

CLINICAL COMMENTARY

Epilepsy care and COVID-19: A cross-sectional online survey from Lithuania

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Background: Changes in epilepsy care during the COVID-19 pandemic required to reassess the patient-specialist interaction in the context of telehealth and future vaccination campaigns.**Aims of the study:** The aims were to outline changes in neurologists' experience when providing care for patients with epilepsy (PWE) and to investigate how neurologists perceive telehealth and vaccination.**Methods:** We conducted an anonymous cross-sectional online survey among members of the Lithuanian Association of Neurology.**Results:** We received 104 completed forms by adult (74, 71.15%) and pediatric neurologists (30, 28.85%). A decrease in epilepsy consultations was noted by 76 (73.1%) specialists, and up to 26 (25.0%) could not provide diagnostic tests at a usual rate. Most respondents (99, 95.2%) would recommend the COVID-19 vaccine for patients at risk. Telehealth was valued as a useful tool in epilepsy care, especially if combined with timely diagnostic and treatment options (Kruskal-Wallis chi-square = 10.392, $p = .034$ and $F[4,99] = 3.125$, $p = .018$, respectively). According to 85 (81.7%) respondents, video calls could substitute in-person visits in at least half of all consultations.**Conclusions:** Despite disrupted epilepsy care, neurologists may benefit from telehealth when providing services for PWE and become vaccination advocates to mitigate the spread of preventable infections.**KEYWORDS**

COVID-19, electroencephalography, epilepsy, lockdown, telehealth, vaccine

1 | INTRODUCTION

The shift toward telehealth during the COVID-19 pandemic was relevant in epilepsy care as remote consultations are often sufficient to address many of the patients' issues (eg, prescription renewal, referral for future testing).¹ Telehealth will probably be widely used in future practice and improve access to health care by being either a substitute or an add-on service for in-person visits.^{2,3} While studies indicate that both persons with epilepsy (PWE) and epilepsy specialists are content with remote consultations, additional research is

needed to determine its main benefits for the diagnostic and treatment process.³⁻⁵ We investigated factors that will be relevant for a seamless transition to a post-pandemic world and may represent innovations of the patient-specialist interaction in epilepsy care. We report a nationwide cross-sectional online survey with focus on epilepsy care among members of the Lithuanian Association of Neurology. The aims of our study were to outline the experience of neurology specialists when providing services for PWE during the global COVID-19 pandemic, determine neurologists' views on vaccination against COVID-19 and telehealth.

TABLE 1 General characteristics of the survey's respondents and their experience during the COVID-19 pandemic

	All	Adult neurologists	Pediatric neurologists	Test value	p value	Group with larger value
Number of participants (n, %)	104 (100.00)	74 (71.15)	30 (28.85)			
Men/women (n, %)	26 (25.0)/78 (75.0)	25 (33.8)/49 (66.2)	1 (3.3)/29 (96.7)	10.556	.001*	
Years in practice (median, range) ^a	27 (1-53)	28.5 (1-53)	23 (4-38)	856.0	.068	
COVID-19 infection (n, %)	12 (11.54)	10 (13.51)	2 (6.67)	n/a	.501	
Hospitalization because of COVID-19 (n, %)	2 (1.92)	2 (2.70)	0 (0.00)	n/a	1.000	
Days lost because of COVID-19 or isolation (median, range)	0 (0-60)	0 (0-60)	0 (0-40)	1012.5	.618	
Agreement with the following statements, median, range (1—completely disagree, 3—neutral, 5—completely agree)						
I managed to provide consultations for most of my patients at an usual rate ^b	3 (1-5)	3 (1-5)	3 (1-5)	967.5	.290	
I managed to provide consultations of usual quality for most of my patients ^b	4 (1-5)	4 (1-5)	4 (1-5)	1027.0	.521	
I provided services for a smaller number of patients than usually ^{b,c}	4 (1-5)	4 (1-5)	4 (1-5)	983.5	.337	
Less patients consulted me because of urgencies ^{b,c}	3 (1-5)	3 (1-5)	3 (1-5)	1081.5	.833	
The condition of some of my patients deteriorated because of delayed diagnostic tests ^{b,c}	3 (1-5)	3 (1-5)	2 (1-4)	697.5	.002*	A > P
The condition of some of my patients deteriorated because of delayed or unadjusted treatment ^{b,c}	3 (1-5)	3 (1-5)	3 (1-4)	834.0	.040*	A > P
I missed some data or clinical findings because of providing telehealth rather than in-person services ^{b,c}	2 (1-5)	2 (1-5)	2 (1-5)	1051.0	.656	
When required, I ordered electroencephalography at an usual rate ^b	4 (1-5)	4 (1-5)	4 (1-5)	963.0	.271	
When required, I ordered neuroimaging tests at an usual rate ^b	4 (1-5)	4 (1-5)	4 (1-5)	974.5	.303	
Score of work experience during COVID-19, mean, standard deviation (possible range from 9 to 45) ^d	27.95 (5.85)	27.50 (5.48)	29.07 (6.63)	-1.241	.217	

