



Functional neurological disorder: a comparative analysis of experience of Czech, Slovak, and Italian neurologists

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ABSTRACT

Aim of study. We aimed to compare knowledge, opinions, and clinical experiences among Czech, Slovak, and Italian neurologists to identify potential educational gaps and unify understanding.

Clinical rationale for study. Functional neurological disorder (FND) is a disabling condition characterised by motor, sensory, or cognitive symptoms which are incompatible with other neurological disorders. Novel diagnostic and treatment approaches have improved FND management. However, the extent of their adoption, and any differences or similarities across European communities, remain to be established.

Material and methods. Members of the Czech and Slovak Neurological Societies were invited via e-mail to participate in a 14-item web-based survey investigating their approach to FND. This data was compared to results from a previous study involving 492 Italian neurologists.

Results. 232 questionnaires were completed by Czech and Slovak neurologists (CZ-SK). Similarities were found between CZ-SK and Italian neurologists in their preference for the term 'FND' over other psychological-related terms and in explaining symptoms as due to abnormal functioning of the nervous system rather than attributing them to mental illness. However, only fewer than 5% in both groups thought that simulation was highly unlikely. Both groups reported relying on positive signs (e.g. inconsistency, distractibility) according to the current diagnostic criteria, but also a tendency to perform additional tests to exclude other causes. However, some differences were observed: Italian neurologists placed a greater emphasis on psychological factors including litigation. CZ-SK neurologists were more likely to suggest physiotherapy as a treatment option and to provide educational intervention for patients and their relatives.

Conclusions. Overall, our findings suggest that although Czech, Slovak, and Italian neurologists have adopted some new developments in the field of FND, significant gaps still exist in their understanding and common practices regarding conceptualisation, diagnosis, and treatment.

Clinical implications. Our results suggest that promoting knowledge through postgraduate curricula and teaching courses for neurologists is necessary to optimise patient management in various European countries.

Keywords: functional neurological disorder, conversion disorder, survey, education, opinions, diagnosis, treatment, cross-cultural, neurological practice

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Introduction

Functional neurological disorder (FND) presents motor, sensory, and cognitive symptoms that display clinical features which are incompatible with other neurological disorders [1]. FND, also known as ‘conversion disorder’, has been traditionally seen as a psychological disorder in which emotional distress is ‘converted’ into physical symptoms [2]. Recent discoveries from neuroimaging and behavioural studies have provided new insights into the pathophysiology of the disease, which is now explained in terms of abnormal functioning of multiple brain networks involved in attention, sense of agency, interoception, and emotion processing including salience [3–14]. These findings are paralleled with changes in terminology and novel FND diagnosis and treatment approaches, improving management effectiveness for this disabling condition [1, 15]. An identifiable psychological stressor or psychiatric disturbance is no longer required for the diagnosis [16, 17], which should be made by the neurologist based on positive clinical signs of inconsistency (e.g. functional tremor is modified by distractive manoeuvres) and incongruence with the manifestations of other neurological conditions [18]. An integrated multidisciplinary approach has been recommended, with a growing body of evidence proving the efficacy of physiotherapy, psychotherapy, and their combinations, along with other treatments [19, 20]. Results from recent studies among neurologists have suggested that, although a modern concept of FND is developing, further steps are needed to improve up-to-date knowledge about new approaches to diagnosis and treatment [21, 22]. The exploration of attitudes to, and clinical experience with, FND among European neurologists has until now been limited to the UK [23], Italy [24], and the Netherlands [25], using different questionnaires.

Clinical rationale for study

We hypothesised that understanding and treating FND across different European countries remains variable and often suboptimal, partly due to differing knowledge, opinions, and clinical practices among neurologists. To identify the current community-based differences (or similarities) in the adoption of a modern approach to FND, our cross-cultural study addressed the actual opinions and clinical approach to patients with FND among Czech and Slovak (CZ-SK) neurologists. Results were compared to those from a previous study involving Italian neurologists.

Material and methods

Questionnaire

A validated translation of a survey questionnaire previously used with Italian neurologists was used with CZ-SK neurologists [24]. The complete questionnaire consisting of

14 single and multiple-choice questions and its translation method is presented as Supplementary Material in English. It included five items on demographics (age, gender, geographical area of residence) and professional features (years of post-specialisation and practice setting). One item estimated the number of FND patients seen per week. The remaining eight items investigated practices, opinions, and knowledge about FND, with a specific focus on preferred terminology and their thinking behind how they explain FND to patients, opinions on the likelihood of malingering, criteria predicting an FND diagnosis, adequacy of various specialists’ consultations and treatments in management strategies, and the role of neurologists in diagnosing and treating FND. The questionnaire was implemented on the Google Forms Online tool (Google LLC, Menlo Park, CA, USA). Due to mutual intelligibility between the Czech and Slovak languages, the Czech version of the questionnaire was also used in Slovakia.

