

The approach to patients with psychogenic nonepileptic seizures in epilepsy surgery centers regarding diagnosis, treatment, and education



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ABSTRACT

Previous studies, using surveys, provided an understanding about how health-care providers address patients with PNES. To date, there is limited information on the management of patients with PNES by tertiary referral centers for epilepsy. In this study, we surveyed 11 Brazilian epilepsy center directors about diagnosis, treatment, education and research on PNES. Respondents reported that patients with PNES represented 10–20% of all adult patients recorded by video-EEG (VEEG). All respondents recognized VEEG as the method to confirm the diagnosis, and 81.8% used this approach for confirmation. Most centers had a standard protocol for diagnosis. None of the centers had a particular protocol to treat PNES, but 90.9% had a uniform treatment approach including therapy and educational measures. Psychotherapy was not easily obtained in nine centers (81.8%). Seven (63.3%) centers reported ongoing research projects with PNES. Five centers referred to an educational PNES program discussing diagnosis, but only one reported an educational program for treatment. This study showed a commitment to PNES diagnosis; however, some gaps remain regarding treatment and training, namely implementing a psychotherapy approach for patients and providing educational curricula for clinicians.

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1. Introduction

Psychogenic nonepileptic seizures (PNES) represent a universal human condition and are recognized as a worldwide phenomenon [1], sharing many similarities on patient demographics, semiology, and coexisting neurological and psychiatric disorders, despite cultural and economic differences across nations [2–4]. Approximately one-fifth of

patients referred with new-onset events and 20–25% of all patients referred to specialist epilepsy clinics have PNES [5–9]. Minimum requirements for PNES diagnosis and controlled protocols for treatment have been established [10,11] but are not implemented at all centers.

Previous studies, using surveys, provided an understanding about how health-care providers (HCP) from different countries, such as USA, Chile, UK, Australia, and Brazil address patients with PNES [12–15]. These surveys were directed to professionals who diagnose and treat patients with epilepsy and PNES. These studies showed differences in the diagnosis and treatment that were deemed to be related mainly to the health-care system and to professional medical attitudes.

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These findings highlighted that more regional health-care policies may be necessary because of these differences across countries and cultures and consequently in the HCPs' attitudes and the associated practice difficulties, including limited access to video-EEG (VEEG) and referral to effective psychotherapy for PNES.

To date, data are limited on how tertiary care centers for epilepsy manage diagnosis, treatment, education, and research on PNES. Tertiary care centers play a significant role in neurologists' education in diagnosis and treatment of epilepsy and PNES. Typically in Brazil, neurologists are the first to encounter, diagnose, and provide initial treatment for patients with PNES, and then sometimes refer the patients to psychiatric settings [15]. In this context, tertiary care centers play a major role in determining guidelines for patient management.

The Brazilian Health System has distinct particularities from other South American countries that notably influence health care. The Brazilian system is distinctly divided into private and public sectors. It is estimated that approximately 75% of a population of almost 200 million use the public sector in Brazil, representing one of the largest public health systems in the world [16].

The presence of a protocol with a uniform approach for diagnosis and treatment across tertiary centers could potentially provide better care and also could play a contributory role for educational purposes. In this study, we aimed to: (1) determine the presence of a uniform and standard approach to patients with PNES when considering diagnosis and treatment in different centers of a middle-income country, and (2) verify the existence of an educational program and of ongoing research about PNES in these centers.

2. Methods

2.1. Study design

The original questionnaire was used in an earlier survey developed by LaFrance et al. for assessing standard medical care (SMC) for PNES by North American HCPs [12]. As previously done with other HCPs, this questionnaire was administered in this study as a single group survey in a cross-sectional design, with the intent of quantifying the approaches to diagnosis, treatment, research, and education of PNES across Brazilian epilepsy centers.

2.2. Questionnaire design

A Brazilian physician (KV), with proficiency in both languages, translated the original PNES SMC questionnaire [12] from English to Portuguese. Next, a native-English-speaking teacher with proficiency in English and Portuguese back-translated the survey. The authors compared the back-translated version with the original translation and identified words that did not reflect the original meaning and that thus, needed a semantic adaptation. For the purpose of the current study, the authors modified this adapted questionnaire and submitted it to further analysis (WCL). The survey consisted of 30 questions assessing diagnostic and treatment practices, research, and education for PNES. The areas of interest covered by this questionnaire are shown in Table 1.

