

# Attitudes of Medical Students Toward Pediatric Neurology

Mohammed M. S. Jan, MD<sup>\*†</sup> and Nadia M. Fida, MD<sup>†</sup>

**Planning strategies to encourage students to pursue a career in pediatric neurology requires assessment of their attitudes and career choices. A structured 30-item questionnaire was designed to examine students' attitudes toward pediatric neurology. In the study, 161 final-year medical students (1999-2000), 20-26 years of age (mean, 23 years of age) were included prospectively. Although most students had been taught by a pediatric neurologist and considered neurologic disorders interesting, 77%-100% had unfavorable attitudes. Although 79% considered pediatric neurology as a future career option, only nine students (6%) selected it as their first choice. Our findings highlight some aspects that might be targeted to promote students' interest in pediatric neurology and improve their learning experiences. © 2002 by Elsevier Science Inc. All rights reserved.**

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## Introduction

Neurologic disorders, particularly genetic disorders, are common in Saudi Arabia as a result of the high rate of inbreeding [1]. Consanguineous marriage is a common traditional practice that is followed within certain sectors of our community [2]. This practice results in the high prevalence of many inherited neurologic disorders, which may become more common in the future [1]. Neurology is also a relatively difficult field. General practitioners working in primary care were found to have less confidence in handling patients with neurologic disorders than patients with other common medical conditions [3]. In another study, up to 54% of pediatricians referred more than 90% of their children with neurologic complaints to pediatric neurologists [4]. Therefore, diagnosing and managing

these disorders and other more common neurologic diseases require the skills and expertise of physicians specialized in this field. In Saudi Arabia, trained pediatric neurologists are few and are available only in selected tertiary care centers of larger cities. There is a strong demand for this specialty in this region.

Many medical students and generalists view the pediatric neurology specialty as difficult, sad, and depressing. The suffering of families of infants and children with acute or chronic neurologic disorders may become overwhelming to the less experienced physicians who may ask why any physician would choose pediatric neurology as a life-long profession. To many others, pediatric neurology is a wonderful specialty that deals with the whole family and enables the physician to help, interact, and laugh with infants and children. Stimulating medical students' interests in pediatric neurology and encouraging them to pursue a career in this specialty is required. An initial step would be to examine their attitudes toward the specialty to plan strategies for further stimulation of their interests. It was for this reason that the present study was undertaken. Several studies have examined students' attitudes toward family medicine [5], physical medicine [6], and psychiatry [7]. However, attitudes toward pediatric neurology have received limited attention. In our experience many medical students have apprehensions and misconceptions regarding children with neurologic disorders resulting from multiple factors related to their personal experiences and influenced by their teaching experiences. We aimed to explore these issues and examine the possible correlating and contributing factors to unfavorable student attitudes.

## Methods

Medical students (year 5 or 6) who completed their pediatric rotation during the 1999-2000 academic year at King Abdulaziz University Hospital or Maternity and Children Hospital, Jeddah, Saudi Arabia, were included in this prospective survey. King Abdulaziz University Hospital

From the <sup>\*</sup>Department Neurosciences; King Faisal Specialist Hospital & Research Center; and the <sup>†</sup>Department of Pediatrics; King Abdulaziz University Hospital; Jeddah, Kingdom of Saudi Arabia.

Communications should be addressed to:  
Dr. Jan; Department of Neurosciences; King Faisal Specialist Hospital & Research Centre; MBC J-76; P.O. Box 40047; Jeddah 21499, Kingdom of Saudi Arabia.  
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**Table 1. Results of the Likert scale items examining students' impressions, experiences, and attitudes toward pediatric neurology (maximum score = 4)\***

Question Items	Disagree (%)	Total Score (Mean)
1. My pediatric neurology teaching experience is strong	18.5%	2.16
2. I consider pediatric neurology a future career option	21%	2.27
3. Neurological signs are difficult to elicit consistently	10%	2.40
4. In pediatric neurology, limited treatments are available	10.5%	2.48
5. Neurological diseases are complicated and difficult	7%	2.73
6. Neurological disorders are challenging and interesting	7.5%	2.75
7. Children are uncooperative and difficult to examine	5%	2.90
8. Most neurological diseases have poor outcome	14%	2.99
9. Dealing with children with neurological disorders is more difficult emotionally than nonneurologic diseases	4%	3.18
10. Pediatric neurology requires a very long training time	2%	3.44

\* Response categories were: (1) disagree, (2) agree somewhat, (3) agree moderately, and (4) agree strongly.