Procedure

The invitation to participate was sent via e-mail by the offices of the Czech Neurological Society (CNS) and the Slovak Neurological Society (SNS) to their members. In total, 921 Czech and 650 Slovak neurologists received an invitation to complete the survey. It was aimed at investigating the opinions, knowledge, and clinical experience of non-organic neurological disorders among neurologists, using the same method as in the Italian survey published in 2022 [24]. Participants obtained access to the survey questions after giving their consent. The survey remained open for 35 weeks (from 1 June 2021 to 7 February 2022) in the Czech Republic and for 26 weeks (from 25 September 2021, to 30 March 2022) in Slovakia. Two separate email reminders were sent three and 25 weeks after the initial emailing in the Czech Republic, and four and 20 weeks after the initial emailing in Slovakia. For the analysis, the answers of Czech and Slovak respondents were merged, given the overlapping academic backgrounds and educational resources, the similarity of curricula and training in neurology, and joint educational events, including annual conferences and other meetings, plus a common bilingual neurology journal provided to all members of the Czech and Slovak neurological societies.

Data was downloaded from the Google Forms and analysed with SPSS Statistics 25. Demographic characteristics and survey responses of the current and the previous Italian survey [24] were examined by means of descriptive statistics, including frequency and percentage. Differences between CZ-SK and Italian neurologists with regards to gender, age, and years of practice were analysed by means of a chi-squared test or t-test. Data regarding the probability that patients simulate symptoms, predictors of diagnosis, specialist consultation, treatment adequacy for FND, and management strategies were converted into a 5-point Likert scale from 1 (‘not predictive at all’, ‘not adequate at all’, and ‘strongly disagree’) to 5 (‘extremely predictive’, ‘extremely adequate’, and ‘strongly agree’), and ‘I don’t know’. Frequencies and percentages from each response

from the survey on Italian neurologists were compared to current survey data using a Fisher's exact test, a chi-squared test, and a Mann-Whitney U test. Bonferroni corrections for multiple comparisons were applied where appropriate. Level of significance was set at $p < 0.05$.

Results

Demographic data and professional characteristics

232 questionnaires were completed by CZ-SK neurologists [response rate: 15%; mean age \pm standard deviation (SD), 44.98 ± 13.10 ; mean years of practice after medical certification \pm SD, 14.70 ± 13.18]. The sample consisted of a higher proportion of females ($n = 141, 61\%$) than males ($n = 91, 39\%$; $\chi^2 = 10.39, p = 0.001$). Most respondents were consultant neurologists ($n = 182, 78\%$), while the remaining 50 were doctors in training (22%). Practice types and their possible subspecialties were: general neurological outpatient clinics $n = 95 (41\%)$, movement disorders $n = 48 (21\%)$, cerebrovascular disorders $n = 27 (12\%)$, demyelinating disorders $n = 15 (6\%)$, epilepsy $n = 18 (8\%)$, and other services $n = 29 (12\%)$ (e.g. headache, sleep disorders, cognitive disorders, neurologist in a neurosurgery department). Data from CZ-SK neurologists was compared to a previous survey involving Italian neurologists ($n = 492$; females = 251; age \pm SD = 49.12 ± 12.70 ; mean years of practice \pm SD: 18.71 ± 13.37) [24]. Gender, age, and years of practice significantly differed between the two groups (gender: $\chi^2 = 8.80, p = 0.03$; age: $t_{(722)} = 4.044, p = 0.0001$; years of practice: $t_{(722)} = 3.471, p = 0.0001$). Demographic characteristics of the CZ-SK and Italian neurologists are set out in Table 1.