2.3. Data collection and preparation

Brazilian Epilepsy Center directors were contacted by e-mail by the lead author (KV) to provide an explanation about the objective of the questionnaire and its design. After consent, the survey was sent to Brazilian epilepsy centers' directors by email, who returned the completed questionnaires by email to the lead author.

The data were collected and entered directly in a Microsoft Excel database by the first author. All center directors completed the surveys entirely. Therefore, no questionnaire was excluded from the final analyses.

Table 1

Areas addressed in the questionnaire.

1. Estimated Frequency of PNES
1.1 Outpatient facility
1.2 Inpatient long-term VEEG
1.3. Estimated frequency of PNES and epilepsy
2. Diagnosis of PNES
2.1. Presence of a protocol for diagnosis
2.2. Main reasons for PNES referral for VEEG
2.3. Diagnostic methods used to confirm a suspected diagnosis of PNES
2.4. Is VEEG always used to confirm the diagnosis
2.5. Induction techniques
3. Communication of Diagnosis of PNES
3.1. Professional(s) in charge for communication (source of information)
3.2. To whom the diagnosis is given (patient; family; patient and family)
3.3. Terminology used when the diagnosis is given
4. Treatment
4.1. Presence of a protocol for treatment
4.2. Professional(s) in charge of treatment
4.3. Treatment proposed after diagnosis
4.4. Availability of psychiatric intervention, educative measures and psychotherapy
4.4 Pharmacologic treatment (AED withdrawn/Psychoactive drugs for comorbid diagnosis)
5. Education
5.1. Educational training for the diagnosis of PNES
5.2. Educational training for the treatment of PNES
6. Knowledge about PNES among distinct professionals
6.1. Psychiatrists
6.2. Psychotherapists
6.3. Neurologists
7. Research about PNES
7.1. Previous and current research about PNES
7.2. Previous and current research about psychiatric issues and epilepsy

2.4. Analysis plan

Categorical responses were tabulated as frequencies and percentages. Continuous variables were reported as means and ranges. For qualitative assessment, the open-ended questions were reviewed, and significant themes are noted in the Results. The study was approved by the local ethics committee of the University of São Paulo.

3. Results

3.1. Epilepsy center characteristics

The survey was sent by email to 13 tertiary epilepsy centers. Eleven centers responded to the survey. Five (45.4%) respondents were from the Southeast region of Brazil, four (36.4%) were from the South, and two (18.2%) were from the Central West region. All respondents were epileptologists (neurologists) responsible for their centers (Epilepsy Center Coordinators). One center did not answer the email, and one center was not accepting patients with PNES at the time of the survey administration.

All 11 responding centers identified themselves as tertiary epilepsy centers and 10 (90.9%) as epilepsy surgery centers. The reported number of adult patients with epilepsy attending the outpatient facility ranged from 60 to 680/month (mean 206.36; median 160; SD 176.76), and the long-term inpatient VEEGs ranged from 10 to 30/month.

The reported number of patients with PNES attending the outpatient facility ranged from 1 to 40/month. The number of patients with PNES documented by long-term inpatient VEEG was 1–5/month in nine centers, and 6–10/month in two centers. The centers reported an estimated frequency of co-existing PNES and epilepsy that ranged from 10%–50% (four centers reported 21 to 30%; three centers reported 41 to 50%; two centers related \leq 10%; one center, 11–20%; and one center, 31–40%).

