



## Neurophobia among general practice trainees: The evidence, perceived causes and solutions



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### ABSTRACT

**Introduction:** As general practice (GP) is the main source of referrals to neurologists, neurology education for GP trainees is important. We investigated the existence of neurophobia, contributing factors and potential prevention strategies among GP trainees.

**Methods:** In a questionnaire survey interest, knowledge, confidence and perceived difficulty in neurology were compared with different medical specialties. Reasons for difficulty with neurology, postgraduate neurology education experience, learning methods and suggested teaching improvements were examined.

**Results:** Of 205 GP trainees, 118 (58%) completed the questionnaire. Threshold analyses justified categorical intervals for the Likert responses. Trainees recorded poorer knowledge ( $p < 0.001$ ), less confidence ( $p < 0.001$ ) and more perceived difficulty ( $p < 0.001$ ) with neurology than with any other medical specialty. GP trainees had less interest in neurology than any other medical specialty (Duncan test,  $p < 0.001$ ). There was a similar gradation in difficulty and confidence perception across medical specialties. Hospital and community-based neurology teaching was graded as “poor” or “very poor” by over 60% of GP trainees. There were multiple perceived causes of neurophobia, including neuroanatomy and poor quality teaching. More organised clinical teaching and referral guidance were suggested to address GP neurophobia.

**Conclusions:** Neurophobia is common among GP trainees in Northern Ireland. GP trainees have clear and largely uniform ideas on improving their neurology education. GP training posts should reflect the importance of neurology within the GP curriculum.

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## 1. Introduction

One in ten consultations in primary care has a significant neurological component [1]. In the UK there has been a recent trend of increasing numbers of referrals to neurology departments. This may be due to many reasons including public demand, fear of medico-legal proceedings, a gradual loss of the general physician and neurophobia [2,3], which is defined as “a fear of the neural sciences and clinical neurology that is due to the students’ inability to apply their knowledge of basic sciences to clinical situations” [4]. Views from patients and neurologists on this topic have previously been

reported [5,6], but there has been relatively little attention afforded to the referring doctors and in particular to general practice (GP) specialist trainees (ST).

Neurophobia has been systematically studied among medical students and junior doctors [7]. Compared to other medical specialties, neurology has a poor reputation in that although there has been interest in the subject [8–10], medical students and junior doctors feel that they know less neurology, are less confident and score neurology as more difficult compared to other medical specialties [8–12]. To date no study has examined neurophobia exclusively among GP trainees. As most neurology referrals are derived from primary care [13], we developed a conceptual framework [14] to explore neurophobia among GP trainees. Having identified the published literature on neurophobia [7], we wanted to determine if neurophobia specifically exists among GP trainees and explore four aspects of Kern’s six step approach to

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curriculum development [15] (problem identification, needs assessment of learners, instructional strategies and evaluation/feedback). We used a questionnaire survey to explore postgraduate neurology education for GP trainees with reference to the presence of neurophobia, perceived reasons and prevention strategies for neurophobia (if present) and potential improvements in neurology education for GP trainees.

## 2. Methods

### 2.1. Design

All trainees enrolled in the Northern Ireland GP training scheme in 2010/2011 (ST1, 2 and 3) were invited to participate in a questionnaire survey (Appendix). The questionnaire was a modified version of that used by Schon et al. [8] in which a numbered Likert scale was used for each category. In addition to examining interest, knowledge, difficulty and confidence in neurology compared to other medical specialties, the questionnaire also explored potential contributors to neurophobia and ways of improving neurology education for primary care trainees with both Likert-style and open questions.

### 2.2. Participants

All GP trainees in Northern Ireland were e-mailed an invitation letter and study information sheet with a link to the questionnaire using survey monkey™. Two reminders were sent out and the survey closed within six weeks.