Table 1. Sample demographics and years of practice

	Responses no., (%)	
	Czech-Slovak neurologists	Italian neurologists
Sex		
Male	91 (39)	241 (49)
Female	141 (61)	251 (51)
Age (years)		
< 40	96 (41)	152 (31)
41-50	61 (26)	104 (21)
51-60	38 (16)	122 (25)
> 60	37 (16)	114 (23)
Years of practice (post-specialisation)		
< 10	104 (45)	168 (34)
11-20	55 (24)	108 (22)
21-30	39 (17)	106 (22)
> 30	34 (15)	110 (22)

Opinions, knowledge, and clinical experiences with FND

Practice with FND patients

Data on exposure to patients with FND is set out in Table 2. Like neurologists of the Italian sample, half of the CZ-SK sample ($n = 123; 53\%$) thought that less than 10% of their patients presented functional neurological symptoms. The chi-squared test yielded statistical significance ($\chi^2_{(4)} = 13.881, p = 0.008$). This result was not confirmed by post-hoc comparisons (Bonferroni corrected p -value = 0.005) (all $p > 0.03$).

Terminology

Table 2 displays selected responses from both groups regarding terminology. Respondents could choose from a list of 10 terms which they usually used to describe neurological symptoms without an organic cause, with the option to choose more than one term. Free-text responses (e.g. fibromyalgia, functional impairment of mobility, psychogenic non-epileptic seizure, non-specific polymorphic difficulties) were given by 14 participants (5%) in the CZ-SK group.

Statistical comparisons revealed that CZ-SK neurologists chose the terms 'stress-related disorder' ($n = 4; 2\%$) (Italian

Table 2. Exposure to patients with FND and terms chosen to define condition

	Responses no., (%)	
	Czech-Slovak neurologists	Italian neurologists
Percentage of patients with FND seen in one week		
< 10	124 (53)	247 (50)
10-25	84 (36)	203 (41)
25-50	10 (4)	(7)
> 50	3 (1)	3 (1)
Don't know	11 (5)	5 (1)
Terminology*		
Functional neurological disorders	176 (76)	374 (76)
Somatoform disorders	75 (32)	168 (16)
Non-organic disorder	35 (15)	134 (13)
Psychogenic disorder	60 (26)	122 (12)
Conversion disorder	54 (23)	110 (10)
Unspecific anxious syndrome	19 (8)	48 (5)
Stress-related syndrome	4 (2)	38 (4)
Depression	9 (4)	32 (3)
Medically unexplained disorder	5 (2)	8 (1)
Hysteria	0 (0)	3 (0)

FND — functional neurological disorders. More than one response allowed; *results presented as number of respondents and percentage (%)

Table 3. Probability that patients simulate symptoms and explanation of symptoms

	Responses no., (%)	
	Czech-Slovak neurologists	Italian neurologists
Probability that patients simulate symptoms		
Not at all	9 (4)	24 (5)
Low probability	163 (70)	328 (67)
Moderate probability	49 (21)	131 (27)
High probability	10 (4)	9 (2)
Very high probability	1 (0)	0 (0)
Explanation of symptoms		
Disorder due to abnormal functioning of nervous system	140 (60)	284 (58)
Absent neurological disorder	29 (13)	57 (12)
Psychogenic disorder	35 (15)	104 (21)
Stress	0 (0)	31 (6)
Other	25 (11)	16 (3)

Results presented as number of respondents and percentage (%)

neurologists: $n = 38$; 8%; $p = 0.001$) and ‘non-organic disorder’ ($n = 35$; 15%) (Italian neurologists: $n = 134$; 27%) ($p < 0.001$) less frequently than Italian neurologists. No other statistically significant differences between groups were found (all $p > 0.171$).

Probability that patients simulate symptoms

Table 3 presents responses from both groups when asked about the probability that patients simulate symptoms. No statistically significant differences were found between the two groups ($\chi^2_{(4)} = 8.39$; $p = 0.078$).

Explanation of symptoms

Table 3 presents the preferred methods used by both groups of neurologists to explain symptoms to their patients. Twenty-five CZ-SK neurologists (11%) chose free text responses (e.g. change in nervous system function without structural damage, neurological symptoms, psychosomatic disorder, dysfunction closely linked to the psyche, disorder without an identifiable organic cause).

Significant differences between groups ($\chi^2_{(4)} = 32.494$; $p < 0.001$) were due to a lower proportion of CZ-SK neurologists explaining symptoms as due to ‘stress’ ($n = 0$; 0%) compared to Italian neurologists ($n = 31$; 6%; $p = 0.004$). No other statistically significant differences between groups were found (all $p > 0.690$).