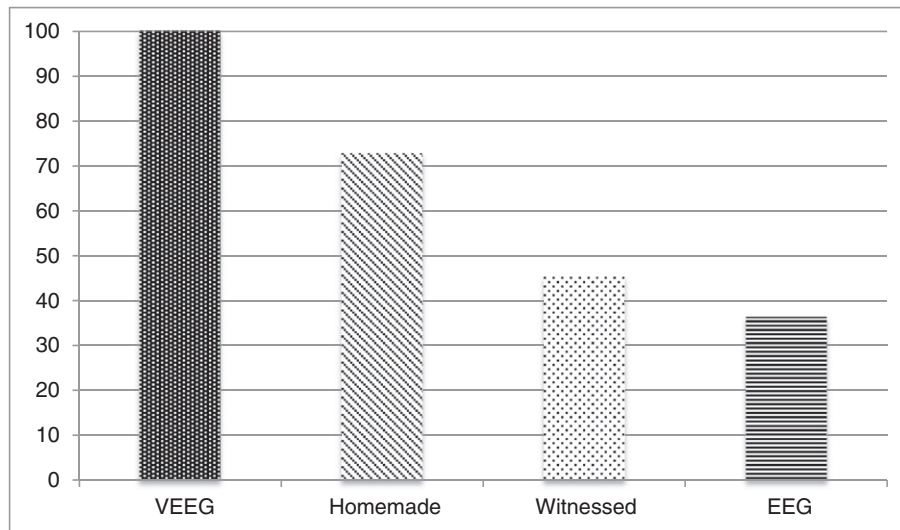


Fig. 1. Diagnostic methods used for establishing PNES.

3.2. Diagnosis protocol of PNES

The reasons for referral for VEEG monitoring of patients with PNES were: refractory epilepsy (eight centers [72.7%]); suspected diagnosis of PNES (six centers [54.5%]); epilepsy surgery evaluation (five centers [45.4%]), and differential diagnosis of epilepsy and nonepileptic events in general (five centers [45.4%]). More than one reason for referral was identified by five centers.

Diagnostic methods used to confirm the diagnosis of PNES were: long-term inpatient VEEG (11/11), homemade videos (8/11); witnessed events (5/11) and outpatient EEG (4/11) (See Fig. 1). Routine activation procedures, i.e. hyperventilation and photic stimulation, were utilized for PNES induction in all but one center during routine EEG. All respondents recognize VEEG as the method to confirm the diagnosis and most (9/11 [81.8%]) always used this method for confirmation.

Four (36.4%) centers had a specific diagnostic protocol with well-established diagnostic guidelines for PNES. Six (54.5%) other centers accounted for a uniform, but not a protocol-based, approach to the diagnosis, and one (9.1%) reported a varied and non-uniform approach.

Induction procedures during VEEG were used if seizures were not recorded spontaneously in four centers (36.4%) – three with saline injection and one was verbal. Others centers (7/11 [63.6%]) did not adopt any technique to induce PNES.

3.3. Communication

The terminology used to communicate was “PNES” in nine centers (81.1%), “psychogenic nonepileptic events” in one, and one center did not have a standard nomenclature. Two centers also provided an explanation about the term used for communication.

In five centers, only the epileptologist communicated the diagnosis, and in others, another professional did so. The professional who delivered the diagnosis was the epileptologist involved in the PNES monitoring in nine centers (81.8%), and the team psychiatrist, who is consulted with this procedure, in five (45.4%). A neurologist related to the team, but not necessarily involved in the VEEG process, communicated the diagnosis in the two centers (18.2%), and a general psychiatrist, in one (9.1%). (See Fig. 2.)

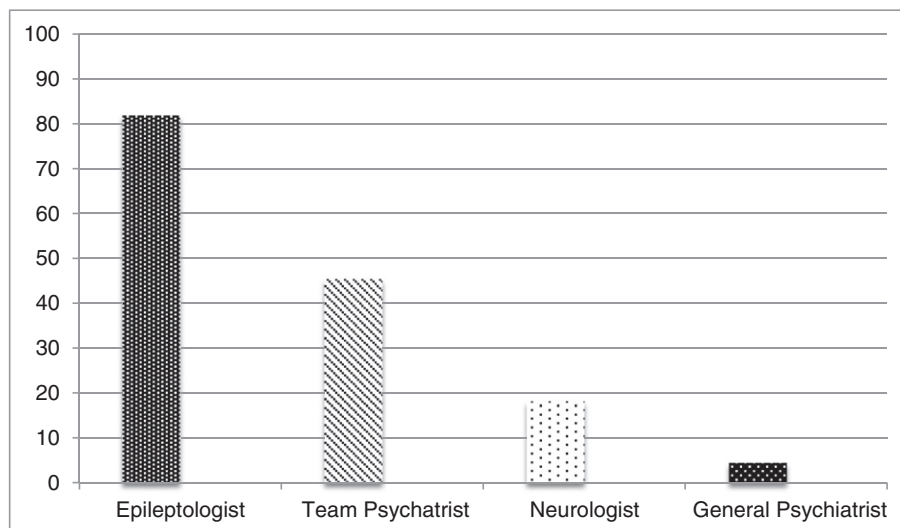


Fig. 2. Professional in charge for communication of diagnosis.