and Maternity and Children Hospital provide primary pediatric care to the Jeddah area, and secondary and tertiary care for most of the regional patients of western Saudi Arabia. King Abdulaziz University Hospital is the main teaching center of the western region in collaboration with King Faisal Specialist Hospital & Research Center. The same university consultants, consisting of mostly general pediatricians and few pediatric subspecialists including two pediatric neurologists, perform the teaching in both hospitals. Pediatric neurology is taught in three ways: lectures, seminars, and clinical demonstrations. A pediatric neurologist does not necessarily conduct all sessions. During clinical demonstrations, students are exposed mostly to inpatients (80%) with some outpatient exposure (20%). They are not involved in the practical medical management of these patients.

Before consenting to the study the approached students were assured that taking part in the study was voluntary, that their identity would remain anonymous, and that the quality of their evaluations would not be affected if they choose not to participate. A structured 30-item questionnaire was designed to examine their attitudes toward pediatric neurology. It was worded on a simple reading level in the English language and consisted of three sections. The first section included questions about sociodemographic characteristics, family history of neurologic disorders, and whether the student had a relative in the medical field. In the next section, several school- and career-related questions were included. Students were asked to select a first future career choice from the following list: (1) general practice, (2) subspecialty (other than neurology), (3) pediatric neurology, (4) not decided, or (5) general specialty (internal medicine, surgery, pediatrics, and obstetrics-gynecology). The last section of the questionnaire included several Likert scale items [8] to examine the student's impressions, experiences, and attitudes toward pediatric neurology including whether they would consider pediatric neurology as a future career option (Table 1). Response categories to the Likert scale items were: (1) disagree, (2) agree somewhat, (3) agree moderately, and (4) agree strongly. The students were asked about the source of their information and impressions about pediatric neurology. The last section also included open-ended questions to ask the students about the best and worst aspects of their pediatric neurologic experience

and to describe how that experience could improve. The questionnaires were completed at the end of the pediatric rotations. Two pediatric consultants supervised the survey. The consultants introduced the questionnaires to each group of students and explained the study at the end of a clinical session. Students were asked not to discuss the survey among themselves and to give their honest opinion. The consultant then left the room and the unsupervised students completed the forms and left them in the room in a random order. Later, the supervising consultant returned to the room and independently collected the completed questionnaires.

The data were tabulated and analyzed using chi-square statistics for categorical variables [9]. The magnitude of significant associations is presented as *P*-values, odds ratios (OR), and the 95% confidence interval for the odds ratio.

## Results

During the study period, 161 students (83 males and 78 females) completed the questionnaires. All approached students agreed to participate in the study. Their ages ranged between 20 and 26 years of age (mean = 23 years of age, S.D. = 1.2). Fourteen (8.7%) students were married, and eight (5%) had children. All students had clinical teaching by at least one of the study investigators. The questionnaires were completed toward the end of their 6-8 week pediatric clinical rotation (range = third to eighth week, mean = 4.3). The results of the Likert scale items examining students' impressions, experiences, and attitudes toward pediatric neurology are presented in Table 1. The students' pediatric neurology teaching experience was not strong, and the specialty was not highly considered as a future career option. When asked about their first future career choice, 63 students (39%) were undecided, and only nine students (6%) selected pediatric neurology (Tables 2 and 3). Those who selected general practice as a first choice (3%) were least likely to consider neurology as a future career option ( $P = 0.007$ ).

The percentages of students' responses according to sex, year, and previous year's grade are provided in Table 2. Males were more likely to report strong teaching experiences (41% vs 25.5%,  $P = 0.04$ ). All included male students had teaching by a pediatric neurologist compared with 61.5% of the females ( $P < 0.0001$ ). More fifth-year students selected a subspecialty as a first future career choice when compared with sixth-year students (29% vs 14%,  $P = 0.03$ ), the difference being offset by those who were undecided. Students with A or B grades were 4.2 times more likely to select a subspecialty as a first future career choice (95% CI 1.4-12.3,  $P = 0.004$ ). On the other hand, students with grade C or less were more frequently undecided ( $P = 0.03$ ). These students were five times more likely to report difficulties in eliciting neurologic signs (95% CI 1.2-21,  $P = 0.01$ ) as indicated in Table 2.