Predictors of diagnosis

Fig. 1 presents the responses from both groups on the extent to which various criteria were predictive for FND. Statistical comparisons yielded significant results for ‘litigation’ ($\chi^2_{(3)} = 53.916$; $p < 0.001$). Post-hoc tests revealed that a higher proportion of Italian neurologists believed ‘litigation’ was ‘a lot’ or ‘very much’ predictive of FND ($n = 241$; 49%) compared to CZ-SK neurologists ($n = 61$; 26%; $p < 0.001$). No other statistically significant differences were found (all $p > 0.125$).

Specialist consultation

Fig. 2A presents the results from both groups on the adequacy of various specialists’ consultations. Statistical comparisons revealed significant differences in ‘psychotherapy consultation’ ($\chi^2_{(3)} = 21.859$; $p < 0.001$) and ‘physiotherapy consultation’ ($\chi^2_{(3)} = 39.513$; $p < 0.001$), with a higher proportion of CZ-SK neurologists rating both as more adequate for FND compared to Italian neurologists. No other significant differences were noted (all $p > 0.074$).

Treatment

Fig. 2B presents the responses from both groups on the suitability of treatments for FND. Statistical comparisons showed significant results for ‘educational intervention’ ($\chi^2_{(3)} = 54.098$; $p < 0.001$), ‘rehabilitation’ ($\chi^2_{(3)} = 43.664$; $p < 0.001$), and ‘psychotherapy without medication’ ($\chi^2_{(3)} = 29.911$; $p < 0.001$). A higher proportion of CZ-SK neurologists found these interventions more adequate for FND than Italian neurologists did. No other significant differences were detected (all $p > 0.194$).

Management strategies

Results of responses on management strategies from both groups are presented in Fig 3. Between-group comparisons were significant for the following items: ‘neurological investigations’ ($\chi^2_{(2)} = 6.945$; $p = 0.031$), ‘refer patients to a psychologist or psychotherapist’ ($\chi^2_{(2)} = 11.897$; $p = 0.003$), ‘refer patients to a physiotherapist’ ($\chi^2_{(2)} = 109.847$; $p < 0.001$), ‘wait to see how symptoms develop’ ($\chi^2_{(2)} = 7.101$; $p = 0.029$), and ‘pharmacological prescription’ ($\chi^2_{(2)} = 28.958$; $p < 0.001$). Post-hoc comparisons did not confirm a statistical difference between groups for ‘neurological investigations’ and ‘wait to see how symptoms develop’ (all $p > 0.021$, Bonferroni corrected p value = 0.008), but revealed that, compared to Italian neurologists, a higher proportion of CZ-SK neurologists chose