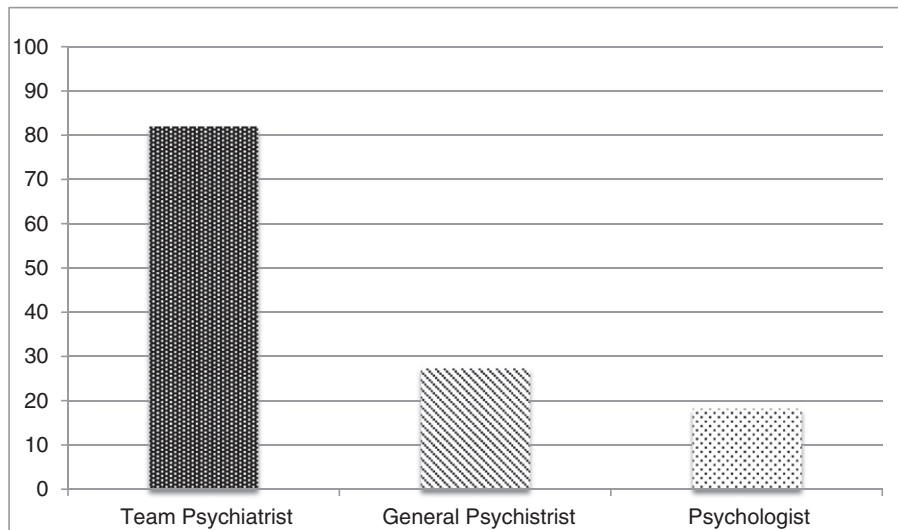


Fig. 3. Professional in charge for treatment.

In 10 centers, the diagnosis was shared with the patient and families, and in one, only patients received the diagnosis.

3.4. Treatment protocol

None of the centers had a particular protocol with rigorous guidelines to treat PNES. Ten (90.9%) centers reported a uniform treatment approach and one (9.1%) used a heterogeneous therapeutic strategy. Most (81.8%) centers responded that one psychiatrist (always the same) familiar with PNES treatment provided follow-up with a standard method. Seven (63.6%) replied that the neurologist in charge of the patient continued to follow the patient to increase treatment adherence (4/7) and as part of the center approach (3/7). In the case of patient non-adherence or refusal of psychiatric/psychological treatment, all centers reported continued follow-up with the neurologist in charge.

The team psychiatrist (9/11), a general psychiatrist (3/11) and a psychologist (2/11) provided mental health treatment (See Fig. 3). The treatment strategy adopted involved educational measures and therapy in all centers and the use of psychotropic drugs in six centers (54.5%).

All centers did AED withdrawal in lone PNES once diagnosed, and prescribers tapered off AEDs slowly.

Psychiatric assessment was considered easy to obtain in nine centers (81.8%). Psychotherapy was not available in nine centers (81.8%) (See Fig. 4).

3.5. Research and education

Center directors considered that epileptologists had a sound knowledge about PNES, and nine (81.8%) reported that their psychiatrist also had a good understanding of the disorder.

Seven (63.6%) centers reported ongoing research projects with PNES, and seven (63.6%) reported current research on comorbid psychiatric disorders associated with epilepsy.

Five centers referred to having an educational program for PNES diagnosis for fellows during their epilepsy fellowship program, and one had education training for PNES treatment (See Fig. 5).