Abbreviations: A, adult neurologists; n/a, not applicable; P, pediatric neurologists.

^aOne extreme outlier has been removed from the dataset.

^bThis question was included in the topic's scale.

^cThe results of this question were inverted in the topic's scale.

^dCronbach's $\alpha = .748$.

* $p < .05$.

2 | MATERIALS AND METHODS

Data for this study were collected by sending a questionnaire (Google Forms, Google Inc.) to members of the Lithuanian Association of Neurology (closed mailing list, 300 recipients). The survey was open from 8 December 2020 to 24 December 2020. All data were completely anonymous. Because of such design, no informed consent forms or formal approval from the local Bioethics Committee was required, according to local regulations. The questionnaire (its translation is provided as Appendix S1) revolved around different aspects of epilepsy care during the pandemic (eg, potential causes for health deterioration among PWE, the participants' outlook on vaccination, and experience with telehealth).

Statistical analysis was conducted in Microsoft Excel 16.0 and SPSS Statistics 23.0. The sample size was not calculated because of a finite number of potential participants and an unpredictable response rate. The Mann-Whitney *U*, Kruskal-Wallis (ordinal/non-normally distributed variables), Student's *t* test, and one-way ANOVA (normally distributed variables) were used for group comparison. Chi-square and Fisher's exact tests were employed for nominal variables.

Topics concerning the neurologists' outlook on (1) epilepsy care during the pandemic, (2) vaccination, and (3) telehealth services were each composed of interrelated questions on a five-point scale and were judged by the authors to have adequate face validity. Therefore, questions within these separate topics were tested for internal consistency and were treated as scales (summarized topic's scores) if Cronbach's $\alpha > .7$.

3 | RESULTS

The study sample consisted of 104 respondents (response rate 34.7%). The participants' characteristics and reported work experience during the COVID-19 pandemic are presented in Table 1. More detailed results of this and subsequent sections are presented in Table S1. Overall, 34 (32.7%) neurologists agreed that the state of their patients deteriorated because of delayed diagnostic tests, 42 (40.4%)—because of delayed or unadjusted treatment. During the pandemic, most respondents provided services for a smaller number of patients, some witnessed less urgencies (76 [73.1%] and 46 [44.2%], respectively). Regarding the availability of diagnostic tests, 26 (25.0%) neurologists provided electroencephalography (EEG) less frequently, 18 (17.3%) reported a decrease in referrals for neuroimaging. However, most participants stated that their service quality did not deteriorate (61, 58.7%) and they did not miss relevant clinical data because of telehealth (60, 57.7%).

Characteristics of the patient-specialist communication during the COVID-19 pandemic are presented in Table 2. Neurologists indicated major determinants of the deterioration of health among PWE to be worse availability of in-person consultations (67, 64.4%), socioeconomic harm of the pandemic (63, 60.6%), and impact of lockdown measures (59, 56.7%).