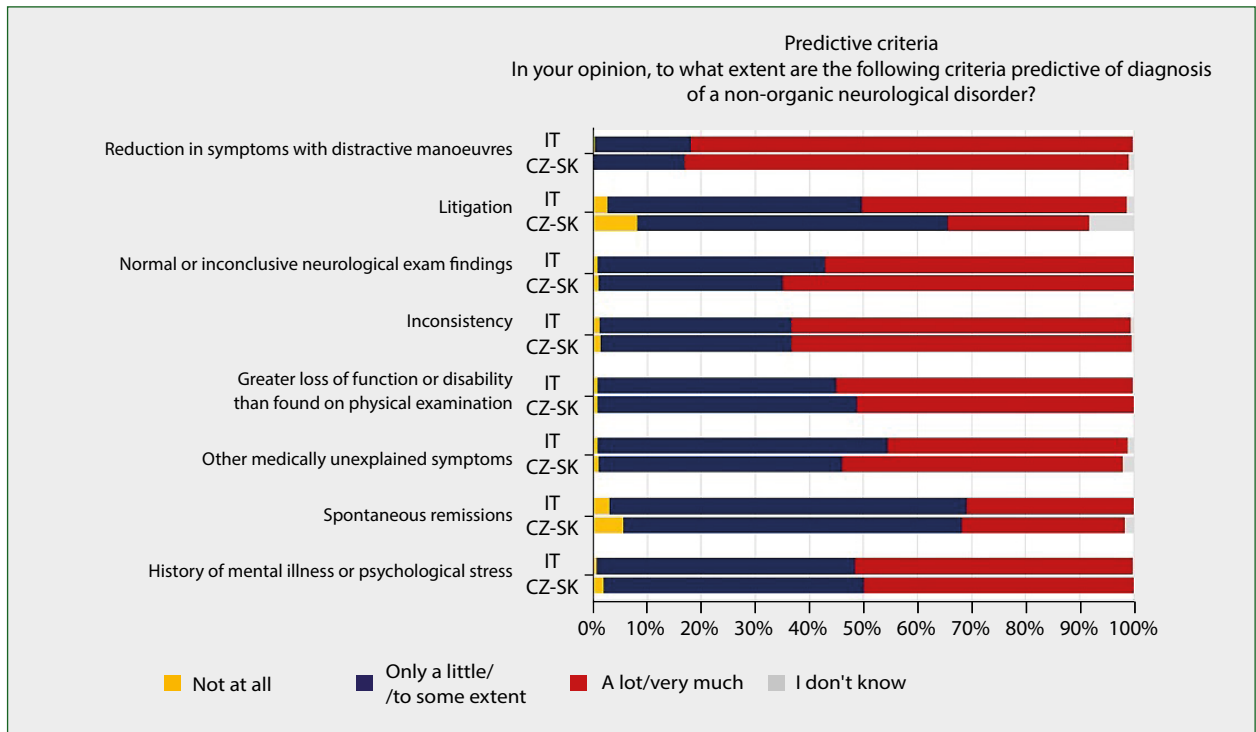


Figure 1. Percentages of responses for predictive criteria in Italian (IT) and Czech-Slovak (CZ-SK) groups

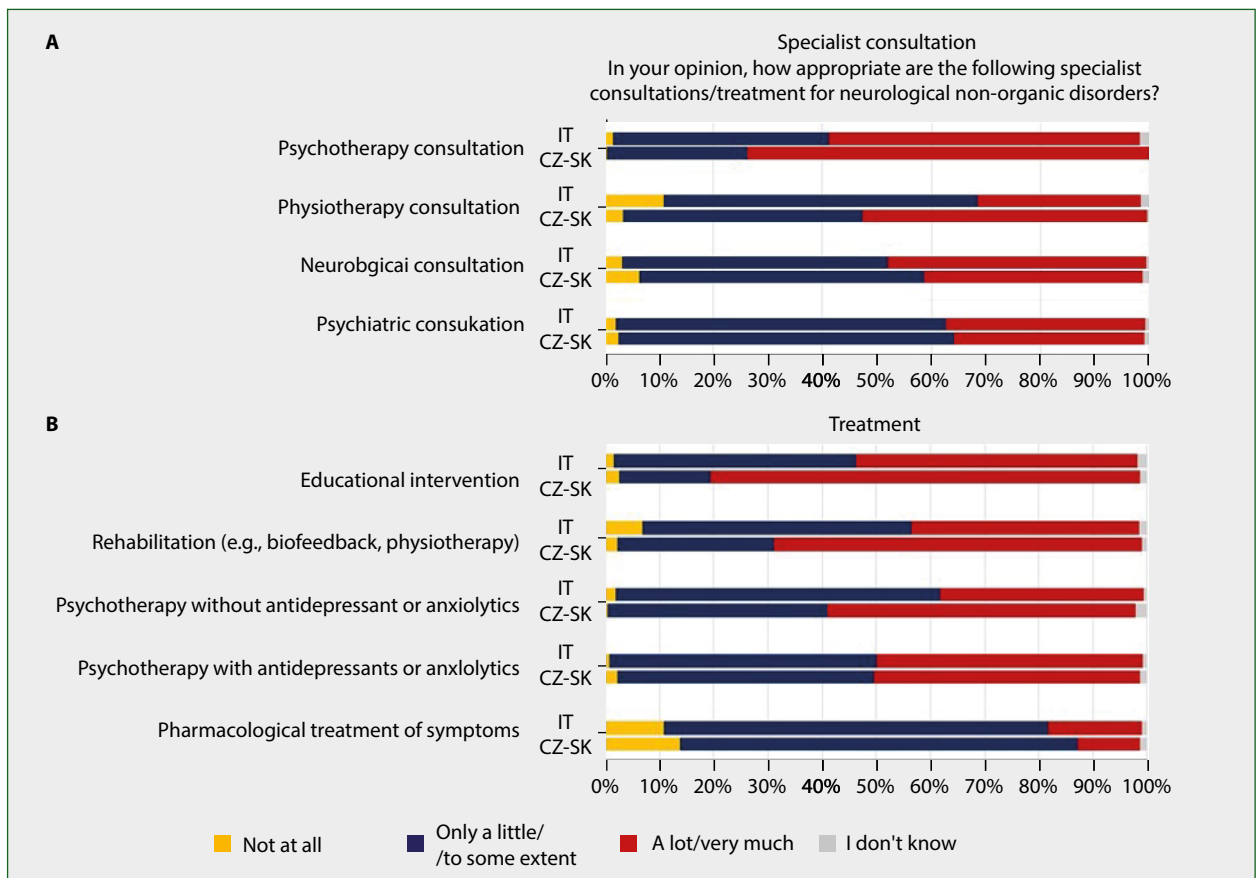


Figure 2. Percentages of responses for specialist consultations and treatment in Italian (IT) and Czech-Slovak (CZ-SK) groups