4. Discussion

Brazil is geopolitically divided into five regions, created according to physical, political, social, and economic similarities. Our study surveyed 11 tertiary care centers of epilepsy practices across the South, Southeast,

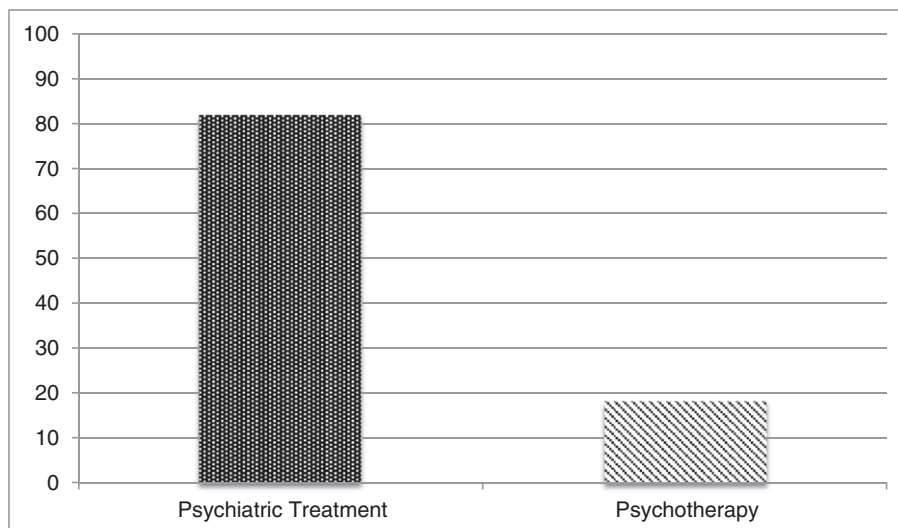


Fig. 4. Treatments offered.

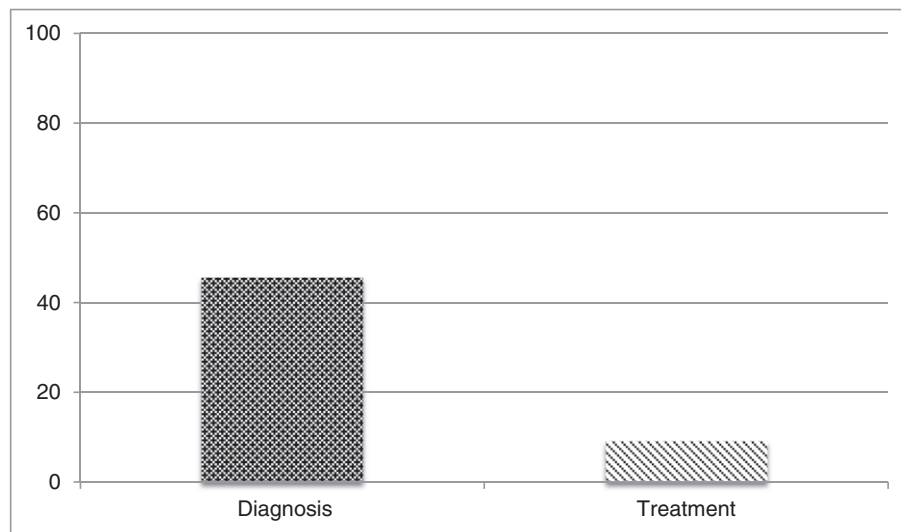


Fig. 5. Educational information for diagnosis and treatment.

and Central West regions of Brazil. This is the first national epilepsy center survey in Brazil of center directors known to the authors. The lack of information from North and Northeast regions of Brazil is related to uneven distribution of resources across the country, illustrated by the absence of tertiary centers in these areas. Consequently, it is clear that respondents represent tertiary epilepsy centers that are overburdened, with an average of 160 patients/month, probably referred from all regions.

The number of patients with PNES documented by long-term inpatient VEEG (from 1 to 10/month) represented 10–20% of all adult patients recorded by VEEG at the responding centers. Studies from other centers report that approximately 5–10% of patients with PNES referred to outpatient facilities also have co-existing epilepsy [17]. In other tertiary care centers and, especially if certain subgroups of patients are included, such as persons with intellectual disability, mixed epilepsy/PNES may be as high as 30%, as reported by most centers in this study [7,9,18]. The authors noted that the presence of centers with higher rates of mixed PNES and epilepsy (>30%) may reflect a sampling bias – that is, centers with a particular interest in studying PNES and epilepsy. Patients with epilepsy and co-existing PNES pose a significant challenge for treatment. Therefore, it is reasonable that these patients are referred to centers that are clinically proficient in VEEG.

