only among medical students, but also among residents and generalists [1,12,21,23,24].

There are several possible solutions to these problems that should be addressed. First, there is a strong need to train and recruit more pediatric neurologists in our country. We need to work with our students, residents, and generalists to increase their interest in pediatric neurology and promote training in the specialty. Enhanced pediatric neurology exposure may favorably influence their attitudes towards the specialty [24]. This is particularly important given that many students may change their early medical career choices [26]. Edwards et al. [26] compared student's early career choices with their employment 11 years after qualification and found 65% working within the first choice. This would encourage us in our long-term plan to promote and maintain pediatric neurology as a vibrant medical subspecialty. Secondly, appropriate neurological training of general practitioners and pediatricians could reduce the pressure on the limited pediatric neurology services [8]. This can be accomplished during their pediatric residency and by attending interactive continuous medical educational activities. A short and comprehensive training or clinical attachment to an experienced pediatric neurologist can be offered to pediatricians interested in the field. Finally, a practical and shorter-term solution to the problem is to regulate and refine the type of referrals to busy pediatric

neurology services. The role of pediatric neurologists is important in the management of children with active epilepsy, complicated headaches, neuromuscular and neurodegenerative disorders. However, their role is less clear in the routine care of children with developmental delay, cerebral palsy, learning, and behavioral disorders [12]. These disorders may not need to be evaluated initially and followed for routine care by pediatric neurologists. If pediatricians, developmental specialists, and psychologists assume a more active role in the routine management of these disorders, we may be able to function quite well with a lower ratio of pediatric neurologists to the pediatric population. In fact, a recent Saudi study revealed that only 25% of generalists referred more than 60% of their neurology patients to neurologists [1]. These numbers are significantly lower than the referral rates reported in developed countries and may reflect the limitation in access to pediatric neurologists, which was true for more than 30% of the physicians in the study sample [1]. Interestingly, physicians who were interested in pursuing a career in neurology were less likely to refer their patients, reflecting their higher confidence level.

In conclusion, this study documented a significant shortage of pediatric neurologists in our country. The currently practicing neurologists are under pressure to see many patients with long waiting lists and inadequate support services in many institutions. I proposed several short and long term solutions to this problem including increased training and recruitment of pediatric neurologists, enhanced pediatric neurology exposure for medical students, residents, and generalists to increase their interest and promote training in the specialty, encourage and mandate appropriate neurological training of general practitioners and pediatricians to reduce and refine referrals to busy pediatric neurology services. Generalists and pediatricians need to continue to take a proactive role in the routine care of children with simple, uncomplicated, and common general pediatric neurology disorders in Saudi Arabia.

Acknowledgments

I would like to acknowledge the assistance and cooperation of all Pediatric Neurologists who participated in the study. Without their cooperation, honest input, and support this study would not have been possible.

References

- [1] M.M. Jan, Perception of pediatric neurology among non-neurologists, *J Child Neurol* **19** (2004), 1–5.
- [2] M. Herrera Martin, R. Gracia Remiro, C. Santana Rodriguez, A. Jimenez Moya, J. Ayala Curiel and P. Cuadrado Bello, Neuropediatric healthcare demand in a general hospital, *An Esp Pediatr* **53** (2000), 106–111, (in Spanish).
- [3] J. Diez, M. Machin, M. Sanchez, P. Marco and E. Arbesu, Referral to specialists by pediatric clinics at an urban health center, *Aten Primaria* **14** (1994), 680–682, (in Spanish).
- [4] S. Ashwal and R. Rust, Child neurology in the 20th century, *Pediatr Res* **53** (2003), 345–361.
- [5] B. Casabella Abril and J. Perez Sanchez, The attitudes and behavior of the general primary-care physician towards the neurological patient, *Aten Primaria* **15** (1995), 385–386, 388, (in Spanish).
- [6] B.L. Maria and W. English, Do pediatricians independently manage common neurologic problems? *J Child Neurol* **8** (1993), 73–77.
- [7] J. Lopez-Pison, V. Rebage, T. Arana, A. Baldellou, P. Arcauz and J.L. Pena-Segura, A study of the demand for neuropediatric services in a general hospital. II. Reasons for consultation, *Rev Neurol* **25** (1997), 1685–1688, (in Spanish).
- [8] T. Horiguchi, M. Kaga, M. Inagaki, A. Uno, R. Lasky and K. Hecox, An assessment of the mental health of physicians specializing in the field of child neurology, *J Pediatr Nurs* **18** (2003), 70–74.
- [9] G.M. Ronen and B.F. Meaney, Pediatric neurology services in Canada: Demand versus supply, *J Child Neurol* **18** (2003), 180–184.
- [10] M. Tomas Vila, J. Gisbert Mestre and O. Penalver Giner, Neuropediatric practice in Spanish hospitals: Supply and demand, *An Pediatr (Barc)* **58** (2003), 322–326, (in Spanish).
- [11] D.C. Bergen, World Federation of Neurology Task Force on Neurological Services. Training and distribution of neurologists worldwide, *J Neurol Sci* **198** (2002), 3–7.
- [12] S.M. Rothman, Pediatric neurology's midlife crisis, *Neurology* **62** (2004), 845–846.
- [13] *Demographics and Health Indicators for Countries of the East Mediterranean*, WHO, Regional Office for the EM, 1999.
- [14] Central Department of Statistics (CDS). Ministry of Planning, Saudi Arabia.
- [15] M. Al-Yousuf, T.M. Akerele and Y.Y. Al-Mazrou, Organization of the Saudi health system, *East Mediterr Health J* **8** (2002), 645–653.
- [16] G.O. Tadmouri and N.B. Tadmouri, Genetic disorders in Arabs as for OMIM, *Neuroscience* **4** (1999), 1–3.
- [17] M.A.F. El-Hazmi and A.S. Warsy, Genetic disorders among Arab populations, *Saudi Med J* **17** (1996), 108–123.
- [18] S. Carter, Of priorities, promise, and the path ahead, *Neurology* **21** (1971), 877–888.
- [19] A.B. Toth, Saudi Arabia. Microsoft Encarta Online Encyclopedia (<http://encarta.msn.com>), 1997–2004 Microsoft Corporation.
- [20] C.D. Ward, Medical education and the challenge of neurological disability, *J Neurol Neurosurg Psychiatry* **55** (1992), 54–58.
- [21] M.M. Jan and N.M. Fida, Attitudes of medical students toward pediatric neurology, *Pediatr Neurol* **27** (2002), 106–110.
- [22] P.D. Charles, B. Scherokman and R.F. Jozefowicz, How much neurology should a medical student learn? A position statement of the AAN Undergraduate Education Subcommittee, *Acad Med* **74** (1999), 23–26.
- [23] R.M. Werner and D. Polsky, Strategies to attract medical students to the specialty of child neurology, *Pediatr Neurol* **30** (2004), 35–38.
- [24] E. Laureta and S.L. Moshe, State of training in child neurology 1997–2002, *Neurology* **62** (2004), 864–869.
- [25] M.A. Al-Asnag and M.M. Jan, Influence of the clinical rotation on intern attitudes toward pediatrics, *Clin Pediatr (Phila)* **41** (2002), 509–514.
- [26] C. Edwards, T.W. Lambert, M.J. Goldacre and J. Parkhouse, Early medical career choices and eventual careers, *Med Educ* **31** (1997), 237–242.