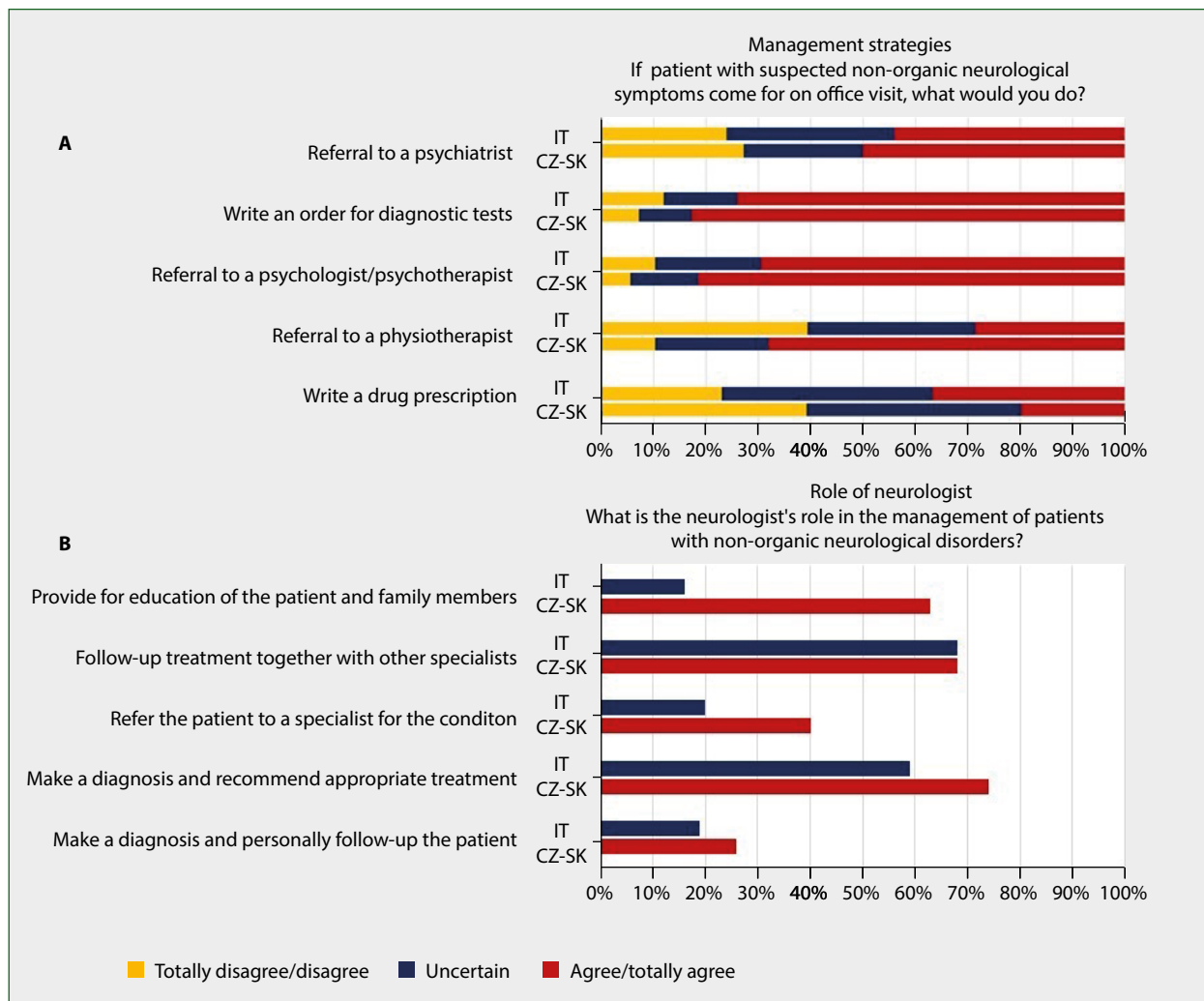


Figure 3. Percentages of responses for management strategies and role of neurologists in Italian (IT) and Czech-Slovak (CZ-SK) groups

‘refer patients to a psychologist or psychotherapist’ (‘agree’ or ‘totally agree’, $p < 0.001$), or ‘refer patients to a physiotherapist’ (‘agree’ or ‘totally agree’, $p < 0.001$) and excluded from their clinical practice ‘pharmacological prescription’ (‘disagree’ or ‘totally disagree’, $p < 0.001$). No significant differences were found for the item ‘refer patients to a psychiatrist’ ($p = 0.053$).