The participants' perspectives on vaccines and telehealth are presented in Table 3. Most neurologists (94, 90.4%) agreed that vaccines are a safe way to stop the spread of infections, and 53 (51.0%) think they are safe for PWE. Almost all neurologists (99, 95.2%) would recommend the vaccine for patients at risk of severe COVID-19 complications.

Neurologists viewed telehealth as a frequent substitute for in-person services: 82 (78.8%) respondents could use telehealth to renew prescriptions, 62 (59.6%)—to collect initial patient information in more than half of all cases. The mean score of telehealth usefulness was high, regardless of missed clinical data during remote consultations ($F[4,99] = 0.884, p = .477$, Figure 1). However, the scores were higher among respondents who did not witness worsening patient status because of delayed diagnostic tests or treatment (Kruskal-Wallis chi-square = 10.392, $p = .034$ and $F[4,99] = 3.125, p = .018$, respectively) and were able to order EEG at a usual rate (Kruskal-Wallis chi-square = 10.613, $p = .031$). Such results remained statistically significant after adjusting for outliers. Remote consultations by phone call and video call were seen as equivalent substitutes for at least half of all in-person consultations by 60 (57.7%) and 85 (81.7%) respondents, respectively.

4 | DISCUSSION

The first wave of COVID-19 and a national lockdown in Lithuania took place from 16 March to 16 June 2020. It was followed by a summer with low infection rates and a large second wave and national lockdown from November 7 (cases peaked at the time of the survey with 3.0% of the population infected when closing the online form).⁶ In-person visits were restricted during the first three-month-long lockdown and impeded during the study period in late 2020 because the healthcare system became overwhelmed with new COVID-19 cases. The direct disruption of accessible services and changes in help-seeking behavior (eg, fear of being infected with COVID-19 at an epilepsy clinic) may explain the reported decrease in patient consultations and urgencies.⁷

The unavailability or delay of EEG or neuroimaging translated into worse patient outcomes, as perceived by a third of respondents. This phenomenon was less frequent among pediatric neurologists (speculatively because of lower patient flow and less fear of COVID-19 infections among children). A decrease in access to diagnostic tools (eg, EEG) has been noted across European reference centers and in the United States—it should therefore be advised to restore or even expand these services as the pandemic abates.^{8,9}

Neurologists in Lithuania recognized that a lack of in-person consultations, socioeconomic harm, and strict national lockdowns were the most damaging consequences of the pandemic. Socioeconomic strain and mental health issues were highly prevalent during the pandemic—the latter may be even more relevant than seizure exacerbation.^{10,11} Accordingly, more respondents in our study saw anxiety rather than increased seizure frequency as an emerging complaint.

TABLE 2 Characteristics of the patient-specialist communication during the COVID-19 pandemic