The percentages of students' responses according to their personal and family experiences are presented in Table 3. The presence of a family member in the medical field did not have any statistically significant impact on the students' responses (Table 3). However, students with a family history of neurologic disorders were 2.7 times more likely to select a subspecialty as a first future career

**Table 2. Percentages of students' responses according to gender, year, and grade**

Question Items Regarding Pediatric Neurology*	Gender		Year		Grades	
	Males (n = 83)	Female (n = 78)	5th (n = 76)	6th (n = 85)	A&B† (n = 26)	Other† (n = 109)
1. First future career choice:						
a. General practice	2.5%	4%	4%	2%	0.00	3.5%
b. Subspecialty other than neurology	20.5%	22%	29%	14%	38%	13%
c. Pediatric neurology	6%	5%	5%	6%	8%	4.5%
d. Not decided	44.5%	33%	32%	46%	19%	42%
e. General specialty	26.5%	36%	30%	32%	35%	37%
2. Strong teaching experience	41%	25.5%	38%	29%	88%	79%
3. Consider it a career option	82%	75.5%	80%	78%	69%	80%
4. Signs are difficult to elicit	88%	92%	85%	94%	77%	94%
5. Limited treatments are available	90%	82%	93%	85%	96%	86%
6. Disorders are complicated	89%	97%	91%	95%	100%	93%
7. Interesting and challenging	96%	88%	93%	92%	88%	92%
8. Children are difficult to examine	94%	96%	91%	99%	92%	95%
9. Most diseases have poor outcome	88%	85%	85%	87%	81%	88%
10. Emotionally difficult	95%	96%	100%	92%	100%	94%
11. Requires very long training time	99%	97%	97%	99%	100%	99%

\* Items 2-11, % = all positive responses on the Likert scale (2-4).

† Twenty-six students did not specify their previous year's grade.

choice (95% CI 1.2-6.5,  $P = 0.01$ ). Students who had teaching by a pediatric neurologist were more likely to view the specialty as interesting and challenging ( $P = 0.04$ ), as indicated in Table 3. Variable additional comments and suggestions were obtained from the open-ended questions regarding the best and worst aspects of pediatric neurology and how this experience might improve. In Table 4 we summarize the students' responses to these questions. The source of the students' information and impressions was the teaching physicians (66%), personal experiences (31.5%), and family members (2.5%). The source did not correlate significantly with any of the other question items.

## Discussion

The study results confirm that most medical students may be unfavorably disposed toward pediatric neurology. Most students felt that children with neurologic disorders are uncooperative, difficult to examine, and have poor outcomes. They highly reported that pediatric neurology is emotionally charged and requires long postgraduate training. At the same time, most students believed that neurologic disorders are challenging and interesting and they would consider pediatric neurology as a future career option. However, on the Likert scale this consideration was low (2.27/4). Most students did not feel that their

**Table 3. Percentages of students' responses according to their personal and family experiences**

Question Items Regarding Pediatric Neurology*	Relative in the Medical Field		Family History of Neurologic Illness		Teaching by a Child Neurologist	
	Yes (n = 88)	No (n = 73)	Yes (n = 47)	No (n = 114)	Yes (n = 131)	No (n = 30)
1. First future career choice:						
a. General practice	1%	5.5%	0.00	4%	3%	3.5%
b. Subspecialty other than neurology	25%	16.5%	34%	16%	21%	20%
c. Pediatric neurology	7%	4.5%	6%	5%	5%	6.5%
d. Not decided	36%	43%	30%	43%	41%	33%
e. General specialty	31%	30.5%	30%	32%	30%	37%
2. Strong teaching experience	78%	85%	72%	85%	82%	77%
3. Consider it a career option	75%	83%	81%	78%	80%	73%
4. Signs are difficult to elicit	88%	92%	87%	91%	89%	93%
5. Limited treatments are available	91%	88%	91%	89%	91%	83%
6. Disorders are complicated	95%	90%	91%	94%	92%	100%
7. Interesting and challenging	87%	98%	98%	90%	95%	83%
8. Children are difficult to examine	93%	97%	89%	97%	94%	100%
9. Most diseases have poor outcome	87%	85%	89%	85%	88%	80%
10. Emotionally difficult	93%	98%	96%	96%	95%	100%
11. Requires very long training time	98%	98%	98%	98%	98%	97%

\* Items 2-11, % = all positive responses on the Likert scale (2-4).