Satisfaction

When asked to rate their satisfaction in managing FND on an 11-point scale from 0 (not at all) to 10 (entirely satisfied), on average, CZ-SK neurologists were less satisfied with their care of patients with FND (4.42 ± 2.20) compared to Italian neurologists (4.90 ± 2.47) ($Z = -2.89$, $p = 0.004$).

Role of neurologist

Results on the responses regarding the role of neurologists in FND management are shown in Fig 3. 196 respondents (84%) gave more than one response (Italian neurologists: $n = 273$; 55%). Between-group comparison revealed

a significantly higher proportion of CZ-SK neurologists believed their role was to ‘make a diagnosis and recommend adequate treatment’ ($p = 0.018$), provide ‘educational intervention for patients and their families’ ($p < 0.001$), ‘referral to a specialist for the patient’s medical condition’ ($p < 0.001$), and ‘make a diagnosis and personally follow-up the patient’ ($p = 0.031$). No difference was found regarding ‘following-up the treatment together with other specialists (psychiatrist, psychotherapist, physiotherapist)’ ($p = 0.534$).

Discussion

This survey investigated knowledge about, attitudes to, and practice regarding the diagnosis and management of FND in CZ-SK neurologists and compared the results to a previous survey involving Italian neurologists [25].

The two groups differed in gender, age, and years of practice in neurological settings. More precisely, CZ-SK

respondents were predominantly female, younger, and with fewer years of practice than Italian neurologists.

Regarding the understanding of the disease as a result of abnormal brain functioning, both CZ-SK and Italian neurologists showed similarities. The term 'functional neurological disorders' was used more frequently than other psychological-related terms (e.g. conversion disorder). Both groups preferred explaining symptoms based on abnormal functioning of the nervous system rather than attributing them to mental illness. While most adopted the latest terminology and conceptualisation of FND, only a small proportion used a psychological explanation. Even so, about half of the neurologists considered a previous mental illness or psychological stress to be an important predictor of FND. Overall, these findings suggest that despite evolving FND understanding, the aetiology is still often linked to psychological factors, which can cause diagnostic misinterpretation.

In mapping neurologists' understanding, only a few respondents in both groups stated that their patients do not feign symptoms at all, while the majority suspected at least some probability of symptom simulation. Despite a large body of evidence distinguishing FND from malingering or factitious disorders [26], many neurologists remain uncertain about symptom veracity. Moreover, both CZ-SK and Italian neurologists considered litigation a predictor for FND diagnosis. Since litigation has long been linked to symptom feigning, these findings suggest that some neurologists believe that patients may fake symptoms for personal gain. These observations also highlight the need for diagnostic tools to differentiate genuine symptoms in FND from deception, as already pointed out in a previous survey [24].

With regard to diagnostic approach, symptom reduction with distraction, and inconsistency over time were considered among the most predictive criteria for a diagnosis of FND by CZ-SK and Italian neurologists, suggesting that they can identify positive clinical signs of FND, as required by the novel diagnostic criteria [16, 17]. However, many still prefer further neurological investigations (e.g. magnetic resonance imaging, laboratory tests) as a primary step, continuing a rule-out diagnostic approach noted in previous studies [21, 24, 27]. It is worth underlining that avoiding unnecessary investigations is important because they can delay a positive diagnosis, something which has been associated with poor outcomes [28].

Regarding treatment, both CZ-SK and Italian neurologists favoured psychotherapy as the most adequate specialist consultation and first-line management strategy for FND patients, especially in the CZ-SK group, aligning with the evidence suggesting its efficacy for different subtypes of FND [1, 29–31].