	All, n = 104 (n,% or median, range)	Adult neurologists, n = 74 (71.15%) (n,% or median, range)	Pediatric neurologists, n = 30 (28.85%) (n,% or median, range)	Test value	p value	Group with larger value
Which of these do you usually discuss with your patients during the pandemic?						
The risk of becoming infected with COVID-19 when having epilepsy	40 (38.46)	29 (39.19)	11 (36.67)	0.057	.811	
Relevant COVID-19 complications in epilepsy	26 (25.00)	20 (27.03)	6 (20.00)	0.562	.453	
The importance of the AED regime during the pandemic	78 (75.00)	53 (71.62)	25 (83.33)	1.562	.211	
The patient's mental health status	72 (69.23)	50 (67.57)	22 (73.33)	0.333	.564	
Socioeconomic burden (eg, lost job)	35 (33.65)	29 (39.19)	6 (20.00)	3.520	.061	
The importance of sleep hygiene during the pandemic	60 (57.69)	40 (54.05)	20 (66.67)	1.391	.238	
The importance of physical activity during the pandemic	74 (71.15)	50 (67.57)	24 (80.00)	1.607	.205	
The possibility of being vaccinated against influenza and/or pneumococcal infections	51 (49.04)	36 (48.65)	15 (50.00)	0.016	.901	
Complaints that are more frequent during the pandemic						
Increase in seizure frequency	19 (18.27)	12 (16.22)	7 (23.33)	0.724	.395	
AED side effects	2 (1.92)	2 (2.7)	0 (0)	n/a	1.000	
Anxiety	88 (84.62)	66 (89.19)	22 (73.33)	n/a	.069	
Sadness	40 (38.46)	33 (44.59)	7 (23.33)	4.077	.043*	A > P
Disturbed sleep	63 (60.58)	45 (60.81)	18 (60.00)	0.006	.939	
Themes that patients evoke during the discussion						
COVID-19 complications in epilepsy	17 (16.35)	15 (20.27)	2 (6.67)	n/a	.142	
AED use when being ill with COVID-19	20 (19.23)	16 (21.62)	4 (13.33)	0.944	.331	
Changes in seizure frequency because of COVID-19	23 (22.12)	18 (24.32)	5 (16.67)	0.727	.394	
COVID-19 vaccine	28 (26.92)	24 (32.43)	4 (13.33)	3.958	.047*	A > P
Reasons for worsening in the patients' condition during the pandemic (1—almost never, 3—in half cases, 5—almost always)						
COVID-19 infection	3 (1–5)	3 (1–5)	3 (1–5)	855.5	.058	
Worse availability of in-person consultations	4 (1–5)	4 (1–5)	4 (2–5)	945.5	.203	
Worse availability of telehealth consultations	3 (1–5)	3 (1–5)	2 (1–5)	822.5	.031*	A > P
Consequences of COVID-19 lockdown measures	4 (1–5)	4 (1–5)	3.5 (2–5)	978.5	.316	
Socioeconomic impact of the pandemic	4 (1–5)	4 (1–5)	3 (2–5)	806.5	.020*	A > P

Abbreviations: A, adult neurologists; n/a, not applicable; n, number of participants; P, pediatric neurologists.

*p < .05.

TABLE 3 Neurologists' answers regarding vaccination and telehealth

	All, n = 104 (median, range)	Adult neurologists, n = 74 (71.15%) (median, range)	Pediatric neurologists, n = 30 (28.85%) (median, range)	Test value	p value
Outlook on vaccines (1—completely disagree, 3—neutral, 5—completely agree)					
I would recommend the COVID-19 vaccine for all patients with epilepsy ^a	4 (1–5)	4 (2–5)	4 (1–5)	880.5	.081
I would recommend the COVID-19 vaccine for patients with epilepsy at risk of COVID-19 complications ^a	5 (1–5)	5 (1–5)	5 (3–5)	1004.5	.367
I would not recommend the COVID-19 vaccine for patients with epilepsy ^{a,b}	1 (1–5)	1 (1–5)	1 (1–3)	1066.5	.723
Presumably, most of my patients would agree to be vaccinated against COVID-19	3 (2–5)	3 (2–5)	3 (2–5)	1003.0	.399
The vaccine against COVID-19 is safe for persons with epilepsy ^a	4 (2–5)	4 (2–5)	3 (2–5)	980.0	.312
Vaccines are a safe way to stop the spread of infectious diseases ^a	5 (2–5)	5 (2–5)	5 (2–5)	1045.5	.599
Patients with epilepsy should be prioritized to get the COVID-19 vaccine	3 (1–5)	3 (1–5)	3 (1–5)	997.0	.393
The score of positive outlook on vaccines (possible range from 5 to 25) ^c	21.5 (12–25)	22 (12–25)	20 (17–25)	941.5	.224
Outlook on teleconsultations: how often the statements are regarded as true? (1—almost never, 3—in half cases, 5—almost always)					
They are as effective as in-person consultations ^a	3 (1–5)	3 (1–5)	3 (1–5)	865.5	.065
Patient complaints and medical history are collected reliably ^a	4 (1–5)	4 (1–5)	4 (2–5)	876.5	.075
Treatment can be initiated or adjusted appropriately ^a	3 (1–5)	3 (1–5)	3 (1–5)	989.5	.363
It is possible to reliably note the side effects of AEDs ^a	3 (1–5)	3 (1–5)	3 (2–5)	1088.0	.868
Prescriptions for current treatment can be reliably renewed ^a	4 (1–5)	4 (1–5)	4 (2–5)	1045.5	.612
Seizure semiology may be investigated equally well as in-person ^a	3 (1–5)	3 (1–5)	4 (1–5)	950.5	.231
Telehealth usefulness score (possible range from 6 to 30) ^d	21 (6–29)	20 (6–29)	22 (13–28)	911.5	.153
What percentage of consultations would you be able to provide remotely while preserving consultation quality? (1%–0%, 2%–25%, 3%–50%, 4%–75%, 5%–100%)					
Consultations by phone	3 (1–4)	3 (1–4)	3 (1–4)	1078.0	.806
Consultations through video and audio platforms	3 (1–5)	3 (1–5)	4 (1–5)	967.5	.277
Consultations by letters and written messages	2 (1–5)	2 (1–5)	2 (1–4)	1104.5	.967