**Table 4. Summary of the students' responses to the open-ended questions**

Student's Responses	Number/Total* (%)
Best aspects of the pediatric neurology experience	
1. Finding the diagnosis	30/99 (30%)
2. Challenging and interesting field	22/99 (22%)
3. Helping children with neurological diseases	16/99 (16%)
4. The overall clinical experience	14/99 (14%)
5. Better prognosis in children as compared to adults	5/99 (5%)
6. Other	13/99 (13%)
Worst aspects of the pediatric neurology experience	
1. Poor prognosis of many neurological disorders	25/104 (24%)
2. Difficulties in examining children	20/104 (19.5%)
3. Difficulties in reaching the diagnosis	17/104 (16%)
4. Limited available treatments	15/104 (14.5%)
5. Wide number of difficult topics (theory)	10/104 (10%)
6. Other	17/104 (16%)
Suggestions to improve the pediatric neurology experience	
1. Increase clinical teaching and exposure	65/95 (69%)
2. Teaching by neurologists	22/95 (23%)
3. Use audio-visual and computer programs in teaching	5/95 (5%)
4. Teaching of basic neuroscience	3/95 (3%)

\* Total = total number of students who responded to the question.

teaching experience was strong. This is in agreement with other investigators who found that general neurology education at the undergraduate level was declining and that the education was deficient in training physicians to manage general neurologic disorders [10]. The education of medical students about epilepsy, for example, a very common pediatric neurology problem, was often fragmented and incomplete [11]. The assessment and management of neurologic disorders requires specific knowledge, skills, and attitudes that can be supported by medical education [12]. In our sample, students who had teaching by a pediatric neurologist were more likely to report stronger teaching experience and view the specialty as interesting and challenging. Other researchers have also reported that good clinical teachers strongly influenced students' specialty interests [13].

Overall, only 3% of our students selected general practice as their first career choice. This is consistent with the recently reported drop in popularity of general practice as a career choice [14]. Students rejecting general practice cited insufficient prestige, low intellectual content, and concerns about mastering too broad a content area as the main reasons [14]. We found that many of the students (39%) were undecided about their first future career choice, and 31% selected a general specialty. This number is lower than that found in a 1994 Saudi study in which 60% of the students selected a general specialty (internal medicine, surgery, pediatrics, or obstetrics-gynecology), and only 27% were undecided [15]. Our findings reflect

the trend toward subspecialization by an increasing number of young Saudi students. In fact, we found younger students (fifth-year) and students with higher grades (A or B) more likely to select a subspecialty as a first future career choice. On the other hand, students with grade C or less were more frequently undecided, suggesting that students with higher academic marks are more likely to select subspecialties.

The students' most common suggestions for improvement of the pediatric neurology experience were to increase clinical teaching, exposure to more cases, and increase teaching by neurologists. There are some suggestions in the literature that a specialty-oriented curriculum may affect medical students' career choices [16]. A model clinical neuroscience curriculum has been proposed [17]. However, some extracurricular interventions failed to stimulate medical students to peruse certain career options [16]. As well, Lehman and Davies found that increased exposure to lectures by neurology faculty did not increase subsequent student enrollment in clinical clerkship in neurology when students had a choice of clerkship [18]. However, the impact of increased clinical teaching, which was suggested by most of our students, was not systematically evaluated. As well, increased exposure to more common and less complicated pediatric neurology patients in an ambulatory setting may provide the student with a better overall picture of the specialty.

There are some limitations to our study. The unfavorable student attitudes could reflect exposure to a restricted group of patients who required hospital admission. Our students had limited exposure to the less complicated patients observed in the outpatient clinics. Also our sample was relatively small, which may explain the lower strength of some significant associations. However, the study sample was very representative of our student pool with a narrow age range, similar sex representation, and similar numbers of students in each year. The questionnaires were completed toward the end of the pediatric clinical rotation to provide the students, particularly the fifth-year students, enough exposure before enrollment. The students' views may not be reliable in predicting the future choices as a result of their limited exposure to pediatric neurology. One other shortcoming of this study was the unequal number of male and female students who had been taught by a pediatric neurologist. This was not the result of the study methodology, but rather because of some departmental limitations regarding teaching of male students by female doctors (both pediatric neurologists in our institution are males). This fact had a significant impact, because male students were more likely to report strong teaching experiences.

In conclusion, although most students found neurologic disorders challenging and interesting, the majority had unfavorable attitudes toward pediatric neurology. Most students felt that their teaching experience was not strong, and only a small percentage actually selected pediatric neurology as a first future career choice. Researchers have

found that many students will change their early medical career choices [19]. They compared students' early career choices with their employment 11 years after qualification and found 65% working within their first choice [19]. This would encourage us to continue to stimulate and interact with students to increase their interest in pediatric neurology. The study findings highlight some aspects that might be targeted to promote students' interest in pediatric neurology and improve their learning experiences.

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