We also found some important differences between CZ-SK and Italian neurologists. Specifically, CZ-SK neurologists were more prone to provide educational intervention for patients and their relatives. Furthermore, rehabilitation (e.g. physiotherapy) and psychotherapy without antidepressants were

considered as highly adequate by most neurologists only in CZ-SK. Education, including a demonstration of the positive clinical signs of FND and an explanation of the attentional mechanisms underlying distractibility, allows patients to understand the diagnosis, thus in turn improving compliance with treatment [32]. Compared to Italian neurologists, CZ-SK neurologists believed physiotherapy is more appropriate for FND, in line with increasing evidence suggesting its efficacy for functional motor disorders [33–36].

Regarding their role in the management of FND, CZ-SK and Italian neurologists believed they should 'make a diagnosis and recommend adequate treatment' (with a higher proportion among CZ-SK neurologists) and 'follow-up the treatment together with other specialists (psychiatrist, psychotherapist, physiotherapist)'. In line with current recommendations, this suggests that neurologists in different European countries favour an active role in FND management in a multidisciplinary team [37, 38]. However, recent surveys have suggested important knowledge gaps regarding FND among psychiatrists, psychotherapists, physiotherapists, and other health professionals [39–41], potentially further limiting patient care quality and contributing to limited satisfaction of neurologists with managing FND.

The results indicate that while numerous advances in the FND field have been adopted by neurologists, even outside the FND community important gaps remain which should be addressed through the education of neurologists. CZ-SK and Italian neurologists, while relying on positive signs in the diagnosis of FND, are also likely to perform additional tests to rule out other causes which can delay the effective management and potentially worsen the prognosis. In Italy, there is a stronger emphasis on psychological factors, including litigation, and insufficient recognition of educational interventions and physiotherapy as effective treatment strategies.

There are some limitations to this study, including participation bias. Despite response rates being consistent with previous studies [21, 23, 41], it is possible that those already interested in this field might have been more likely to complete the survey, thus limiting the generalisability of our findings. The CZ-SK sample was smaller than the Italian sample and consisted of younger neurologists with fewer years of practice. It is possible that CZ-SK neurologists who participated in the survey were more likely to have received training that is/was in line with current views regarding the role of psychological factors (such as litigation) and are/were more familiar with new treatment options. Having unbalanced groups might have affected our findings, limiting a more precise understanding of the differences between CZ-SK and Italian neurologists with regards to attitudes and knowledge about FND. However, sociocultural factors, not addressed in this study, might also have influenced differences regarding some aspects, such as the role of litigation, education or suggesting psychotherapy with or without medication while treating individuals with FND.

Clinical implications and future directions

In recent decades, a novel approach to FND has been proposed, emphasising a multifaceted aetiology of the disease involving biological, psychological, and social factors [1]. Accordingly, a multidisciplinary approach to FND's diagnosis and treatment is required to deal with these disabling neuropsychiatric conditions [1]. Embracing a novel approach to FND is essential for health professionals to enhance efficacy in FND care.

Overall, our finding suggests that despite adopting some new developments in the field of FND, further training is needed to improve knowledge of the diagnostic and therapeutic options and optimise patient management in different countries. Promoting knowledge through balanced postgraduate curricula and teaching courses, as exemplified by various successful initiatives in other countries [42], and establishing specialised multidisciplinary services, is of the utmost importance in enhancing the management of patients with FND by CZ-SK and Italian neurologists.

Article information

Authors' contributions: AM: conceptualisation (supporting); data curation (lead); formal analysis (lead); investigation (equal); methodology (supporting); writing — original draft preparation (lead). MF: conceptualisation (supporting); investigation (equal); methodology (supporting); supervision (lead); writing — review & editing (equal). IV: investigation (equal); writing — review & editing (equal). LN: data curation (equal); investigation (equal); writing — original draft preparation (equal); writing — review & editing (equal). MŠ: investigation (equal); project administration (lead); supervision (supporting); writing — review & editing (equal). ER: conceptualisation (equal); investigation (equal); project administration (supporting); supervision (supporting); writing — review & editing (equal). MT: conceptualisation (lead); investigation (equal); methodology (supporting); supervision (lead); writing — review & editing (equal). TS: conceptualisation (equal); investigation (equal); methodology (supporting); project administration (lead); supervision (supporting), writing — original draft preparation (equal); writing — review & editing (lead).

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Conflicts of interest: None.

Ethical statement: The study was conducted in accordance with the Declaration of Helsinki. Given the survey-based nature of the study with no patient-identifying information, no

Ethics Committee approval was required. All respondents gave their written informed consent to participate in the study, and anonymised data was used.

Data availability statement: Datasets analysed during the current study are available upon reasonable request. All data will be anonymised. Enquiries may be directed to the Corresponding Author.

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