Abbreviations: n, number of participants; n/a, not applicable.

^aThis question was included in the topic's scale.^bThe results of this question were inverted in the topic's scale.^cCronbach's $\alpha = .750$.^dCronbach's $\alpha = .866$.

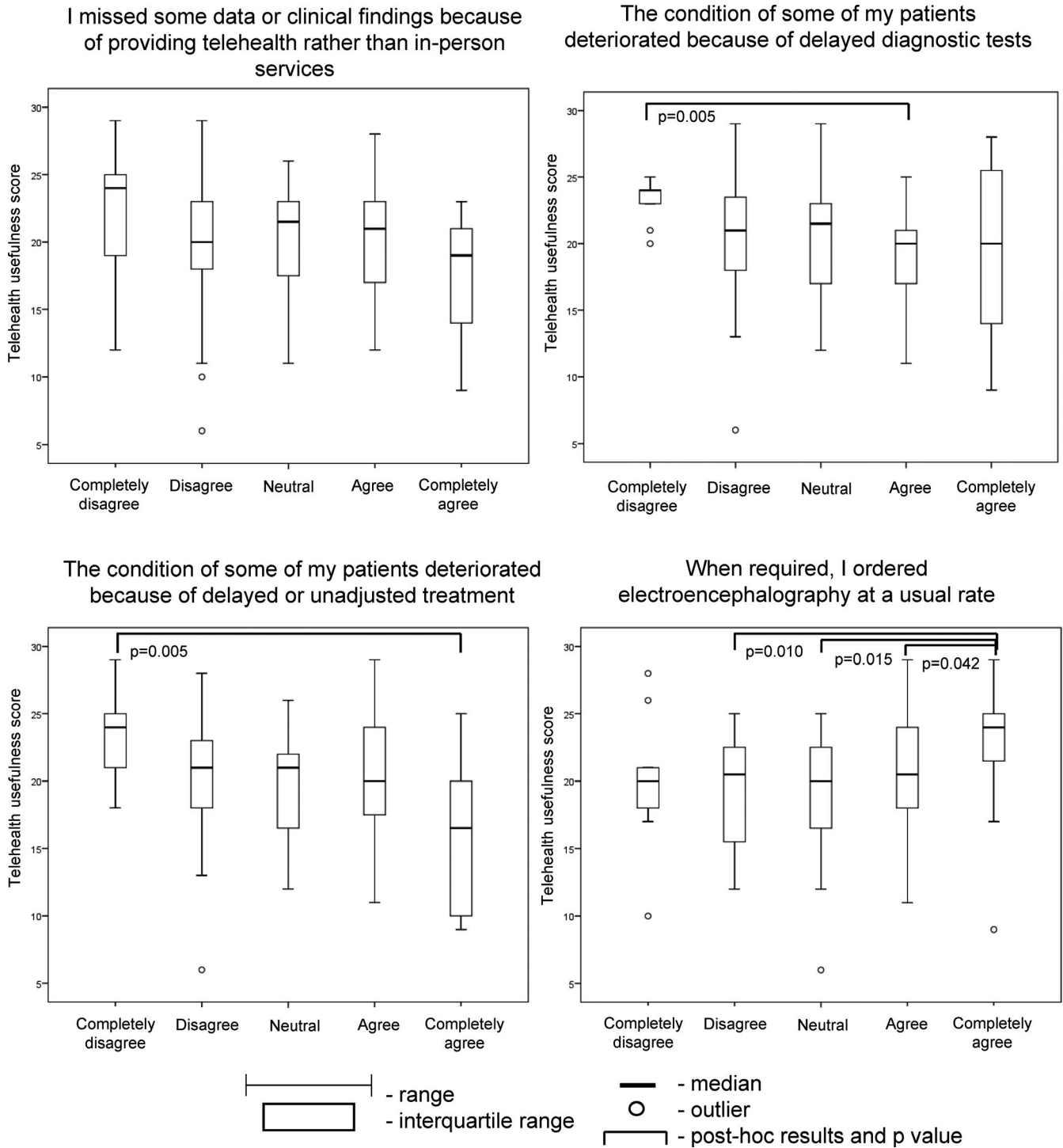


FIGURE 1 The scores of perceived usefulness of telehealth among subgroups based on answers about work experience during the COVID-19 pandemic (*p* values are presented after adjusting for outliers)

While infections of the respiratory system lie outside the scope of routine epilepsy care, a third of adult neurologists indicated that patients initiate discussions around COVID-19 vaccines and half of all respondents discuss vaccination against respiratory tract infections with their patients. Thus, a well-established patient-specialist relationship might help counteract vaccine hesitancy if PWE perceived neurologists as trusted sources of information.¹²

While neurologists in our study viewed vaccines as a safe way to combat infectious diseases and would recommend the COVID-19 vaccine for patients at risk of COVID-19 complications, some would not acknowledge their safety for PWE. Toward the very end of the study period (on December 21), the first COVID-19 vaccine was approved by the European Medicines Agency (EMA).¹³ Thus, participants were presumably waiting for the final safety approval by EMA

and were unwilling to prematurely conclude that the vaccine is safe. Further, the approved vaccine was not evaluated in the pediatric population, explaining the neutral position of pediatric neurologists.¹³ Neurologists also remained neutral when asked about the priority for PWE to get the vaccine—this may reflect a view that PWE are not at a higher risk of COVID-19 complications.¹⁴ Vaccine rollout in Lithuania began on 27 December 2020 and first targeted medical personnel and patients at risk (mass availability is sought around mid-2021).⁶

Even those respondents who reportedly missed clinical data because of remote consultations endorsed telehealth. However, delays of diagnostic tests or treatment and unavailable EEG were associated with poorer outlook on telehealth. This probably reveals that telehealth is useful only if combined with timely diagnostics and smooth medication prescription and renewal.¹ Telehealth may therefore be reserved for cases when no extensive investigation is required. Alternatively, the emergence of virtual clinics might replace most of face-to-face follow-up visits (including EEG testing, which might be done at local clinics) as this lowers healthcare costs and journeys for PWE.¹⁵ In Lithuania, almost everyone is covered by healthcare insurance and may receive free teleconsultations through selected software or by phone call.

In summary, we report difficulties providing epilepsy care to the routine extent during the COVID-19 pandemic. However, telehealth is appreciated whenever diagnostic tests and appropriate treatment options are available. Further, neurologists might have a beneficial role when providing information about vaccines for PWE. This survey has limited generalizability because of its cross-sectional and single-country design and may be influenced by non-response bias.

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We thank all neurology specialists for dedicating their time and effort to answer to our survey.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICAL APPROVAL

Ethical review and approval were not required due to anonymous design of the online survey (according to local bioethics regulations).

DATA AVAILABILITY STATEMENT

Raw study data are available from the authors upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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