### 2.3. Analyses

Survey monkey™ provided questionnaire results. Means and standard errors were calculated. For associations between categorical variables the  $\chi^2$  test was used. Means were compared using paired *t*-tests. Using Statistical Package for the Social Sciences an item response theory model was performed with ordinal regression analysis or Polytomous universal model to determine whether the interval thresholds between the Likert responses for interest, knowledge, perceived difficulty and confidence within each question were equivalent to permit parametric analyses with student *t*-tests as had been performed in previous publications [8–12], i.e. to ensure that the assigned ordinal values were approximately evenly separated. A general linear model was then applied across the medical specialties using a post hoc Duncan test (multiple comparison test of group means) to compare neurology with other medical specialty responses. Cronbach's alpha was used to test reliability across four questions (interest, knowledge, perceived difficulty and confidence).

**Table 2**

Mean differences in Likert scores demonstrating effect sizes with confidence intervals.

Specialty versus neurology	Knowledge mean difference (95% CIs)	Interest mean difference (95% CIs)	Difficulty mean difference (95% CIs)	Confidence mean difference (95% CIs)
Cardiology	0.88 (0.74, 1.02)	0.25 (0.06, 0.45)*	−1.05 (−1.20, −0.91)	0.94 (0.80, 1.08)
Endocrinology	0.56 (0.42, 0.70)	0.20 (0.01, 0.40)*	−0.69 (−0.83, −0.54)	0.64 (0.50, 0.78)
Gastroenterology	0.96 (0.82, 1.10)	0.42 (0.23, 0.62)	−1.54 (−1.68, −1.39)	1.34 (1.20, 1.48)
Geriatrics	1.00 (0.86, 1.14)	0.38 (0.19, 0.58)	−1.30 (−1.45, −1.16)	1.27 (1.13, 1.41)
Respiratory Med	0.97 (0.82, 1.11)	0.41 (0.21, 0.60)	−1.44 (−1.59, −1.30)	1.30 (1.16, 1.45)
Rheumatology	0.42 (0.27, 0.56)	0.32 (0.13, 0.52)**	−0.96 (−1.10, −0.81)	0.70 (0.56, 0.84)

The negative signs for difficulty indicate that all other specialties were perceived as easier. All comparisons are significant at  $p < 0.001$  except \* $p < 0.05$  and \*\* $p < 0.01$

**Table 1**

Sex ratio of general practice trainees participating in questionnaire study in each year.

Year	Male		Female		<i>p</i> value*
	Total	Participants (%)	Total	Participants (%)	
ST1	15	9 (60)	53	30 (57)	NS
ST2	17	10 (59)	51	24 (47)	NS
ST3	24	17 (71)	45	28 (62)	NS

ST, specialist training; NS, not significant.

\*  $\chi^2$  test.

## 3. Results

One hundred and eighteen questionnaires were returned from 205 primary care trainees, representing a 58% response rate from all of the primary care trainees in Northern Ireland. There was no significant difference between the sex ratio participating in each year. Involvement varied among the different ST years, ranging from 50% of ST2 trainees to 65% of ST3 doctors (Table 1,  $\chi^2$  test,  $p < 0.001$ ).

### 3.1. Interest, knowledge, difficulty and confidence – ordinal regression

Compared to neurology each medical specialty was significantly different for each of the questions concerning knowledge, interest, perceived difficulty and confidence (Table 2). There was less of a gulf between neurology and other medical specialties with regard to level of interest, but there was a large gulf in knowledge scores, and particularly in scores for perceived difficulty and confidence. Post hoc application of the Duncan test demonstrated a hierarchy of subset differences in knowledge, interest, perceived difficulty and confidence in which neurology consistently had an adverse and distinct subset categorization.

A composite Cronbach alpha (a measure of reliability ranging from 0 to 1) of 0.73 was calculated.

### 3.2. Overall rating of neurology teaching

In-hospital postgraduate teaching of neurology was graded as “poor” or “very poor” by 69% of trainees while postgraduate teaching of neurology in community practice was deemed “poor” or “very poor” for 61% of trainees ( $\chi^2$  test: not significant).

### 3.3. Contributors to perceived difficulty with neurology

There were multiple contributors to perceived difficulty in neurology (Fig. 1). Except for neurology's reputation for difficulty, all of the other categories in the Likert scale were scored as “important” or “very important” reasons for the perceived difficulty in neurology by more than 50% of GP trainees.

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