All reporting centers had a protocol with strict guidelines or a uniform and homogeneous approach among team members for diagnosis, and all recognized long-term inpatient VEEG as the gold-standard method to confirm the diagnosis. The relevance of VEEG has been reinforced by the long average delay to diagnosis in prior studies (7.2–9.4 years) that is partially related to the lack of VEEG [19,20]. With increasing awareness of the importance of VEEG in establishing the diagnosis of PNES, one would expect that in tertiary care centers all patients with suspected PNES would undergo VEEG for diagnostic confirmation. It is of note that most of the centers, but not all of them, always used VEEG for diagnostic confirmation. Some possible explanations for underutilization of VEEG are that overburdened centers will have to select patients for VEEG and in this context, patients with clear major and minor motor PNES (documented by homemade videos and those witnessed by families or PNES observed during EEG) are not referred for long-term VEEG. In this context, surgical patients may have priorities for VEEG referral, since these centers are financially supported by epilepsy surgery in Brazil. An argument for using the same monitoring beds for patients with PNES is that high medical utilization (i.e., frequent emergency department visits and multiple AEDs for presumed refractory epilepsy) may be curbed with accurate diagnosis and appropriate treatment.

Regarding diagnostic approaches, conventional activation procedures were used in all centers; however, in contrast, seizure induction was always used as part of the protocol only in one center, in three if necessary, and was not employed in others. The limited use of induction procedures could reflect the ethical concerns about induction, which has been debated by others [21].

Following diagnosis, centers reported that the neurologist plays a significant role in communication. Epileptologists, most often the ones involved with the VEEG monitoring, communicated the diagnosis. Most Brazilian epilepsy centers convey the diagnosis to patients and their families, as previously observed in a Brazilian survey of HCPs [15]. As we previously discussed, providing the diagnosis to patients and their families is part of the initial steps of their treatment. Moreover, family engagement in the diagnosis and treatment of chronic diseases is part of the Brazilian culture. Family support promotes understanding of the diagnosis and provides a supportive social network, which is the approach described in patient-centered care, involving not only the health care system, but also community and family [22].

In contrast to the presence of a diagnostic protocol, most Brazilian epilepsy centers reported they do not have a particular treatment guideline for PNES. The absence of established treatment for PNES illustrates that diagnosis may be thought to be easier than treatment. However, providing diagnostic information regarding PNES may be insufficient by itself to meaningfully affect patient outcome [23,24].

Treatment of PNES utilizes a multidisciplinary approach with interplay among neurologists, psychiatrists, and psychologists. Structured feedback and psychiatric consultation appeared adequate to significantly reduce PNES frequency and improve aspects of quality of life [23]. Some studies report that clinical and personality factors can be identified to provide an individualized treatment and prognosis [19]. By generating a patient-specific profile, one can identify goals for psychological therapy. Although targeted psychotherapy has been shown to be an effective treatment for PNES based on controlled studies [25], and manualized treatment is available [26,27], it has been difficult to implement in Brazil, despite the Brazilian epilepsy center respondents noting that they have access to sophisticated diagnostic methods.

Psychogenic nonepileptic seizures have been regarded as one of the most important issues in neuropsychiatric aspects of epilepsy [28]. Respondents indicated that Brazilian centers are aware of the importance of the PNES diagnosis. Most centers reported having ongoing research on PNES and other psychiatric issues associated with epilepsy [15,29–33]. However, only three centers developed a structured educational program for trainees and staff. Therefore, knowledge on PNES

seems to be acquired mainly with daily routine and informal communications rather than with a formal didactic curriculum. One approach to improving provider education could be a program that was carried out in Brazil that tested first-responders' identification of PNES before and after a semiology primer course, showing high rates of correct diagnosis following the training [33].

Limitations of this study included the small sample size. While 11 centers responded, this comprised approximately 70–75% of Brazilian epilepsy centers. Another limitation is that not all regions of Brazil were represented in the survey results equally. The unequal distribution of tertiary centers across the country in the more populated areas of Brazil limits the number of responding regions and our knowledge on how PNES is addressed in these regions. Another limitation is that for this type of survey, the proportions reported of patients seen, investigated, and managed are based on an individual's estimates, rather than from a formal populated database. Therefore, information about PNES is not formed from tracked patient encounters but from memory and overall impression of the center directors, as stated by others [34]. A final critique is that the survey samples only Brazilian centers, and our results may not reflect other national practices in South America or in other continents. Future research could incorporate comparisons of other South American countries to put the practices in a continental context.

5. Conclusions

In conclusion, Brazilian epilepsy centers that responded to our questionnaire showed a commitment to PNES diagnosis, with many centers having established approaches to addressing PNES, including diagnosis, communication, and research. There are, however, some remaining gaps to be filled addressing treatment, including a psychotherapy approach that can be used across epilepsy centers and in non-epilepsy center practices, and providing educational resources/curricula for residents and fellows to familiarize them with this patient population and the associated diagnostic and treatment challenges, the means of establishing the diagnosis, and teaching best practices.

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References

- [1] LaFrance Jr WC. "Hysteria" today and tomorrow. *Front Neurol Neurosci* 2014;35:198–204.

- [2] Yang CH, Lee YC, Lin CH, Chang K. Conversion disorders in childhood and adolescence: a psychiatric consultation study in a general hospital. *Zhonghua Min Guo Xiao Er Ke Yi Xue Hui Za Zhi* 1996;37(6):405–9.
- [3] De Paola L, Silvado C, Mäder-Joaquim MJ, Minhoto GR, Werneck LC. Clinical features of psychogenic nonepileptic seizures (PNES): analysis of a Brazilian series. *J Epilepsy Clin Neurophysiol* 2006;12:37–40.
- [4] Szabó L, Siegler Z, Zubeck L, Liptai Z, Körhegyi I, Bánsági B, et al. A detailed semiologic analysis of childhood psychogenic nonepileptic seizures. *Epilepsia* 2012;53(3):565–70.
- [5] Duncan R, Razvi S, Mulhern S. Newly presenting psychogenic nonepileptic seizures: incidence, population characteristics, and early outcome from a prospective audit of a first seizure clinic. *Epilepsy Behav* 2011;20:308–11.
- [6] Sigurdardóttir KR, Olafsson E. Incidence of psychogenic seizures in adults: a population-based study in Iceland. *Epilepsia* 1998;39:749–52.
- [7] Szaflarski JP, Ficker DM, Cahill WT, Privitera MD. Four-year incidence of psychogenic nonepileptic seizures in adults in Hamilton County, OH. *Neurology* 2000;55:1561–3.
- [8] Benbadis SR, Allen HW. An estimate of the prevalence of psychogenic non-epileptic seizures. *Seizure* 2000;9:280–1.
- [9] Kotsopoulos IA, de Krom MC, Kessels FG, et al. The diagnosis of epileptic and non-epileptic seizures. *Epilepsy Res* 2003;57:59–67.
- [10] LaFrance Jr WC, Reuber M, Goldstein LH. Management of psychogenic nonepileptic seizures. *Epilepsia* 2013;54(Suppl. 1):53–67.
- [11] LaFrance Jr WC, Baker GA, Duncan R, Goldstein LH, Reuber M. Minimum requirements for the diagnosis of psychogenic nonepileptic seizures: a staged approach: a report from the International League Against Epilepsy Nonpileptic Seizures Task Force. *Epilepsia* 2013;54(11):2005–18.
- [12] LaFrance Jr WC, Rusch MD, Machan JT. What is "treatment as usual" for nonepileptic seizures? *Epilepsy Behav* 2008;12(3):388–94.
- [13] LaFrance Jr WC, de Marinis AJ, Webb AF, Machan JT, Rusch MD, Kanner AM. Comparing standard medical care for nonepileptic seizures in Chile and the United States. *Epilepsy Behav* 2012;25(2):224–9.
- [14] Mayor R, Smith PE, Reuber M. Management of patients with nonepileptic attack disorder in the United Kingdom: a survey of health care professionals. *Epilepsy Behav* 2011;21(4):402–6.
- [15] Valente KD, Rzezak P, LaFrance Jr WC. Standard medical care for psychogenic nonepileptic seizures in Brazil. *Epilepsy Behav* 2015;45:128–35.
- [16] Paim J, Travassos C, Almeida C, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. *Lancet* 2011;377(9779):1778–97.
- [17] Martin R, Burneo JG, Prasad A, et al. Frequency of epilepsy in patients with psychogenic seizures monitored by video-EEG. *Neurology* 2003;61:1791–2.
- [18] Lesser RP. Psychogenic seizures. *Neurology* 1996;46(6):1499–507.
- [19] Reuber M, Fernández G, Bauer J, Helmstaedter C, Elger CE. Diagnostic delay in psychogenic nonepileptic seizures. *Neurology* 2002;58(3):493–5.
- [20] Seneviratne U, Briggs B, Lowenstern D, D'Souza W. The spectrum of psychogenic nonepileptic seizures and comorbidities seen in an epilepsy monitoring unit. *J Clin Neurosci* 2011;18(3):361–3.
- [21] Goyal G, Kalita J, Misra UK. Utility of different seizure induction protocols in psychogenic nonepileptic seizures. *Epilepsy Res* Aug 2014;108(6):1120–7.
- [22] LaFrance Jr WC, Devinsky O. The treatment of nonepileptic seizures: historical perspectives and future directions. *Epilepsia* 2004;45(Suppl. 2):15–21.
- [23] Drane DL, LaRoche SM, Ganesh GA, Teagarden D, Loring DW. A standardized diagnostic approach and ongoing feedback improves outcome in psychogenic nonepileptic seizures. *Epilepsy Behav* 2016;54:34–9.
- [24] McKenzie P, Otto M, Russel A, Pelosi A, Duncan R. Early outcome and predictors in 260 patients with psychogenic nonepileptic seizures. *Neurology* 2010;74(1):64–9.
- [25] LaFrance Jr WC, Baird GL, Barry JJ, Blum AS, Webb AF, Keitner GI, et al. Multicenter pilot treatment trial for psychogenic nonepileptic seizures: a randomized clinical trial. *JAMA Psychiat* 2014;71(9):997–1005.
- [26] Reiter JM, Andrews D, Reiter C, LaFrance Jr WC. Taking control of your seizures: workbook. New York: Oxford University Press; 2015.
- [27] LaFrance Jr WC, Wincze JP. Treating nonepileptic seizures: therapist guide. New York, NY: Oxford University Press; 2015.
- [28] Kerr MP, Mensah S, Besag F, de Toffol B, Ettinger A, Kanemoto K, et al. International consensus clinical practice statements for the treatment of neuropsychiatric conditions associated with epilepsy. *Epilepsia* 2011;52:2133–8.
- [29] Baroni G, Piccinini V, Martins WA, de Paola L, Paglioli E, Margis R, et al. Variables associated with co-existing epileptic and psychogenic nonepileptic seizures: a systematic review. *Seizure* Apr 2016;37:35–40.
- [30] Bragatti JA, Torres CM, Cherubini PA, Leistner-Segal S, Bianchin MM. Is interictal EEG activity a biomarker for mood disorders in temporal lobe epilepsy? *Clin Neurophysiol* Oct 2014;125(10):1952–8.
- [31] de Araujo Filho GM, Furlan AE, Ribeiro AE, Marques LH. Psychiatric disorders as "hidden" contraindications for presurgical VEEG in patients with refractory epilepsy: a retrospective cohort study in a tertiary center. *Epilepsy Behav* 2015;45:35–8.
- [32] de Lemos Zingano B, Guarnieri R, Diaz AP, Schwarzbald ML, Bicalho MA, Claudino LS, et al. Validation of diagnostic tests for depressive disorder in drug-resistant mesial temporal lobe epilepsy. *Epilepsy Behav* 2015;50:61–6.
- [33] De Paola L, Terra VC, Silvado CE, Teive HA, Palmieri A, Valente KD, et al. Improving first responders' psychogenic nonepileptic seizures diagnosis accuracy: development and validation of a 6-item bedside diagnostic tool. *Epilepsy Behav* 2016;54:40–6.
- [34] Alessi R, Valente KD. Psychogenic non-epileptic seizures at a tertiary care center in Brazil. *Epilepsy Behav* 2013;26:91–5.